



**TEST REPORT
FROM
RFI GLOBAL SERVICES LTD**

Partial Test of: Motorola Point to Point Fixed Wireless Solutions PTP49600

To: FCC Part 90: 2008 (Chapter I), RSS-Gen Issue 2
June 2007 and RSS-111 Issue 2 June 2007

Test Report Serial No:
RFI/RPT2/RP74951JD01A

Supersedes Test Report Serial No:
RFI/RPT1/RP74951JD01A

This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:	
	
Checked By:	Nigel Davison
	
Date of Issue:	28 April 2009

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1. Customer Information






Company Name:	Motorola Point to Point Fixed Wireless Solutions Group
Address:	Unit A1 Linhay Business Park Eastern Road Ashburton Devon TQ13 7UP

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR90
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 90 (Private Land Mobile Radio Services) (Chapter I)
Specification Reference:	RSS-111 Issue 2 June 2007
Specification Title:	Broadband Public Safety Equipment Operating in the Band 4940-4990 MHz
Specification Reference:	RSS-GEN Issue 2 June 2007
Specification Title:	General Requirements and Information for the Certification of Radio communication Equipment
Site Registration:	FCC: 209735 Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	22 April to 24 April 2009

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Port Type	Result
90.205/90.1215(a)/2.1046	3.1/4.3	Transmitter Peak Carrier Output Power (Conducted)	Antenna Terminals	
90.205/90.1215/2.1046	3.2/4.3	Transmitter Peak Power Spectral Density (Conducted)	Antenna Terminals	
90.209, 2.1049	4.3	Transmitter Occupied Bandwidth (Bandwidth Limitations)	Antenna Terminals	
90.210 (m)	4.4 High-Power	Transmitter Conducted Emissions Masks	Antenna Terminals	
90.210	4.4	Transmitter Conducted Emissions (Out of Band) (9 kHz to 40 GHz)	Antenna Terminals	

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:	Wireless Ethernet Bridge - ODU
Brand Name:	Motorola
Model Name or Number:	PTP49600
Serial Number:	000456806665
IMEI Number:	000456806665
Hardware Version Number:	D05-R02-C
Software Version Number:	B1534
FCC ID Number:	QWP49100

3.2. Description of EUT

The equipment under test was a 4.9 GHz band Wireless Ethernet Bridge.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal 120 V, 60 Hz AC Mains Supply		
Intended Operating Environment:	Residential, Commercial and Light Industry		
Equipment Category:	Microwave fixed radio link		
Type of Unit:	Base Station (Fixed used) Transceiver		
Antenna Type:	Flat Plate		
Antenna Gain:	22dBi		
Modulation Type:	OFDM		
Channel Spacing:	5, 10, 20MHz		
Transmit Frequency Range:	4940 MHz to 4990 MHz		
Transmit Channels Tested:	Channel Bandwidth (MHz)	Bottom Channel Frequency (MHz)	Top Channel Frequency (MHz)
	5	4942.5	4987.5
	10	4945	4985
	20	4950	4980
Receive Frequency Range:	4940 MHz to 4990 MHz		
Receive Channels Tested:	Channel Bandwidth (MHz)	Bottom Channel Frequency (MHz)	Top Channel Frequency (MHz)
	5	4942.5	4987.5
	10	4945	4985
	20	4950	4980
Highest Fundamental Frequency:	5882 MHz		

3.5. Support Equipment

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

Description:	Power In Door Unit - PIDU for Master ODU (EUT)
Brand Name:	Motorola
Model Name or Number:	PTP49600
Serial Number:	0624215516
Cable Length and Type:	2 metres / CAT 5 and 2 metre mains cable
Connected to Port:	Ethernet on master Wireless Ethernet Bridge and Ethernet to laptop PC

Description:	Wireless Ethernet Bridge – ODU (Slave)
Brand Name:	Motorola
Model Name or Number:	PTP49600
Serial Number:	0004568054AC
Cable Length and Type:	0.5 metres / coaxial and 2 metre Ethernet
Connected to Port:	To RF port on EUT master Wireless Ethernet Bridge. Ethernet to slave PIDU.

Description:	Power In Door Unit - PIDU for Slave ODU
Brand Name:	Motorola
Model Name or Number:	PTP49600
Serial Number:	0629259014
Cable Length and Type:	2 metres / CAT 5 and 2 metre mains cable
Connected to Port:	Ethernet on slave Wireless Ethernet Bridge and Ethernet to laptop PC

Description:	Laptop PC
Brand Name:	Dell
Model Name or Number:	Latitude D420
Serial Number:	Not marked or stated
Cable Length and Type:	2 metres CAT 5 / Ethernet
Connected to Port:	Ethernet on EUT PIDU and Ethernet on slave PIDU

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- As a master device, transmitting using one of the following modulation types; BPSK, QPSK, 16QAM, 64QAM and 256QAM.
- Operating on the bottom, centre or top channel, as per each test case requirement.
- Transmitter power tests were performed with the EUT transmitting at full power.

4.2. Configuration and Peripherals

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

- The EUT was connected to a slave ODU through suitably attenuated RF cables and a communications link was maintained. The integral antenna was replaced by a connector plate giving access to horizontal and vertical antenna connections. Connection to the measuring equipment was made through suitably attenuated RF cables, and/or an RF splitter/combiner connected to the RF port on the EUT.
- The ODU was powered by the PIDU through the Ethernet cable. The PIDU was powered by mains voltage.
- A laptop PC with customer's bespoke software was used to configure the EUT and slave ODU during the testing.

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 Method

The peak carrier output power measurements were made using a Rohde & Schwarz FSUP signal source analyser, which was loaned to RFI Global Services Ltd. by the customer. This equipment was within the calibration period (Calibrated by the manufacturer on 14-05-2008, calibration due 19-05-2009). The customer requested that the procedure below was followed. The procedure for test had been agreed in advance by both the FCC and Industry Canada.

The Time Domain Method proposed involves setting the analyser as follows:

- a) Zero span mode with the frequency of the analyser set to the centre of the emission.
- b) Resolution Bandwidth RBW set to $>EBW$ such that the RBW is wide enough that further increases do not increase the reported power.
- c) Video BW set to maximum (must be $> EBW$).
- d) Either video or externally triggered to capture the whole Tx burst.
- e) Max Peak detector.
- f) Single Sweep to ensure a measurement over an interval of continuous transmission.
- g) Maximum number of sample points (30001) to give the most accurate measurement of the signal.
- h) Select Time Domain Power Measurement and set the start and stop intervals (T1/T2) to be within the transmitted burst.
- i) Set the analyser to report the RMS equivalent power in the channel.

5.3. Test Results**5.4. Transmitter Peak Carrier Output Power (Conducted)****Test Summary:**

FCC Part:	90.205, 90.1215(a), 2.1046
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Environmental Conditions:

Temperature Range (°C):	26 to 24
Relative Humidity Range (%):	49 to 31

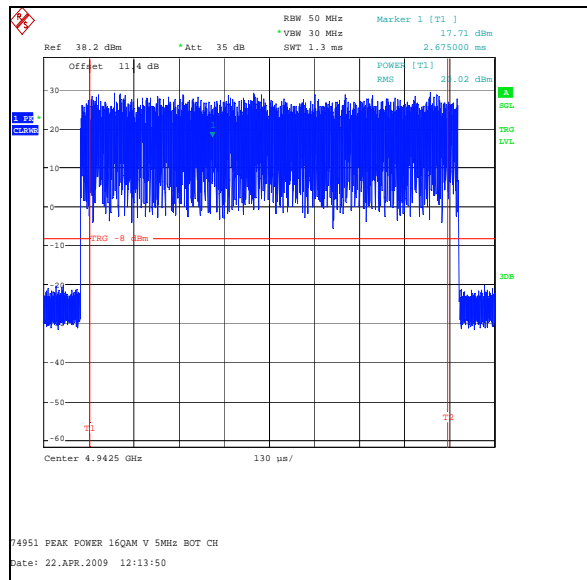
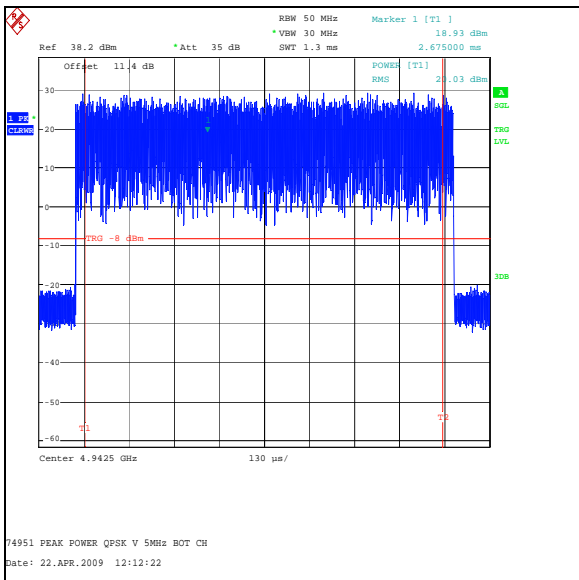
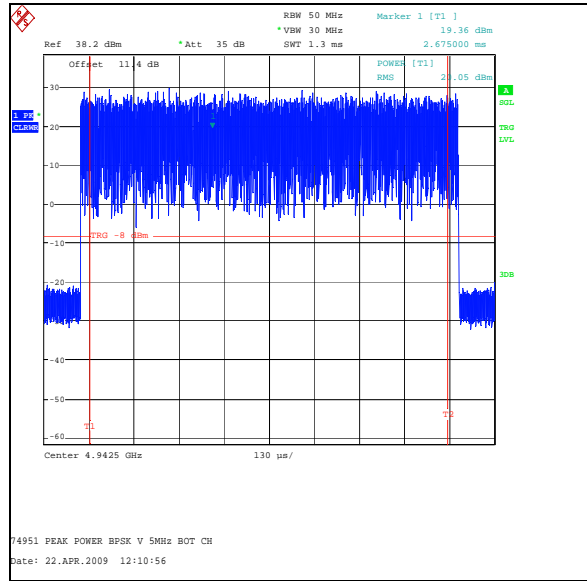
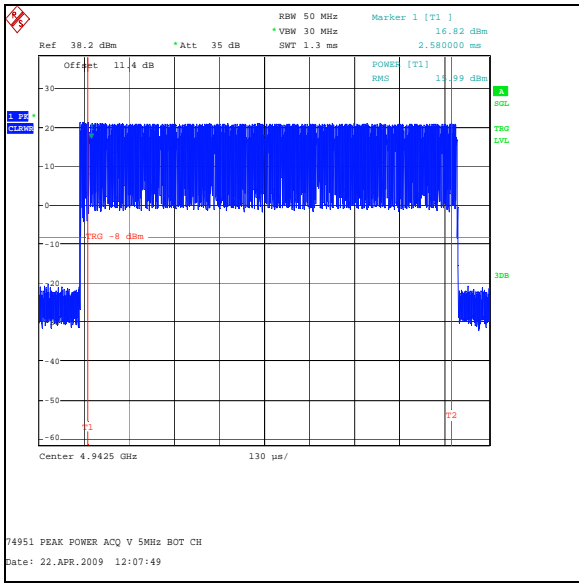
Note(s):

1. The maximum output power was measured using a spectrum analyser with a Time Domain Power Measurement function. The start and stop intervals (T1/T2) were set to be within the transmitted burst. The analyser was configured as described in Para 5.2 and the results obtained are shown in the Tables below.
2. Typical plots taken during the measurements are shown below. Due to the number of measurements taken only a selected sample of the graphs are included in the report.

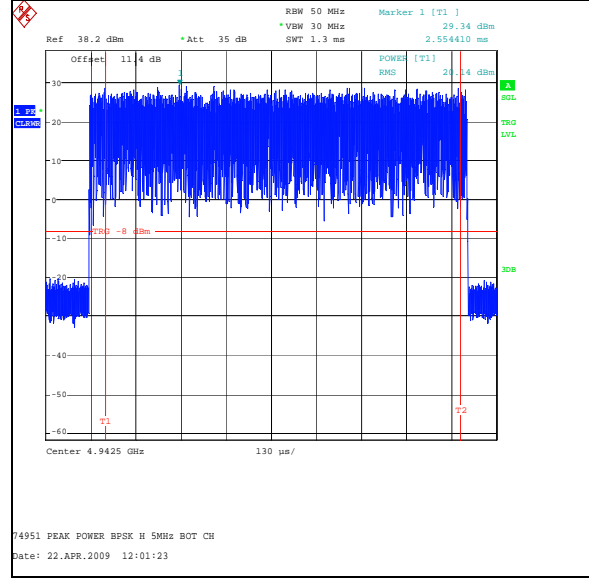
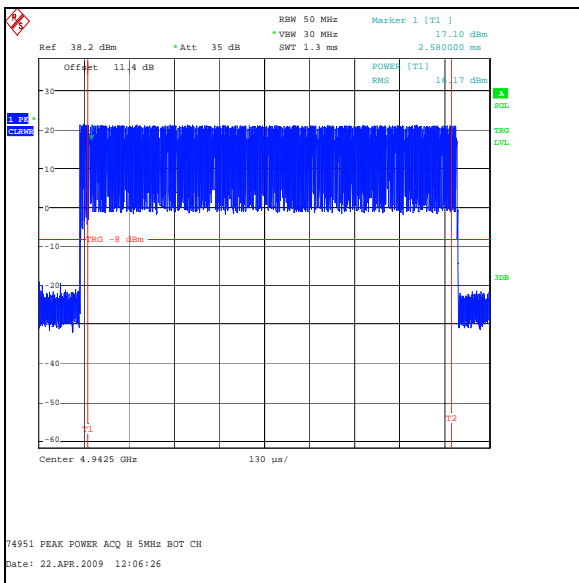
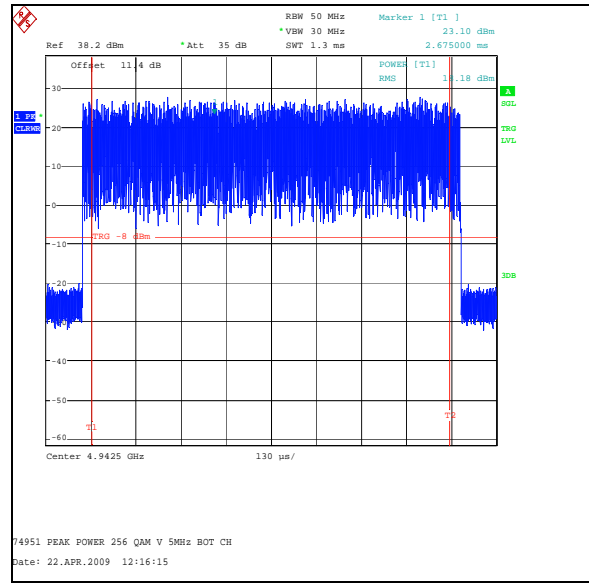
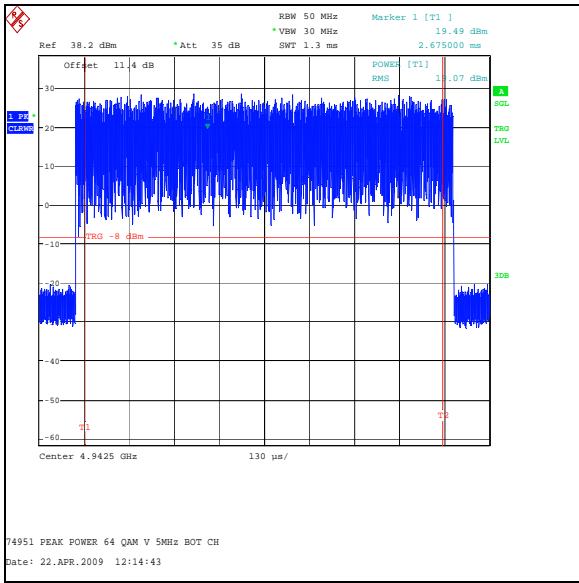
Results: 5 MHz Channel - Bottom Channel

Mode	Maximum Output Power (dBm)			Limit (dBm)	Margin (dB)
	Port H	Port V	Aggregate		
ACQ	16.2	16.0	19.1	27.0	7.9
BPSK	20.1	20.1	23.1	27.0	3.9
QPSK	20.1	20.0	23.1	27.0	3.9
16QAM	20.2	20.0	23.1	27.0	3.9
64QAM	19.3	19.1	22.2	27.0	4.8
256QAM	18.4	18.2	21.3	27.0	5.7

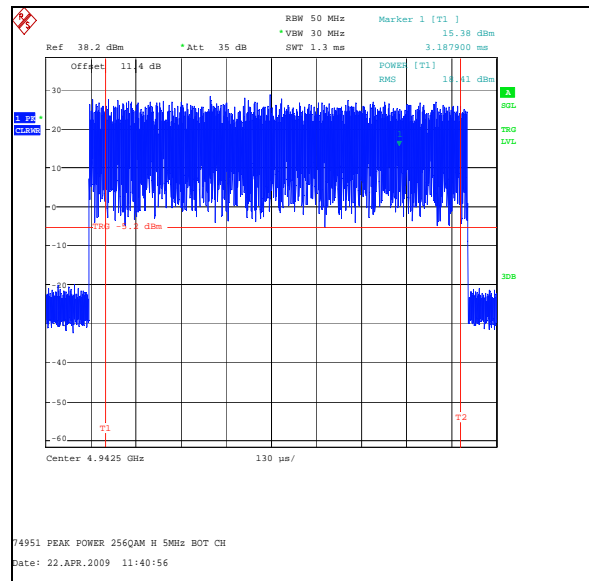
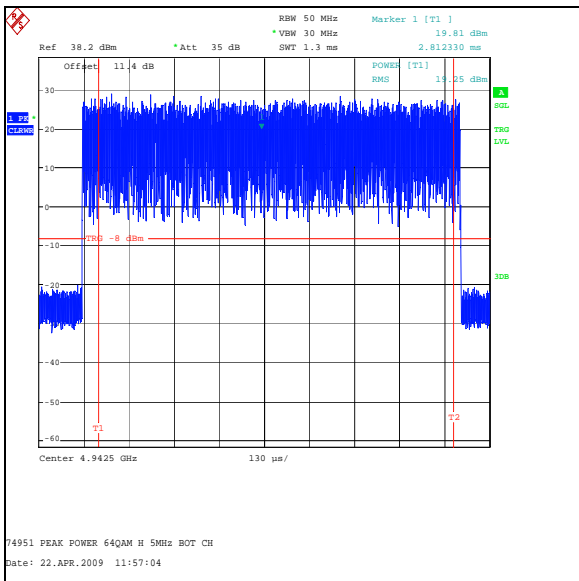
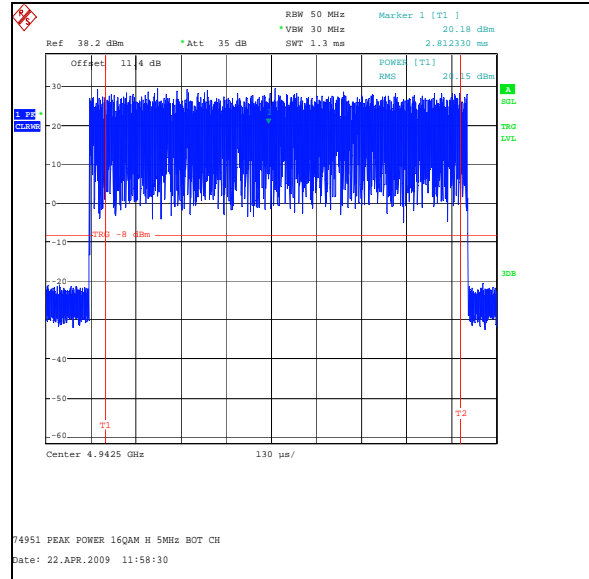
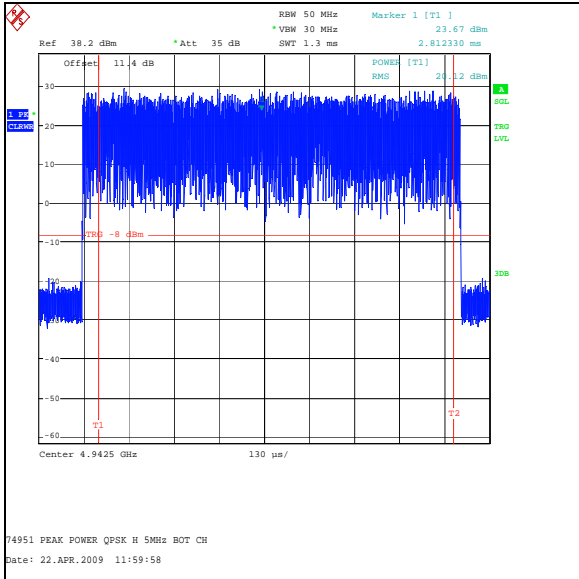
Transmitter Peak Carrier Output Power (Conducted) (continued)



Transmitter Peak Carrier Output Power (Conducted) (continued)



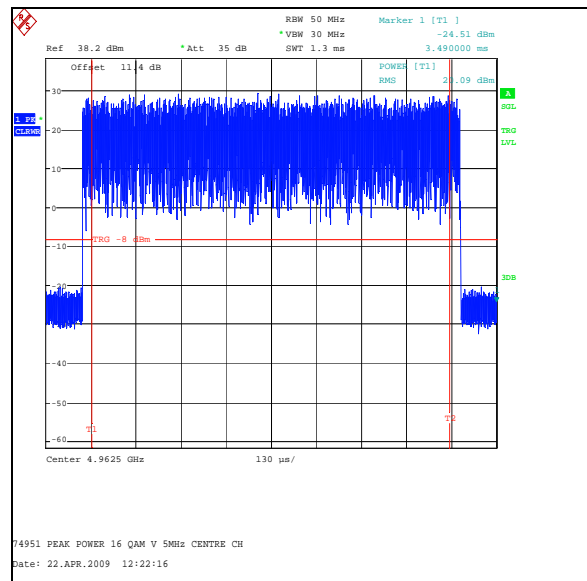
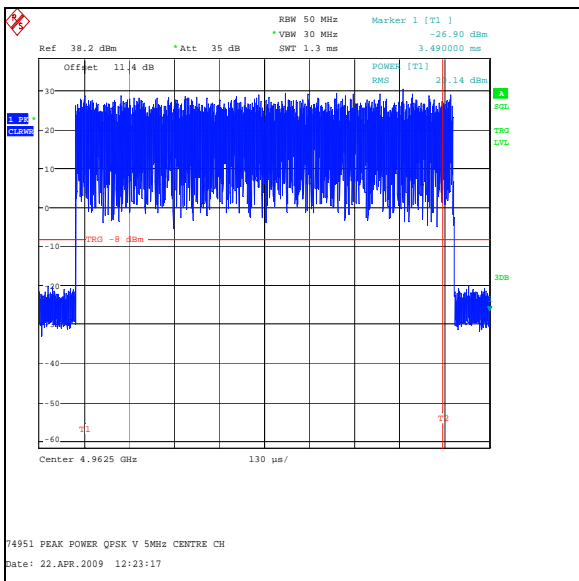
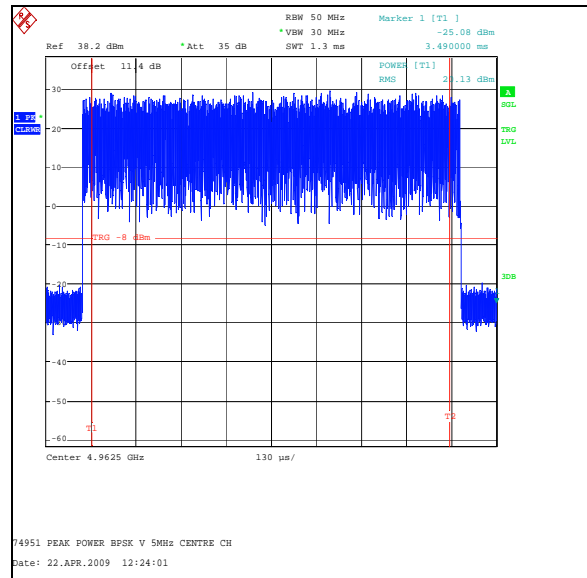
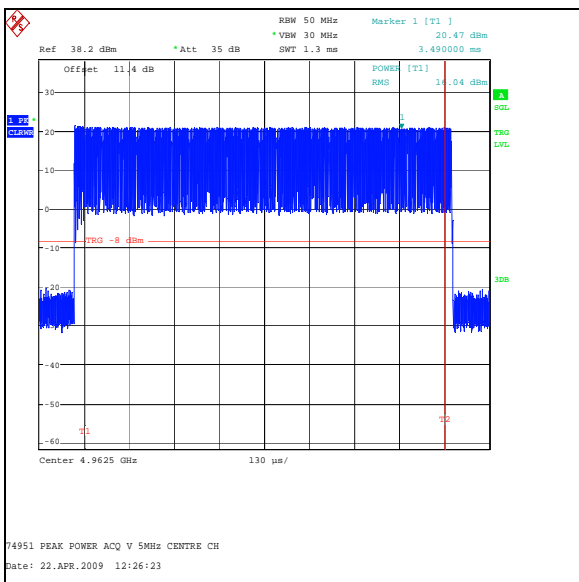
Transmitter Peak Carrier Output Power (Conducted) (continued)



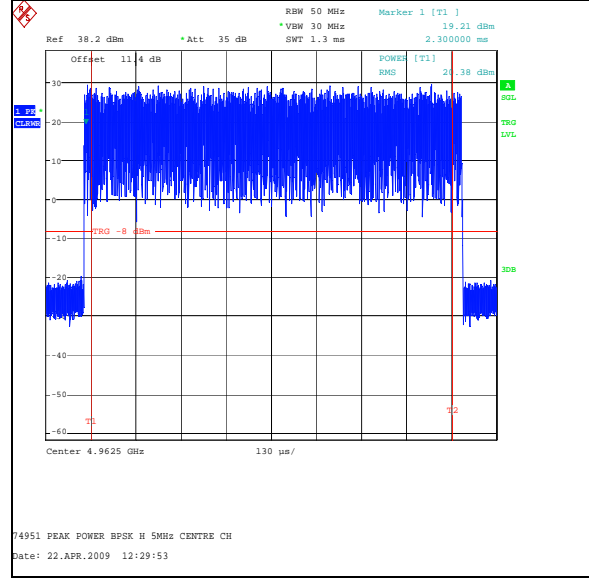
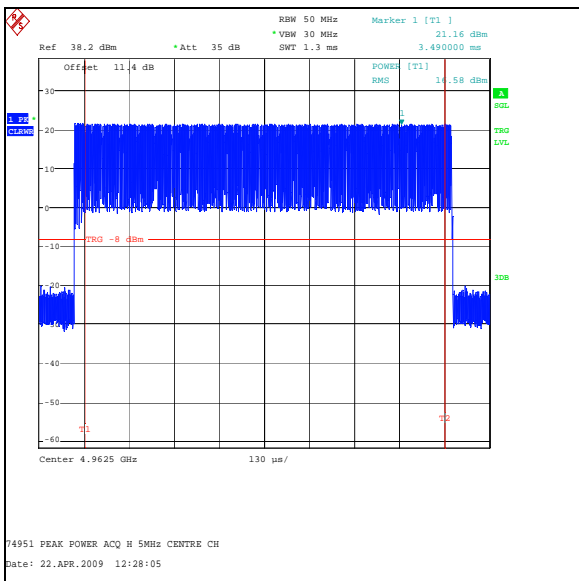
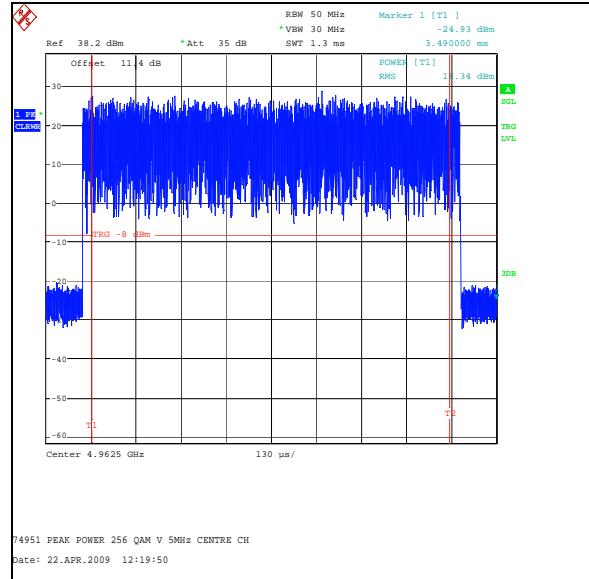
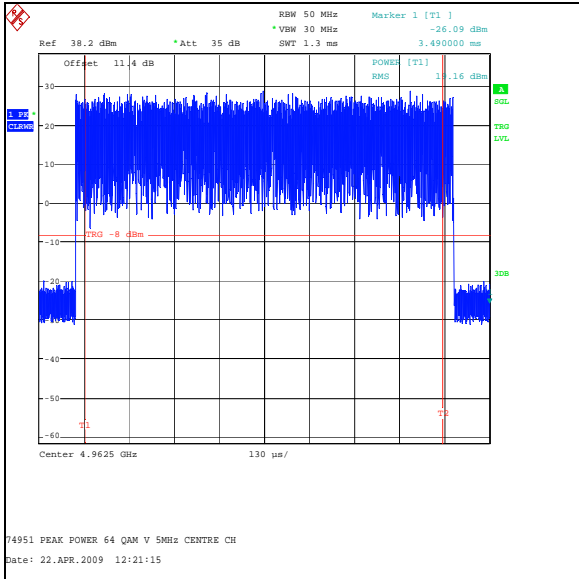
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 5 MHz Channel - Centre Channel

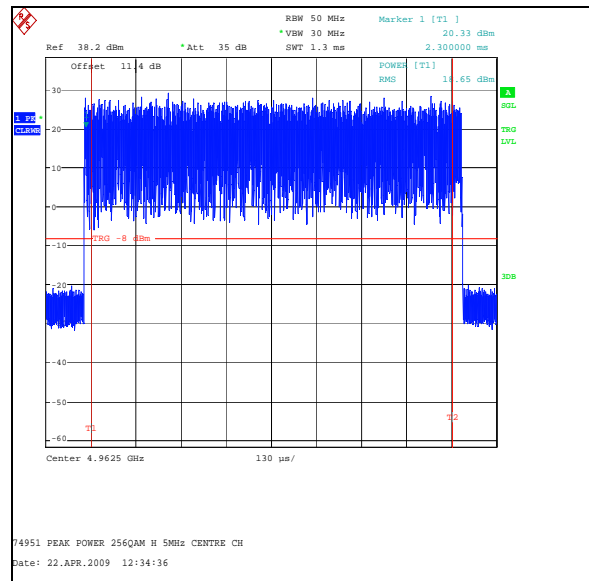
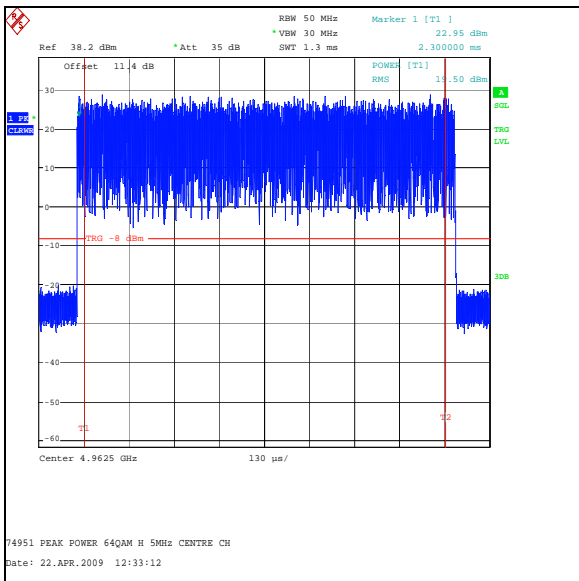
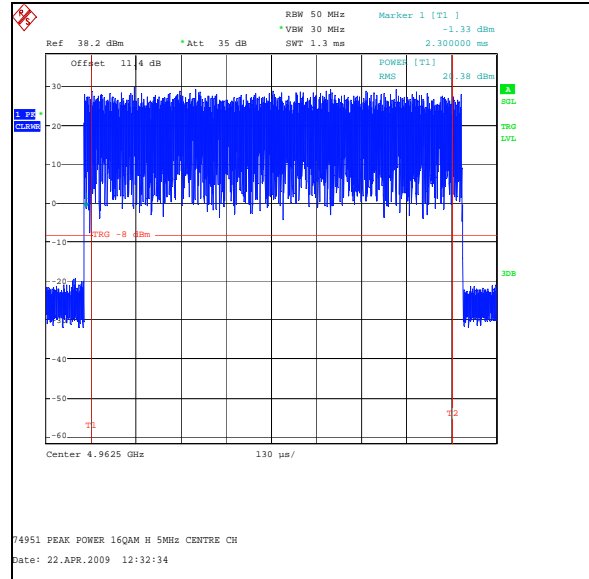
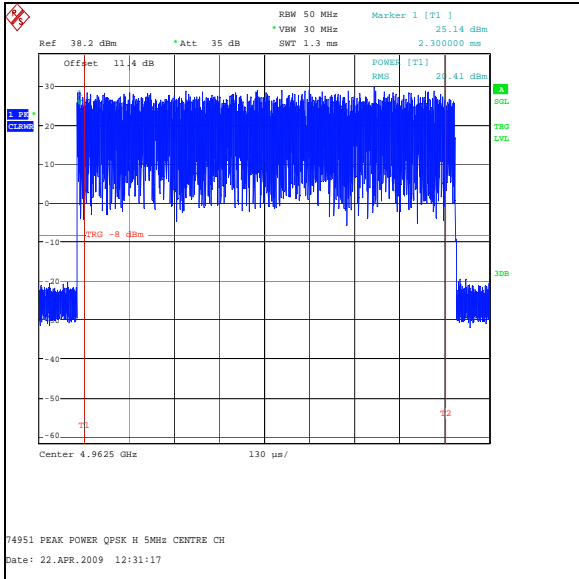
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.6	16.0	19.3	27.0	7.7
BPSK	20.4	20.1	23.3	27.0	3.7
QPSK	20.4	20.1	23.3	27.0	3.7
16QAM	20.4	20.1	23.3	27.0	3.7
64QAM	19.5	19.2	22.4	27.0	4.6
256QAM	18.7	18.3	21.5	27.0	5.5



Transmitter Peak Carrier Output Power (Conducted) (continued)



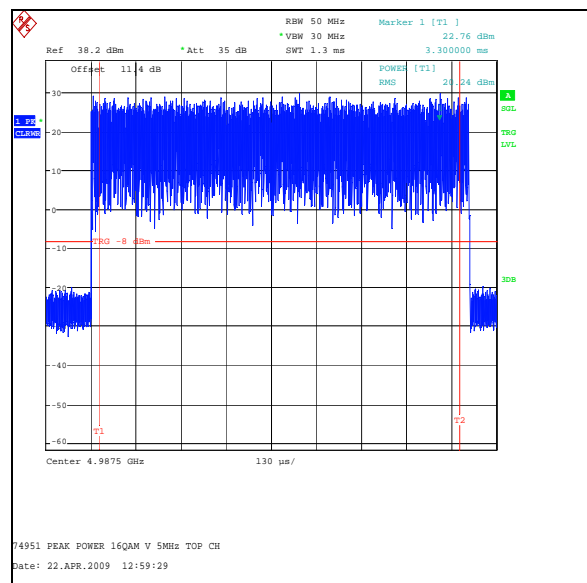
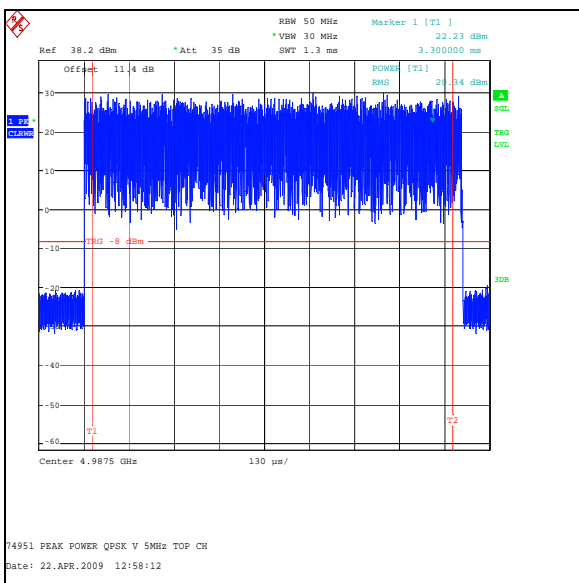
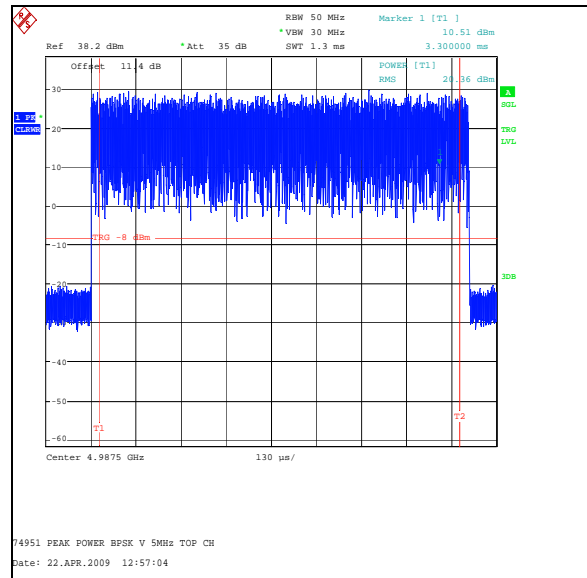
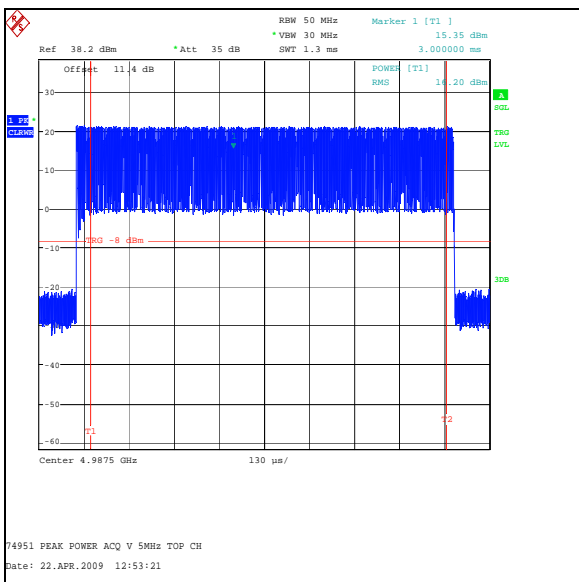
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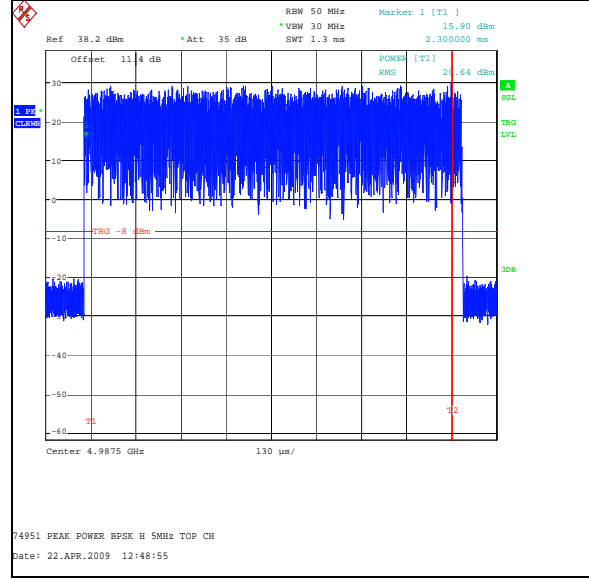
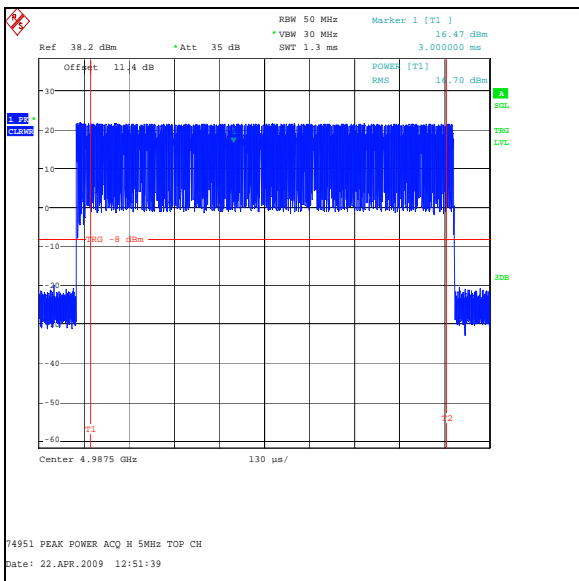
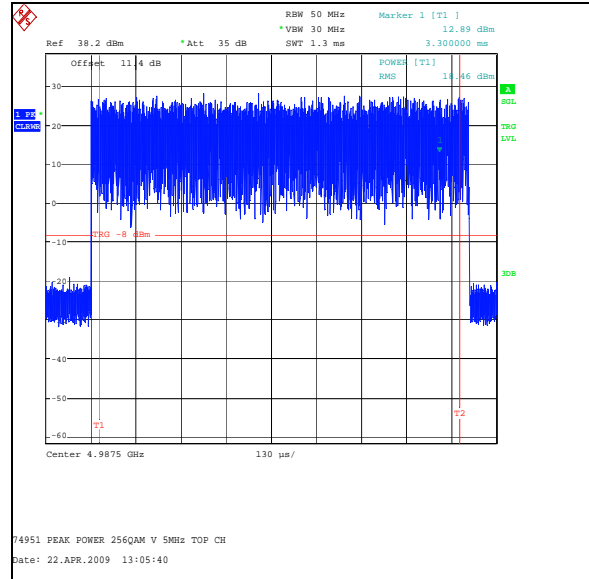
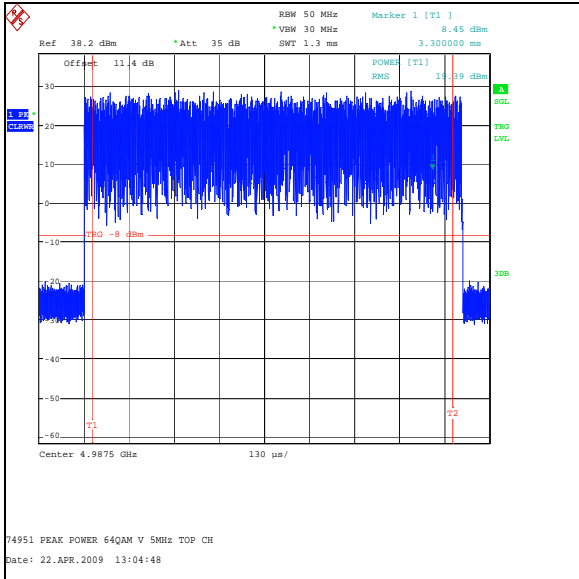
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 5 MHz Channel - Top Channel

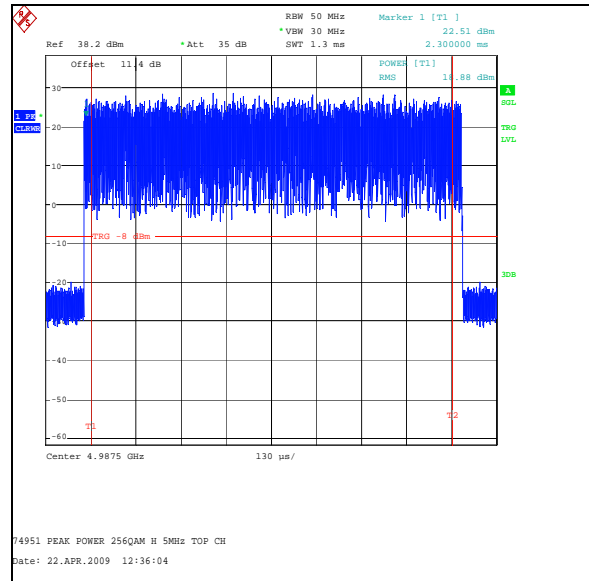
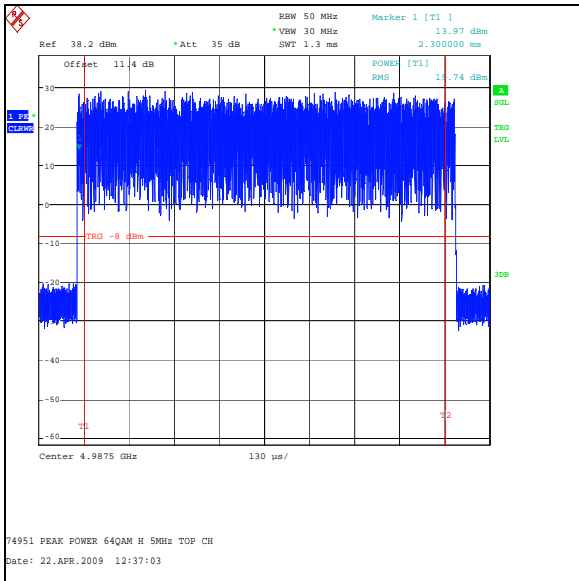
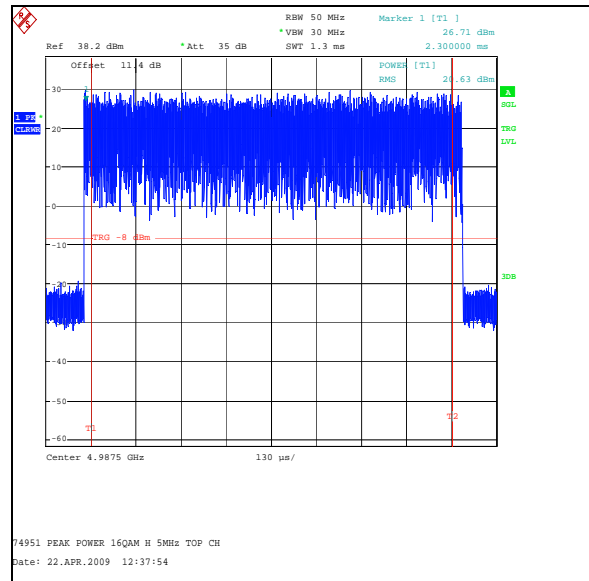
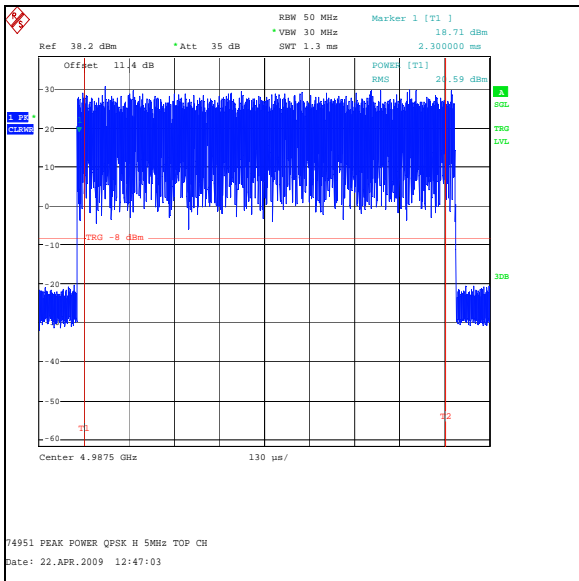
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.7	16.2	19.5	27.0	7.5
BPSK	20.6	20.4	23.5	27.0	3.5
QPSK	20.6	20.3	23.5	27.0	3.5
16QAM	20.6	20.2	23.4	27.0	3.6
64QAM	19.7	19.4	22.6	27.0	4.4
256QAM	18.9	18.5	21.7	27.0	5.3



Transmitter Peak Carrier Output Power (Conducted) (continued)



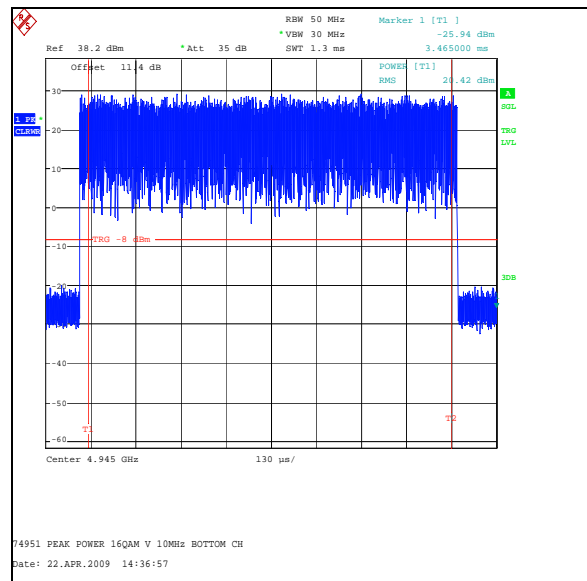
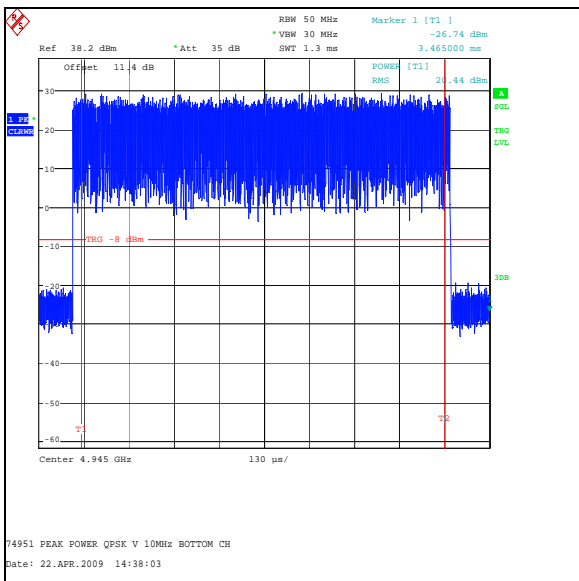
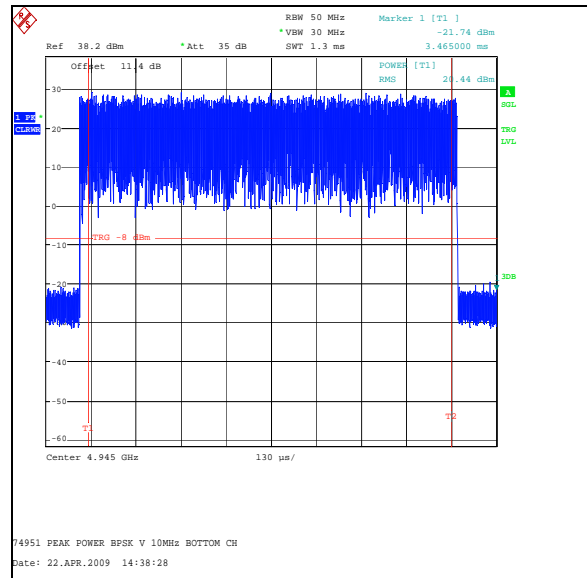
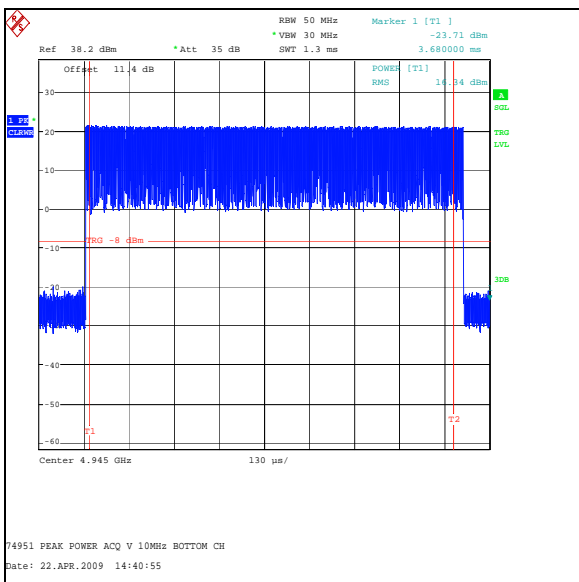
Transmitter Peak Carrier Output Power (Conducted) (continued)



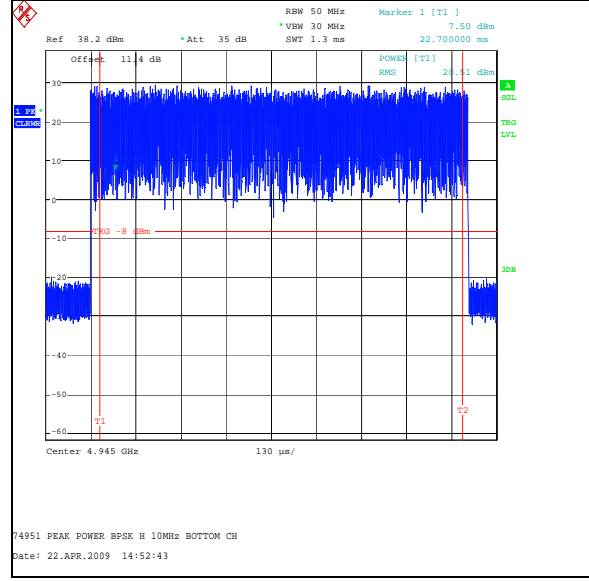
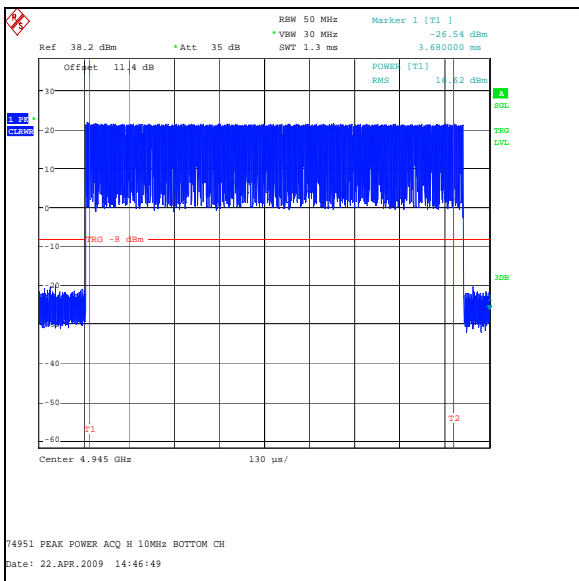
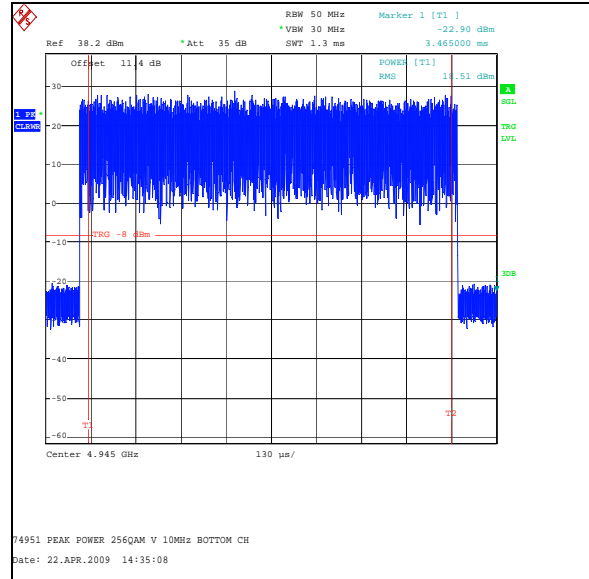
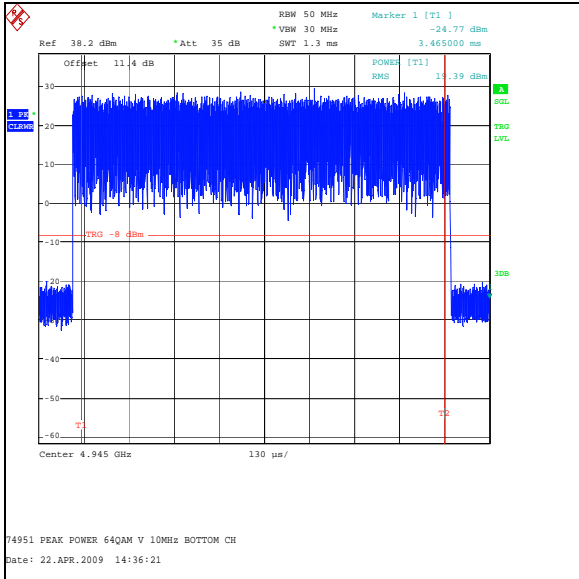
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 10 MHz Channel - Bottom Channel

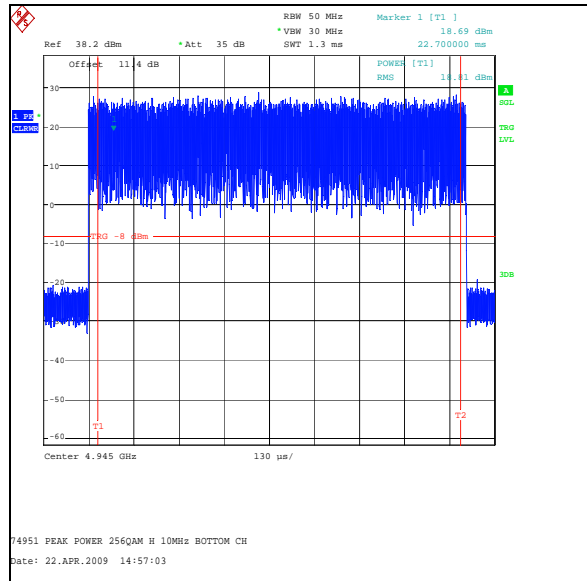
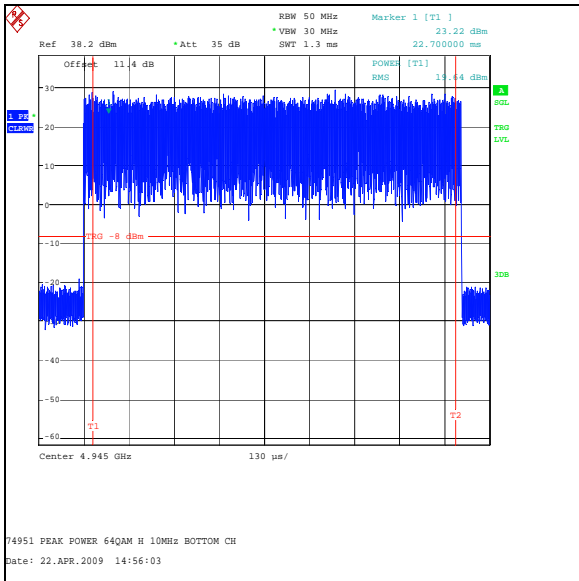
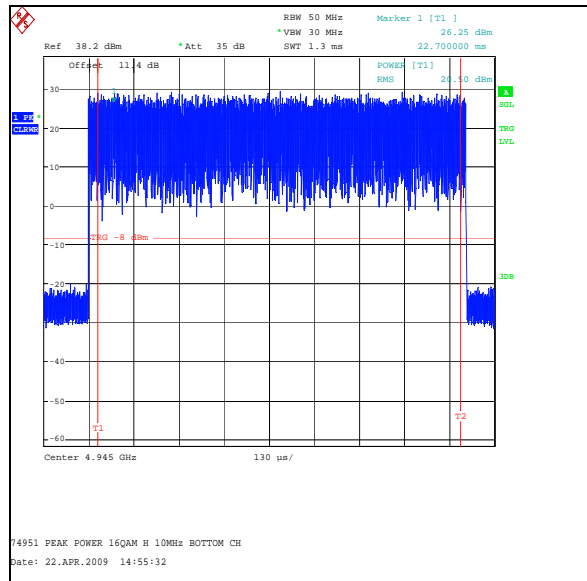
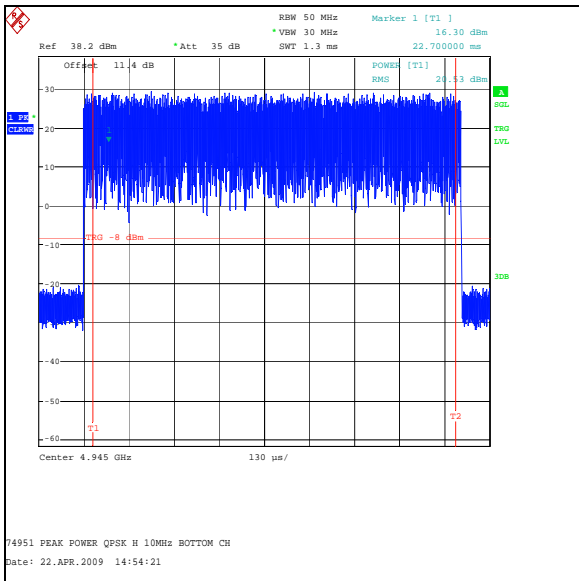
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.6	16.3	19.5	30.0	10.5
BPSK	20.5	20.4	23.5	30.0	6.5
QPSK	20.5	20.4	23.5	30.0	6.5
16QAM	20.5	20.4	23.5	30.0	6.5
64QAM	19.6	19.4	22.5	30.0	7.5
256QAM	18.8	18.5	21.7	30.0	8.3



Transmitter Peak Carrier Output Power (Conducted) (continued)



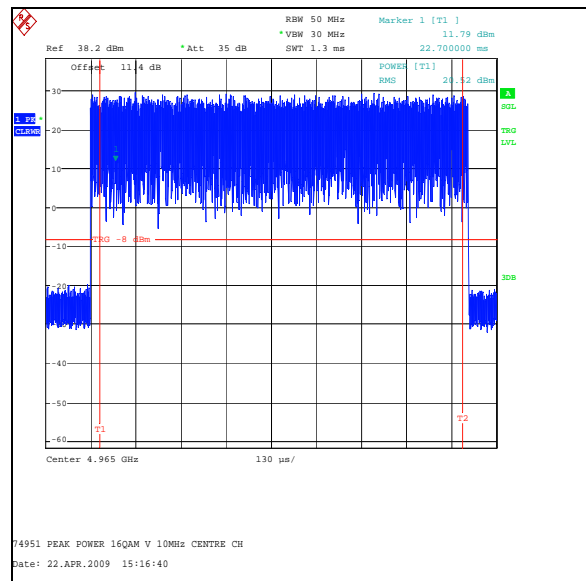
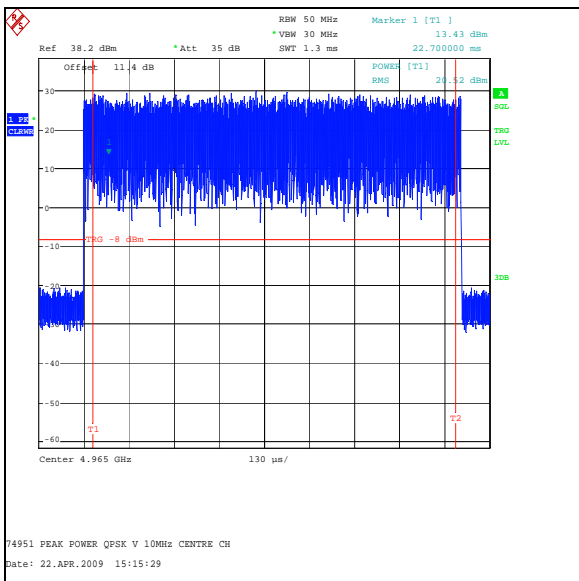
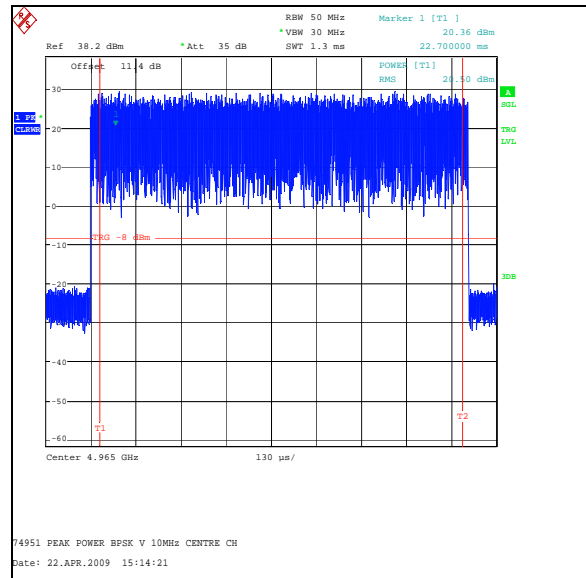
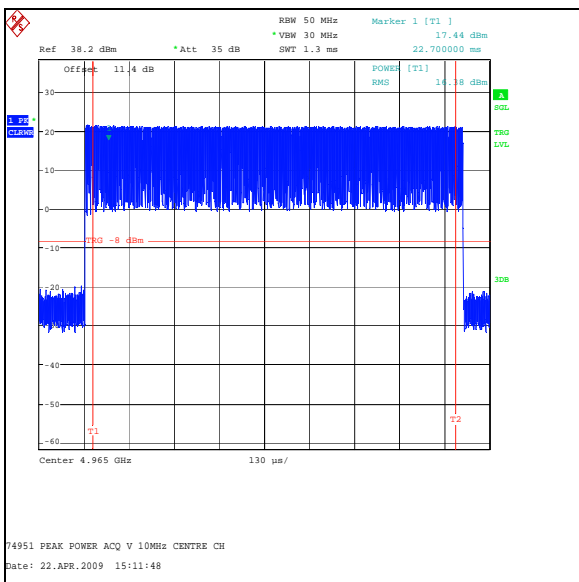
Transmitter Peak Carrier Output Power (Conducted) (continued)



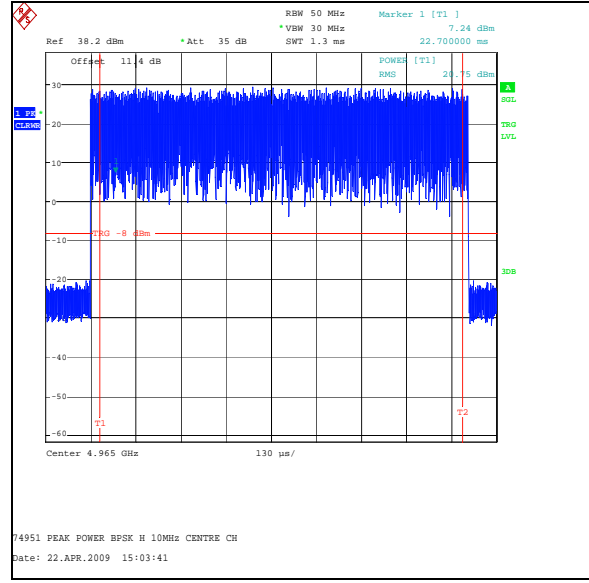
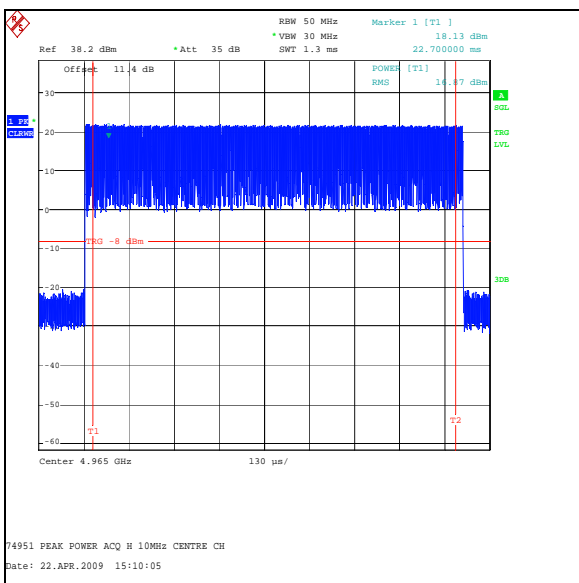
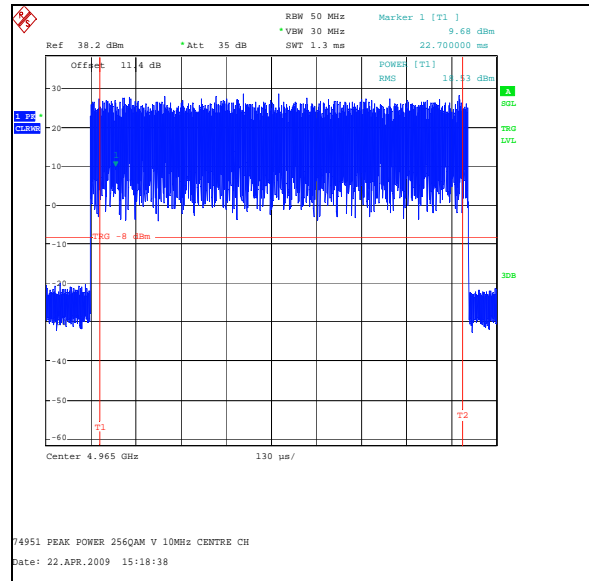
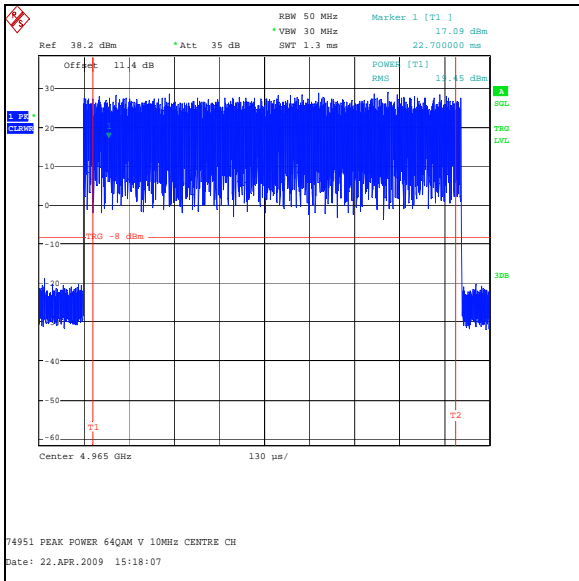
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 10 MHz Channel - Centre Channel

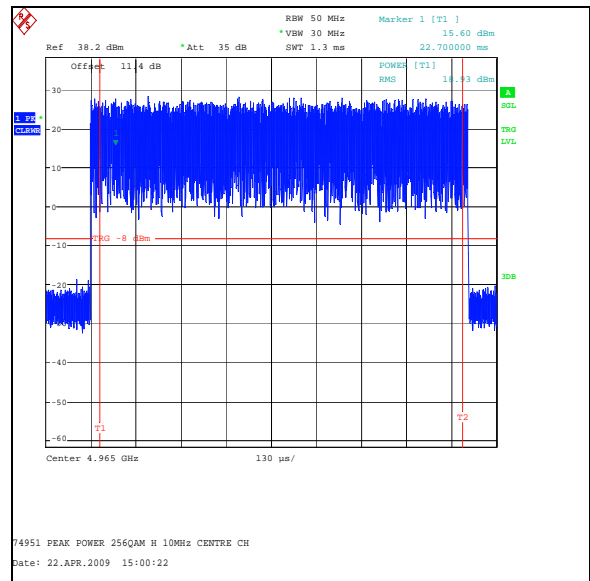
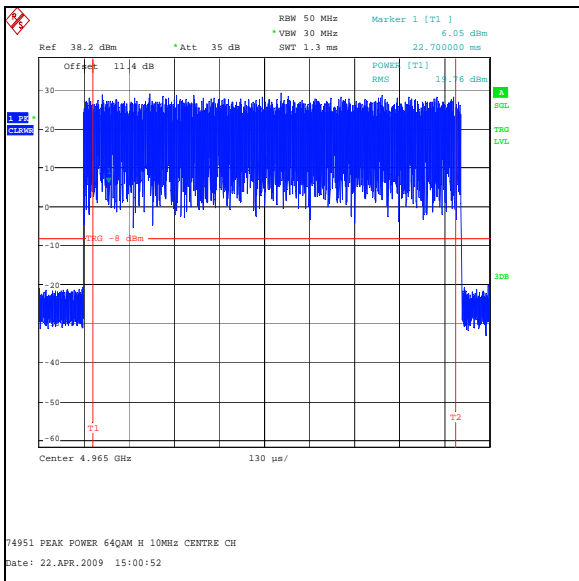
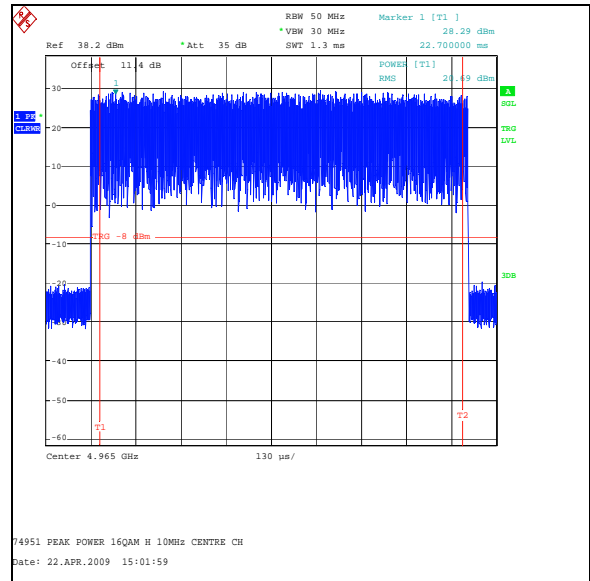
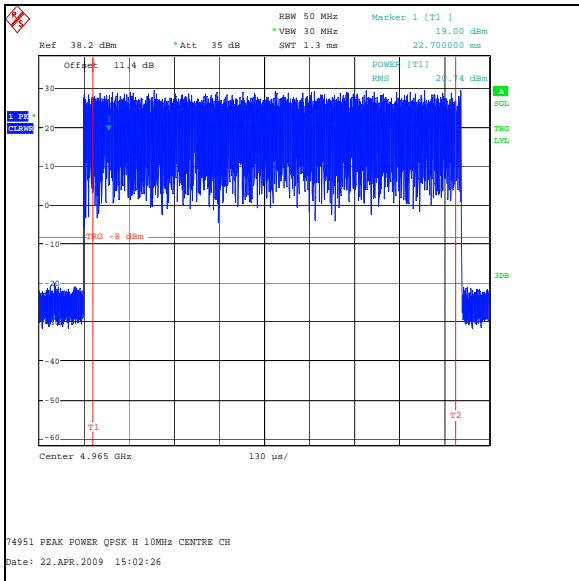
Maximum Output Power (dBm)				Limit (dBm)	Margin (dB)
Mode	Port H	Port V	Aggregate		
ACQ	16.9	16.4	19.7	30.0	10.3
BPSK	20.8	20.5	23.7	30.0	6.3
QPSK	20.7	20.5	23.6	30.0	6.4
16QAM	20.7	20.5	23.6	30.0	6.4
64QAM	19.8	19.5	22.7	30.0	7.3
256QAM	18.9	18.5	21.7	30.0	8.3



Transmitter Peak Carrier Output Power (Conducted) (continued)



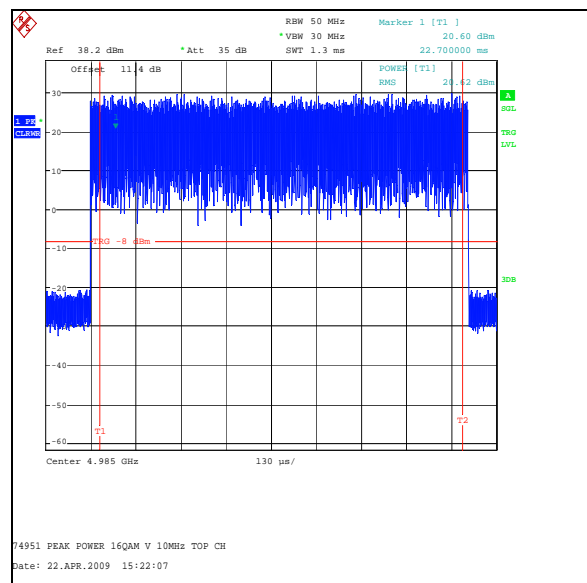
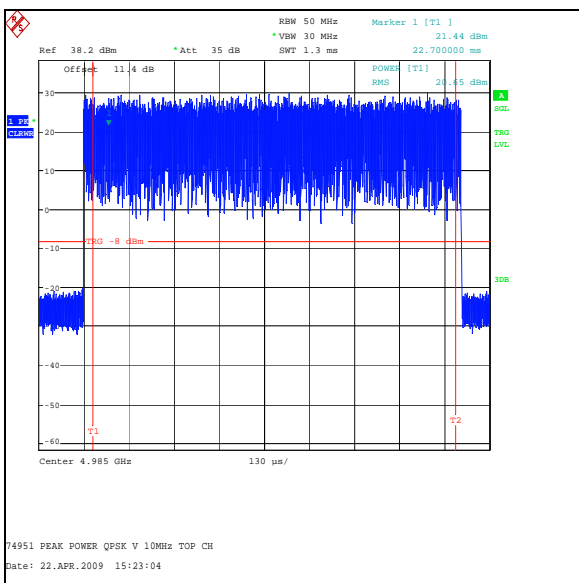
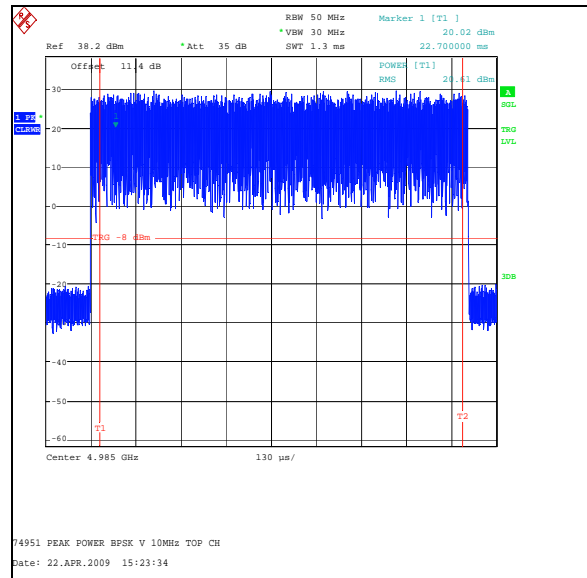
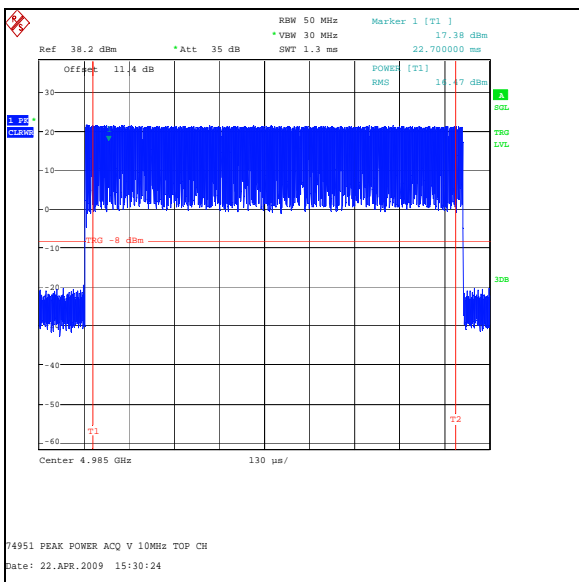
Transmitter Peak Carrier Output Power (Conducted) (continued)



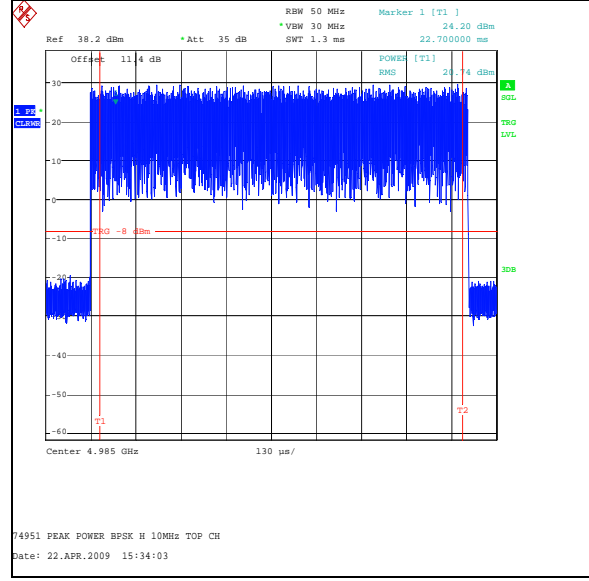
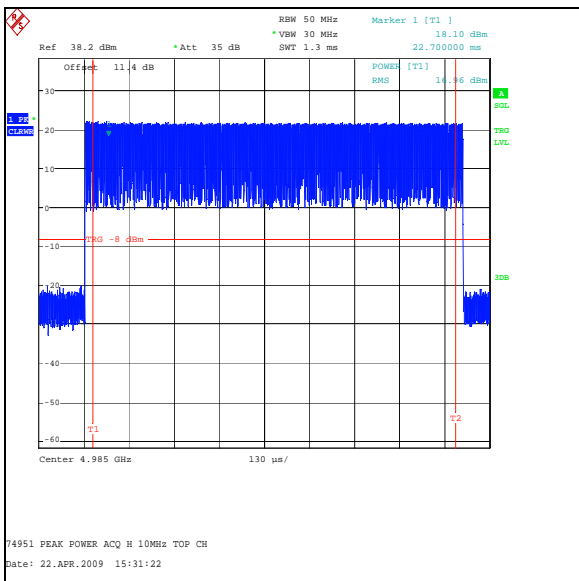
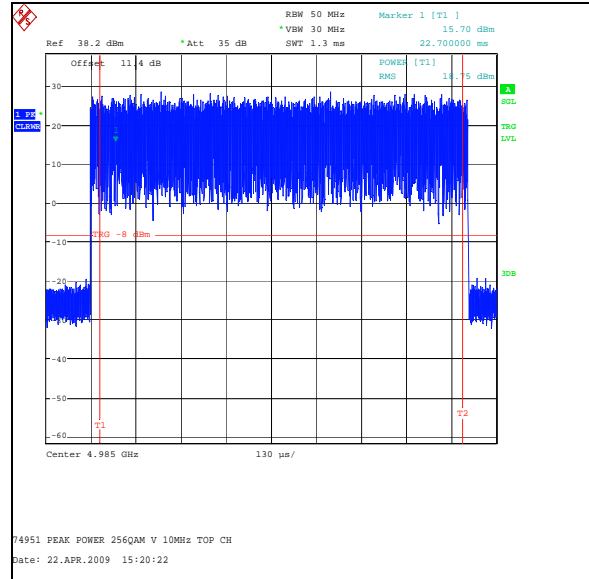
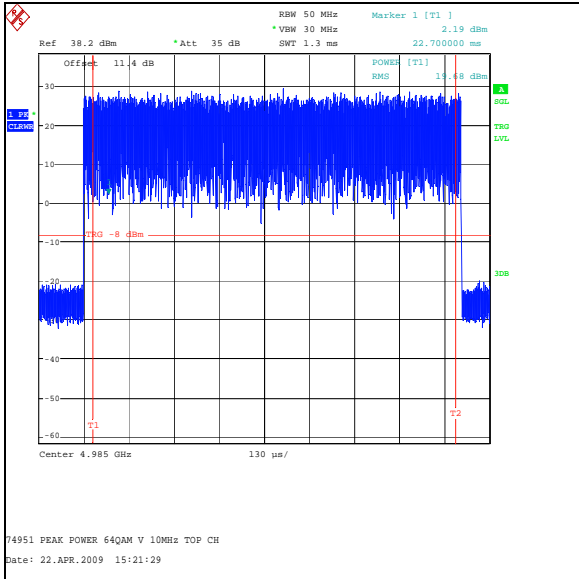
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 10 MHz Channel - Top Channel

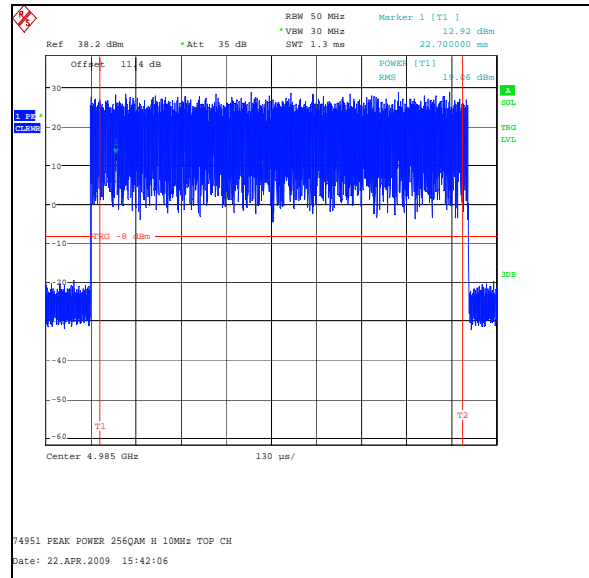
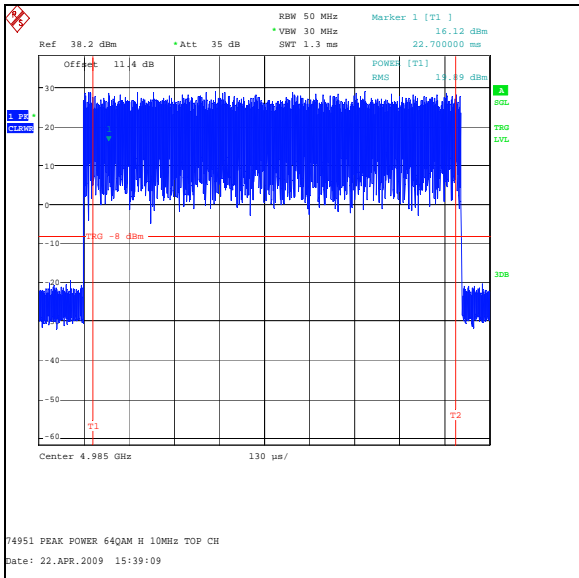
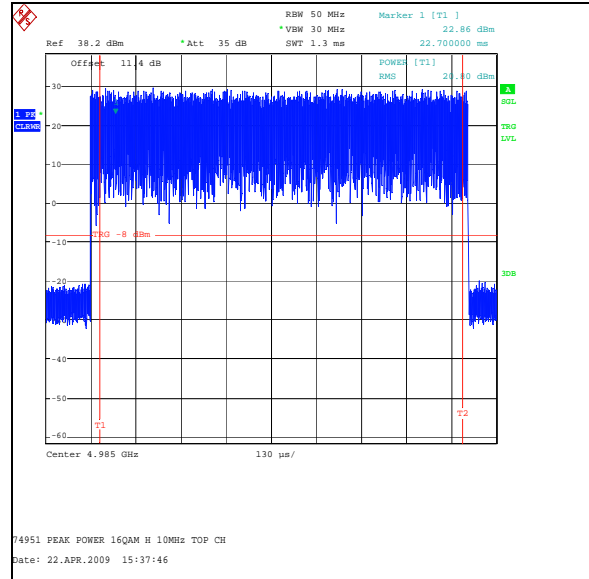
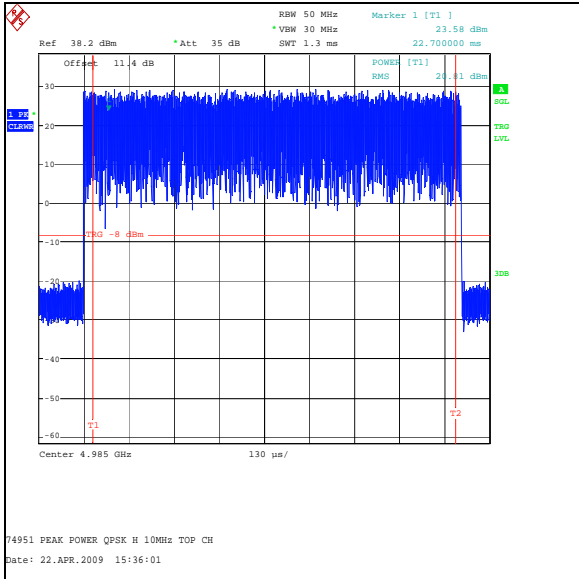
Maximum Output Power (dBm)				Limit (dBm)	Margin (dB)
Mode	Port H	Port V	Aggregate		
ACQ	17.0	16.5	19.8	30.0	10.2
BPSK	20.7	20.6	23.7	30.0	6.3
QPSK	20.8	20.7	23.8	30.0	6.2
16QAM	20.8	20.6	23.7	30.0	6.3
64QAM	19.9	19.7	22.8	30.0	7.2
256QAM	19.1	18.8	22.0	30.0	8.0



Transmitter Peak Carrier Output Power (Conducted) (continued)



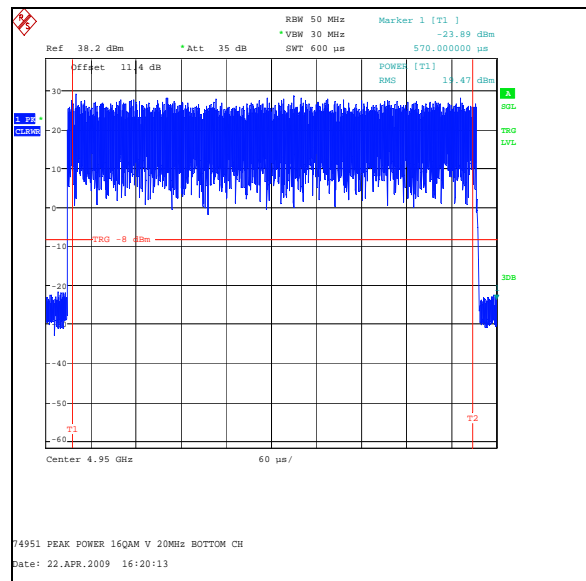
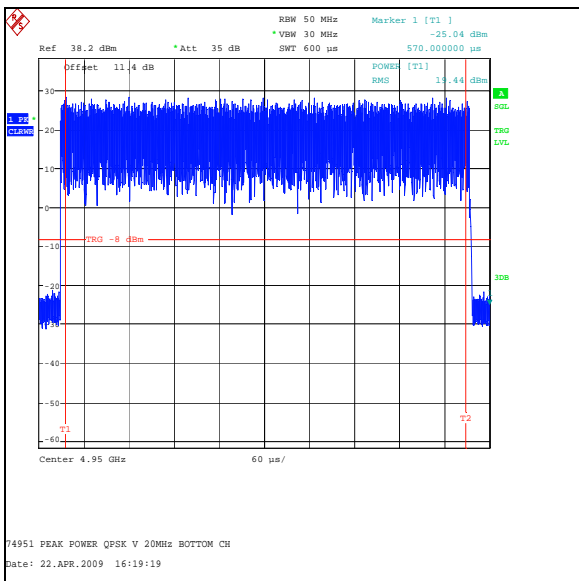
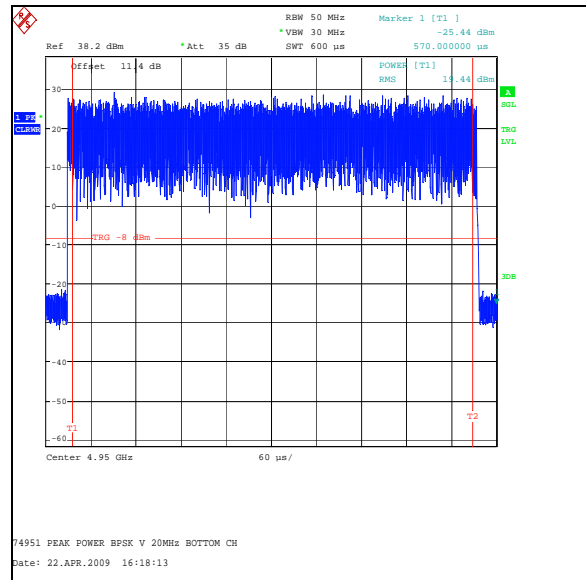
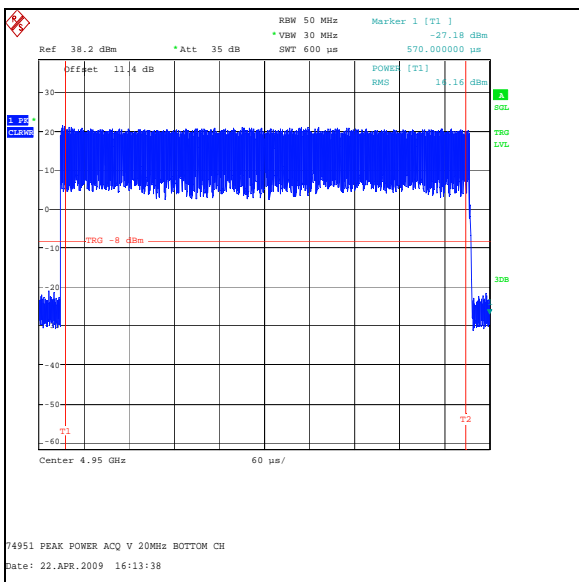
Transmitter Peak Carrier Output Power (Conducted) (continued)



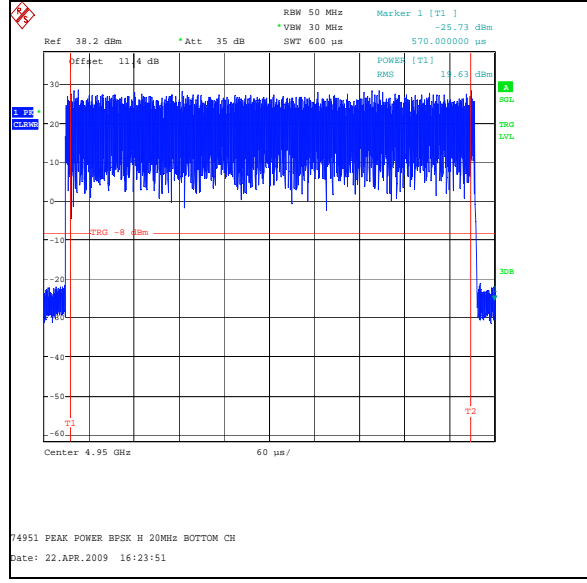
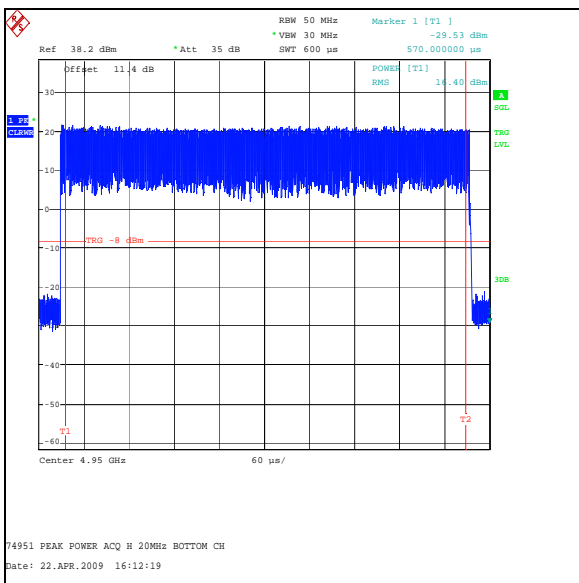
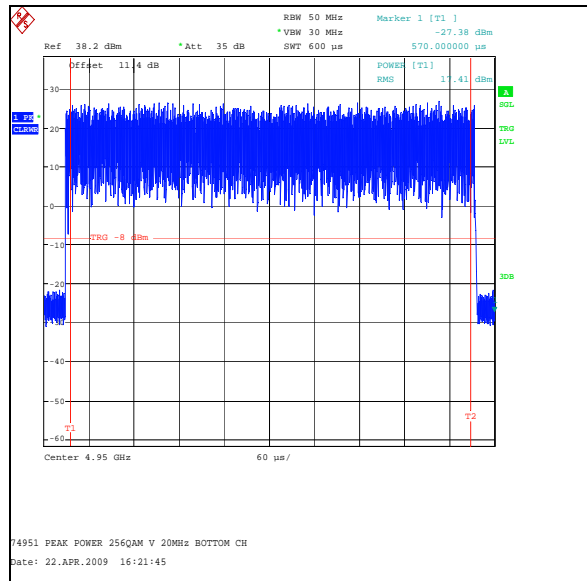
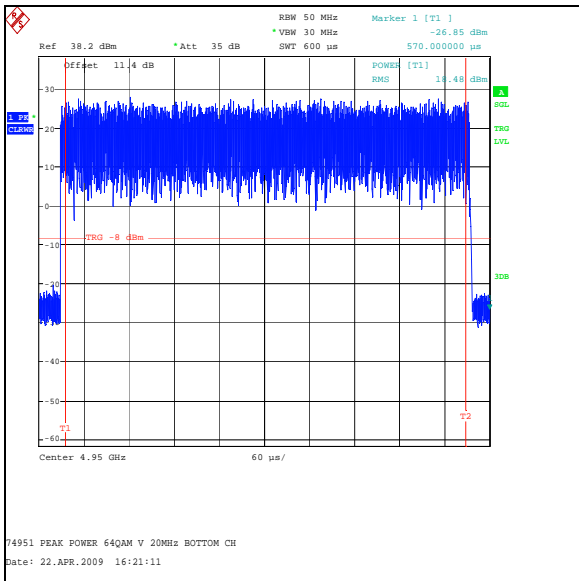
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 20 MHz Channel - Bottom Channel

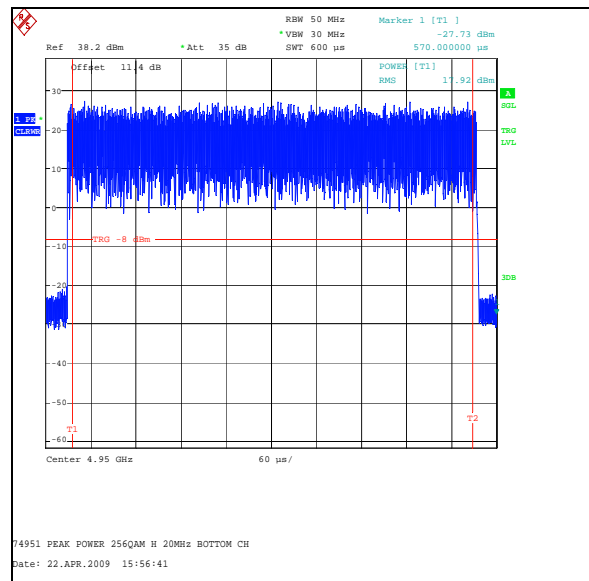
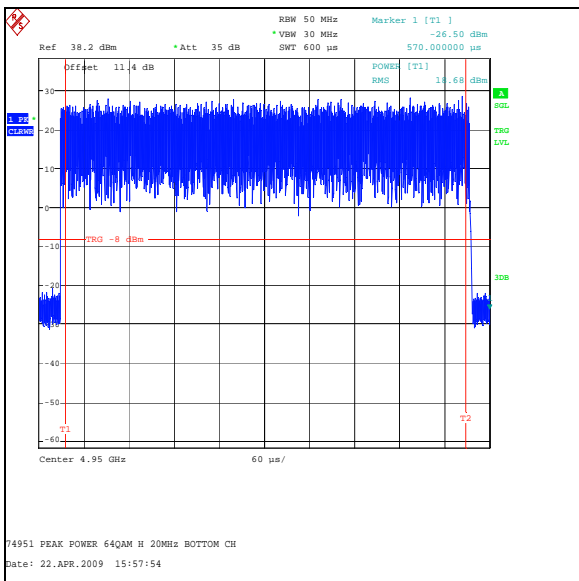
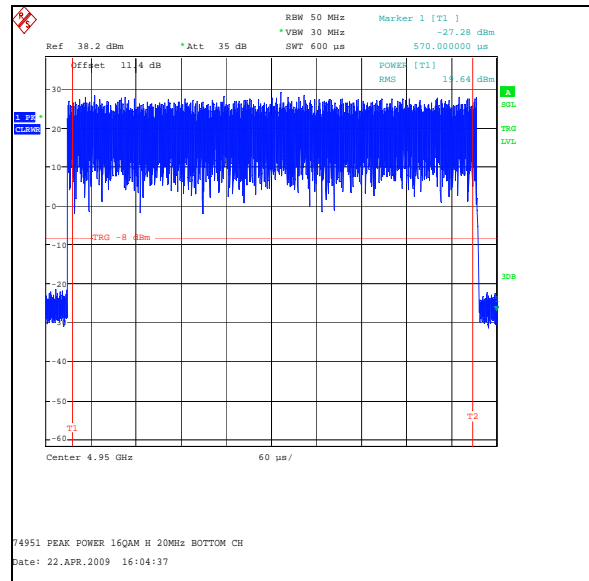
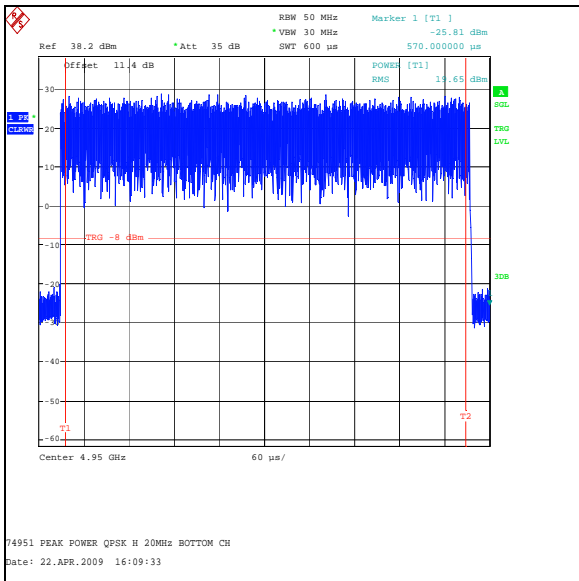
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.4	16.2	19.3	33.0	13.7
BPSK	19.6	19.4	22.5	33.0	10.5
QPSK	19.7	19.4	22.6	33.0	10.4
16QAM	19.6	19.5	22.6	33.0	10.4
64QAM	18.7	18.5	21.6	33.0	11.4
256QAM	17.9	17.4	20.7	33.0	12.3



Transmitter Peak Carrier Output Power (Conducted) (continued)



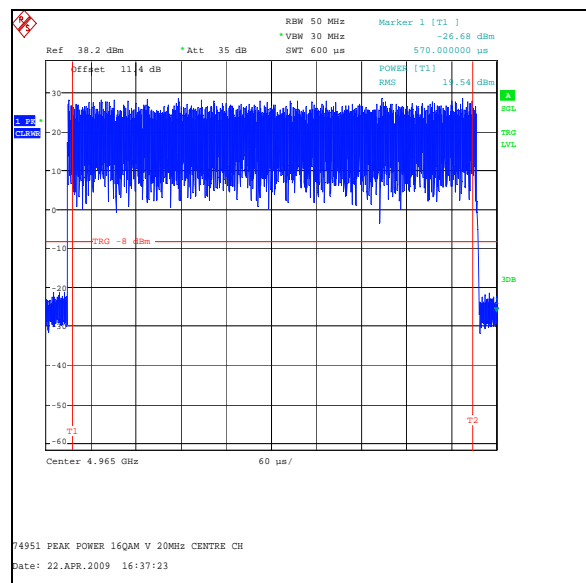
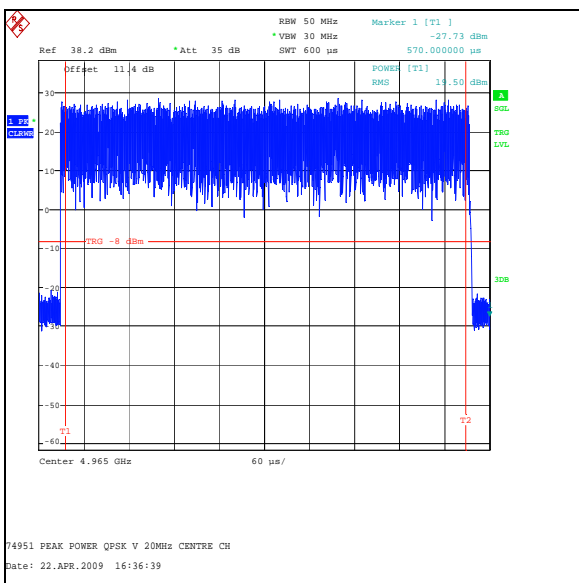
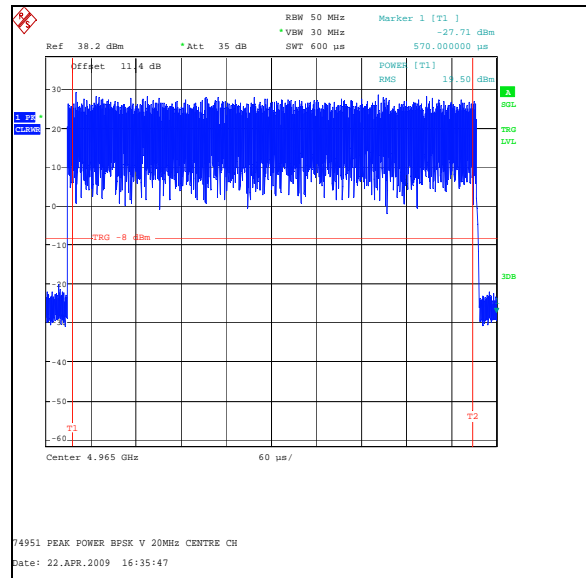
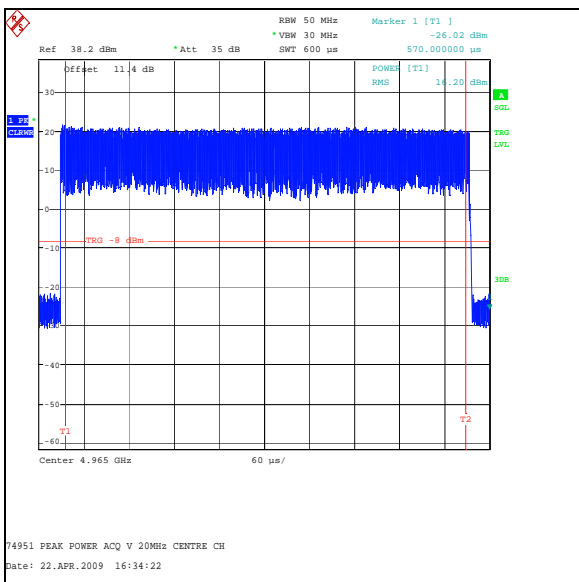
Transmitter Peak Carrier Output Power (Conducted) (continued)



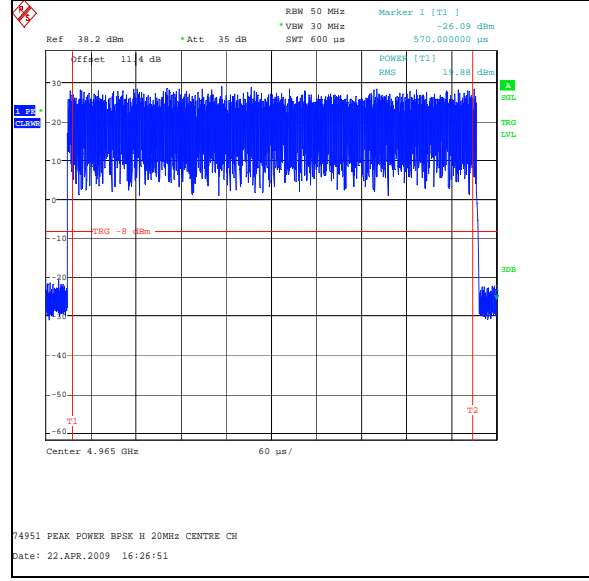
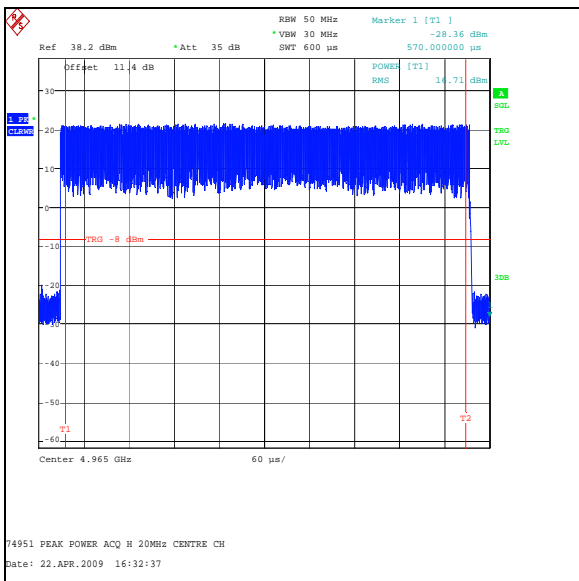
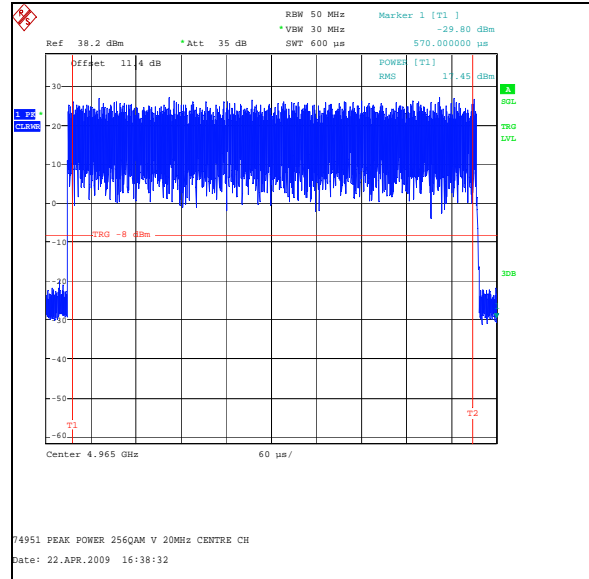
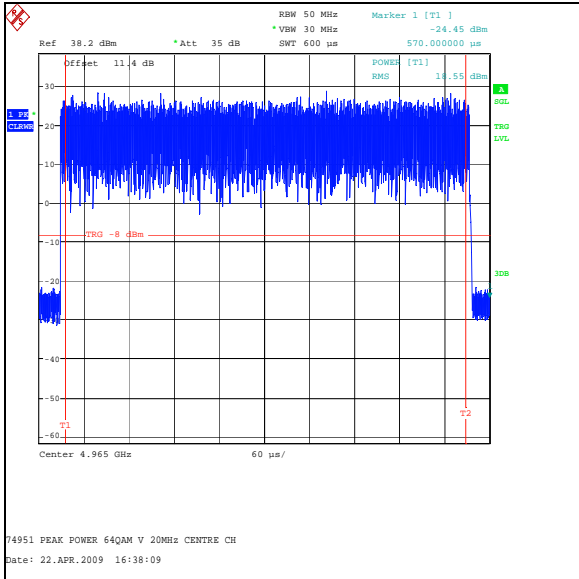
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 20 MHz Channel - Centre Channel

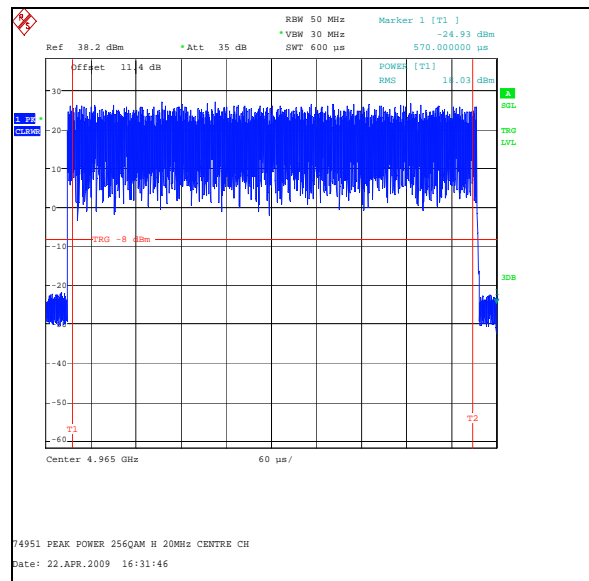
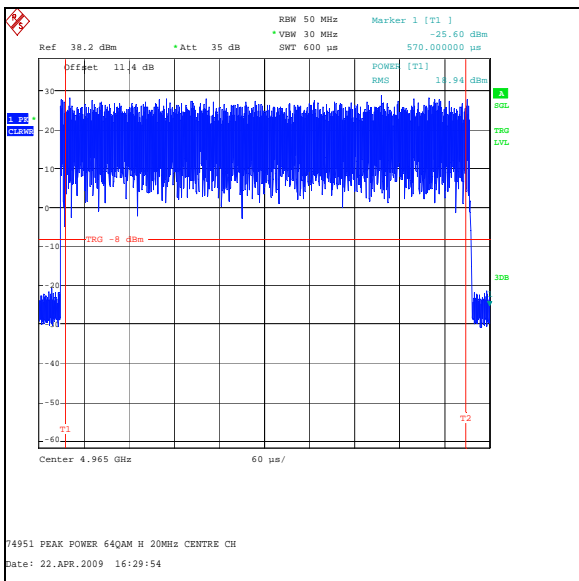
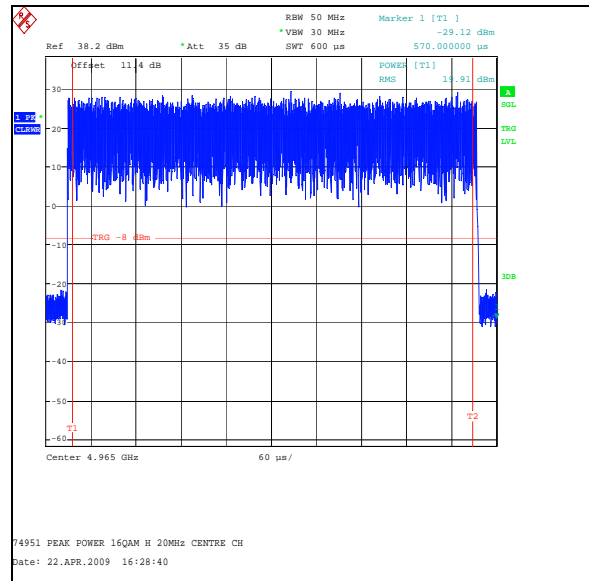
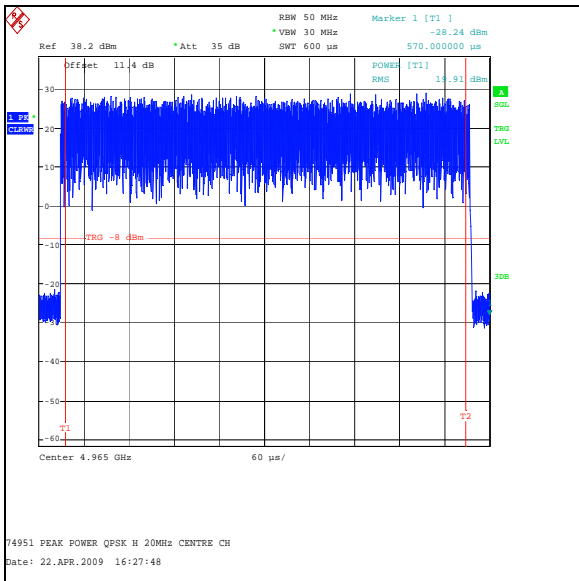
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.7	16.2	19.5	33.0	13.5
BPSK	19.9	19.5	22.7	33.0	10.3
QPSK	19.9	19.5	22.7	33.0	10.3
16QAM	19.9	19.5	22.7	33.0	10.3
64QAM	18.9	18.6	21.8	33.0	11.2
256QAM	18.0	17.5	20.8	33.0	12.2



Transmitter Peak Carrier Output Power (Conducted) (continued)



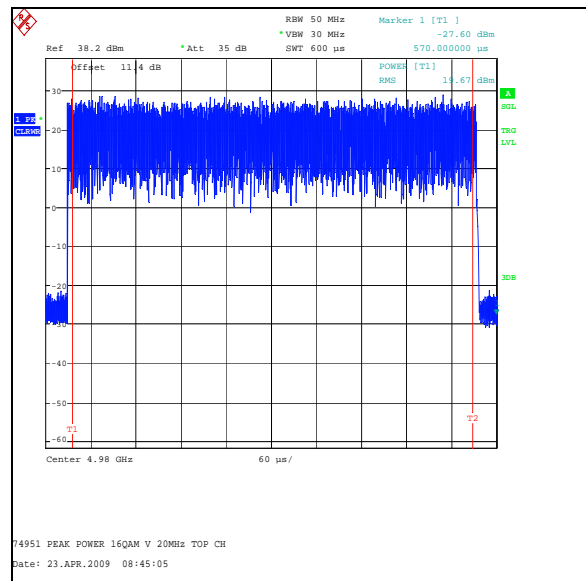
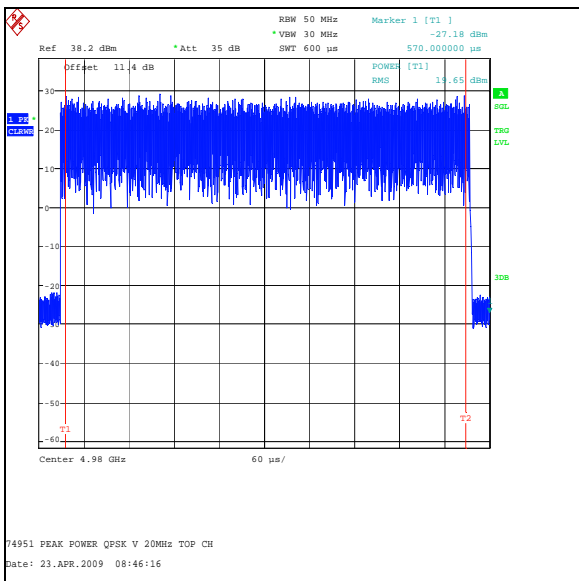
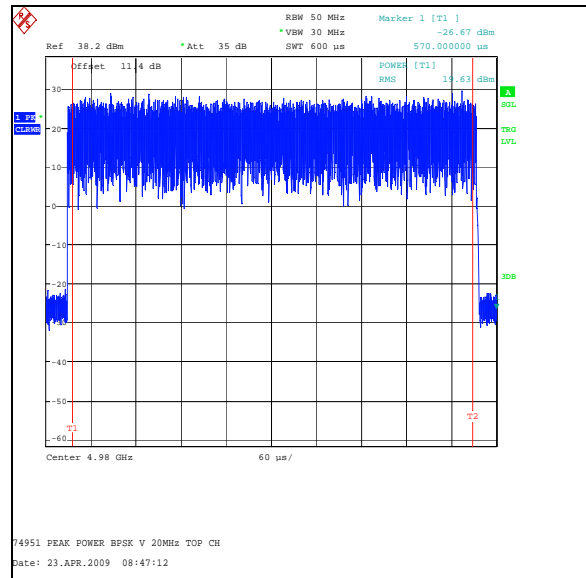
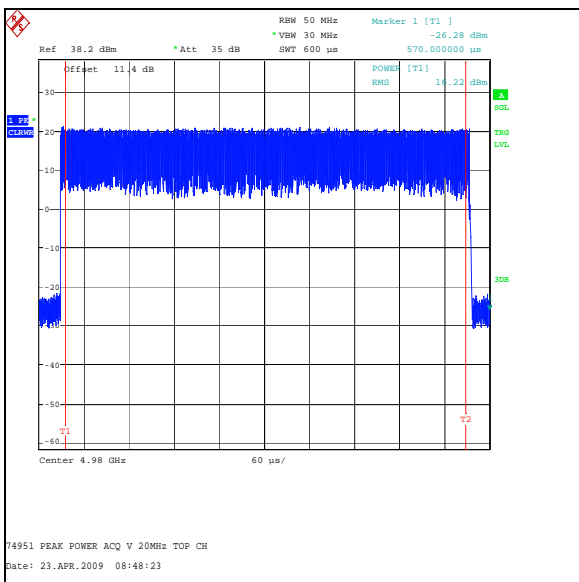
Transmitter Peak Carrier Output Power (Conducted) (continued)



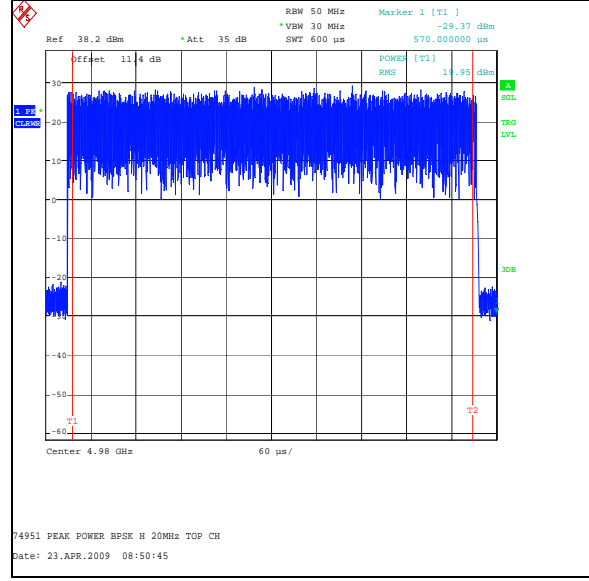
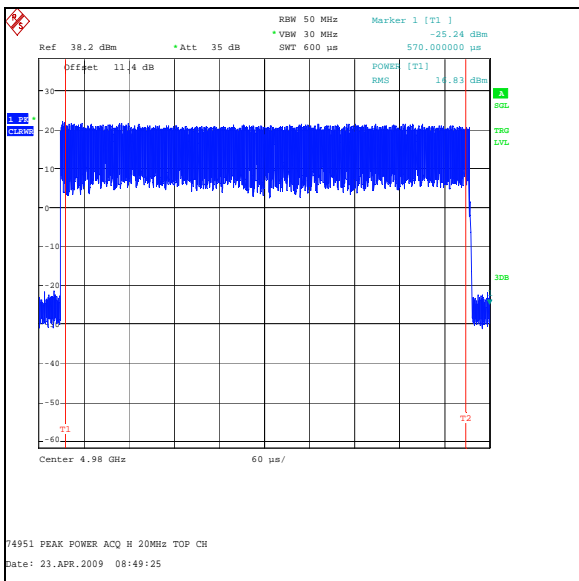
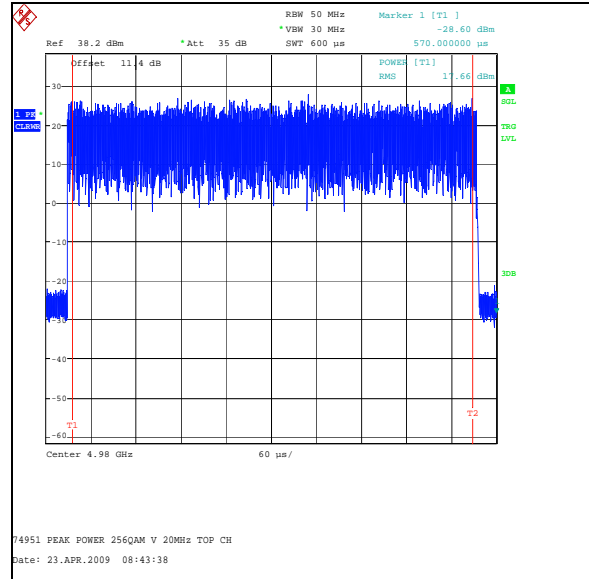
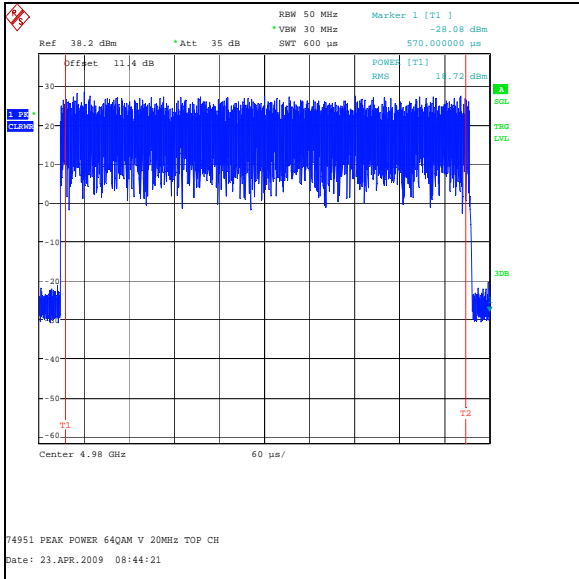
Transmitter Peak Carrier Output Power (Conducted) (continued)

Results: 20 MHz Channel - Top Channel

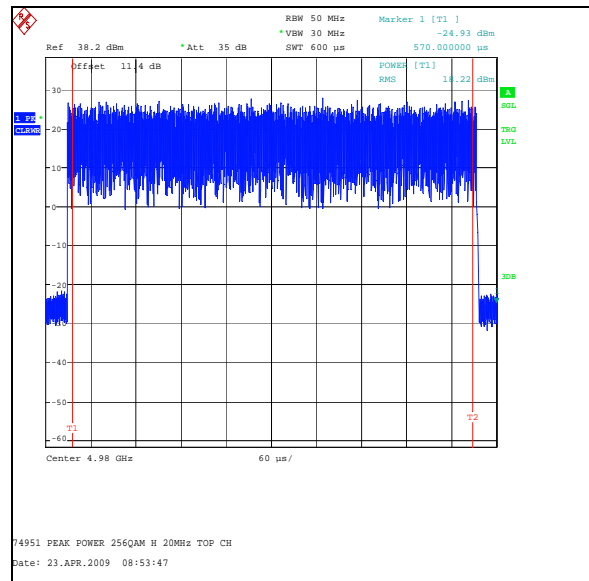
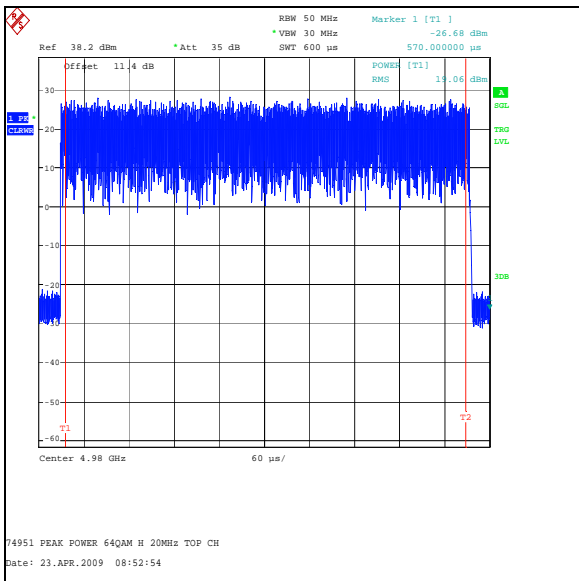
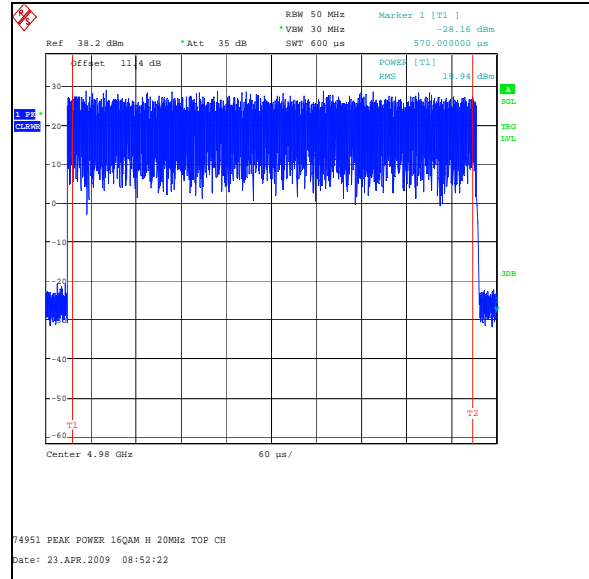
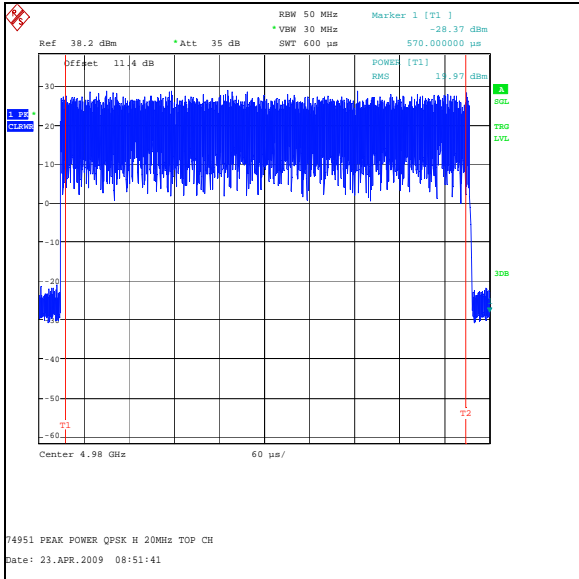
Maximum Output Power (dBm)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	16.8	16.2	19.5	33.0	13.5
BPSK	20.0	19.6	22.8	33.0	10.2
QPSK	20.0	19.7	22.9	33.0	10.1
16QAM	19.9	19.7	22.8	33.0	10.2
64QAM	19.1	18.7	21.9	33.0	11.1
256QAM	18.2	17.7	21.0	33.0	12.0



Transmitter Peak Carrier Output Power (Conducted) (continued)



Transmitter Peak Carrier Output Power (Conducted) (continued)



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

FCC Part:	90.205, 90.1215(a), 2.1046
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Environmental Conditions:

Temperature Range (°C):	26
Relative Humidity Range (%):	30

Note(s):

1. The transmitter peak power spectral density was measured by setting the spectrum analyser resolution bandwidth to the 1MHz and video bandwidth to 3MHz. The EUT was operated at maximum power and the result was read directly from the display as dBm/MHz.
2. Typical plots taken during the measurement are shown below. Due to the number of measurements taken, only selected samples of the graphs are included in the report.

Results: 5 MHz Channel - Bottom Channel

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	14.0	13.8	16.9	21.0	4.1
BPSK	14.0	13.8	16.9	21.0	4.1
QPSK	14.0	13.8	16.9	21.0	4.1
16QAM	13.9	13.9	16.9	21.0	4.1
64QAM	13.1	13.0	16.1	21.0	4.9
256QAM	12.3	12.1	15.2	21.0	5.8

Results: 5 MHz Channel - Centre Channel

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	14.4	13.9	17.2	21.0	3.8
BPSK	14.3	13.9	17.1	21.0	3.9
QPSK	14.3	14.0	17.2	21.0	3.8
16QAM	14.2	13.9	17.1	21.0	3.9
64QAM	13.4	13.0	16.2	21.0	4.8
256QAM	12.5	12.2	15.4	21.0	5.6

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

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	14.5	14.1	17.3	21.0	3.7
BPSK	14.5	14.2	17.4	21.0	3.6
QPSK	14.5	14.2	17.4	21.0	3.6
16QAM	14.5	14.3	17.4	21.0	3.6
64QAM	13.6	13.2	16.4	21.0	4.6
256QAM	12.7	12.3	15.5	21.0	5.5

Results: 10 MHz Channel - Bottom Channel

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	12.3	12.0	15.2	21.0	5.8
BPSK	11.3	11.2	14.3	21.0	6.7
QPSK	11.3	11.2	14.3	21.0	6.7
16QAM	11.2	11.1	14.2	21.0	6.8
64QAM	9.3	10.2	12.8	21.0	8.2
256QAM	9.4	9.2	12.3	21.0	8.7

Results: 10 MHz Channel - Centre Channel

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	12.6	12.1	15.4	21.0	5.6
BPSK	11.5	11.3	14.4	21.0	6.6
QPSK	11.5	11.2	14.4	21.0	6.6
16QAM	11.6	11.2	14.4	21.0	6.6
64QAM	10.6	10.4	13.5	21.0	7.5
256QAM	9.7	9.3	12.5	21.0	8.5

Results: 10 MHz Channel - Top Channel

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	12.6	12.2	15.4	21.0	5.6
BPSK	11.6	11.3	14.5	21.0	6.5
QPSK	11.6	11.3	14.5	21.0	6.5
16QAM	11.5	11.3	14.4	21.0	6.6
64QAM	10.5	10.2	13.4	21.0	7.6
256QAM	9.9	9.3	12.6	21.0	8.4

Transmitter Peak Power Spectral Density (Conducted) (continued)**Results: 20 MHz Channel - Bottom Channel**

Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	9.9	9.5	12.7	21.0	8.3
BPSK	8.5	8.3	11.4	21.0	9.6
QPSK	8.5	8.3	11.4	21.0	9.6
16QAM	8.4	8.3	11.4	21.0	9.6
64QAM	7.5	7.1	10.3	21.0	10.7
256QAM	6.9	6.4	9.7	21.0	11.3

Results: 20 MHz Channel - Centre Channel

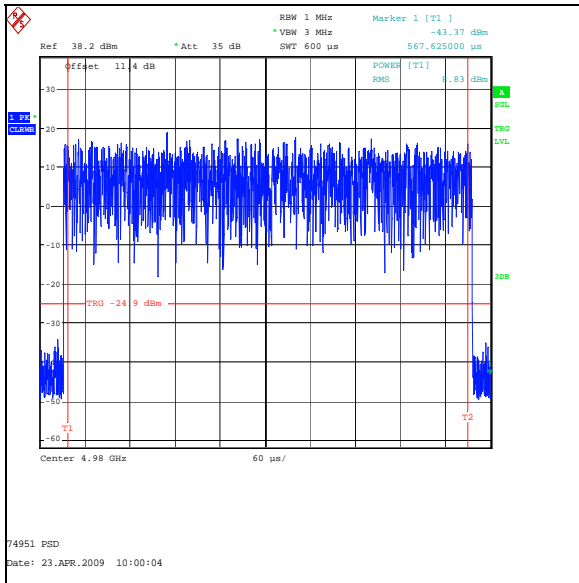
Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	10.0	9.6	12.8	21.0	8.2
BPSK	8.8	8.3	11.6	21.0	9.4
QPSK	8.8	8.4	11.6	21.0	9.4
16QAM	8.8	8.3	11.6	21.0	9.4
64QAM	7.7	7.1	10.4	21.0	10.6
256QAM	6.9	6.4	9.7	21.0	11.3

Results: 20 MHz Channel - Top Channel

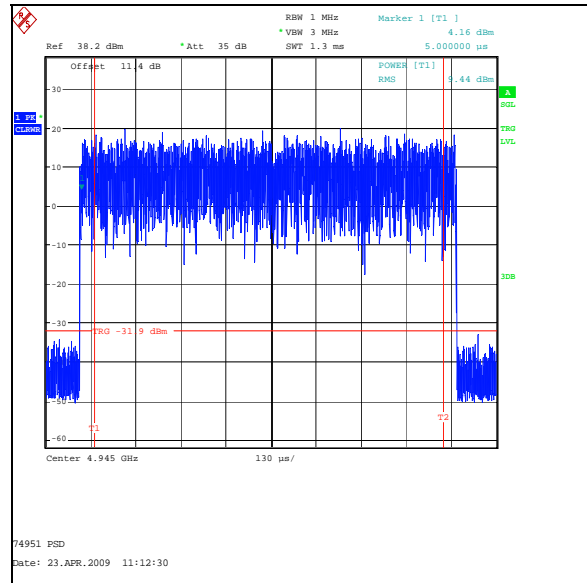
Peak Power Spectral Density (dBm/MHz)				Limit	Margin
Mode	Port H	Port V	Aggregate	(dBm)	(dB)
ACQ	10.2	9.6	12.9	21.0	8.1
BPSK	8.8	8.5	11.7	21.0	9.3
QPSK	8.8	8.4	11.6	21.0	9.4
16QAM	8.7	8.5	11.6	21.0	9.4
64QAM	7.9	7.6	10.8	21.0	10.2
256QAM	7.0	6.3	9.7	21.0	11.3

Transmitter Peak Power Spectral Density (Conducted) (continued)

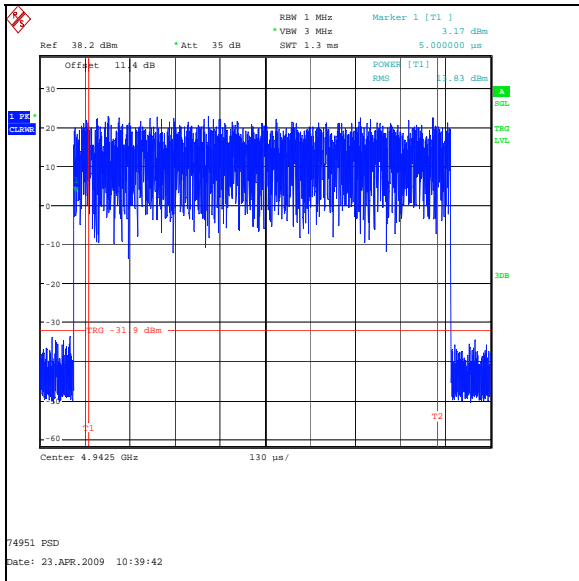
Sample Plots for Peak Power Spectral Density



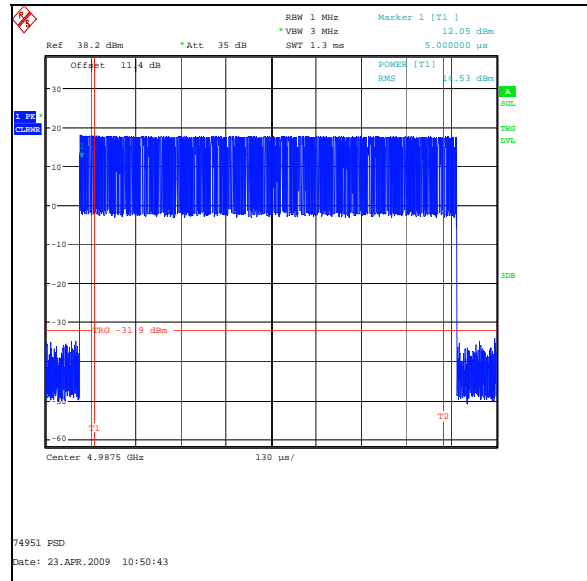
BPSK H port 20MHz top channel



256QAM H port 10MHz bottom channel



BPSK V port 5MHz bottom channel



ACQ H port 5MHz top channel

5.6. Transmitter Occupied Bandwidth (Bandwidth Limitations)**Test Summary:**

FCC Part:	90.209, 2.1049
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Environmental Conditions:

Temperature Range (°C):	27
Relative Humidity Range (%):	29

Note(s):

1. The Occupied bandwidth was determined by measuring the 20dB bandwidth of the fundamental signal using a spectrum analyser. The resolution bandwidth was set to 1% of emission bandwidth where possible or the next bandwidth up.
2. Complete testing was performed on one port and the results are shown below. Random testing also was performed on the other port. The second port showed comparable results to the first port but the results are not recorded in this report.

Results: 5 MHz Channel / V Port / Acquisition Mode

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4942.5	100	300	4.468937
Middle	4962.5	100	300	4.448898
Top	4987.5	100	300	4.448898

Results: 5 MHz Channel / V Port / BPSK Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4942.5	100	300	4.729458
Middle	4962.5	100	300	4.749499
Top	4987.5	100	300	4.729459

Results: 5 MHz Channel / V Port / 16QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4942.5	100	300	4.689379
Middle	4962.5	100	300	4.729459
Top	4987.5	100	300	4.729459

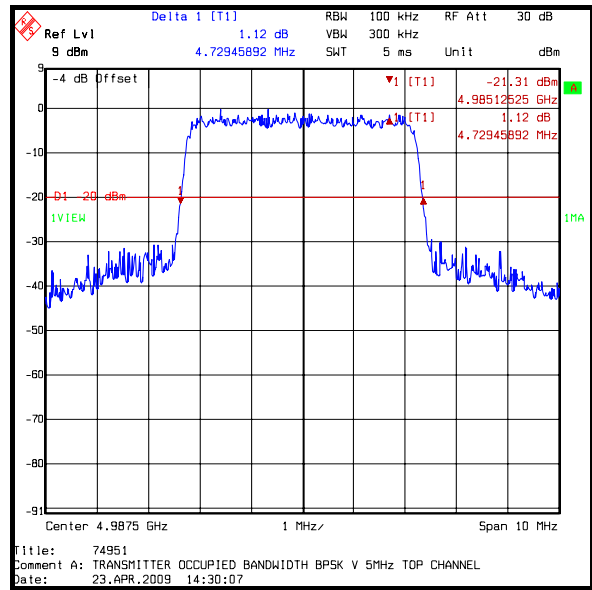
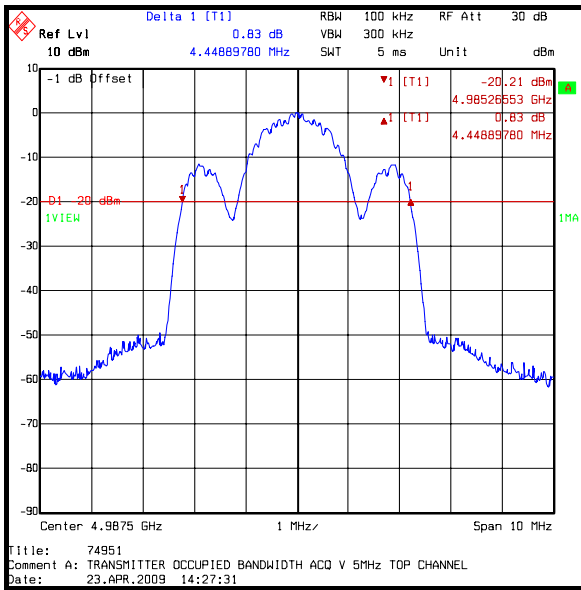
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 5 MHz Channel / V Port / 64QAM Modulation

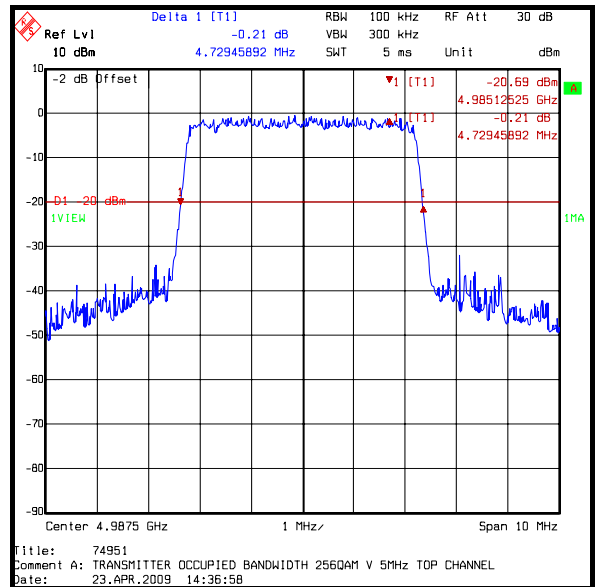
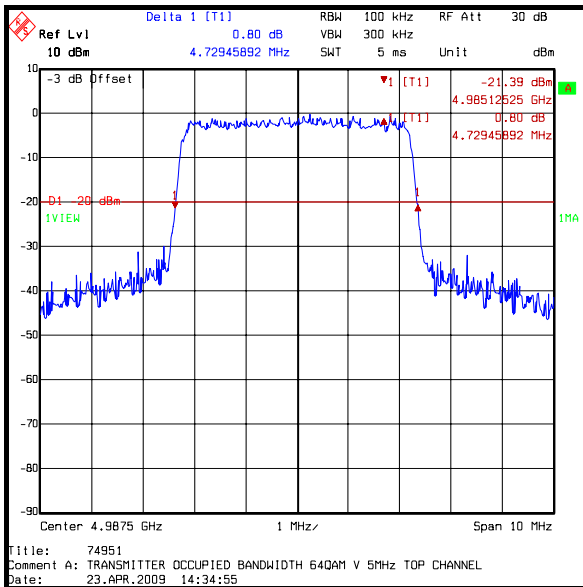
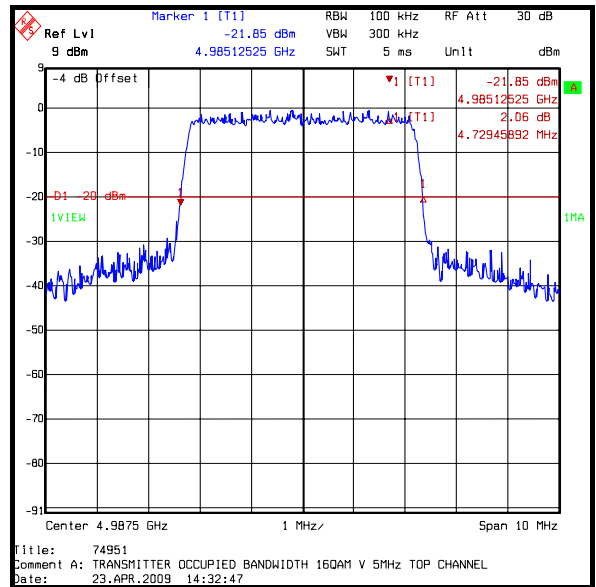
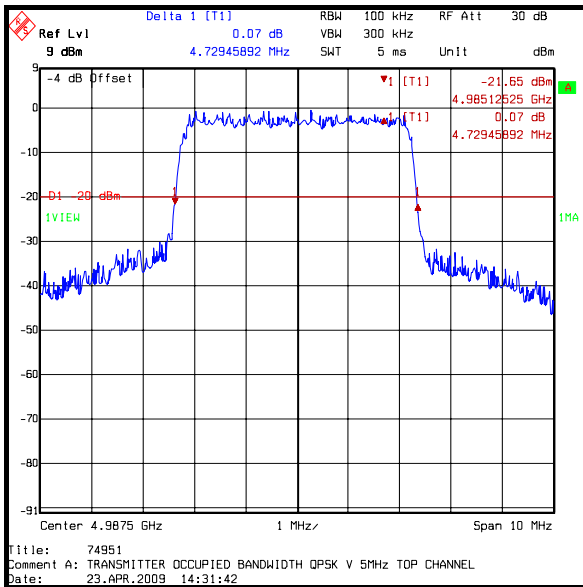
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4942.5	100	300	4.729459
Middle	4962.5	100	300	4.709419
Top	4987.5	100	300	4.729459

Results: 5 MHz Channel / V Port / 256 QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4942.5	100	300	4.729458
Middle	4962.5	100	300	4.709419
Top	4987.5	100	300	4.729458



Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)



Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)**Results: 10 MHz Channel / V Port / Acquisition Mode**

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	8.897796
Middle	4965.0	100	300	8.867735
Top	4985.0	100	300	8.867735

Results: 10 MHz Channel / V Port / BPSK Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	9.348697
Middle	4965.0	100	300	9.288577
Top	4985.0	100	300	9.348697

Results: 10 MHz Channel / V Port / QPSK Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	9.378757
Middle	4965.0	100	300	9.378757
Top	4985.0	100	300	9.348697

Results: 10 MHz Channel / V Port / 16QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	9.378757
Middle	4965.0	100	300	9.318637
Top	4985.0	100	300	9.378757

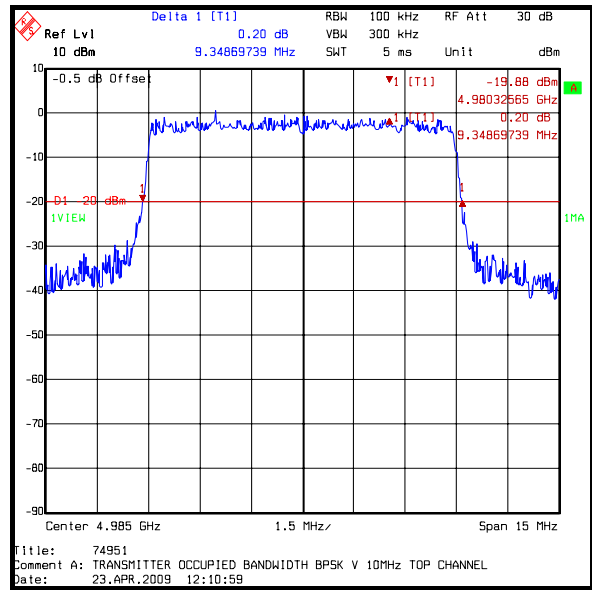
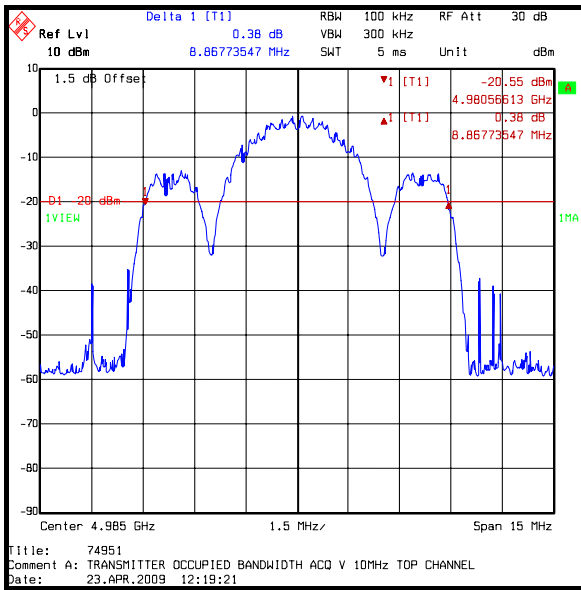
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 10 MHz Channel / V Port / 64QAM Modulation

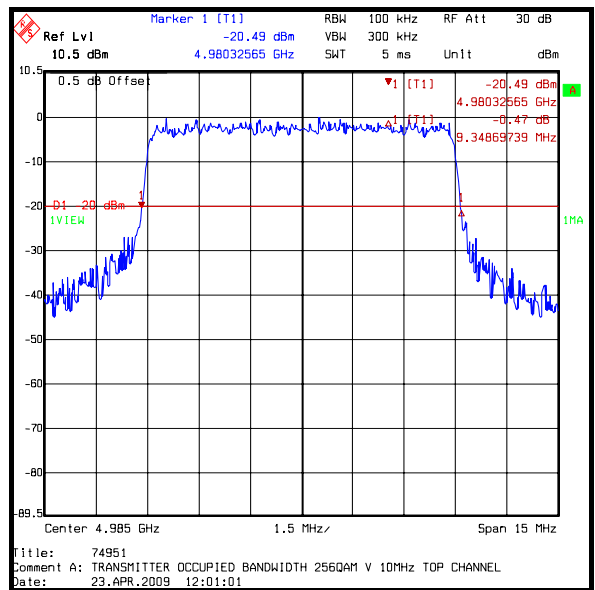
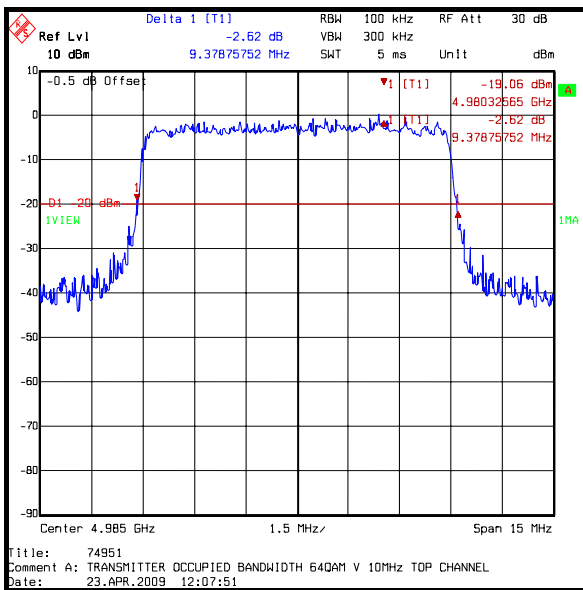
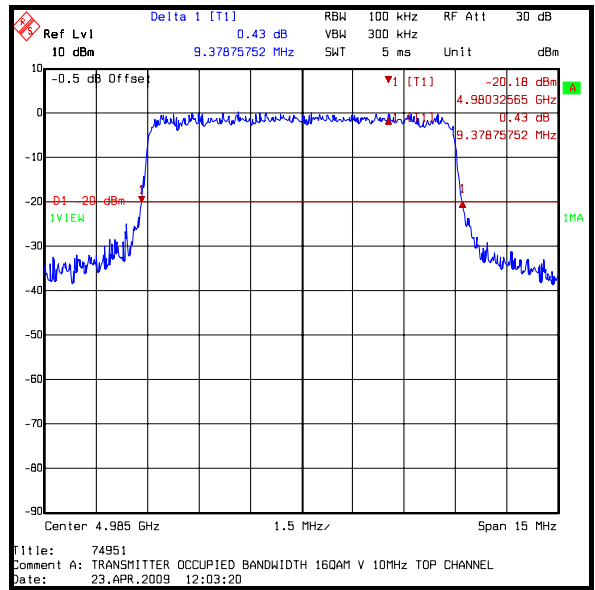
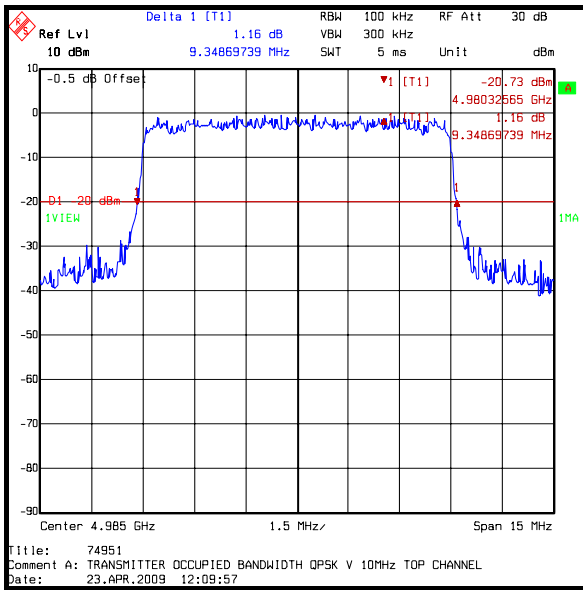
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	9.348697
Middle	4965.0	100	300	9.288577
Top	4985.0	100	300	9.378757

Results: 10 MHz Channel / V Port / 256 QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4945.0	100	300	9.318637
Middle	4965.0	100	300	9.318637
Top	4985.0	100	300	9.348697



Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)



Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)**Results: 20 MHz Channel / V Port / Acquisition Mode**

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (kHz)
Bottom	4950.0	200	1000	17.795591
Middle	4965.0	200	1000	17.885771
Top	4980.0	200	1000	17.855711

Results: 20 MHz Channel / V Port / BPSK Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4950.0	200	1000	18.757515
Middle	4965.0	200	1000	18.727454
Top	4980.0	200	1000	18.757515

Results: 20 MHz Channel / V Port / QPSK Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4950.0	200	1000	18.817635
Middle	4965.0	200	1000	18.787575
Top	4980.0	200	1000	18.817635

Results: 20 MHz Channel / V Port / 16QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4950.0	200	1000	18.817635
Middle	4965.0	200	1000	18.847695
Top	4980.0	200	1000	18.757515

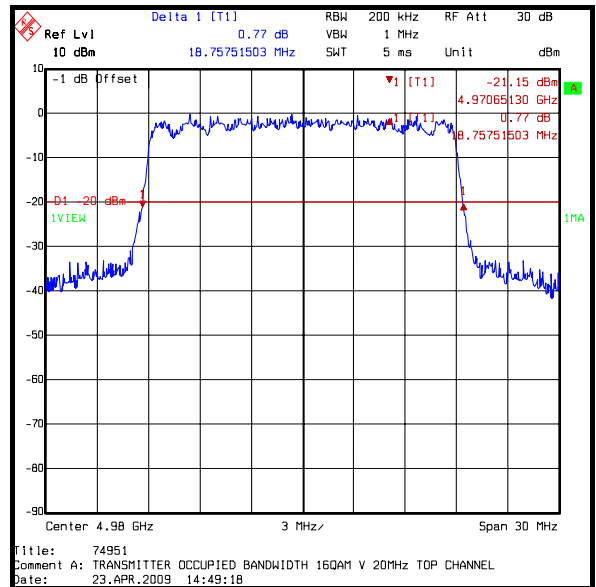
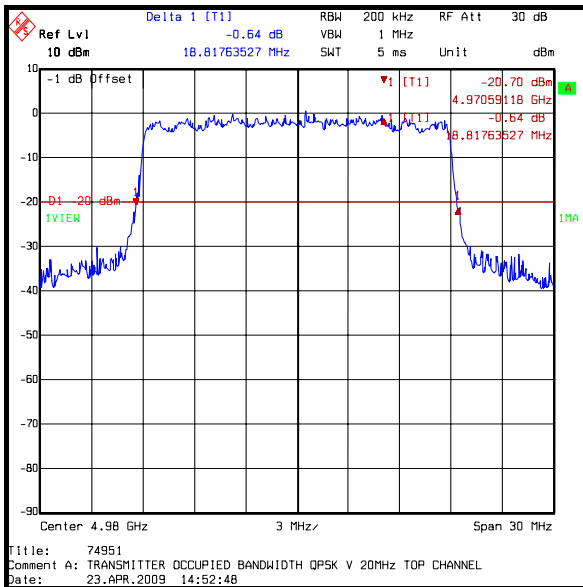
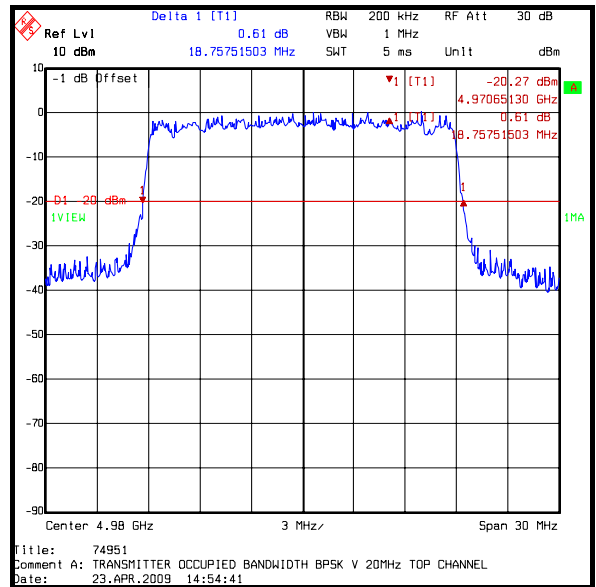
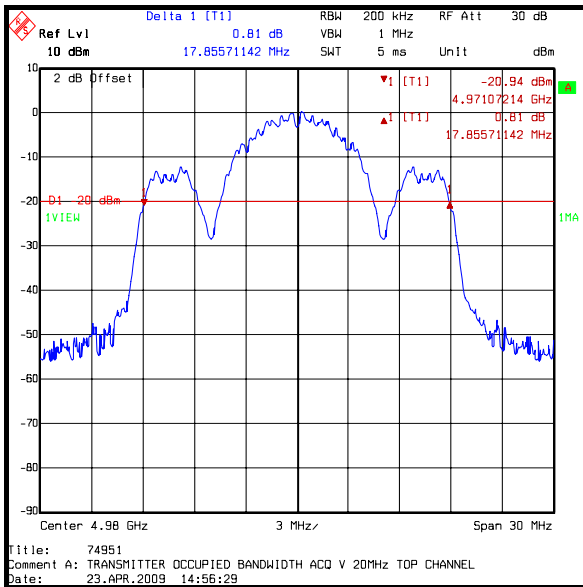
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)**Results: 20 MHz Channel / V Port / 64QAM Modulation**

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4950.0	200	1000	18.877756
Middle	4965.0	200	1000	18.727455
Top	4980.0	200	1000	18.817635

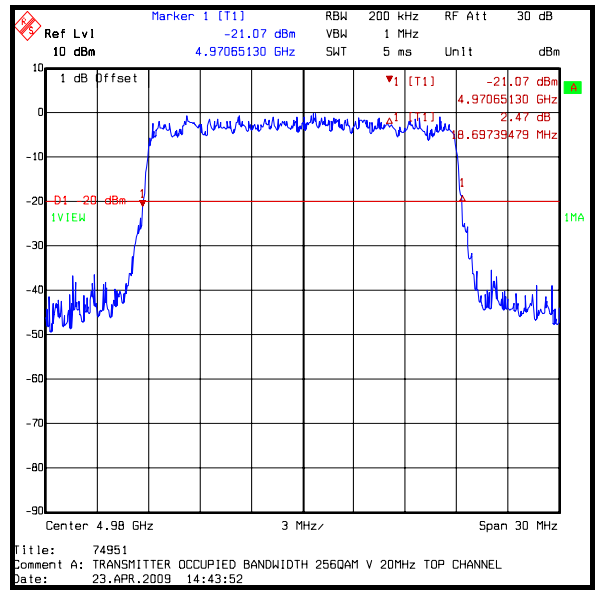
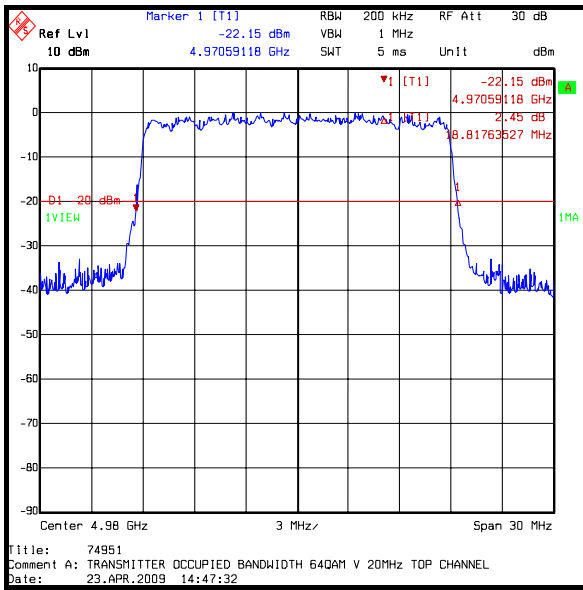
Results: 20 MHz Channel / V Port / 256 QAM Modulation

Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	4950.0	200	1000	18.697395
Middle	4965.0	200	1000	18.667335
Top	4980.0	200	1000	18.697395

Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)



Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)



5.7. Transmitter Conducted Emissions Masks

Test Summary:

FCC Part:	90.210(m), 2.1051
Test Method Used:	In accordance with EIA/TIA-603-B Section 2.2.13

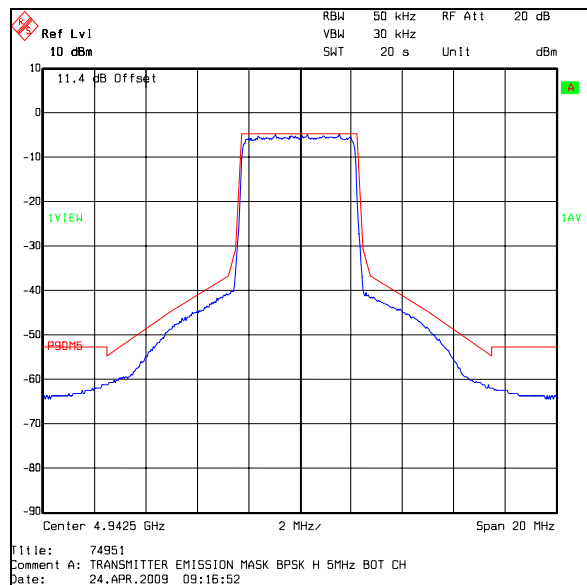
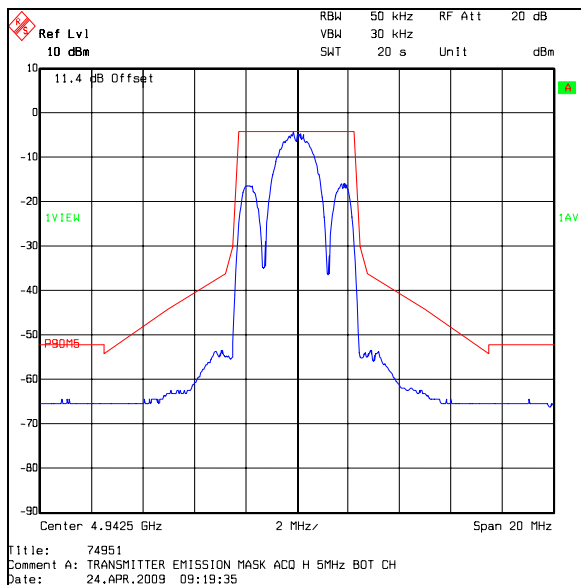
Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	28

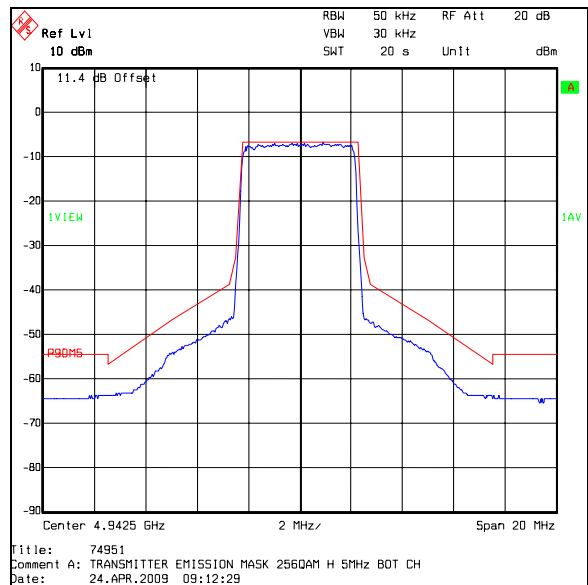
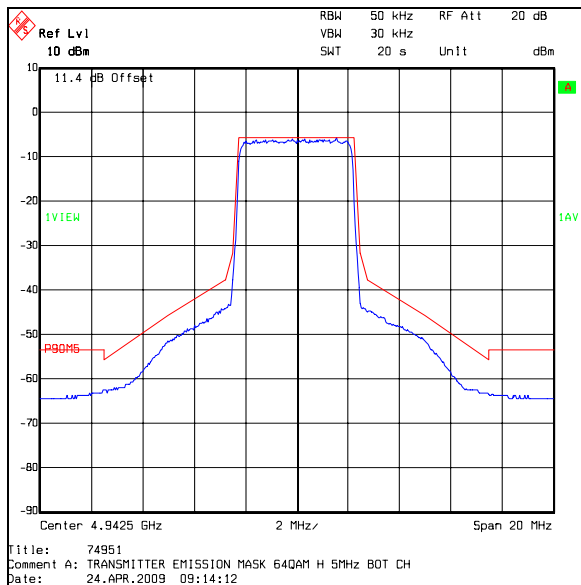
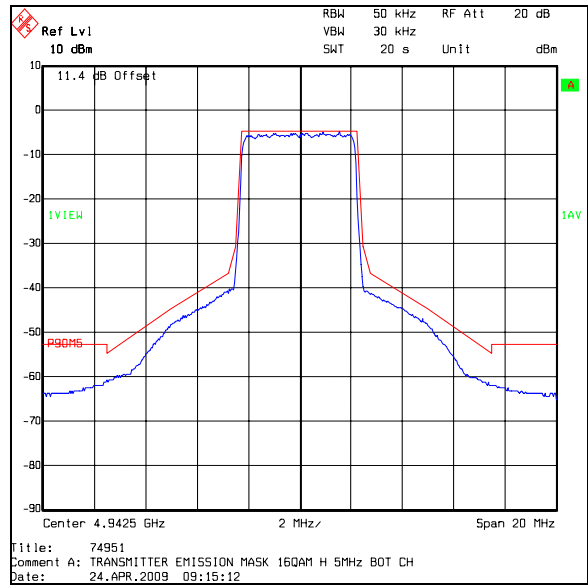
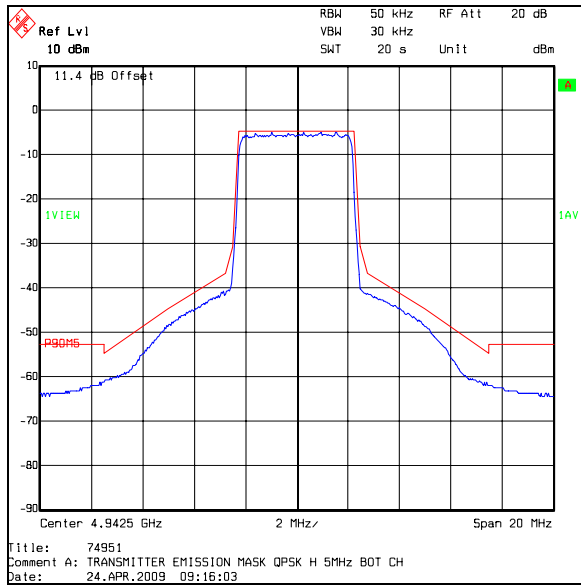
Note(s):

1. For the frequency ranges close to and including the fundamental frequency, plots of the spectral distribution (emission masks) were recorded using a spectrum analyser for the EUT transmitting on bottom, middle and top channels.
2. Complete testing was performed on the H port for the Emission Masks and the results are shown below. Sample tests on the V port confirmed that the performance of both ports was the same and so results for the V port are not included. However, the In-Band emission plots were performed for both H and V ports and are shown below

Results: 5 MHz Channel – Bottom Channel

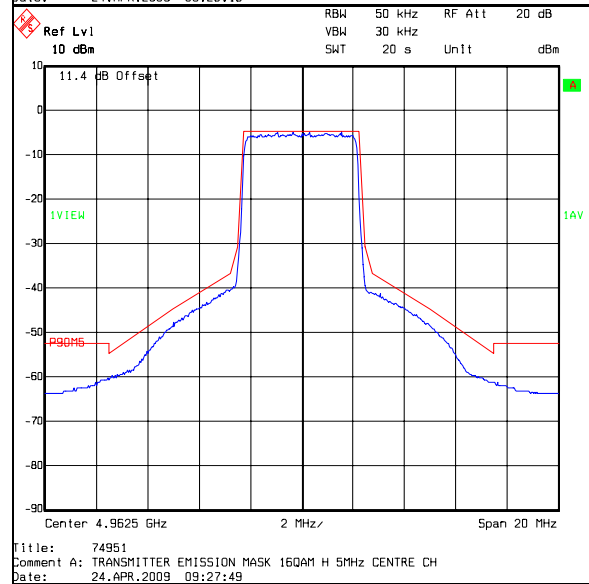
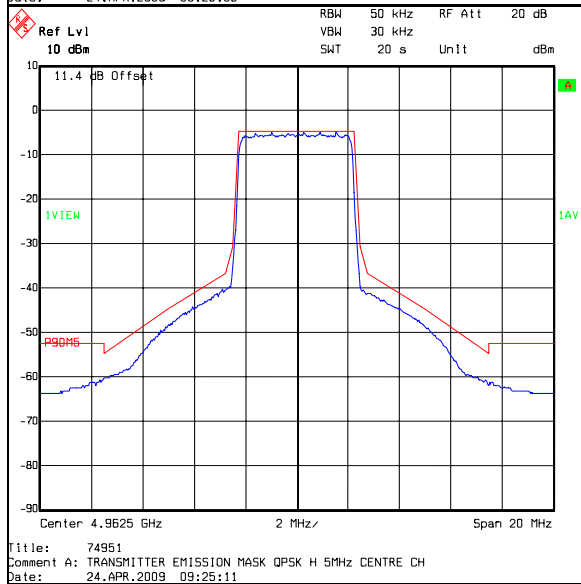
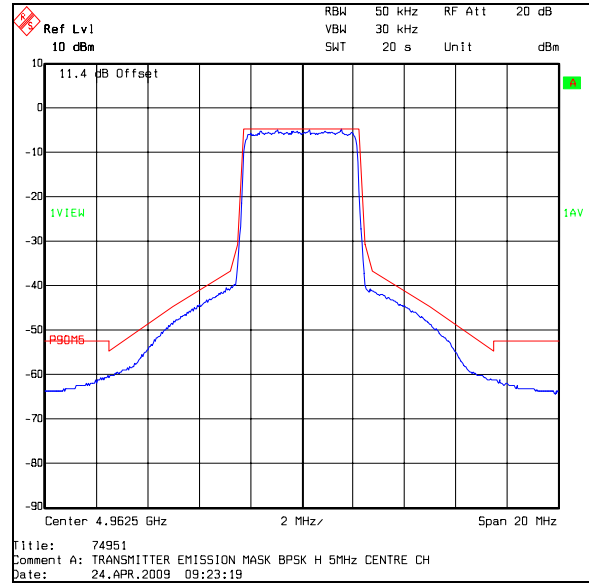
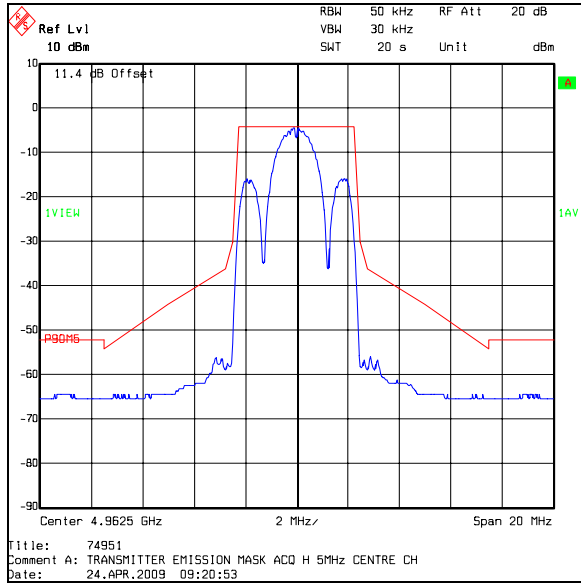


Transmitter Conducted Emissions Masks (continued)

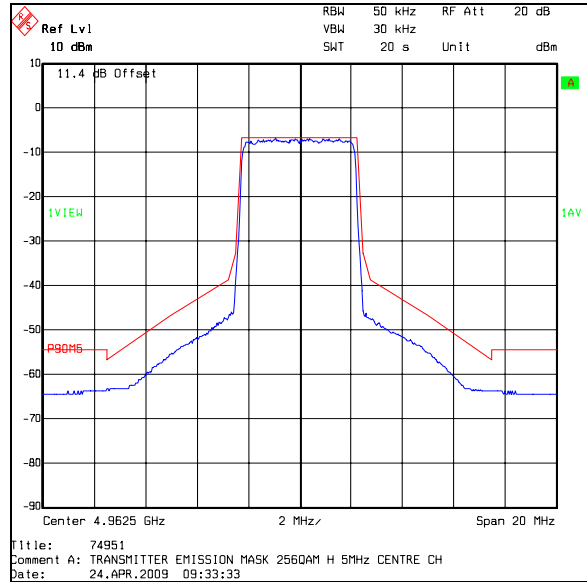
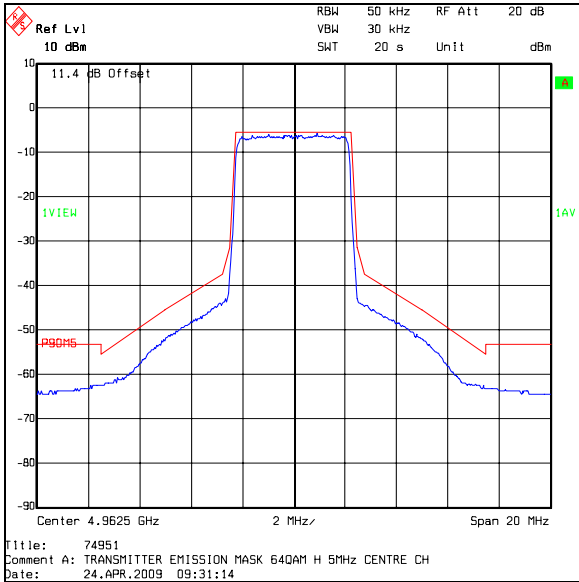


Transmitter Conducted Emissions Masks (continued)

Results: 5 MHz Channel – Centre Channel

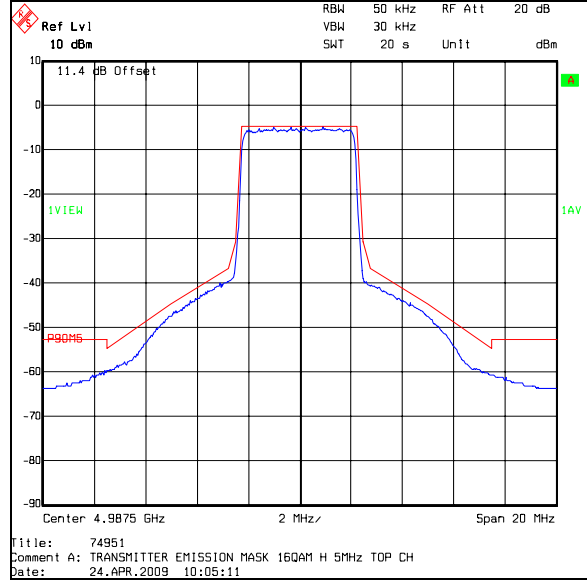
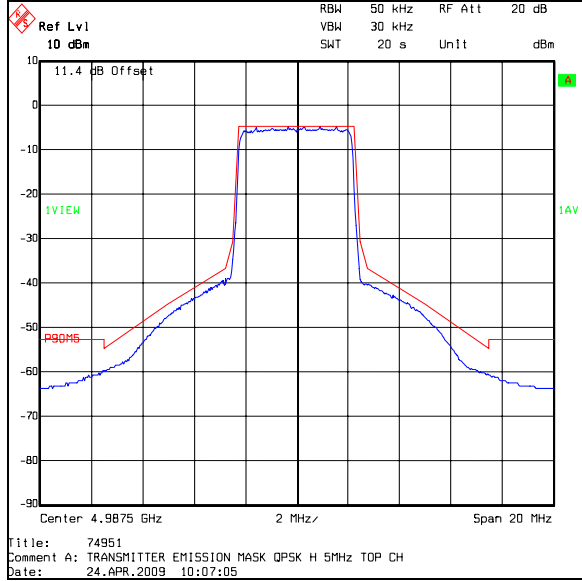
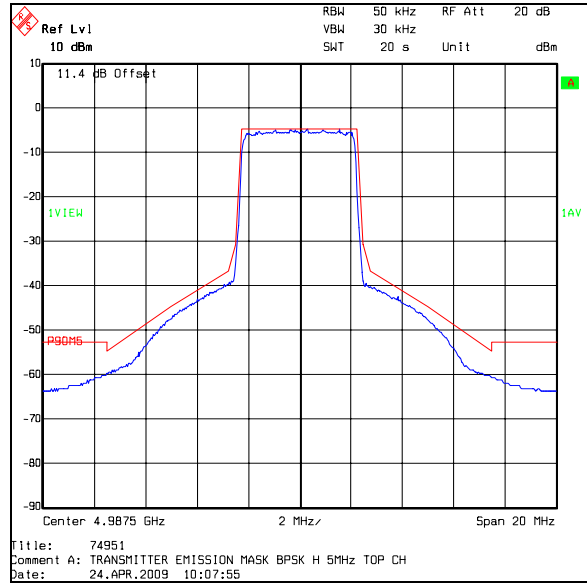
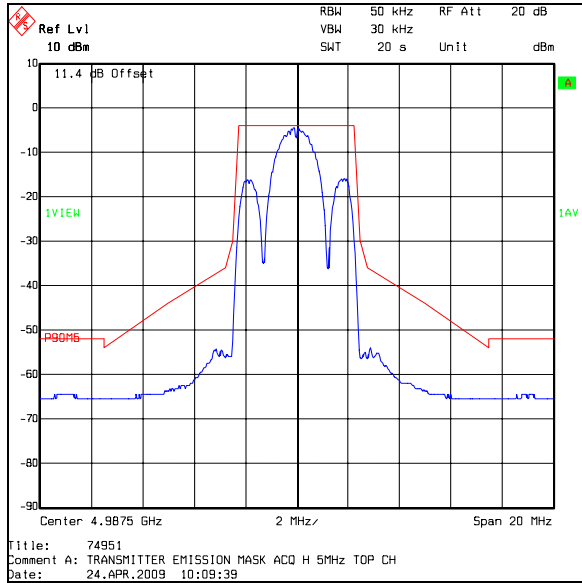


Transmitter Conducted Emissions Masks (continued)
Results: 5 MHz Channel – Centre Channel (continued)



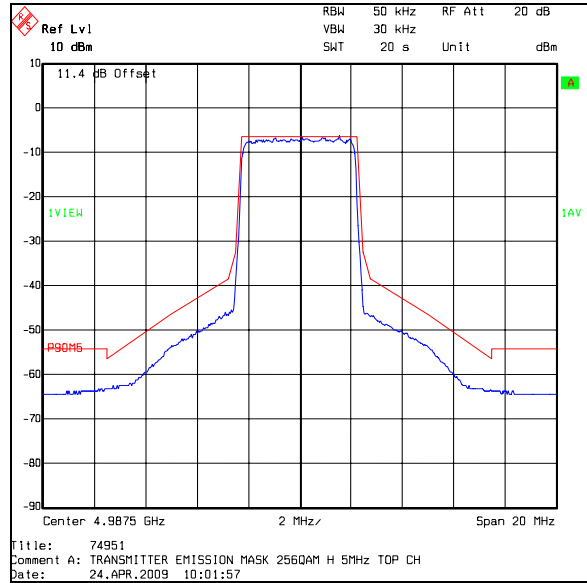
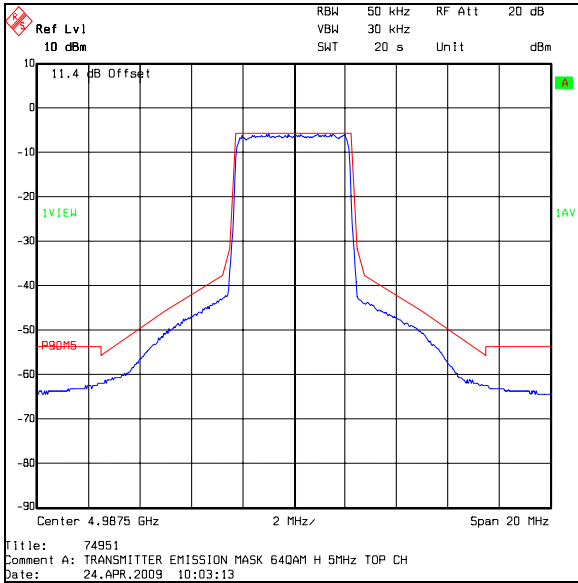
Transmitter Conducted Emissions Masks (continued)

Results: 5 MHz Channel – Top Channel



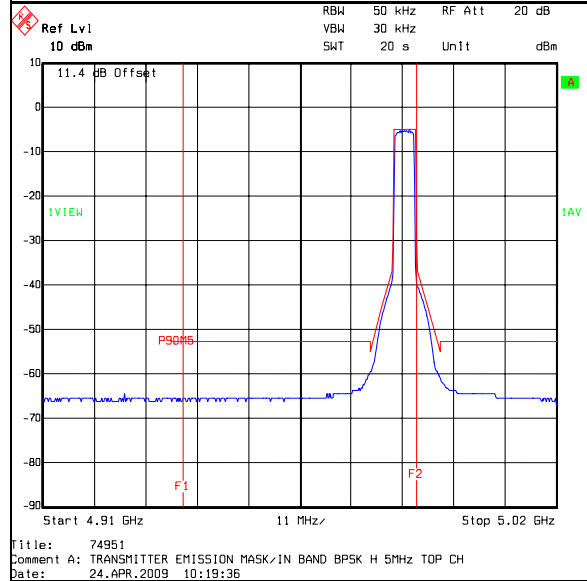
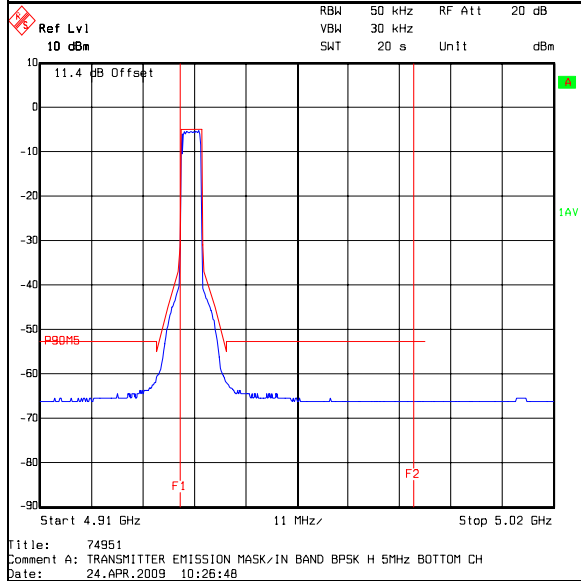
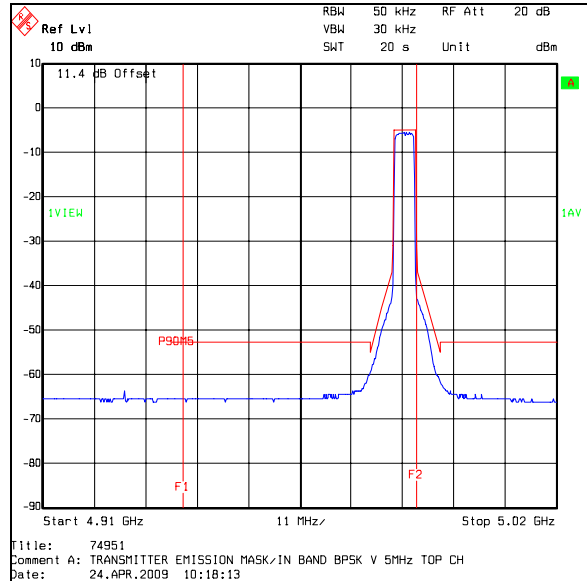
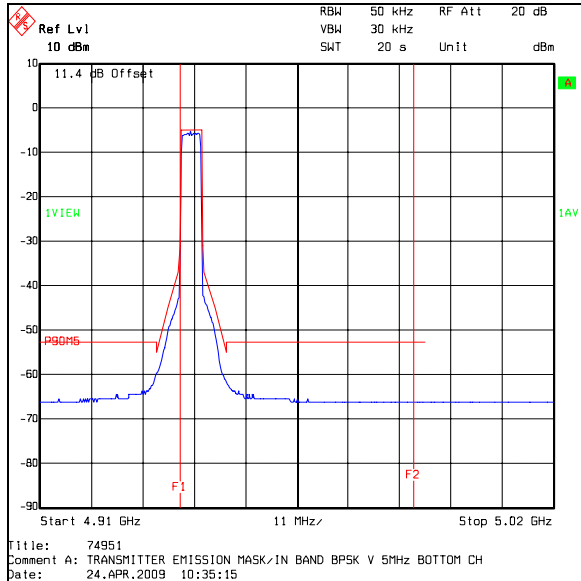
Transmitter Conducted Emissions Masks (continued)

Results: 5 MHz Channel – Top Channel (continued)



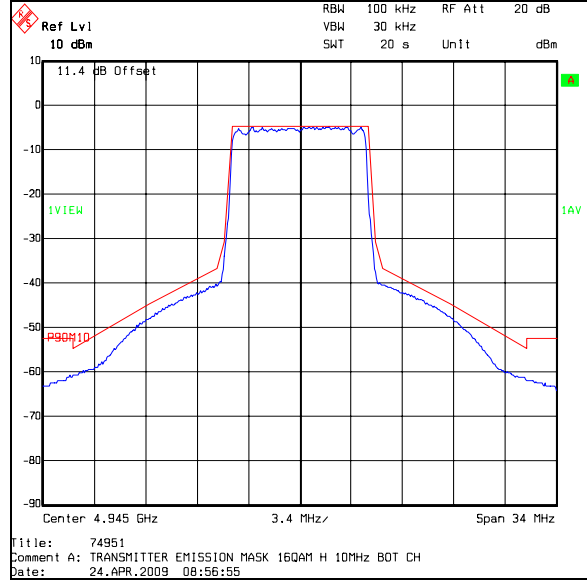
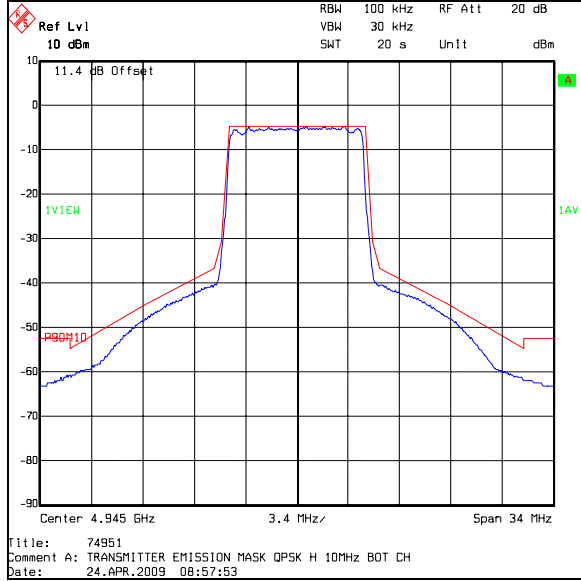
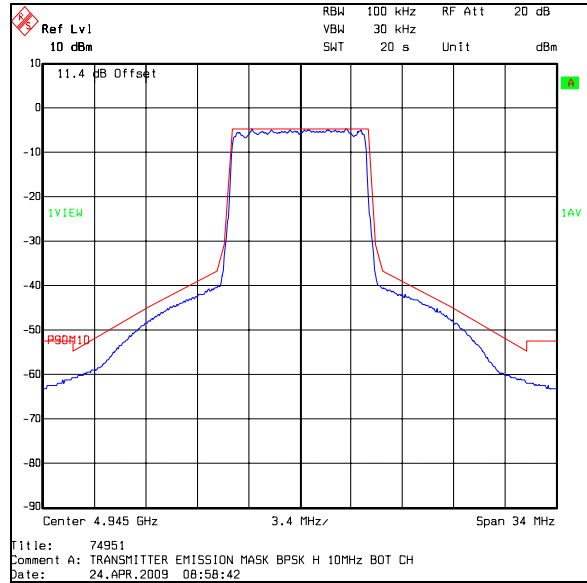
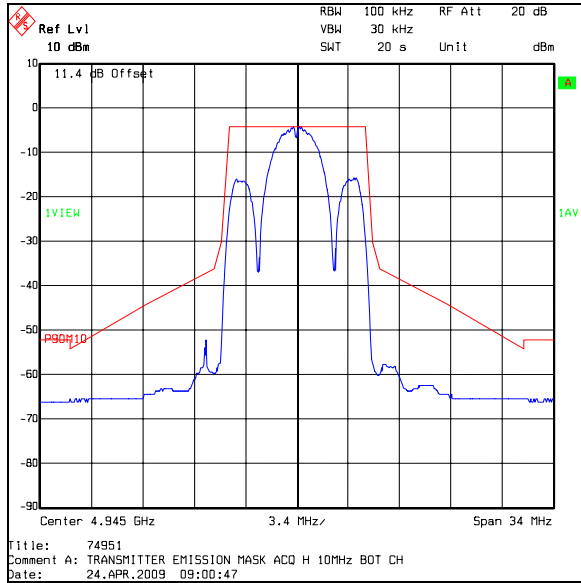
Transmitter Conducted Emissions Masks (continued)

Results: 5 MHz Channel – In Band Emissions



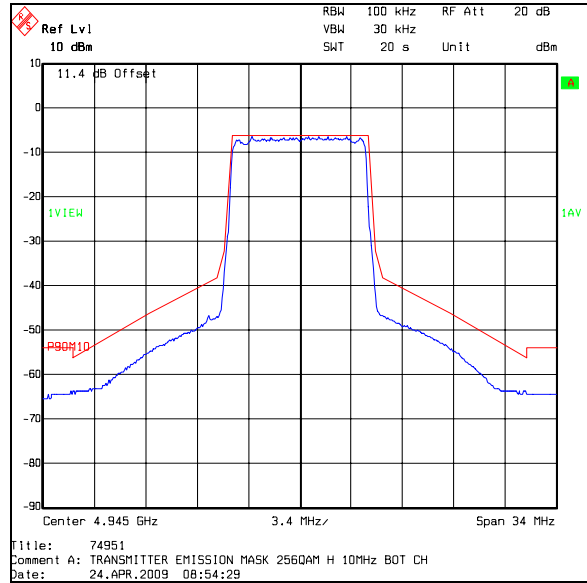
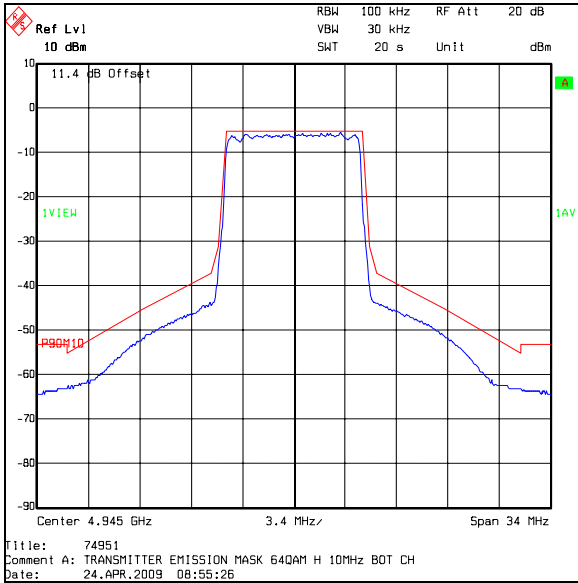
Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – Bottom Channel



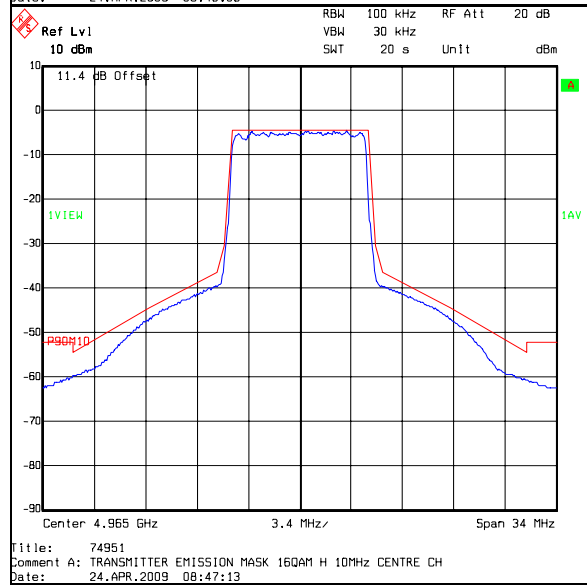
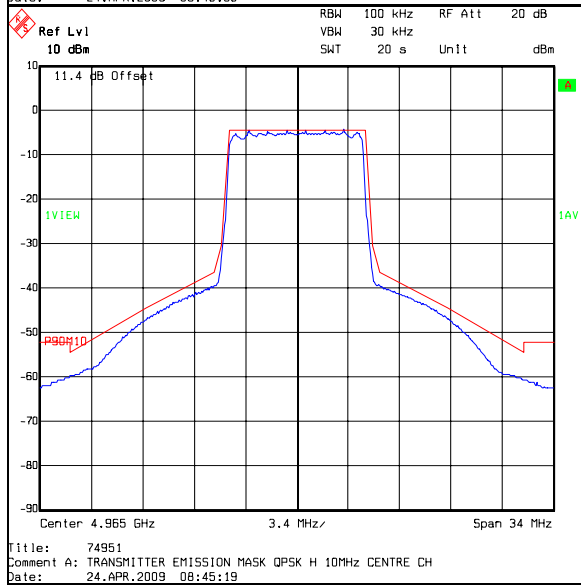
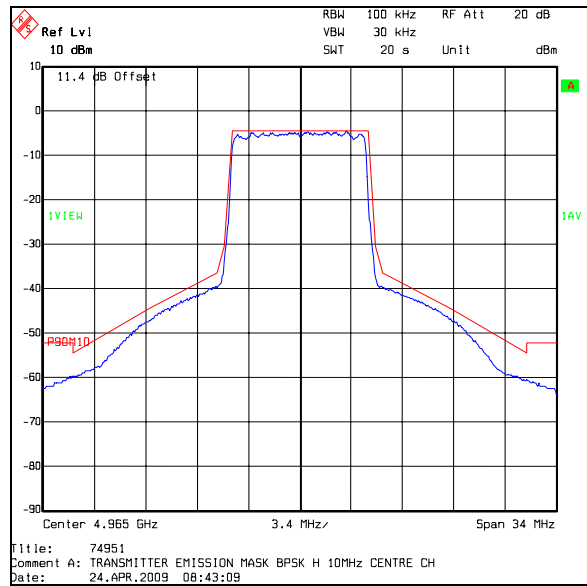
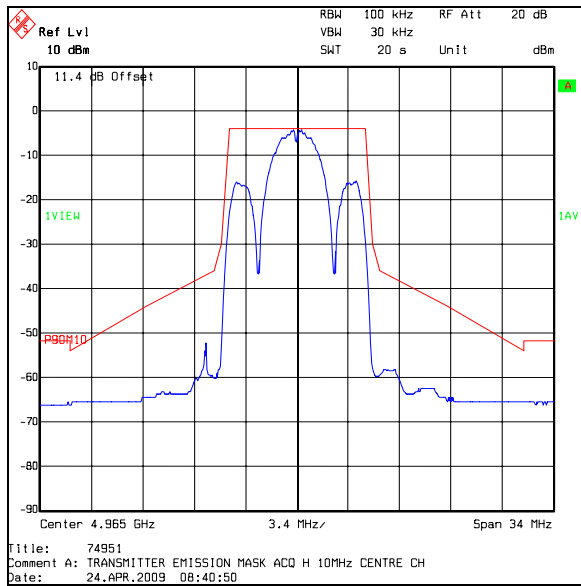
Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – Bottom Channel (continued)



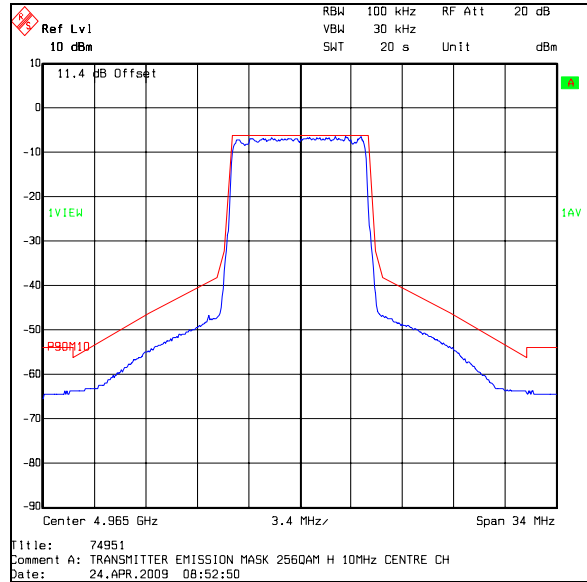
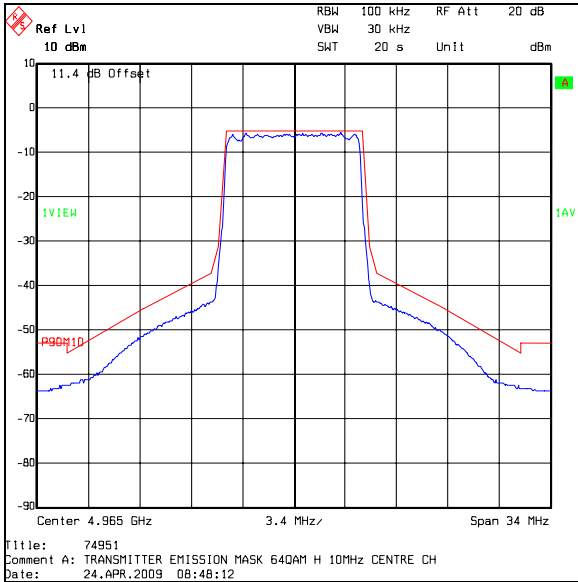
Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – Centre Channel



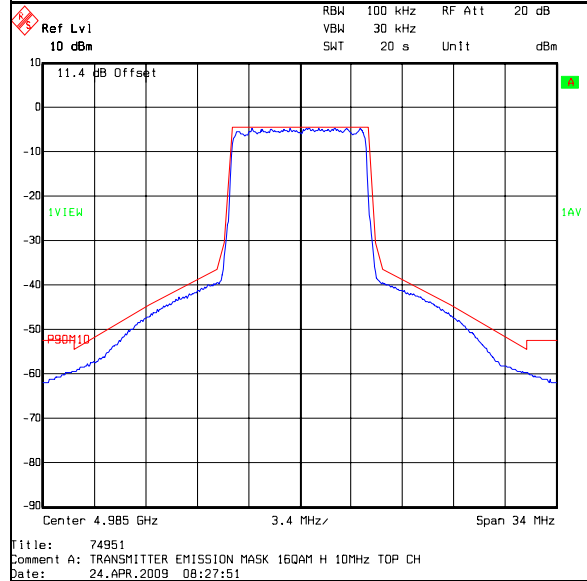
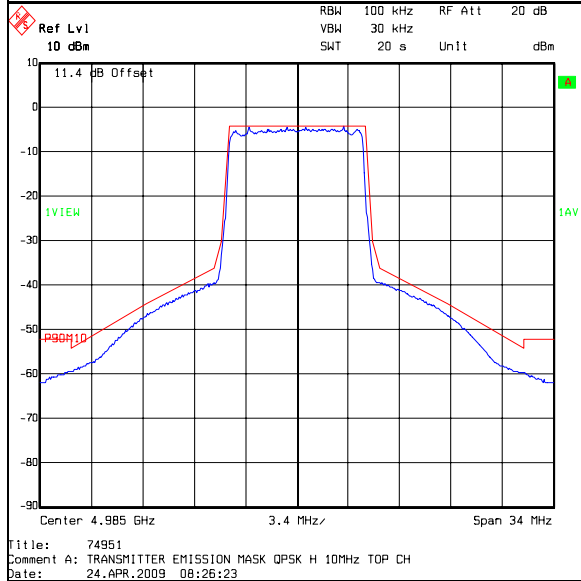
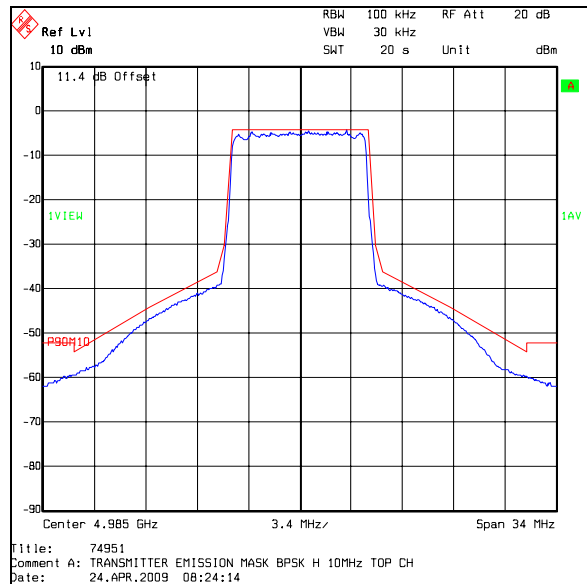
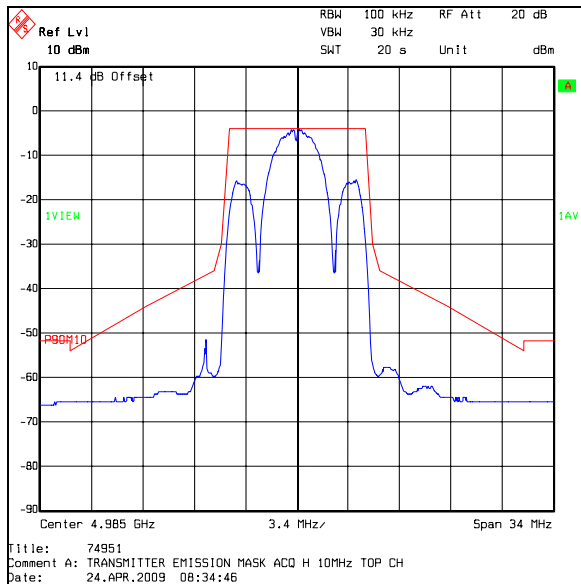
Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – Centre Channel (continued)

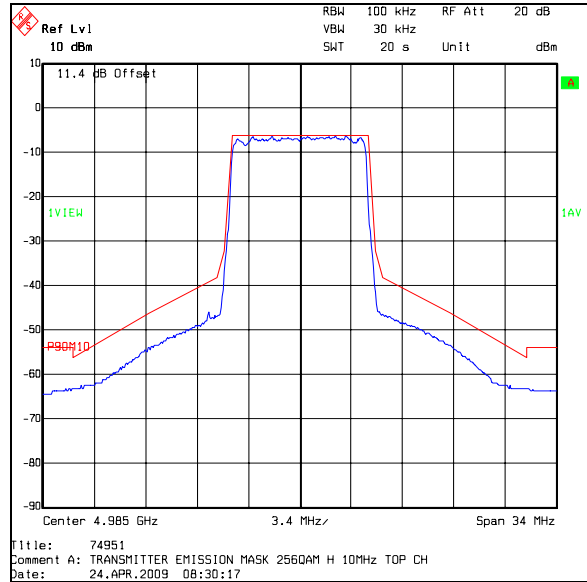
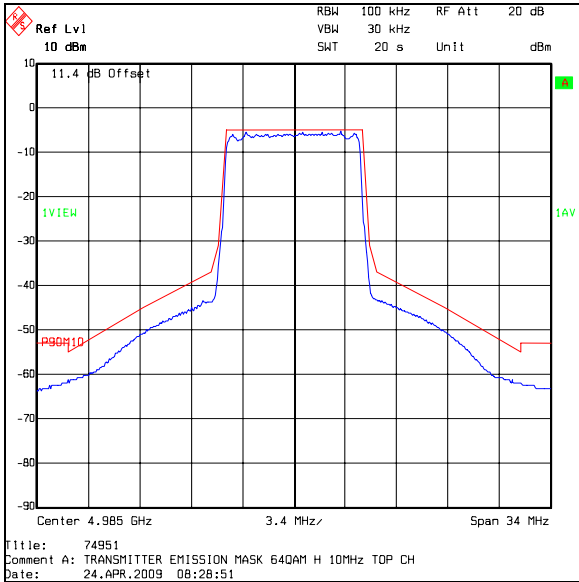


Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – Top Channel

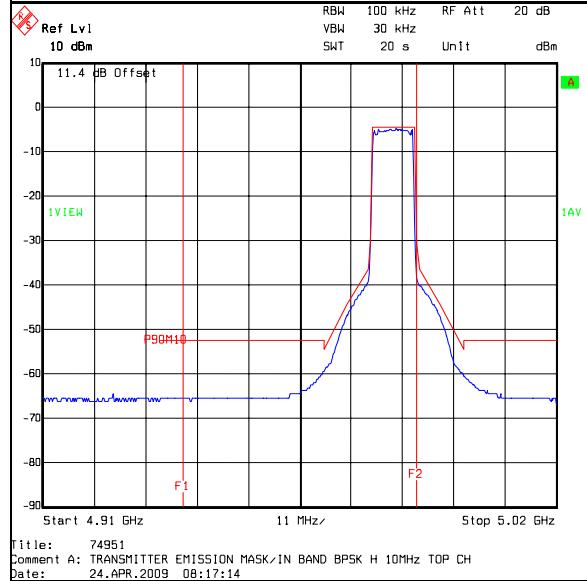
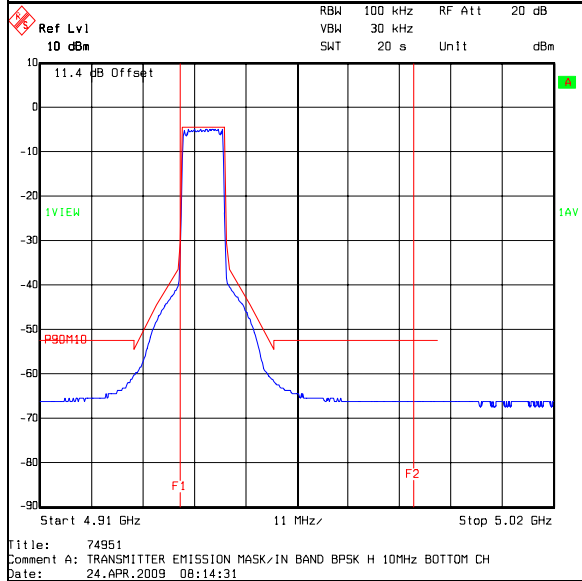
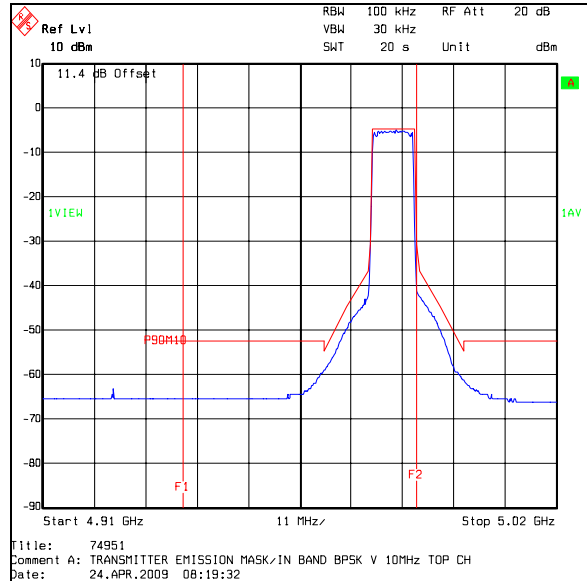
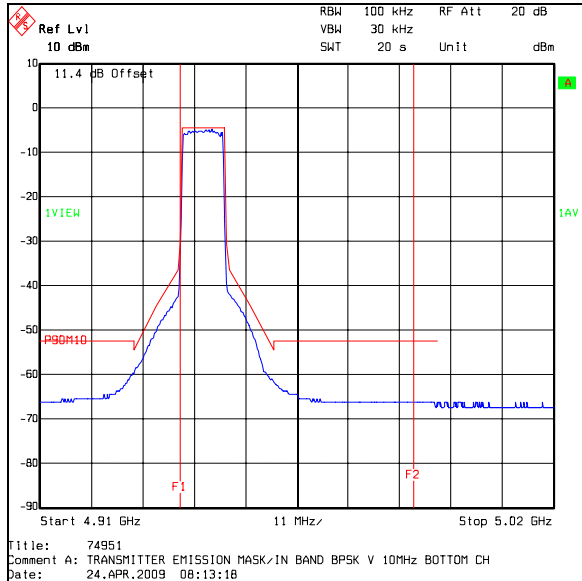


Transmitter Conducted Emissions Masks (continued)
Results: 10 MHz Channel – Top Channel (continued)



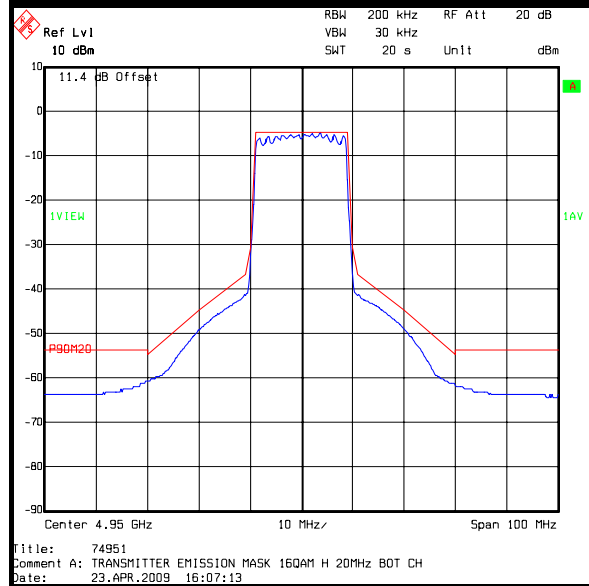
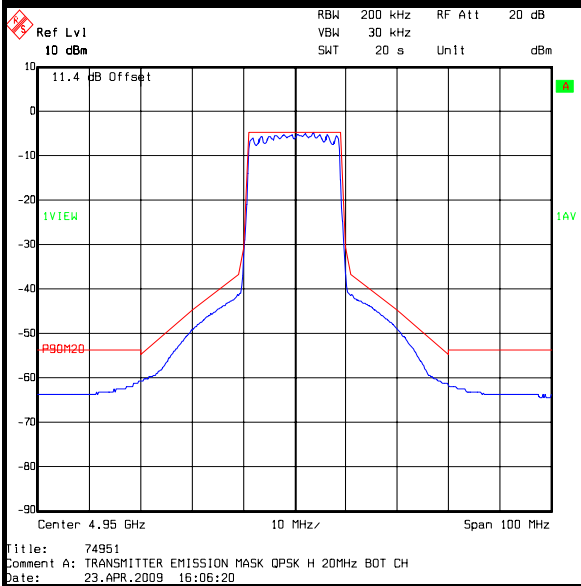
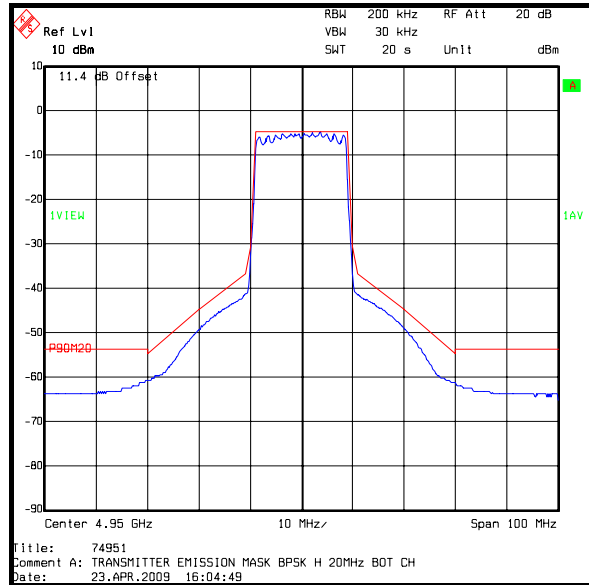
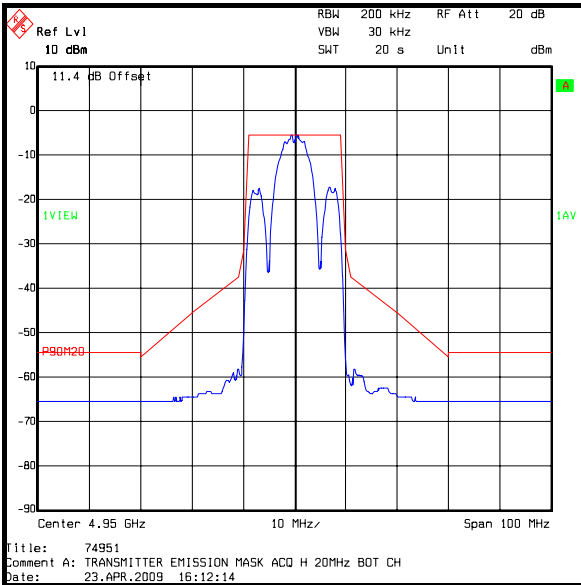
Transmitter Conducted Emissions Masks (continued)

Results: 10 MHz Channel – In Band Emissions



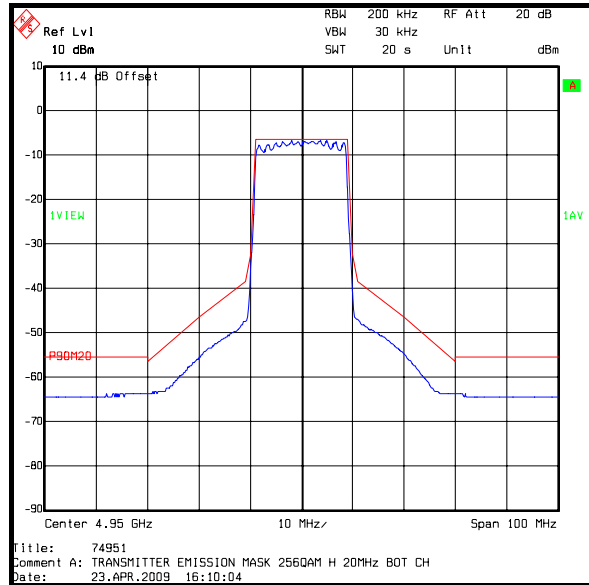
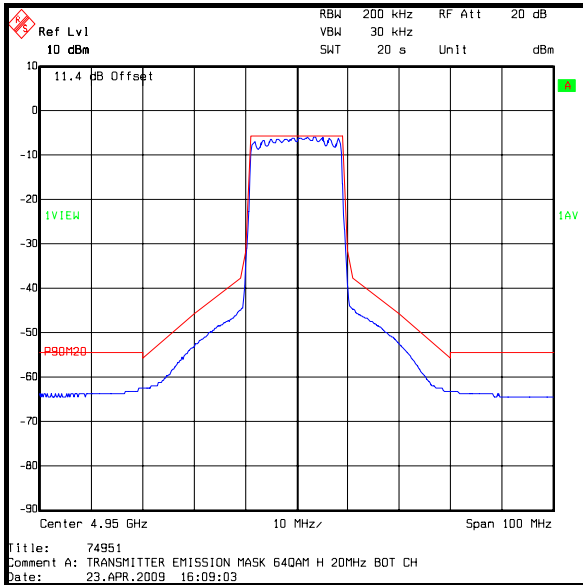
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Bottom Channel



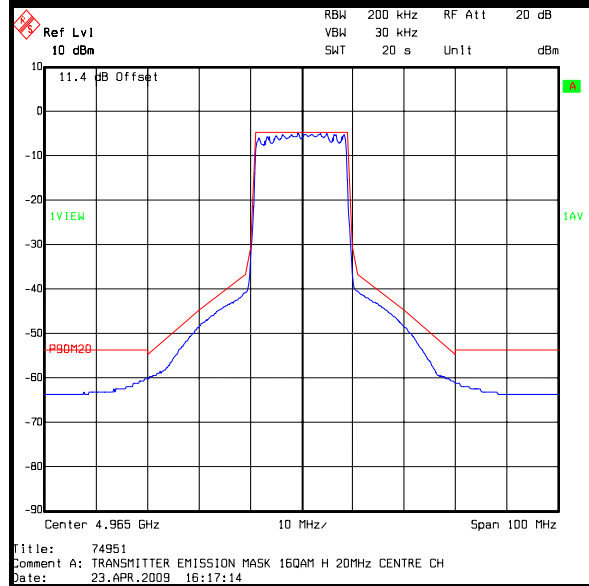
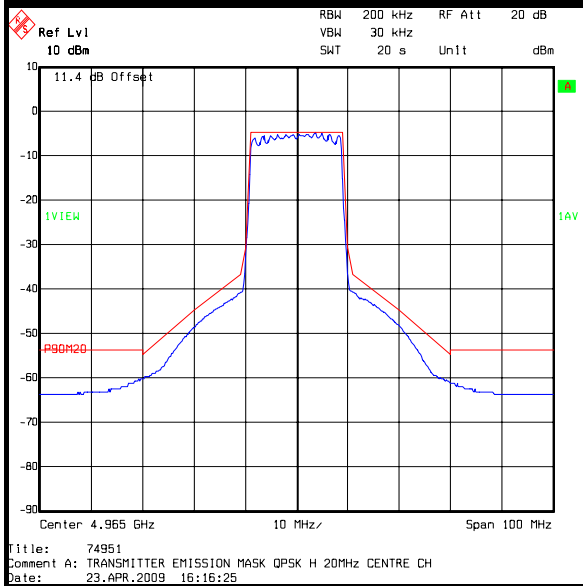
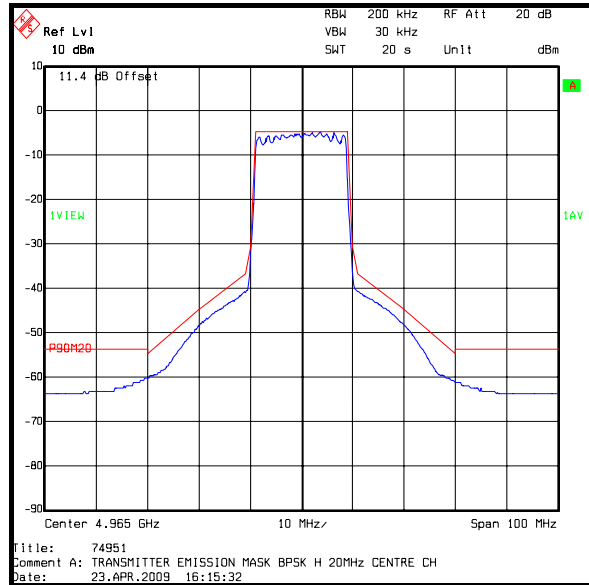
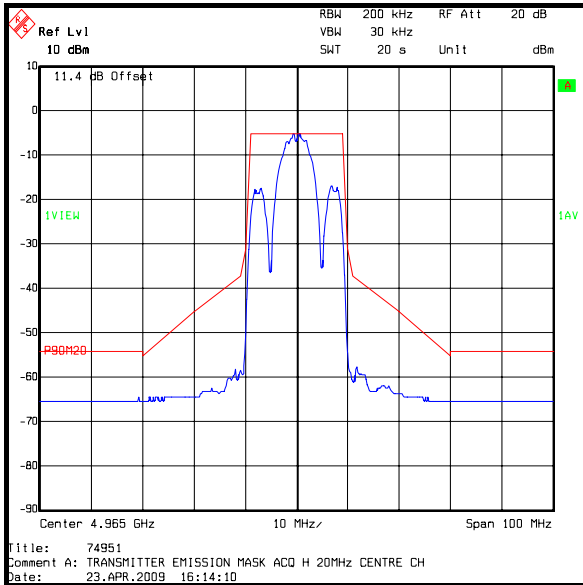
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Bottom Channel (continued)



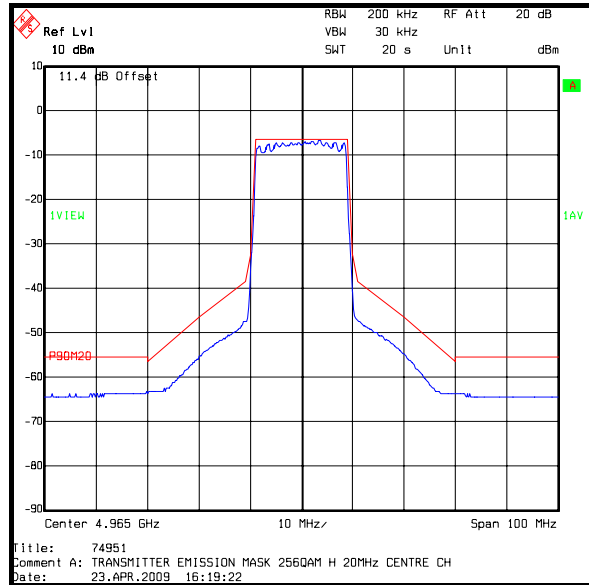
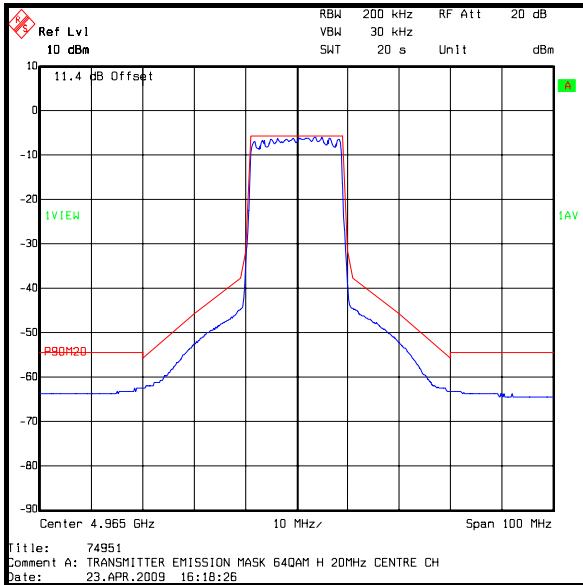
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Centre Channel



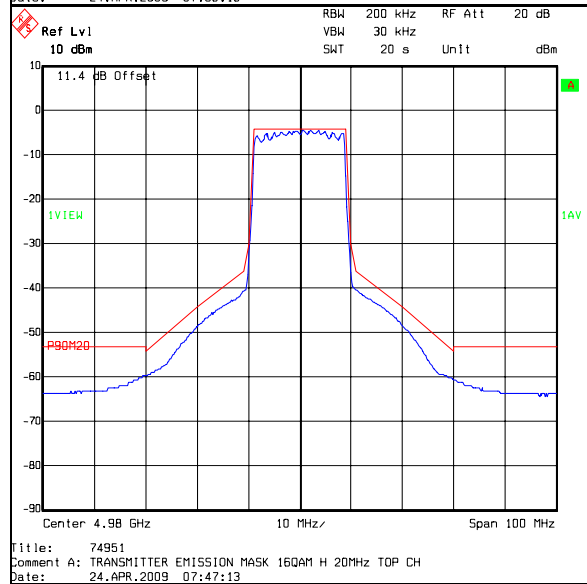
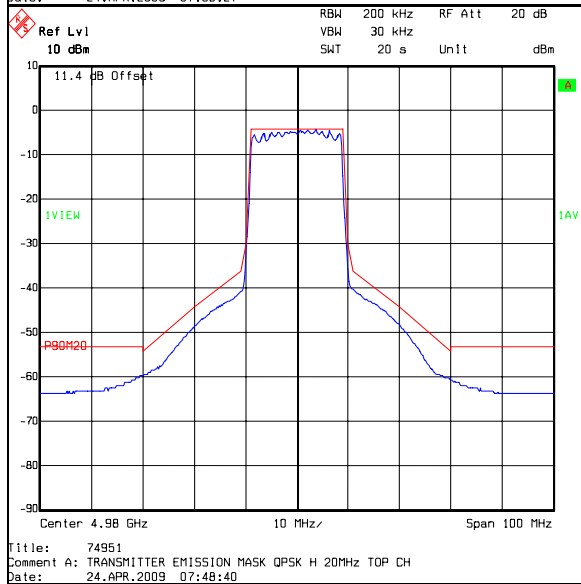
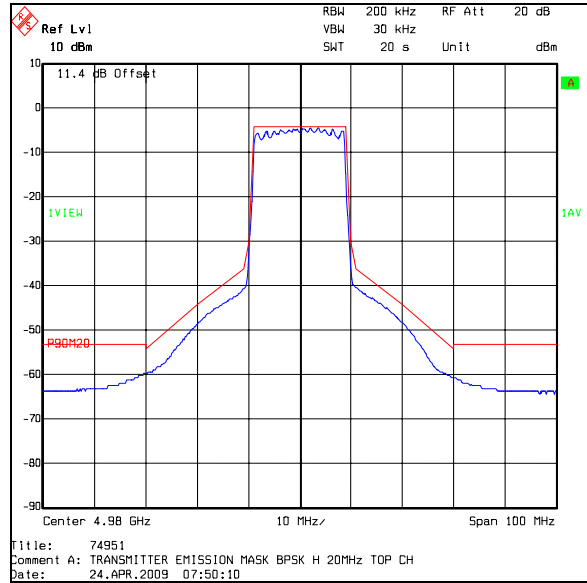
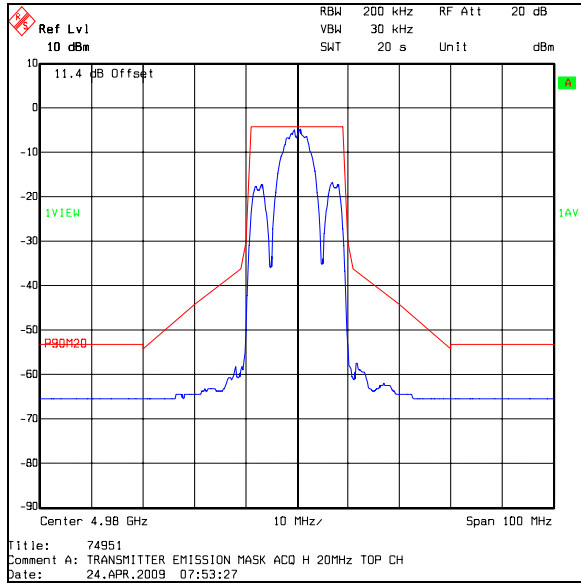
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Centre Channel (continued)



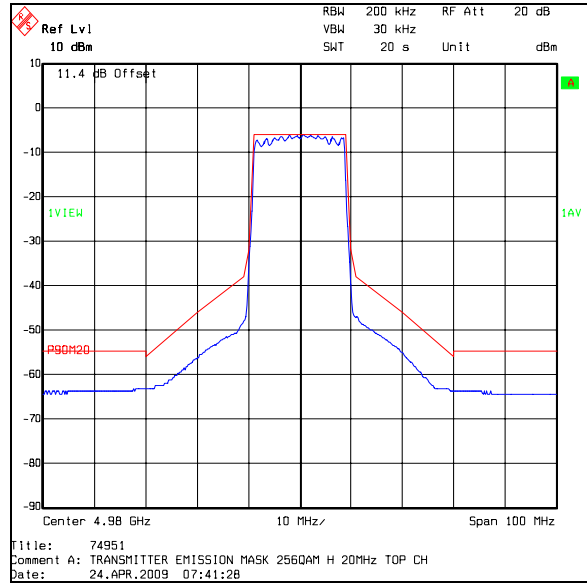
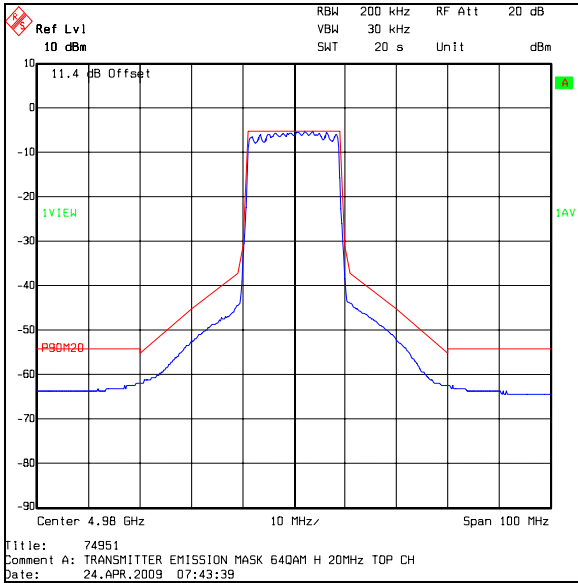
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Top Channel



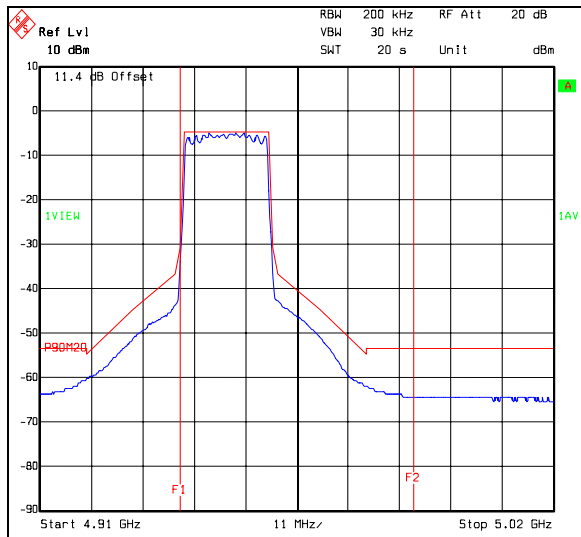
Transmitter Conducted Emissions Masks (continued)

Results: 20 MHz Channel – Top Channel (continued)

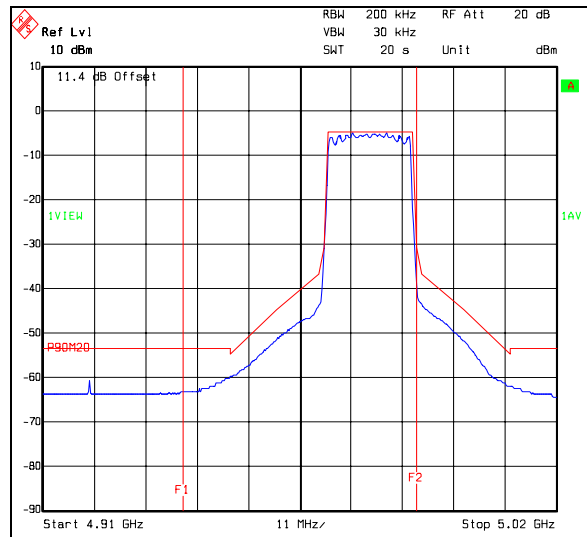


Transmitter Conducted Emissions Masks (continued)

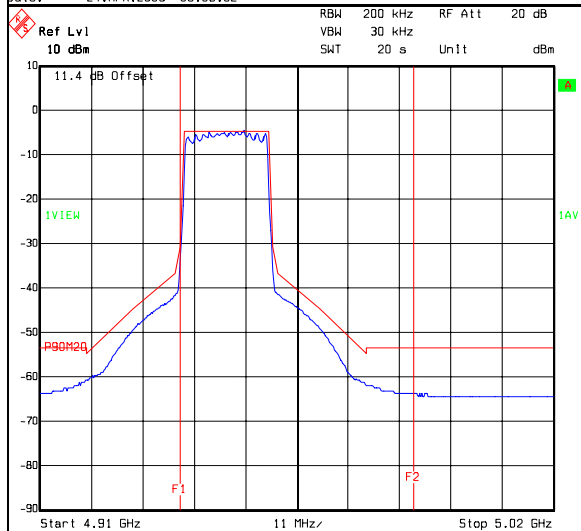
Results: 20 MHz Channel – In Band Emissions



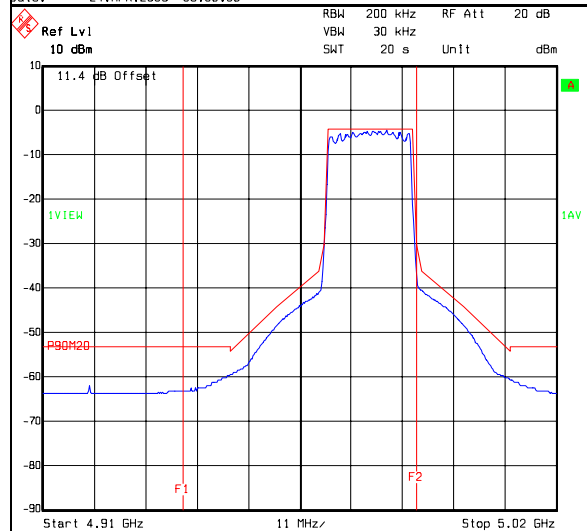
Title: 74951
Comment A: TRANSMITTER EMISSION MASK/IN BAND BPSK V 20MHz BOTTOM CH
Date: 24.APR.2009 08:06:52



Title: 74951
Comment A: TRANSMITTER EMISSION MASK/IN BAND BPSK V 20MHz TOP CH
Date: 24.APR.2009 08:00:33



Title: 74951
Comment A: TRANSMITTER EMISSION MASK/IN BAND BPSK H 20MHz BOTTOM CH
Date: 24.APR.2009 08:05:09



Title: 74951
Comment A: TRANSMITTER EMISSION MASK/IN BAND BPSK H 20MHz TOP CH
Date: 24.APR.2009 07:59:19

5.8. Transmitter Conducted Emissions (Out of Band)**Test Summary:**

FCC Part:	90.210(m), 2.1051
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Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	26

Note(s):

1. A spectrum analyser was connected to the antenna port of the EUT via a suitable cable and RF attenuator. The total loss of both the cable and the attenuator was measured and entered as a reference level offset into the measuring receiver to correct for the losses across the measurement bandwidth.
2. Pre-scans and final measurements were performed with the EUT transmitting with QPSK modulation/ 5 MHz channel on the H port as this combination was previously found to produce the highest peak power spectral density. Pre-scans were performed on the top channel.

Results: 5 MHz Channel / QPSK / H Port – Bottom Channel

Frequency (MHz)	Emission Level (dBm/MHz)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
971.723	-52.1	-66.6	-39.5	27.1	Complied
4770.260	-51.3	-65.8	-39.5	26.3	Complied

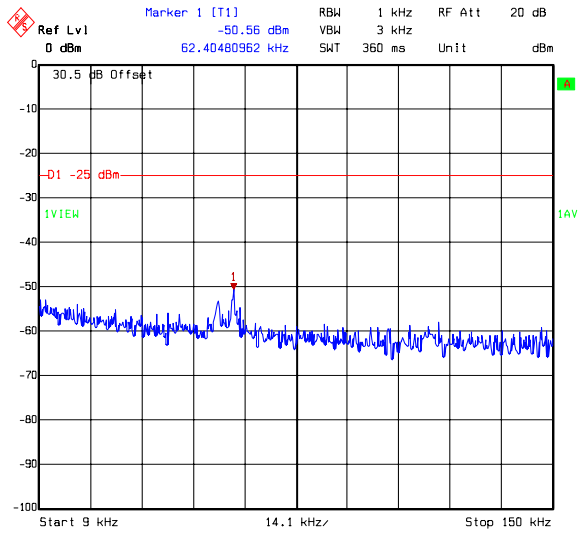
Results: 5 MHz Channel / QPSK / H Port – Middle Channel

Frequency (MHz)	Emission Level (dBm/MHz)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
991.673	-51.1	-65.6	-39.5	26.1	Complied
4770.260	-50.3	-64.8	-39.5	25.3	Complied

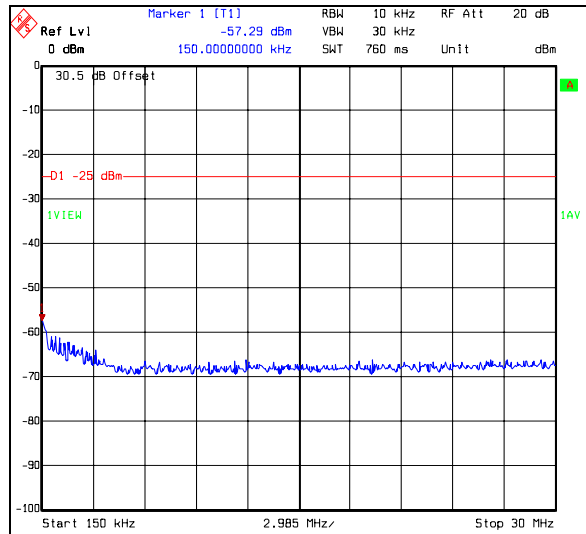
Results: 5 MHz Channel / QPSK / H Port – Top Channel

Frequency (MHz)	Emission Level (dBm/MHz)	Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
1016.980	-50.4	-64.9	-39.5	25.4	Complied
4770.260	-48.8	-63.3	-39.5	23.8	Complied

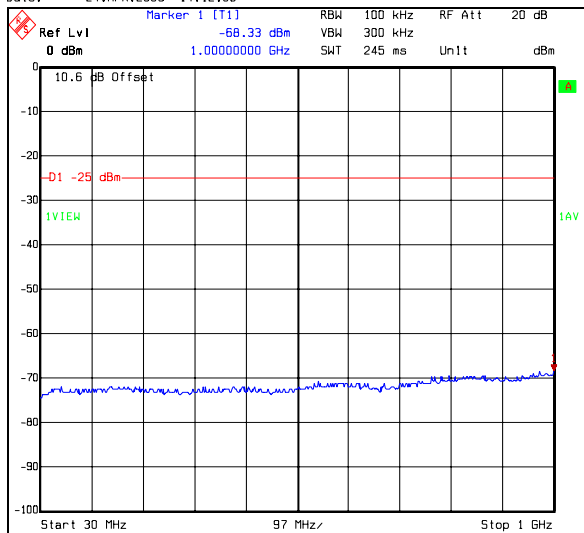
Transmitter Conducted Emissions (Out of Band) (continued)



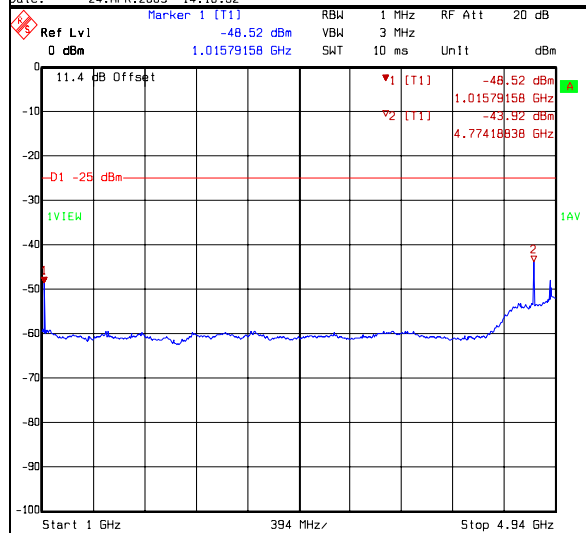
Title: 74951
 Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
 Date: 24.APR.2009 14:12:03



Title: 74951
 Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
 Date: 24.APR.2009 14:10:52

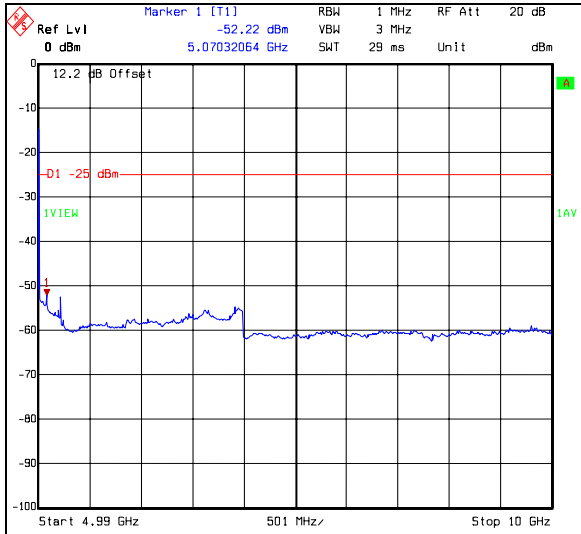


Title: 74951
 Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
 Date: 24.APR.2009 14:08:14

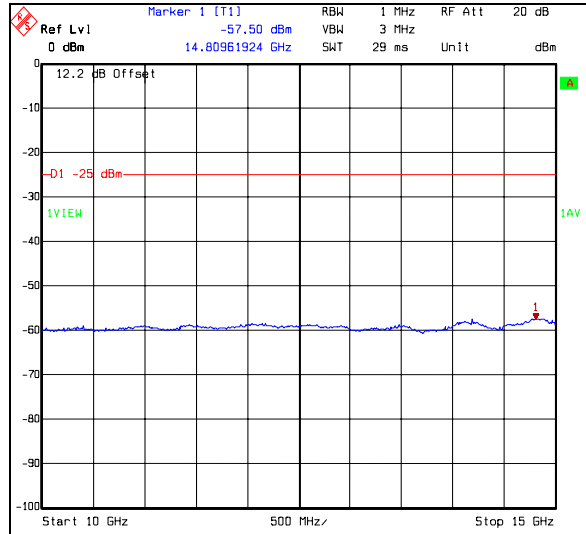


Title: 74951
 Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
 Date: 24.APR.2009 13:19:27

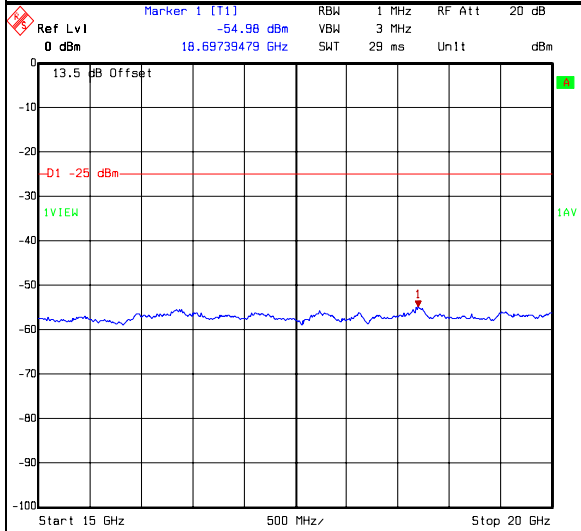
Transmitter Conducted Emissions (Out of Band) (continued)



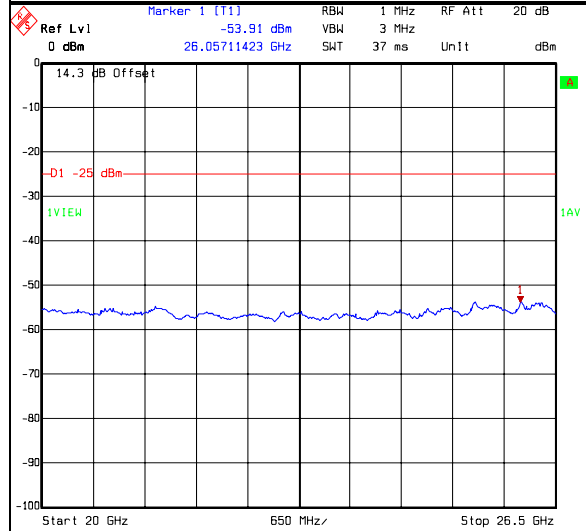
Title: 74951
Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
Date: 24.APR.2009 13:50:19



Title: 74951
Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
Date: 24.APR.2009 13:51:54

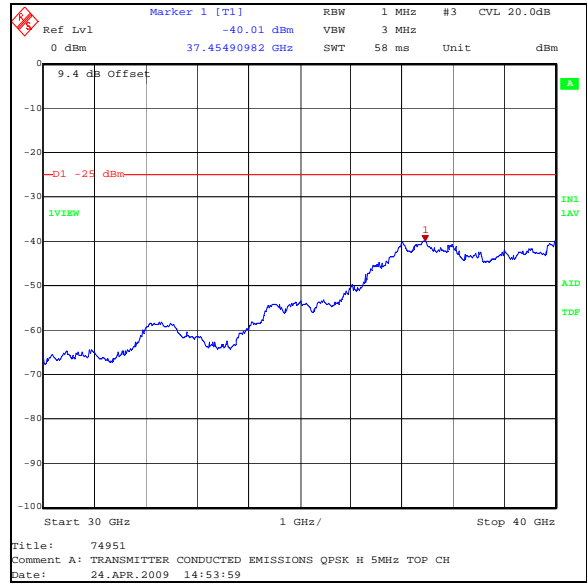
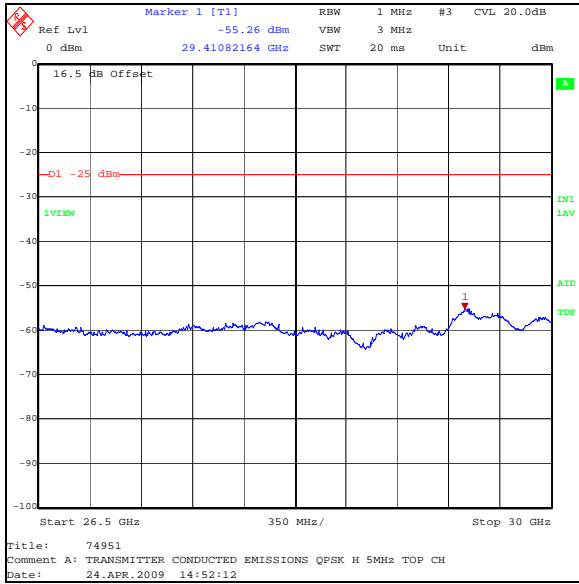


Title: 74951
Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
Date: 24.APR.2009 13:53:15



Title: 74951
Comment A: TRANSMITTER CONDUCTED EMISSIONS QPSK H 5MHz TOP CH
Date: 24.APR.2009 13:55:08

Transmitter Conducted Emissions (Out of Band) (continued)



6. Measurement Uncertainty

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Transmitter Maximum Peak Output Power	1 GHz to 26 GHz	95%	±2.94 dB
Transmitter Peak Power Spectral Density	1 GHz to 26 GHz	95%	±2.94 dB
Transmitter Occupied Bandwidth (Bandwidth Limitations)	1 GHz to 26 GHz	95%	±0.12%
Transmitter Conducted Emissions Masks	1 GHz to 26 GHz	95%	±2.94 dB
Transmitter Conducted Emissions (Out of Band)	9 kHz to 40 GHz	95%	±1.2 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1368	Directional Coupler	Pasternack Enterprises.	PE2214-10	None	Calibrated before use	-
C1030	Cable	Rosenberger	FA210B-1-010M-30X30	FA00C 7590	Calibrated before use	-
G085	Continuous Wave Generator	Hewlett Packard	83650L	3614A00104	27 Oct 2008	24
K0004	Site Reference 4428	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
L0980	R&S FSUP	R&S	FSUP	10-300137015	Calibration not required	-
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	09 Dec 2008	12
M1435	Power Meter	Hewlett Packard	437B	3125U14631	03 Jun 2008	12
M283	Power Sensor	Hewlett Packard	8487A	3318A03241	27 Oct 2008	12

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