TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: StarMAX 8200-36 Base Station

To: FCC Part 90: Subpart Z (October 2008)

Test Report Serial No:
RFI/RPT7/RP75484JD01A

Supersedes Test Report Serial No:
RFI/RPT6/RP75484JD01A

This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director: 	
Checked By:	Nigel Davison
Signature: 	
Date of Issue:	18 December 2009

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1. Customer Information

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

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR90
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 90: Public Safety Radio Pool
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	01 September 2009 to 20 September 2009

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.109 ANSI C63.4 Section 8	Idle Mode Radiated Spurious Emissions	Enclosure	✓
Part 15.207 ANSI C63.4 Section 7	Transmitter AC Conducted Emissions	AC Mains	✓
Part 90.1321(a) TIA-603-C Section 2.2.1	Transmitter Equivalent Isotropic Radiated Power (EIRP)	Antenna	✓
Part 90.1321/2.1046 TIA-603-C Section 2.2.1	Transmitter Peak Power Spectral Density (Conducted)	Antenna	✓
Part 90.209 / FCC Part 2.1049 TIA-603-C Section 2.2.1	Transmitter Occupied Bandwidth (Bandwidth Limitations)	Antenna	✓
Part 90.1323/2.1051 TIA-603-C Section 2.2.13	Transmitter Conducted Emissions	Antenna	✓
Part 90.1323/2.1051 TIA-603-C Section 2.2.13	Transmitter Band Edge Conducted Emissions	Antenna	✓
Part 90.1323/2.1053 ANSI C63.4 Section 8	Transmitter Radiated Emissions	Antenna	✓
Part 90.1323/2.1053 ANSI C63.4 Section 8	Transmitter Band Edge Radiated Emissions	Antenna	✓
Part 90.213 / 2.1055 TIA-603-C Section 2.2.2	Transmitter Frequency Stability (Temperature & Voltage Variation)	Antenna	✓

Key to Results

✓ = Complied ✗ = Did not comply

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

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Description:	Base Station – Outdoor Unit
Brand Name:	Harris Stratex Networks
Product:	StarMAX 8200-36
Model Name or Number:	8200-36-02-01
Serial Number:	X00000277X0929X
Unit Code:	AX01041T36001050000-000 Rev A
Hardware Version Number:	450-1058-003-R05
Software Version Number:	4.1.1.1
FCC ID Number:	VPX-8200-36A

Description:	Base Station – Indoor Unit
Brand Name:	Harris Stratex Networks
Model Name or Number:	WiMAX 6100
Code:	6122-02-00-01
Serial Number:	TSS41170900024
Hardware Version Number:	450-1058-003-R05
Software Version Number:	4.1.1.1
FCC ID Number:	VPX-8200-36A

Description:	Directional Antenna
Brand Name:	PCTEL
Model Name or Number:	SP3338-17XP65 65 Degree Sector Antenna
Frequency Range:	3.3 – 3.8 GHz
Gain:	16.5 dBi
Serial Number:	464324
FCC ID Number:	None Stated

Description:	Omni-Directional Antenna 1
Brand Name:	Doradus
Model Name or Number:	Omni Directional Antenna
Operational Frequency:	3.5 GHz
Gain:	13 dBi
Serial Number:	None Stated
FCC ID Number:	None Stated

Description:	Omni-Directional Antenna 2
Brand Name:	Doradus
Model Name or Number:	Omni Directional Antenna
Operational Frequency:	3.5 GHz
Gain:	13 dBi
Serial Number:	None Stated
FCC ID Number:	None Stated

3.2. Description of EUT

The equipment under test was an IP base station operating in the 3.650 to 3.675 GHz band. The equipment operates with 802.16e-2005 WiMAX protocol.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	WiMAX 802.16e-2005						
Category of Equipment:	Transceiver						
Type of Equipment	Base Station						
Intended Operating Environment:	Residential, Commercial and Industrial						
Highest Internally Generated Clock or Oscillator Frequency:	3.7 GHz						
Modulation Type:	QPSK		16QAM		64QAM		
Coding Scheme	1/2	3/4	1/2	3/4	2/3	3/4	5/6
Duty Cycle	60%						
Channel Spacing:	5 MHz, 10 MHz						
Antenna Connection Type:	External						
Antenna Type:	Omni-Directional, and Directional						
Antenna Gain:	13.0 dBi						
Power Supply Requirement:	Nominal		-48 V				
	Minimum		-40.8 V				
	Maximum		-55.2 V				
Tested Temperature Range:	Minimum		-30 °C				
	Maximum		+50 °C				
Transmit Frequency Range:	3.650 – 3.675 GHz						

Transmit Channels Tested: - 5 MHz	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	-	3652.5
	Top	-	3672.5

Transmit Frequency Range:	3.650 – 3.675 GHz		
Transmit Channels Tested: - 10 MHz	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	-	3655.0
	Top	-	3670.0

3.5. Port Identification

Port	Description	Type	Applicable
1	ODU - Antenna Port 1	N-Type	Yes
2	ODU - Antenna Port 2	N-Type	Yes
3	ODU - Fibre Optic	Custom	No
4	ODU - -48VDC Input	Twin Core	Yes
5	IDU – 10x Ethernet Port	CAT5 / CAT6	No
6	IDU – 2x -48VDC Input	Twin Core	Yes
7	IDU – 4x Fibre Optic Ports	Twin Fibre	No

3.6. Support Equipment

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

Description:	NMS Server + IP Packet Generator PC for Base Station
Brand Name:	Dell
Model Name or Number:	OPTIPLEX GX620
Serial Number:	PC393NT
Cable Length and Type:	CAT5 Ethernet Cable >3 metres
Connected to Port:	Base Station via Router

Description:	Network Router
Brand Name:	Netgear
Model Name or Number:	DG834 v4
Serial Number:	1PL596BD001A4
Cable Length and Type:	2x CAT5 Ethernet Cable >3 metres
Connected to Port:	Base Station [M Eth Port + D Eth Port] NMS Server + IP Packet Generator PC

Description:	Subscriber Unit
Brand Name:	Harris Stratex
Model Name or Number:	WiMAX 3160 16e Outdoor SS
Code:	3160-37-11-01
Serial Number:	TSS40330900027
MAC Address:	00:02:73:00:12:7F
Cable Length and Type:	Air Link / Simulated Air Link
Connected to Port:	Antenna Port

Description:	Power Block + Communications for Subscriber Unit
Brand Name:	PowerDsine
Model Name or Number:	PowerDsine 3001
Part Number:	PD-3001/AC
Serial Number:	R08126050010312101
Cable Length and Type:	2x CAT5 Ethernet Cable + IEC Lead
Connected to Port:	Subscriber Unit, IP Packet Generator PC + AC Mains

Support Equipment - Continued

Description:	IP Packet Generator PC for Subscriber Unit
Brand Name:	Dell
Model Name or Number:	OPTIPLEX GX620
Serial Number:	PC460NT
Cable Length and Type:	CAT5 Ethernet Cable >3 metres
Connected to Port:	Subscriber Unit

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Idle mode with the transmitter switch off
- Transmit mode operating at maximum output power with a modulated carrier operating with maximum data flow as per the modulation types listed in the additional information relating to testing table above.

4.2. Configuration and Peripherals

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

- **Radiated Testing**
    - Idle Mode – The EUT was connected to a -48 V DC power supply. Both the indoor and outdoor unit were connected via fibre optic cable. The transmitter was turned off within the base station via the management software. Depending on the test case, either the Directional or Omni Directional antenna was connected to both ports of the outdoor unit via N-type cables
    - Transmitting Mode – The EUT was connected to a -48 V DC power supply. Both the indoor and outdoor unit were connected via fibre optic cable. The indoor unit was connected to an NMS server and IP packet generator PC via a network router. For radiated spurious emissions testing, the modulation and coding scheme was set to QAM64-2/3 in a 10 MHz as this was found to be the worse case mode. For radiated band edge, and modulation / coding schemes and channel bandwidths were exercise. The IP packet generator PC provided IP data which sent to the indoor unit at the maximum data rate allowed for each specific modulation / coding scheme. The outdoor unit was connected wireless to the subscriber unit and an active was maintained through all testing. Depending on the test case, either the Directional or Omni Directional antenna was connected to both ports of the outdoor unit via N-type cables
- **Conducted Testing**
    - Idle Mode – AC Conducted Only - The EUT was connected to a -48 V DC power supply. Both the indoor and outdoor unit were connected via fibre optic cable. The transmitter was turned off within the base station via the management software. The antenna ports on the outdoor unit were terminated with a 50 Ohm load.
    - Transmitting Mode – The EUT was connected to a -48 V DC power supply. Both the indoor and outdoor unit were connected via fibre optic cable. The indoor unit was connected to an NMS server and IP packet generator PC via a network router. For conducted spurious emissions testing, the modulation and coding scheme was set to QAM64-2/3 in a 10 MHz as this was found to be the worse case mode. For all other test cases all modulation / coding schemes and channel bandwidths were exercised. The IP packet generator PC provided IP data which sent to the indoor unit at the maximum data rate allowed for each specific modulation / coding scheme. The outdoor unit was connected via an attenuator and cable assembly to the subscriber unit and an active was maintained through all testing. The second antenna port was terminated through all testing.
- Preliminary testing was performed on both antenna ports with each the worse case port being selected for measurements.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

5.2. Test Results

5.2.1. Idle Mode Radiated Spurious Emissions

Test Summary:

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

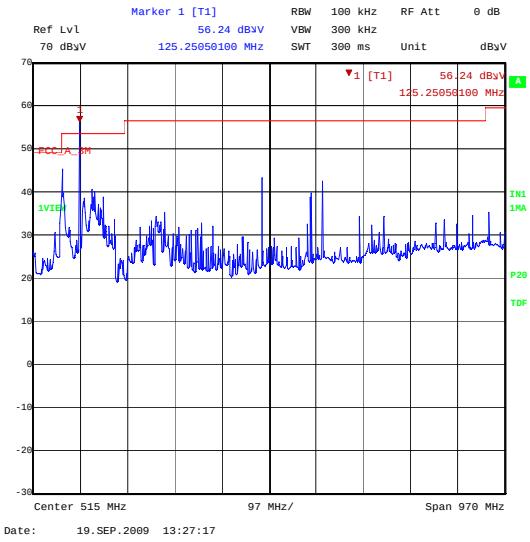
Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	36

Results: - Directional Antenna

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
91.072	Vertical	41.5	53.5	12.0	Complied
124.992	Horizontal	51.8	53.5	1.7	Complied
499.984	Horizontal	43.3	56.4	13.1	Complied
599.983	Vertical	37.9	56.4	18.5	Complied
624.978	Horizontal	42.5	56.4	13.9	Complied

Idle Mode Radiated Spurious Emissions – Directional Antenna (continued)



Class A

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

Idle Mode Radiated Spurious Emissions – Directional Antenna (continued)

Test Summary:

FCC Part:	FCC 15.109
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 20 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	35

Results: Highest Peak Level – Directional Antenna

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1649.298	Vertical	47.7	-3.1	44.6	74.0	29.4	Complied
1979.960	Vertical	46.6	-1.4	45.2	74.0	28.8	Complied
2178.357	Vertical	47.6	0.7	48.3	74.0	25.7	Complied
2376.753	Vertical	44.6	-0.2	44.4	74.0	29.6	Complied

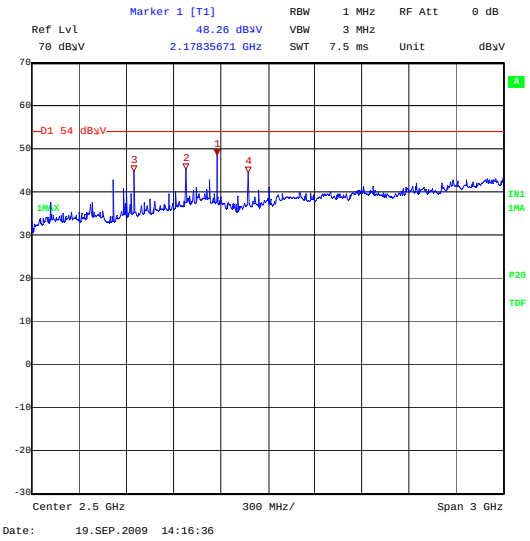
Results: Highest Average Level – Directional Antenna

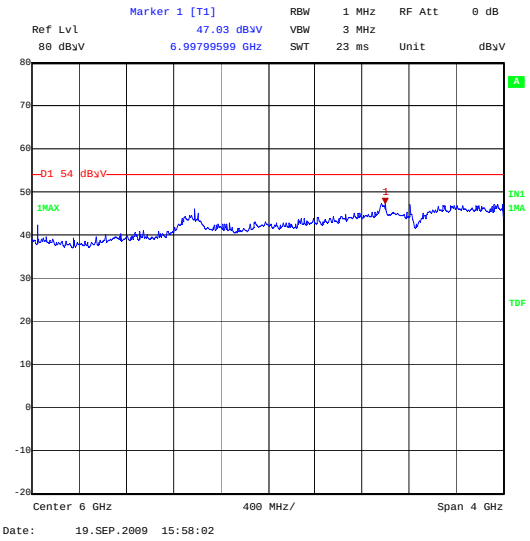
Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1649.298	Vertical	47.7	-3.1	44.6	54.0	9.4	Complied
1979.960	Vertical	46.6	-1.4	45.2	54.0	8.8	Complied
2178.357	Vertical	47.6	0.7	48.3	54.0	5.7	Complied
2376.753	Vertical	44.6	-0.2	44.4	54.0	9.6	Complied

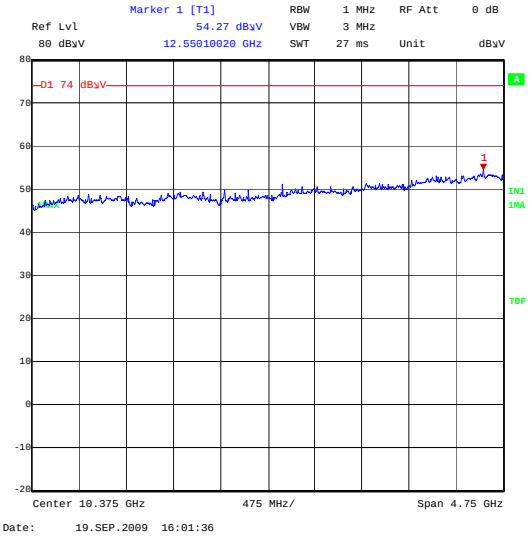
Note(s):

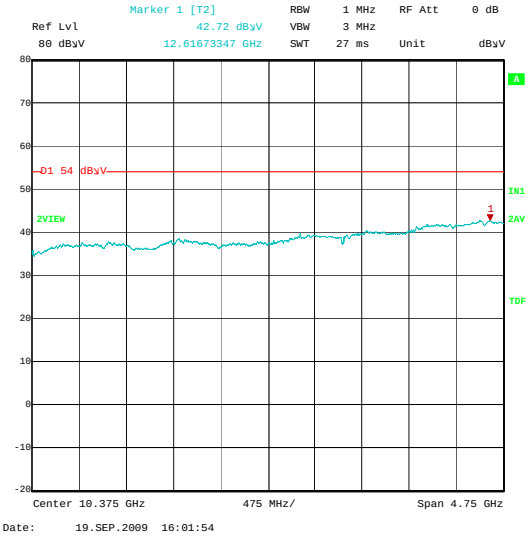
1. Where emissions fell below the 54 dBuVm average limit when measured with a peak detector, no further measurements were performed as compliance can be shown.

Idle Mode Radiated Spurious Emissions – Directional Antenna (continued)

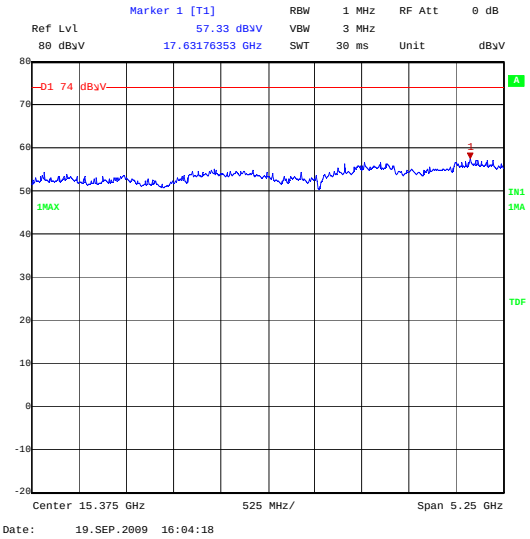


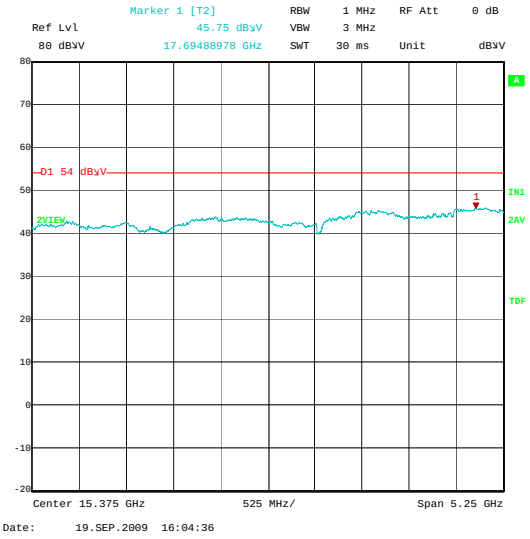






Peak **Average**

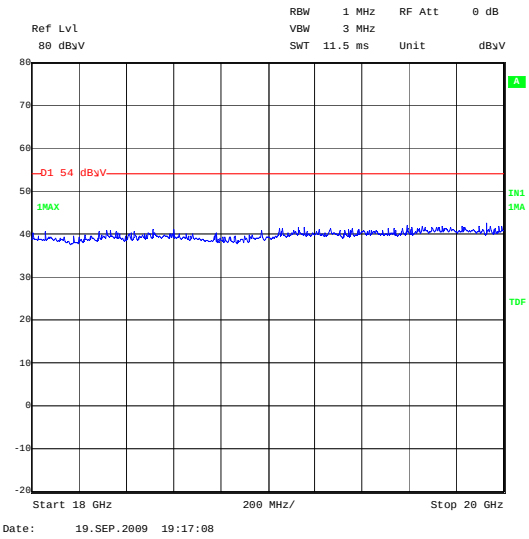




Peak **Average**

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

Idle Mode Radiated Spurious Emissions – Directional Antenna (continued)



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

5.2.2. Idle Mode Radiated Spurious Emissions - Omni-Directional Antenna

Test Summary:

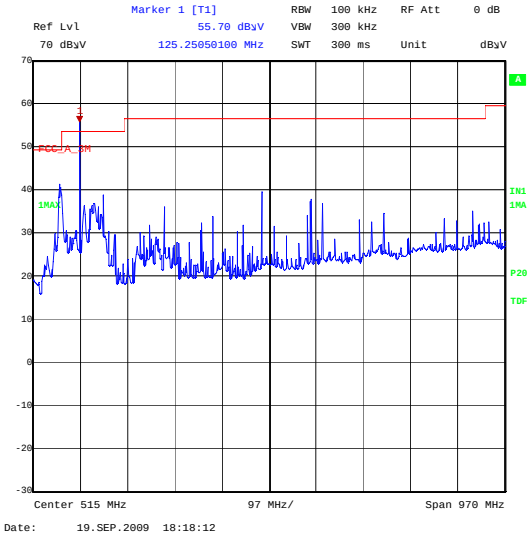
FCC Part:	FCC 15.109
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1 GHz

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	36

Results: – Omni-Directional Antenna

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
91.072	Vertical	41.5	53.5	12.0	Complied
124.992	Horizontal	51.8	53.5	1.7	Complied
499.984	Horizontal	43.3	56.4	13.1	Complied
599.983	Vertical	37.9	56.4	18.5	Complied
624.978	Horizontal	42.5	56.4	13.9	Complied



Class A

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

Idle Mode Radiated Spurious Emissions - Omni-Directional Antenna (continued)

Test Summary:

FCC Part:	FCC 15.109
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 20 GHz

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	35

Results: Highest Peak Level – Omni-Directional Antenna

Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1649.299	Vertical	50.8	-3.1	47.7	74.0	26.3	Complied
1979.960	Vertical	49.1	-0.1	49.0	74.0	25.0	Complied
2178.357	Vertical	51.9	-0.5	51.4	74.0	22.6	Complied
2376.754	Vertical	47.4	-0.2	47.2	74.0	26.8	Complied

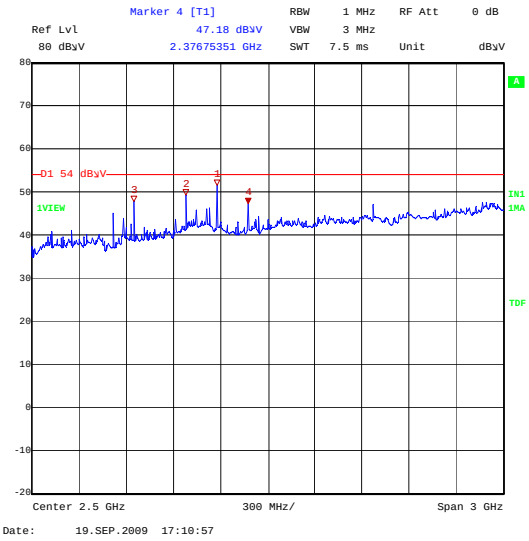
Results: Highest Average Level – Omni-Directional Antenna

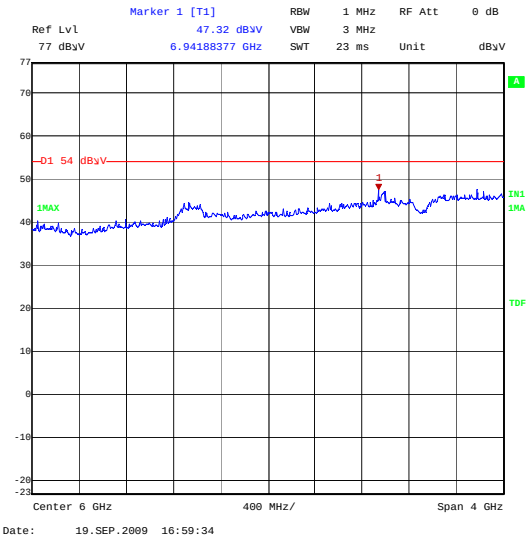
Frequency (GHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
1649.299	Vertical	50.8	-3.1	47.7	74.0	6.3	Complied
1979.960	Vertical	49.1	-0.1	49.0	74.0	5.0	Complied
2178.357	Vertical	51.9	-0.5	51.4	74.0	2.6	Complied
2376.754	Vertical	47.4	-0.2	47.2	74.0	6.8	Complied

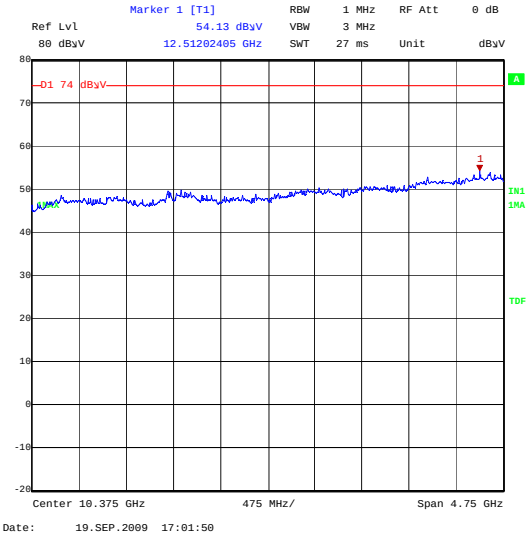
Note(s):

1. Where emissions fell below the 54 dBµV/m average limit when measured with a peak detector, no further measurements were performed as compliance can be shown.

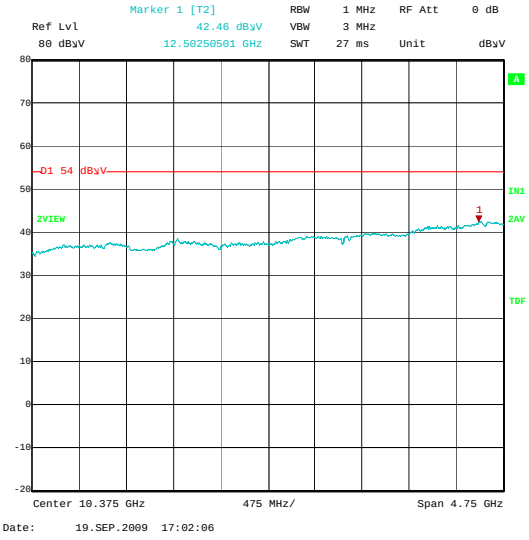
Idle Mode Radiated Spurious Emissions - Omni-Directional Antenna (continued)



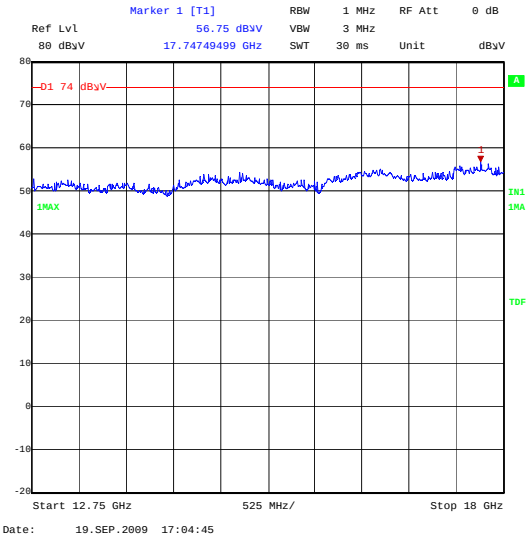




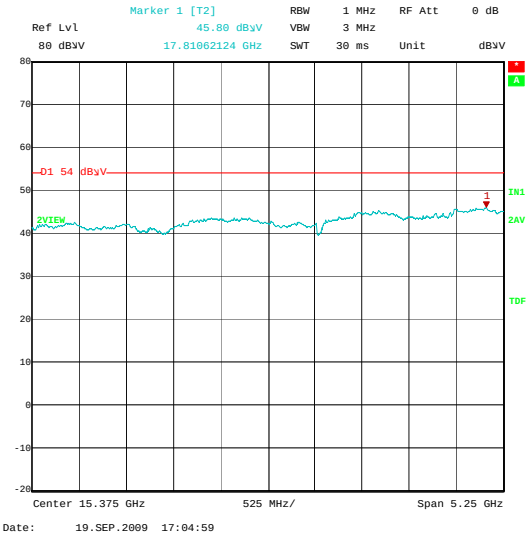
Peak



Average

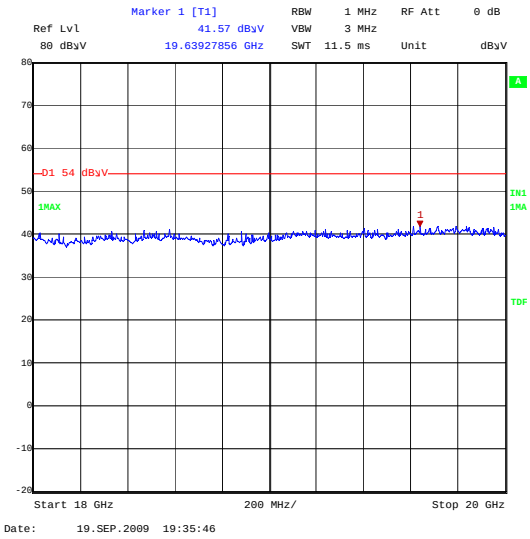


Peak



Average

Idle Mode Radiated Spurious Emissions - Omni-Directional Antenna (continued)



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

5.2.3. Idle 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:

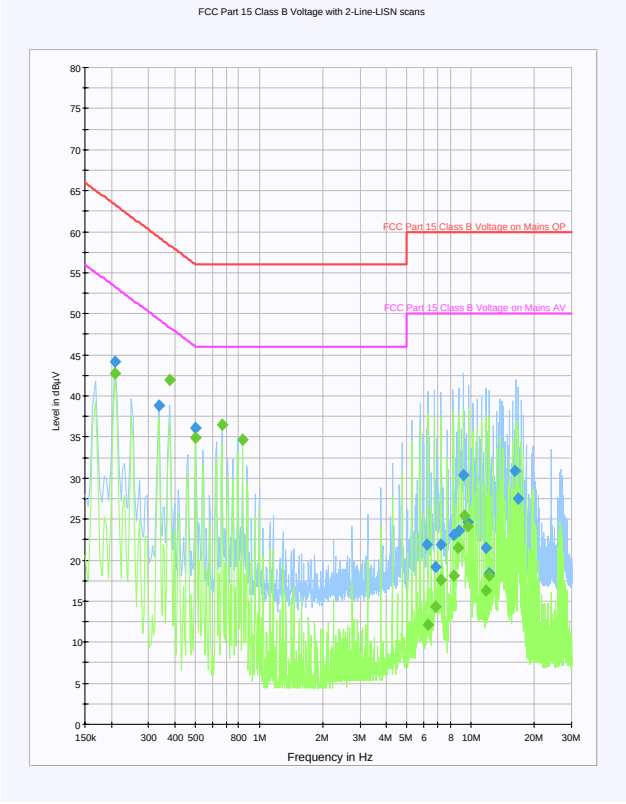
Temperature Range (°C):	22
Relative Humidity Range (%):	32

Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.208500	Live 1	44.2	63.3	19.1	Complied
0.334500	Live 1	38.8	59.3	20.5	Complied
0.501000	Neutral	36.1	56.0	19.9	Complied
6.211500	Neutral	21.9	60.0	38.1	Complied
6.792000	Neutral	19.2	60.0	40.8	Complied
7.224000	Neutral	21.8	60.0	38.2	Complied
8.304000	Neutral	23.1	60.0	36.9	Complied
8.763000	Neutral	23.6	60.0	36.4	Complied
9.262500	Neutral	30.4	60.0	29.6	Complied
9.726000	Neutral	24.6	60.0	35.4	Complied
11.769000	Live 1	21.5	60.0	38.5	Complied
12.259500	Neutral	18.4	60.0	41.6	Complied
16.228500	Neutral	30.9	60.0	29.1	Complied
16.777500	Neutral	27.5	60.0	32.5	Complied

Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.208500	Live 1	42.7	53.3	10.6	Complied
0.375000	Live 1	41.9	48.4	6.5	Complied
0.501000	Neutral	34.9	46.0	11.1	Complied
0.667500	Live 1	36.4	46.0	9.6	Complied
0.834000	Neutral	34.7	46.0	11.3	Complied
6.270000	Neutral	12.1	50.0	37.9	Complied
6.778500	Neutral	14.4	50.0	35.6	Complied
7.215000	Neutral	17.6	50.0	32.4	Complied
8.304000	Neutral	18.1	50.0	31.9	Complied
8.713500	Neutral	21.5	50.0	28.5	Complied
9.303000	Neutral	25.4	50.0	24.6	Complied
9.717000	Neutral	24.0	50.0	26.0	Complied
11.769000	Live 1	16.3	50.0	33.7	Complied
12.264000	Neutral	18.0	50.0	32.0	Complied



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

5.2.4. 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 Range (°C):	22
Relative Humidity Range (%):	32

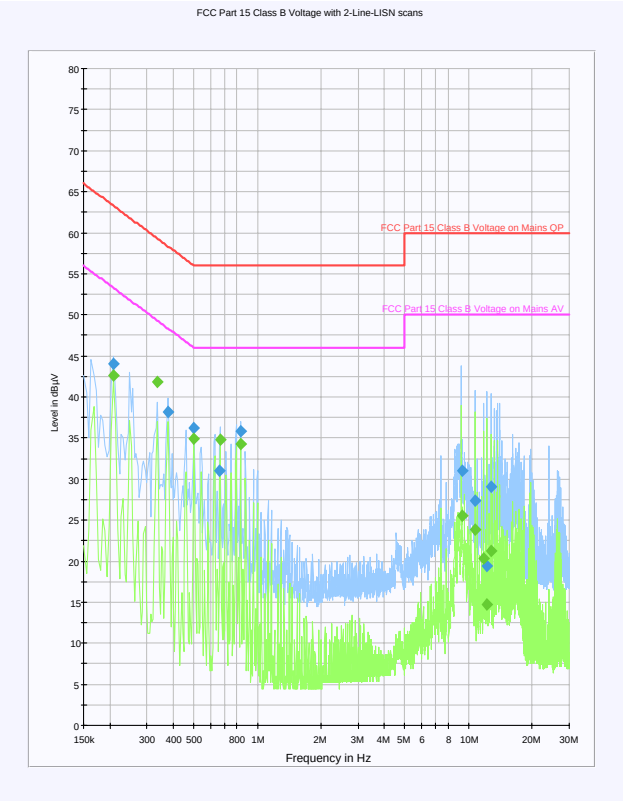
Results: Quasi Peak Detector Measurements

Frequency (MHz)	Line	Quasi Peak Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.208500	Live 1	44.1	63.3	19.2	Complied
0.375000	Live 1	38.2	58.4	20.2	Complied
0.501000	Neutral	36.2	56.0	19.8	Complied
0.663000	Live 1	31.1	56.0	24.9	Complied
0.834000	Neutral	35.9	56.0	20.1	Complied
9.303000	Live 1	31.0	60.0	29.0	Complied
10.792500	Live 1	27.3	60.0	32.7	Complied
12.268500	Live 1	19.4	60.0	40.6	Complied
12.781500	Live 1	29.0	60.0	31.0	Complied

Results: Average Detector Measurements

Frequency (MHz)	Line	Average Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.208500	Live 1	42.6	53.3	10.7	Complied
0.334500	Live 1	41.8	49.3	7.5	Complied
0.501000	Neutral	34.9	46.0	11.1	Complied
0.667500	Neutral	34.7	46.0	11.3	Complied
0.834000	Neutral	34.3	46.0	11.7	Complied
9.298500	Live 1	25.5	50.0	24.5	Complied
10.792500	Live 1	23.8	50.0	26.2	Complied
11.769000	Live 1	20.3	50.0	29.7	Complied
12.228000	Live 1	14.7	50.0	35.3	Complied
12.808500	Live 1	21.2	50.0	28.8	Complied

Transmitter AC Conducted Spurious Emissions – (continued)



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

5.2.5. Transmitter Equivalent Isotropic Radiated Power (EIRP)

Test Summary:

FCC Part:	FCC Part 90.1321(a)
Test Method:	TIA-603-C Section 2.2.1

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	52

Results: - 5 MHz

Modulation / Coding Scheme	O/P Power Port 1 (dBm)	O/P Power Port 2 (dBm)	Summed Power Port 1+2 (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
QPSK-1/2	20.4	20.3	23.4	13	36.4	37	0.6	Complied
QPSK-3/4	20.3	20.5	23.4	13	36.4	37	0.6	Complied
16QAM-1/2	20.5	20.5	23.5	13	36.5	37	0.5	Complied
16QAM-3/4	20.4	20.4	23.4	13	36.4	37	0.6	Complied
64QAM-2/3	20.7	20.2	23.5	13	36.5	37	0.5	Complied
64QAM-3/4	20.3	20.6	23.5	13	36.5	37	0.5	Complied
64QAM-5/6	20.4	20.6	23.5	13	36.5	37	0.5	Complied

Results: - 10 MHz

Modulation / Coding Scheme	O/P Power Port 1 (dBm)	O/P Power Port 2 (dBm)	Summed Power Port 1+2 (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)	Result
QPSK-1/2	23.5	23.8	26.7	13	39.7	40	0.3	Complied
QPSK-3/4	23.5	23.7	26.6	13	39.6	40	0.4	Complied
16QAM-1/2	23.6	23.8	26.7	13	39.7	40	0.3	Complied
16QAM-3/4	23.6	23.4	26.5	13	39.5	40	0.5	Complied
64QAM-2/3	23.7	23.6	26.7	13	39.7	40	0.3	Complied
64QAM-3/4	23.0	23.5	26.3	13	39.3	40	0.7	Complied
64QAM-5/6	22.6	23.4	26.0	13	39.0	40	1.0	Complied

Note(s):

1. In accordance the following *Response to Inquiry to FCC (Tracking Number 210233)*, the measurement detector used was an RMS detector using the channel power function of the spectrum analyser.
2. The channel power function within the analyser set the bandwidths and these were approximately 1% of the emission bandwidth. The sweep time of the analyser was set to 10 seconds.
3. The conducted output power measurement was compensated for the transmitter's duty cycle. The duty cycle of each modulation and channel bandwidth combination was observed to be the following:
   - Pulse Duration = 2.94 mS
   - Amount in 100 mS = 21
   - Duty Cycle = 62%
   - Correction factor = 2.1 dB

   All of the measurements had a correction factor added into the final result listed in the tables above.
4. In deviation to TIA-603-C section 2.2.1, a microphone was not used to modulated the signal, instead a communications link was maintained and data sent as per the details in section 4.2 of the present document.
5. In accordance with the clients requirements following *Response to Inquiry to FCC (Tracking Number 976660)*, the antenna gain used is that which will be the lowest used with the EUT.

5.2.6. Transmitter Peak Power Spectral Density (Conducted)

Test Summary:

FCC Part:	FCC 90.1321/2.1046
Test Method:	TIA-603-C Section 2.2.1

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	48

Results: - 5 MHz

Modulation / Coding Scheme	Conducted Power Port 1 (dBm/MHz)	Conducted Power Port 2 (dBm/MHz)	Summed Power Port 1+2 (dBm/MHz)	Antenna Gain (dBi)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Result
QPSK-1/2	13.1	13	16.1	13.0	29.1	30.0	0.9	Complied
QPSK-3/4	13.3	13.5	16.4	13.0	29.4	30.0	0.6	Complied
16QAM-1/2	12.9	12.9	15.9	13.0	28.9	30.0	1.1	Complied
16QAM-3/4	12.4	12.4	15.4	13.0	28.4	30.0	1.6	Complied
64QAM-2/3	12.4	11.9	15.2	13.0	28.2	30.0	1.8	Complied
64QAM-3/4	11.7	12	14.9	13.0	27.9	30.0	2.1	Complied
64QAM-5/6	11.9	12.1	15.0	13.0	28.0	30.0	2.0	Complied

Results: - 10 MHz

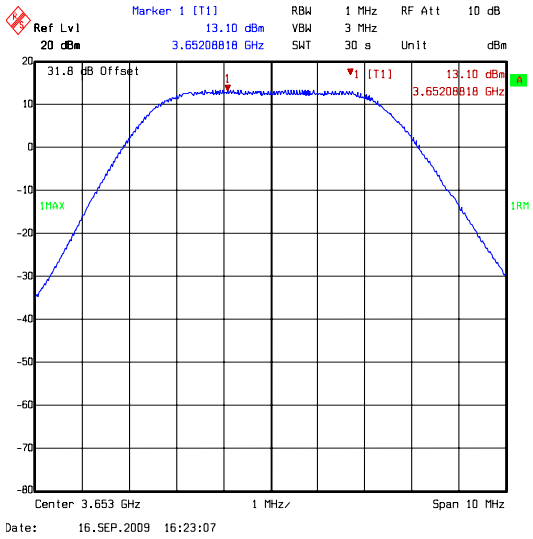
Modulation / Coding Scheme	Conducted Power Port 1 (dBm/MHz)	Conducted Power Port 2 (dBm/MHz)	Summed Power Port 1+2 (dBm/MHz)	Antenna Gain (dBi)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Result
QPSK-1/2	12.7	13	15.9	13.0	28.9	30.0	1.1	Complied
QPSK-3/4	11.8	12	14.9	13.0	27.9	30.0	2.1	Complied
16QAM-1/2	12.3	12.5	15.4	13.0	28.4	30.0	1.6	Complied
16QAM-3/4	11.4	11.2	14.3	13.0	27.3	30.0	2.7	Complied
64QAM-2/3	11.2	11.1	14.2	13.0	27.2	30.0	2.8	Complied
64QAM-3/4	10.7	11.2	14.0	13.0	27.0	30.0	3.0	Complied
64QAM-5/6	10.6	11.4	14.0	13.0	27.0	30.0	3.0	Complied

Note(s):

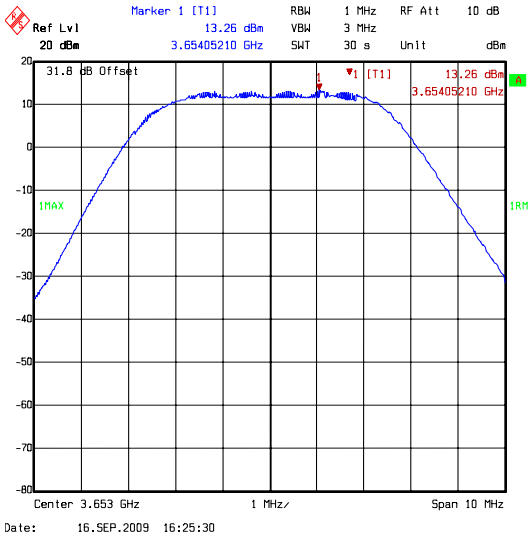
1. The highest peak level of the carrier emission found in a 1 MHz measurement bandwidth was measured.
2. In accordance the following *Response to Inquiry to FCC (Tracking Number 210233)*, the measurement detector used was an RMS detector.
3. In deviation to TIA-603-C section 2.2.1, as microphone was not used to modulated the signal, instead a communications link was maintained and data sent as per the details in section 4.2 of the present document.
4. The conducted power spectral density measurement was compensated for the transmitter's duty cycle. The duty cycle of each modulation and channel bandwidth combination was observed to be the following:
   - Pulse Duration = 2.94 mS
   - Amount in 100 mS = 21
   - Duty Cycle = 62%
   - Correction factor = 2.1 dB

   All of the measurements had a correction factor added into the final result listed in the tables above.

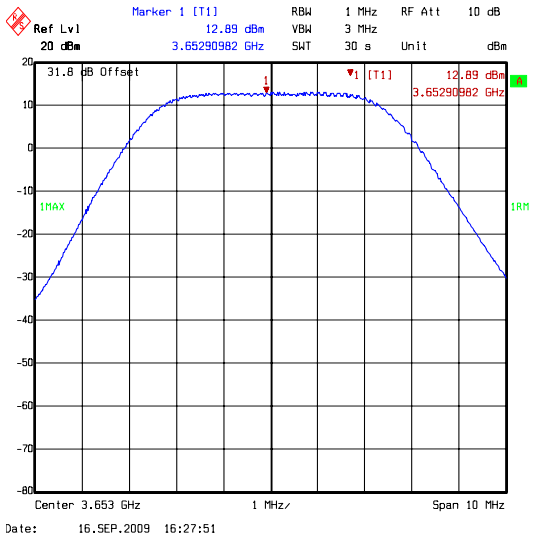
Transmitter Peak Power Spectral Density (Conducted) – 5 MHz (continued)



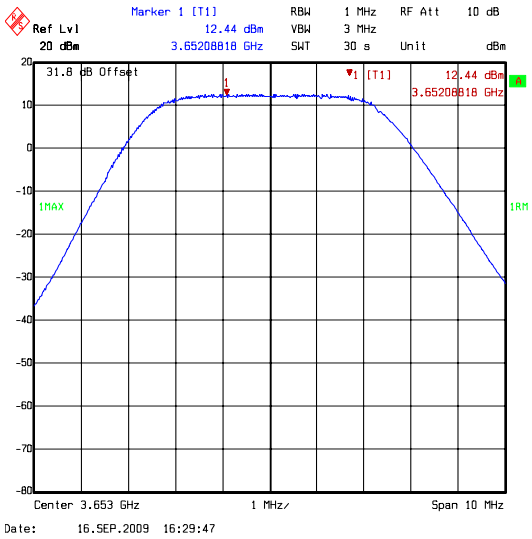
QPSK-1/2



QPSK-3/4

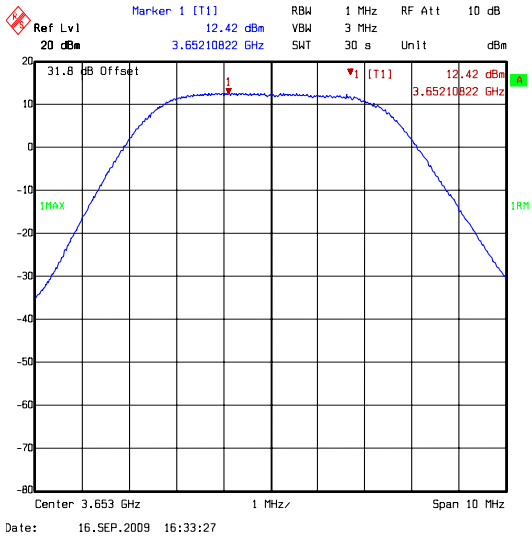


16QAM-1/2

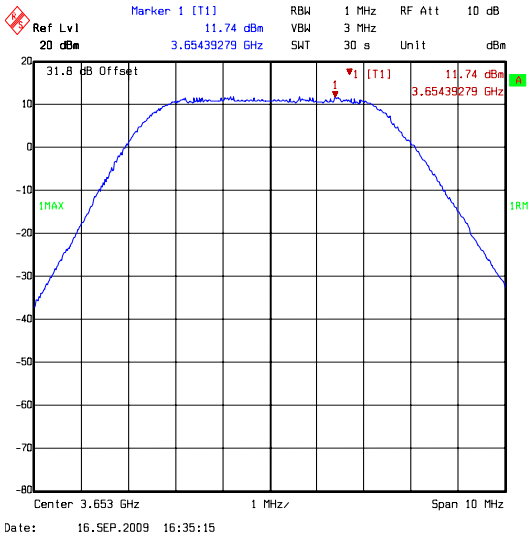


16QAM-3/4

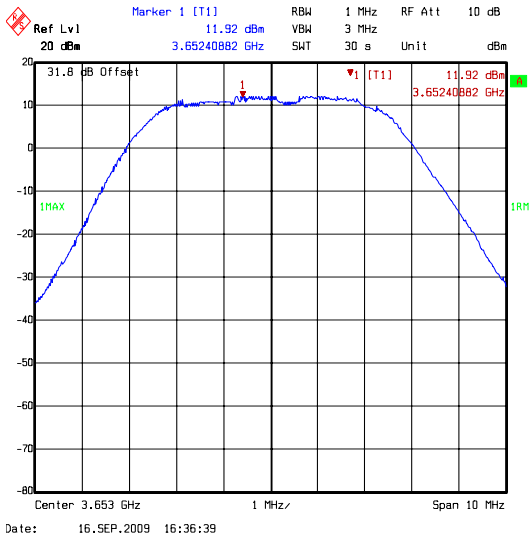
Transmitter Peak Power Spectral Density (Conducted) – 5 MHz (continued)



64QAM-2/3

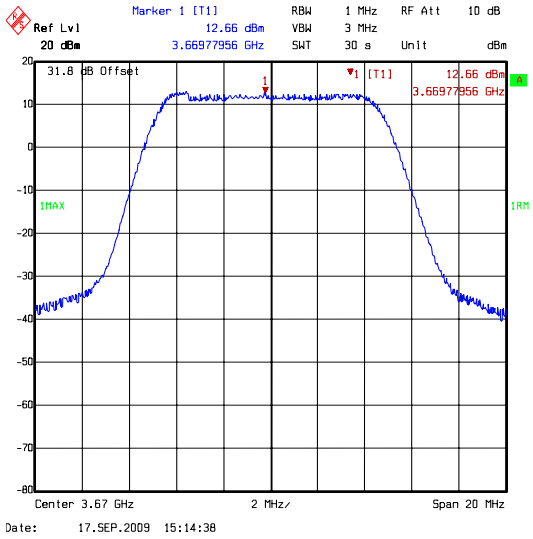


64QAM-3/4

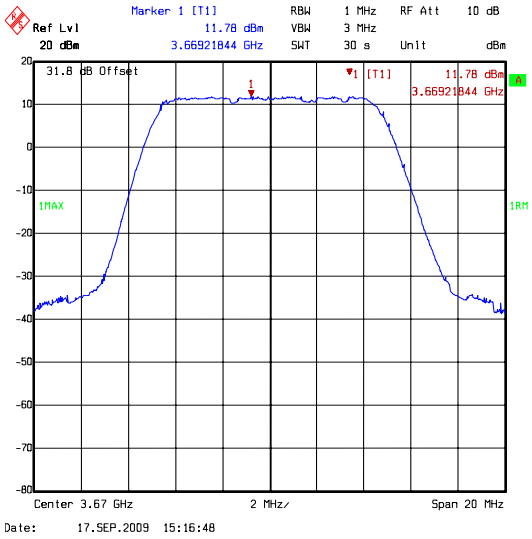


64QAM-5/6

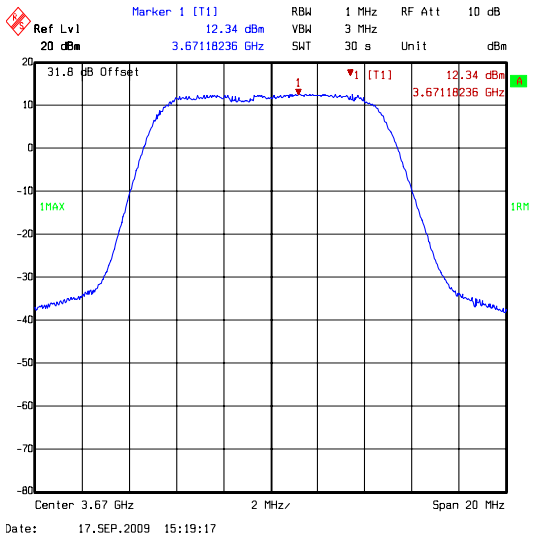
Transmitter Peak Power Spectral Density (Conducted) – 10 MHz (continued)



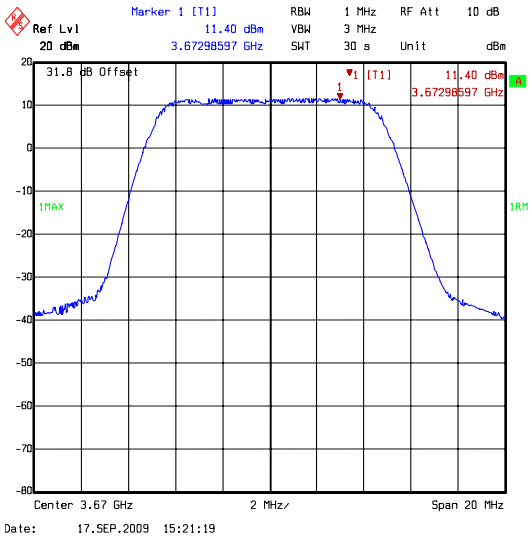
QPSK-1/2



QPSK-3/4

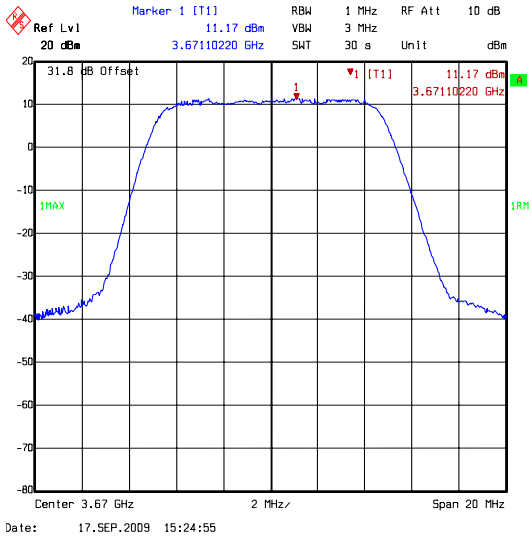


16QAM-1/2

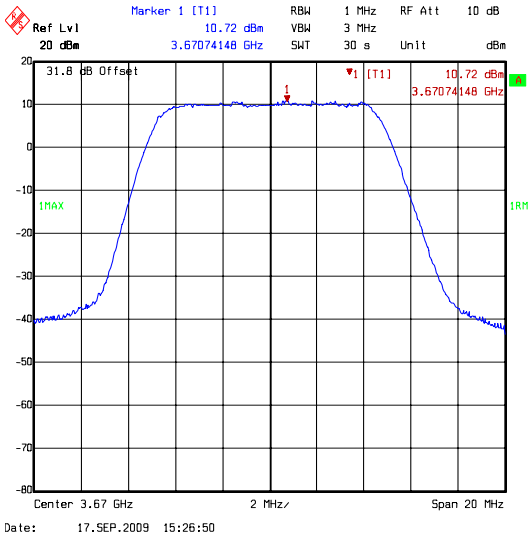


16QAM-3/4

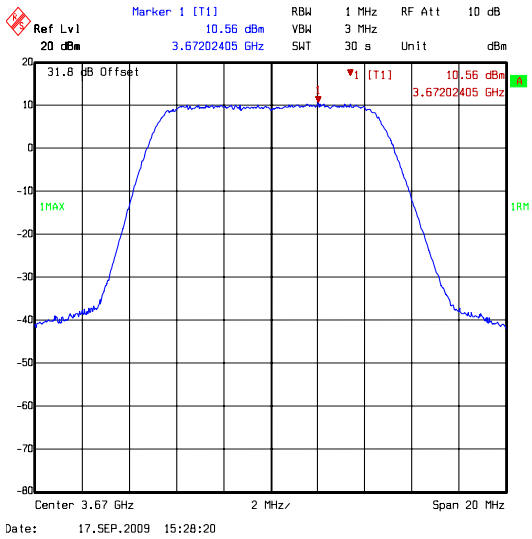
Transmitter Peak Power Spectral Density (Conducted) (continued) – 10 MHz



64QAM-2/3



64QAM-3/4



64QAM-5/6

5.2.7. Transmitter Occupied Bandwidth (Bandwidth Limitations)

Test Summary:

FCC Part:	FCC 90.209 / 2.1049
Test Method:	TIA-603-C Section 2.2.1

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	40

Results: - 5 MHz

Modulation / Coding Scheme	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (kHz)
QPSK-1/2	3653	100	300	4609.218
QPSK-3/4	3653	100	300	4609.218
16QAM-1/2	3653	100	300	4609.218
16QAM-3/4	3653	100	300	4609.218
64QAM-2/3	3653	100	300	4609.218
64QAM-3/4	3653	100	300	4609.218
64QAM-5/6	3653	100	300	4609.218

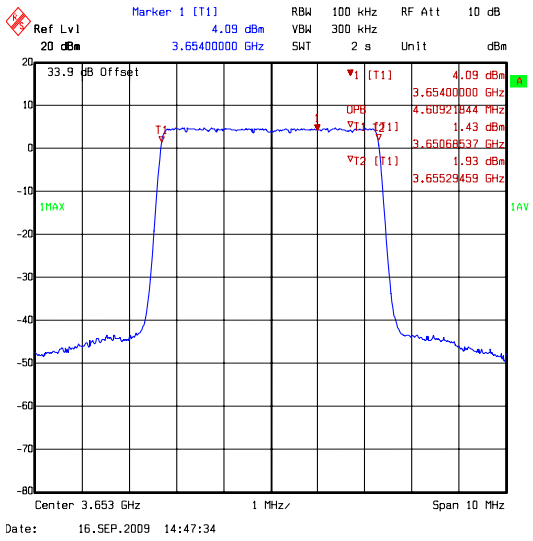
Results: - 10 MHz

Modulation / Coding Scheme	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (kHz)
QPSK-1/2	3653	300	1000	9298.597
QPSK-3/4	3653	300	1000	9258.517
16QAM-1/2	3653	300	1000	9298.597
16QAM-3/4	3653	300	1000	9258.517
64QAM-2/3	3653	300	1000	9298.597
64QAM-3/4	3653	300	1000	9338.677
64QAM-5/6	3653	300	1000	9298.597

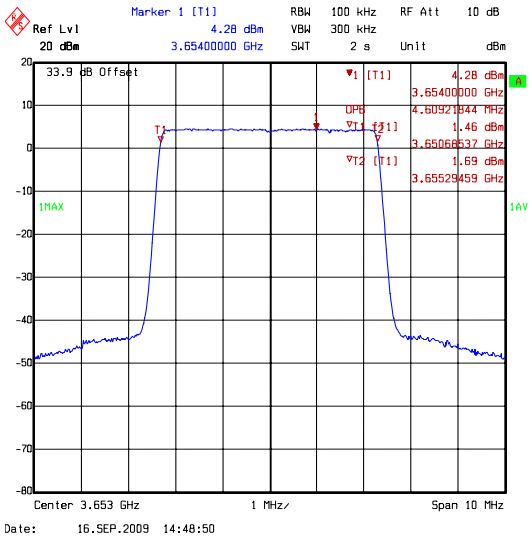
Note(s):

1. The occupied bandwidth function within the spectrum analyser was used. The spectrum analyser was set to measure the 99% bandwidth.
2. In deviation to TIA-603-C section 2.2.1, a microphone was not used to modulate the signal, instead a communications link was maintained and data sent as per the details in section 4.2 of the present document.

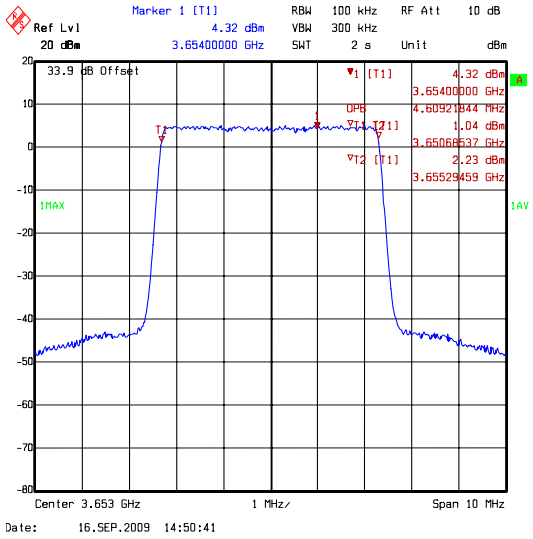
Transmitter Occupied Bandwidth (Bandwidth Limitations) – 5 MHz (continued)



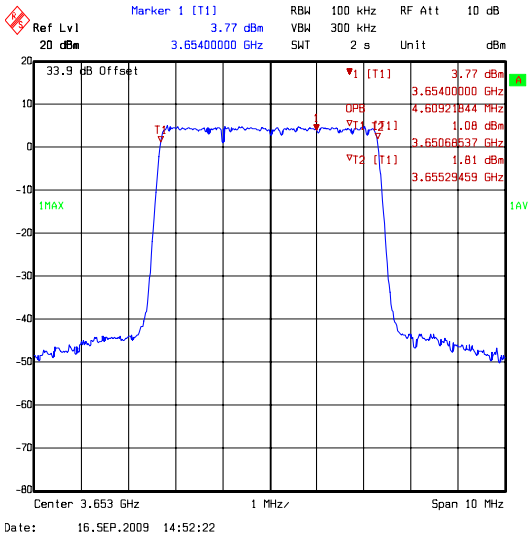
QPSK-1/2



QPSK-3/4

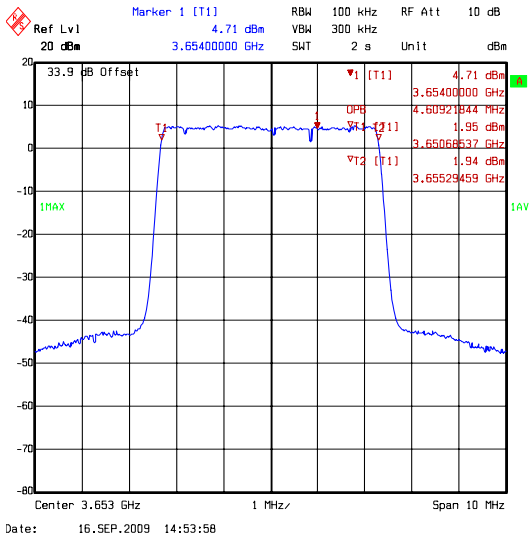


16QAM-1/2

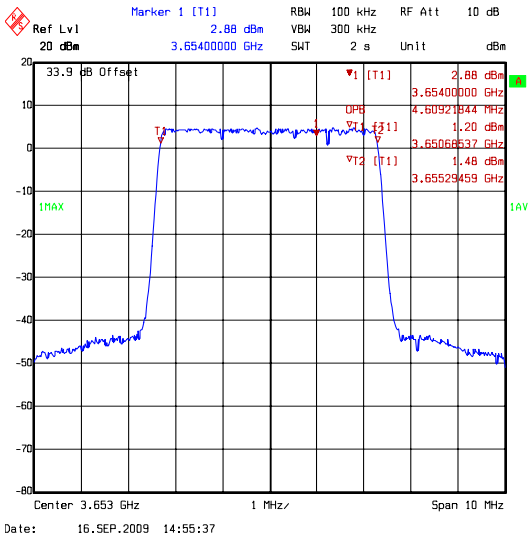


16QAM-3/4

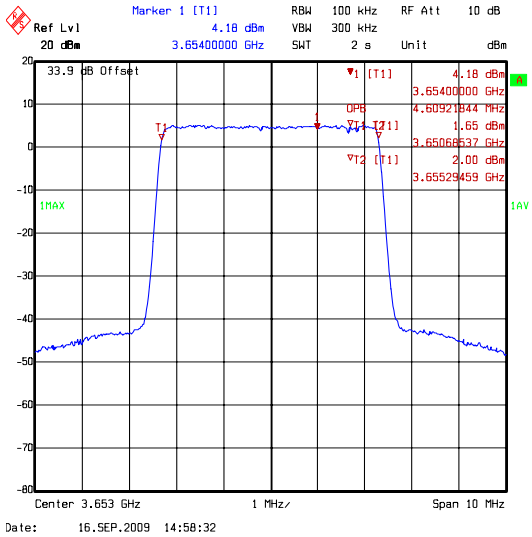
Transmitter Occupied Bandwidth (Bandwidth Limitations) – 5 MHz (continued)



64QAM-2/3

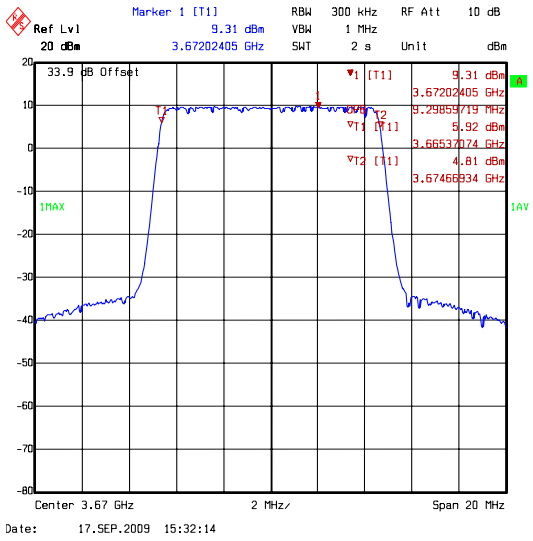


64QAM-3/4

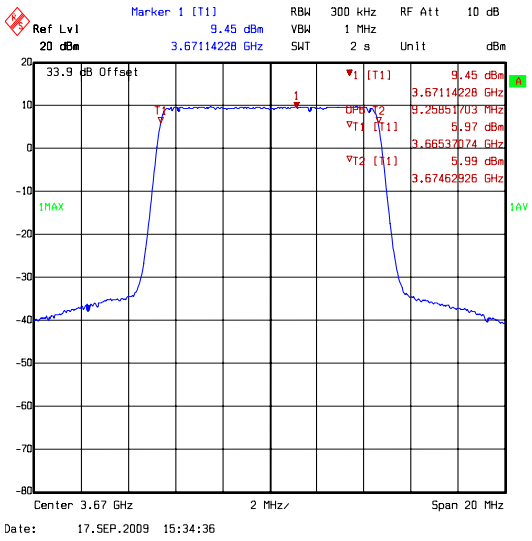


64QAM-5/6

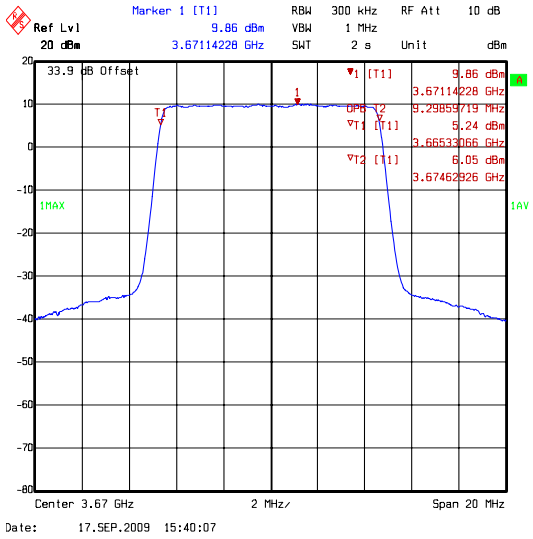
Transmitter Occupied Bandwidth (Bandwidth Limitations) – 10 MHz (continued)



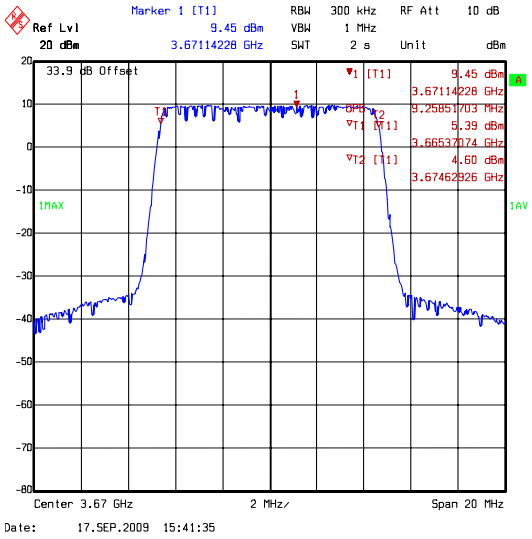
QPSK-1/2



QPSK-3/4

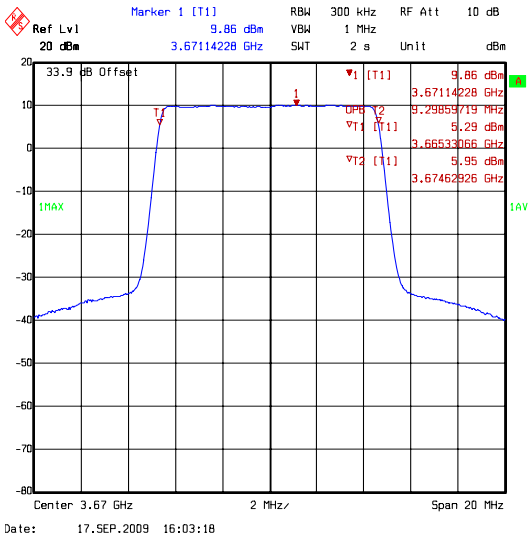


16QAM-1/2

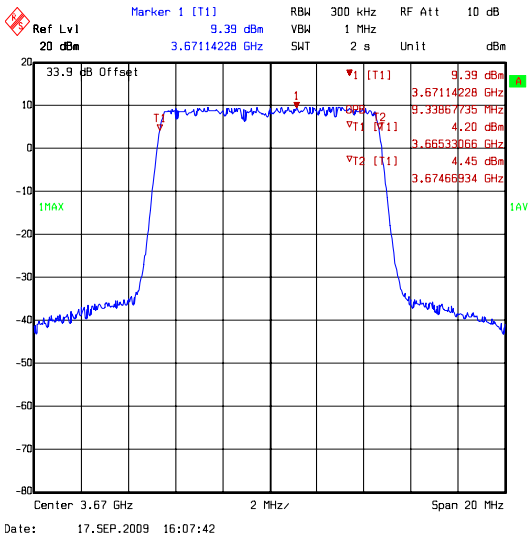


16QAM-3/4

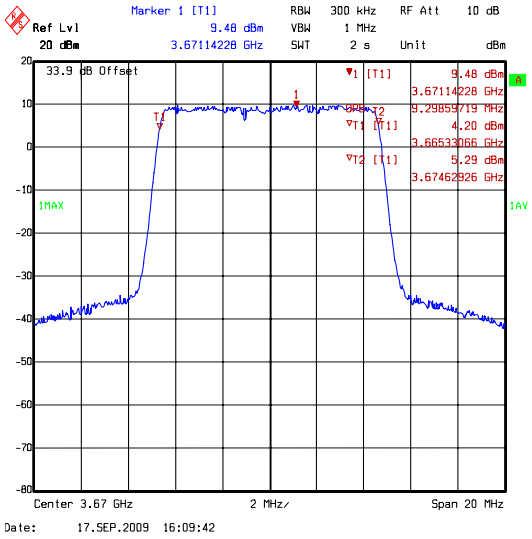
Transmitter Occupied Bandwidth (Bandwidth Limitations) – 10 MHz (continued)



64QAM-2/3



64QAM-3/4



64QAM-5/6

5.2.8. Transmitter Conducted Emissions

Test Summary:

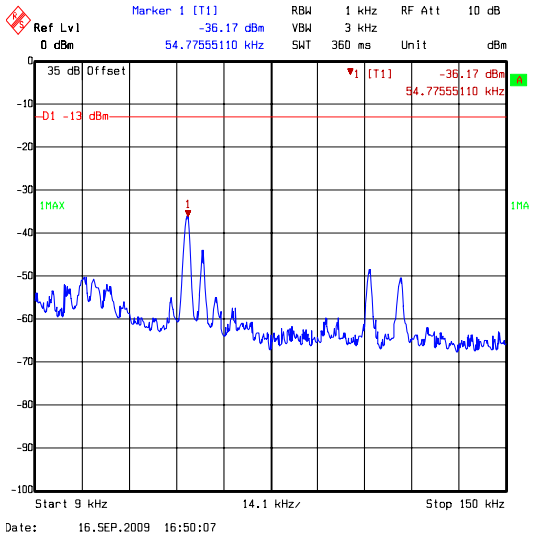
FCC Part:	FCC 90.1323/2.1051
Test Method:	TIA-603-C Section 2.2.13

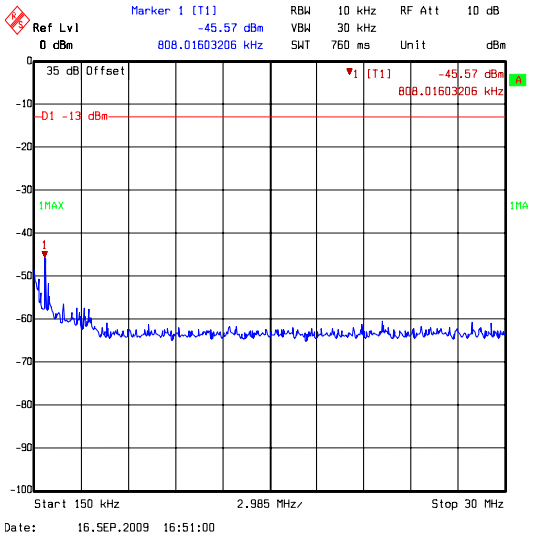
Environmental Conditions:

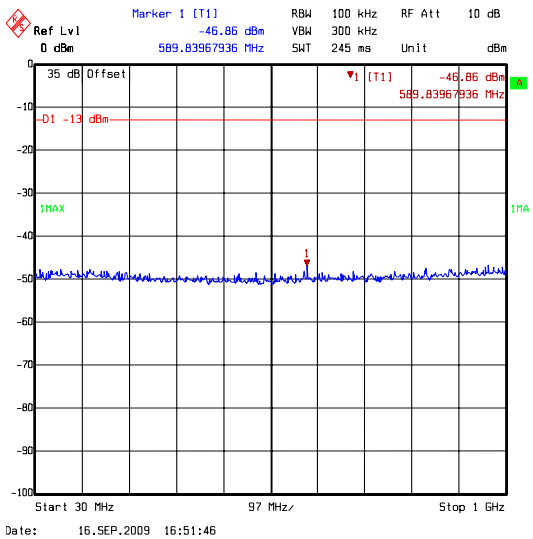
Temperature (°C):	24
Relative Humidity (%):	40

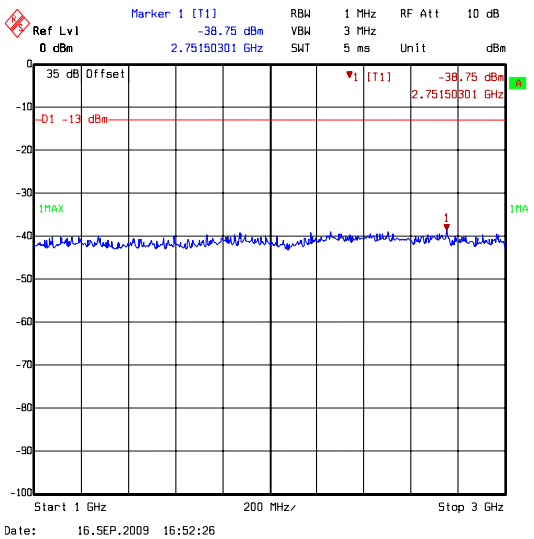
Results: - 5 MHz – 64QAM-2/3

Frequency (GHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
36.825	-27.0	-13.0	14.0	Complied

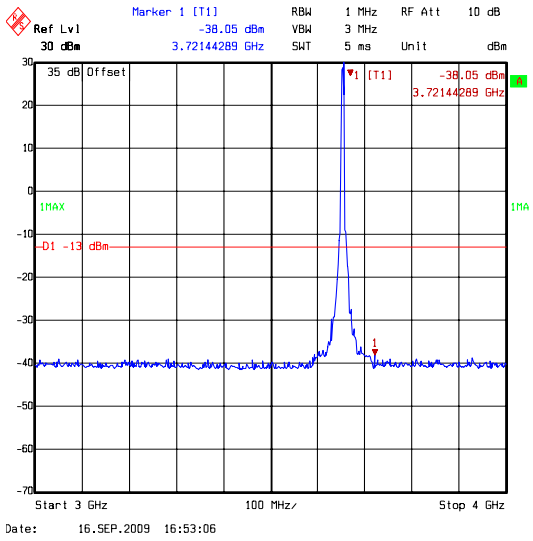


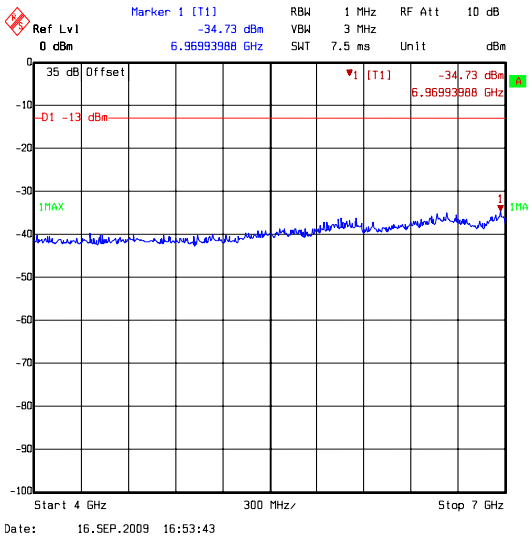


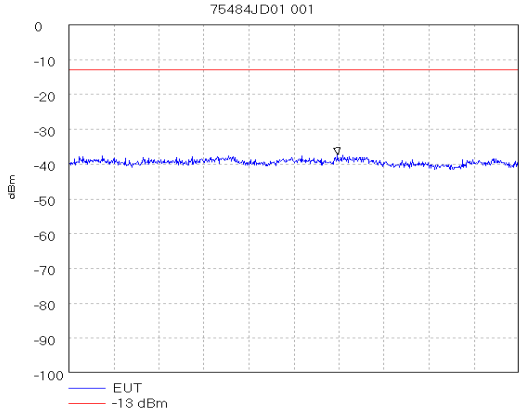




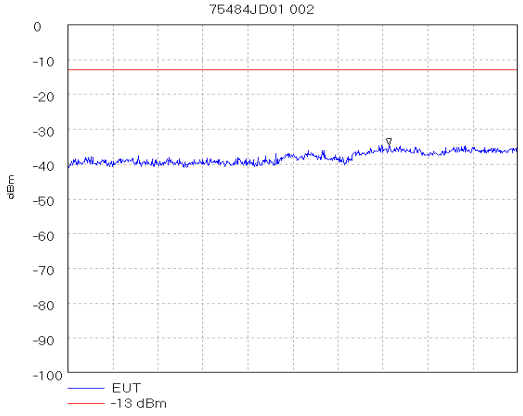
Transmitter Conducted Emissions (continued)





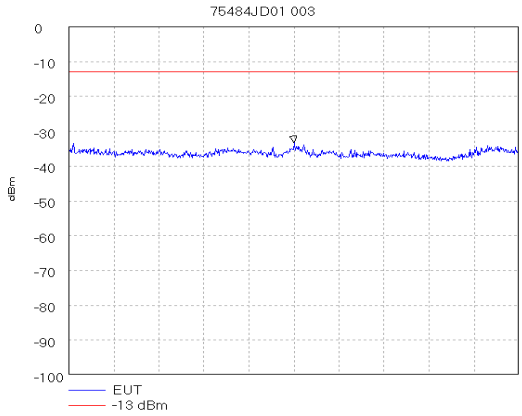


Start 7.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 60.0 mS
Peak 8.79 GHz, -37.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:07:07

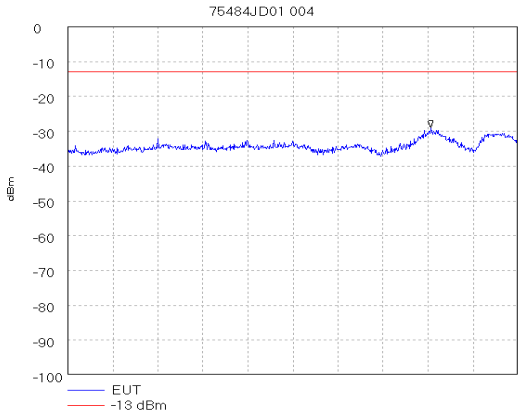


Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 13.566667 GHz, -34.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:07:59

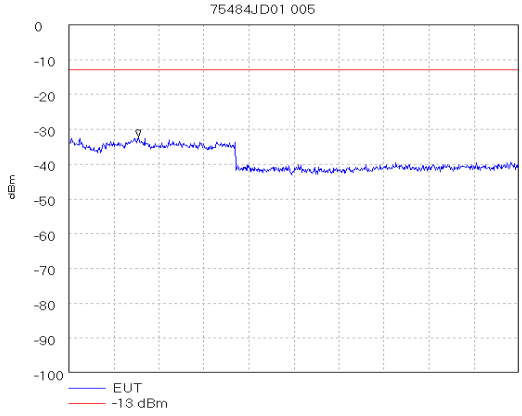
Transmitter Conducted Emissions (continued)



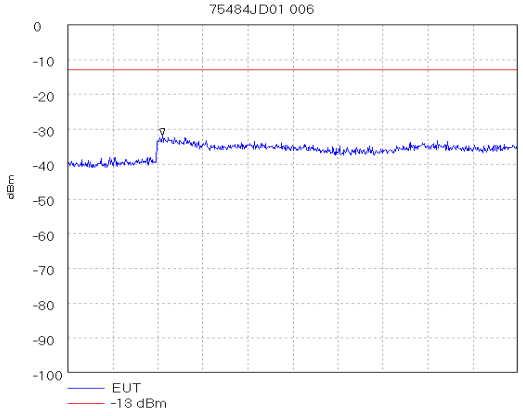
Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 17.5 GHz, -33.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:08:26



Start 20.0 GHz; Stop 25.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 24.033333 GHz, -29.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:09:00

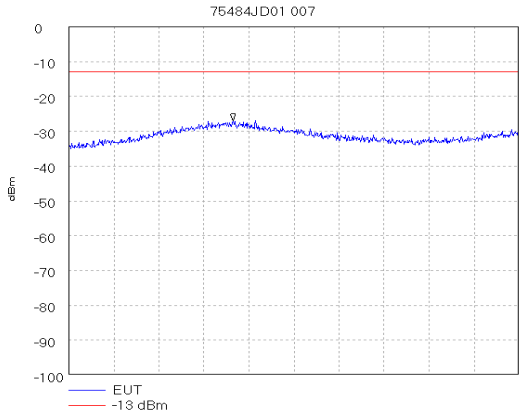


Start 25.0 GHz; Stop 30.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 25.775 GHz, -32.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:09:22



Start 30.0 GHz; Stop 35.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 31.05 GHz, -31.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:09:44

Transmitter Conducted Emissions (continued)



Start 35.0 GHz; Stop 40.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 36.825 GHz, -27.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/09/2009 17:10:09

Transmitter Conducted Emissions (continued)

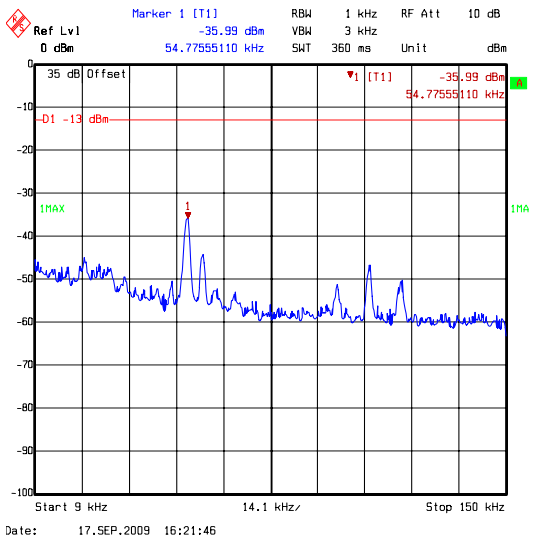
Results: - 10 MHz – 64QAM-2/3

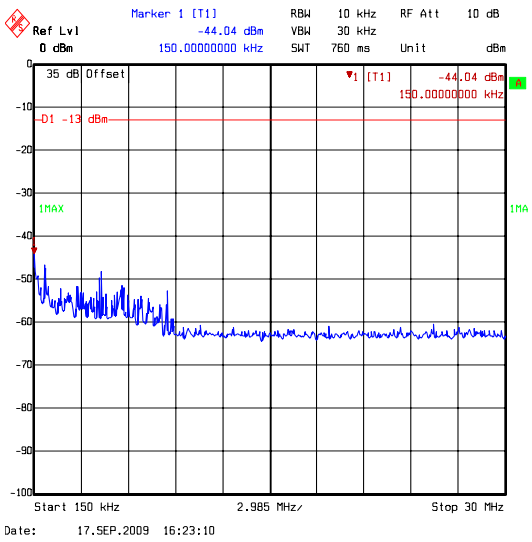
Frequency (GHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
36.808	-25.8	-13.0	12.8	Complied

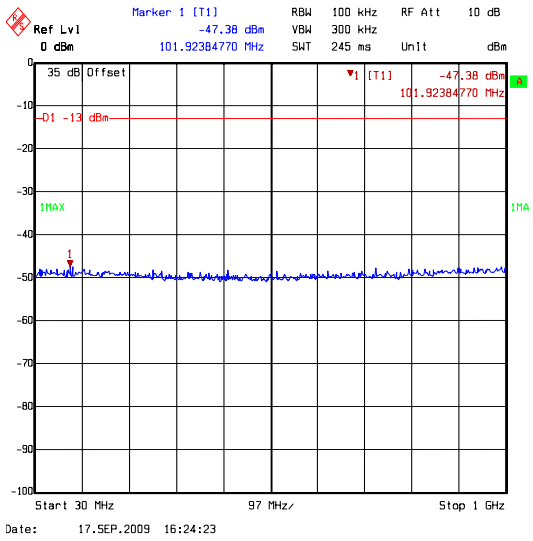
Note(s):

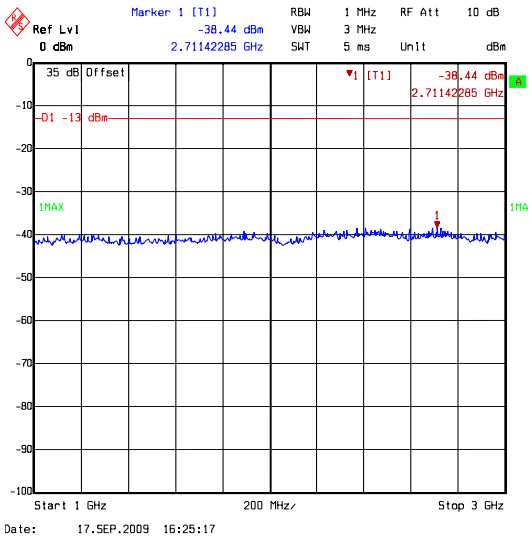
1. Measurements were made at the antenna connector.
2. Measurements were made on 64QAM-2/3 modulation / coding scheme as this was the worse case configuration for both the 5 MHz and 10 MHz bandwidth configuration.
3. All emissions were at least 20 dB below the noise floor. The highest noise floor value from the measurements has been recorded in the tables above.
4. In deviation to TIA-603-C, an audio generator, dummy microphone and RF signal generator were not used for this exercising the equipment. Instead a communications link was maintained with data sent through the link as per section 4.2.
5. In deviation to TIA-603-C the following steps were not applicable to this type of equipment and were by-passed: c), and g) to l)
6. All measurements were compensated for the transmitter's duty cycle. The duty cycle of each modulation and channel bandwidth combination was observed to be the following:
   - Pulse Duration = 2.94 mS
   - Amount in 100 mS = 21
   - Duty Cycle = 62%
   - Correction factor = 2.1 dB

   All of the measurements had a correction factor added into the final result listed in the tables above.



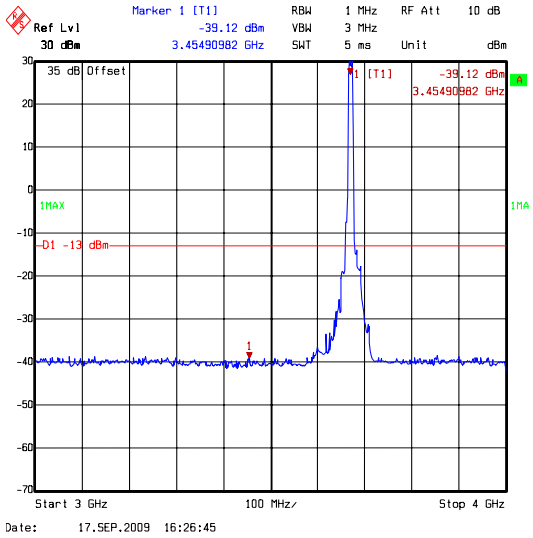


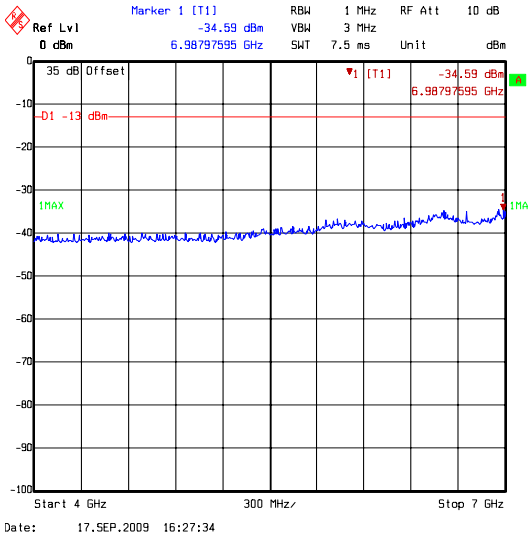

Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
-47.38 dBm
VBW 300 kHz
0 dBm
101.92384770 MHz
SWT 245 ms
Unit dBm
35 dB Offset
1 [T1] -47.38 dBm
101.92384770 MHz
D1 -13 dBm
1MAX
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 17.SEP.2009 16:24:23

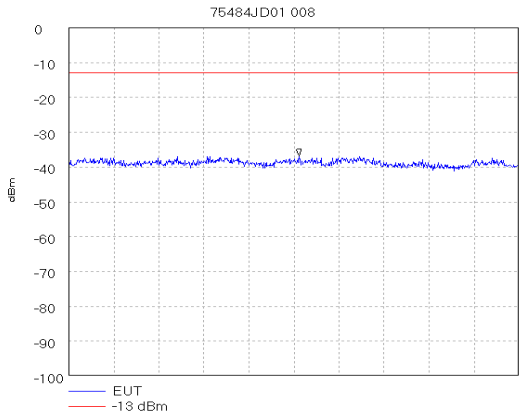

Marker 1 [T1]
RBW 1 MHz
RF Att 10 dB
Ref Lvl
-38.44 dBm
VBW 3 MHz
0 dBm
2.71142285 GHz
SWT 5 ms
Unit dBm
35 dB Offset
1 [T1] -38.44 dBm
2.71142285 GHz
D1 -13 dBm
1MAX
1MA
Start 1 GHz
200 MHz/
Stop 3 GHz
Date: 17.SEP.2009 16:25:17

Transmitter Conducted Emissions (continued)

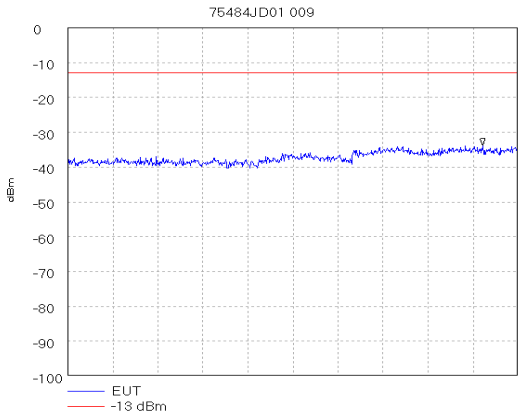
Results: - 10 MHz – 64QAM-2/3







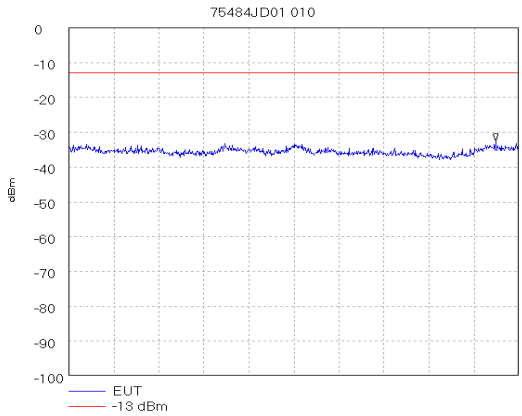
Start 7.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 60.0 mS
Peak 8.535 GHz, -36.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:35:46



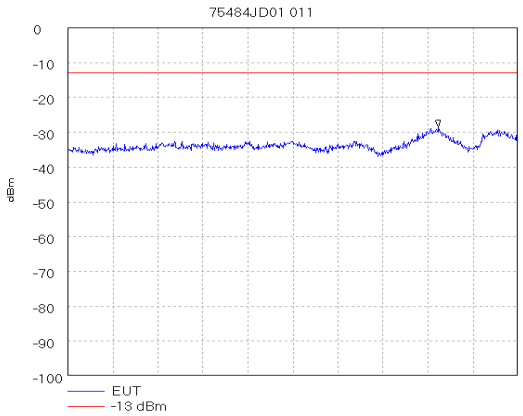
Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 14.608333 GHz, -33.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:36:20

Transmitter Conducted Emissions (continued)

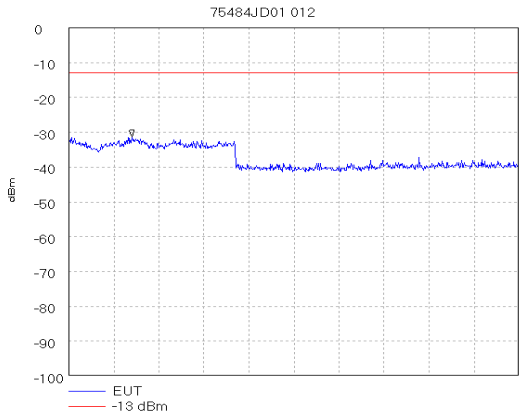
Results: - 10 MHz – 64QAM-2/3



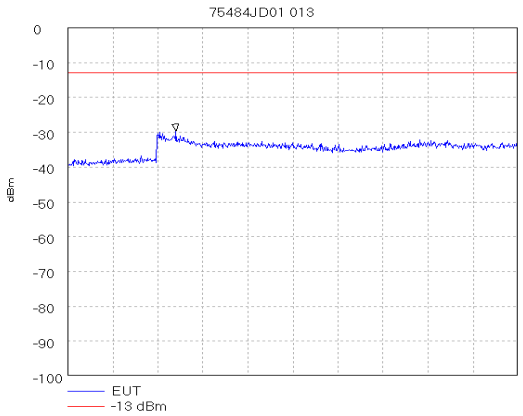
Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 19.741667 GHz, -32.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:36:51



Start 20.0 GHz; Stop 25.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 24.116667 GHz, -28.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:37:15



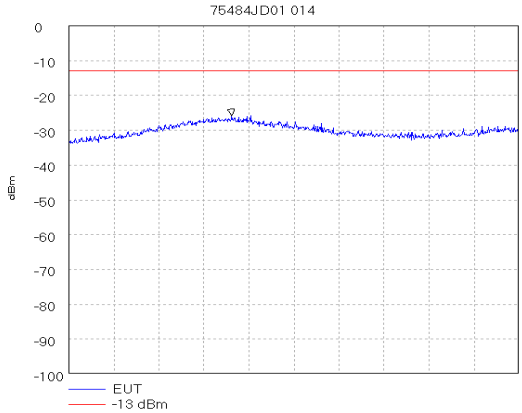
Start 25.0 GHz; Stop 30.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 25.7 GHz, -31.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:37:54



Start 30.0 GHz; Stop 35.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 31.2 GHz, -29.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:38:34

Transmitter Conducted Emissions (continued)

Results: - 10 MHz – 64QAM-2/3



Start 35.0 GHz; Stop 40.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 100.0 mS
Peak 36.808333 GHz, -25.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 17/09/2009 16:39:00

5.2.9. Transmitter Band Edge Conducted Emissions

Test Summary:

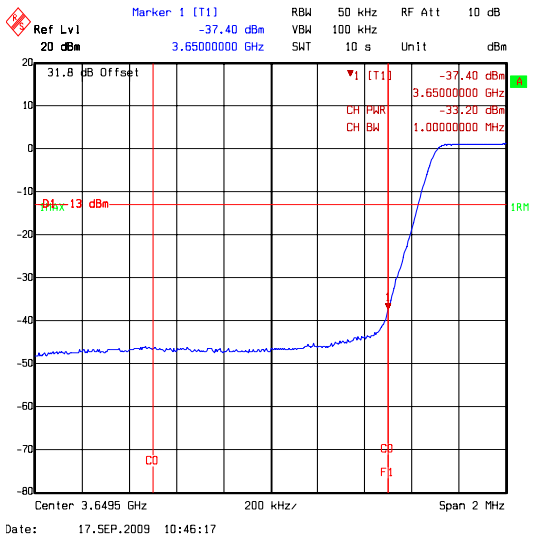
FCC Part:	FCC 90.1323/2.1051
Test Method:	TIA-603-C Section 2.2.13

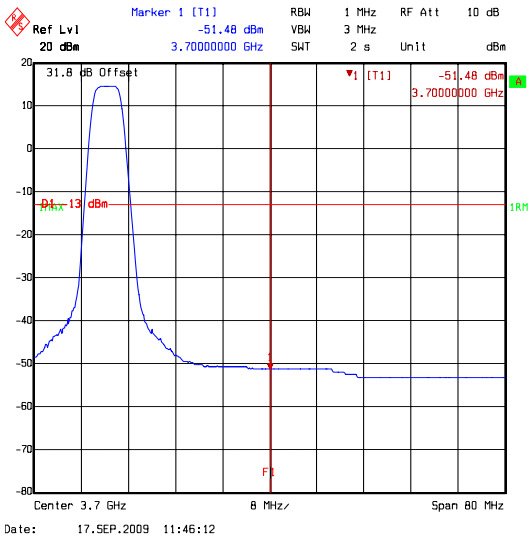
Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	42

Results: - 5 MHz – QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-33.2	-13.0	20.2	Complied
3700	-51.5	-13.0	38.5	Complied

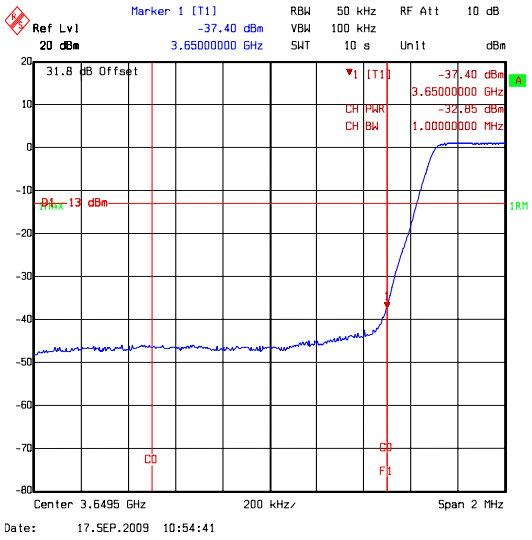


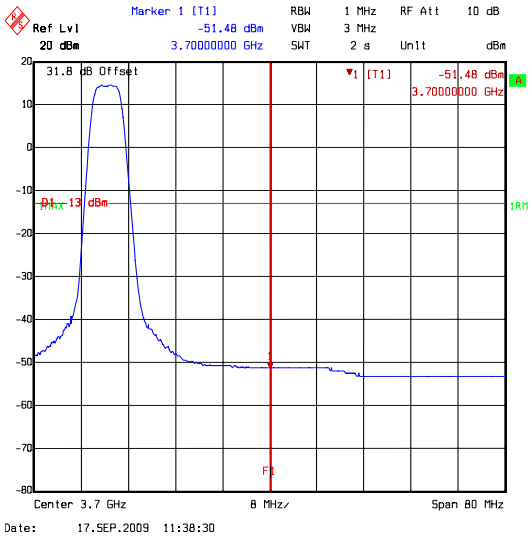


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-32.9	-13.0	19.9	Complied
3700	-51.5	-13.0	38.5	Complied

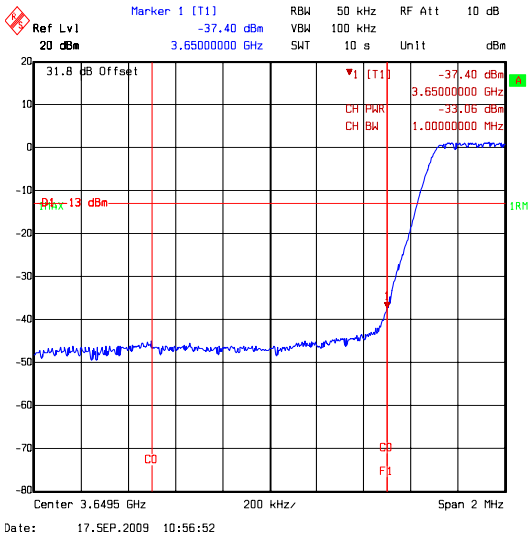


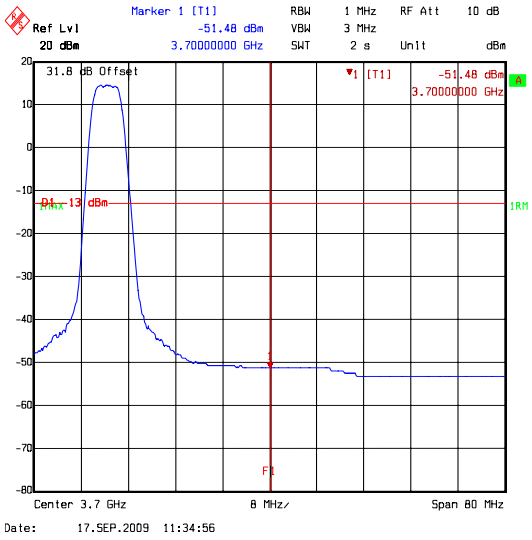


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-33.1	-13.0	20.1	Complied
3700	-51.5	-13.0	38.5	Complied

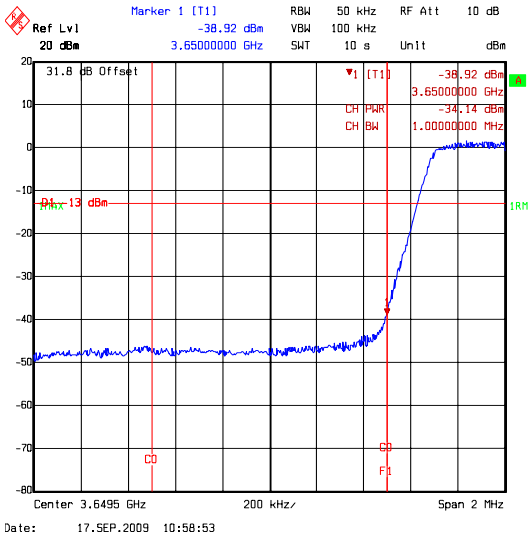


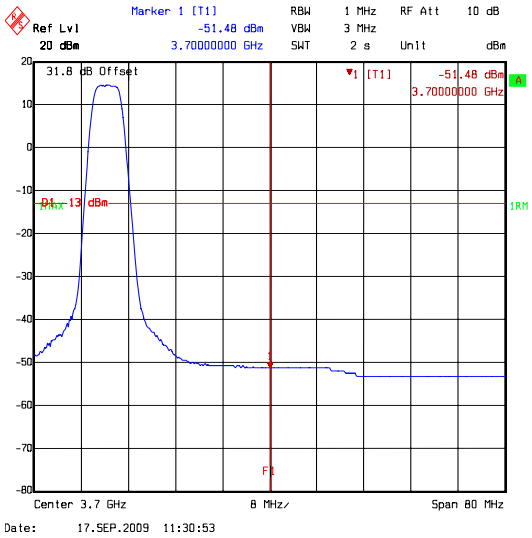


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-34.1	-13.0	21.1	Complied
3700	-51.5	-13.0	38.5	Complied

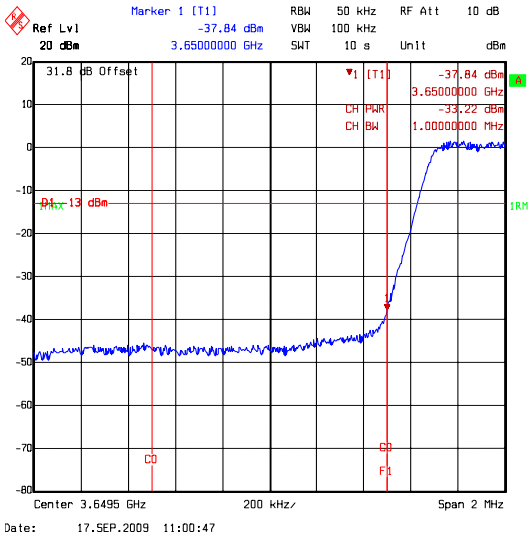


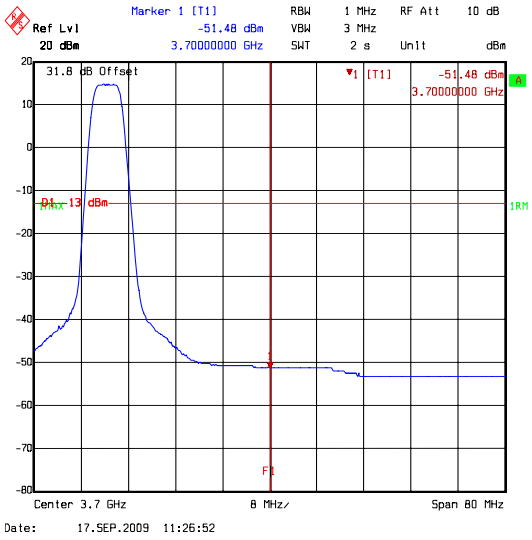


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-33.2	-13.0	20.2	Complied
3700	-51.5	-13.0	28.5	Complied

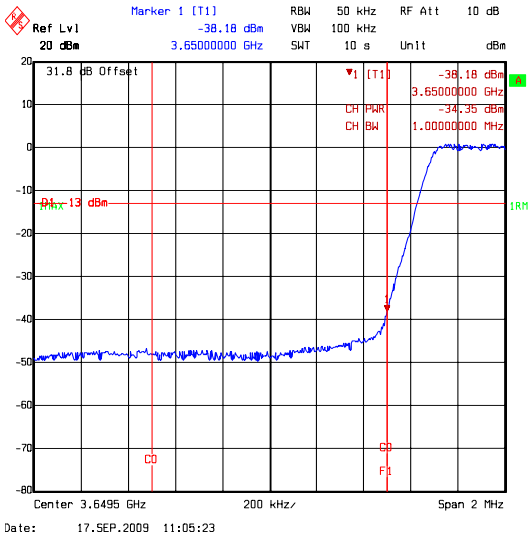


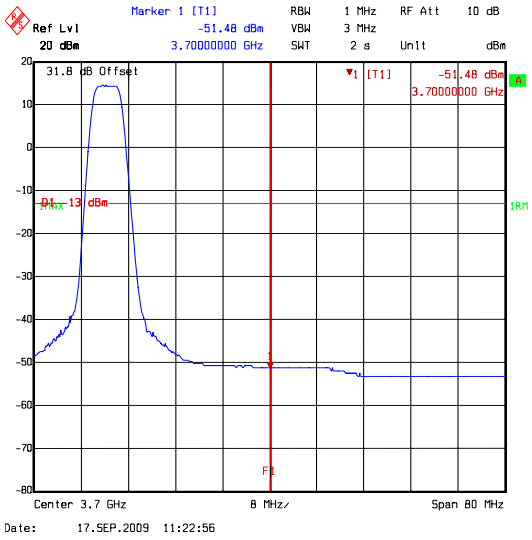


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – 64QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-34.5	-13.0	21.5	Complied
3700	-51.5	-13.0	38.5	Complied

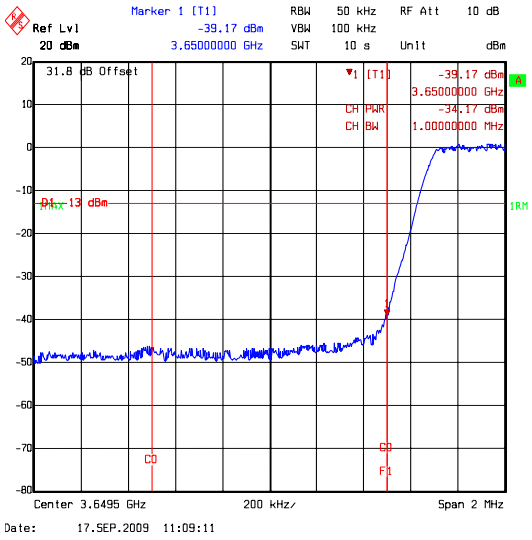


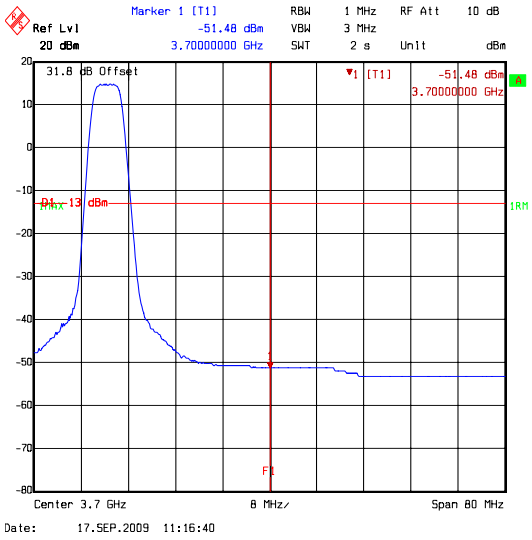


Transmitter Band Edge Conducted Emissions (continued)

Results: - 5 MHz – 64QAM-5/6

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-34.2	-13.0	21.2	Complied
3700	-51.5	-13.0	38.5	Complied

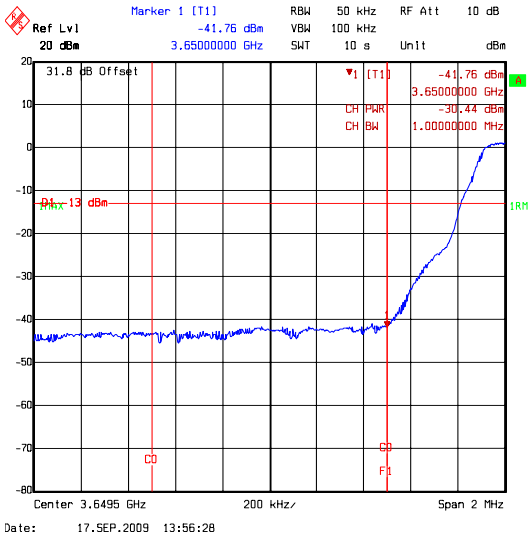


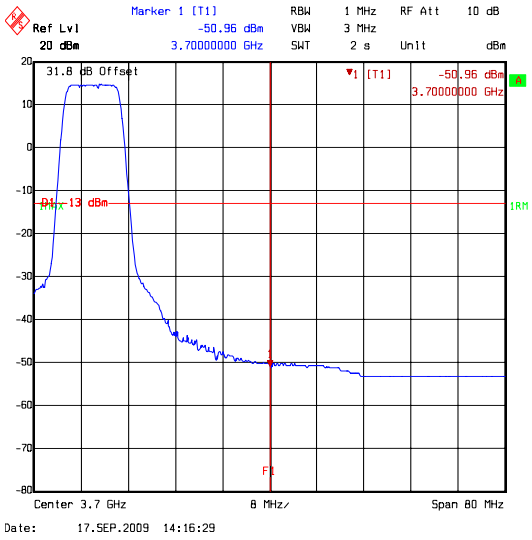


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-30.4	-13.0	17.4	Complied
3700	-51.0	-13.0	38.0	Complied

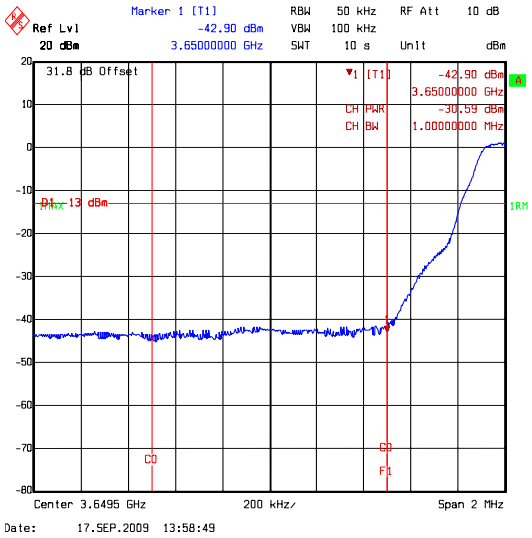


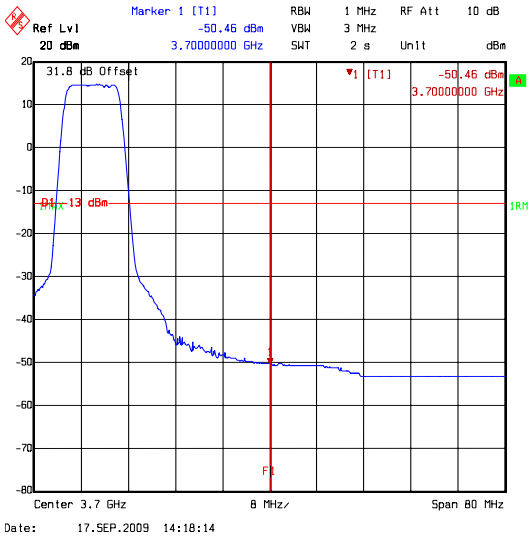


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-30.6	-13.0	17.6	Complied
3700	-50.5	-13.0	37.5	Complied

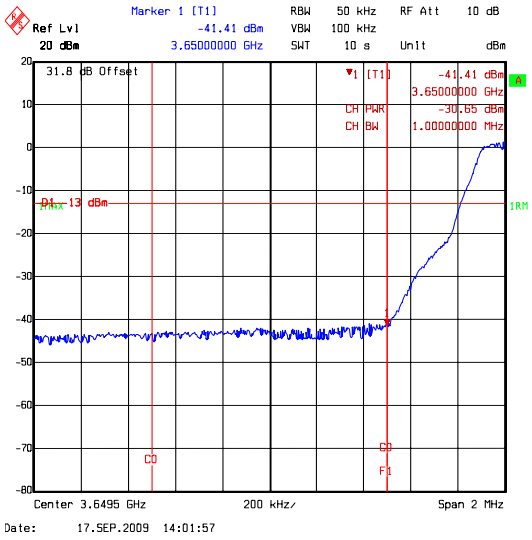


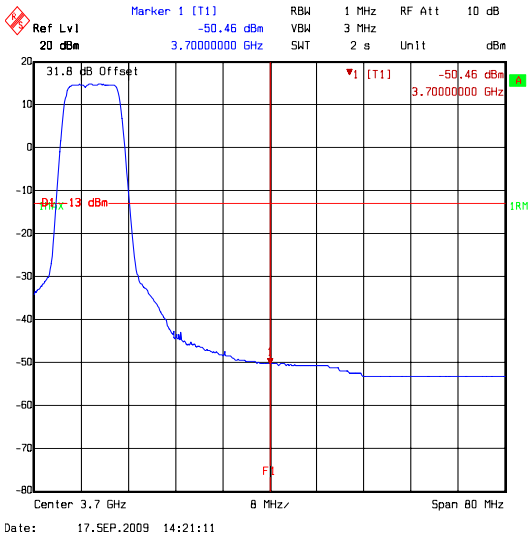


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-30.7	-13.0	17.7	Complied
3700	-50.5	-13.0	37.5	Complied

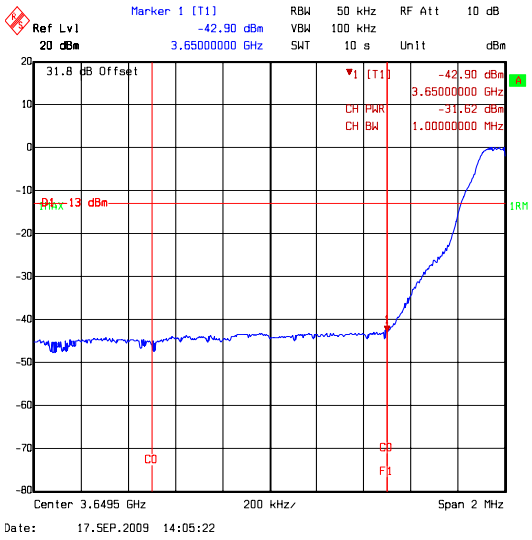


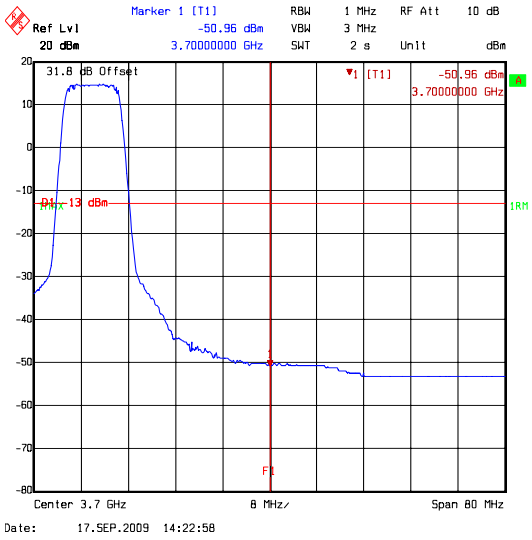


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-31.6	-13.0	18.6	Complied
3700	-51.0	-13.0	-58.0	Complied

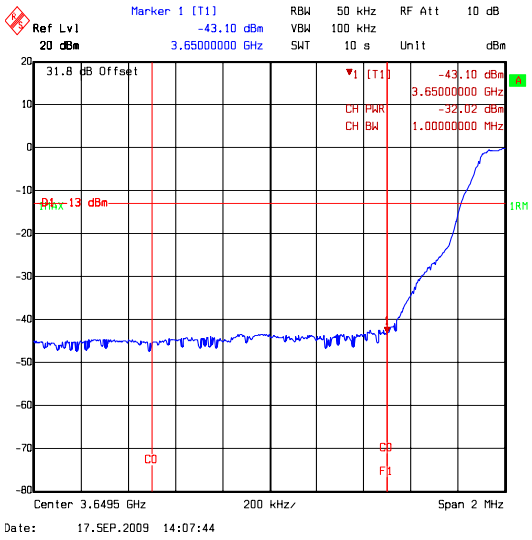


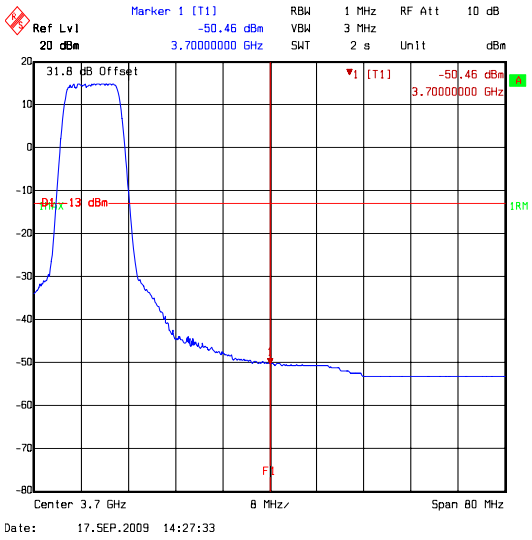


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-32.0	-13.0	19.0	Complied
3700	-50.5	-13.0	37.5	Complied

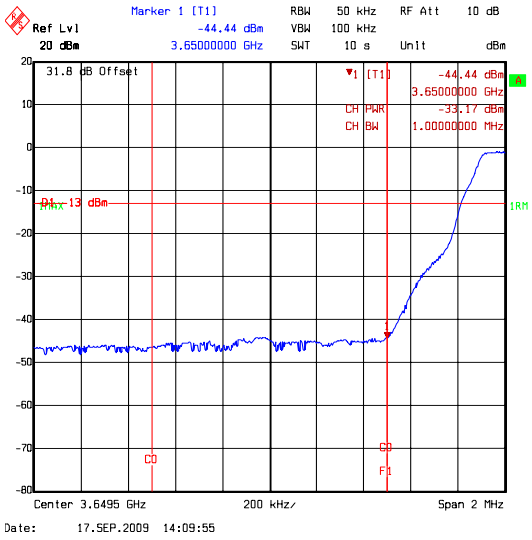


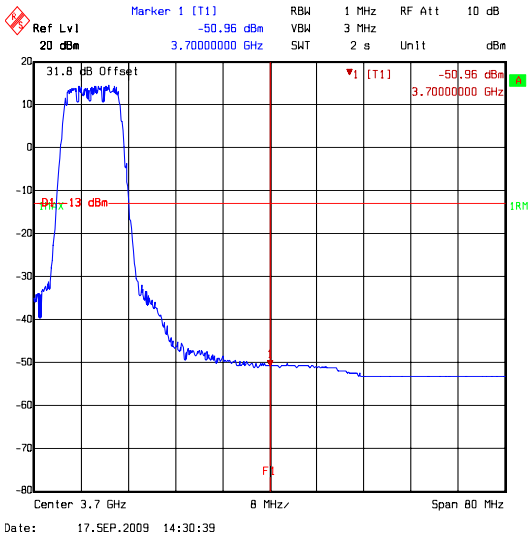


Transmitter Band Edge Conducted Emissions (continued)

Results: - 10 MHz – 64QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-33.2	-13.0	20.2	Complied
3700	-51.0	-13.0	59.0	Complied





Transmitter Band Edge Conducted Emissions (continued)

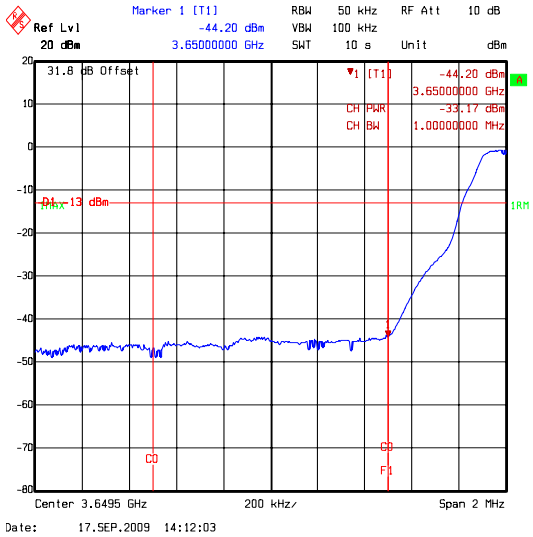
Results: - 10 MHz – 64QAM-5/6

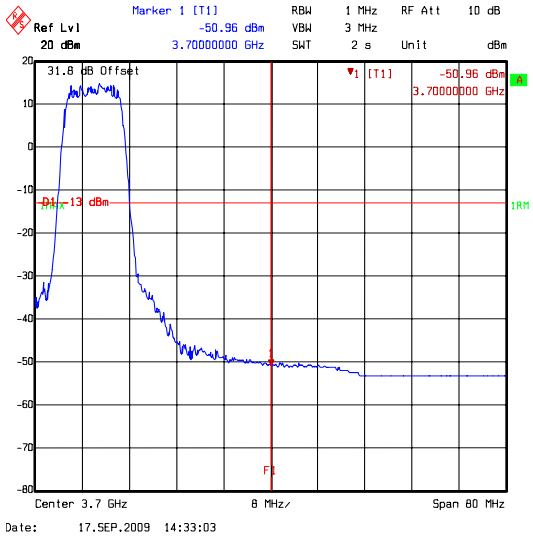
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-33.2	-13.0	20.2	Complied
3700	-51.0	-13.0	58.0	Complied

Note(s):

1. Tests were performed to identify the maximum conducted band edge emission levels.
2. The tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom channels with 1 MHz RBW, the EUT was retested using a RBW of more than 1% of the emission bandwidth in the first 1 MHz strip adjacent to the band edge.
3. In deviation to TIA-603-C the following steps were not applicable to this type of equipment and were by-passed: c), and g) to l)
4. All measurements were compensated for the transmitter's duty cycle. The duty cycle of each modulation and channel bandwidth combination was observed to be the following:
   - Pulse Duration = 2.94 mS
   - Amount in 100 mS = 21
   - Duty Cycle = 62%
   - Correction factor = 2.1 dB

   All of the measurements had a correction factor added into the final result listed in the tables above.





5.2.10. Transmitter Radiated Emissions – Directional Antenna

Test Summary:

FCC Part:	FCC 90.1323
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	35

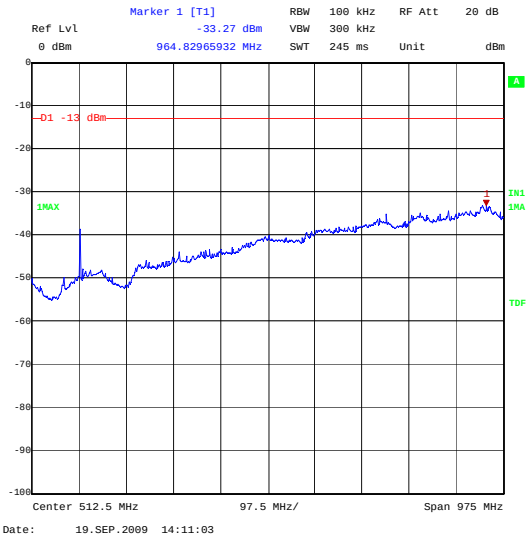
Results: – Directional Antenna

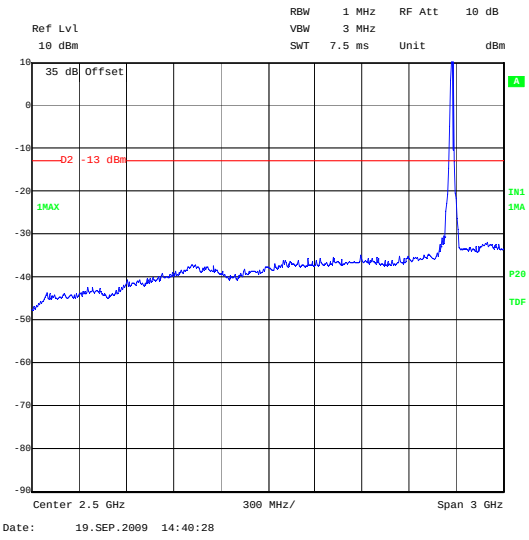
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
6997.996	-22.2	-13.0	9.2	Complied

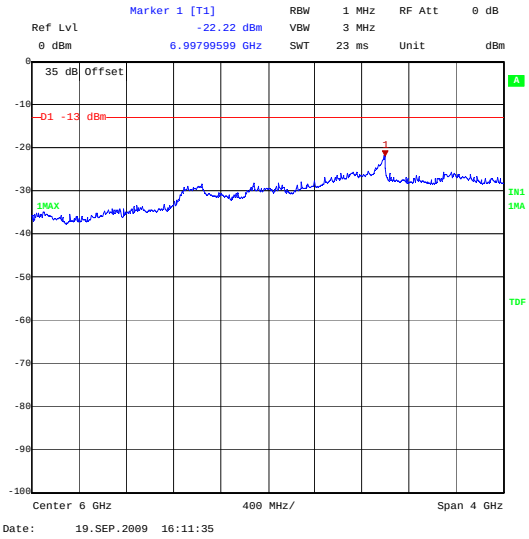
Note(s):

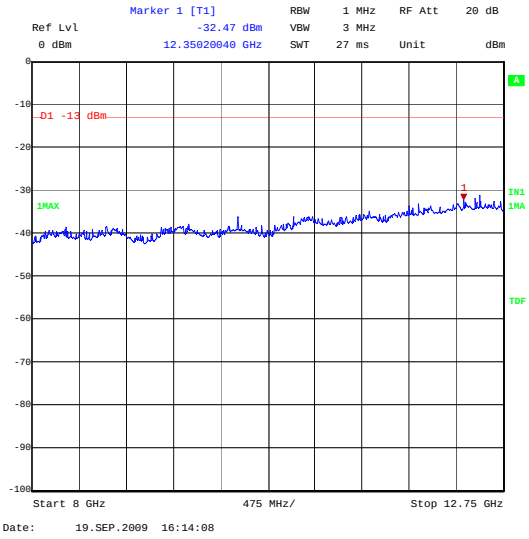
1. No emissions were indicated during the pre-scans, however the noise floor was within 20 dB below the limit and as such, has been recorded in the table above.

Transmitter Radiated Emissions – Directional Antenna (continued)

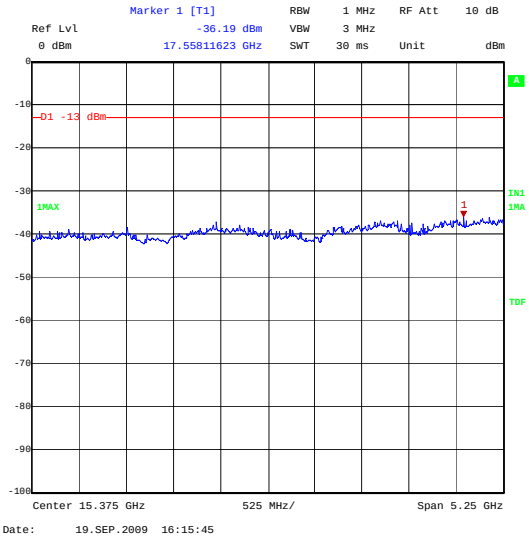


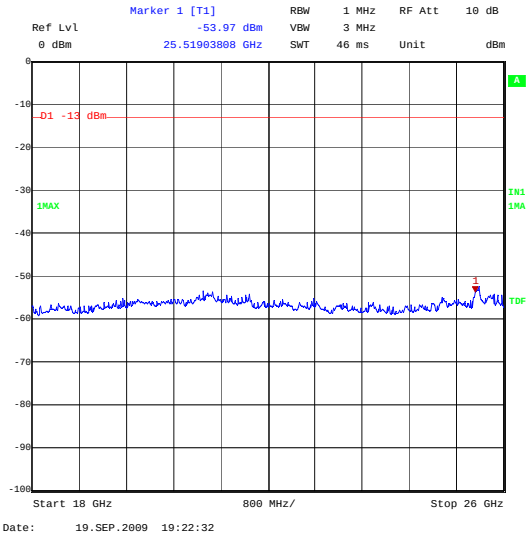


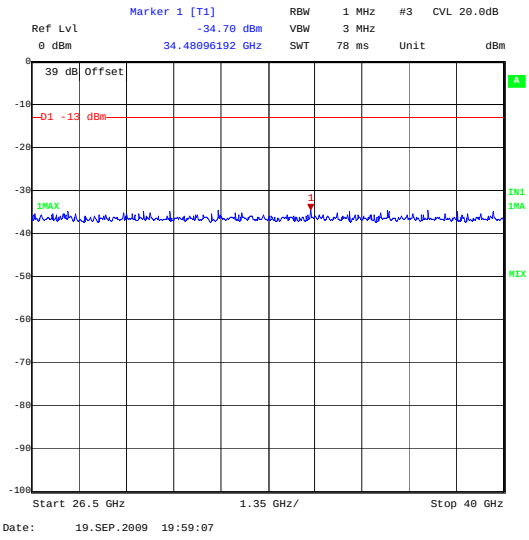




Transmitter Radiated Emissions – Directional Antenna (continued)







5.2.11. Transmitter Radiated Emissions - Omni Directional Antenna

Test Summary:

FCC Part:	FCC 90.210
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	35

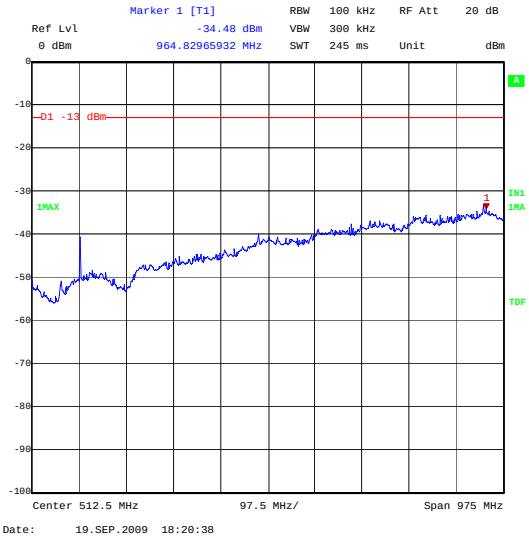
Results: – Omni Directional Antenna

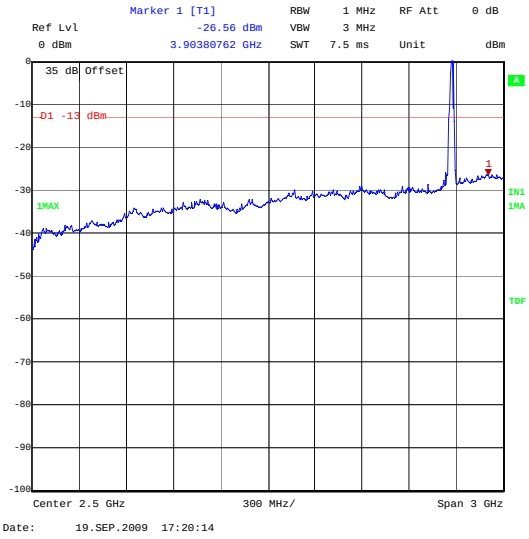
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
6973.948	-22.7	-13.0	9.7	Complied

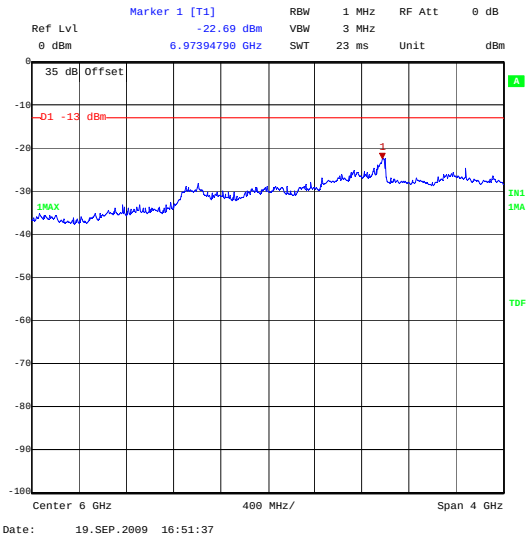
Note(s):

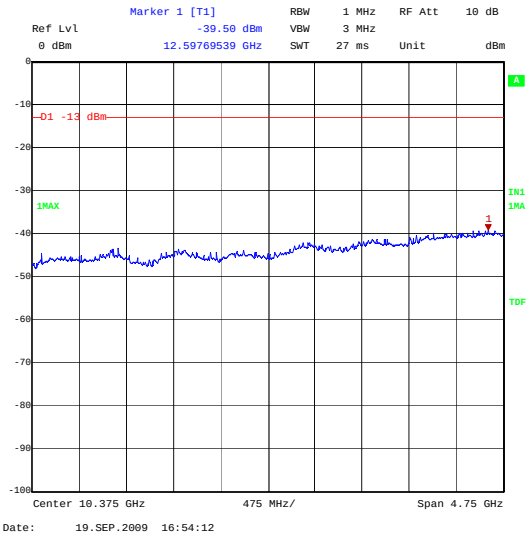
1. No emissions were measured during pre-scans, however the noise floor was more than 20 dB below the limit and as such, has been recorded in the table above.

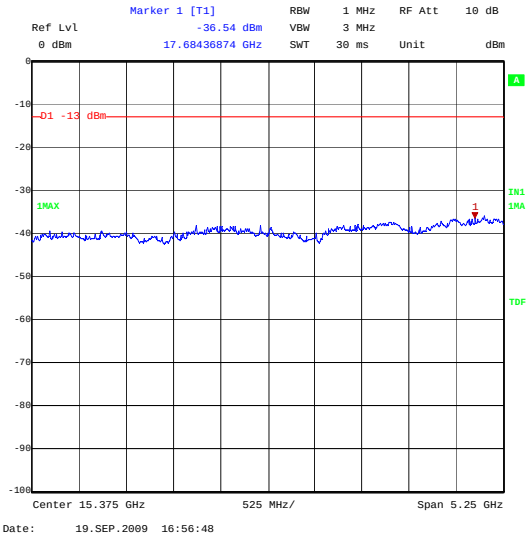
Transmitter Radiated Emissions – Omni Directional Antenna (continued)

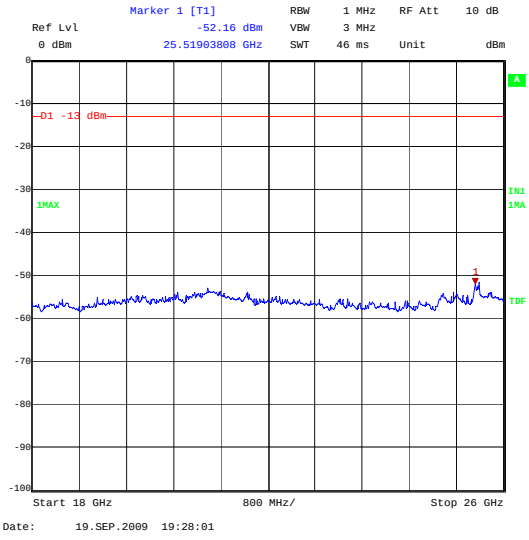




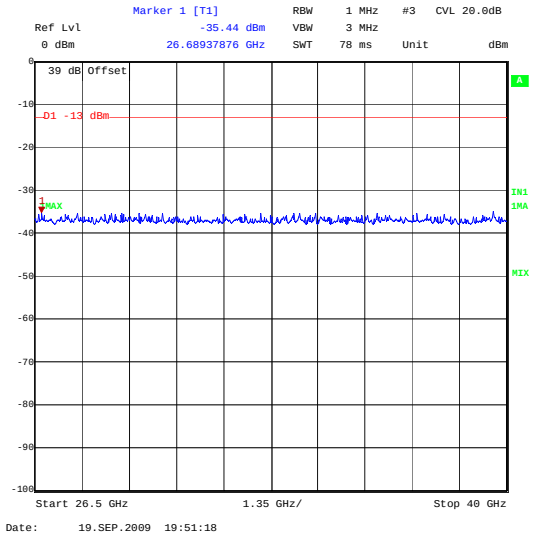








Transmitter Radiated Emissions – Omni Directional Antenna (continued)



5.2.12. Transmitter Band Edge Radiated Emissions - Directional Antenna

Test Summary:

FCC Part:	FCC 90.1323/2.1053
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	35

Results: - 5 MHz QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.5	-13.0	23.5	Complied

Results: - 5 MHz QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.7	-13.0	13.7	Complied

Results: - 5 MHz 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.5	-13.0	13.5	Complied

Results: - 5 MHz 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.7	-13.0	13.7	Complied

Results: - 5 MHz 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.3	-13.0	13.3	Complied

Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

Results: - 5 MHz 64QAM-3/4

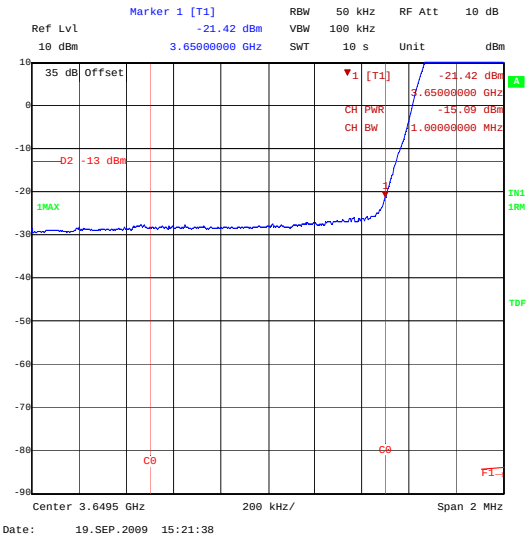
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-16.1	-13.0	3.1	Complied
3700	-36.5	-13.0	13.5	Complied

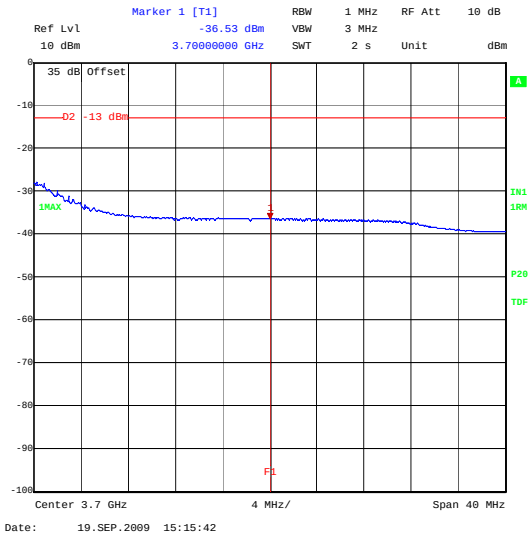
Results: - 5 MHz 64QAM-5/6

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-16.2	-13.0	3.2	Complied
3700	-36.7	-13.0	13.7	Complied

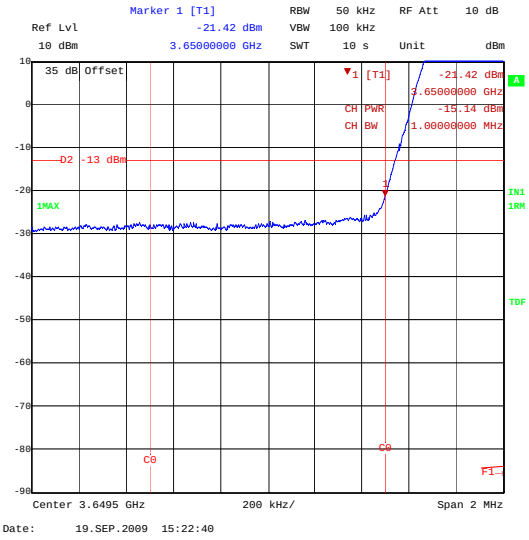
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

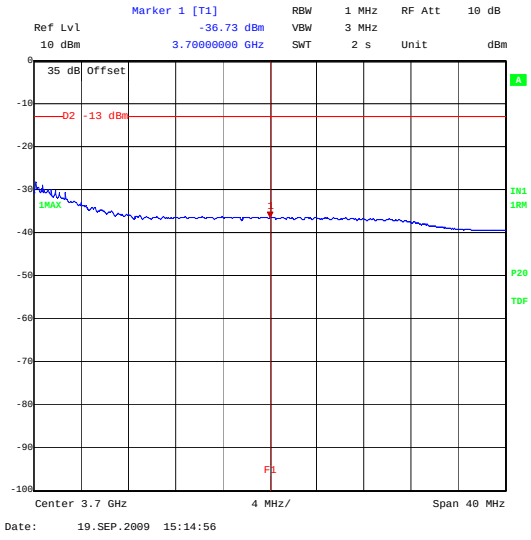
5 MHz QPSK-1/2





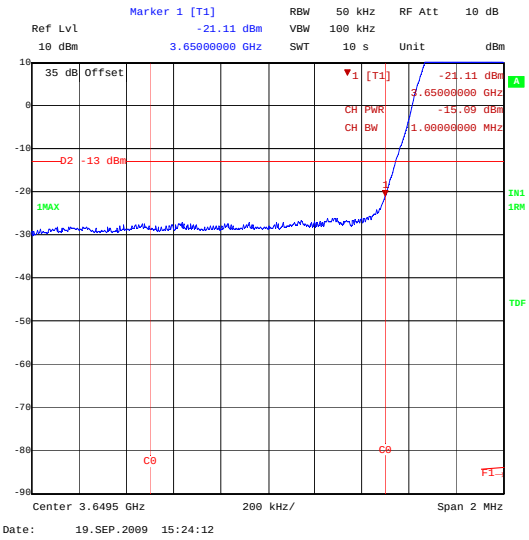
5 MHz QPSK-3/4

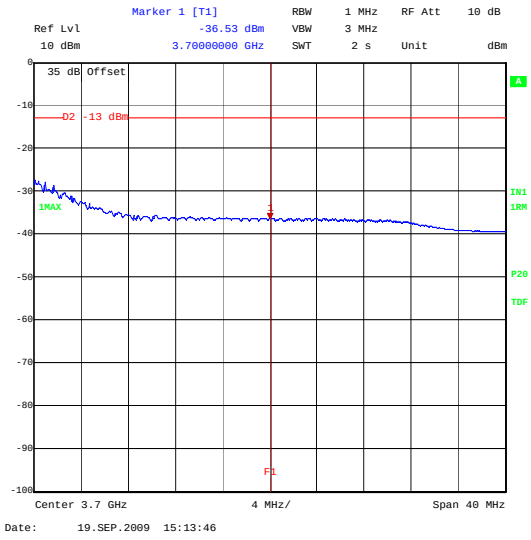




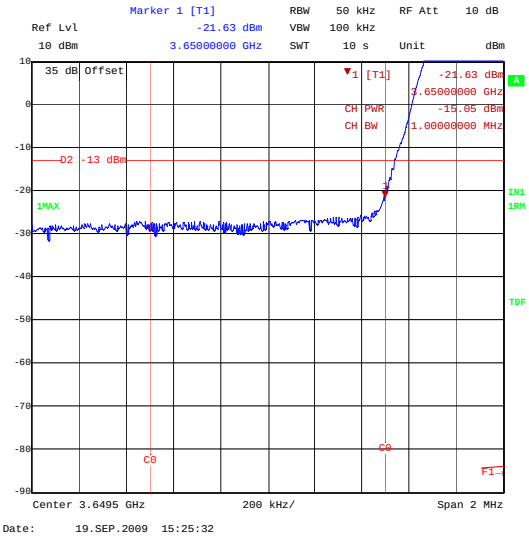
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

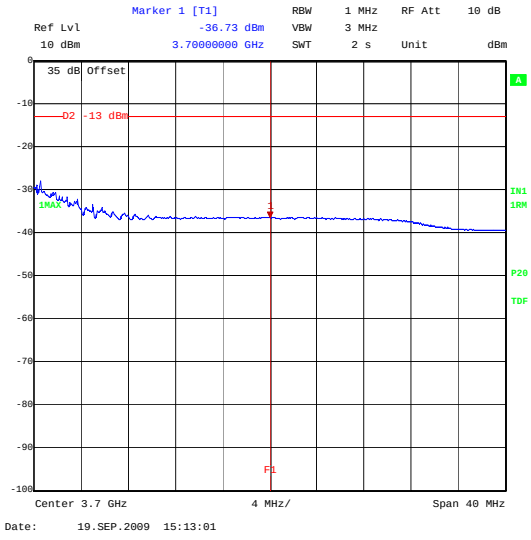
5 MHz 16QAM-1/2





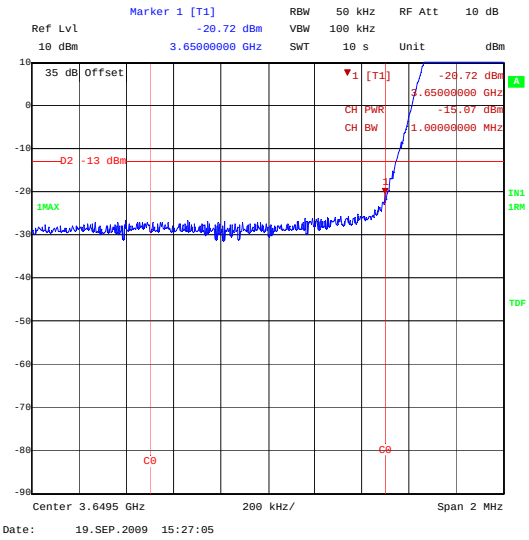
5 MHz 16QAM-3/4

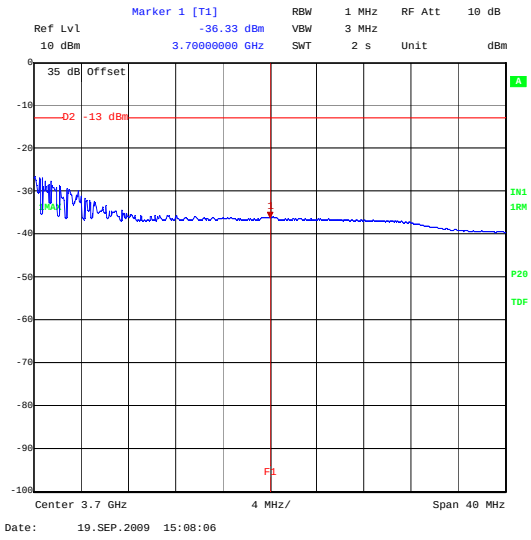




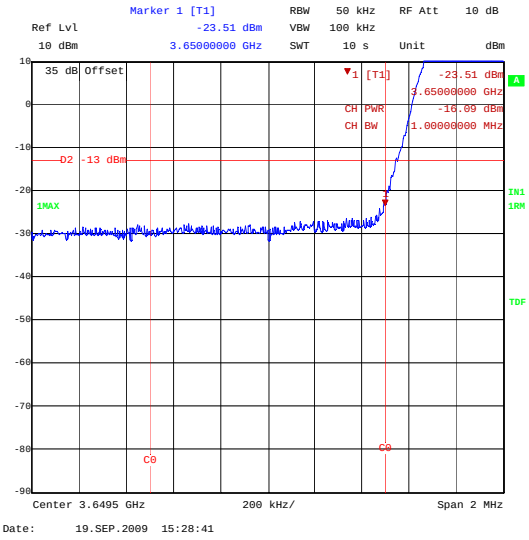
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

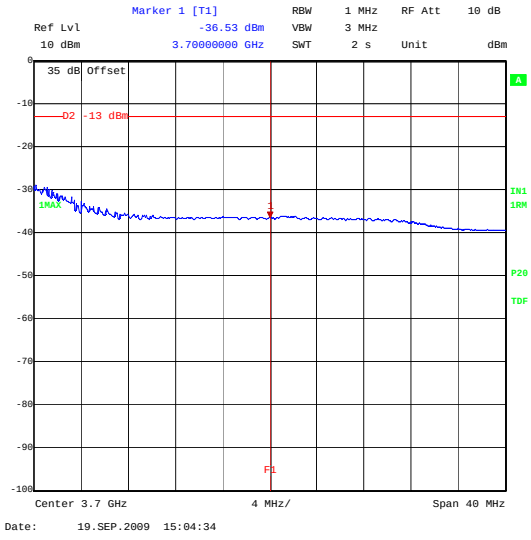
5 MHz 64QAM-1/2





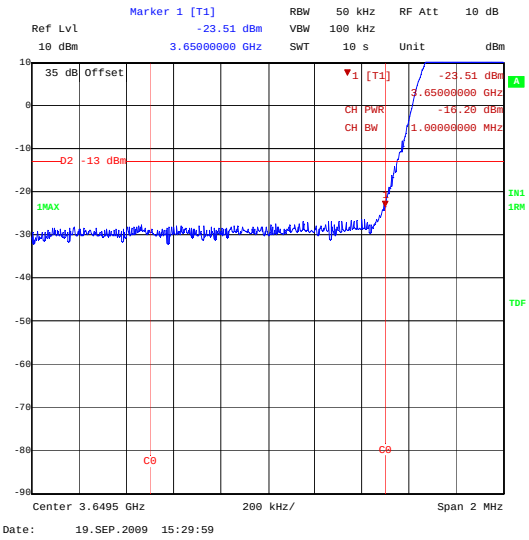
5 MHz 64QAM-3/4

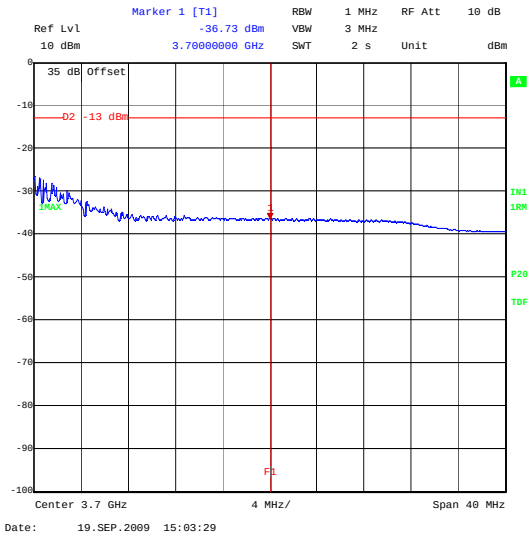




Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

5 MHz 64QAM-5/6





5.2.13. Transmitter Band Edge Radiated Emissions - Directional Antenna

Test Summary:

FCC Part:	FCC 90.1323/2.1053
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	35

Results: - 10 MHz QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-13.5	-13.0	0.5	Complied
3700	-35.6	-13.0	12.6	Complied

Results: -10 MHz QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-13.5	-13.0	0.5	Complied
3700	-35.8	-13.0	12.8	Complied

Results: - 10 MHz 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-13.6	-13.0	0.6	Complied
3700	-35.6	-13.0	12.6	Complied

Results: - 10 MHz 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-14.1	-13.0	1.1	Complied
3700	-36.5	-13.0	13.5	Complied

Results: - 10 MHz 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-14.5	-13.0	1.5	Complied
3700	-35.6	-13.0	12.6	Complied

Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

Results: -10 MHz 64QAM-3/4

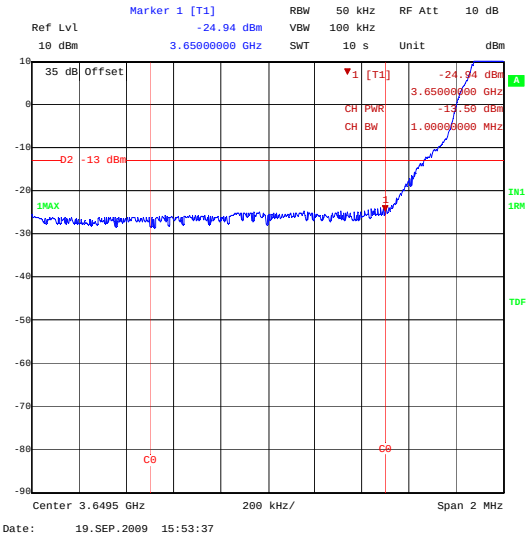
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.1	-13.0	2.1	Complied
3700	-36.1	-13.0	13.1	Complied

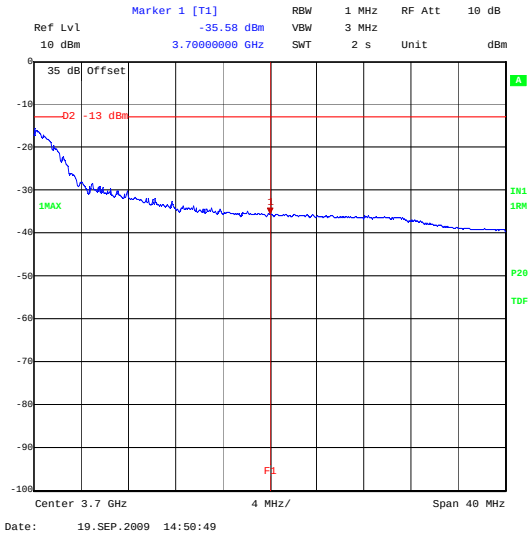
Results: -10 MHz 64QAM-5/6

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-14.7	-13.0	1.7	Complied
3700	-36.3	-13.0	13.3	Complied

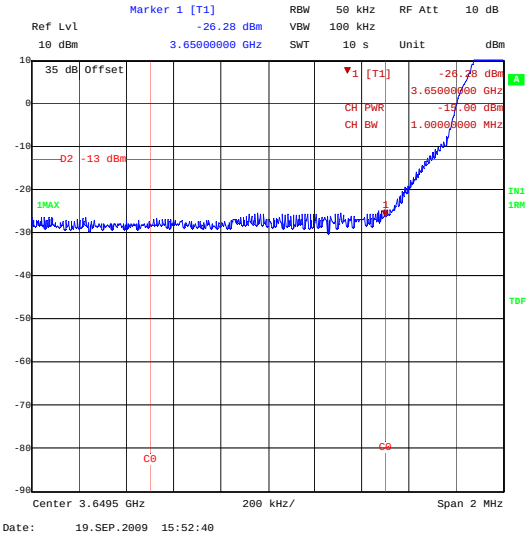
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

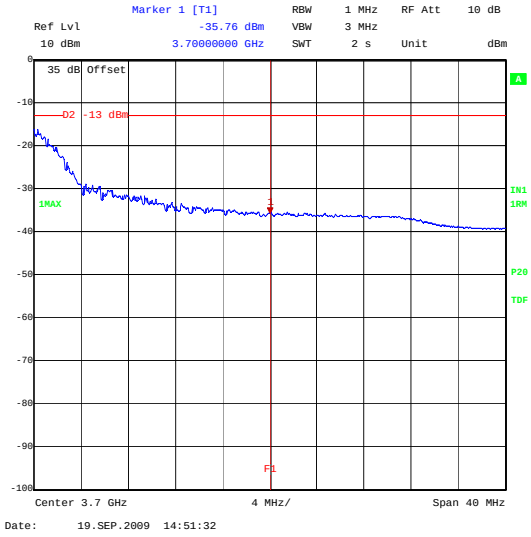
10 MHz QPSK-1/2





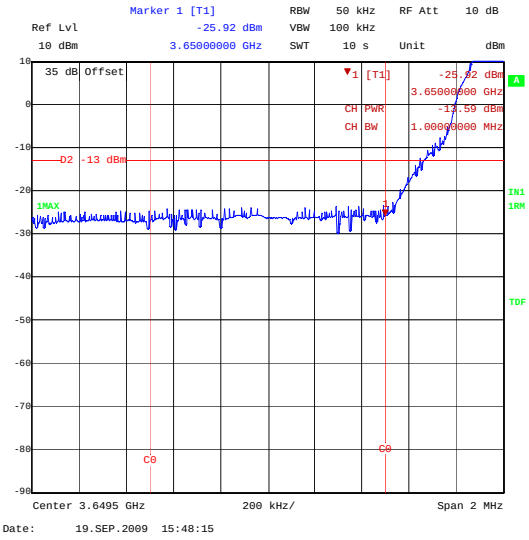
10 MHz QPSK-3/4

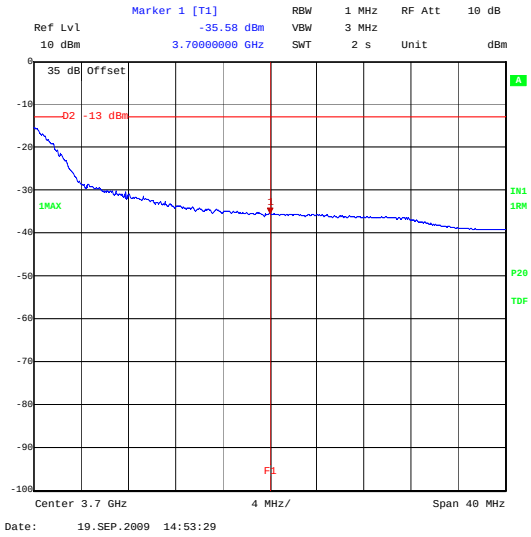




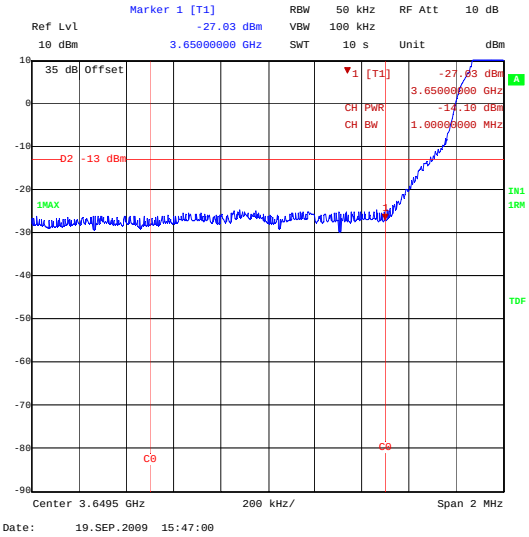
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

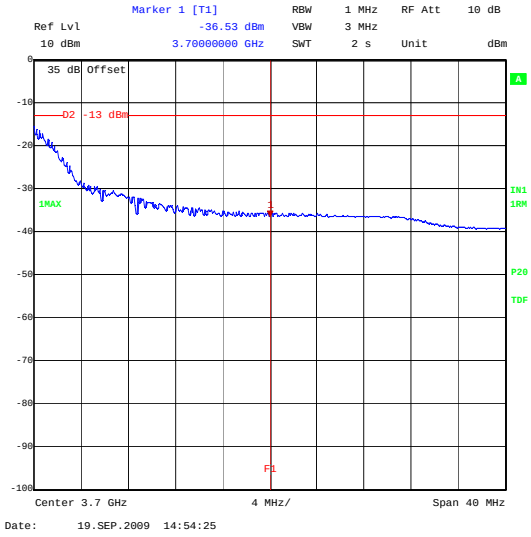
10 MHz 16QAM-1/2





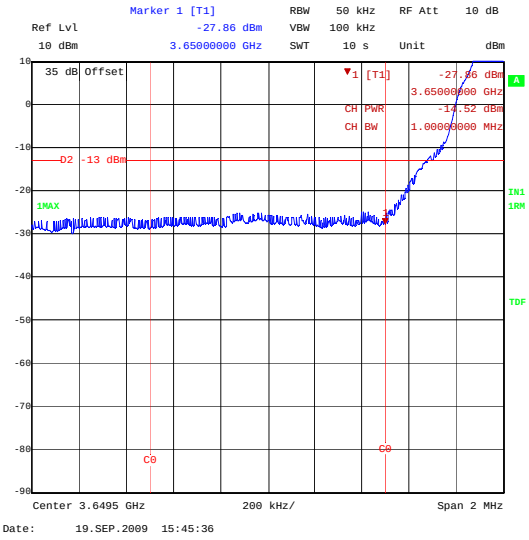
10 MHz 16QAM-3/4

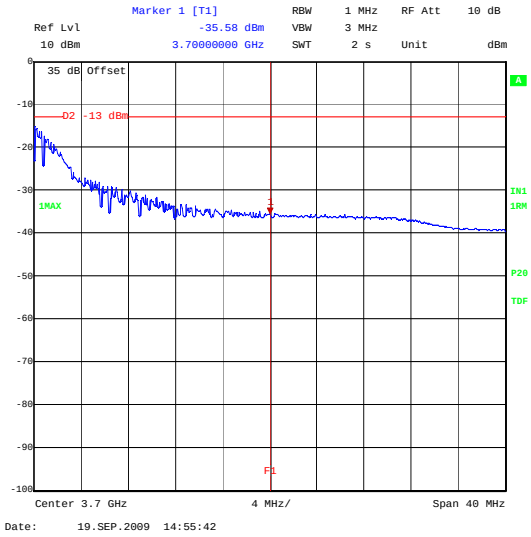




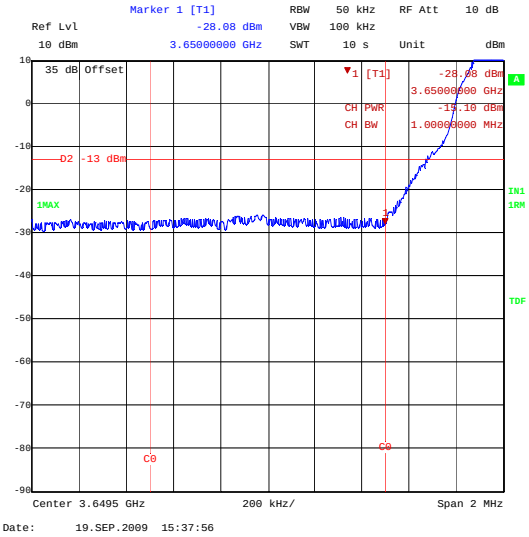
Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

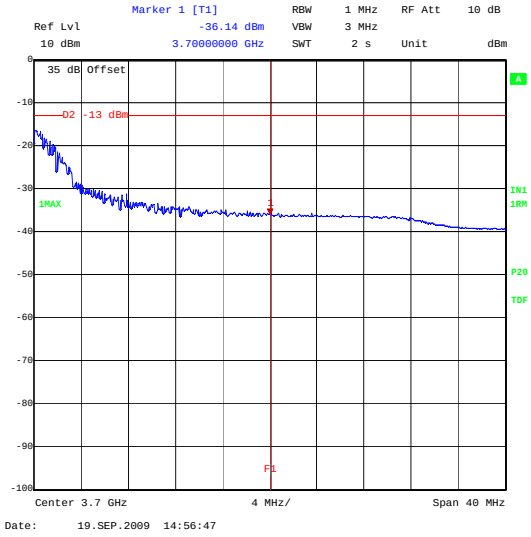
10 MHz 64QAM-2/3





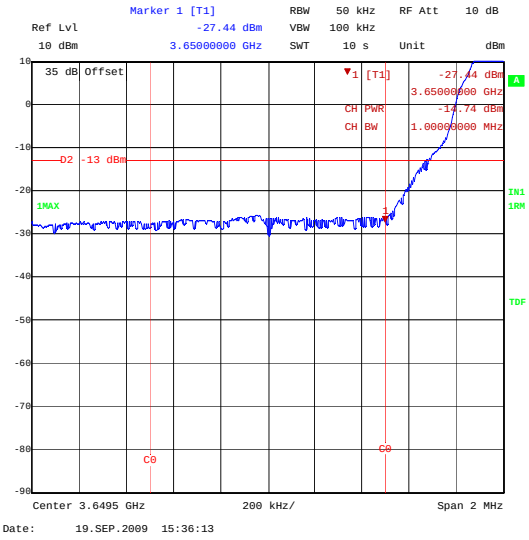
10 MHz 64QAM-3/4

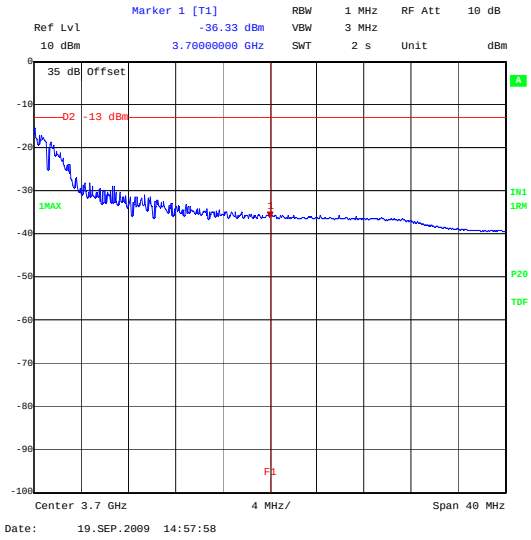




Transmitter Band Edge Radiated Emissions - Directional Antenna (continued)

10 MHz 64QAM-5/6





5.2.14. Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna

Test Summary:

FCC Part:	FCC 90.1323/2.1053
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	22.
Relative Humidity (%):	34

Results: - 5 MHz QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-14.6	-13.0	1.6	Complied
3700	-39.6	-13.0	16.6	Complied

Results: - 5 MHz QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-14.9	-13.0	1.9	Complied
3700	-39.5	-13.0	16.9	Complied

Results: - 5 MHz 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.4	-13.0	2.4	Complied
3700	-39.4	-13.0	16.4	Complied

Results: - 5 MHz 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.5	-13.0	2.5	Complied
3700	-39.4	-13.0	16.4	Complied

Results: - 5 MHz 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.9	-13.0	2.9	Complied
3700	-39.5	-13.0	16.5	Complied

Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

Results: - 5 MHz 64QAM-3/4

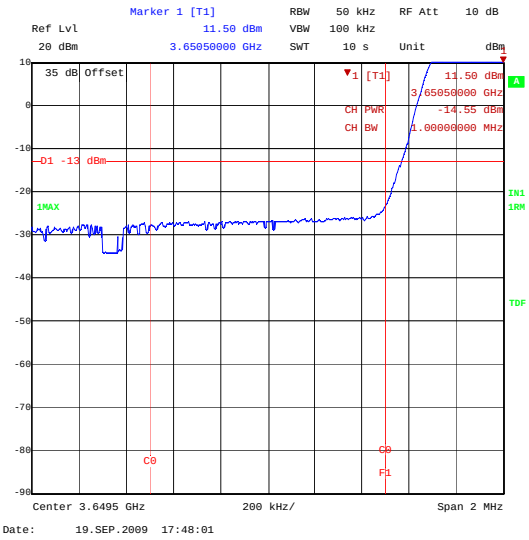
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-16.8	-13.0	3.8	Complied
3700	-39.5	-13.0	16.5	Complied

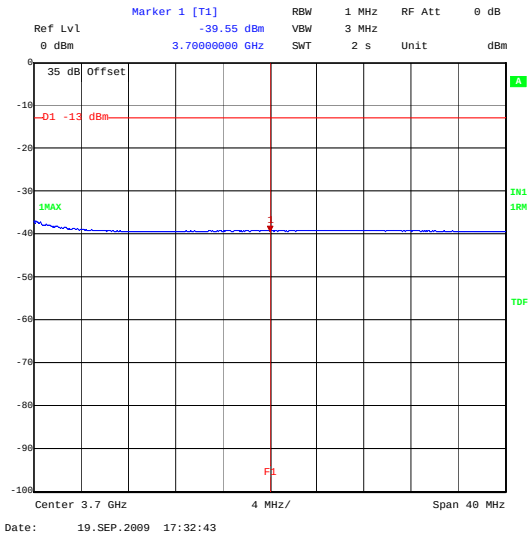
Results: - 5 MHz 64QAM-5/6

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-15.8	-13.0	2.8	Complied
3700	-39.5	-13.0	16.5	Complied

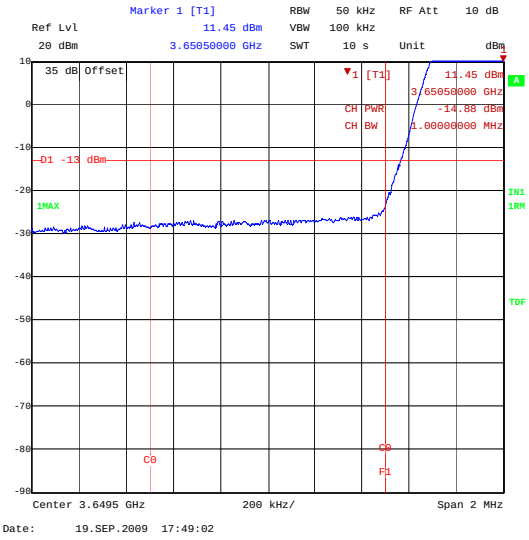
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

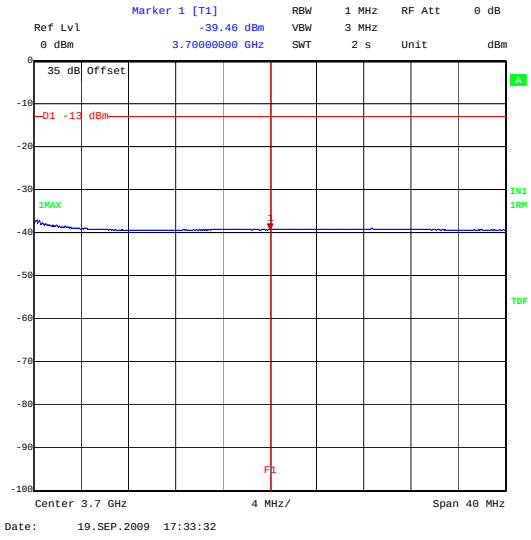
5 MHz QPSK-1/2





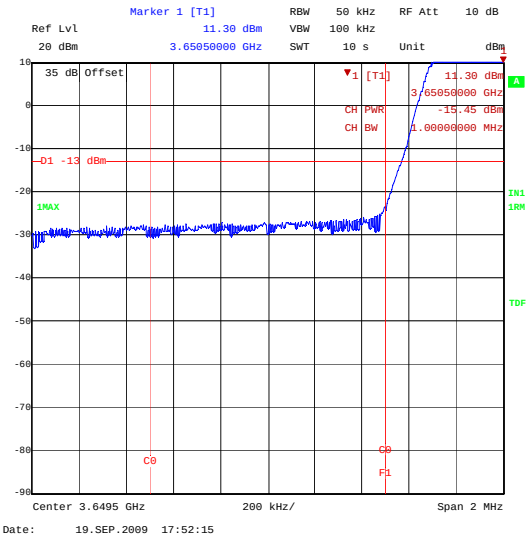
5 MHz QPSK-3/4

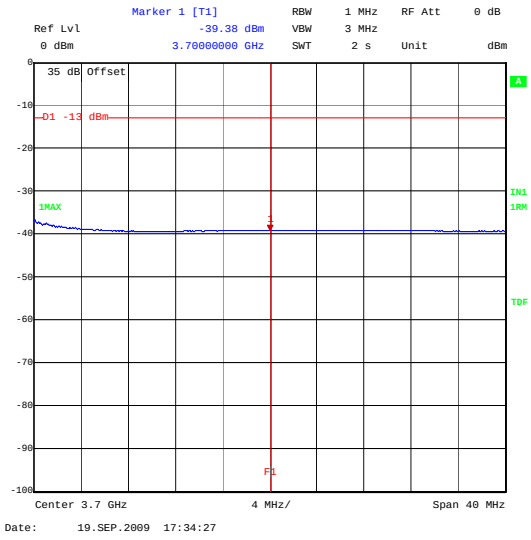




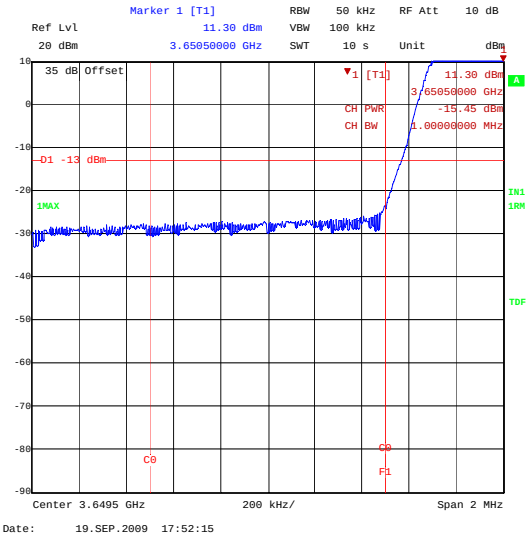
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

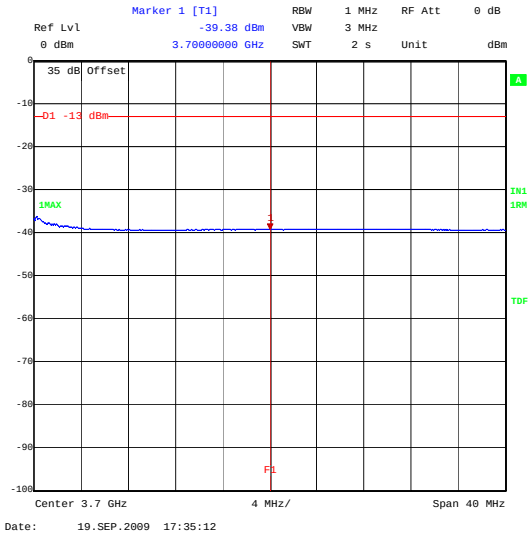
5 MHz 16QAM-1/2





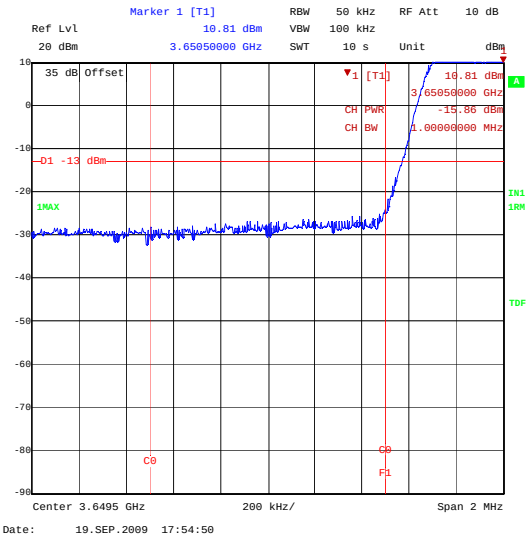
5 MHz 16QAM-3/4

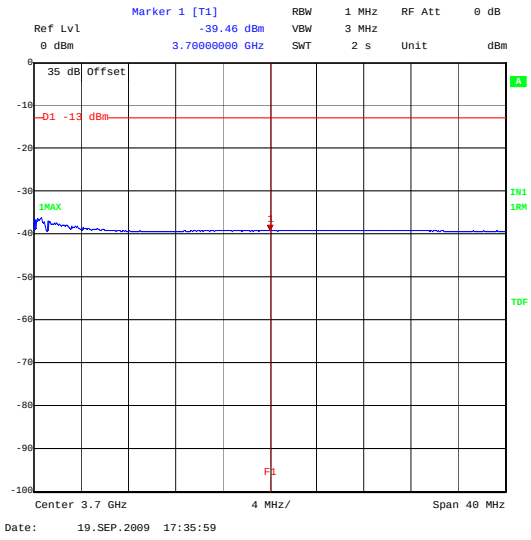




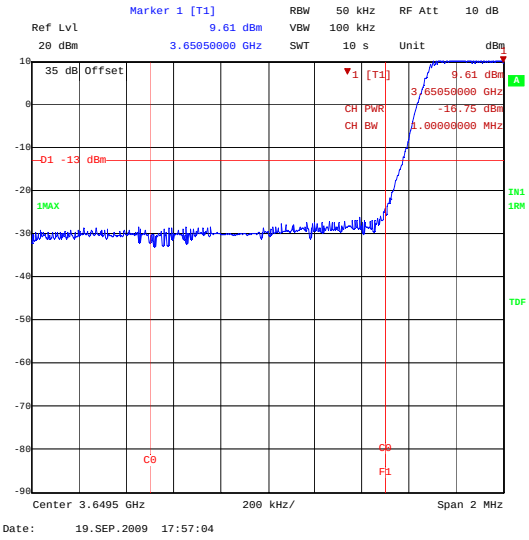
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

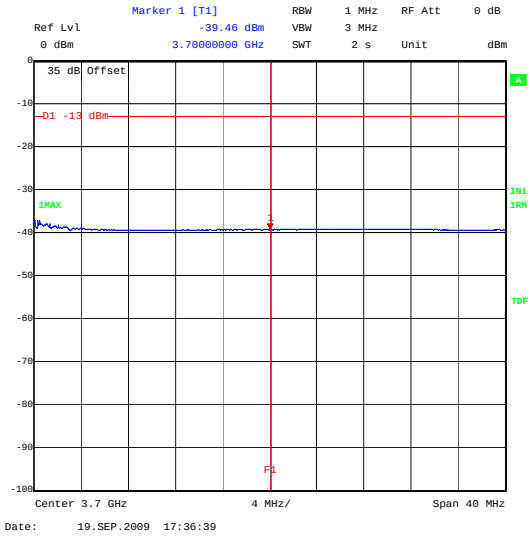
5 MHz 64QAM-2/3





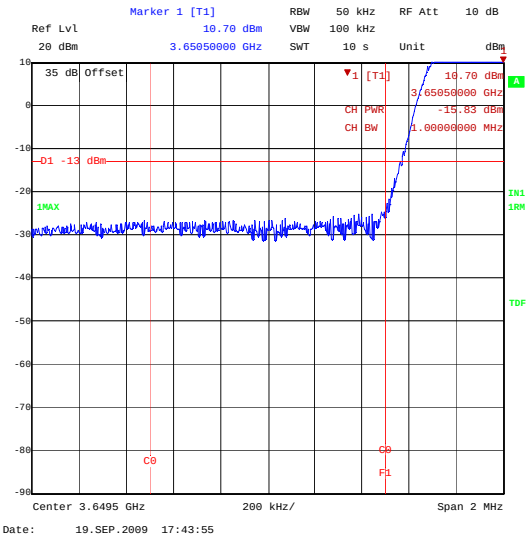
5 MHz 64QAM-3/4

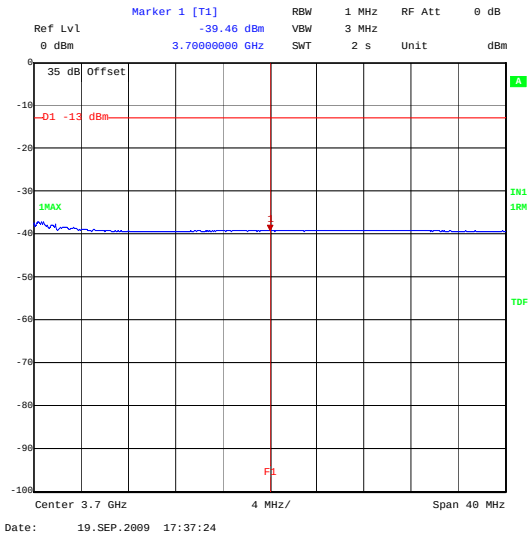




Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

5 MHz 64QAM-5/6





5.2.15. Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna

Test Summary:

FCC Part:	FCC 90.1323/2.1053
Test Method:	As detailed in ANSI C63.4 Section 8 and relevant Annex

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	35

Results: - 10 MHz QPSK-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-18.1	-13.0	5.1	Complied
3700	-39.3	-13.0	16.3	Complied

Results: -10 MHz QPSK-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-18.4	-13.0	5.4	Complied
3700	-39.1	-13.0	16.1	Complied

Results: - 10 MHz 16QAM-1/2

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-18.0	-13.0	5.0	Complied
3700	-39.2	-13.0	16.2	Complied

Results: - 10 MHz 16QAM-3/4

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-19.5	-13.0	6.5	Complied
3700	-39.3	-13.0	16.3	Complied

Results: - 10 MHz 64QAM-2/3

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-20.8	-13.0	7.8	Complied
3700	-39.3	-13.0	16.3	Complied

Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

Results: -10 MHz 64QAM-3/4

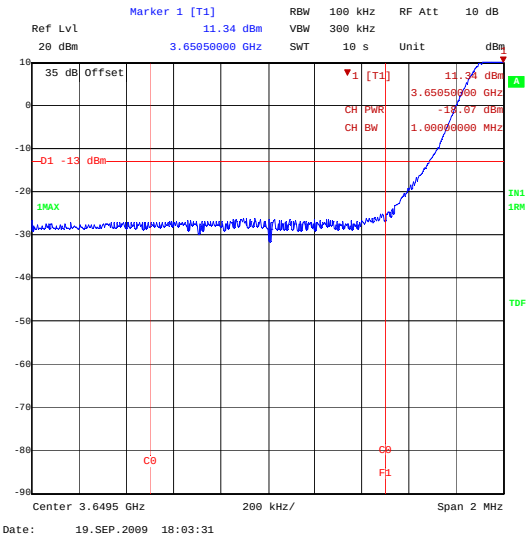
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-22.0	-13.0	9.0	Complied
3700	-39.4	-13.0	16.4	Complied

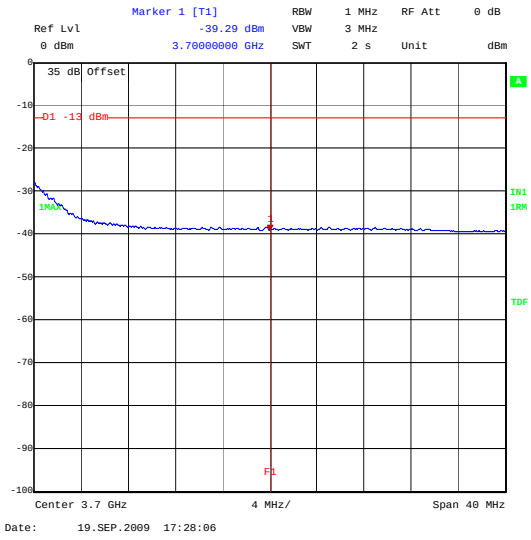
Results: -10 MHz 64QAM-5/6

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-22.0	-13.0	9.0	Complied
3700	-39.2	-13.0	16.2	Complied

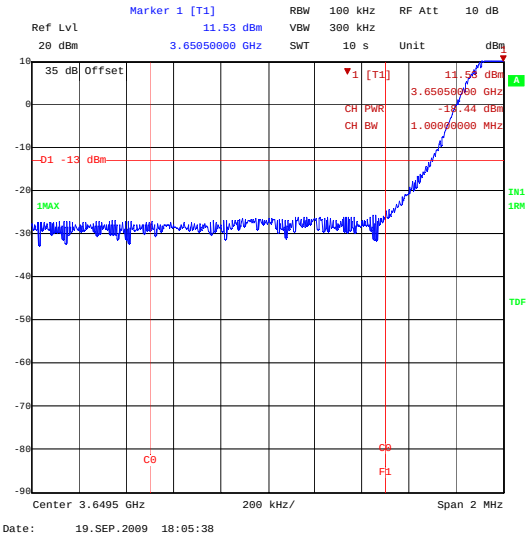
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

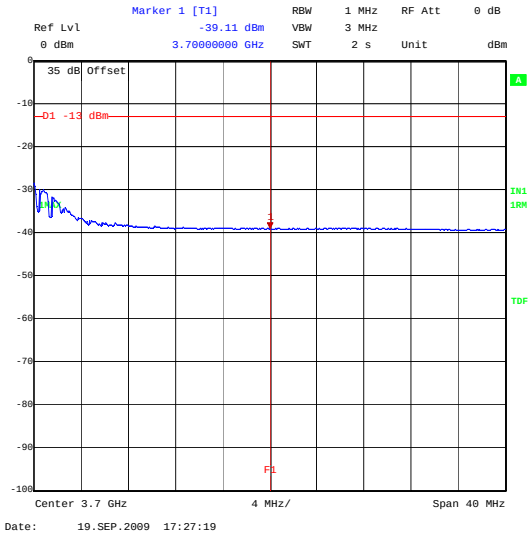
10 MHz QPSK-1/2





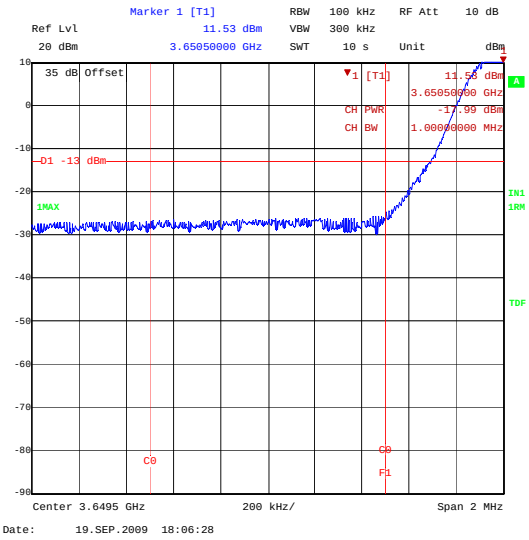
10 MHz QPSK-3/4

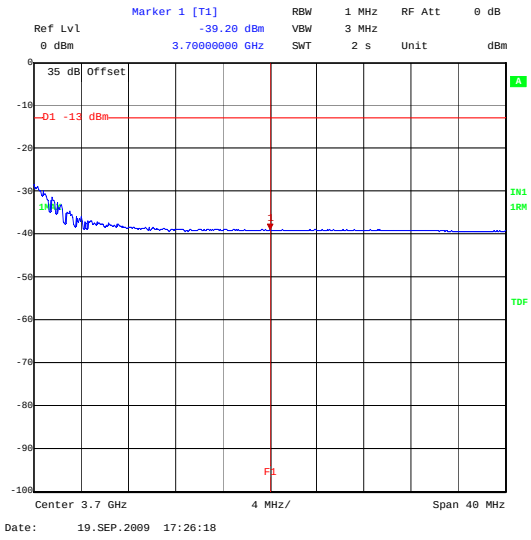




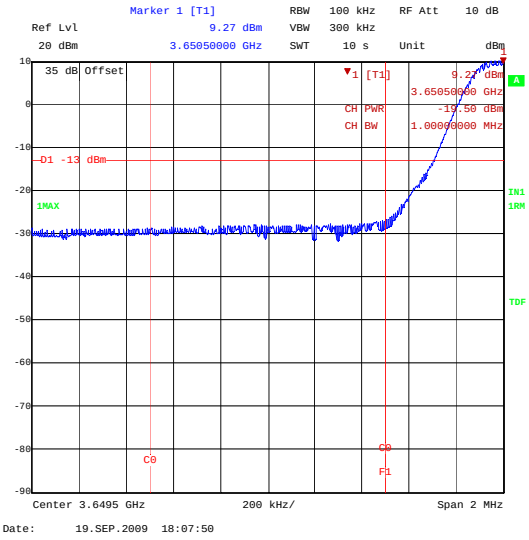
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

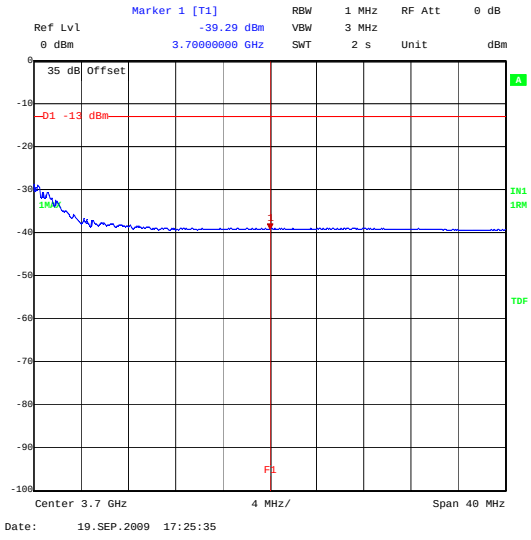
10 MHz 16QAM-1/2





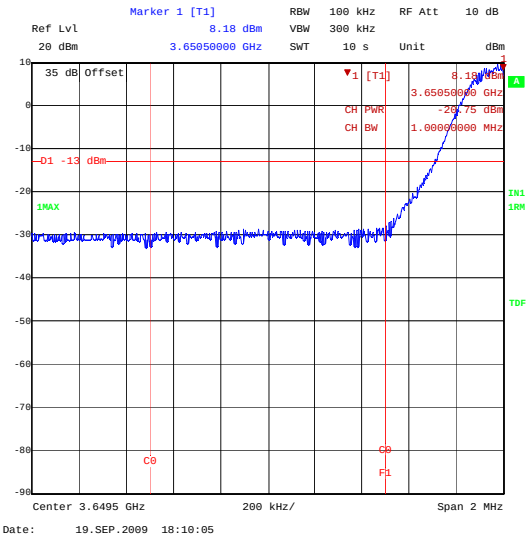
10 MHz 16QAM-3/4

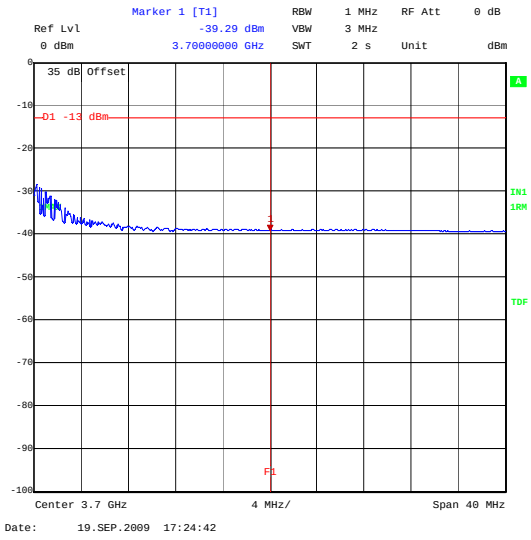




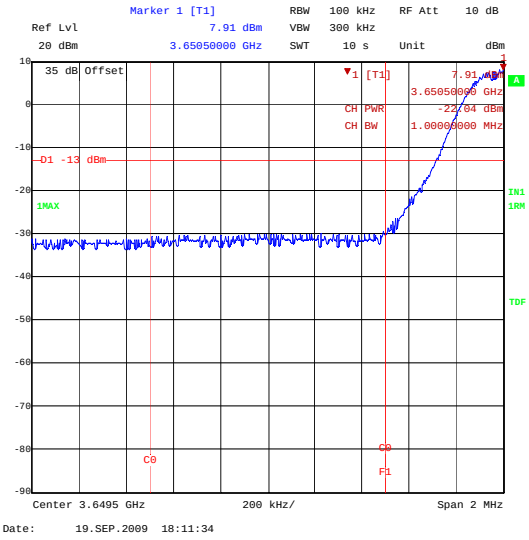
Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

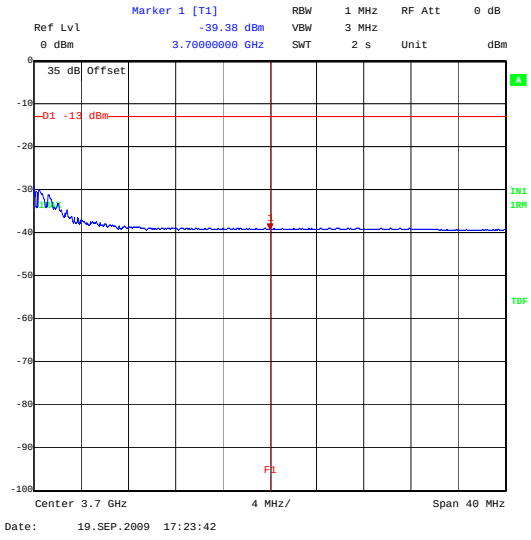
10 MHz 64QAM-2/3





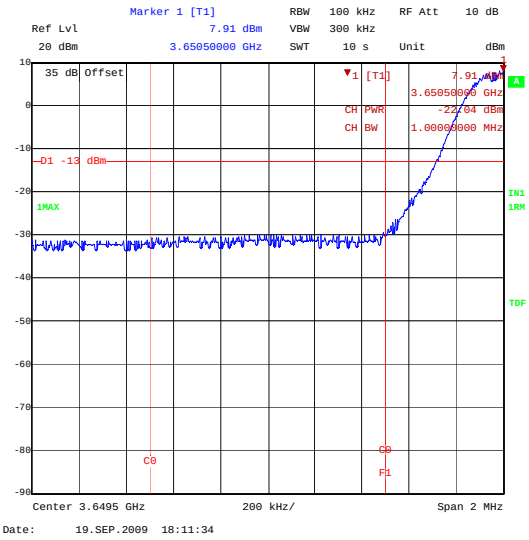
10 MHz 64QAM-3/4

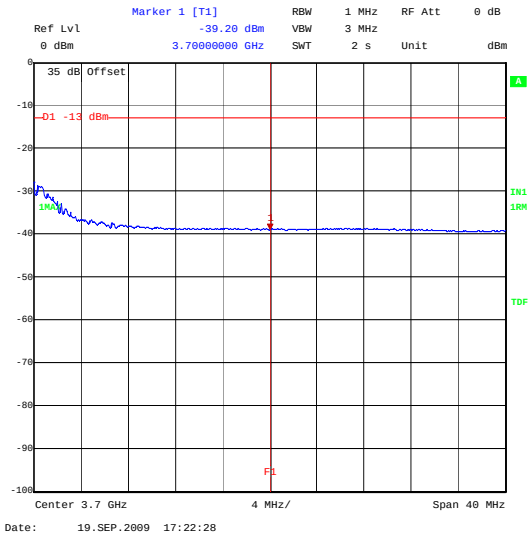




Transmitter Band Edge Radiated Emissions - Omni-Directional Antenna (continued)

10 MHz 64QAM-5/6





5.2.16. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

FCC Part:	FCC 90.213/2.1055(a)(1)
Test Method:	TIA-603-C Section 2.2.2

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	35

Results:

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Lower Band Edge (MHz)	Margin (MHz)	Result
-30	3654.992897	0.007103	3650	4.992897	Complied
-20	3654.995391	0.004609	3650	4.995391	Complied
-10	3654.995166	0.004834	3650	4.995166	Complied
0	3654.994442	0.005558	3650	4.994442	Complied
10	3654.994423	0.005577	3650	4.994423	Complied
20	3654.995521	0.004479	3650	4.995521	Complied
30	3654.996912	0.003088	3650	4.996912	Complied
40	3654.997316	0.002684	3650	4.997316	Complied
50	3654.997241	0.002759	3650	4.997241	Complied

Note(s):

1. In deviation to TIA-603-C, steps c) and d) were altered for this specific type of equipment and operating band:
   c) – the measured frequency was performed by measuring the 6 dB points either side of the carrier frequency and finding the centre carrier frequency. This was performed by using the frequency counter function within the analyser.
   d) – ppm was not calculated for this category type. FCC Part 90.213 requires that the equipment still operates within the allowed band and hence the measured carrier frequency was compared again the band edge
2. In deviation to TIA-603-C, a dummy microphone was not used for exercising the equipment. Instead a communications link was maintained with data sent through the link as per section 4.2.
3. Measurements were only performed on the bottom channel as the top channel of the equipment is 25 MHz aware from the upper operating band edge

5.2.17. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

FCC Part:	FCC 90.213/2.1055
Test Method:	TIA-603-C Section 2.2.2

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	35

Results:

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Margin (ppm)	Result
-42	3654.997244	0.002756	3650	4.997244	Complied
-48	3654.995521	0.004479	3650	4.995521	Complied
-56	3654.996341	0.003659	3650	4.996341	Complied

Note(s):

1. In deviation to TIA-603-C, steps c) and d) were altered for this specific type of equipment and operating band:
   c) – the measured frequency was performed by measuring the 6 dB points either side of the carrier frequency and finding the centre carrier frequency. This was performed by using the frequency counter function within the analyser.
   d) – ppm was not calculated for this category type. FCC Part 90.213 requires that the equipment still operates within the allowed band and hence the measured carrier frequency was compared again the band edge
2. In deviation to TIA-603-C, a dummy microphone was not used for exercising the equipment. Instead a communications link was maintained with data sent through the link as per section 4.2.
3. Measurements were only performed on the bottom channel as the top channel of the equipment is 25 MHz aware from the upper operating band edge

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
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±2.94 dB
Carrier Output Power (ERP)	30 MHz to 2 GHz	95%	+/- 2.94 dB
Occupied Bandwidth	Not applicable	95%	+/- 24.3 Hz
Frequency Stability	Not applicable	95%	+/- 24.3 Hz
Transient Frequency Behaviour	Not applicable	95%	+/- 0.32% (Amplitude) +/- 3.53nS (Time)
Duty Cycle	Not applicable	95%	+/- 0.29 mS

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 (Months
A1065	Attenuator	Hewlett Packard	8494B	3308A38165	Calibrated before use	-
A1418	Attenuator	HP	N/A	CSC21296	Calibrated before use	-
A1428	Directional Coupler	Narda	3292-1	02439	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A465	Attenuator	Hewlett Packard	HP 8496B	3131P324	Calibrated before use	-
C1083	Cable	Rosenberger	001	2799	Calibrated before use	-
C1111	Cable	Semflex Inc.	X116BF SX1008 0	0337	Calibrated before use	--
C1150	36 Tensolite RF Cable	Atlantic	Qflex 5236	N/A	Calibrated before use	-
C1151	79 Tensolite RF Cable	Atlantic	Qflex 5279	N/A	Calibrated before use	-
C1163	Cable	Rosenberger Micro-Coax	FA210A 1010007 070	43187-1	Calibrated before use	-
C1165	Cable	Rosenberger Micro-Coax	FA210A 1020007 070	43189-1	Calibrated before use	-
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibration not required	-
K0002	Site Reference 4421	Rainford EMC	N/A	N/A	01 Sep 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1249	Thermometer	Fluke	52II	88800049	01 Jul 2009	12
M1251	Digital Multimeter	Fluke	175	89170179	23 Jun 2009	12
M166	Thermometer/Barometer/ Hygrometer	EuroCom	None	None	30 Apr 2009	12
M208	Thermometer/Hygrometer	RS Components Ltd	RS212-124	M208-RS212-124	30 Apr 2009	12
M295	Spectrum Analyser	Hewlett Packard	8564E	3846A01561	23 Jan 2009	12

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