



# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Q26Extreme (UMTS bands)

To: FCC Part 22: 2008 Subpart H and Part 24: 2008 Subpart E,  
RSS-Gen Issue 2 June 2007, RSS 132 Issue 2 September 2005  
and RSS-133 Issue 5 February 2009

**Test Report Serial No:**  
RFI/RPT4/RP74544JD05B

**Supersedes Test Report Serial No:**  
RFI/RPT3/RP74544JD05B

<b>This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:</b>	pp 
<b>Checked By:</b>	R. Graham
<b>Signature:</b>	
<b>Date of Issue:</b>	25 November 2009

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**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](mailto:info@rfi-global.com) Website: [www.rfi-global.com](http://www.rfi-global.com)

Registered in England and Wales. Company number:2117901

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**1. Customer Information**

<b>Company Name:</b>	Sierra Wireless SA
<b>Address:</b>	3 Esplanade du Foncet Issy-les-Moulineaux Cedex Paris 92442 France









## 2. Summary of Testing

### 2.1. General Information









<b>Specification Reference:</b>	47CFR22
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 22 Subpart H (Public Mobile Services)
<b>Specification Reference:</b>	47CFR24
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 24 Subpart E (Personal Communication Services)
<b>Specification Reference:</b>	RSS-Gen Issue 2 June 2007
<b>Specification Title:</b>	General Requirements and Information for the Certification of Radiocommunication Equipment
<b>Specification Reference:</b>	RSS-132 Issue 2 Sep 2005
<b>Specification Title:</b>	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
<b>Specification Reference:</b>	SRSP-503 Issue 7 Sep 2008
<b>Specification Title:</b>	Technical Requirements for Cellular Radiotelephone Systems Operating in the Bands 824 – 849 MHz and 869 – 894 MHz
<b>Specification Reference:</b>	RSS-133 Issue 5 Feb 2009
<b>Specification Title:</b>	2 GHz Personal Communications Services
<b>Specification Reference:</b>	SRSP-510 Issue 5 Feb 2009
<b>Specification Title:</b>	Technical Requirements for Personal Communications Services in the Bands 1850-1915 MHz and 1930-1995 MHz

<b>Site Registration:</b>	FCC: 209735; Industry Canada: 3245B-2
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	10 June 2009 to 01 September 2009

**2.2. Summary of Test Results – Part 22 UMTS**

FCC Reference (47CFR )	IC Reference	Measurement	Port Type	Result
Part 15.109	RSS-Gen 4.10/6 RSS-132 4.6	Receiver/Idle Mode Radiated Spurious Emissions	Enclosure	
Part 22.913(a)	RSS-132 4.4 SRSP-503 5.1.3	Transmitter Carrier Output Power	Antenna Terminals	
Part 22.355	RSS-132 4.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature & Voltage Variation)	Antenna	
Part 2.1049	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	Antenna	
Part 2.1053/22.917	RSS-132 4.5	Transmitter Out of Band Radiated Emissions	Antenna	
Part 2.1053/22.917	RSS-132 4.5	Transmitter Band Edge Radiated Emissions	Antenna	
<b>Key to Results</b>				
 = Complied  = Did not comply				

**2.3. Summary of Test Results – Part 24 UMTS**

FCC Reference (47CFR)	IC Reference	Measurement	Port Type	Result
Part 15.109	RSS-Gen 4.10/6 RSS-133 6.6	Receiver/Idle Mode Radiated Spurious Emissions	Enclosure	
Part 24.232	RSS-133 6.4 SRSP-510 5.1.2	Transmitter Carrier Output Power	Antenna Terminals	
Part 24.235	RSS-133 6.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature & Voltage Variation)	Antenna	
Part 2.1049/24.238	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	Antenna	
Part 2.1053/24.238	RSS-133 6.5	Transmitter Out of Band Radiated Emissions	Antenna	
Part 2.1053/24.238	RSS 133 6.5	Transmitter Band Edge Radiated Emissions	Antenna	
<b>Key to Results</b>				
 = Complied  = Did not comply				

## **2.4. Methods and Procedures**

<b>Reference:</b>	ANSI/TIA-603-C-2004
<b>Title:</b>	Land Mobile Communications Equipment, Measurements and performance Standards
<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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.
<b>Reference:</b>	None stated
<b>Title:</b>	FCC SAR Measurement Procedures for 3G Devices October 2007 (Revised)
<b>Reference:</b>	3GPP TS 34.121-1 V8.6.0 (2009-03)
<b>Title:</b>	Universal Mobile Telecommunications System (UMTS); User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 1: Conformance specification (3GPP TS 34.121-1 version 8.6.0 Release 8)

## **2.5. 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)**

<b>Brand Name:</b>	Q26 Extreme Wireless CPU®
<b>Model Name or Number:</b>	Q26Extreme
<b>IMEI Number:</b>	004401769021680
<b>Hardware Version Number:</b>	50
<b>Software Version Number:</b>	FW R4.2.9
<b>IC Number:</b>	3651C-Q26EX
<b>FCC ID:</b>	O9EQ26EX

#### **3.2. Description of EUT**

The equipment under test was a dual mode GSM/GPRS/EGPRS/UMTS modem mounted on a development board.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were made to the EUT during testing.



**3.4. Additional Information Related to Testing – Part 22**

<b>Technology Tested:</b>	UMTS		
<b>Type of Radio Device:</b>	HSPA USB Modem		
<b>Mode:</b>	UMTS Band V Circuit switched, HSDPA and HSUPA		
<b>Modulation Type:</b>	16QAM and QPSK		
<b>Channel Spacing:</b>	5 MHz		
<b>Power Supply Requirement(s):</b>	Nominal	3.8 V	
	Minimum	3.23 V	
	Maximum	4.37 V	
<b>Maximum Output Power (ERP):</b>	23.5 dBm		
<b>Transmit Frequency Range:</b>	824 to 849 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	4132	826.4
	Middle	4182	836.4
	Top	4233	846.6
<b>Receive Frequency Range:</b>	869 to 894 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	4357	871.4
	Middle	4407	881.4
	Top	4458	891.6

**3.5. Additional Information Related to Testing – Part 24**

<b>Technology Tested:</b>	UMTS		
<b>Type of Radio Device:</b>	HSPA USB Modem		
<b>Mode:</b>	UMTS Band II Circuit switched, HSDPA and HSUPA		
<b>Modulation Type:</b>	16QAM and QPSK		
<b>Channel Spacing:</b>	5 MHz		
<b>Power Supply Requirement(s):</b>	Nominal	3.8 V	
	Minimum	3.23 V	
	Maximum	4.37 V	
<b>Transmit Frequency Range:</b>	1850 to 1910 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	9262	1852.4
	Middle	9400	1880.0
	Top	9538	1907.6
<b>Receive Frequency Range:</b>	1930 to 1990 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	9662	1932.4
	Middle	9800	1960.0
	Top	9938	1987.6

**3.6. Support Equipment**

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

<b>Description:</b>	Development board
<b>Brand Name:</b>	Wavecom
<b>Model Name or Number:</b>	STARTERKIT LIGHT Q2686 V2.0
<b>Serial Number:</b>	Not stated

<b>Description:</b>	¼ wave antenna with 0.1 metre coaxial cable. Terminated with an SMA male connector
<b>Brand Name:</b>	Hirschmann
<b>Model Name or Number:</b>	MCA 18 90 80
<b>Serial Number:</b>	Not stated

<b>Description:</b>	0.4m <sup>2</sup> Ground plane for ¼ wave antenna
<b>Model Name or Number:</b>	Not stated
<b>Serial Number:</b>	Not stated

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

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

- Receive/Idle mode, not camped on but scanning all supported bands and modes.
- Constantly transmitting at full power on bottom, centre and top channels as required.

### **4.2. Configuration and Peripherals**

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

- Connected to a UMTS system simulator, operating in transceiver mode.
- A test USIM was fitted to the EUT for all tests.
- All unused ports on the EUT were terminated.
- The EUT was supplied mounted on a development board for the duration of the testing.
- External DC power was provided by a bench power supply and monitored with a calibrated voltmeter. Power from the external supply connected directly to the EUT through development board tracks. No voltage regulation or stabilisation circuits were visible on the development board.
- The customer supplied a  $\frac{1}{4}$  wave antenna mounted centrally on a  $0.4 \text{ m}^2$  metal plate. A  $0.1 \text{ m}$  length of coaxial cable was connected to the antenna base. Radiated tests were performed with the  $\frac{1}{4}$  wave antenna and associated ground plane connected to the EUT. The antenna was moved as far from the EUT as the coaxial cable allowed (approximately  $0.15\text{m}$ ) to maximise any emissions.
- Conducted RF power measurements were made using a calibrated Agilent 8960. The Agilent test procedure for making HSPA measurements according to 3GPP TS 34.121-1 was followed.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

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

**5.2. Test Results – FCC Part 22**

**5.2.1. Receiver/Idle Mode Radiated Spurious Emissions**

**Test Summary:**

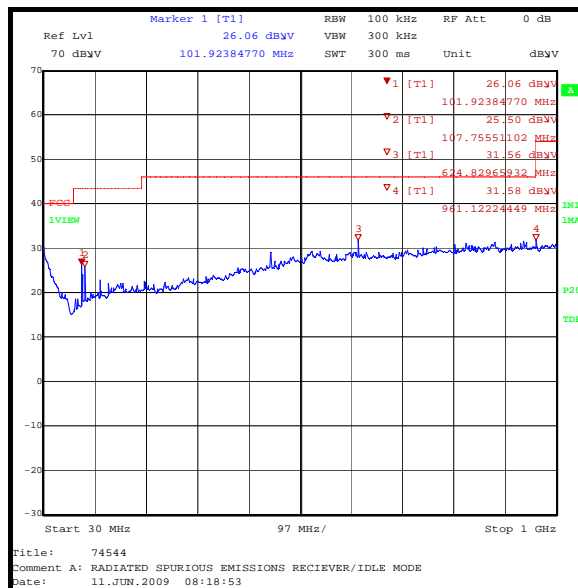
FCC Part:	15.109
Frequency Range:	30 MHz to 1000 MHz
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

**Environmental Conditions:**

Temperature (°C):	23
Relative Humidity (%):	36

**Results:**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
623.993	Vertical	31.9	46.0	14.4	Complied



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

**Receiver/Idle Mode Radiated Spurious Emissions (continued)**

**Test Summary:**

<b>FCC Part:</b>	15.109
<b>Frequency Range:</b>	1 GHz to 5 GHz
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes

**Environmental Conditions:**

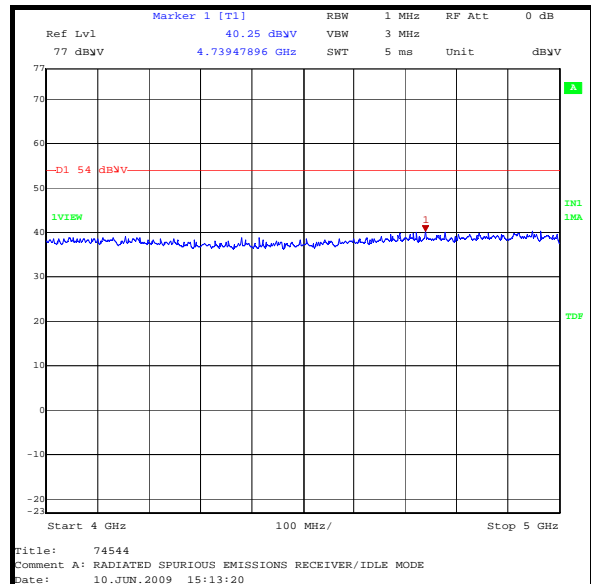
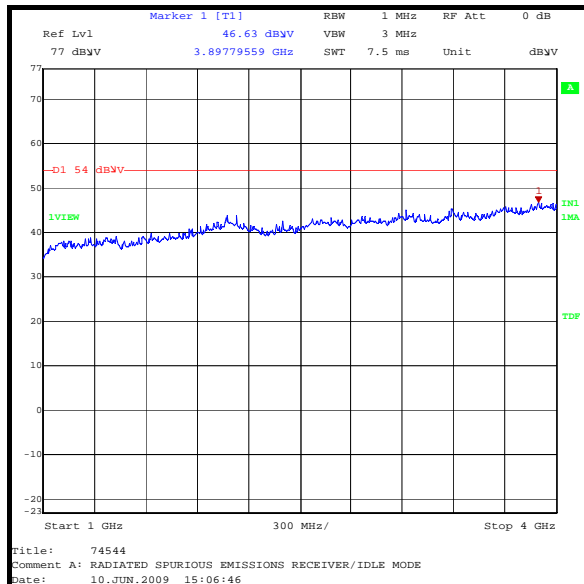
<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	33

**Results: Highest Peak Level**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V/m)	Transducer Factor (dB)	Peak Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
3.897	Horizontal	41.1	5.5	46.6	54.0	7.4	Complied

**Note(s):**

- No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.



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

**5.2.2. Transmitter Output Power****Test Summary:**

<b>FCC Part:</b>	22.913(a)
<b>Test Method Used:</b>	As detailed in 3GPP TS 34.121-1 V8.6.0 (2009-03) and ANSI TIA-603-C-2004 Section 2

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	27 to 31
<b>Relative Humidity Variation (%):</b>	30 to 39

**Results: Conducted**

Modes		HSDPA								
Sub-test		1	2	3	4	RMC 12.2kbps				
Band	Channel	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Limit (dBm)	Margin	Result	
V (850)	4132	22.0	22.0	21.4	21.6	22.1	38.5	16.4	Complied	
	4183	21.8	21.9	21.3	21.4	21.9	38.5	16.6	Complied	
	4233	22.0	21.8	21.3	21.3	21.9	38.5	16.5	Complied	
$\beta_c$		2	12	15	15					
$\beta_d$		15	15	8	4					
$\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$		8	8	8	8					

**Results: Conducted**

Mode		HSUPA								
Sub-test		1	2	3	4	5				
Band	Channel	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Limit (dBm)	Margin	Result	
V (850)	4132	22.1	20.1	21.4	21.8	21.6	38.5	16.4	Complied	
	4182	21.9	20.0	21.3	21.6	21.4	38.5	16.6	Complied	
	4233	21.9	20.0	21.3	21.7	21.5	38.5	16.6	Complied	
$\beta_c$		11	6	15	2	15				
$\beta_d$		15	15	9	15	15				

**Note(s):**

1. Conducted power measurements were compared to the ERP limit.

**5.2.3. Transmitter Frequency Stability (Temperature Variation)****Test Summary:**

<b>FCC Part:</b>	22.355
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	29 to 33
<b>Relative Humidity Variation (%):</b>	37 to 41

**Results: Middle Channel (836.4 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.399982	-18	0.0215	2.5	2.4785	Complied
-20	836.399985	-15	0.0179	2.5	2.4821	Complied
-10	836.399979	-21	0.0251	2.5	2.4749	Complied
0	836.399988	-12	0.0143	2.5	2.4857	Complied
10	836.399977	-23	0.0275	2.5	2.4725	Complied
20	836.399987	-13	0.0155	2.5	2.4845	Complied
30	836.399986	-14	0.0167	2.5	2.4833	Complied
40	836.399988	-12	0.0143	2.5	2.4857	Complied
50	836.399989	-11	0.0132	2.5	2.4868	Complied



**5.2.4. Transmitter Frequency Stability (Voltage Variation)****Test Summary:**

<b>FCC Part:</b>	22.355
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Temperature (°C):</b>	31
<b>Relative Humidity (%):</b>	33

**Results: Middle Channel (836.4 MHz)**

<b>Supply Voltage (V)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Limit (ppm)</b>	<b>Margin (ppm)</b>	<b>Result</b>
3.23	836.399992	-8	0.0096	2.5	2.4904	Complied
4.37	836.399988	-12	0.0143	2.5	2.4857	Complied

**5.2.5. Transmitter Occupied Bandwidth****Test Summary:**

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

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	27 to 31
<b>Relative Humidity Variation (%):</b>	33 to 39

**Results:**

<b>Channel Type</b>	<b>Frequency (MHz)</b>	<b>Occupied Bandwidth (kHz)</b>
RMC 12.2k	836.4	4167
HSDPA sub-test 1	836.4	4165
HSDPA sub-test 2	836.4	4174
HSDPA sub-test 3	836.4	4169
HSDPA sub-test 4	836.4	4165
HSUPA sub-test 1	836.4	4160
HSUPA sub-test 2	836.4	4190
HSUPA sub-test 3	836.4	4145
HSUPA sub-test 4	836.4	4153
HSUPA sub-test 5	836.4	4150

**Note(s):**

1. Measurements were performed using the occupied bandwidth function (99%) of the test equipment. Numerical results were displayed and recorded.

**5.2.6. Transmitter Out of Band Radiated Emissions****Test Summary:**

<b>FCC Part:</b>	2.1053 & 22.917
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	30 MHz to 10 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	22

**Results: 12.2k RMC - Bottom Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1650.125	-19.9	-13.0	6.4	Complied

**Results: 12.2k RMC - Middle Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1670.735	-19.4	-13.0	6.4	Complied

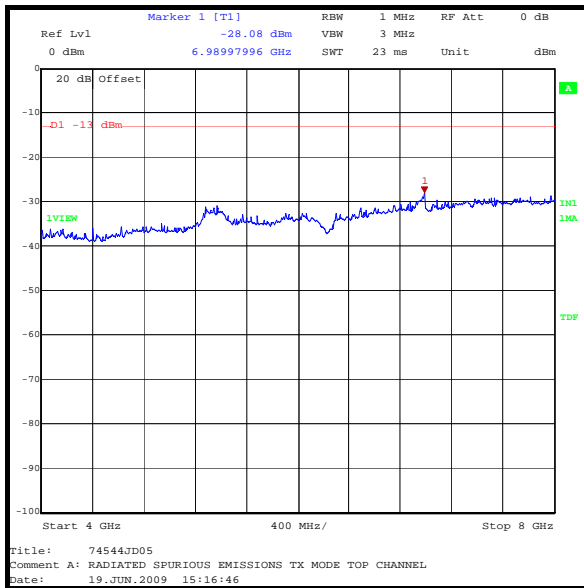
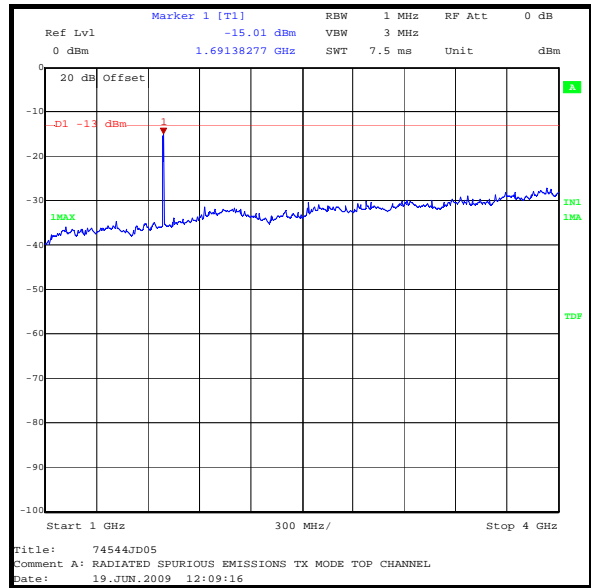
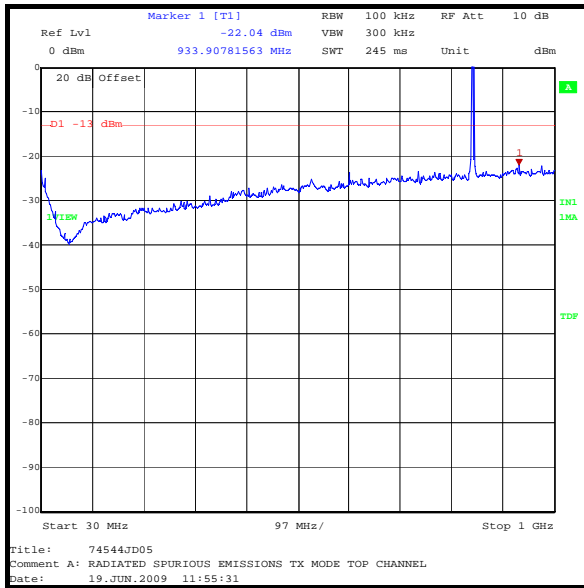
**Results: 12.2k RMC - Top Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1694.853	-21.4	-13.0	8.4	Complied

**Note(s):**

1. The uplink and downlink traffic channels are shown on the 30 MHz to 1 GHz plot at approximately 846 MHz.
2. Final measurements were made using appropriate RF filters and attenuators where required.
3. The receive antenna was rotated through the horizontal and vertical planes. The highest levels were recorded in the above tables.
4. Pre-scans and final measurements were made with the EUT using a 12.2k RMC as this was previously found to produce the highest EIRP out of all tested channel types.

**Transmitter Out of Band Radiated Emissions (continued)**



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

**5.2.7. Transmitter Radiated Emissions at Band Edges****Test Summary:**

<b>FCC Part:</b>	2.1053 & 22.917
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	22

**Results:**

Frequency (MHz)	Mode (HSDPA – QPSK)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
824	Subset 1	-31.7	-13.0	18.7	Complied
849	Subset 1	-29.9	-13.0	16.9	Complied
824	Subset 2	-29.9	-13.0	16.9	Complied
849	Subset 2	-30.4	-13.0	17.4	Complied
824	Subset 3	-28.8	-13.0	15.8	Complied
849	Subset 3	-29.8	-13.0	16.8	Complied
824	Subset 4	-28.9	-13.0	15.9	Complied
849	Subset 4	-28.6	-13.0	15.6	Complied

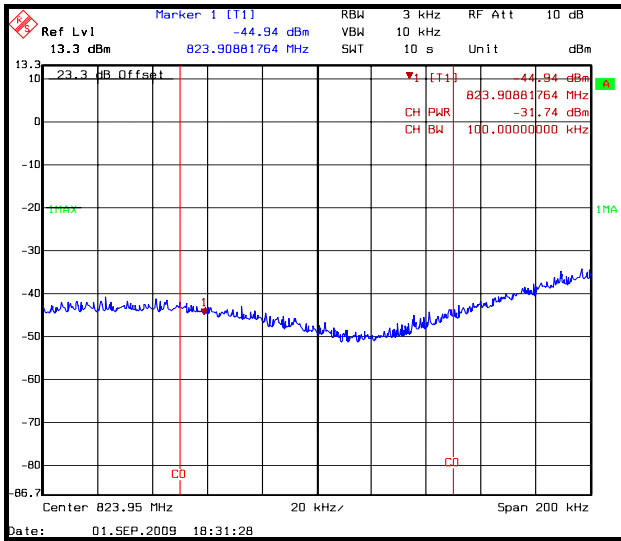
Frequency (MHz)	Mode (HSDPA – 16QAM)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
824	Subset 1	-30.7	-13.0	17.7	Complied
849	Subset 1	-31.9	-13.0	18.9	Complied
824	Subset 2	-31.1	-13.0	18.1	Complied
849	Subset 2	-30.2	-13.0	17.2	Complied
824	Subset 3	-29.0	-13.0	16.0	Complied
849	Subset 3	-28.8	-13.0	15.8	Complied
824	Subset 4	-28.5	-13.0	15.5	Complied
849	Subset 4	-28.9	-13.0	15.9	Complied

Frequency (MHz)	Mode	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
824	RMC/Voice	-32.5	-13.0	19.5	Complied
849	RMC/Voice	-32.8	-13.0	19.8	Complied

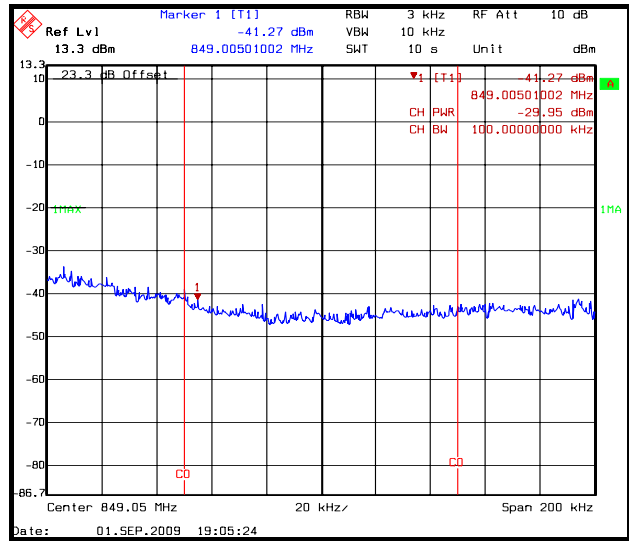
**Transmitter Radiated Emissions at Band Edges (continued)**

<b>Frequency (MHz)</b>	<b>Mode (HSUPA)</b>	<b>Peak Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dBm)</b>	<b>Result</b>
824	Subset 1	-30.0	-13.0	17.0	Complied
849	Subset 1	-29.6	-13.0	16.6	Complied
824	Subset 2	-29.4	-13.0	16.4	Complied
849	Subset 2	-31.0	-13.0	18.0	Complied
824	Subset 3	-29.4	-13.0	16.4	Complied
849	Subset 3	-28.9	-13.0	15.9	Complied
824	Subset 4	-30.4	-13.0	17.4	Complied
849	Subset 4	-31.5	-13.0	18.5	Complied
824	Subset 5	-30.3	-13.0	17.3	Complied
849	Subset 5	-30.1	-13.0	17.1	Complied

**Transmitter Radiated Emissions at Band Edges (continued)**



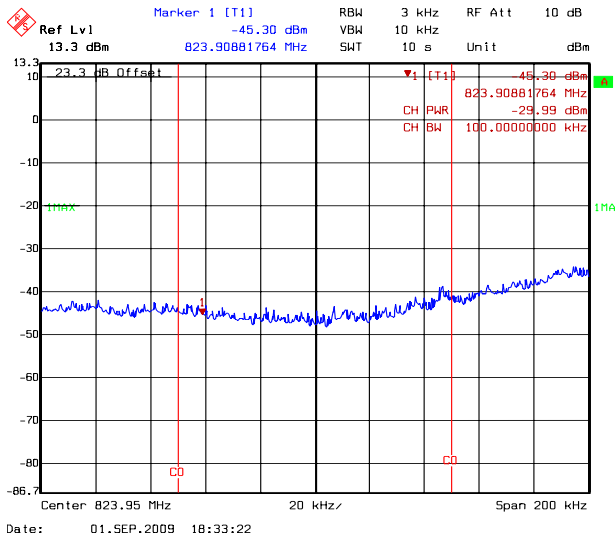
HSDPA 1 QPSK Bottom Channel



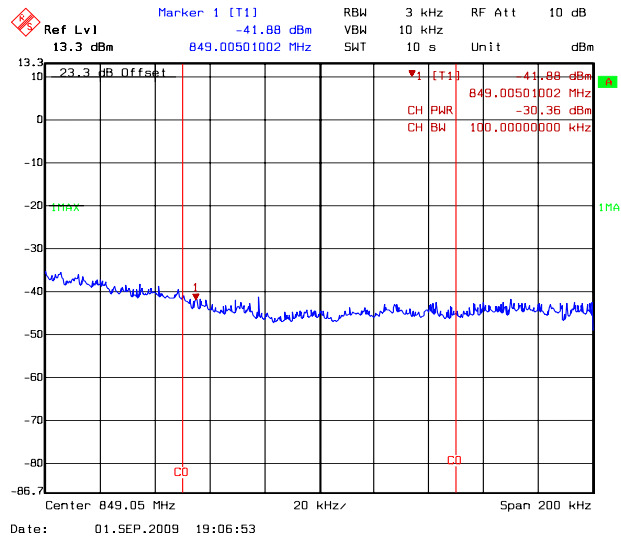
HSDPA 1 QPSK Top Channel

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

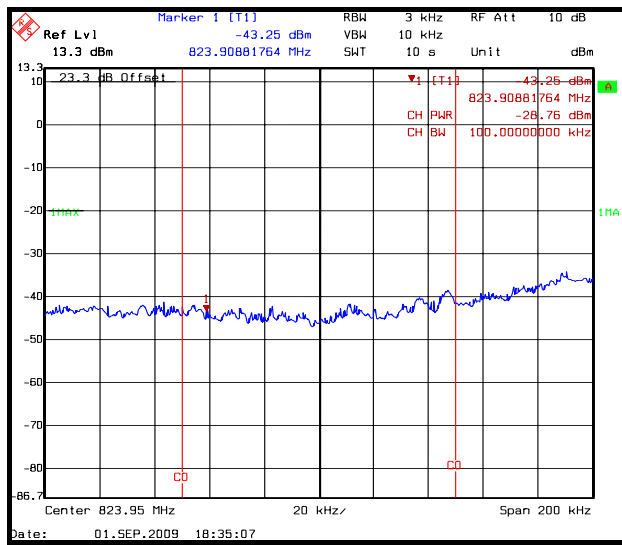
**Transmitter Radiated Emissions at Band Edges (continued)**



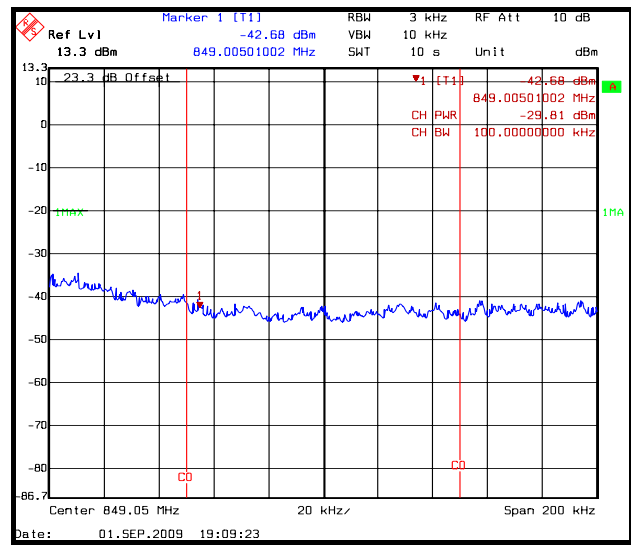
HSDPA 2 QPSK Bottom Channel



HSDPA 2 QPSK Top Channel



HSDPA 3 QPSK Bottom Channel

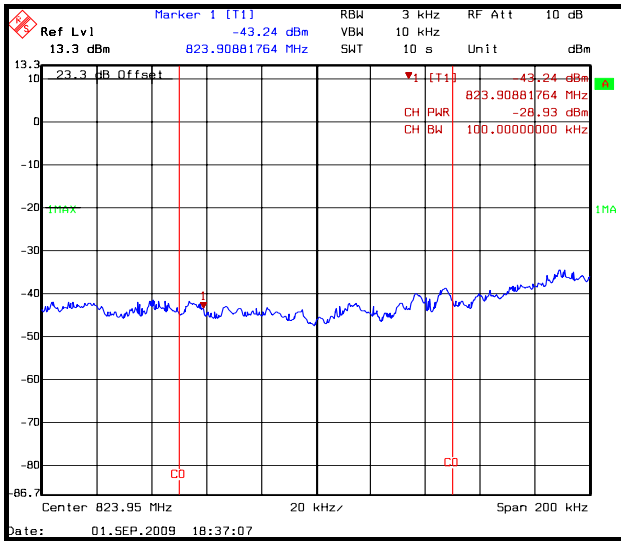


HSDPA 3 QPSK Top Channel

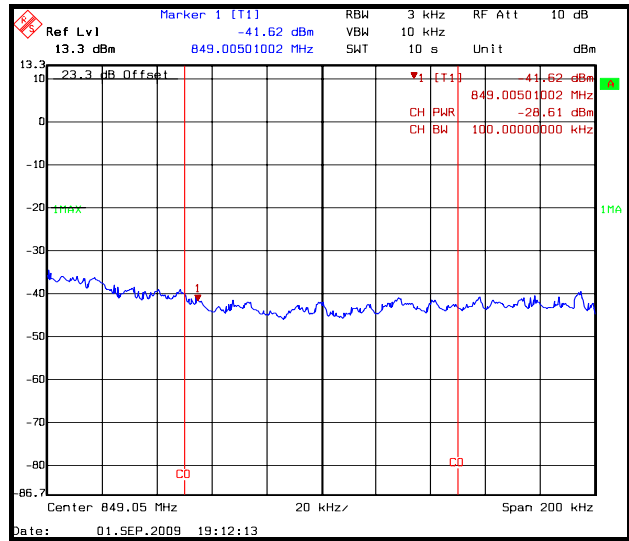
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.



**Transmitter Radiated Emissions at Band Edges (continued)**



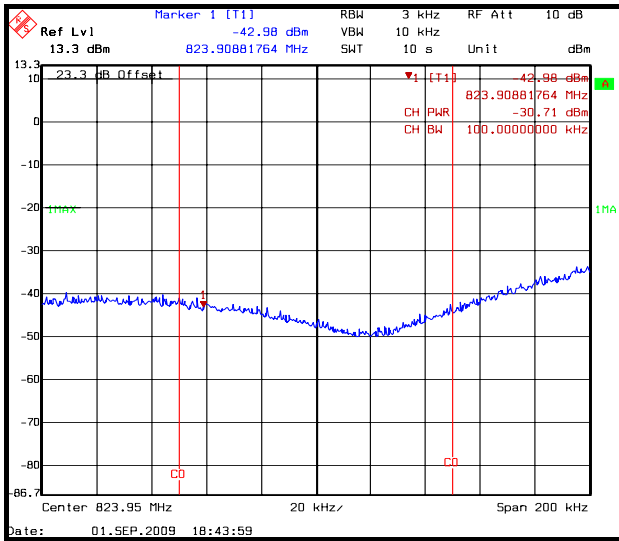
HSDPA 4 QPSK Bottom Channel



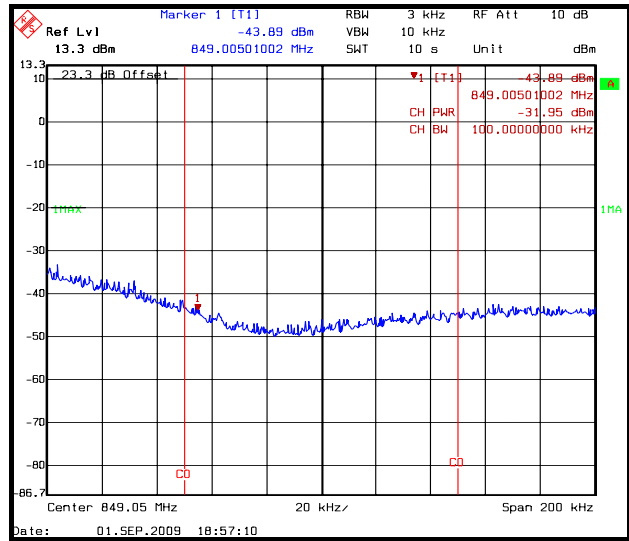
HSDPA 4 QPSK Top Channel

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

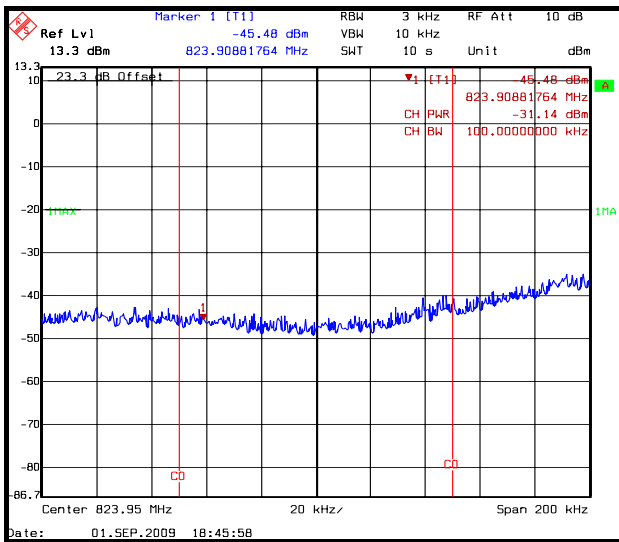
**Transmitter Radiated Emissions at Band Edges (continued)**



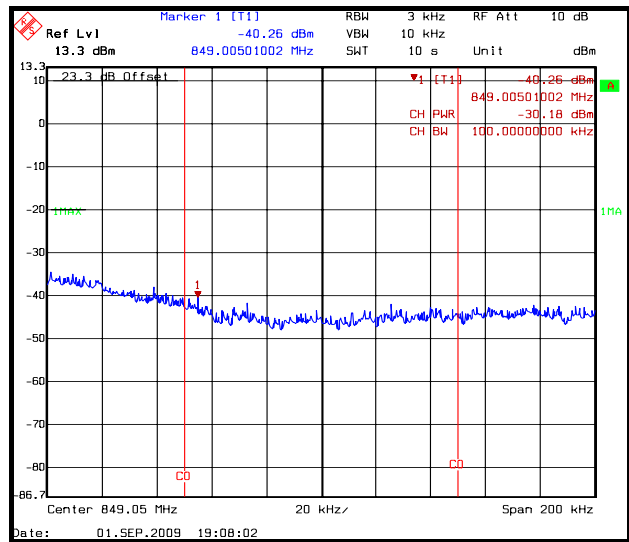
HSDPA 1 16QAM Bottom Channel



HSDPA 1 16QAM Top Channel



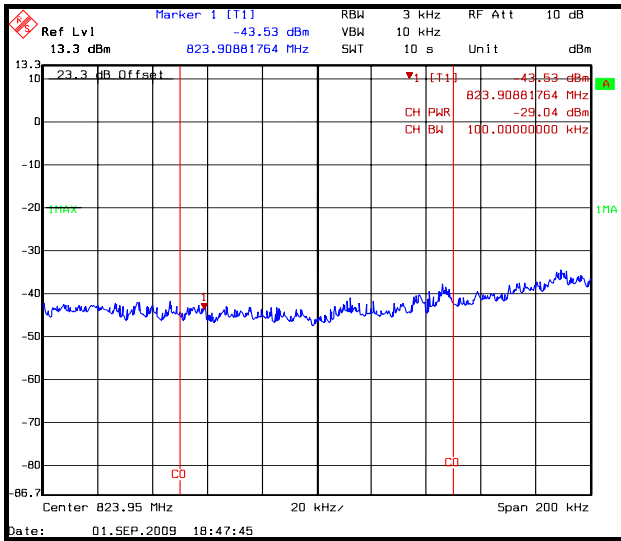
HSDPA 2 16QAM Bottom Channel



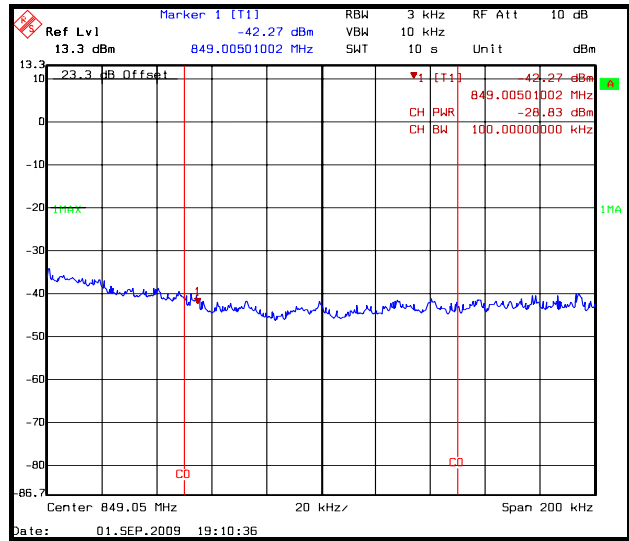
HSDPA 2 16QAM Top Channel

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

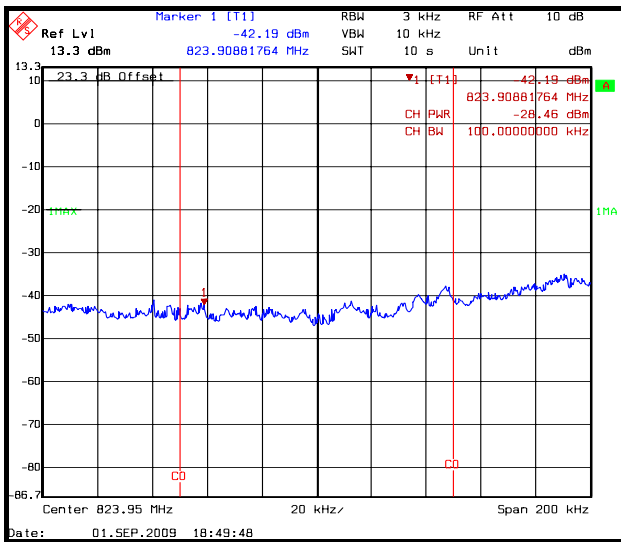
**Transmitter Radiated Emissions at Band Edges (continued)**



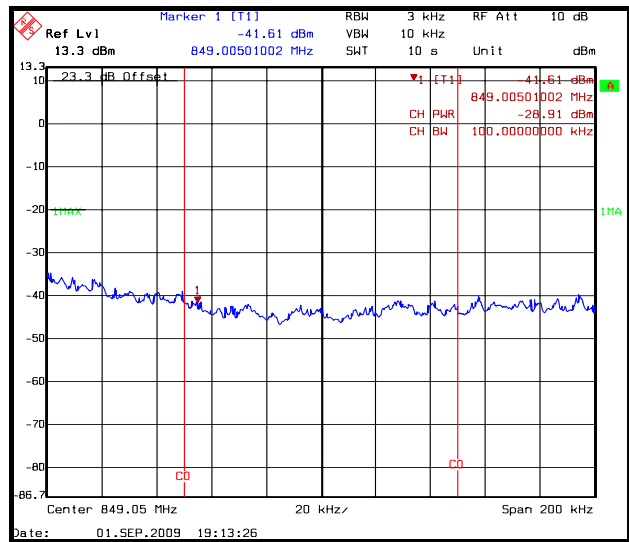
HSDPA 3 16QAM Bottom Channel



HSDPA 3 16QAM Top Channel



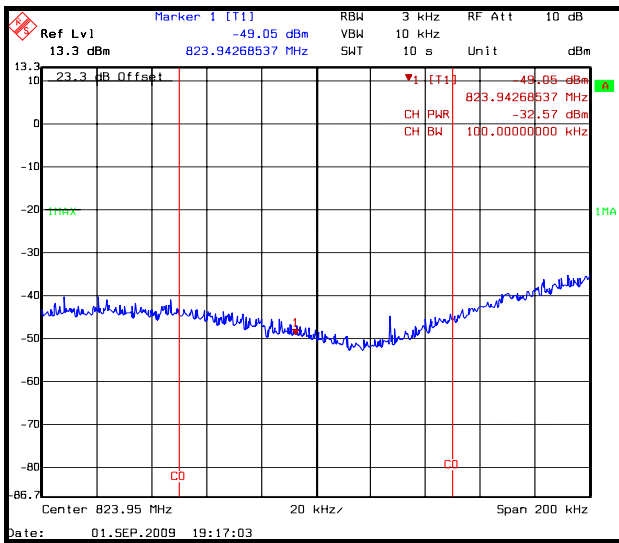
HSDPA 4 16QAM Bottom Channel



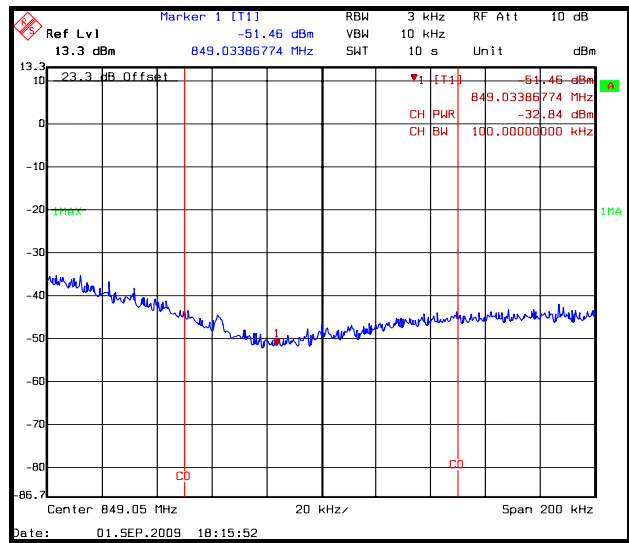
HSDPA 4 16QAM Top Channel

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

**Transmitter Radiated Emissions at Band Edges (continued)**



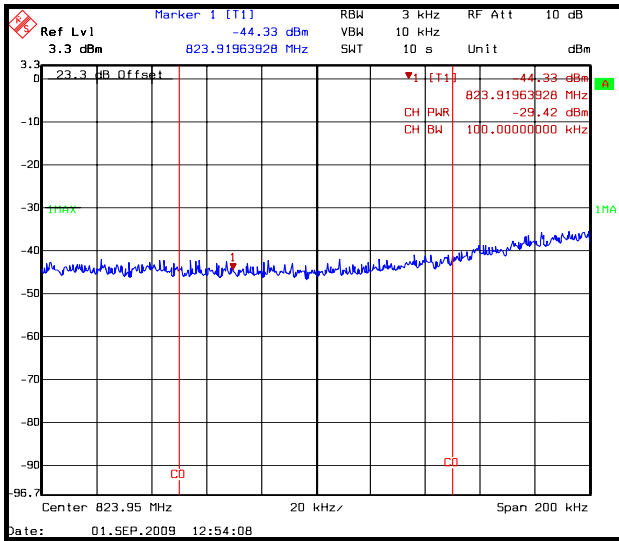
RMC/Voice Bottom Channel



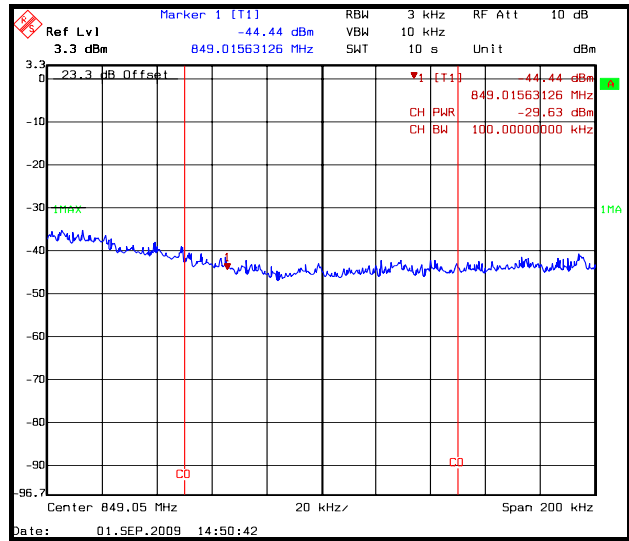
RMC/Voice Top Channel

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

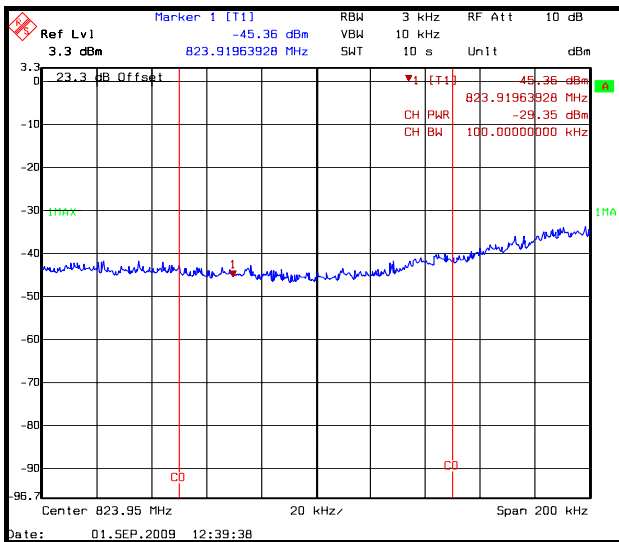
**Transmitter Radiated Emissions at Band Edges (continued)**



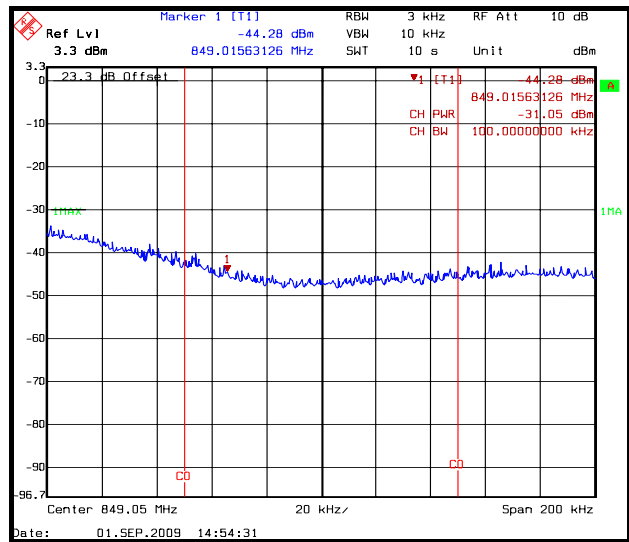
HSUPA 1 Bottom Channel



HSUPA 1 Top Channel



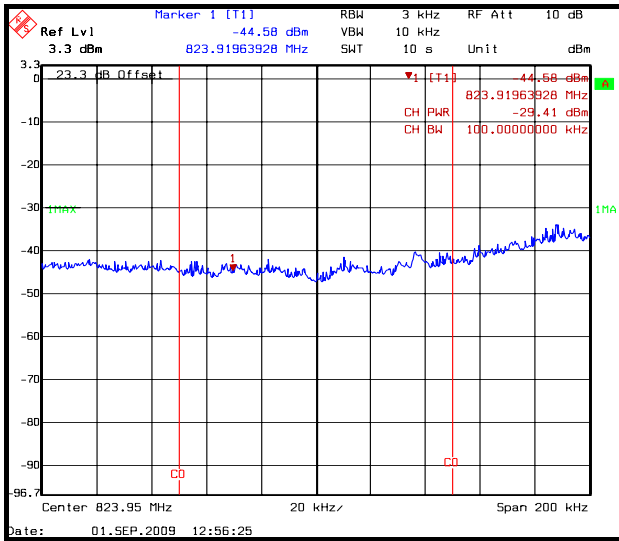
HSUPA 2 Bottom Channel



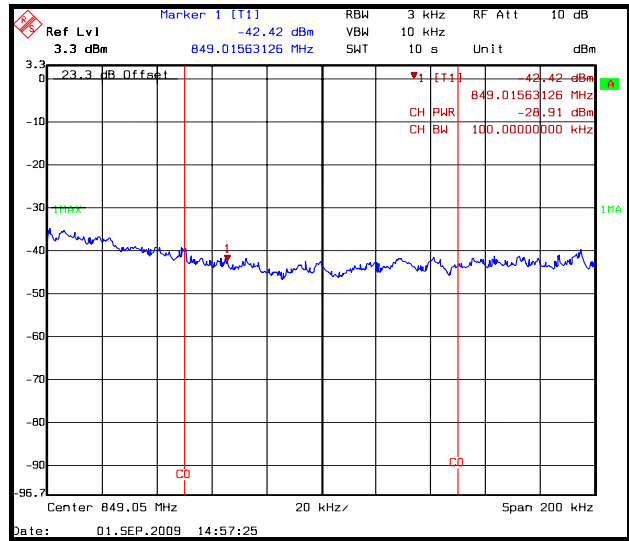
HSUPA 2 Top Channel

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

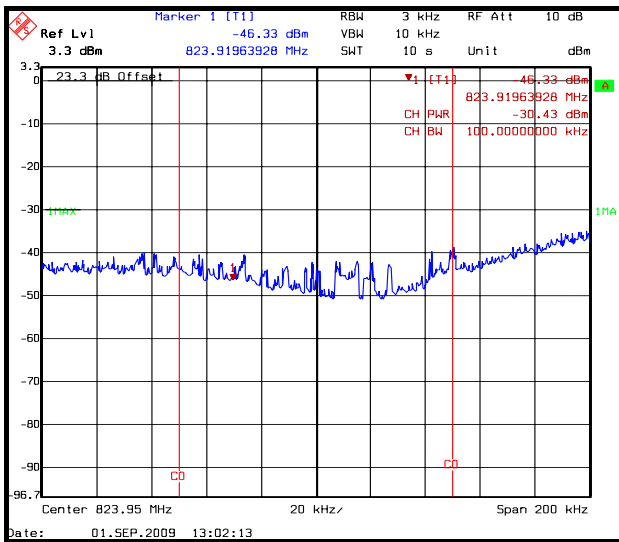
**Transmitter Radiated Emissions at Band Edges (continued)**



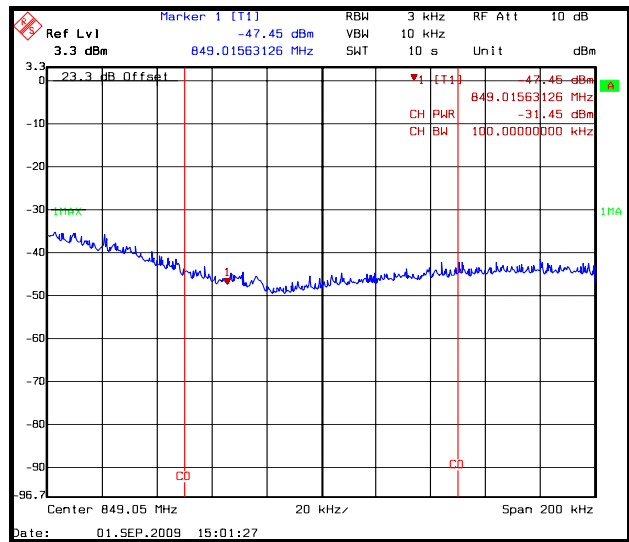
HSUPA 3 Bottom Channel



HSUPA 3 Top Channel

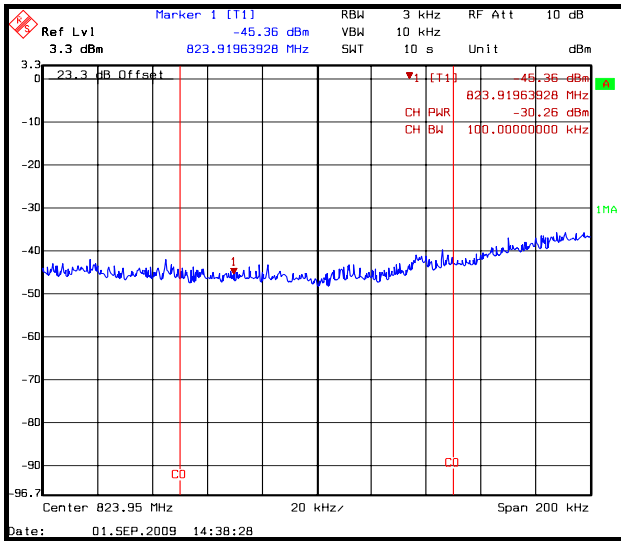


HSUPA 4 Bottom Channel

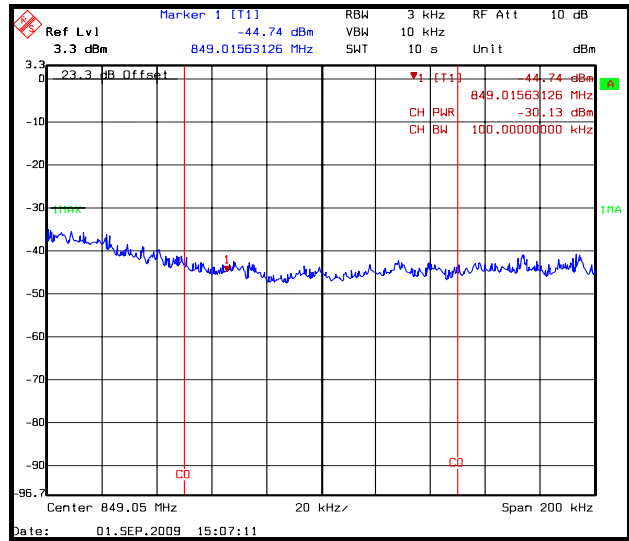


HSUPA 4 Top Channel

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



HSUPA 5 Bottom Channel



HSUPA 5 Top Channel

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

### 5.3. Test Results – FCC Part 24

#### 5.3.1. Receiver/Idle Mode Radiated Spurious Emissions

##### Test Summary:

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

##### Environmental Conditions:

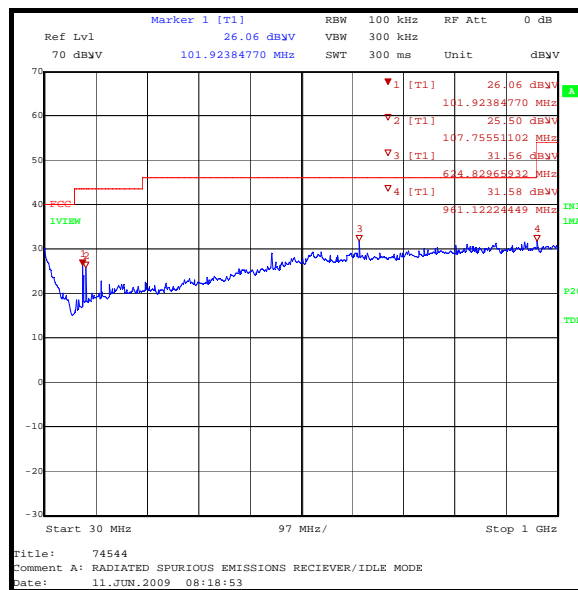
Temperature (°C):	23
Relative Humidity (%):	36

##### Results:

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
623.993	Vertical	31.9	46.0	14.4	Complied

##### Note(s):

1. All other emissions on the pre-scan plot were investigated and found to be ambients.



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



**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Summary:**

<b>FCC Part:</b>	15.109
<b>Frequency Range:</b>	1 GHz to 10 GHz
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	33

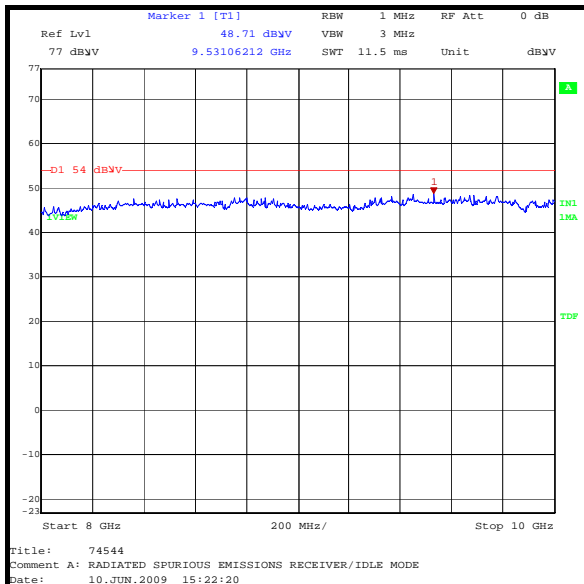
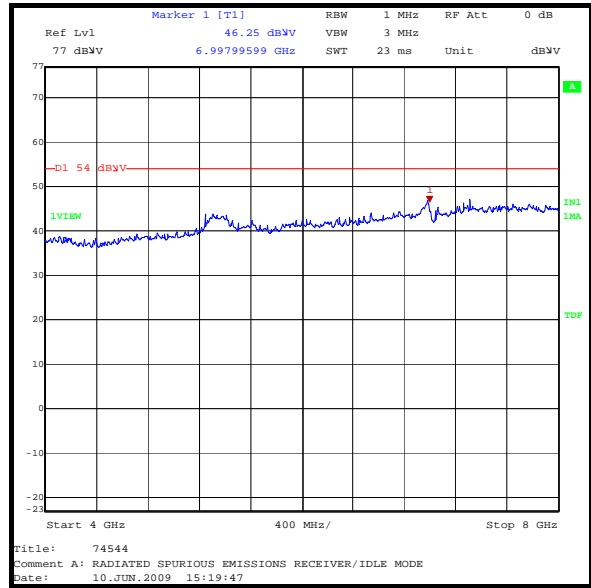
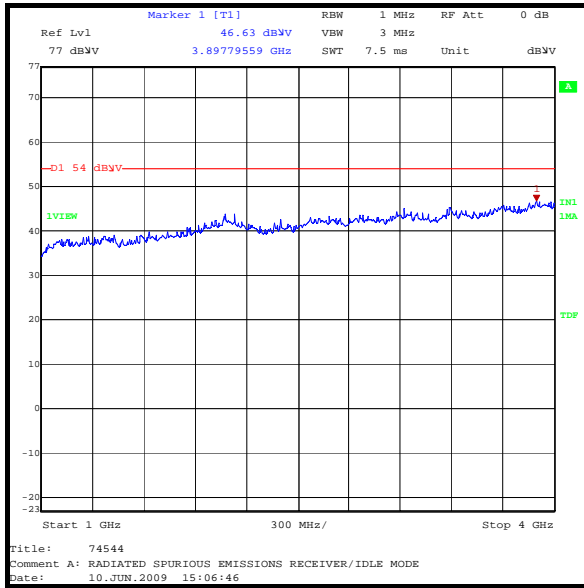
**Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
9531.062	H	48.7	54.0	5.3	Complied

**Note(s):**

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

**Receiver/Idle Mode Radiated Spurious Emissions (continued)**



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

**5.3.2. Transmitter Output Power****Test Summary:**

<b>FCC Part:</b>	24.232
<b>Test Method Used:</b>	As detailed in 3GPP TS 34.121-1 V8.6.0 (2009-03) and ANSI TIA-603-C-2004 Section 2

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	27 to 29
<b>Relative Humidity Variation (%):</b>	29 to 39

**Results: Conducted**

Modes		HSDPA							
Sub-test		1	2	3	4	RMC 12.2kbps			
Band	Channel	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Limit (dBm)	Margin	Result
1900	9262	22.5	22.5	21.7	22.0	22.5	33.0	10.5	Complied
	9400	21.9	21.7	21.2	21.3	21.7	33.0	11.1	Complied
	9538	22.1	21.9	21.3	21.4	22.1	33.0	10.9	Complied
$\beta_c$		2	12	15	15				
$\beta_d$		15	15	8	4				
$\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$		8	8	8	8				

**Results: Conducted**

Mode		HSUPA							
Sub-test		1	2	3	4	5			
Band	Channel	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Power (dBm)	Peak Limit (dBm)	Margin	Result
1900	9262	23.2	22.4	21.4	20.7	21.7	33.0	9.8	Complied
	9400	22.3	21.5	20.5	19.8	20.8	33.0	10.7	Complied
	9538	22.7	21.9	20.9	20.2	21.2	33.0	10.3	Complied
$\beta_c$		11	6	15	2	15			
$\beta_d$		15	15	9	15	15			

**Note(s):**

1. Conducted power measurements were compared to the EIRP limit.

**5.3.3. Transmitter Frequency Stability (Temperature)****Test Summary:**

<b>FCC Part:</b>	24.235
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Temperature Variation (°C):</b>	29 to 33
<b>Relative Humidity Variation (%):</b>	37 to 41

**Results: Bottom Channel (1852.4 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-23	1852.399977	1850.0	2.399977	Complied
-20	-16	1852.399984	1850.0	2.399984	Complied
-10	-19	1852.399981	1850.0	2.399981	Complied
0	-20	1852.399980	1850.0	2.399980	Complied
10	-19	1852.399981	1850.0	2.399981	Complied
20	-19	1852.399981	1850.0	2.399981	Complied
30	18	1852.400018	1850.0	2.400018	Complied
40	-22	1852.399978	1850.0	2.399978	Complied
50	-18	1852.399982	1850.0	2.399982	Complied

**Results: Top Channel (1907.6 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-19	1907.599981	1910.0	2.400019	Complied
-20	-22	1907.599978	1910.0	2.400022	Complied
-10	16	1907.600016	1910.0	2.399984	Complied
0	-23	1907.599977	1910.0	2.400023	Complied
10	-16	1907.599984	1910.0	2.400016	Complied
20	-16	1907.599984	1910.0	2.400016	Complied
30	-18	1907.599982	1910.0	2.400018	Complied
40	-19	1907.599981	1910.0	2.400019	Complied
50	-17	1907.599983	1910.0	2.400017	Complied

**5.3.4. Transmitter Frequency Stability (Voltage Variation)****Test Summary:**

<b>FCC Part:</b>	24.235
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Temperature (°C):</b>	31
<b>Relative Humidity (%):</b>	33

**Results: Bottom Channel (1852.4 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.23	-19	1852.399981	1850.0	2.399981	Complied
4.37	-20	1852.399980	1850.0	2.399980	Complied

**Results: Top Channel (1907.6 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.23	-21	1907.599979	1910.0	2.400021	Complied
4.37	-18	1907.599982	1910.0	2.400018	Complied

**5.3.5. Transmitter Occupied Bandwidth****Test Summary:**

<b>FCC Part:</b>	24.238
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	39

**Results:**

<b>Channel Type</b>	<b>Frequency (MHz)</b>	<b>Occupied Bandwidth (kHz)</b>
RMC 12.2k	1880.0	4208
HSDPA sub-test 1	1880.0	4165
HSDPA sub-test 2	1880.0	4174
HSDPA sub-test 3	1880.0	4164
HSDPA sub-test 4	1880.0	4160
HSUPA sub-test 1	1880.0	4172
HSUPA sub-test 2	1880.0	4175
HSUPA sub-test 3	1880.0	4148
HSUPA sub-test 4	1880.0	4168
HSUPA sub-test 5	1880.0	4173

**Note(s):**

1. Measurements were performed using the occupied bandwidth function (99%) of the test equipment. Numerical results were displayed and recorded.

**5.3.6. Transmitter Out of Band Radiated Emissions****Test Summary:**

<b>FCC Part:</b>	2.1053 & 24.238
<b>Frequency Range:</b>	30 MHz to 20 GHz
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238

**Environmental Conditions:**

<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	30

**Results: 12.2k RMC - Bottom Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
3707.145	-24.9	-13.0	11.9	Complied

**Results: 12.2k RMC - Middle Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
3758.016	-20.7	-13.0	7.7	Complied

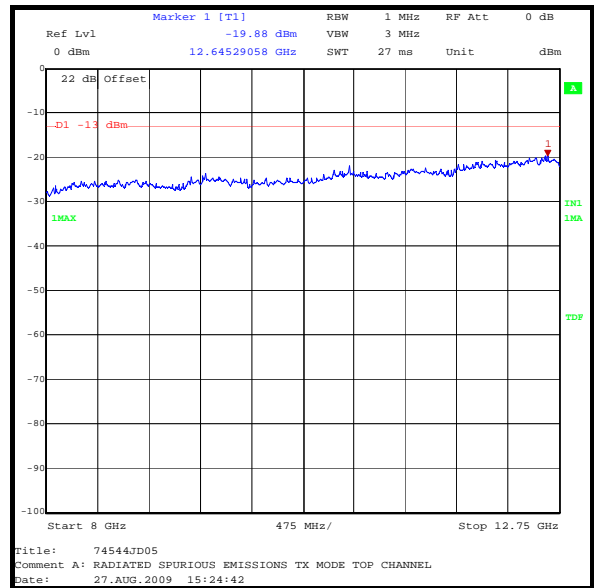
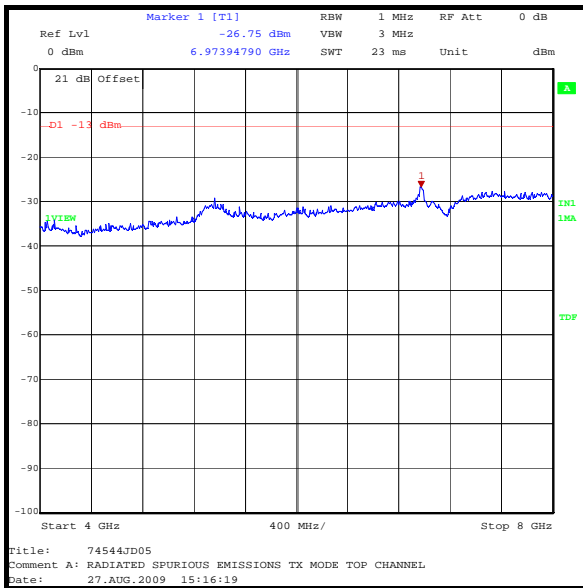
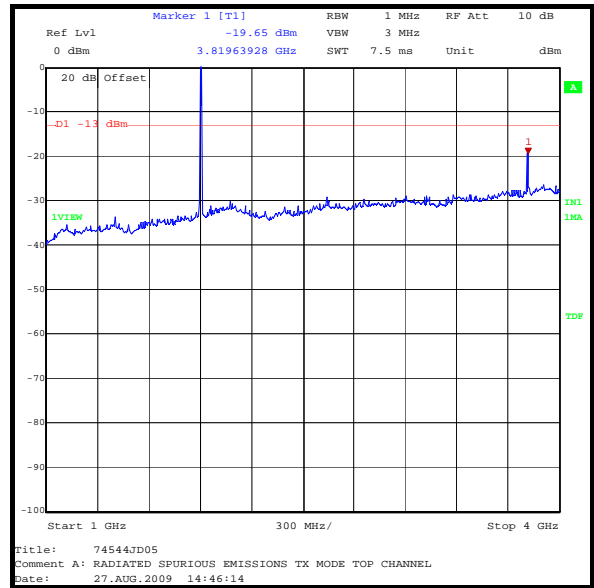
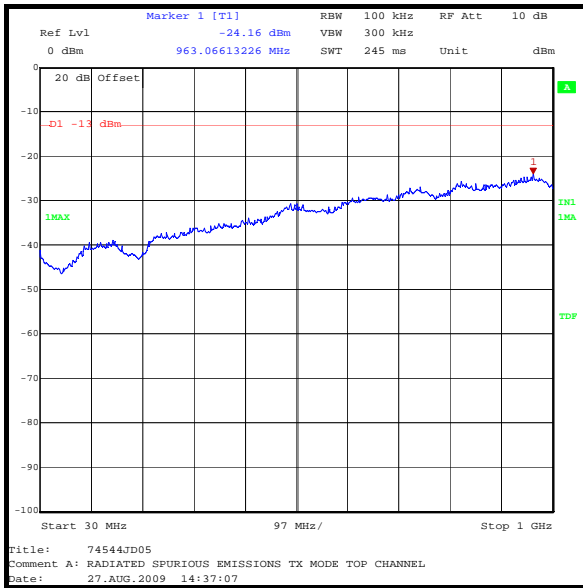
**Results: 12.2k RMC - Top Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
3816.453	-21.0	-13.0	8.0	Complied

**Note(s):**

1. The uplink and downlink traffic channels are shown on the 1 GHz to 4 GHz plot at approximately 1908 MHz.
2. Final measurements were made using appropriate RF filters and attenuators where required.
3. The receive antenna was rotated through the horizontal and vertical planes. The highest levels were recorded in the above tables.
4. Pre-scans and final measurements were made with the EUT using a 12.2k RMC as this was previously found to produce the highest EIRP out of all tested channel types.

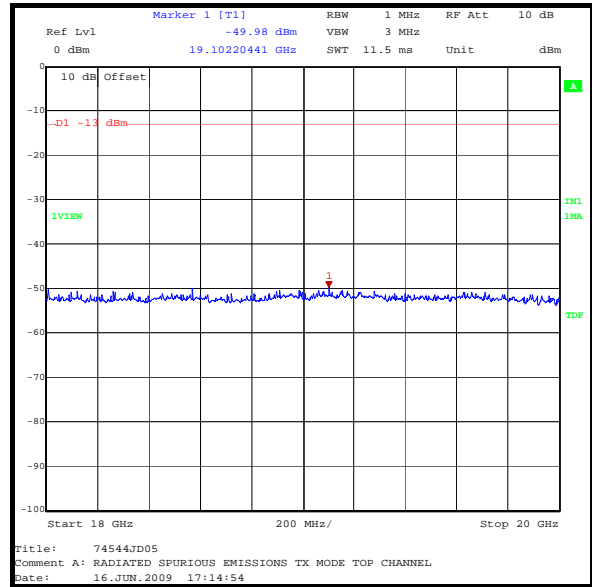
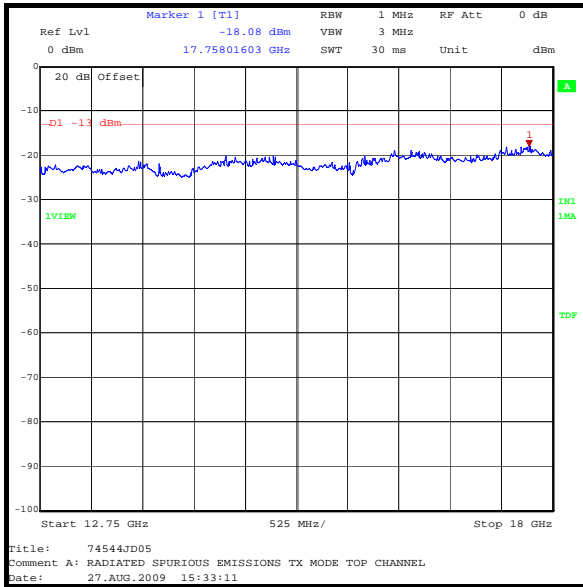
**Transmitter Out of Band Radiated Emissions (continued)**



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



**Transmitter Out of Band Radiated Emissions (continued)**



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

**5.3.7. Transmitter Radiated Emissions at Band Edges****Test Summary:**

<b>FCC Part:</b>	2.1053 & 24.238
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	33

**Results:**

Frequency (MHz)	Mode (HSDPA – QPSK)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850	Subset 1	-30.6	-13.0	17.6	Complied
1910	Subset 1	-30.1	-13.0	17.1	Complied
1850	Subset 2	-26.6	-13.0	13.6	Complied
1910	Subset 2	-28.9	-13.0	15.9	Complied
1850	Subset 3	-28.1	-13.0	15.1	Complied
1910	Subset 3	-28.6	-13.0	15.6	Complied
1850	Subset 4	-28.7	-13.0	15.7	Complied
1910	Subset 4	-28.7	-13.0	15.7	Complied

Frequency (MHz)	Mode (HSDPA – 16QAM)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850	Subset 1	-30.3	-13.0	17.3	Complied
1910	Subset 1	-29.8	-13.0	16.8	Complied
1850	Subset 2	-26.2	-13.0	13.2	Complied
1910	Subset 2	-29.2	-13.0	16.2	Complied
1850	Subset 3	-28.9	-13.0	15.9	Complied
1910	Subset 3	-28.6	-13.0	15.6	Complied
1850	Subset 4	-27.3	-13.0	14.3	Complied
1910	Subset 4	-28.2	-13.0	15.2	Complied

Frequency (MHz)	Mode	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850	RMC/Voice	-30.4	-13.0	17.4	Complied
1910	RMC/Voice	-30.1	-13.0	17.1	Complied

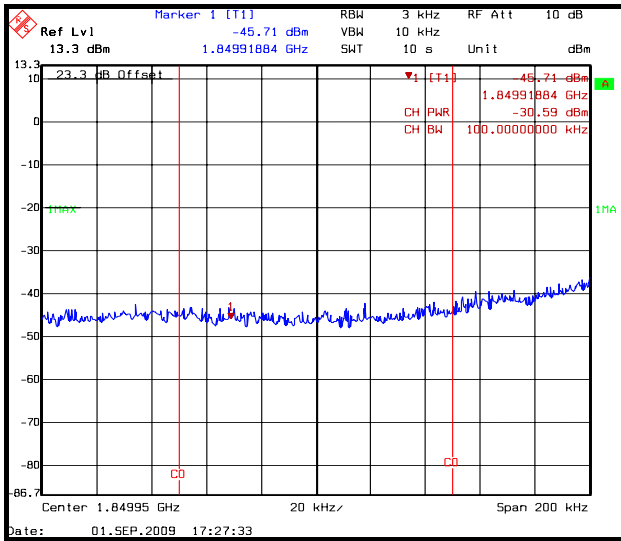
**Transmitter Radiated Emissions at Band Edges (continued)**

Frequency (MHz)	Mode (HSUPA)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850	Subset 1	-26.0	-13.0	13.0	Complied
1910	Subset 1	-29.9	-13.0	16.9	Complied
1850	Subset 2	-25.8	-13.0	12.8	Complied
1910	Subset 2	-31.1	-13.0	18.1	Complied
1850	Subset 3	-28.9	-13.0	15.9	Complied
1910	Subset 3	-28.9	-13.0	15.9	Complied
1850	Subset 4	-29.5	-13.0	16.5	Complied
1910	Subset 4	-28.4	-13.0	15.4	Complied
1850	Subset 5	-29.2	-13.0	16.2	Complied
1910	Subset 5	-29.5	-13.0	16.5	Complied

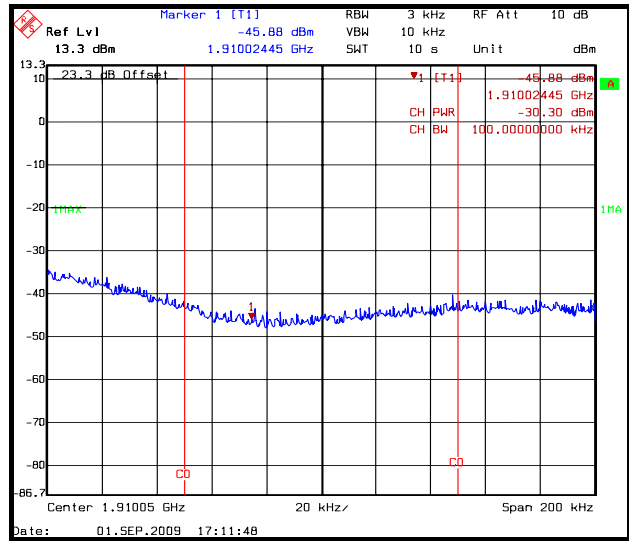
**Note(s):**

1. The band edge result was obtained by integrating a 100 kHz strip immediately adjacent to the band edge using a channel power function of the measurement analyser.

**Transmitter Radiated Emissions at Band Edges (continued)**

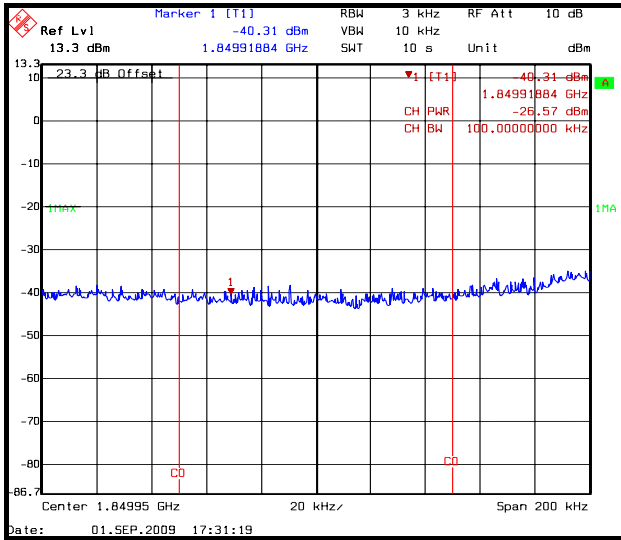


HSDPA 1 QPSK Bottom Channel

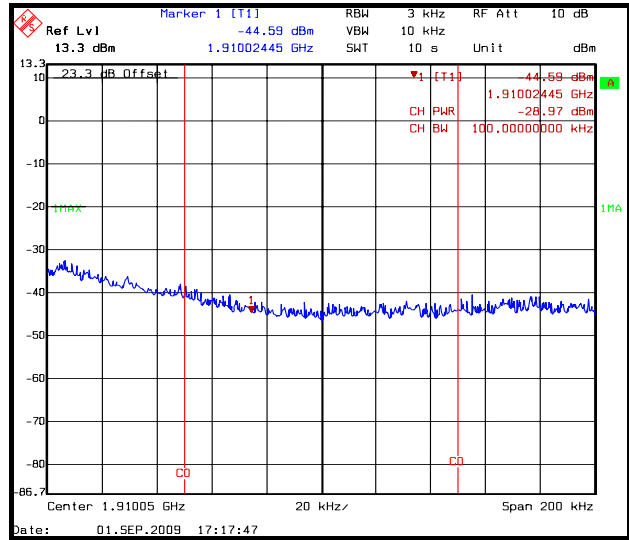


HSDPA 1 QPSK Top Channel

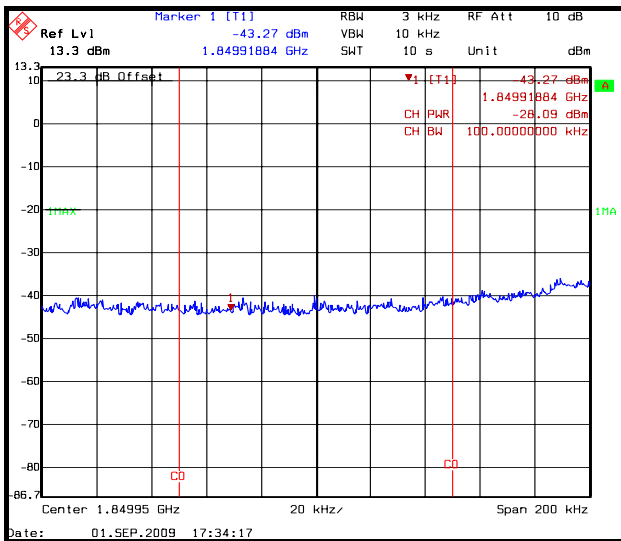
### Transmitter Radiated Emissions at Band Edges (continued)



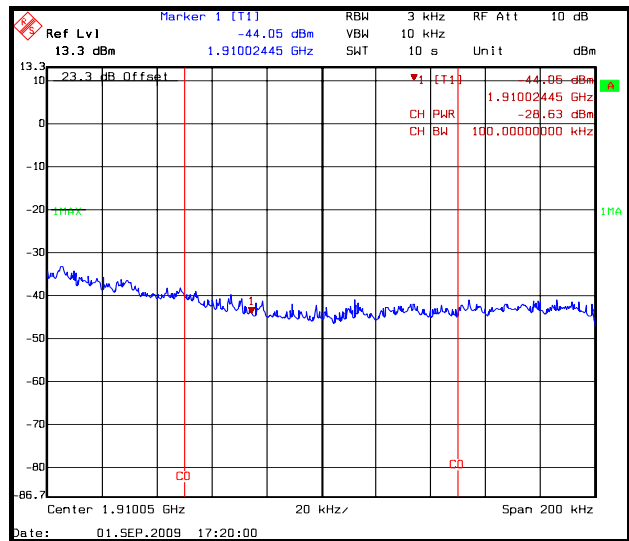
HSDPA 2 QPSK Bottom Channel



HSDPA 2 QPSK Top Channel

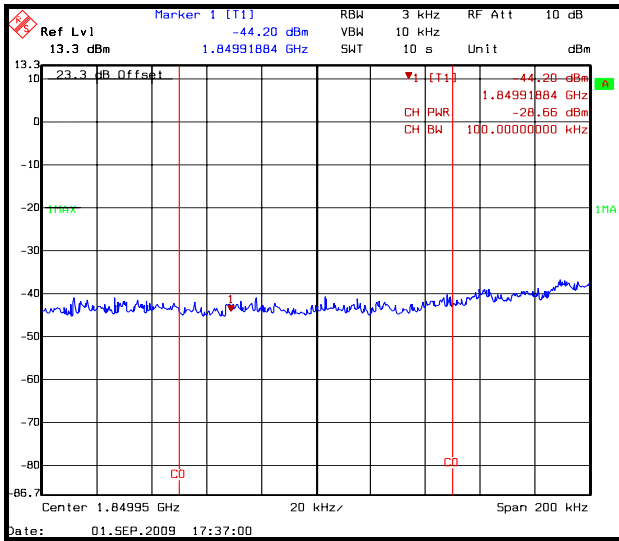


HSDPA 3 QPSK Bottom Channel

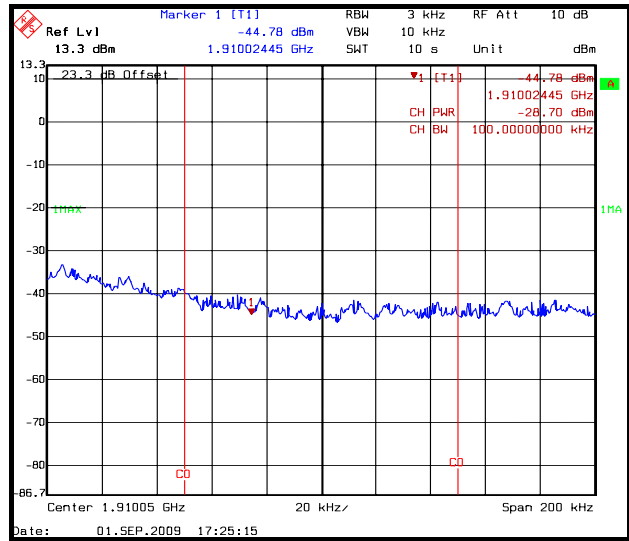


HSDPA 3 QPSK Top Channel

**Transmitter Radiated Emissions at Band Edges (continued)**

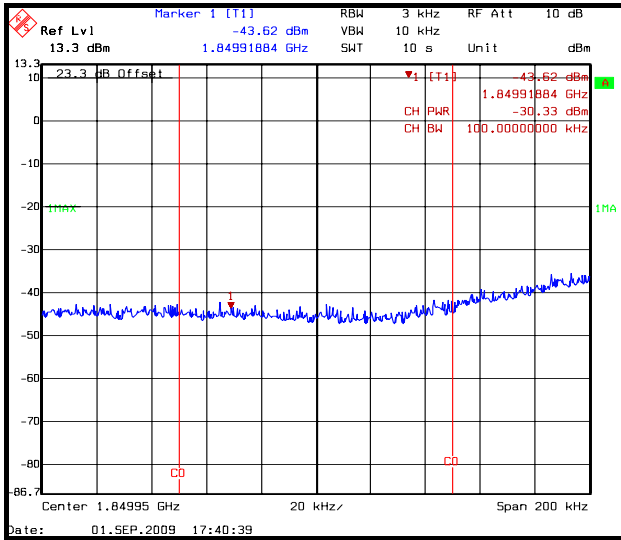


HSDPA 4 QPSK Bottom Channel

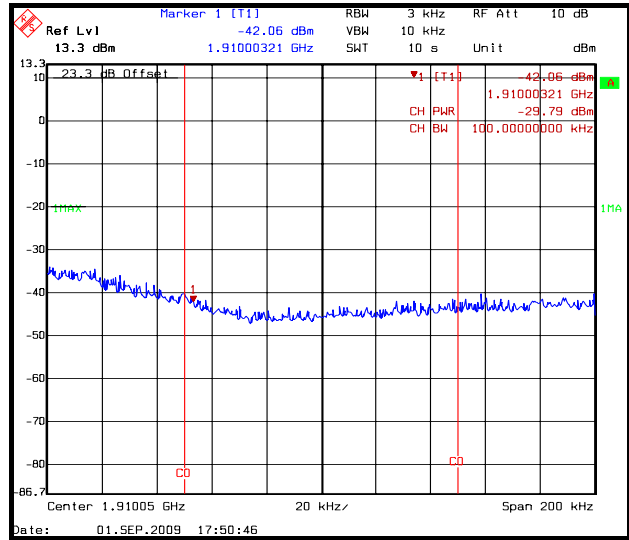


HSDPA 4 QPSK Top Channel

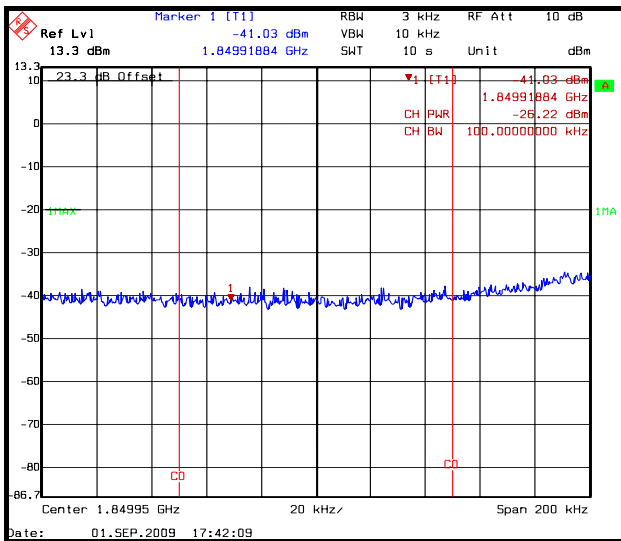
### Transmitter Radiated Emissions at Band Edges (continued)



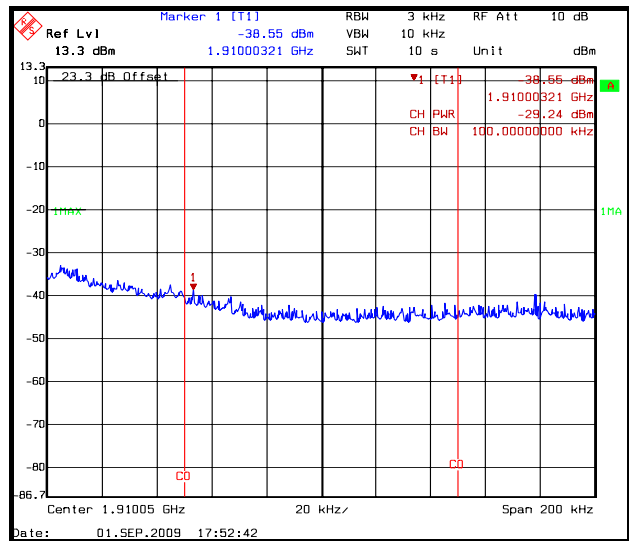
HSDPA 1 16QAM Bottom Channel



HSDPA 1 16QAM Top Channel

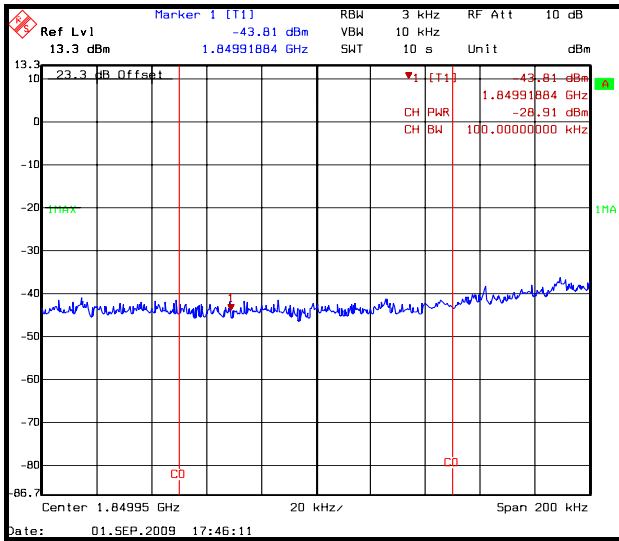


HSDPA 2 16QAM Bottom Channel

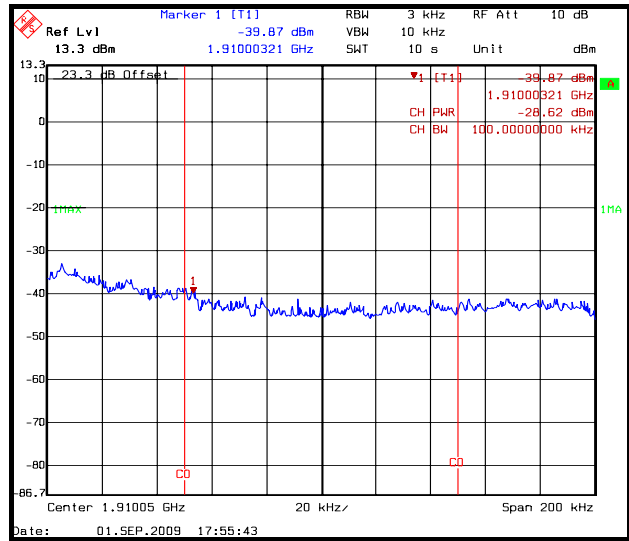


HSDPA 2 16QAM Top Channel

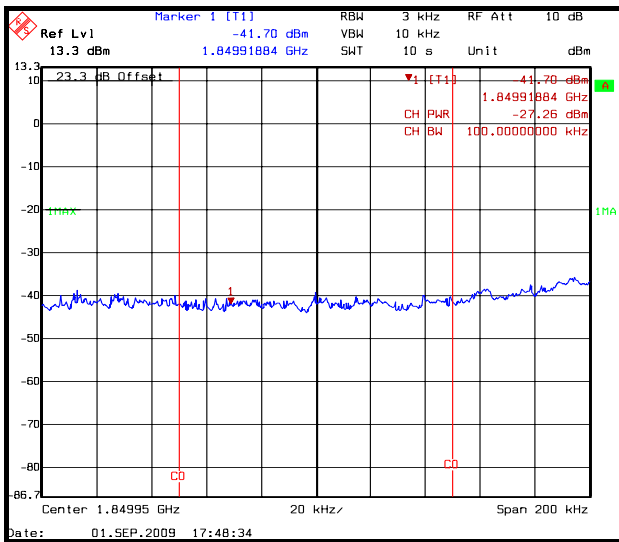
**Transmitter Radiated Emissions at Band Edges (continued)**



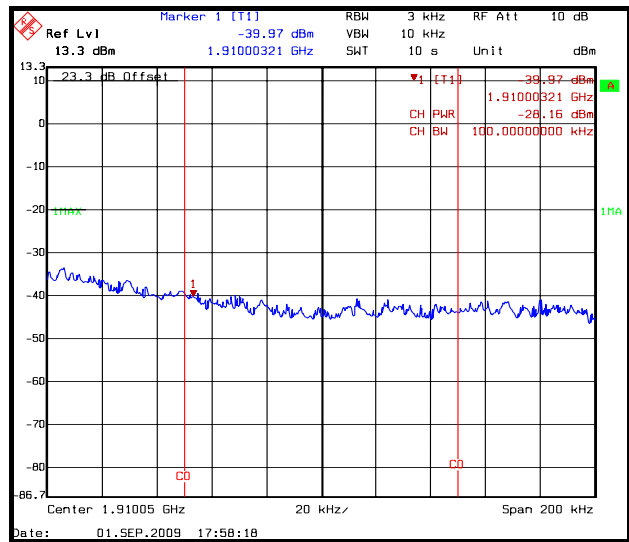
HSDPA 3 16QAM Bottom Channel



HSDPA 3 16QAM Top Channel



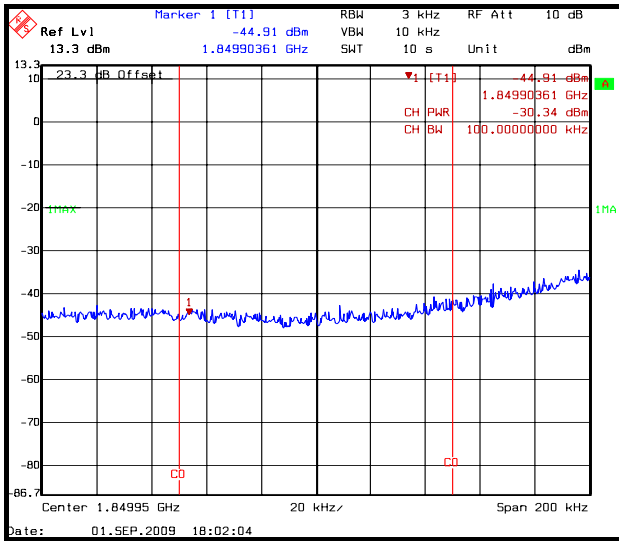
HSDPA 4 16QAM Bottom Channel



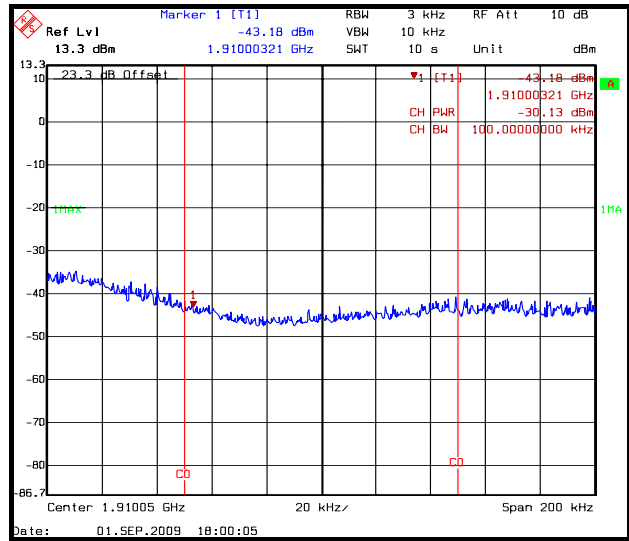
HSDPA 4 16QAM Top Channel



**Transmitter Radiated Emissions at Band Edges (continued)**

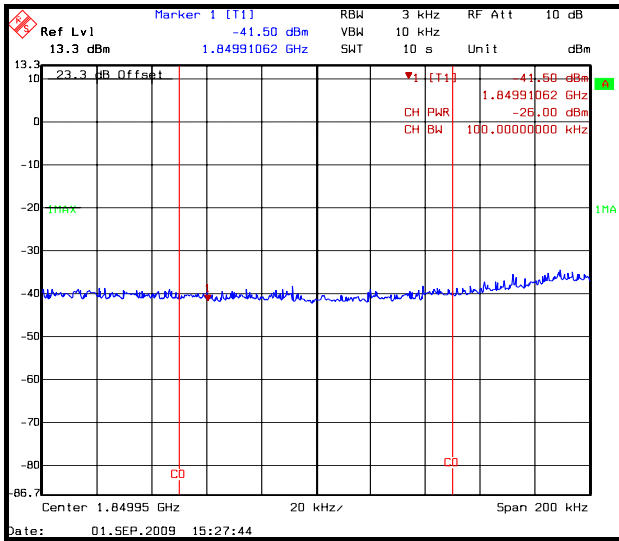


RMC/Voice Bottom Channel

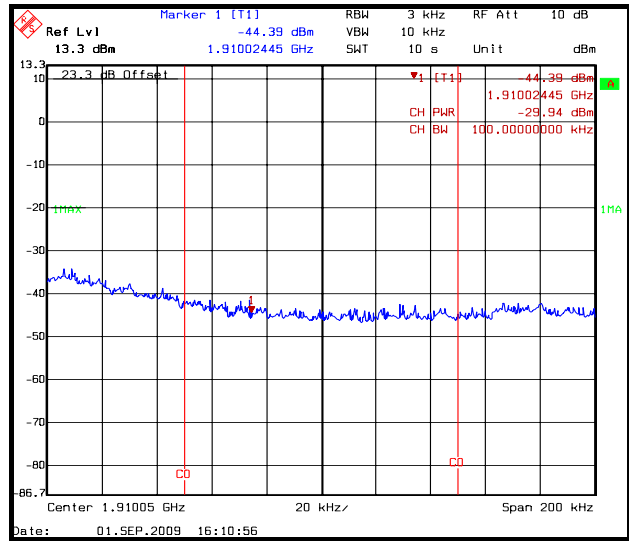


RMC/Voice Top Channel

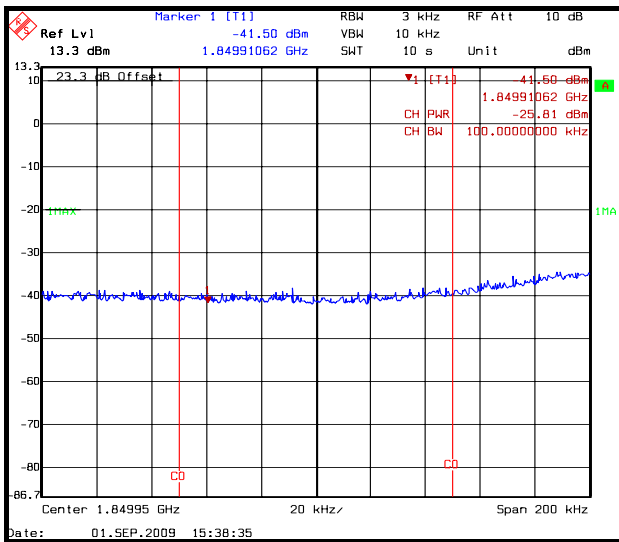
**Transmitter Radiated Emissions at Band Edges (continued)**



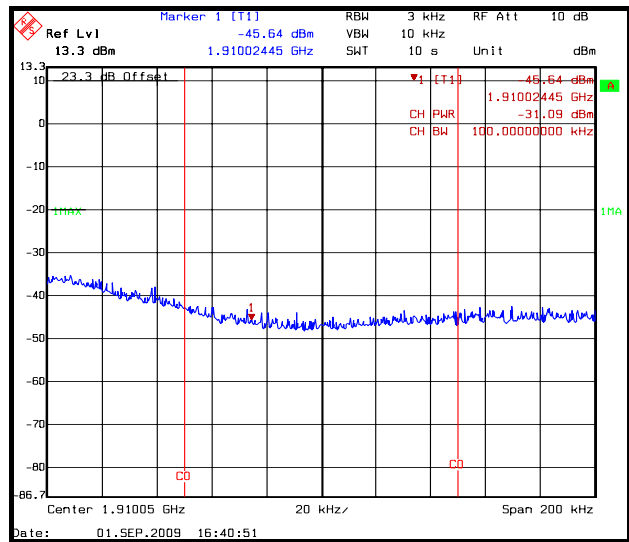
HSUPA 1 Bottom Channel



HSUPA 1 Top Channel

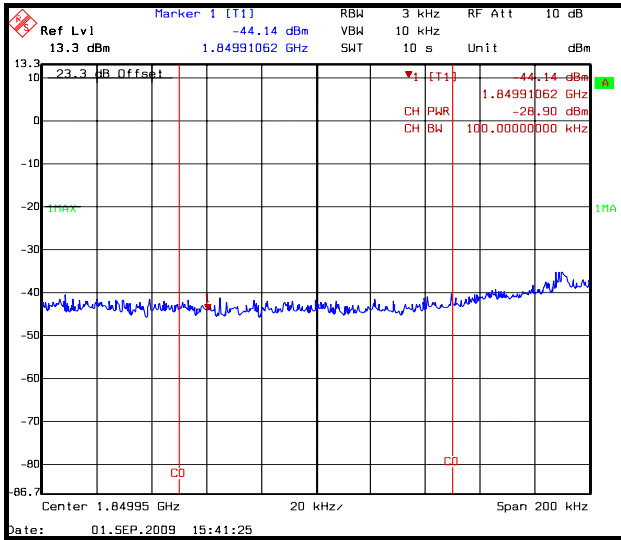


HSUPA 2 Bottom Channel

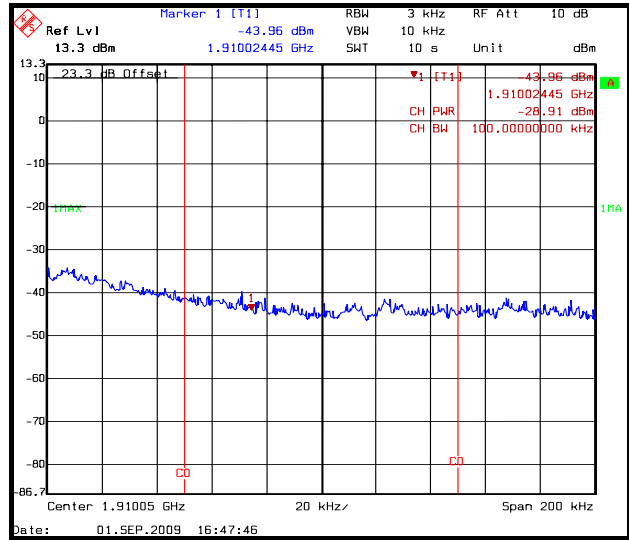


HSUPA 2 Top Channel

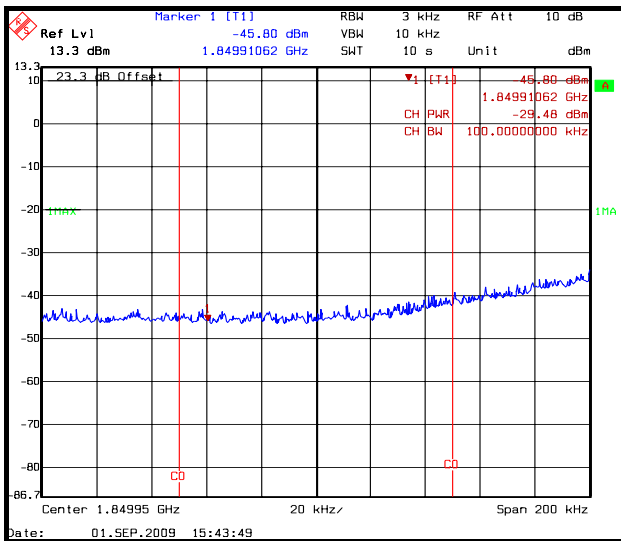
**Transmitter Radiated Emissions at Band Edges (continued)**



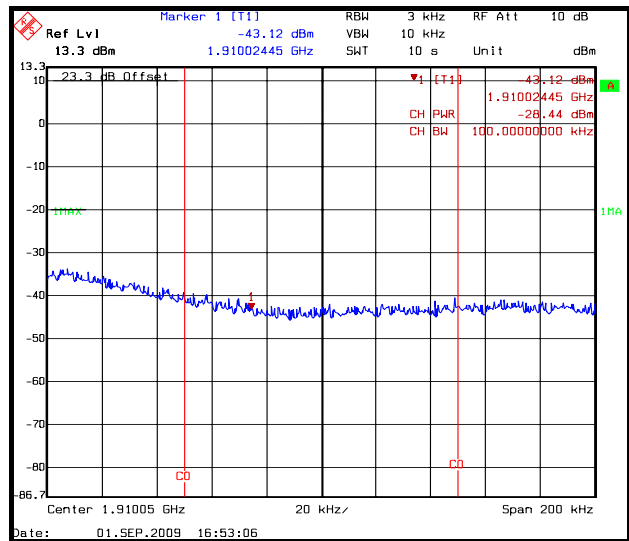
HSUPA 3 Bottom Channel



HSUPA 3 Top Channel

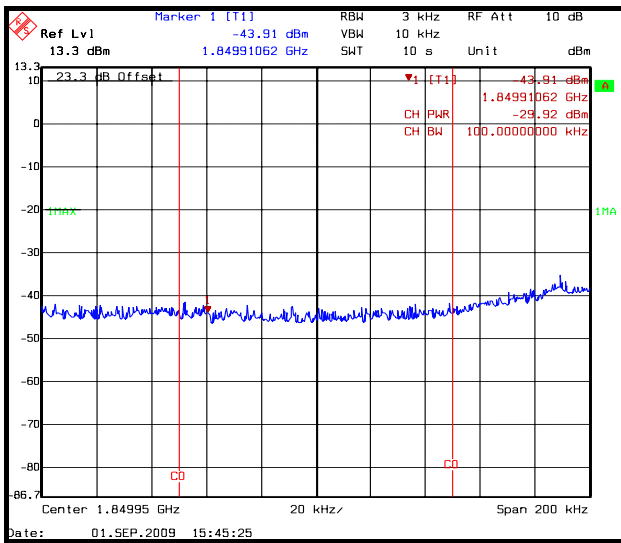


HSUPA 4 Bottom Channel

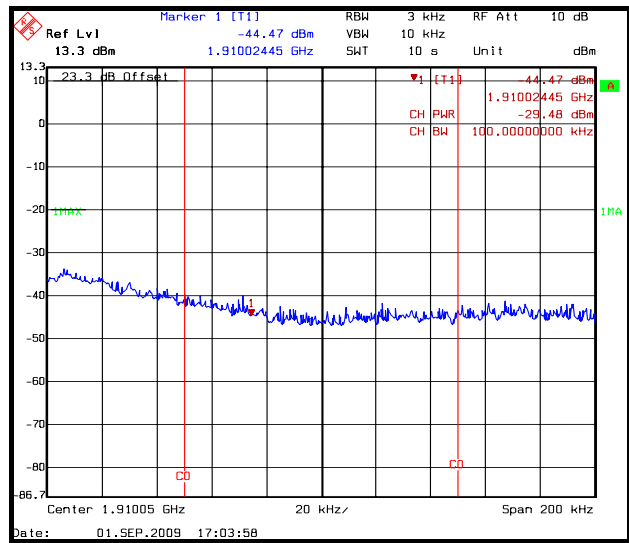


HSUPA 4 Top Channel

**Transmitter Radiated Emissions at Band Edges (continued)**



HSUPA 5 Bottom Channel



HSUPA 5 Top Channel

## **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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
Effective Radiated Power (ERP)	Not applicable	95%	±2.94 dB
Equivalent Isotropic Radiated Power (EIRP)	Not applicable	95%	±2.94 dB
Frequency Stability	Not applicable	95%	±0.92 ppm
Occupied Bandwidth	Not applicable	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 26 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)
A1299	Antenna	Schaffner	CBL6143	5094	13 Aug 2009	12
A1392	Attenuator	Huber + Suhner	757456	6820.17.B	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2008	12
A1932	High Pass Filter	AtlanTecRF	AFH-02000	20r-JFBD04-002	Calibrated before use	12
A288	Antenna	Chase	CBL6111A	1589	13 Mar 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Aug 2009	12
L0990	Comms Test Set	R&S	CMU 200	S220447	18 Feb 2009	12
M122	Digital Voltmeter	Fluke	77	64910017	23 Jun 2009	12
M1068	Thermometer	Iso-Tech	RS55	93102884	09 Jul 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1565	Agilent 8960	Agilent	8960	GB46311280	11 Jul 2009	12
S0520	DC Power Supply	GW instek	GPC-3030	E835141	Calibrated before use	-

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