



TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: GE864-QUAD

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

Test Report Serial No:
RFI/RPT4/RP76660JD03A

Supersedes Test Report Serial No:
RFI/RPT3/RP76660JD03A

This Test Report Is Issued Under The Authority Of Brian Watson, COO Payments and Consultancy:	
	
Checked By:	Nigel Davison
Signature:	
Date of Issue:	20 April 2010

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1. Customer Information












Company Name:	Telit Communications S.p.A.
Address:	Via Stazione di Prosecco, 5/B Sgonico TS 34010 Italy

2. Summary of Testing

2.1. General Information – FCC Part 22

Specification Reference:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 22 Subpart H (Public Mobile Services)
Specification Reference:	RSS-GEN Issue 2 June 2007
Specification Title:	General Requirements and Information for the Certification of Radio communication Equipment
Specification Reference:	RSS-132 Issue 2 Sep 2005
Specification Title:	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
Specification Reference:	RSS-133 Issue 5 Feb 2009
Specification Title:	GHz Personal Communications Services
Specification Reference:	SRSP-510 Issue 4 Feb 2008
Specification Title:	Technical Requirements for Personal Communications Services in the Bands 1850-1915 MHz and 1930-1995 MHz
Specification Reference:	SRSP-503 Issue 6 Jun 2003
Specification Title:	Technical Requirements for Cellular Radiotelephone Systems Operating in the Bands 824 – 849 MHz and 869 – 894 MHz
Site Registration:	FCC: 209735 Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	02 March 2010 to 19 April 2010

2.2. Summary of Test Results – FCC Part 22

FCC Reference (47CFR)	IC Reference	Measurement	Result
FCC Part 15.109	RSS-Gen 4.10/6.0 RSS-132 4.6	Receiver/Idle Mode Radiated Spurious Emissions	
FCC Part 22.913(a)	RSS-132 4.4 SRSP-503 5.1.3	Transmitter Carrier Output Power and Effective Radiated Power (ERP)	
FCC Part 22.355	RSS-132 4.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature Variation)	
FCC Part 22.355	RSS-132 4.3 RSS Gen 4.7	Transmitter Frequency Stability (Voltage Variation)	
FCC Part 2.1049	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	
FCC Part 2.1051/22.917	RSS-132 4.5	Transmitter Out of Band Conducted Emissions	
FCC Part 2.1051/22.917	RSS-132 4.5	Transmitter Conducted Emissions at Band Edges	
FCC Part 2.1053/22.917	RSS-132 4.5	Transmitter Out of Band Radiated Emissions	
FCC Part 2.1053/22.917	RSS-132 4.5	Transmitter Band Edge Radiated Emissions	 *Note
Key to Results			
 = Complied  = Did not comply			











Note(s):

1. Transmitter Band Edge Radiated Emissions was not performed for GSM850, as the residual carrier power seen on the emissions plot is lower than the specified -13.0dBm limit and therefore complies with the band edge limit by inspection.

2.3. General Information – FCC Part 24

Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 24 Subpart E (Personal Communication Services)
Specification Reference:	RSS-GEN Issue 2 June 2007
Specification Title:	General Requirements and Information for the Certification of Radiocommunication Equipment
Specification Reference:	RSS-133 Issue 5 Feb 2009
Specification Title:	GHz Personal Communications Services
Specification Reference:	SRSP-510 Issue 4 Feb 2008
Specification Title:	Technical Requirements for Personal Communications Services (PCS) in the Bands 1850-1915 MHz and 1930-1995 MHz
Site Registration:	FCC: 209735 Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	02 March to 19 April 2010

2.4. Summary of Test Results – FCC Part 24

FCC Reference (47CFR)	IC Reference	Measurement	Result
FCC Part 15.109	RSS-Gen 4.10/6.0 RSS-133 6.6	Receiver/Idle Mode Radiated Spurious Emissions	
FCC Part 24.232	RSS-133 6.4 SRSP-510 5.1.2	Transmitter Carrier Output Power and Effective Isotropic Radiated Power (EIRP)	
FCC Part 24.235	RSS-133 6.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature & Voltage Variation)	
FCC Part 2.1049	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	
FCC Part 2.1051/24.238	RSS-133 6.5	Transmitter Out of Band Conducted Emissions	
FCC Part 2.1051/24.238	RSS-133 6.5	Transmitter Conducted Emissions at Band Edges	
FCC Part 2.1053/24.238	RSS-133 6.5	Transmitter Out of Band Radiated Emissions	
FCC Part 2.1053/24.238	RSS-133 6.5	Transmitter Band Edge Radiated Emissions	
Key to Results			
 = Complied  = Did not comply			

2.5. 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.

2.6. 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)

Brand Name:	Telit
Model Name or Number:	GE864-QUAD
IMEI Number:	TAC:35579703 355797039000502
Hardware Version Number:	0
Software Version Number:	10.00.013 SVN: 03
Industry Canada Certification Number:	5131A-GE864QC2
FCC ID Number:	RI7GE864QC2

3.2. Description of EUT

The equipment under test was a quad band GSM/GPRS modem mounted on a Telit development board. The EUT was mounted to the development board on four support posts and connected by two 40 pin connectors.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	GSM 850 (Part 22)					
Type of Radio Device:	Transceiver					
Power Supply Requirement(s):	Nominal	3.8 V	Minimum	3.2 V	Maximum	4.4 V
Mode:	GSM/GPRS					
Modulation Type:	GMSK					
Channel Spacing:	200 kHz					
Maximum Output Power (ERP):	GSM	34.7 dBm	GPRS	34.6 dBm		
Transmit Frequency Range:	824 to 849 MHz					
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)			
	Bottom	128	824.2			
	Middle	190	836.6			
	Top	251	848.8			
Receive Frequency Range:	869 to 894 MHz					
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)			
	Bottom	128	869.2			
	Middle	190	881.6			
	Top	251	893.8			
Technology Tested:	PCS1900 (Part 24)					
Maximum Output Power (EIRP):	GSM	31.8 dBm	GPRS	31.7 dBm		
Transmit Frequency Range:	1850 to 1910 MHz					
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)			
	Bottom	512	1850.2			
	Middle	660	1879.8			
	Top	810	1909.8			
Receive Frequency Range:	1930 to 1990 MHz					
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)			
	Bottom	512	1930.2			
	Middle	660	1959.8			
	Top	810	1989.8			

3.5. Support Equipment

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

Description:	Development Board
Brand Name:	Telit
Serial Number:	113920002441

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Receiver/Idle mode.
- Constantly transmitting at full power on bottom, centre and top channels as required.
- Occupied bandwidth, output power and band edge tests were performed with the EUT in GSM single timeslot circuit switched and GPRS Multislot Class 10 with the unit transmitting on two timeslots in the uplink.
- Transmitter radiated spurious emissions were checked in all modes during prescans. Circuit switched voice was found to be the worst case and all final measurements were performed with the EUT in this mode.

4.2. Configuration and Peripherals

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

- EUT RF port (SMA connector) was connected to a GSM/GPRS system simulator via conducted link, operating in transceiver mode.
- Powered from a bench power supply connected to the 3.8V IN port on the development board.
- There is no integral antenna on the EUT.

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 (%):	25

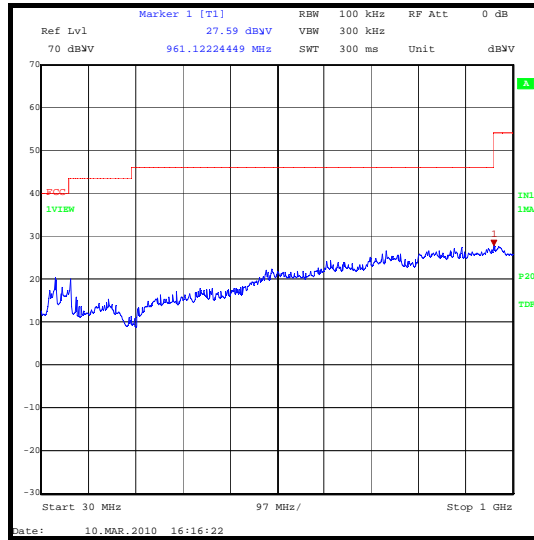
Results:

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
961.122	Vertical	27.6	54.0	26.4	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.

Receiver/Idle Mode Radiated Spurious Emissions (continued)



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:**

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	25

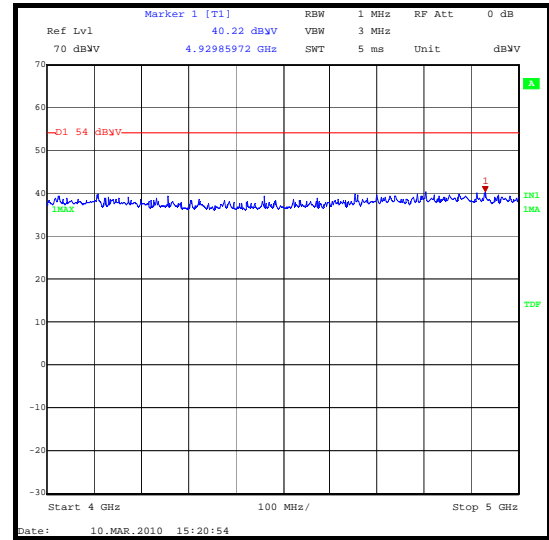
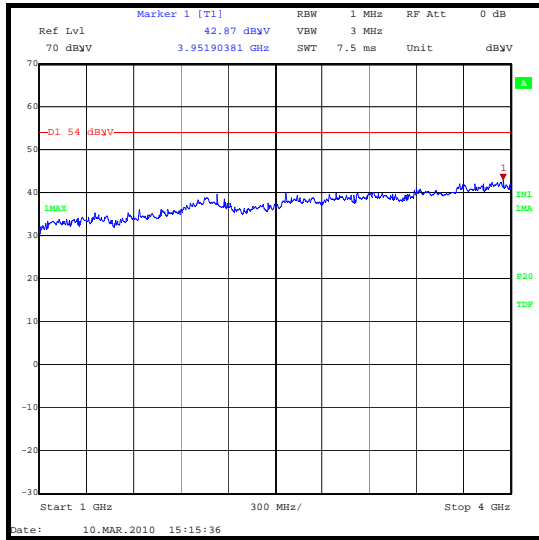
Results: Highest Peak Level

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV/m)	Transducer Factor (dB)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3.952	Vertical	37.6	5.3	42.9	54.0	11.1	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.

5.2.2. Transmitter Conducted Output Power and Effective Radiated Power (ERP)**Test Summary:**

FCC Part:	22.913(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

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

Results: GSM

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Antenna Gain (dB)	Calculated ERP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	31.7	3.0	34.7	38.5	3.8	Complied
Middle	836.6	31.4	3.0	34.4	38.5	4.1	Complied
Top	848.8	31.2	3.0	34.2	38.5	4.3	Complied

Results: GPRS

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Antenna Gain (dB)	Calculated ERP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	31.6	3.0	34.6	38.5	3.9	Complied
Middle	836.6	31.4	3.0	34.4	38.5	4.1	Complied
Top	848.8	31.1	3.0	34.1	38.5	4.4	Complied

Note(s):

1. No antenna was provided for testing therefore only conducted output power was measured. The ERP was by calculated by adding a customer declared maximum antenna gain of 3dBi.
2. All modes were compared on each channel and the highest power recorded was subtracted from the limit to show the margin.

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

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

Environmental Conditions:

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

Results: Middle Channel (836.6 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.600055	55	0.07	2.5	2.43	Complied
-20	836.600061	61	0.07	2.5	2.43	Complied
-10	836.600046	46	0.05	2.5	2.45	Complied
0	836.600017	17	0.02	2.5	2.48	Complied
10	836.599957	-43	0.05	2.5	2.45	Complied
20	836.599962	-38	0.05	2.5	2.45	Complied
30	836.599958	-42	0.05	2.5	2.45	Complied
40	836.599967	-33	0.04	2.5	2.46	Complied
50	836.599978	-22	0.03	2.5	2.47	Complied

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

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

Environmental Conditions:

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

Results: Middle Channel (836.6 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.2	836.599967	-33	0.04	2.5	2.46	Complied
4.4	836.599955	-45	0.05	2.5	2.45	Complied

5.2.5. Transmitter Occupied Bandwidth

Test Summary:

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

Environmental Conditions:

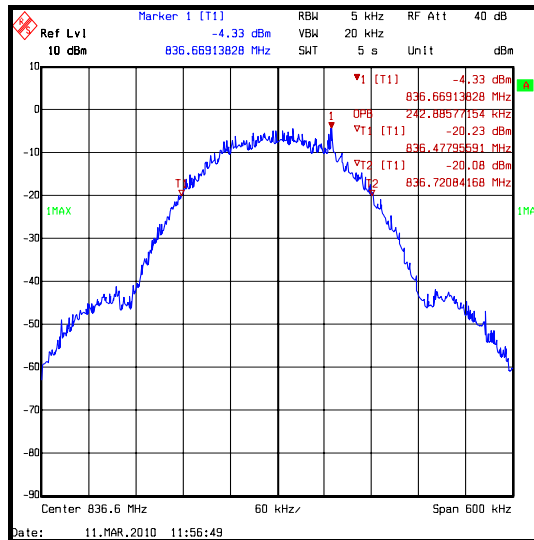
Temperature (°C):	23
Relative Humidity (%):	22

Results: GSM

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	242.886

Note(s):

- Occupied bandwidth was measured using the spectrum analyser Occupied Bandwidth function.



Transmitter Occupied Bandwidth (continued)

Test Summary:

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

Environmental Conditions:

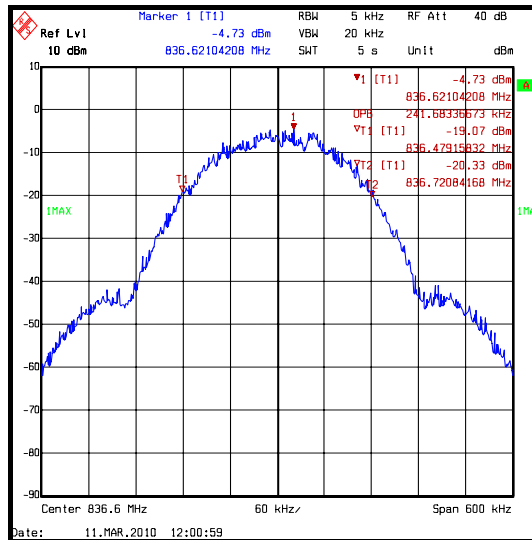
Temperature (°C):	23
Relative Humidity (%):	22

Results: GPRS

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	241.683

Note(s):

- Occupied bandwidth was measured using the spectrum analyser Occupied Bandwidth function.



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

FCC Part:	2.1051 and 22.917
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

Temperature Variation (°C):	22
Relative Humidity Variation (%):	25

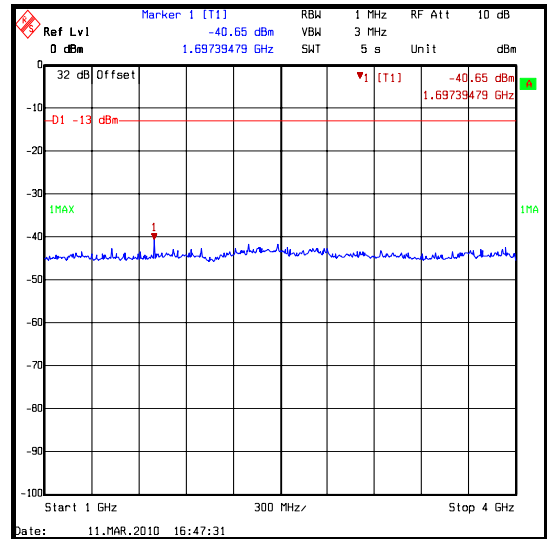
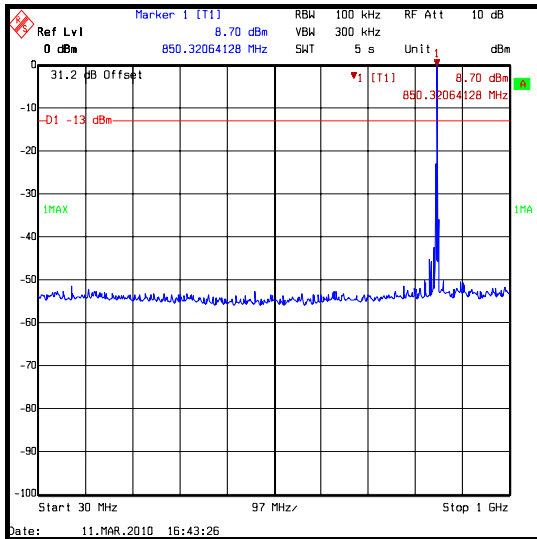
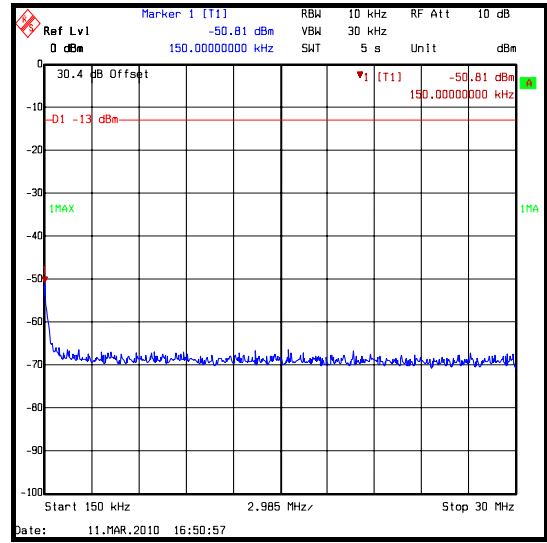
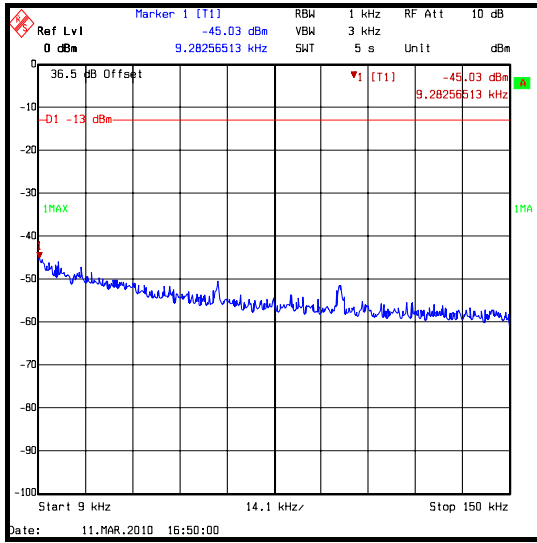
Results: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
6790.089	-39.9	-13.0	26.9	Complied

Note(s):

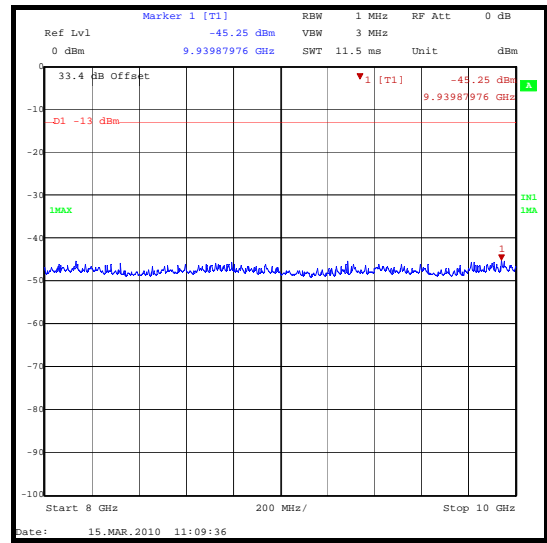
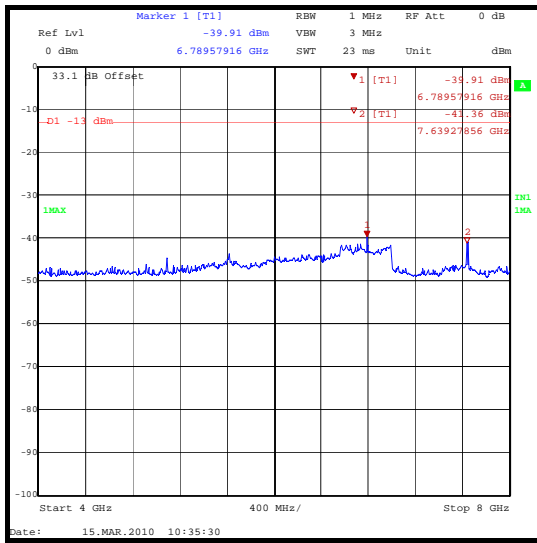
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. Final measurements were made using appropriate attenuation and filters where required.
3. The emissions shown at approximately 850.321 MHz on the 30 MHz to 1 GHz plot is the carrier.

Transmitter Conducted Emissions (continued)



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

Transmitter Conducted Emissions (continued)



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

5.2.7. Transmitter Conducted Emissions at Band Edges

Test Summary:

FCC Part:	2.1051 and 22.917
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

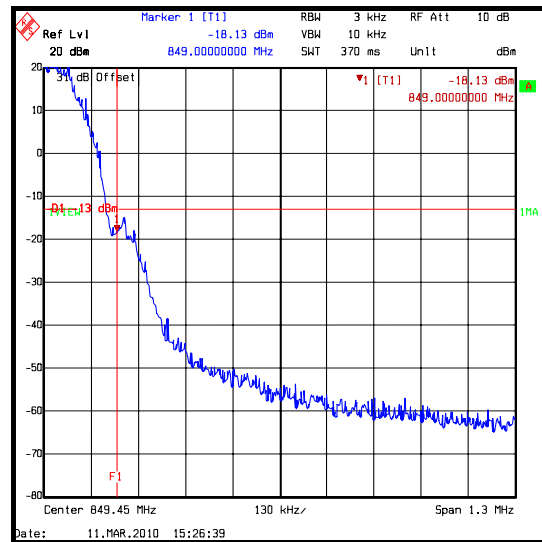
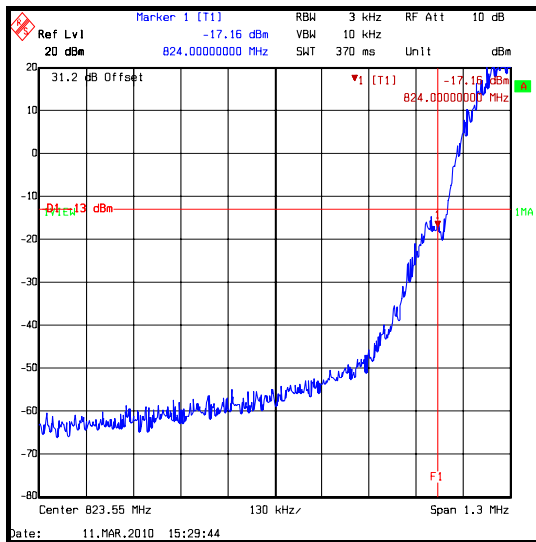
Temperature Variation (°C):	22
Relative Humidity Variation (%):	25

Results: GSM Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
824	-17.2	-13.0	4.2	Complied

Results: GSM Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
849	-18.1	-13.0	5.1	Complied



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

Transmitter Conducted Emissions at Band Edges (continued)

Test Summary:

FCC Part:	2.1051 and 22.917
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

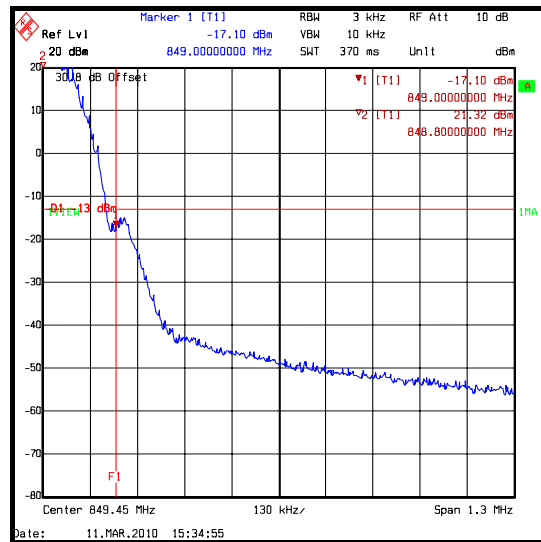
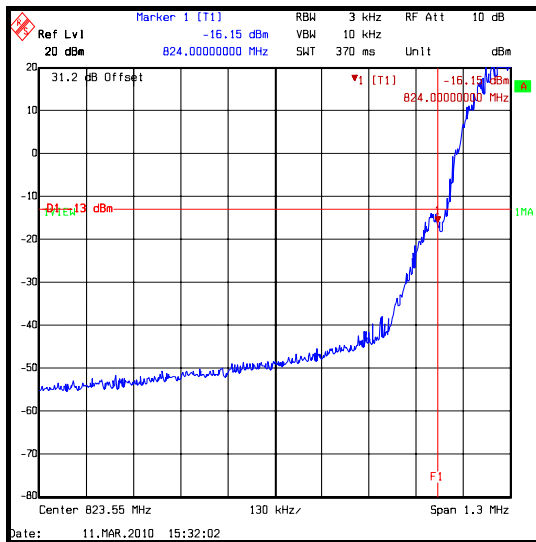
Temperature Variation (°C):	22
Relative Humidity Variation (%):	25

Results: GPRS Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
824	-16.2	-13.0	3.2	Complied

Results: GPRS Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
849	-17.1	-13.0	4.1	Complied



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

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

FCC Part:	2.1053 & 22.917
Test Method Used:	As detailed in ANSI C63.4 Section8 and relevant annexes referencing FCC CFR Part 2.1049

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	29

Results: Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1648.418	-31.1	-13.0	18.1	Complied

Results: Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1673.343	-32.2	-13.0	19.2	Complied

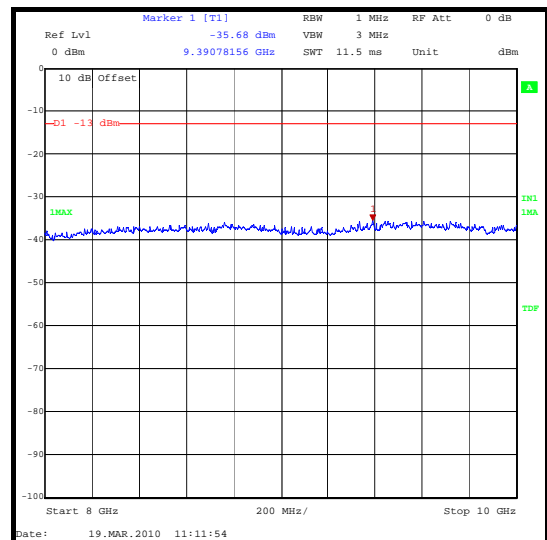
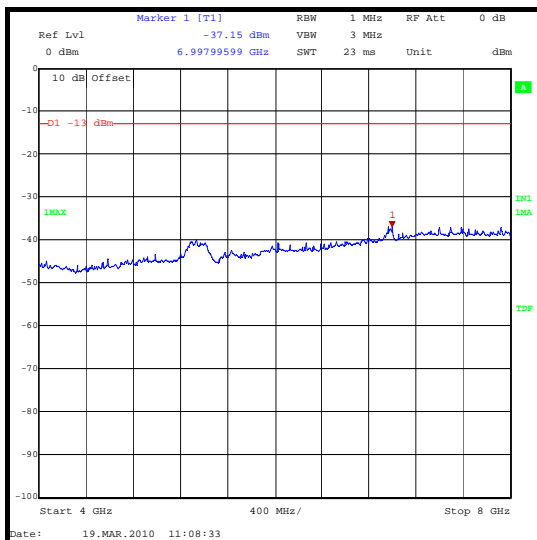
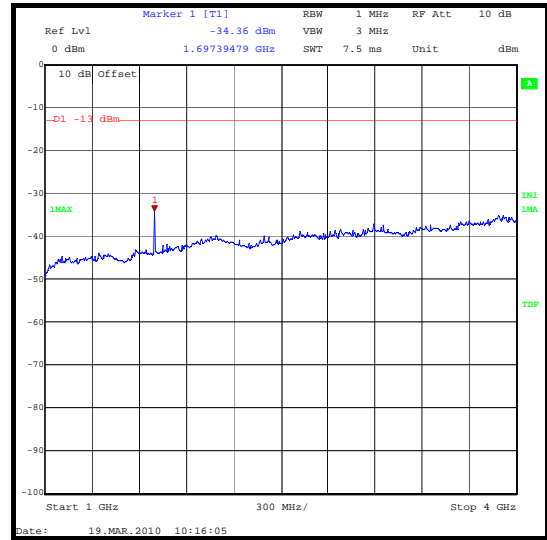
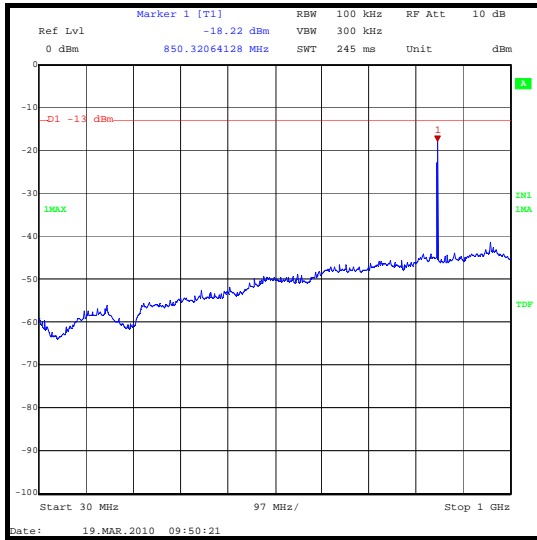
Results: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1697.802	-33.6	-13.0	20.6	Complied

Note(s):

1. Final measurements were made using appropriate attenuation and filters where required.
2. The emissions shown at approximately 850.320 MHz on the 30 MHz to 1 GHz plot is the carrier.

Transmitter Out of Band Radiated Emissions (continued)



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

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

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	21

Results: GSM - Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Refer to Note				

Results: GSM - Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Refer to Note				

Note(s):

1. Transmitter Band Edge Radiated Emissions was not performed for GSM850, as the residual carrier power seen on the emissions plot is lower than the specified -13.0dBm limit and therefore complies with the band edge limit by inspection.

Transmitter Radiated Emissions at Band Edges (continued)

Test Summary:

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	21

Results: GPRS - Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Refer to Note				

Results: GPRS - Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Refer to Note				

Note(s):

1. Transmitter Band Edge Radiated Emissions was not performed for GSM850, as the residual carrier power seen on the emissions plot is lower than the specified -13.0dBm limit and therefore complies with the band edge limit by inspection.

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):	22
Relative Humidity (%):	25

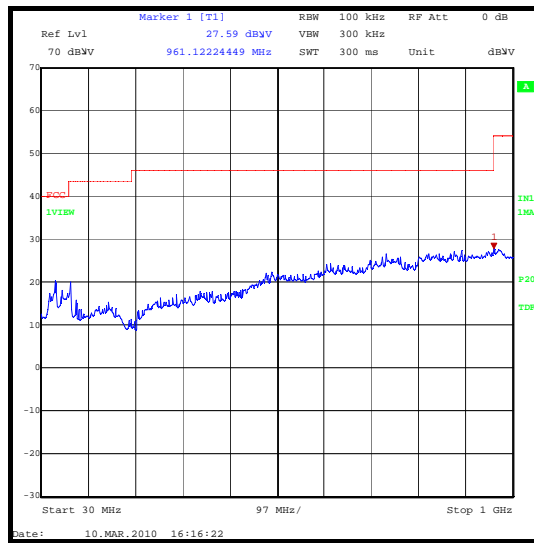
Results:

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
961.122	Vertical	27.6	54.0	26.4	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.

Receiver/Idle Mode Radiated Spurious Emissions (continued)



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:**

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

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	25

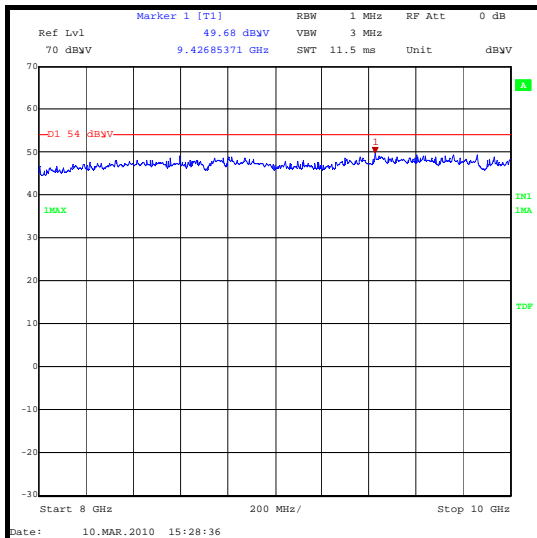
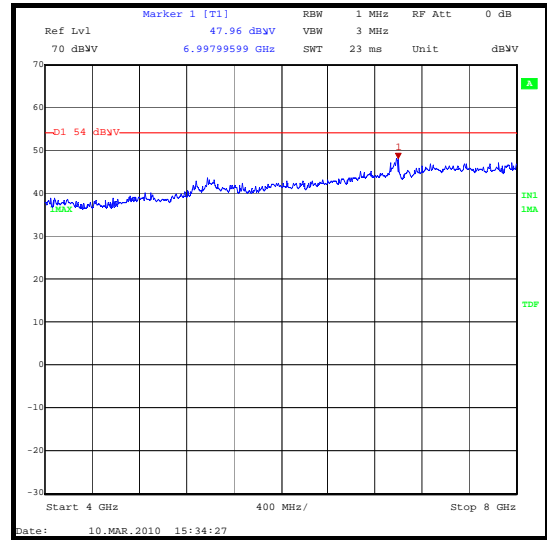
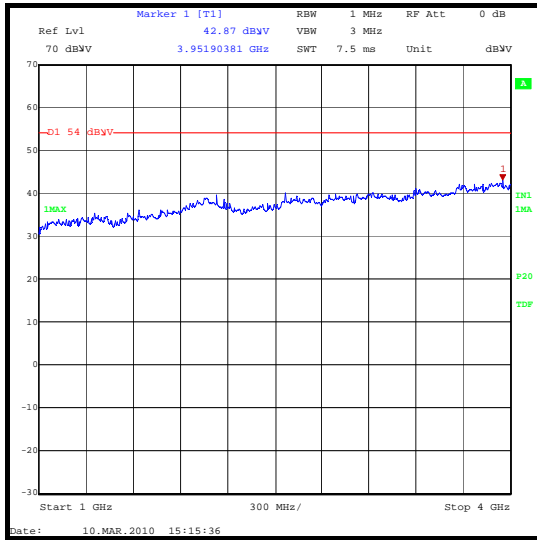
Results:

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV/m)	Transducer Factor (dB)	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
9426.854	Vertical	41.0	8.7	49.7	54.0	4.3	Compliant

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 Conducted Output Power and Equivalent Isotropic Radiated Power (EIRP)**Test Summary:**

FCC Part:	24.232
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	26

Results: GSM

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Antenna Gain (dB)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	28.8	3.0	31.8	33.0	1.2	Complied
Middle	1879.8	28.6	3.0	31.6	33.0	1.4	Complied
Top	1909.8	27.9	3.0	30.9	33.0	2.1	Complied

Results: GPRS

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Antenna Gain (dB)	Calculated EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	28.7	3.0	31.7	33.0	1.3	Complied
Middle	1879.8	28.4	3.0	31.4	33.0	1.6	Complied
Top	1909.8	27.9	3.0	30.9	33.0	2.1	Complied

Note(s):

1. No antenna was provided for testing therefore only conducted output power was measured. The EIRP was by calculated by adding a customer declared maximum antenna gain of 3dBi.
2. All modes were compared on each channel and the highest power recorded was subtracted from the limit to show the margin.

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

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

Environmental Conditions:

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

Results: Bottom Channel (1850.2 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	1850.200103	103	0.06	2.5	2.44	Complied
-20	1850.200117	117	0.06	2.5	2.44	Complied
-10	1850.200062	62	0.03	2.5	2.47	Complied
0	1850.200052	52	0.03	2.5	2.47	Complied
10	1850.200049	49	0.03	2.5	2.47	Complied
20	1850.200047	47	0.03	2.5	2.47	Complied
30	1850.200041	41	0.02	2.5	2.48	Complied
40	1850.200039	39	0.02	2.5	2.48	Complied
50	1850.200041	41	0.02	2.5	2.48	Complied

Results: Top Channel (1909.8 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	1909.800105	105	0.05	2.5	2.45	Complied
-20	1909.800120	120	0.06	2.5	2.44	Complied
-10	1909.800062	62	0.03	2.5	2.47	Complied
0	1909.800055	55	0.03	2.5	2.47	Complied
10	1909.800047	47	0.02	2.5	2.48	Complied
20	1909.800046	46	0.02	2.5	2.48	Complied
30	1909.800041	41	0.02	2.5	2.48	Complied
40	1909.800043	43	0.02	2.5	2.48	Complied
50	1909.800038	38	0.02	2.5	2.48	Complied

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

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

Environmental Conditions:

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

Results: Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.2	1850.200046	46	0.02	2.5	2.48	Complied
4.4	1850.200037	37	0.02	2.5	2.48	Complied

Results: Top Channel (1909.8 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (MHz)	Result
3.2	1909.800048	48	0.03	2.5	2.47	Complied
4.4	1909.800038	38	0.02	2.5	2.48	Complied

Note: that the limit shown is an Industry Canada Limit only. The margin from band edge for FCC compliance was greater than 100kHz.

5.3.5. Transmitter Occupied Bandwidth

Test Summary:

FCC Part:	24.238
Test Method Used:	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

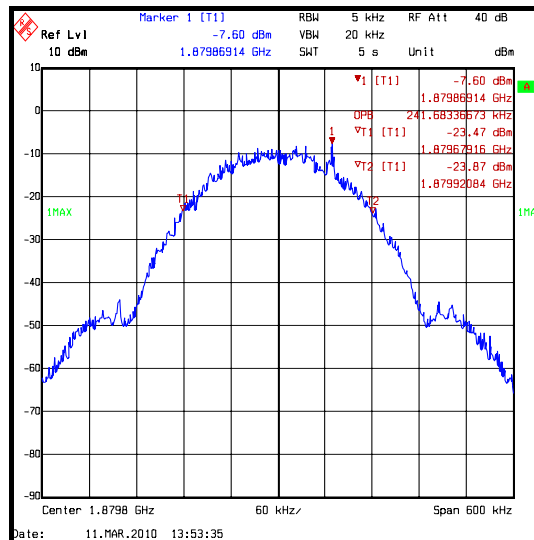
Temperature (°C):	23
Relative Humidity (%):	22

Results: GSM

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1879.8	241.683

Note(s):

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



Transmitter Occupied Bandwidth (continued)

Test Summary:

FCC Part:	24.238
Test Method Used:	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

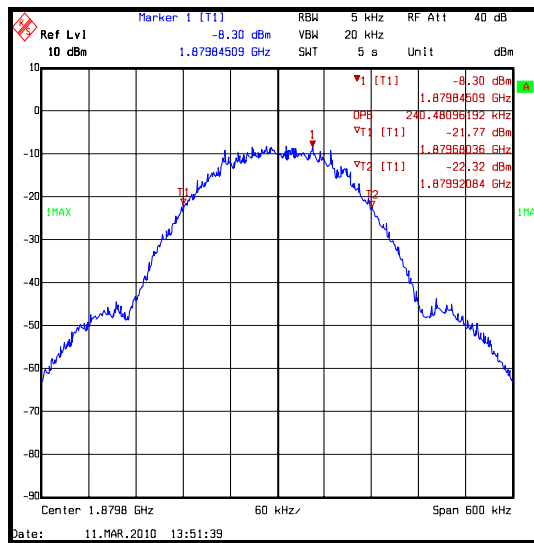
Temperature (°C):	23
Relative Humidity (%):	22

Results: GPRS

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1879.8	240.481

Note(s):

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



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

FCC Part:	2.1051 and 24.238
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

Temperature Variation (°C):	22
Relative Humidity Variation (%):	24

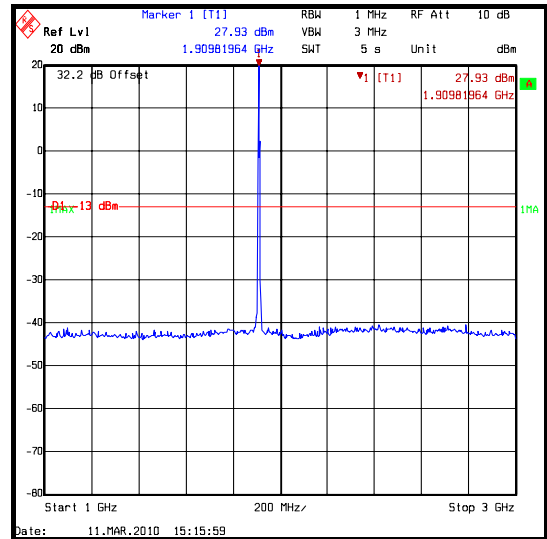
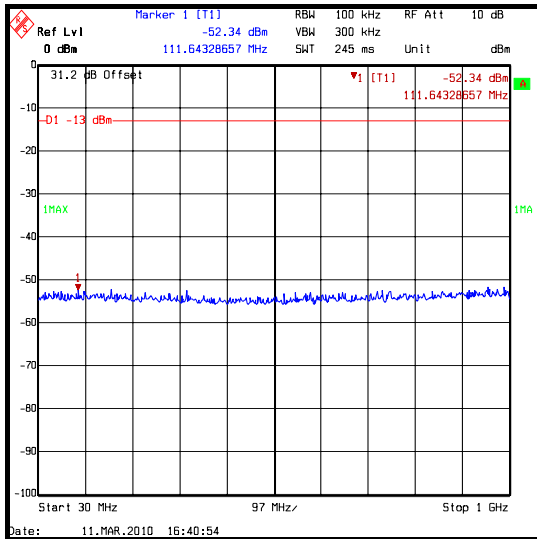
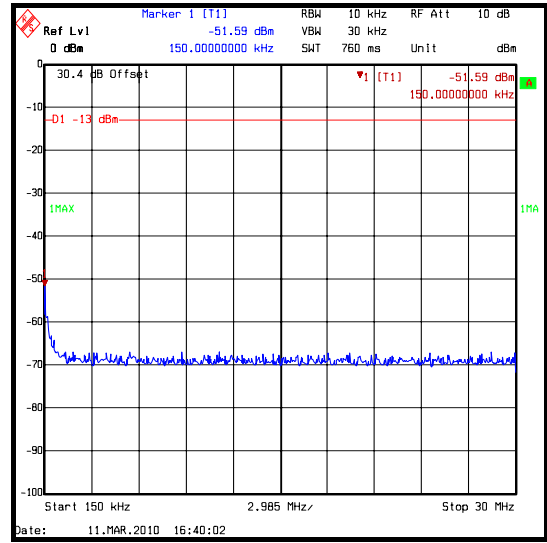
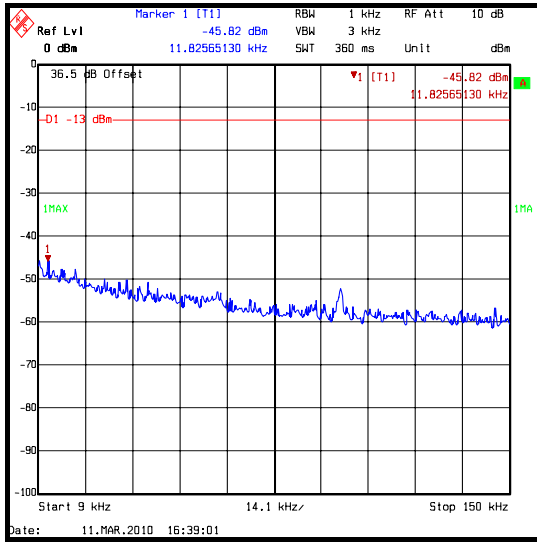
Results: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
18841.683	-39.3	-13.0	26.3	Complied

Note(s):

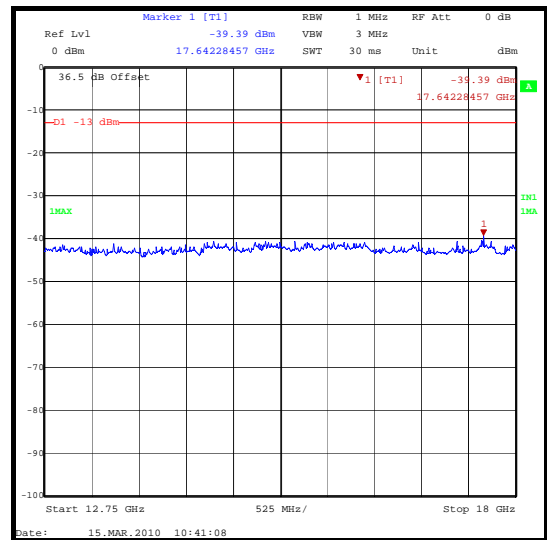
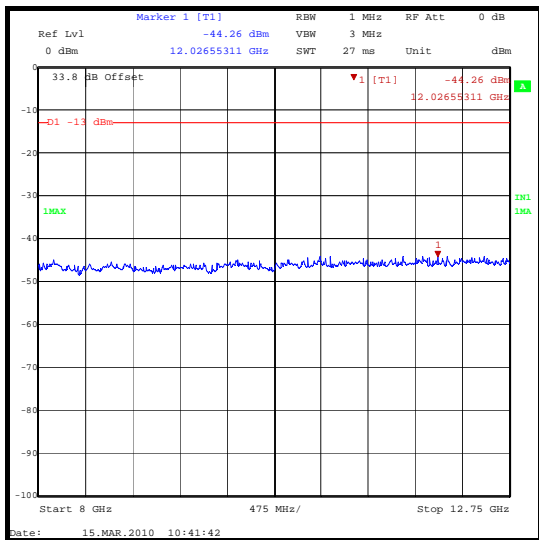
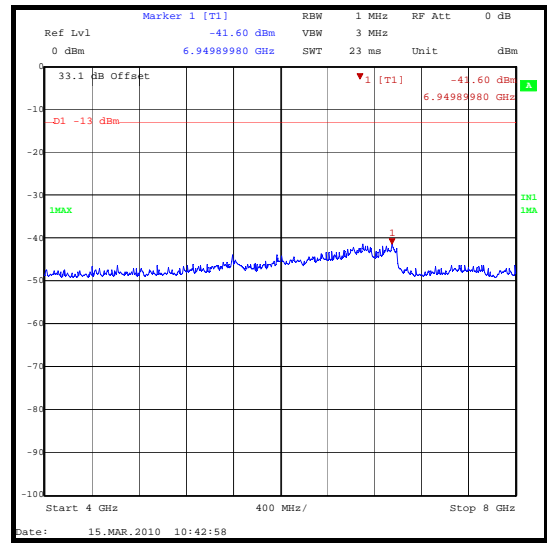
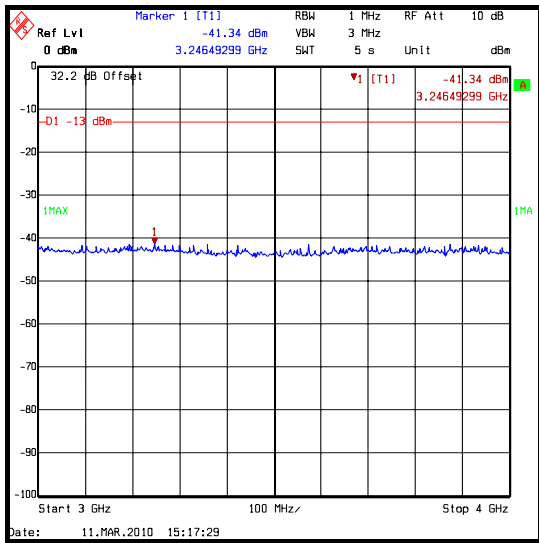
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. Final measurements were made using appropriate attenuation and filters where required.
3. The emissions shown at approximately 850.321 MHz on the 1 MHz to 4 GHz plot is the carrier.

Transmitter Out of Band Conducted Emissions (continued)



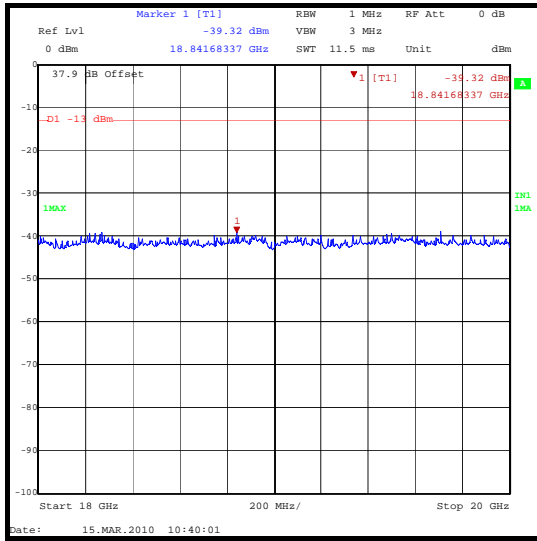
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Transmitter Out of Band Conducted Emissions (continued)



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

Transmitter Out of Band Conducted Emissions (continued)



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

5.3.7. Transmitter Conducted Emissions at Band Edges

Test Summary:

FCC Part:	2.1051 and 24.238
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

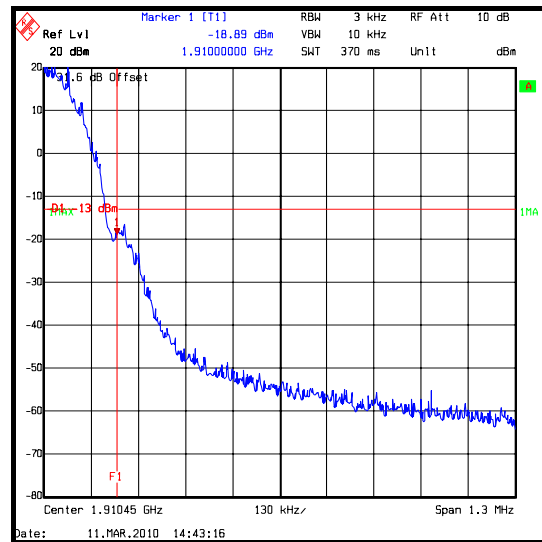
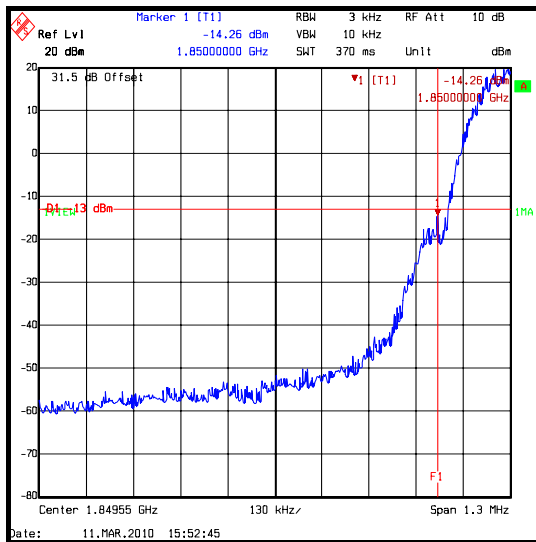
Temperature Variation (°C):	22
Relative Humidity Variation (%):	25

Results: GSM Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1850	-14.3	-13.0	1.3	Complied

Results: GSM Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1910	-18.9	-13.0	5.9	Complied



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

Transmitter Conducted Emissions at Band Edges (continued)

Test Summary:

FCC Part:	2.1051 and 24.238
Test Method Used:	As detailed in ANSI TIA-603.C-2004 referencing FCC Part 2.1051

Environmental Conditions:

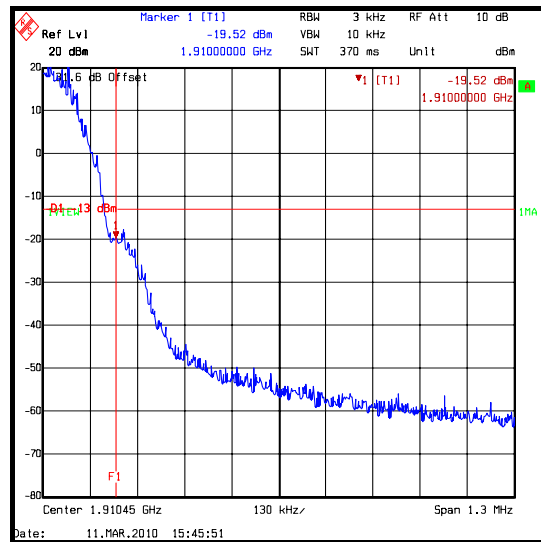
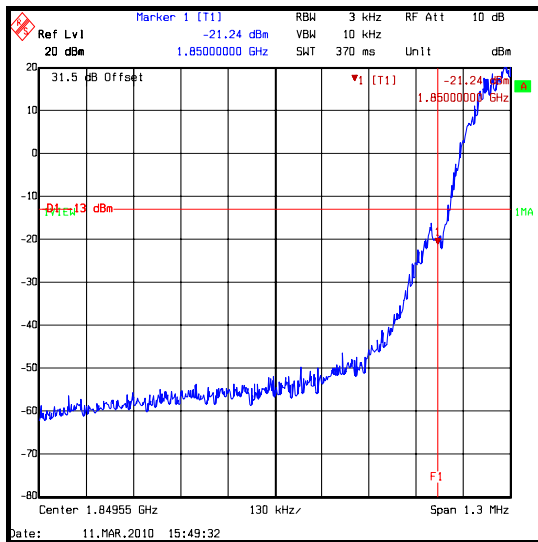
Temperature Variation (°C):	22
Relative Humidity Variation (%):	25

Results: GPRS Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1850	-21.2	-13.0	8.2	Complied

Results: GPRS Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1910	-19.5	-13.0	6.5	Complied



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

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

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	29

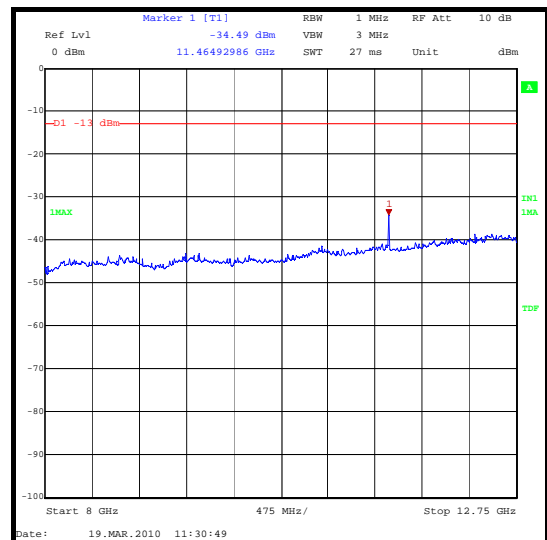
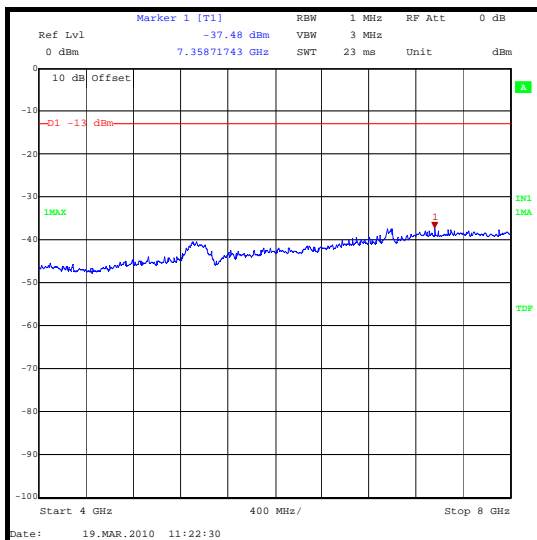
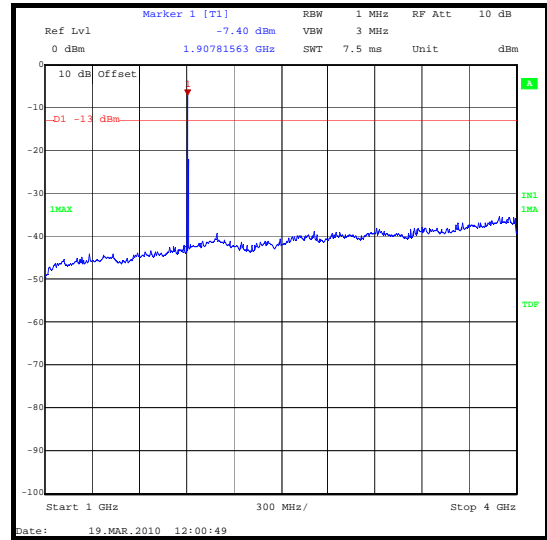
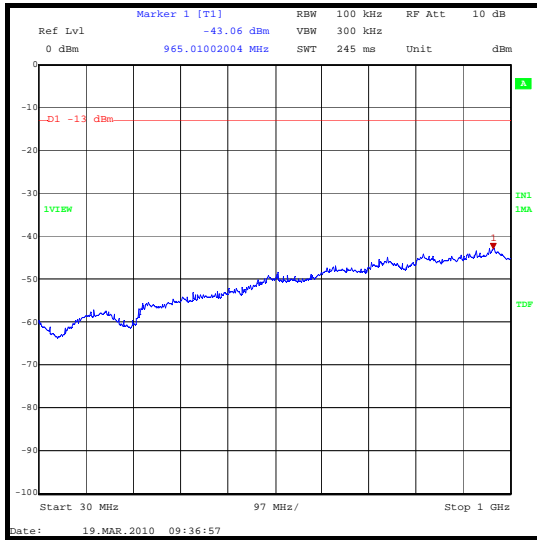
Results: Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
11464.930	-34.5	-13.0	21.5	Complied

Note(s):

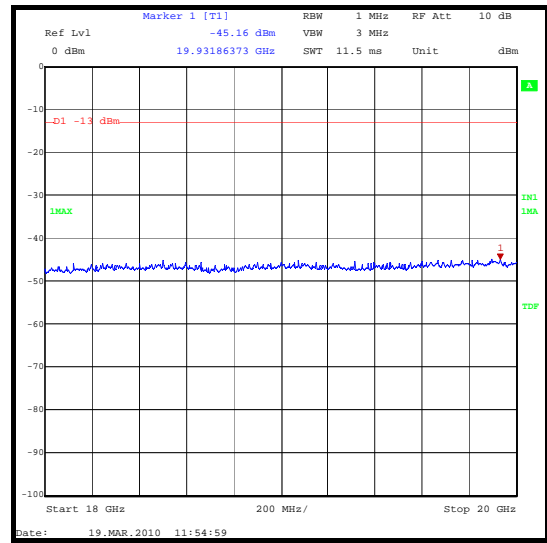
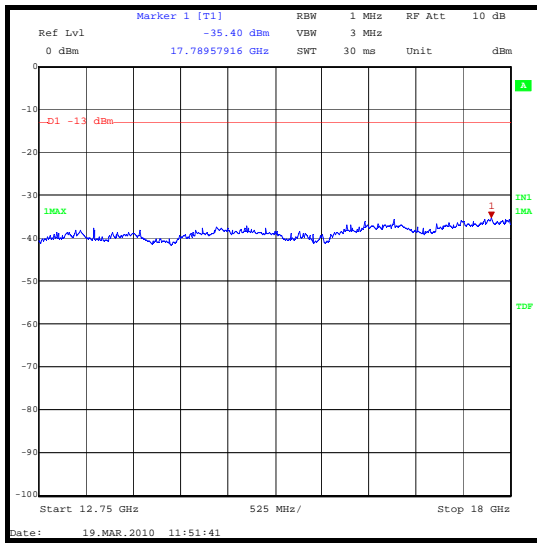
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. Final measurements were made using appropriate attenuation and filters where required.
3. The transmitter fundamental is shown on the 1 GHz to 4 GHz plot at 1907.815 MHz

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.

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

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	21

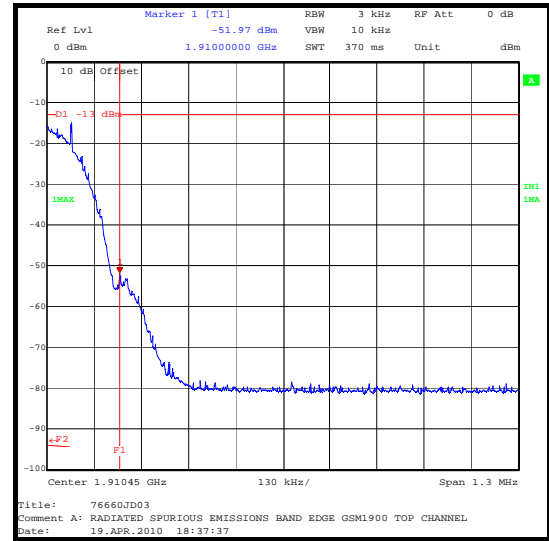
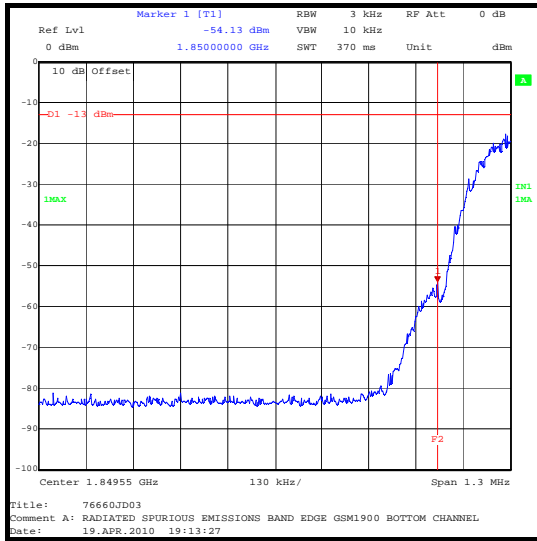
Results: GSM - Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850.0	-54.1	-13.0	41.1	Complied

Results: GSM - Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1910.0	-52.0	-13.0	39.0	Complied

Transmitter Radiated Emissions at Band Edges (continued)



Note: These plots were taken with the antenna port terminated into a dummy load. They represent the leakage power from the EUT cabinet. The radiated pre-scans performed within this report showed the residual power to be over the emissions limit and so it was deemed appropriate to perform the band edge measurement to confirm compliance.

Transmitter Radiated Emissions at Band Edges (continued)**Test Summary:**

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	21

Results: GPRS - Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1850.0	-55.9	-13.0	42.9	Complied

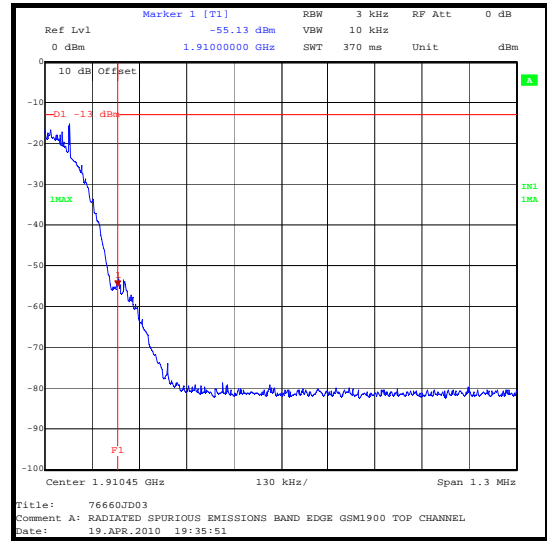
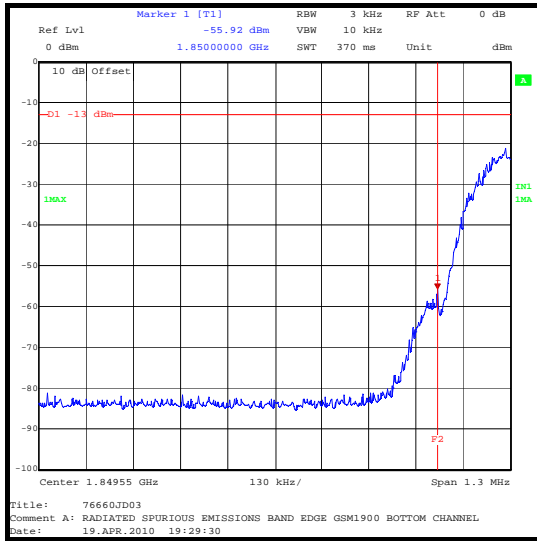
Results: GPRS - Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
1910.0	-55.1	-13.0	42.1	Complied

Note(s):

1. The band edge result was obtained by integrating the 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)



Note: These plots were taken with the antenna port terminated into a dummy load. They represent the leakage power from the EUT cabinet. The radiated pre-scans performed within this report showed the residual power to be over the emissions limit and so it was deemed appropriate to perform the band edge measurement to confirm compliance.

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
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	824 to 849 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 dB
Radiated Spurious Emissions	1 GHz to 20 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)
A057	High Pass Filter	AERIAL FACILITIES LTD	HP-950-5N	4389B	Calibrated before use	-
A1391	Attenuator	HUBER + SUHNER AG	757987	6810.17.B	Calibrated before use	-
A1393	Attenuator	HUBER + SUHNER AG	757456	6820.17.B	Calibrated before use	-
A1396	Attenuator	HUBER + SUHNER AG	757987	6810.17.B	Calibrated before use	-
A1428	Directional Coupler	Narda	3292-1	02439	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2009	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	Calibrated before use	-
A288	Antenna	Chase	CBL6111A	1589	16 Mar 2010	12
A308	High Pass Filter	Aerial Facilities Ltd	HP-1517-6N	34278B	Calibrated before use	-
A436	Antenna	Flann	20240-20	330	Calibrated before use	-
G013	Signal Generator	Rohde & Schwarz	SMHU	894 055/003	30 Apr 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sept 2009	12
K0004	Bench Test Site	RFI Global Services Ltd	N/A	N/A	Calibration not required	-
M037	Power Meter	Rohde & Schwarz	URY	891.259/053	19 Aug 2009	12
M1068	Thermometer	Iso-Tech	RS55	93102884	01 Oct 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1138	CMU 200	Rohde & Schwarz	CMU200 - 1100.0008.02	836202/093	Calibration not required	-
M1140	Radio Communications Analyser	Anritsu	MT8820A	6K0000647	Calibration not required	-

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
M122	Digital Voltmeter	Fluke	77	64910017	23 Jun 2009	12
M1223	Environmental Chamber	Votsch	VT4002	58566072720010	Calibrated before use	-
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	10 Jul 2009	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	01 Apr 2009	12
M1565	Wireless Communications Test Set	Agilent	8960 Series 10	GB46311280	11 Jul 2009	12
M208	Thermometer/Hygrometer	RS Components Ltd	RS212-124	M208-RS212-124	30 Apr 2009	12
S0520	DC Power Supply Unit	GW instek	GPC-3030	E835141	Calibrated before use	-

Note that assets A288, M1273 and M1124 indicate they were out of calibration during testing. It shall be noted however that the assets were in calibration for the tests for which they were used.

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