TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Partial Test of: Motorola Point to Point Fixed Wireless Solutions
PTP58600 5.8 GHz band Wireless Ethernet Bridge

To: FCC Part 15.247: 2008 Subpart C, RSS-210 Issue 7 June 2007
& RSS-Gen Issue 2 June 2007

Test Report Serial No:
RFI/RPT1/RP75821JD01A

This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:	pp R. Graham
Checked By:	R. Graham
Signature:	R. Graham
Date of Issue:	30 October 2009

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

RFI Global Services Ltd
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number:2117901

This page has been left intentionally blank.

Table of Contents

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 United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.247
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	05 October 2009

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Port Type	Result
Part 15.209	RSS-Gen 4.9	Transmitter Radiated Spurious Emissions	Antenna	✓
Part 15.247(d) & 15.209(a)	RSS-Gen 2.2 RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	Antenna	✓

Key to Results

✓ = Complied ✗ = Did not comply

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2003)
Title:	American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

2.4. Deviations from the Test Specification

Testing to FCC Part 15.247 Transmitter radiated spurious emissions up to 40 GHz and band edge only requested.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Description:	Wireless Ethernet Bridge
Brand Name:	PTP Range
Product Description:	PTP58600
Model Name:	WB2352/WB2853
Serial Number:	58500-80845F
Hardware Version Number:	6
Software Version Number:	58600-08
FCC ID Number:	QWP58100
Industry Canada ID Number:	109AO-58100

Description:	Power Indoor Unit - PIDU
Brand Name:	PTP Range
Model Name or Number:	PIDU Plus 300/500/600 Series ACPSSW200-03A
Serial Number:	0922067370

Description:	Sectored antenna, 17 dBi gain, dual polarized
Brand Name:	Radio Waves
Model Name or Number:	SEC-55D-60-17
Serial Number:	0922067370

3.2. Description of EUT

The equipment under test is a 5.8 GHz band Wireless Ethernet Bridge.

The customer has provided the following information:

The product description is PTP58600; there are Full and Lite versions available and the only difference is the data rate available to the user. There are no differences in the airside interface operation.

Each product comes as either an Integrated antenna version (WB2350 or WB2351) or and external antenna version (WB2852/WB2853). In each case, the two units are identical bar the fact that either an integral antenna is fitted for the integrated antenna version and a connector plate is fitted for the external antenna version.

The subject of this testing is the Connectorised version as it covers the use of external antennas.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Intended Operating Environment:	Residential, Commercial and Light Industry		
Equipment Category:	Microwave fixed radio link		
Type of Unit:	Base Station (Fixed used) Transceiver		
Power Supply Requirement:	Nominal 120 V, 60 Hz AC Mains Supply		
Transmit Frequency Range:	5725 MHz to 5850 MHz		
Transmit Channels Tested:	**Channel Bandwidth (MHz)**	**Bottom Channel Frequency (MHz)**	**Top Channel Frequency (MHz)**
	5	5730	5844
	10	5732	5840
	15	5736	5838
	30	5742	5832
Receive Frequency Range:	5725 MHz to 5850 MHz		
Receive Channels Tested:	**Channel Bandwidth (MHz)**	**Bottom Channel Frequency (MHz)**	**Top Channel Frequency (MHz)**
	5	5730	5844
	10	5732	5840
	15	5736	5838
	30	5742	5832

3.5. Port Identification

Port	Description	Type/Length
1	RF output (Vertical)	N type male
2	RF output (Horizontal)	N type male
3	Data port	RJ45 Ethernet

3.6. Support Equipment

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

Description:	Laptop PC
Brand Name:	HP/Compaq
Model Name or Number:	Compaq 8510W
Serial Number:	CNU81706RX
Cable Length and Type:	2 metres Cat 5 Ethernet
Connected to Port:	Ethernet

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Acquisition mode, transmitting at maximum power. Modulation type is OFDM.
- Stand-alone, not connected in duplex mode.

4.2. Configuration and Peripherals

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

- The antenna and ODU under test were mounted on a metal pole using the supplied mounting hardware in a typical user configuration. Both components were positioned so that their respective centres were at a height of 1.5 metres above the test chamber floor in line with the test system antenna.
- The PIDU was placed on the chamber floor and the cable connecting the ODU to the PIDU was positioned so that it ran vertically upwards along the mounting pole. The supply voltage to the PIDU was 120 VAC 60 Hz throughout the duration of the test.
- The antenna, ODU and PIDU were earthed to the test chamber.
- No receiver tests were performed as the EUT only operates in transceiver mode.
- A laptop PC was used to configure the EUT via an Ethernet cable prior to testing. This was disconnected from the EUT and removed from the test chamber during the test.

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.

Notes

This test report covers the testing carried out in support of a Class II change to an existing device previously approved by the FCC under Part15.247 and Industry Canada under RSS-210 Issue 7.

Device Identifiers

FCC ID: QWP58100

IC ID: 109AO-58100

The change covers the addition of sectored antennas with gains up to 17 dBi, still exclusively for Point to Point applications.

Therefore, as there is no receive-only mode in the device, the testing required under FCC/IC rules for the device concerned is limited to

1. Radiated emissions testing up to 40GHz in accordance with FCC Part 15.209 in the Restricted Bands covered by Part 15.205
2. Band-Edge Radiated emissions in accordance with FCC Part 15.247(d)

5.2. Test Results

5.2.1. Transmitter Radiated Spurious Emissions

Test Summary:

FCC Part:	15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 40 GHz

Environmental Conditions:

Temperature Variation (°C):	23 to 25
Relative Humidity (%):	35

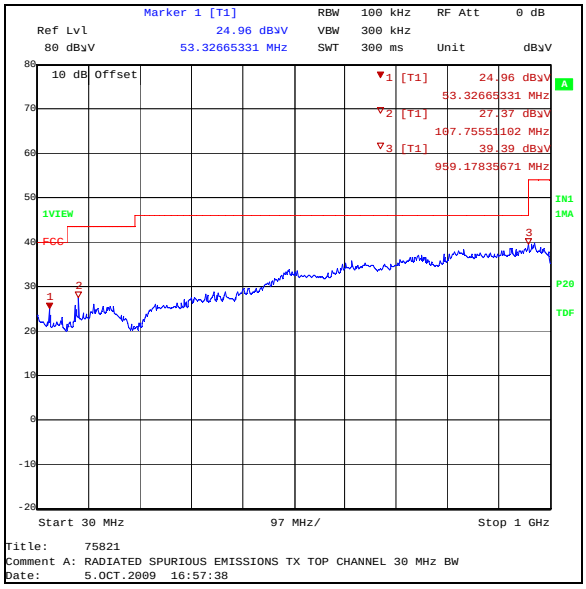
Notes for all carrier bandwidths:

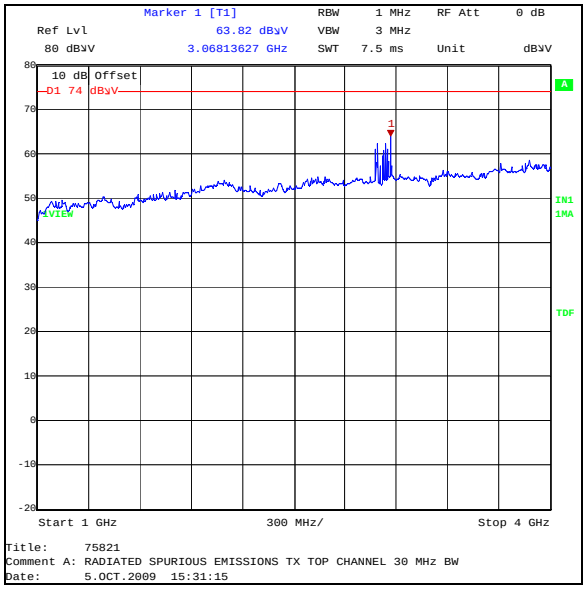
1. Pre-scans were performed with the EUT transmitting on the top channel. EUT carriers are shown on the 4 GHz to 8 GHz plots as the pre-scans were performed across the operating frequency range.
2. The spurious emissions recorded remained at the same frequencies regardless of the frequency the EUT was transmitting on. Any other emissions shown on pre-scan plots were investigated and found to be ambient, greater than 20 dB below the applicable limit or below the level of the test system noise floor.
3. Measurements were performed with the test system antenna in the vertical and horizontal planes. The highest levels recorded are shown in the above table.
4. The emission shown on the pre-scan plot at approximately 107 MHz was investigated and found to be ambient.
5. As high levels of attenuation had to be used due to the EIRP from the EUT, pre-scan levels show the level of the noise floor increased close to or above the FCC restricted band limits with a peak detector. These tests were repeated using an average detector.
6. Final measurements were made using appropriate RF attenuators and filters where required.
7. Peak and average pre-scan measurements were performed in the range 4 GHz to 8 GHz. The attenuation used to suppress the carrier increased the level of the measurement noise floor above the 54 dBµV average limit for restricted bands. The peak and average pre-scans were repeated with the antenna disconnected and both antenna ports terminated. Lower attenuation was used and the noise floor reduced to below the peak and average limits. No spurious emissions were observed across the 4 GHz to 8 GHz range.
8. A background scan was performed in the test chamber with the EUT transmitting but both RF ports terminated. Where no emissions were present, the noise floor level in the restricted bands during the background scan was found to be the same levels as the noise floor with the EUT turned on and transmitting with the antenna connected.
9. The emissions at approximately 11.6 GHz and 17.5 GHz were investigated and found to be 2nd and 3rd harmonics generated by the RF amplifier in the test system. These emissions were found to be below the level of the measurement system noise floor when the RF amplifier was removed from the test system.

Transmitter Radiated Spurious Emissions (continued)

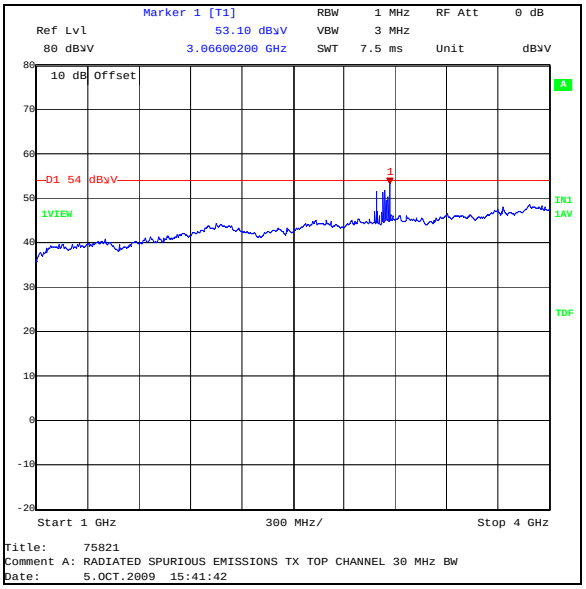
Results: 30 MHz Bandwidth / 5834 MHz

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
52.976	Horizontal	28.2	40.0	11.8	Complied





Peak detector

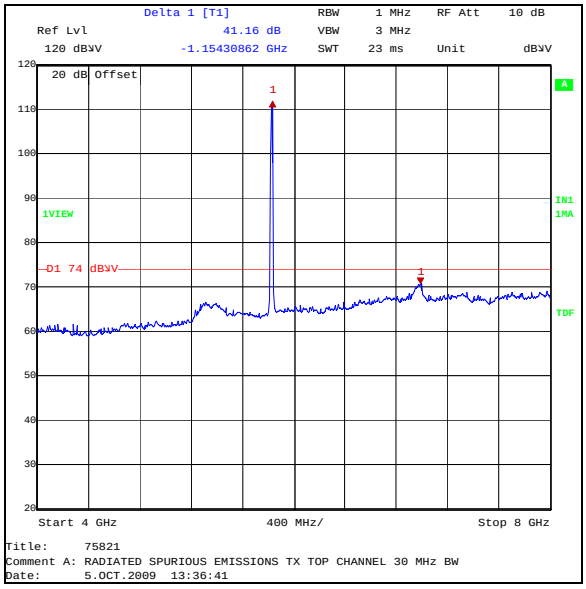


Average detector

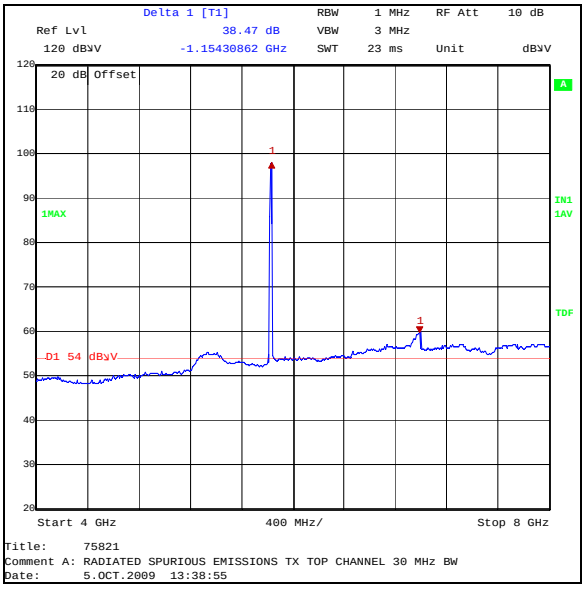
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

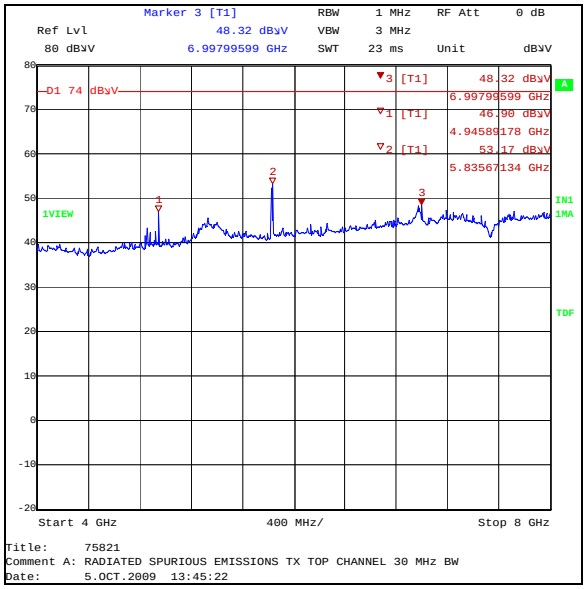
30 MHz channel / 5834 MHz



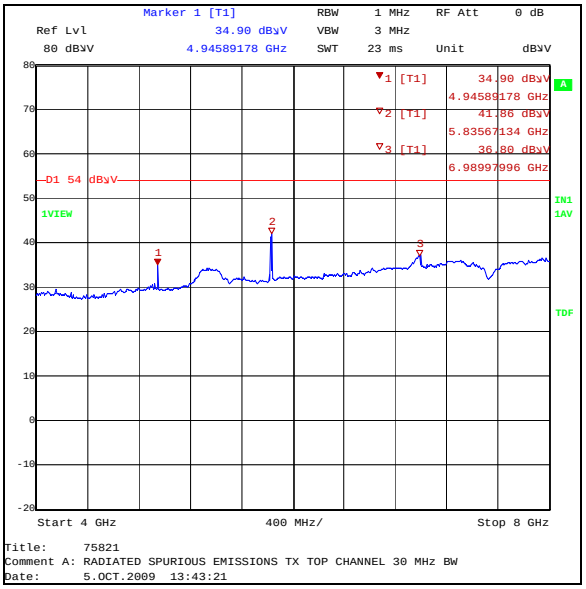
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna ports terminated

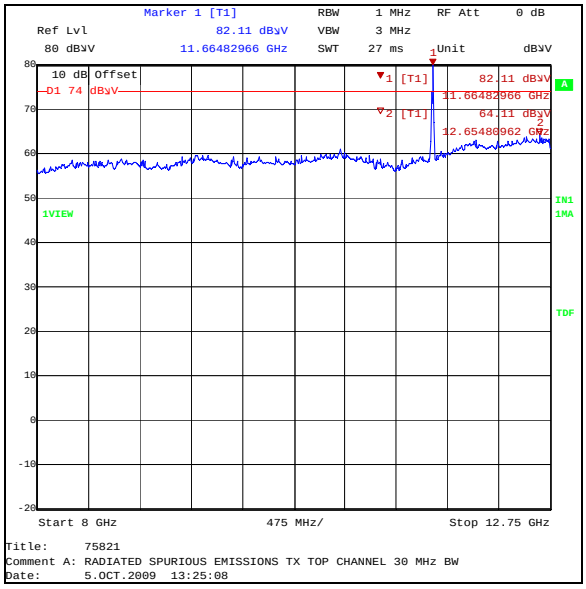


Average detector antenna ports terminated

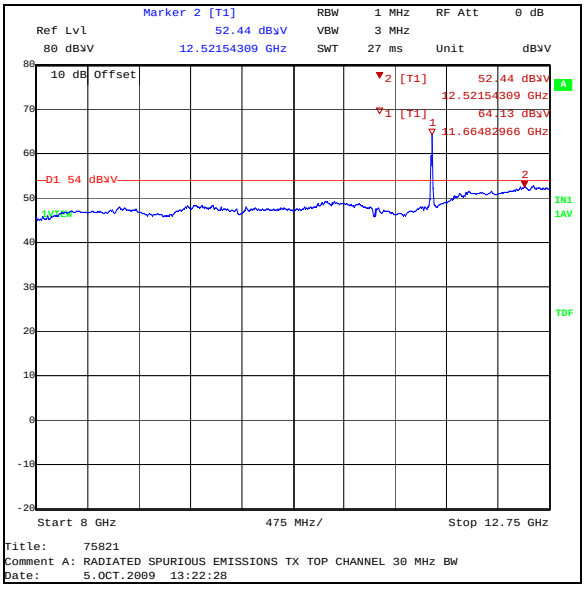
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

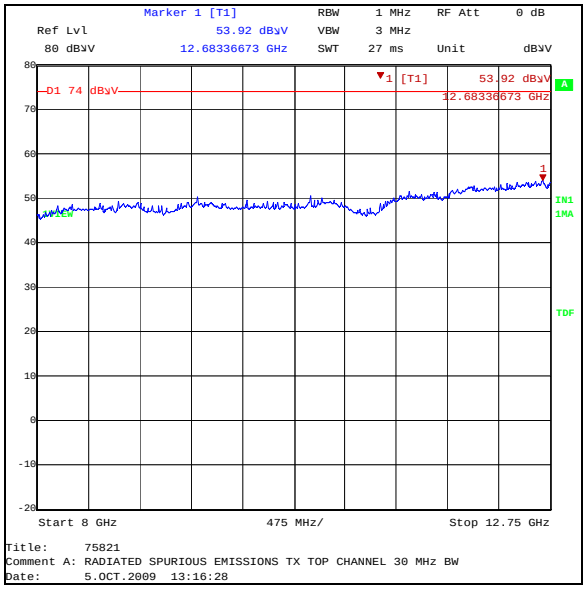
30 MHz channel / 5834 MHz



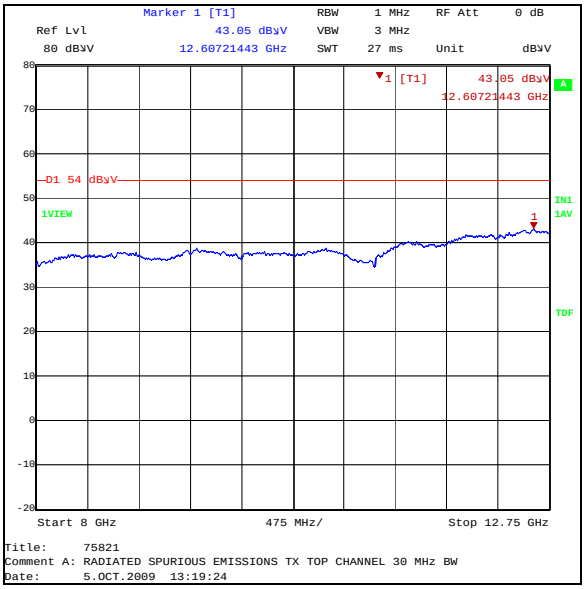
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna ports terminated

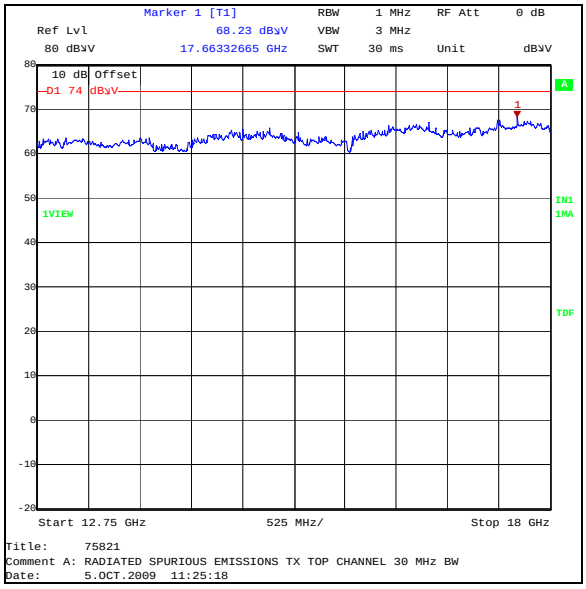


Average detector antenna ports terminated

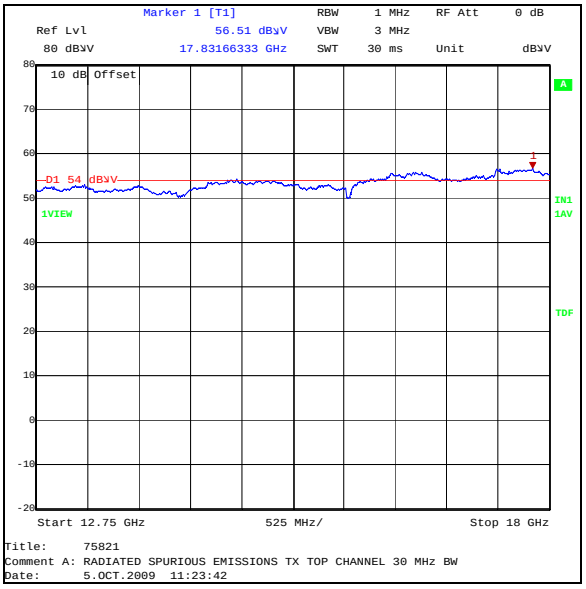
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

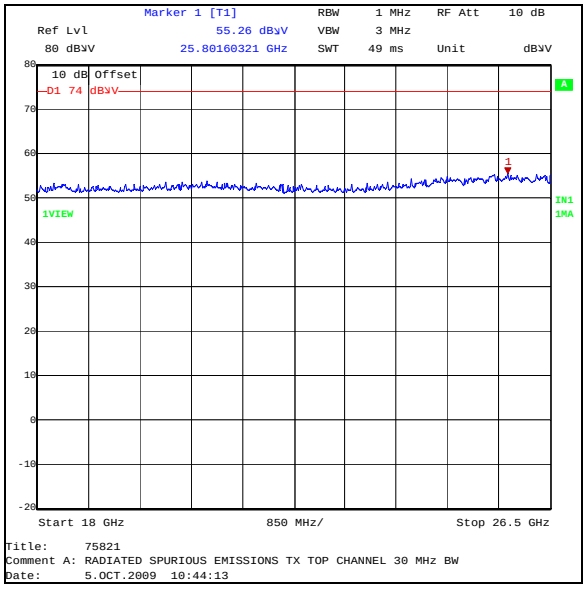
30 MHz channel / 5834 MHz



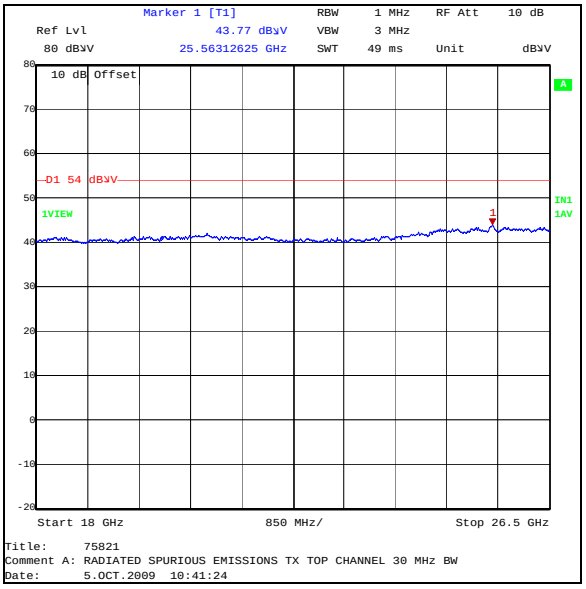
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected

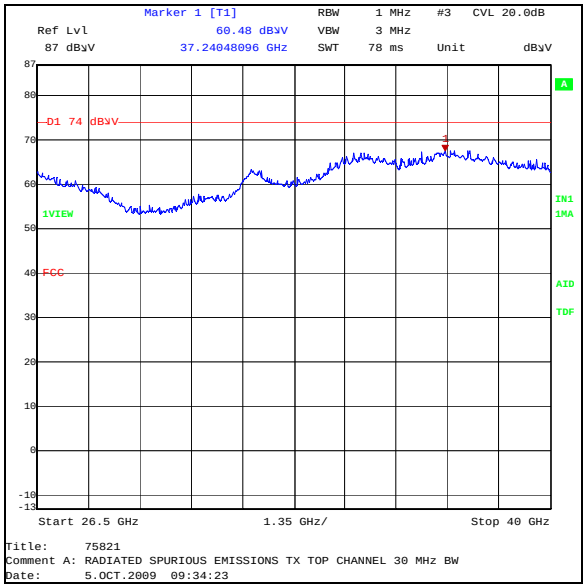


Average detector antenna connected

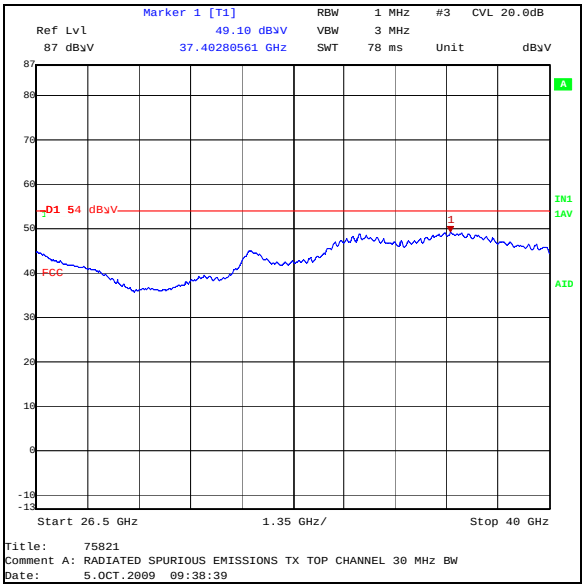
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

30 MHz channel / 5834 MHz



Peak detector antenna connected



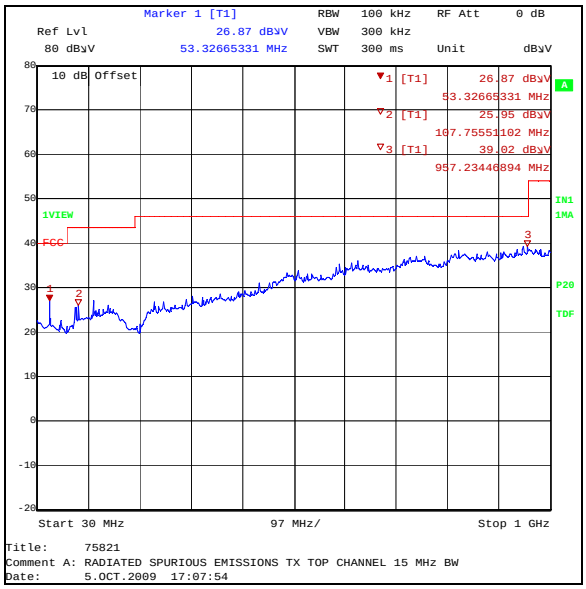
Average detector antenna connected

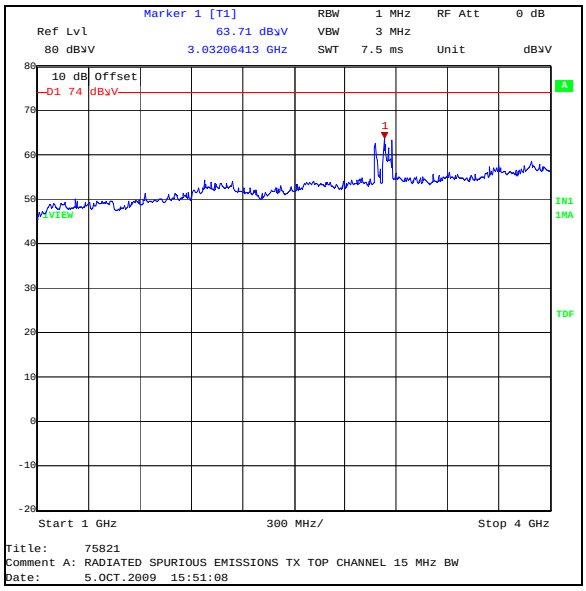
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

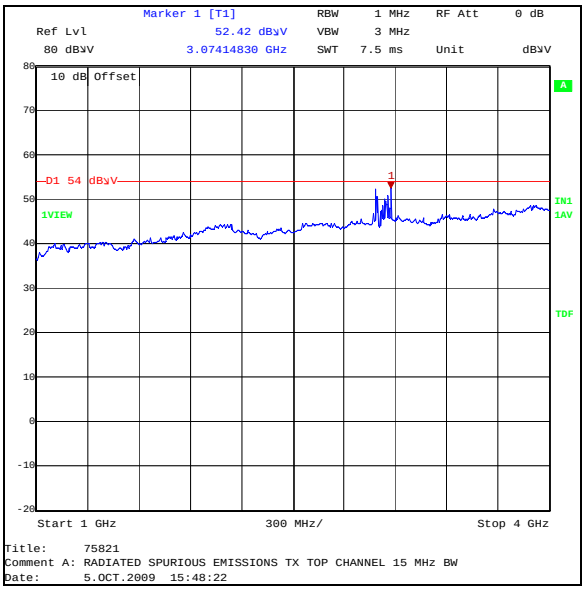
Results: 15 MHz Bandwidth / 5842 MHz

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
52.976	Horizontal	28.2	40.0	11.8	Complied





Peak detector

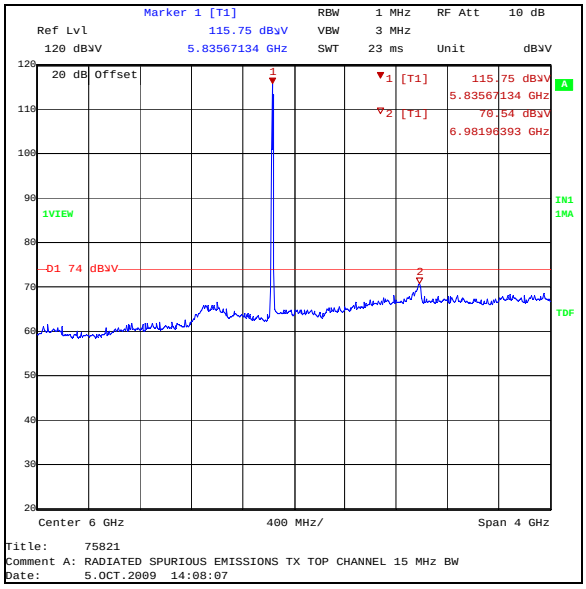


Average detector

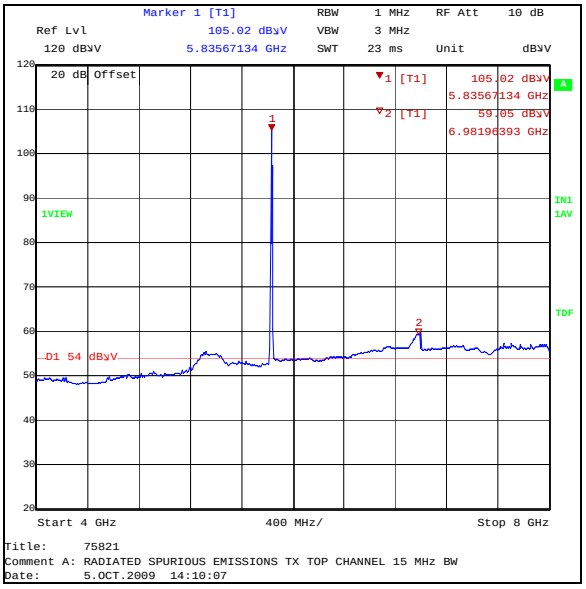
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

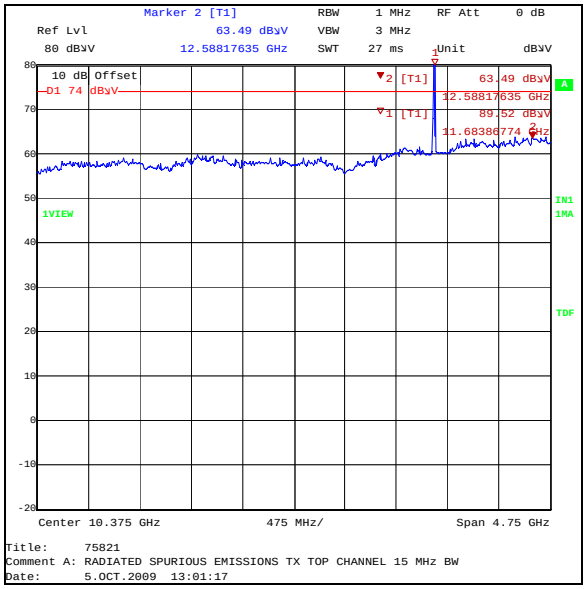
15 MHz channel / 5842 MHz



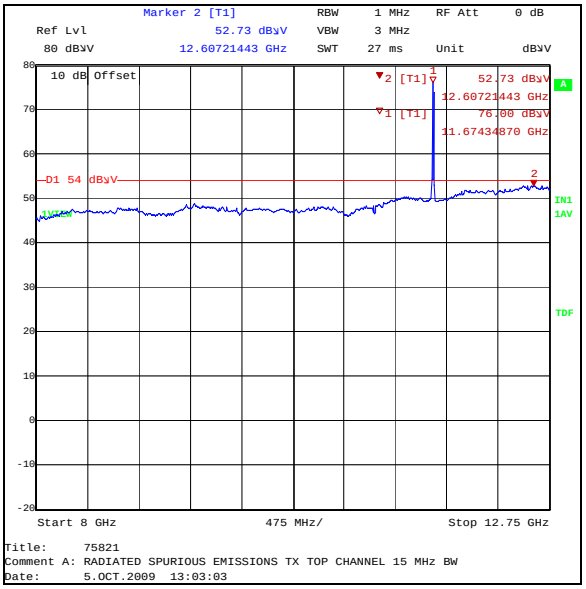
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected

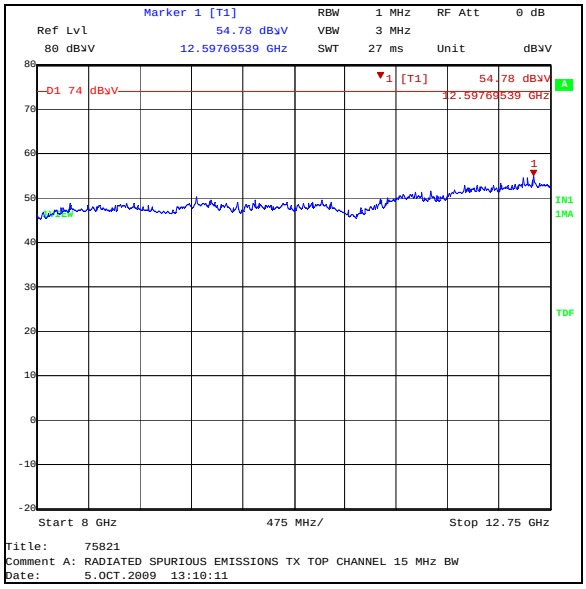


Average detector antenna connected

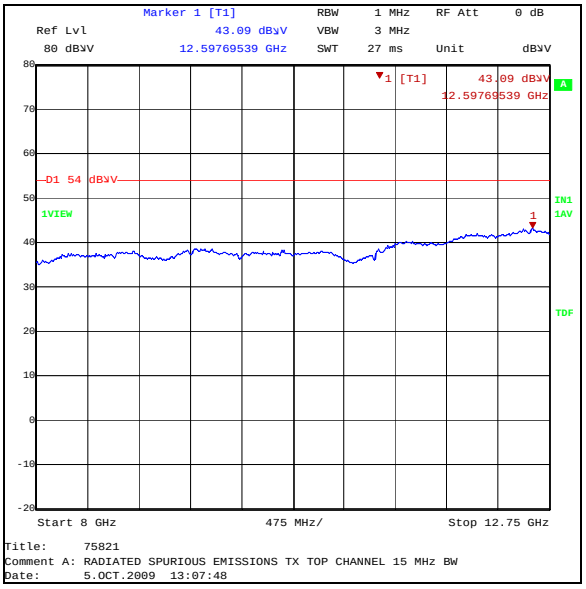
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

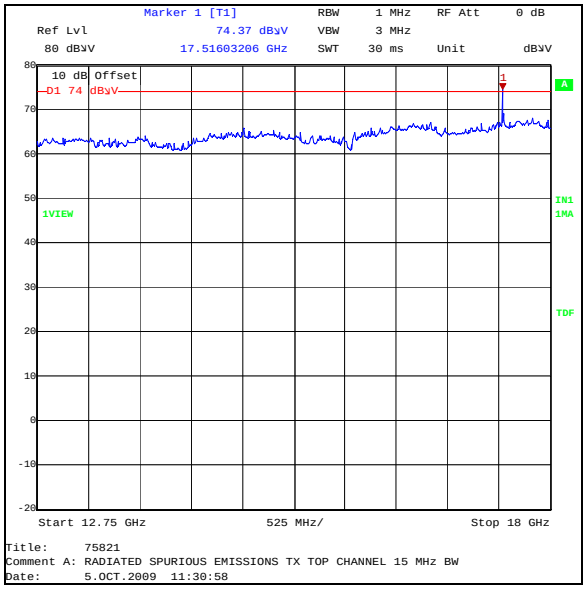
15 MHz channel / 5842 MHz



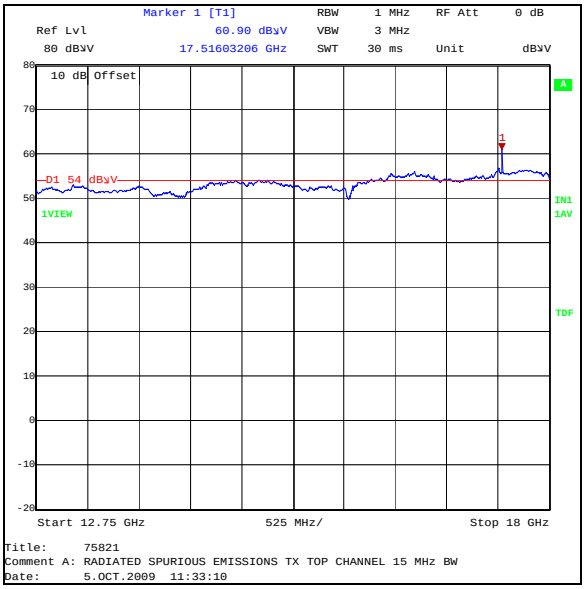
Peak detector antenna ports terminated



Average detector antenna ports terminated



Peak detector antenna connected

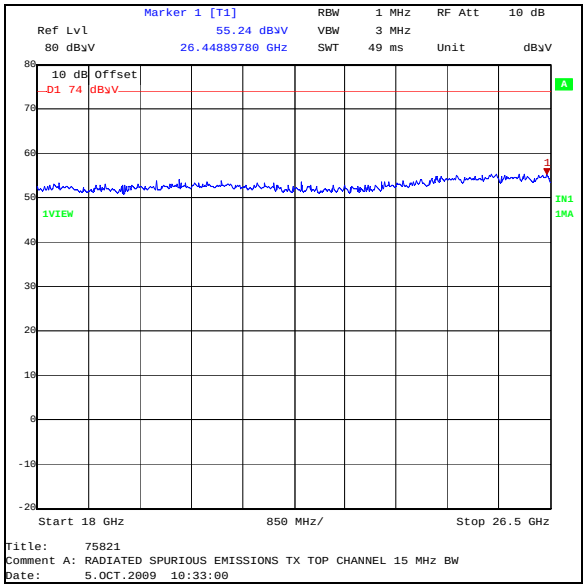


Average detector antenna connected

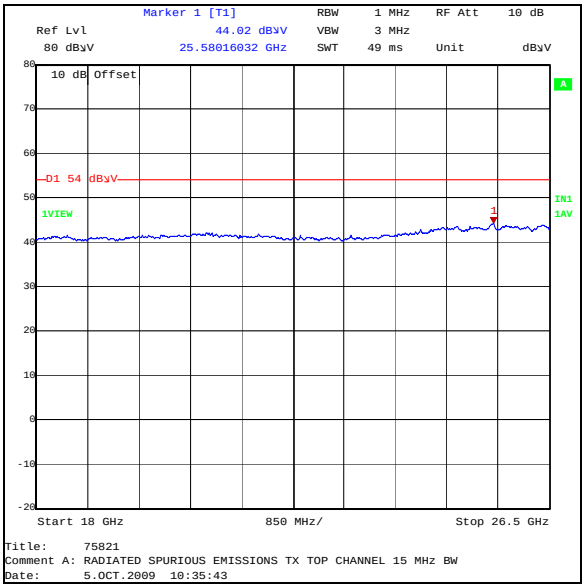
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

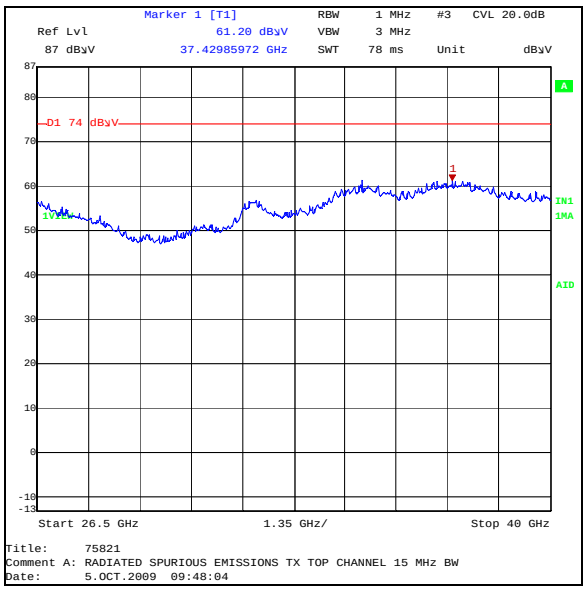
15 MHz channel / 5842 MHz



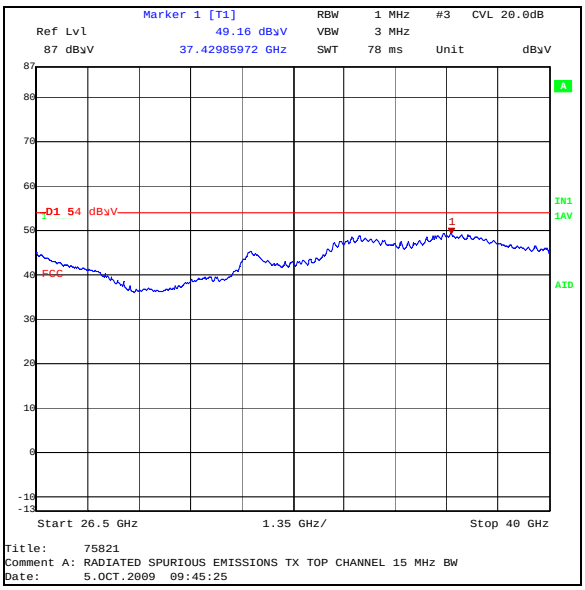
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected



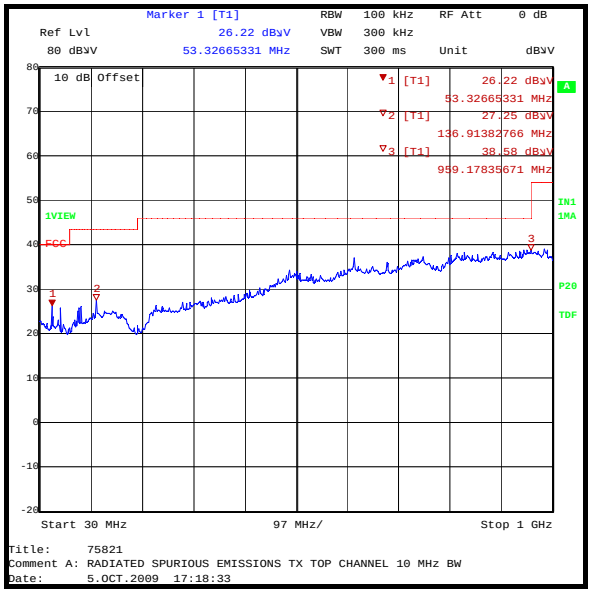
Average detector antenna connected

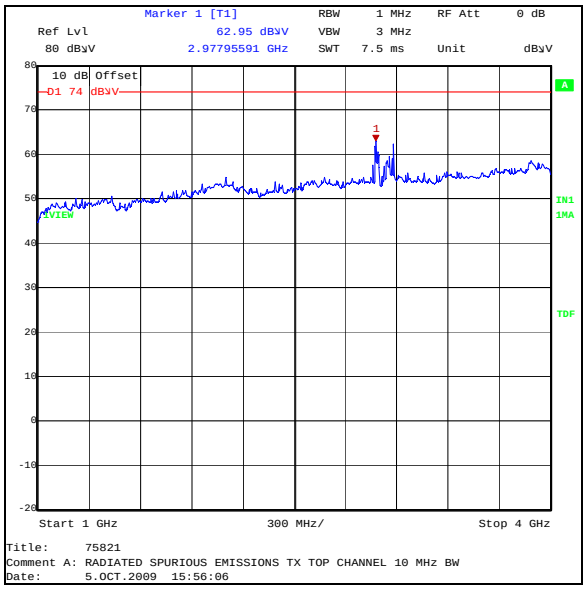
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

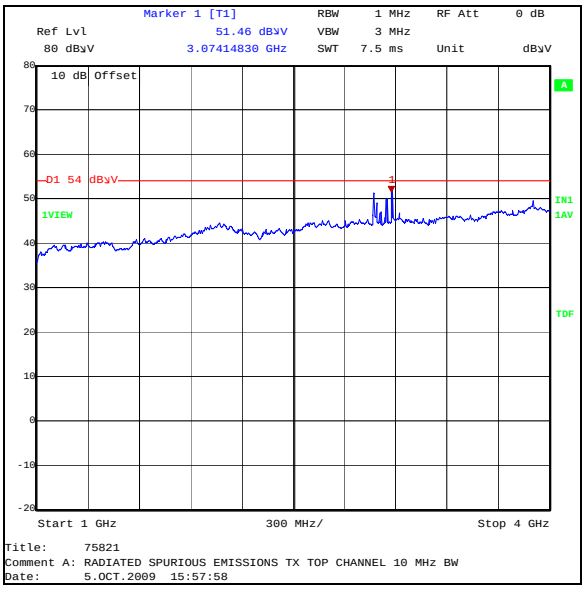
Results: 10 MHz Bandwidth / 5844 MHz

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
52.976	Horizontal	28.2	40.0	11.8	Complied





Peak detector

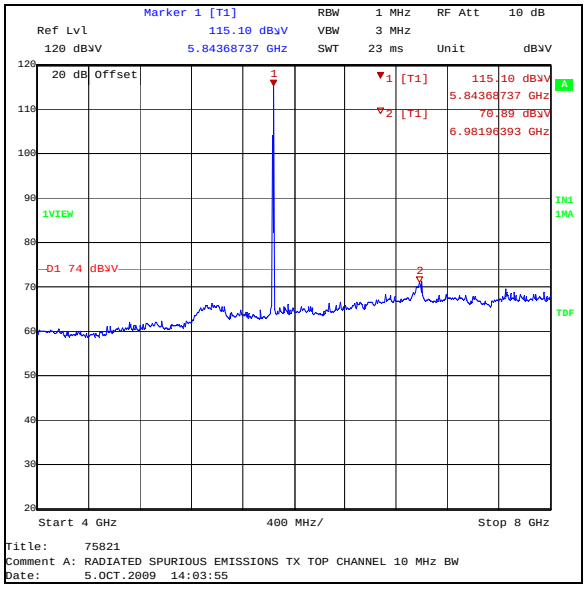


Average detector

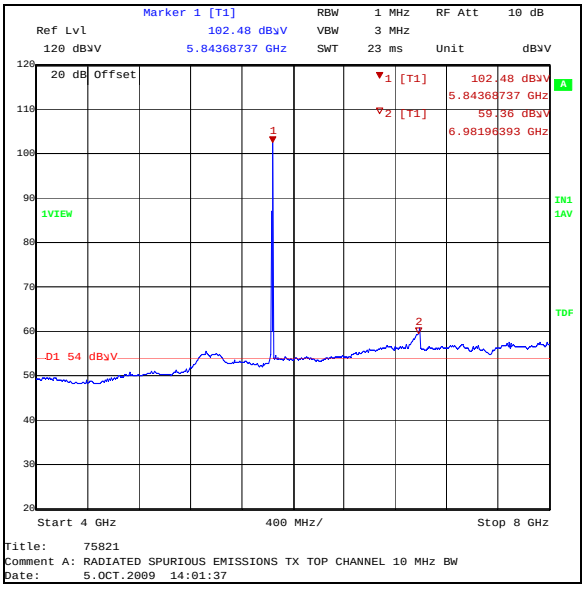
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

10 MHz channel / 5844 MHz



Peak detector antenna connected

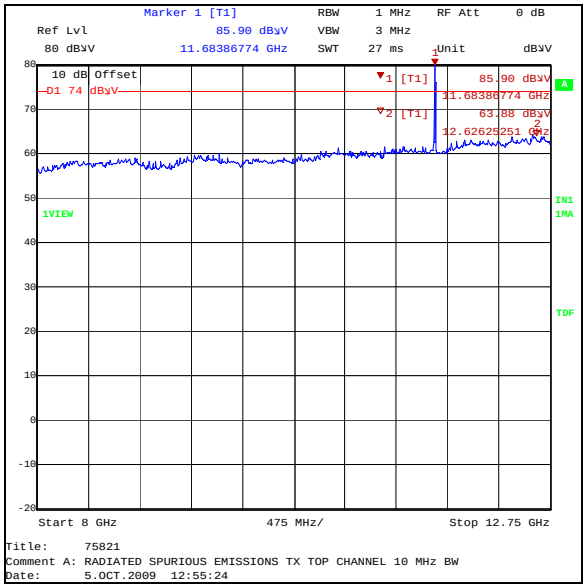


Peak detector antenna connected

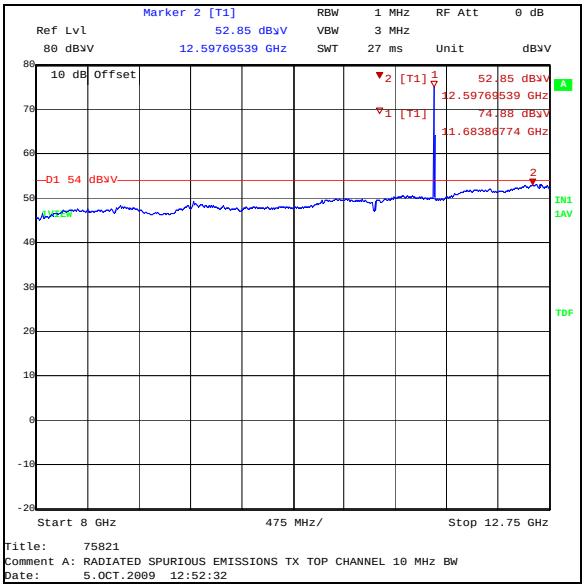
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

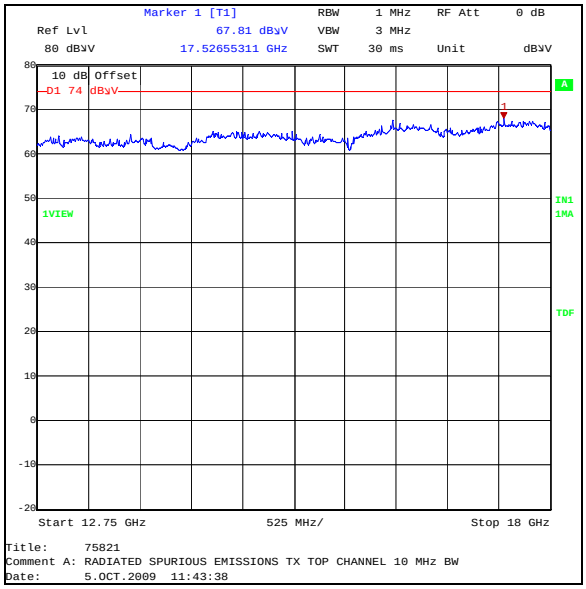
10 MHz channel / 5844 MHz



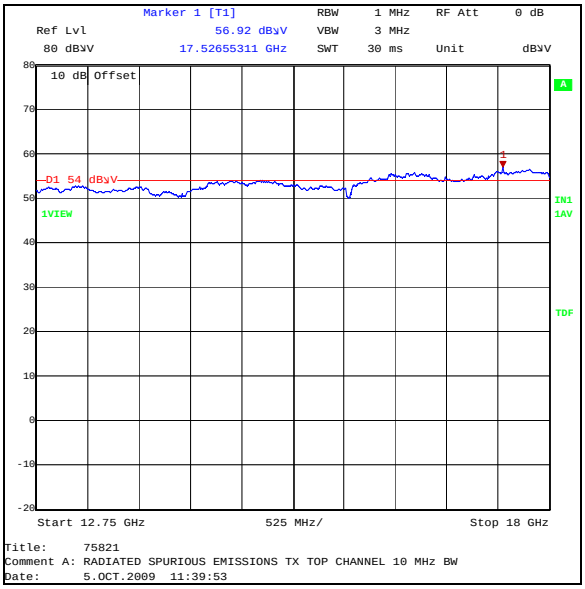
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected

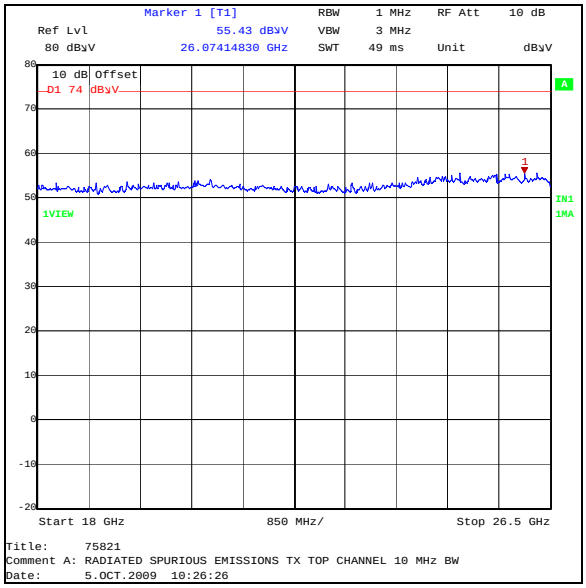


Average detector antenna connected

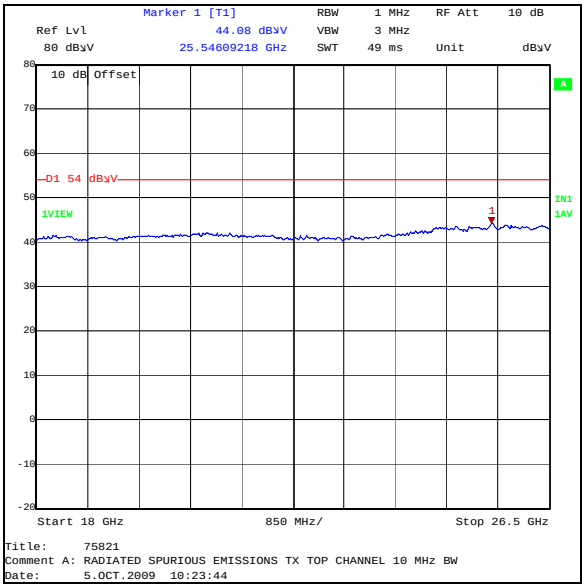
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

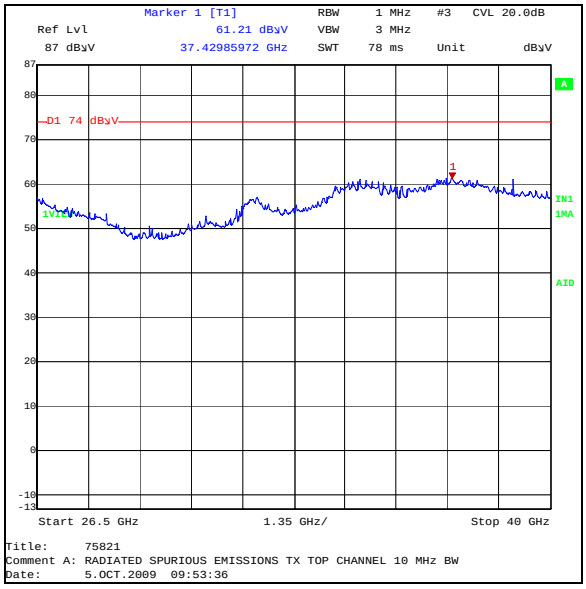
10 MHz channel / 5844 MHz



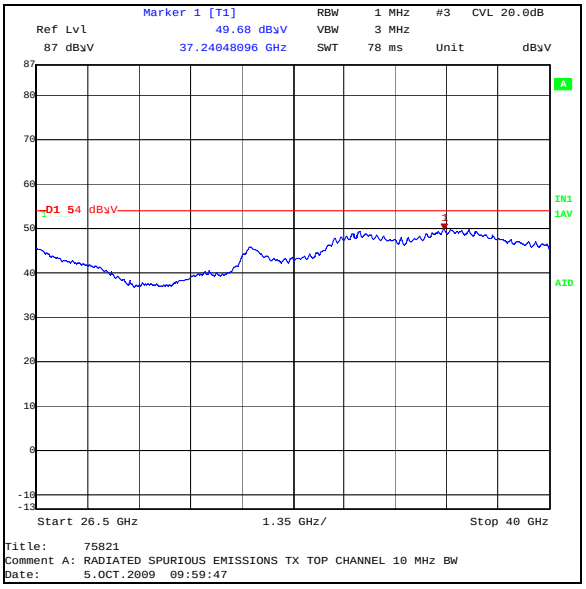
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected



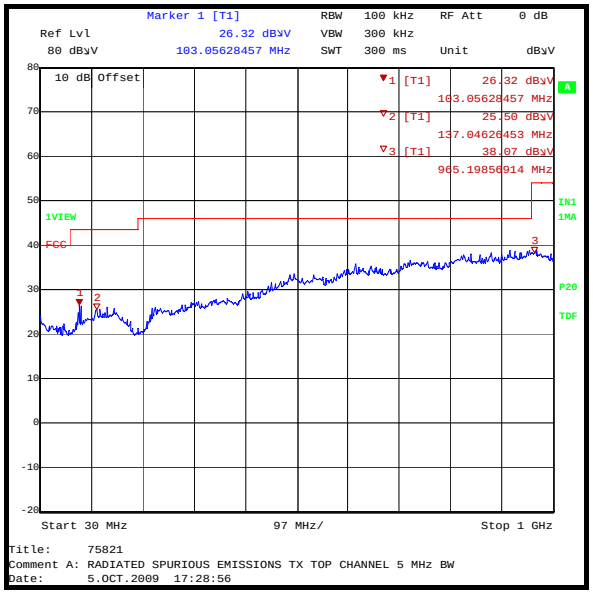
Average detector antenna connected

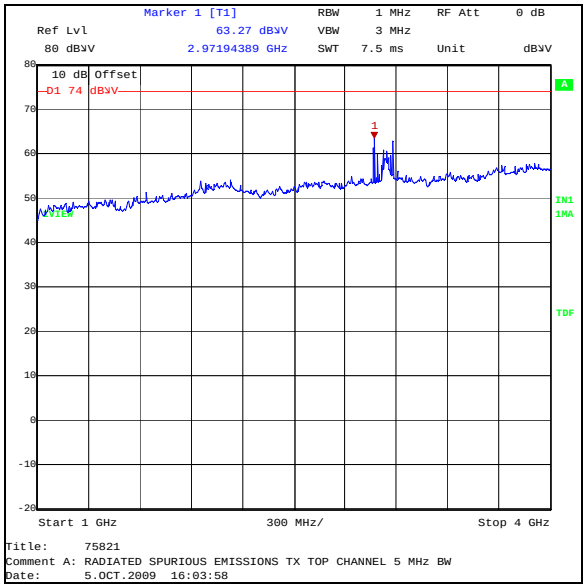
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

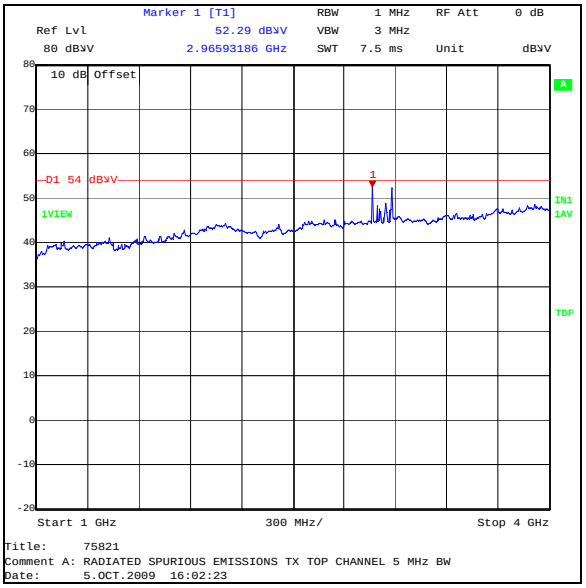
Results: 5 MHz Bandwidth / 5846 MHz

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
137.046	Horizontal	25.5	43.5	18.0	Complied
4913.828	Vertical	34.4	54.0	19.6	Complied
4961.924	Vertical	34.4	54.0	19.6	Complied





Peak detector

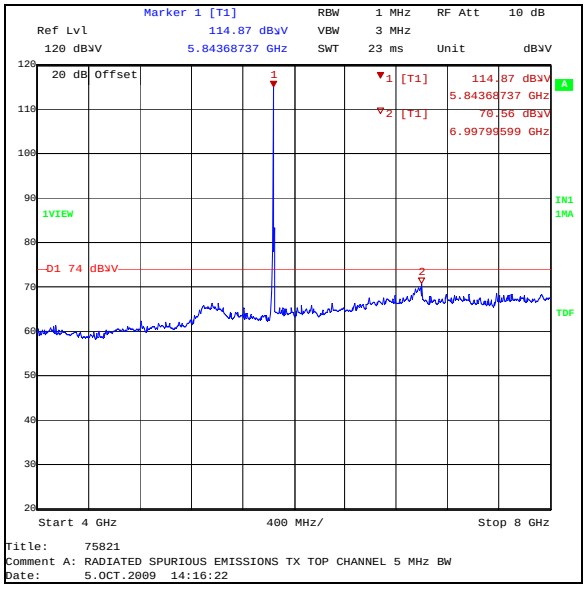


Average detector

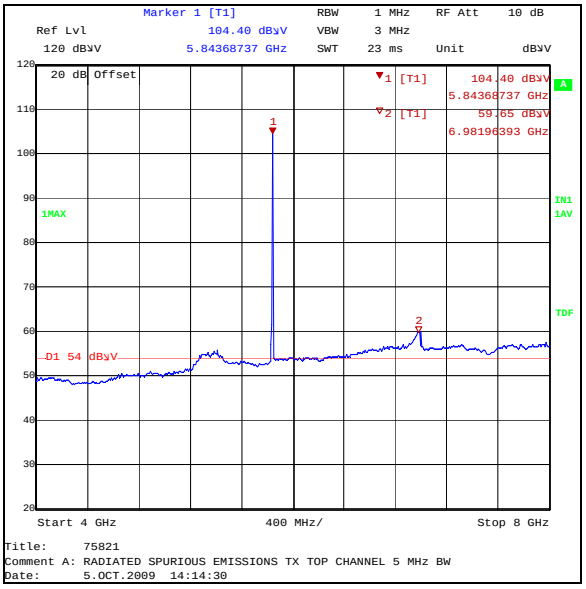
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

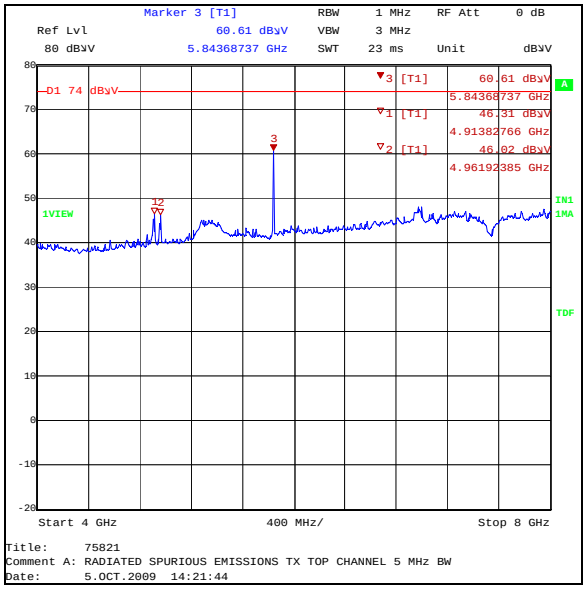
5 MHz channel / 5846 MHz



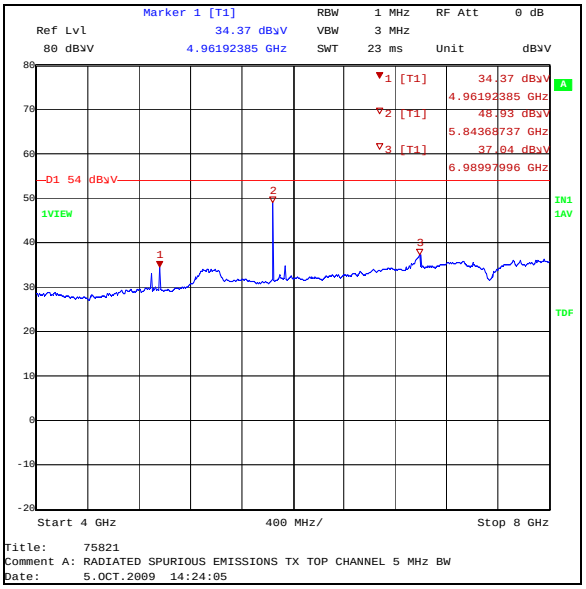
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna ports terminated

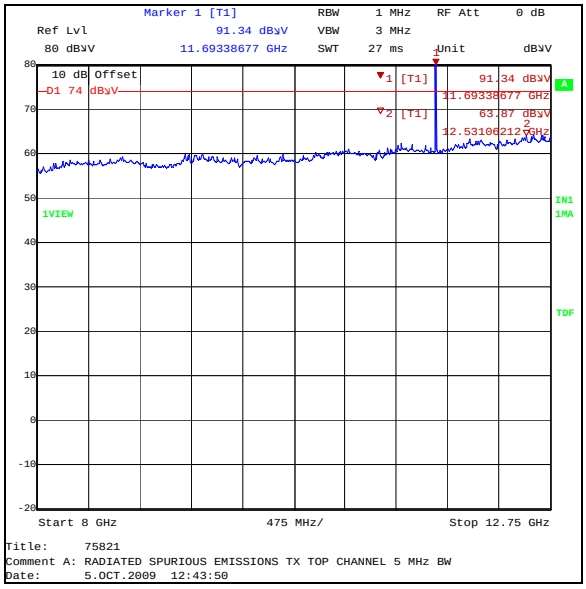


Average detector antenna ports terminated

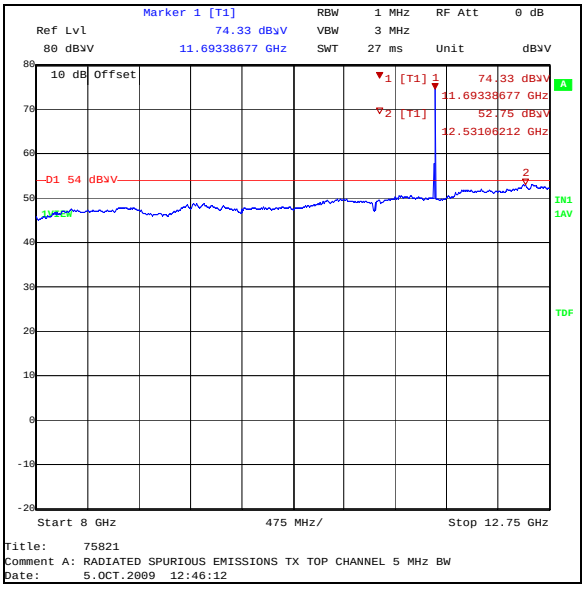
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

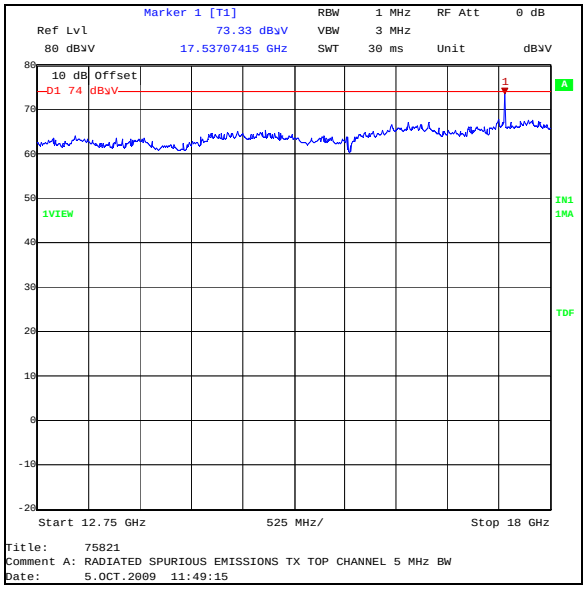
5 MHz channel / 5846 MHz



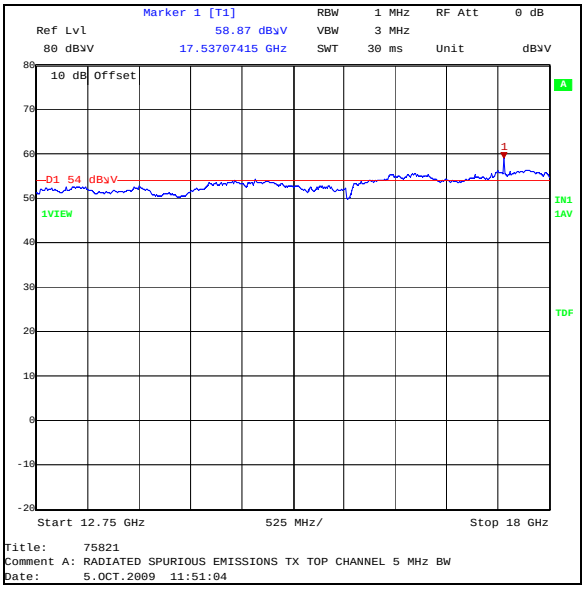
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected

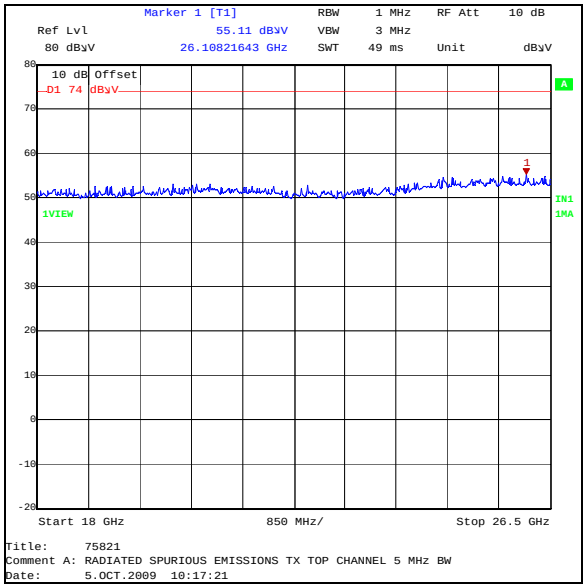


Average detector antenna connected

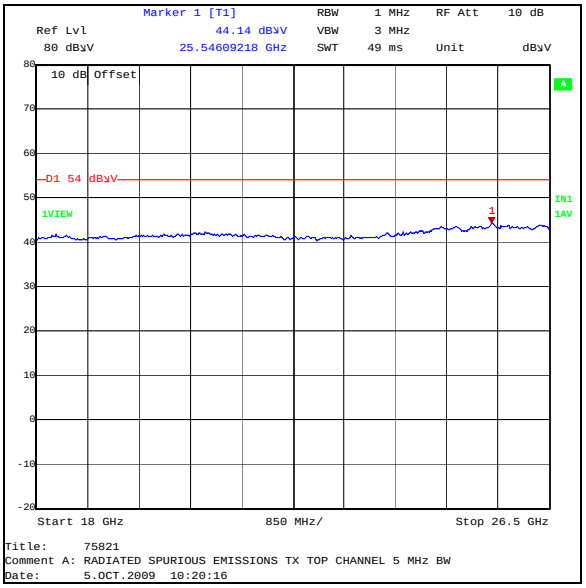
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Radiated Spurious Emissions (continued)

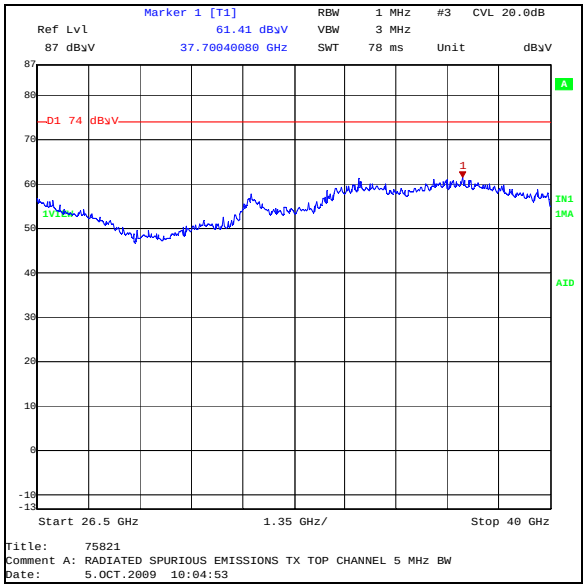
5 MHz channel / 5846 MHz



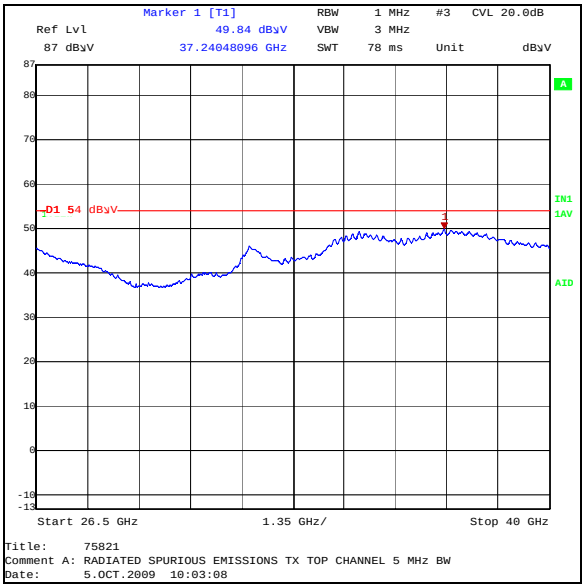
Peak detector antenna connected



Average detector antenna connected



Peak detector antenna connected



Average detector antenna connected

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

5.2.2. Transmitter Band Edge Radiated Emissions

Test Summary:

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8

Environmental Conditions:

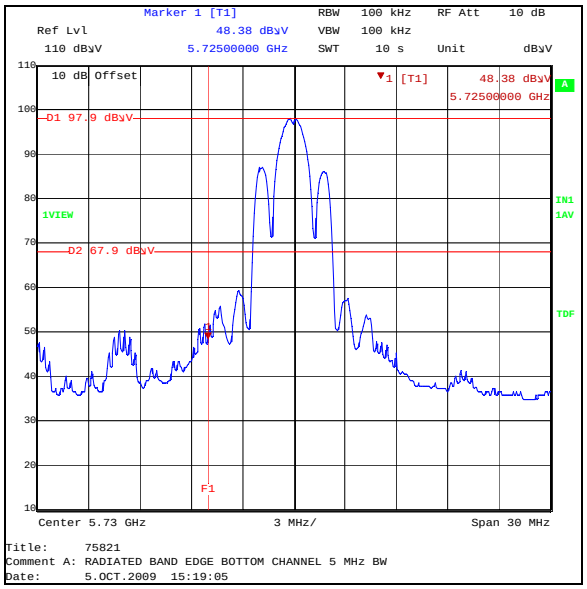
Temperature (°C):	25
Relative Humidity (%):	34

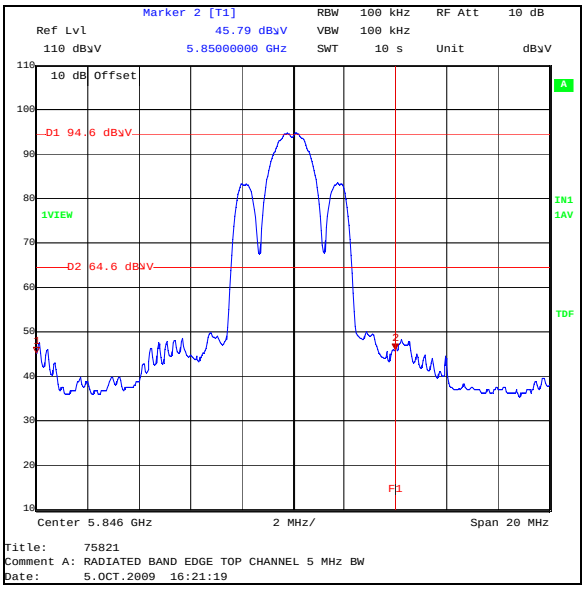
Results 5 MHz channel:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725	Vertical	48.0	0.4	48.4	67.9	19.5	Complied
5850	Vertical	45.1	0.7	45.8	64.6	18.8	Complied

Notes for all bandwidths:

1. -30 dBc limit applies as the out of band spectrum adjacent to both band edges is in non-restricted bands and the measurement was performed using an average detector.



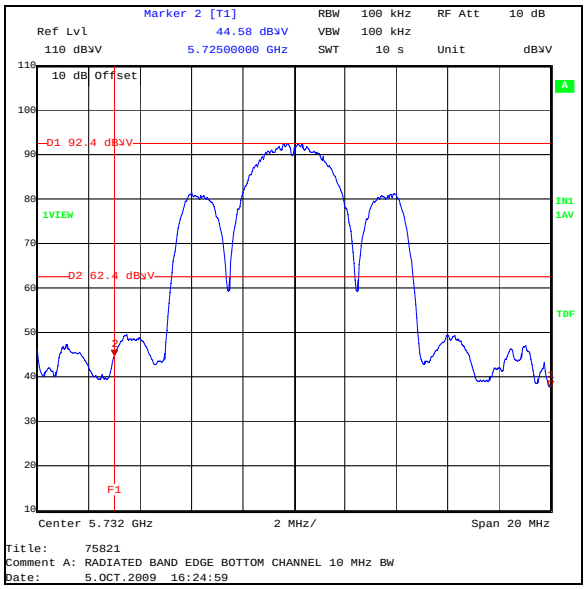


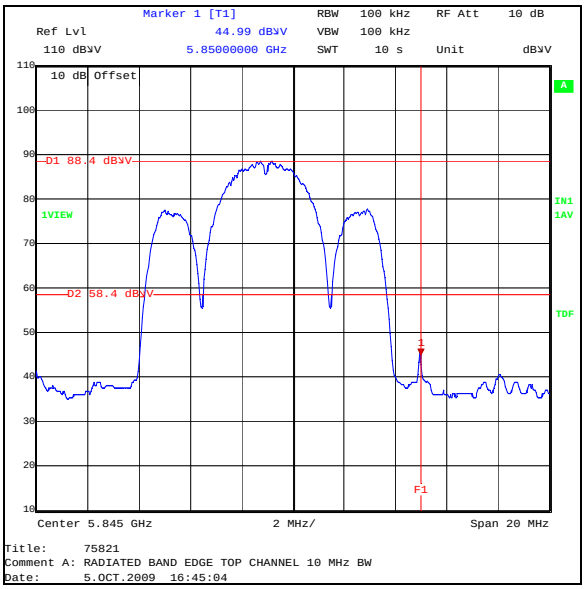
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Band Edge Radiated Emissions (continued)

Results 10 MHz channel:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725	Vertical	44.2	0.4	44.6	62.4	17.8	Complied
5850	Vertical	44.3	0.7	45.0	58.4	13.4	Complied



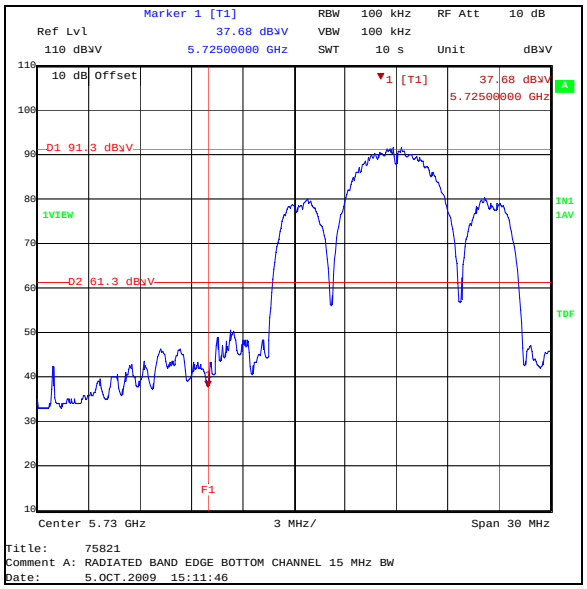


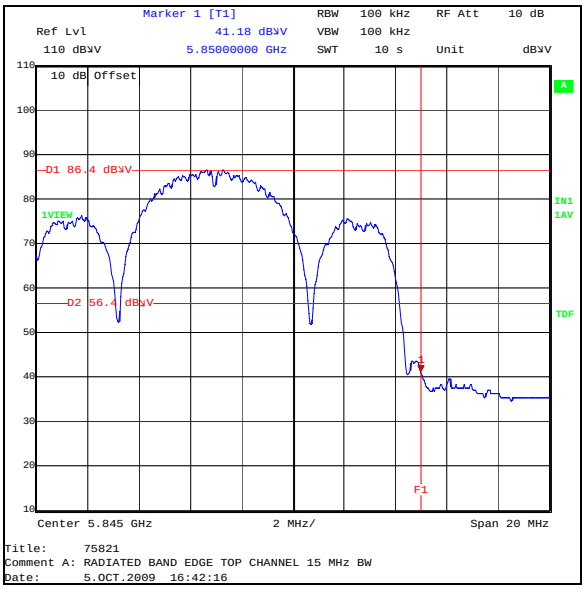
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Band Edge Radiated Emissions (continued)

Results 15 MHz channel:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725	Vertical	37.3	0.4	37.7	61.3	23.6	Complied
5850	Vertical	40.5	0.7	41.2	56.4	15.2	Complied



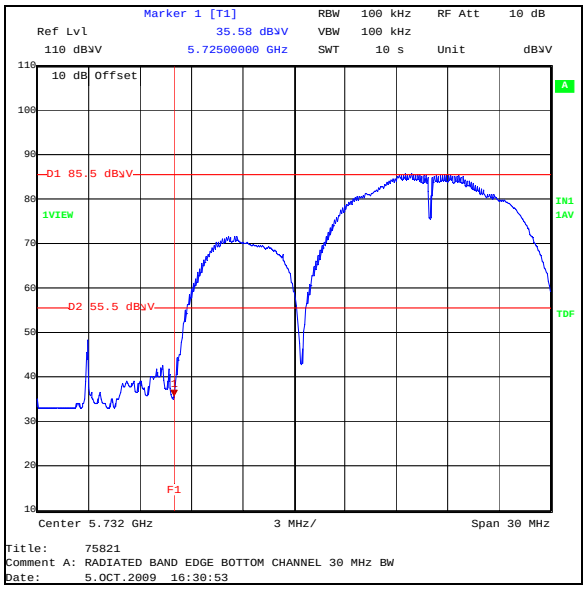


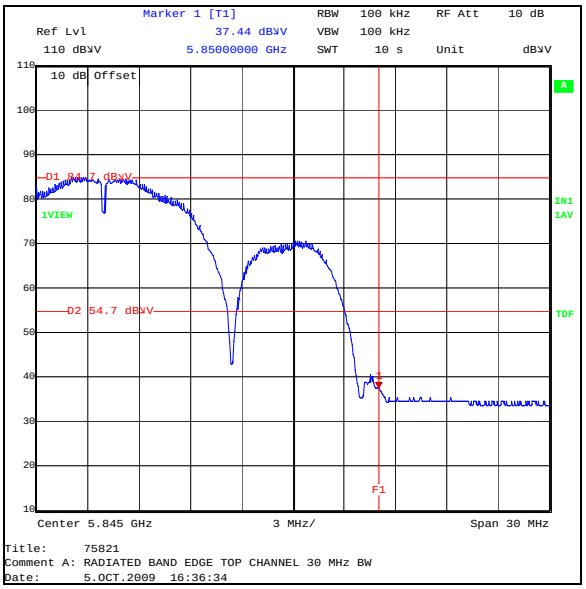
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Band Edge Radiated Emissions (continued)

Results 30 MHz channel:

Frequency (MHz)	Antenna Polarity	Detector Level (dBµV)	Transducer Factor (dB)	Actual Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
5725	Vertical	35.2	0.4	35.6	55.5	19.9	Complied
5850	Vertical	36.7	0.7	37.4	54.7	17.3	Complied





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

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 40 GHz	95%	±2.94 dB

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

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1391	Attenuator	HUBER + SUHNER AG	757987	6810.17.B	Calibrated before use	-
A1392	Attenuator	HUBER + SUHNER AG	757456	6820.17.B	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1785	Low Noise Amplifier	Farran Technology	FLNA-28-30	FTL 6483	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	25 Oct 2008	12
A203	Antenna	Flann Microwave Ltd	22240-20	343	Calibrated before use	-
A288	Antenna	Chase	CBL6111A	1589	13 Mar 2009	12
A366	Isolator	MRI	FRR-400	169	Calibration not required	-
A436	Antenna	Flann	20240-20	330	Calibrated before use	-
G085	Continuous Wave Generator	Hewlett Packard	83650L	3614A00104	27 Oct 2008	24
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1390	Harmonic Mixer	Farran Technology	WHMP 28	FTL1677B	Calibrated before use	-

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