TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: GC864-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-RPT-RP76920JD03A

This Test Report Is Issued Under The Authority Of Brian Watson, COO Payments and Consultancy:	
Checked By:	Ian Watch
Signature:	
Date of Issue:	10 June 2010

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1. Customer Information

Company Name:	Telit Communications S.p.A.
Address:	Via Stazione di Prosecco, 5/B I - 34010 Sgonico (Trieste) Italy

2. Summary of Testing

2.1. General Information

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 Radiocommunication 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:	SRSP-503 Issue 7 Sep 2008
Specification Title:	Technical Requirements for Cellular Radiotelephone Systems Operating in the Bands 824 – 849 MHz and 869 – 894 MHz
Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2009: Part 24 Subpart E (Personal Communication Services)
Specification Reference:	RSS-133 Issue 5 Feb 2009
Specification Title:	2 GHz Personal Communications Services
Specification Reference:	SRSP-510 Issue 5 Feb 2009
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, United Kingdom
Test Dates:	26 April 2010 to 27 May 2010

2.2. Summary of Test Results

FCC Reference (47CFR)	Industry Canada Reference	Measurement	Result
GSM850			
Part 15.109	RSS-Gen 4.10/6 RSS-132 4.6	Receiver/Idle Mode Radiated Spurious Emissions	✓
Part 22.913/ 2.1046(a)	RSS-132 4.4 SRSP-503 5.1.3	Transmitter Carrier Output Power (Conducted)	✓
Part 22.355	RSS-132 4.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature & Voltage Variation)	✓
Part 2.1049	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	✓
Part 2.1051/22.917	RSS-132 4.5	Transmitter Out of Band Conducted Emissions	✓
Part 2.1051/22.917	RSS-132 4.5	Transmitter Band Edge Conducted Emissions	✓
Part 2.1053/22.917	RSS-132 4.5	Transmitter Out of Band Radiated Emissions	✓
Part 2.1053/22.917	RSS-132 4.5	Transmitter Band Edge Radiated Emissions	✓
PCS1900			
Part 15.109	RSS-Gen 4.10/6 RSS-133 6.6	Idle Mode Radiated Spurious Emissions	✓
Part 24.232/ 2.1046(a)	RSS-133 6.4 SRSP-510 5.1.2	Transmitter Carrier Output Power (Conducted)	✓
Part 24.235	RSS-133 6.3 RSS Gen 4.7	Transmitter Frequency Stability (Temperature & Voltage Variation)	✓
Part 2.1049/24.238	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	✓
Part 2.1051/24.238	RSS-133 6.5	Transmitter Out of Band Conducted Emissions	✓
Part 2.1051/24.238	RSS-133 6.5	Transmitter Band Edge Conducted Emissions	✓
Part 2.1053/24.238	RSS-133 6.5	Transmitter Out of Band Radiated Emissions	✓
Part 2.1053/24.238	RSS-133 6.5	Transmitter Band Edge Radiated Emissions	✓
Key to Results ✓ = Complied ✗ = Did not comply			

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile Communications Equipment, Measurements and performance Standards
Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 kHz

2.4. Deviations from the Test Specification

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

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Telit
Model Name or Number:	GC864-QUAD
IMEI Number:	359294039003260
Hardware Version Number:	0H00
Software Version Number:	10.00.033
FCC ID:	RI7GE864QC2
Industry Canada ID:	5131A-GC864QC2

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

Type of Radio Device:	Transceiver					
Power Supply Requirement(s):	Nominal	3.8 V	Minimum	3.22 V	Maximum	4.5 V
Mode:	GSM/GPRS					
Modulation Type:	GMSK					
Channel Spacing:	200 kHz					
Technology Tested:	GSM850					
Maximum Conducted Output Power:	GSM	32.6 dBm	GPRS	32.5 dBm		
Transmit Frequency Range:	824 MHz 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 MHz 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					
Maximum Conducted Output Power:	GSM	30.0 dBm	GPRS	29.8 dBm		
Transmit Frequency Range:	1850 MHz 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 MHz 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:	Laptop PC
Brand Name:	Dell Latitude D600
Serial Number:	PC353NT

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 Multi-slot Class 10 with the unit transmitting on two timeslots in the uplink.
- Transmitter radiated spurious emissions were checked in all modes during pre-scans. 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.

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:

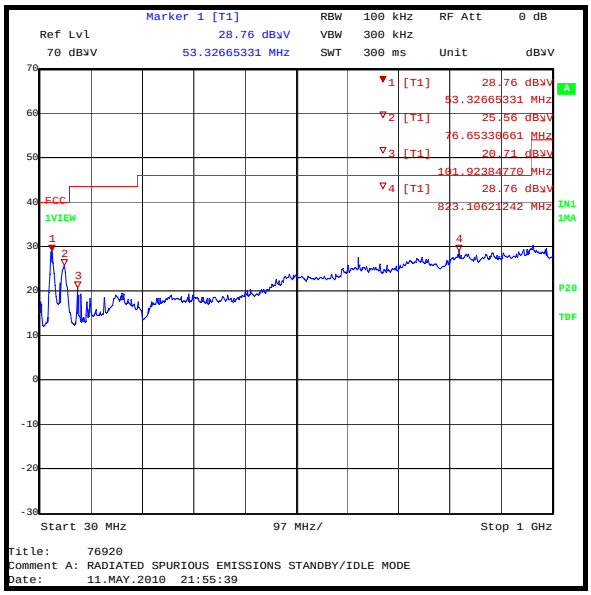
FCC Part:	15.109
Frequency Range:	30 MHz to 1000 MHz
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	20

Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
52.460	Vertical	32.6	40.0	7.4	Complied
76.848	Vertical	26.0	40.0	14.0	Complied
633.943	Horizontal	26.6	46.0	19.4	Complied
823.968	Vertical	29.4	46.0	16.6	Complied



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

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:

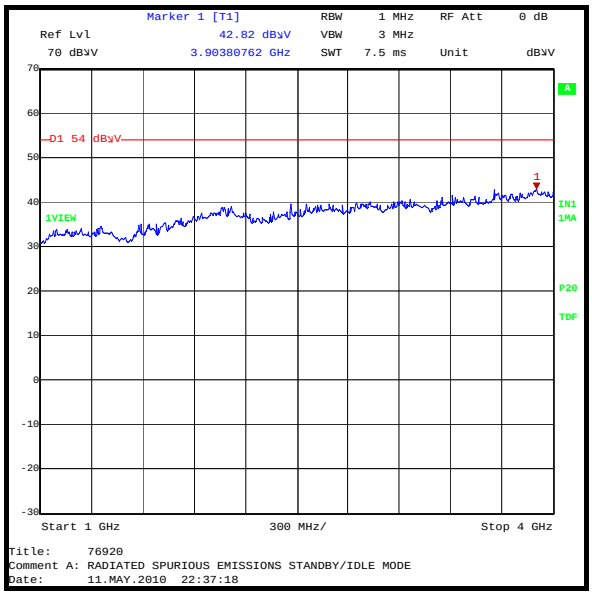
Temperature (°C):	26
Relative Humidity (%):	26

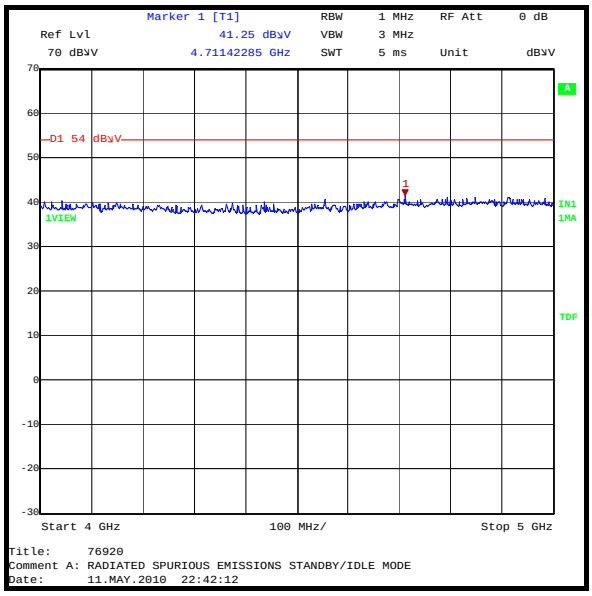
Results: Highest Peak Level

Frequency (GHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
3903.808	Vertical	42.8	54.0	13.2	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.
2. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.





5.2.2. Transmitter Carrier Output Power (Conducted)

Test Summary:

FCC Part:	22.913(a) / 2.1046(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1 referencing FCC CFR Part 2.1046(a)

Environmental Conditions:

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

Results: GSM Circuit Switched

Channel	Frequency (MHz)	Conducted RF Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	32.5	38.5	6.0	Complied
Middle	836.6	32.6	38.5	5.9	Complied
Top	848.8	32.6	38.5	5.9	Complied

Results: GPRS

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	824.2	32.5	38.5	6.0	Complied
Middle	836.6	32.5	38.5	6.0	Complied
Top	848.8	32.5	38.5	6.0	Complied

Note(s):

1. The EUT complies with the Industry Canada SRSP-503 Section 5.1.3 limit of 11.5 Watts (40.6 dBm) EIRP.

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:

Ambient Temperature (°C):	24
Ambient Relative Humidity (%):	30

Results: Middle Channel (836.6 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.600062	62	0.07	2.5	2.43	Complied
-20	836.600035	35	0.04	2.5	2.46	Complied
-10	836.600024	24	0.03	2.5	2.47	Complied
0	836.600024	24	0.03	2.5	2.47	Complied
10	836.600013	13	0.02	2.5	2.48	Complied
20	836.600010	10	0.01	2.5	2.49	Complied
30	836.599952	48	0.06	2.5	2.44	Complied
40	836.599964	36	0.04	2.5	2.46	Complied
50	836.600017	17	0.02	2.5	2.48	Complied

Note(s):

1. Frequency was measured using the frequency counter of a calibrated Rohde & Schwarz CMU 200.

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):	20
Relative Humidity (%):	34

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	836.599972	28	0.03	2.5	2.47	Complied
4.5	836.599949	51	0.06	2.5	2.44	Complied

Note(s):

1. Frequency was measured using the frequency counter of a calibrated Rohde & Schwarz CMU 200.

5.2.5. Transmitter Occupied Bandwidth

Test Summary:

FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.4 Section 13.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

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

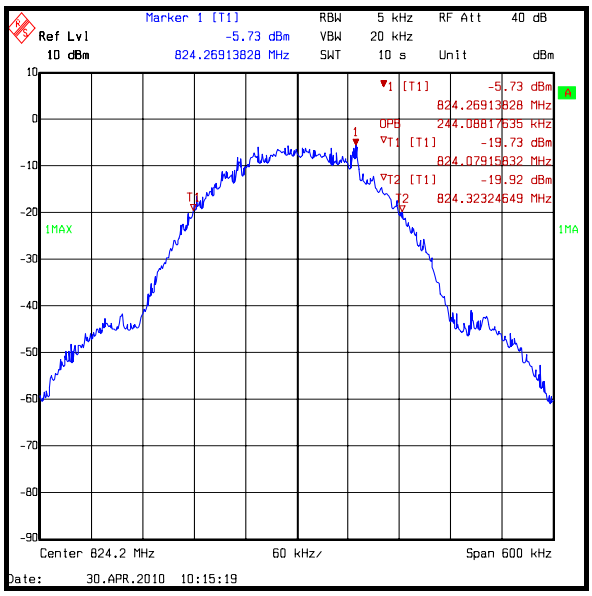
Results: GSM Circuit Switched

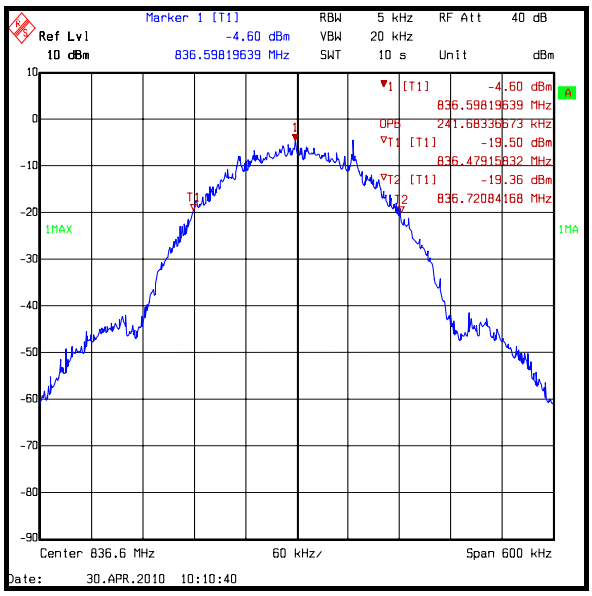
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	824.2	244.088
Middle	836.6	241.683
Top	848.8	241.683

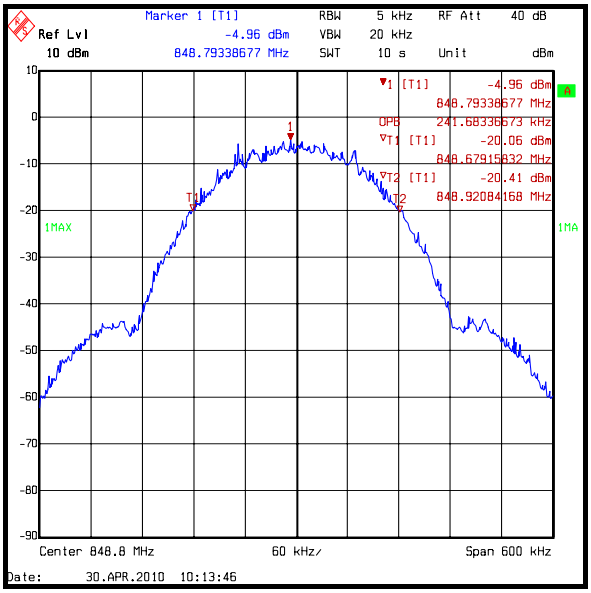
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.7, the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







Transmitter Occupied Bandwidth (continued)

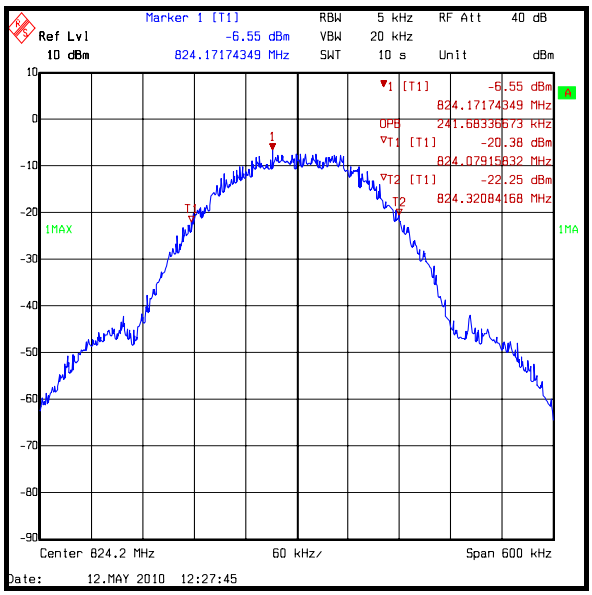
Results: GPRS

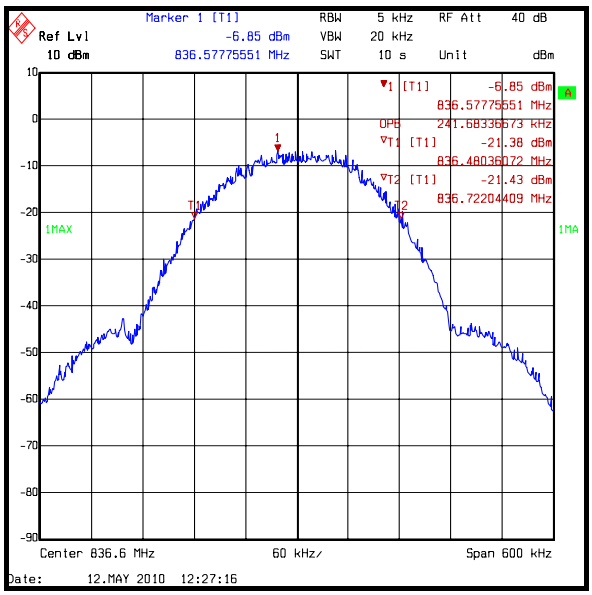
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	824.2	241.683
Middle	836.6	241.683
Top	848.8	240.481

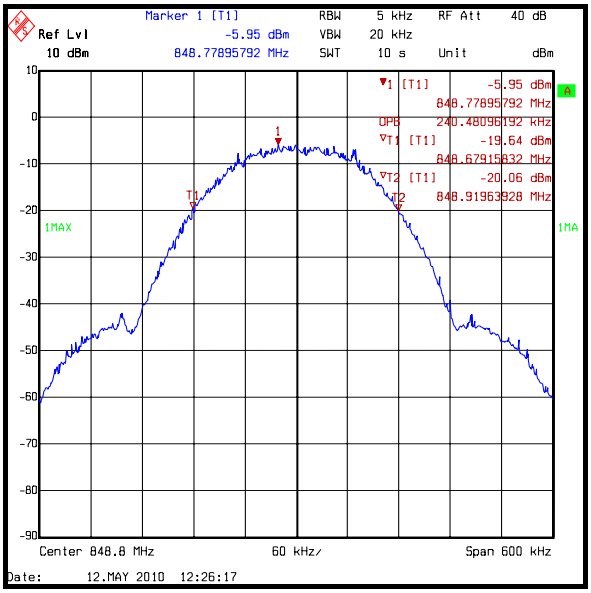
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.7, the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







5.2.6. Transmitter Out of Band Conducted Emissions

Test Summary:

FCC Part:	2.1051 and 22.917
Frequency Range:	9 kHz to 10 GHz
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC CFR Part 2.1051

Environmental Conditions:

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

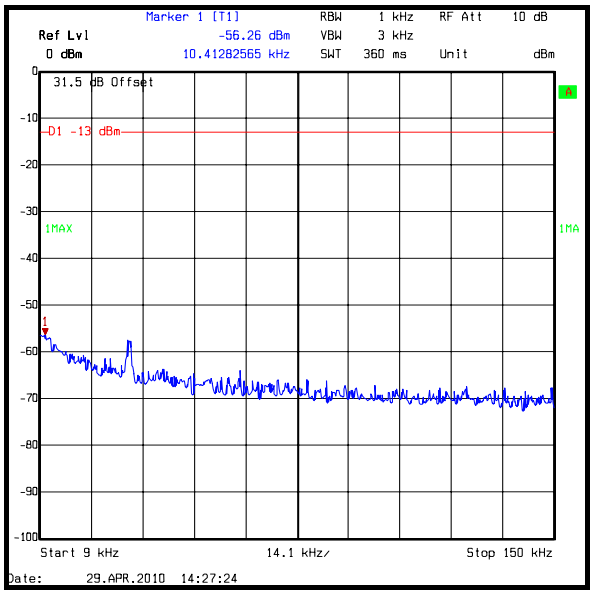
Results: Top Channel

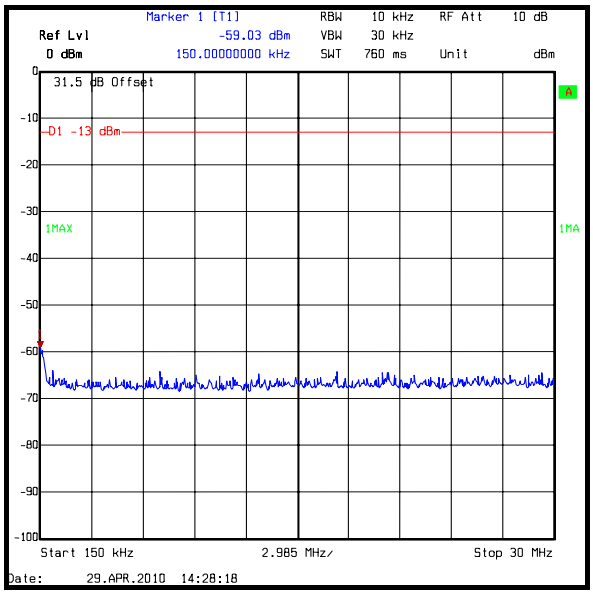
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3639.279	-36.6	-13.0	23.6	Complied

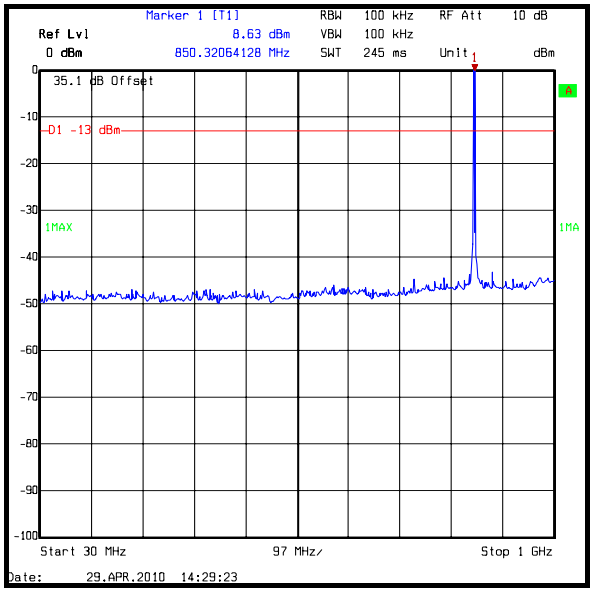
Note(s):

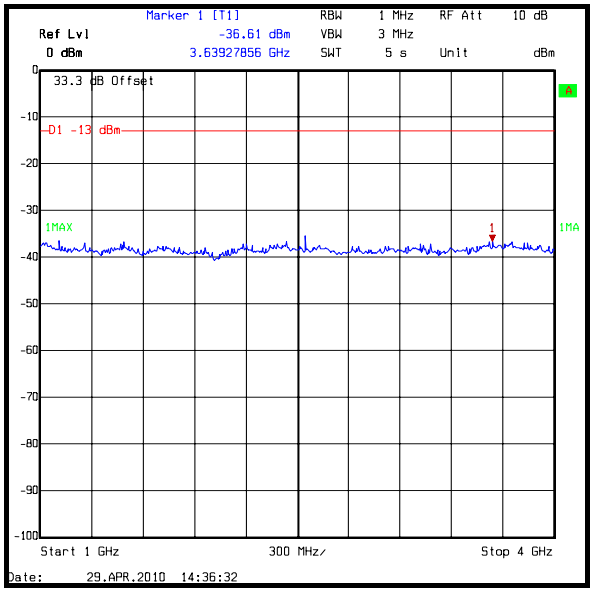
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. The emission shown at approximately 850 MHz on the 30 MHz to 1 GHz plot is the carrier.

Transmitter Out of Band Conducted Emissions (continued)









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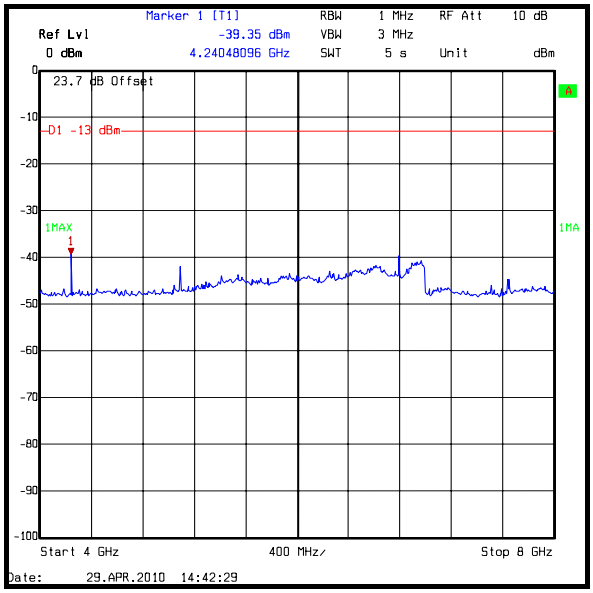
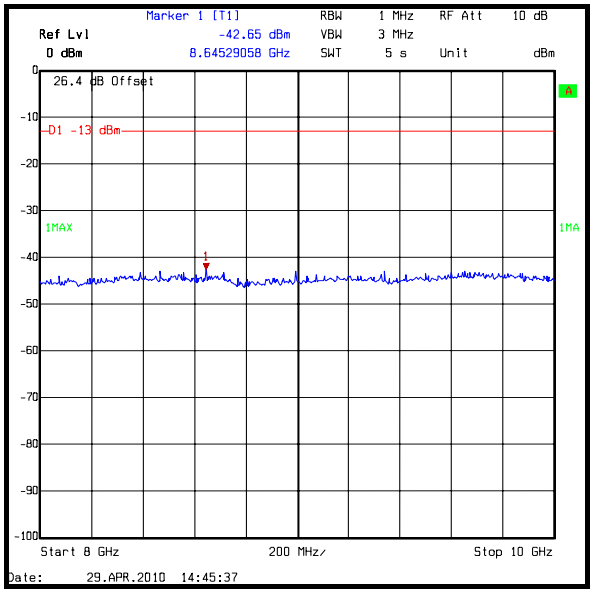




5.2.7. Transmitter Conducted Emissions at Band Edges

Test Summary:

FCC Part:	2.1051 and 22.917
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC CFR Part 2.1051 and 22.917

Environmental Conditions:

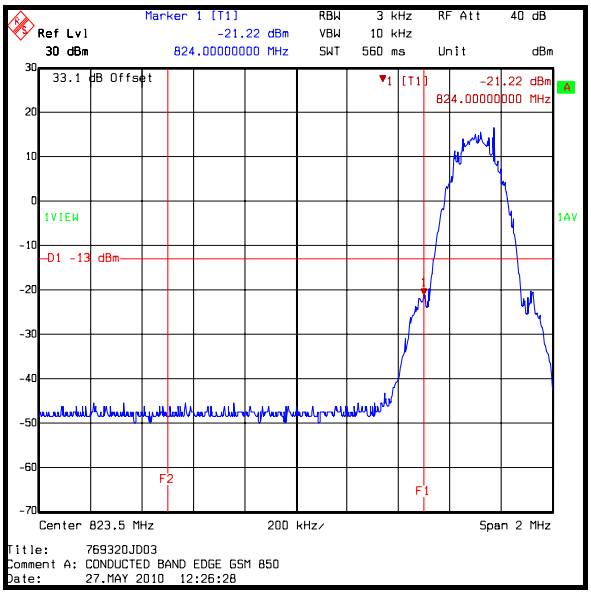
Temperature (°C):	28
Relative Humidity (%):	27

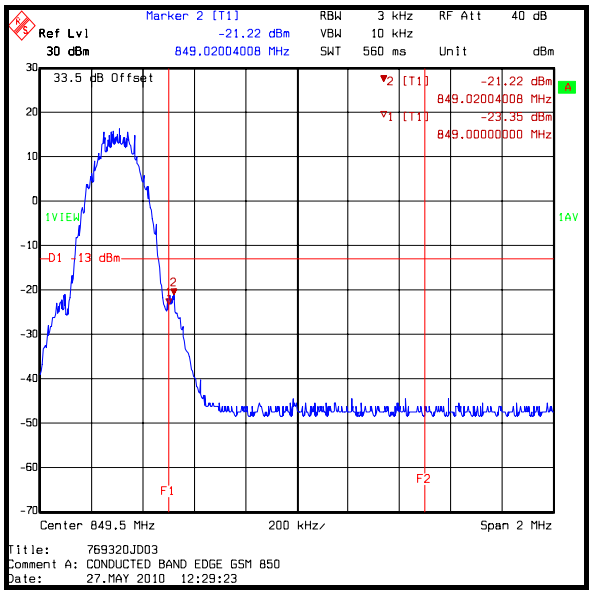
Results: GSM Circuit Switched Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
824	-21.2	-13.0	8.2	Complied

Results: GSM Circuit Switched Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
849	-23.4	-13.0	10.3	Complied
849.020	-21.2	-13.0	8.2	Complied





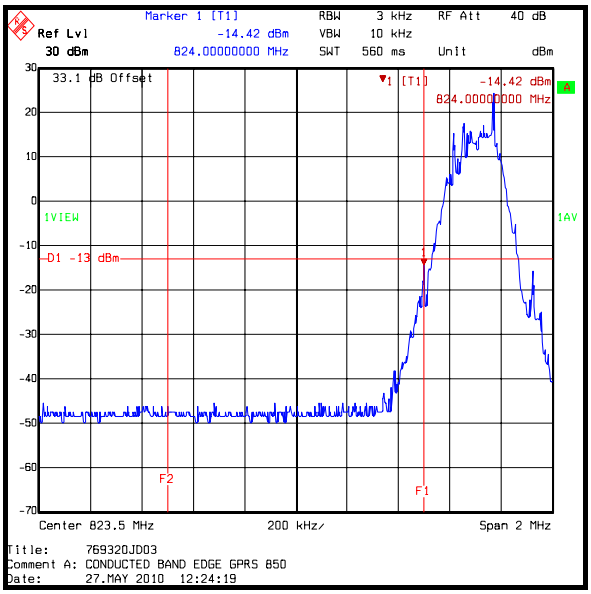
Transmitter Conducted Emissions at Band Edges (continued)

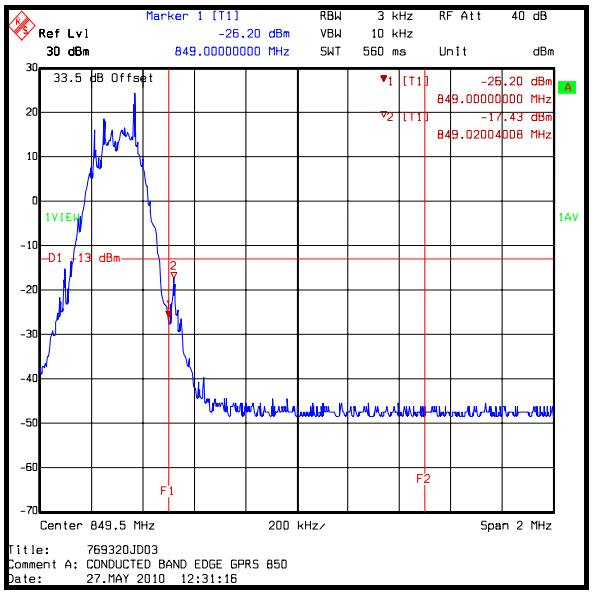
Results: GPRS Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
824	-14.4	-13.0	1.4	Complied

Results: GPRS Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
849	-25.2	-13.0	12.2	Complied
849.020	-17.4	-13.0	4.4	Complied





5.2.8. Transmitter Out of Band Radiated Emissions

Test Summary:

FCC Part:	2.1053 & 22.917
Frequency Range:	30 MHz to 10 GHz
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	23

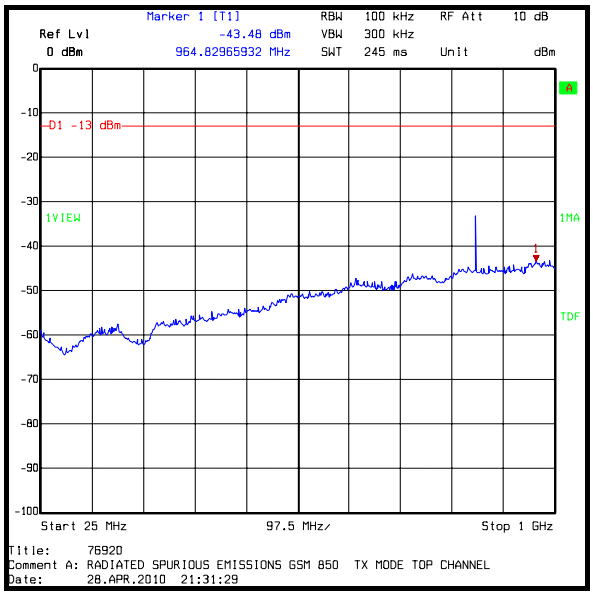
Results: Top Channel

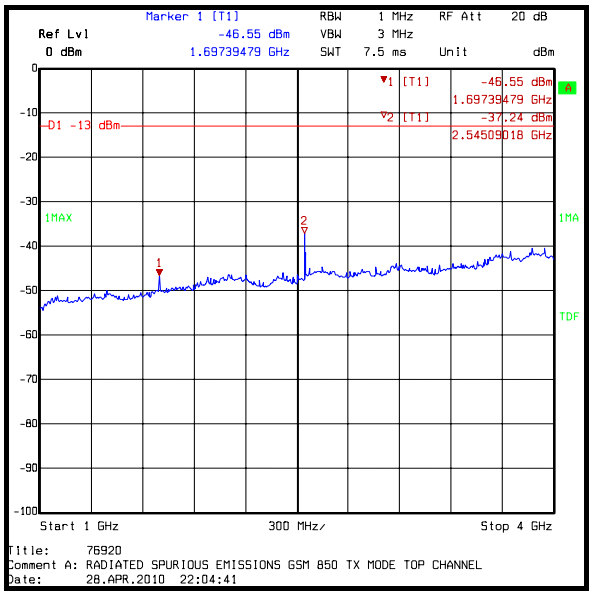
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2545.090	-37.2	-13.0	24.2	Complied

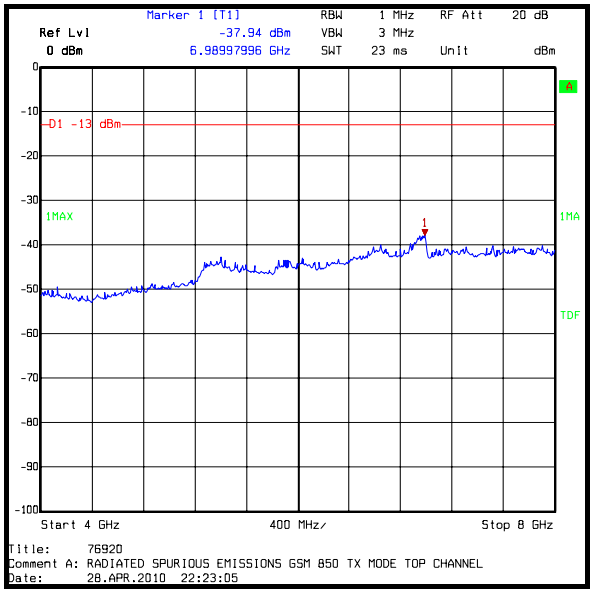
Note(s):

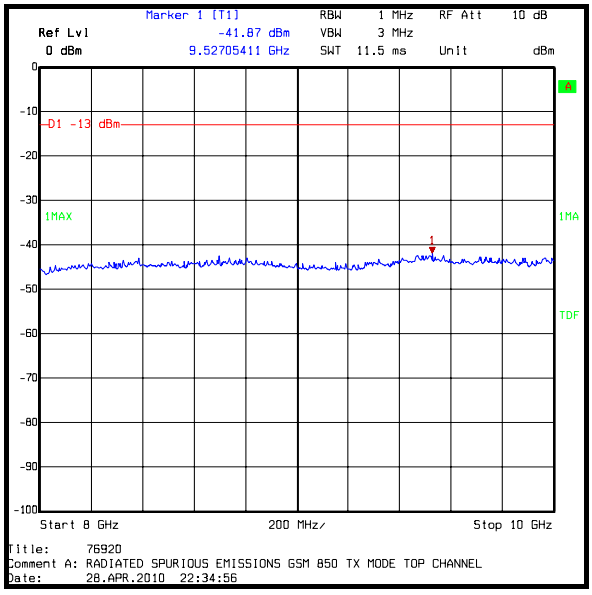
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. The emission shown at approximately 850 MHz on the 30 MHz to 1 GHz plot is the carrier.

Transmitter Out of Band Radiated Emissions (continued)









5.2.9. Transmitter Radiated Emissions at Band Edges

Test Summary:

FCC Part:	2.1053 & 22.917
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 22.917

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	23

Results: GSM Circuit Switched Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
See note below				

Results: GSM Circuit Switched Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
See note below				

Note(s):

1. Transmitter band edge radiated emissions test was not performed for GSM850 circuit switched or GPRS modes, as the residual carrier power seen on the emissions plots are 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:

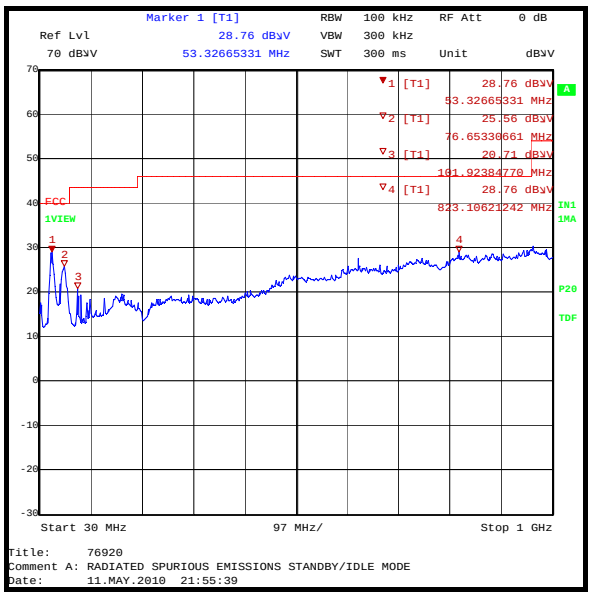
FCC Part:	15.109
Frequency Range:	30 MHz to 1000 MHz
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	20

Results:

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
52.460	Vertical	32.6	40.0	7.4	Complied
76.848	Vertical	26.0	40.0	14.0	Complied
633.943	Horizontal	26.6	46.0	19.4	Complied
823.968	Vertical	29.4	46.0	16.6	Complied



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

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):	25
Relative Humidity (%):	20

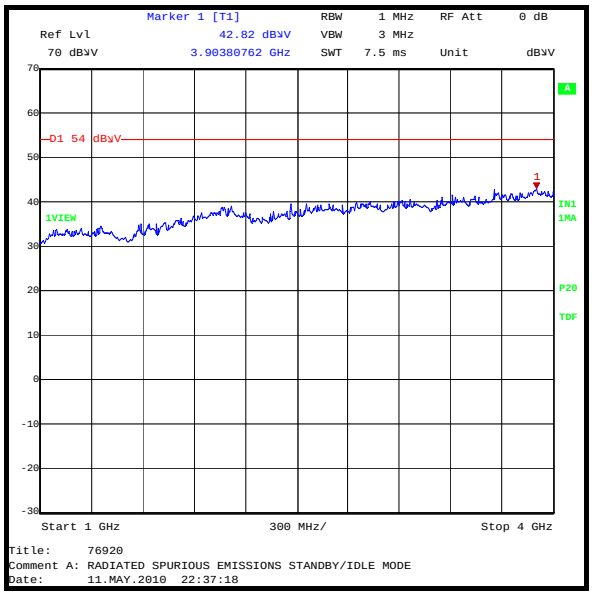
Results: Highest Peak Level

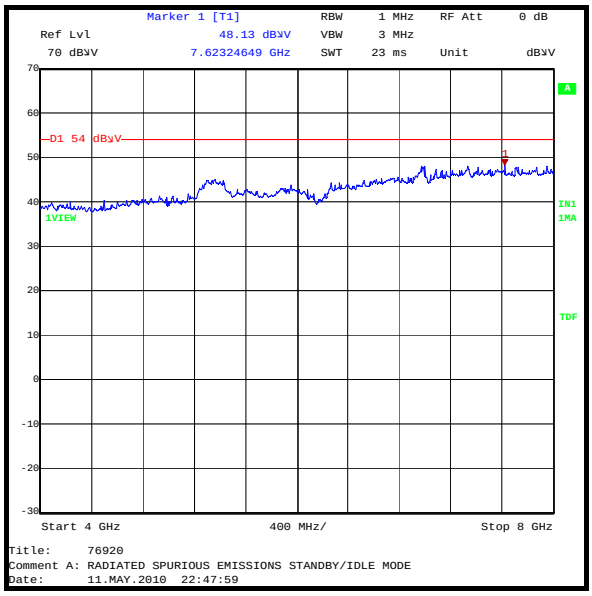
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
9434.870	Vertical	49.9	54.0	4.1	Complied

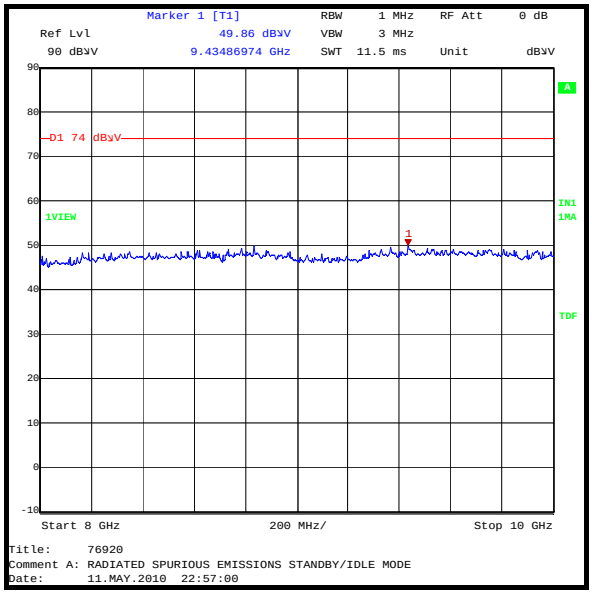
Note(s):

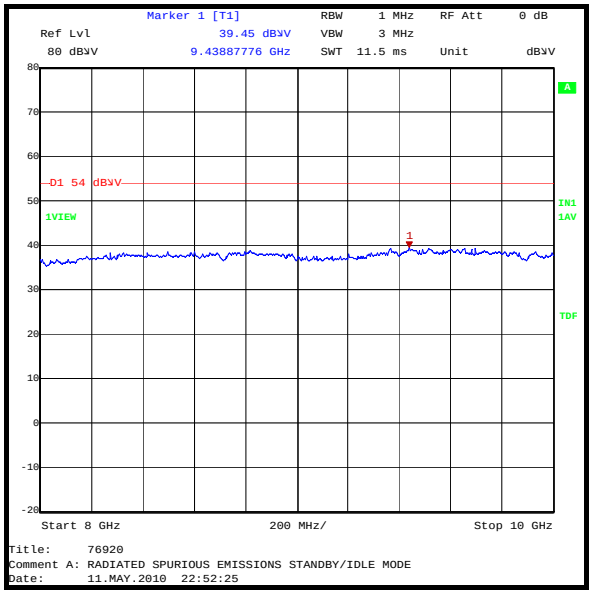
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded in the table above.
   The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
2. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
3. All pre-scans were performed with a peak detector against average limits apart from measurements made in the range of 8 to 10 GHz where pre-scans were performed with peak and average detectors and the applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.

Idle Mode Radiated Spurious Emissions (continued)









Peak Detector **Average Detector**

5.3.2. Transmitter Carrier Output Power (Conducted)

Test Summary:

FCC Part:	24.232(c)/2.1046(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.1 referencing FCC CFR Part 2.1046(a)

Environmental Conditions:

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

Results: GSM Circuit Switched

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	30.0	33.0	3.0	Complied
Middle	1879.8	30.0	33.0	3.0	Complied
Top	1909.8	30.0	33.0	3.0	Complied

Results: GPRS

Channel	Measured Frequency (MHz)	Conducted RF Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	29.8	33.0	3.2	Complied
Middle	1879.8	29.8	33.0	3.2	Complied
Top	1909.8	29.8	33.0	3.2	Complied

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:

Ambient Temperature (°C):	24
Ambient Relative Humidity (%):	30

Results: Bottom Channel (1850.2 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	105	1850.200105	1850.0	0.200105	Complied
-20	85	1850.200085	1850.0	0. 200085	Complied
-10	81	1850.200081	1850.0	0.200081	Complied
0	65	1850.200065	1850.0	0. 200065	Complied
10	44	1850.200044	1850.0	0.200044	Complied
20	42	1850.200042	1850.0	0.200042	Complied
30	49	1850.200049	1850.0	0.200049	Complied
40	47	1850.200047	1850.0	0.200047	Complied
50	60	1850.200060	1850.0	0.200060	Complied

Results: Top Channel (1909.8 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	75	1909.800075	1910.0	0.199925	Complied
-20	68	1909.800068	1910.0	0.199932	Complied
-10	70	1909.800070	1910.0	0.199930	Complied
0	67	1909.800067	1910.0	0.199933	Complied
10	63	1909.800063	1910.0	0.199937	Complied
20	63	1909.800063	1910.0	0.199937	Complied
30	50	1909.800050	1910.0	0.199950	Complied
40	56	1909.800056	1910.0	0.199944	Complied
50	51	1909.800051	1910.0	0.199949	Complied

5.3.3.1. 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):	20
Relative Humidity (%):	30

Results: Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.22	41	1850.200041	1850.0	0.200041	Complied
4.5	47	1850.200047	1850.0	0.200047	Complied

Results: Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.22	53	1908.800053	1910.0	0.199947	Complied
4.5	49	1908.800049	1910.0	0.199951	Complied

5.3.4. Transmitter Occupied Bandwidth

Test Summary:

FCC Part:	24.238
Test Method Used:	As detailed in ANSI C63.4 Section13.7 and relevant annexes referencing FCC CFR Part 2.1049 (see note below)

Environmental Conditions:

Temperature (°C):	27
Relative Humidity (%):	30

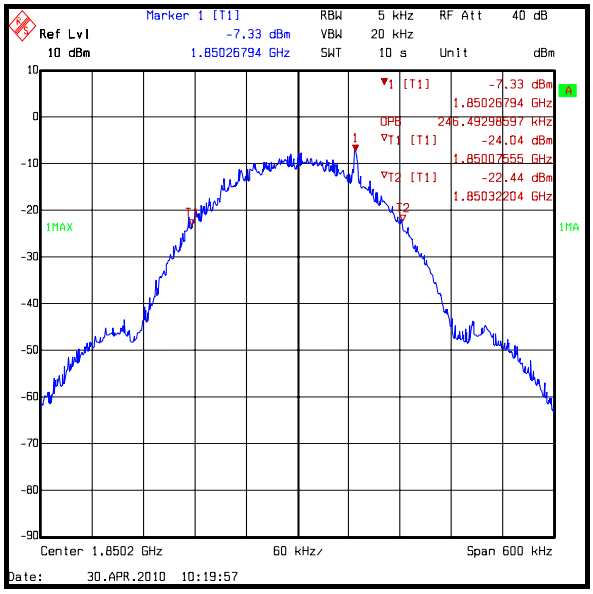
Results: GSM Circuit Switched

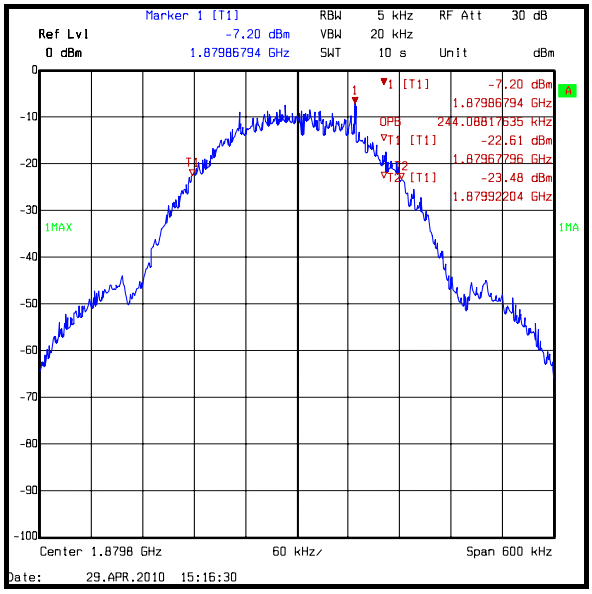
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	246.493
Middle	1879.8	244.088
Top	1909.8	244.088

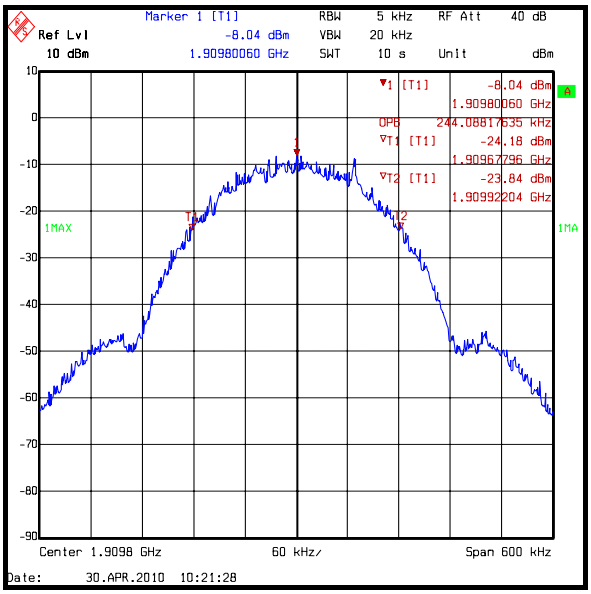
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section13.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







Transmitter Occupied Bandwidth (continued)

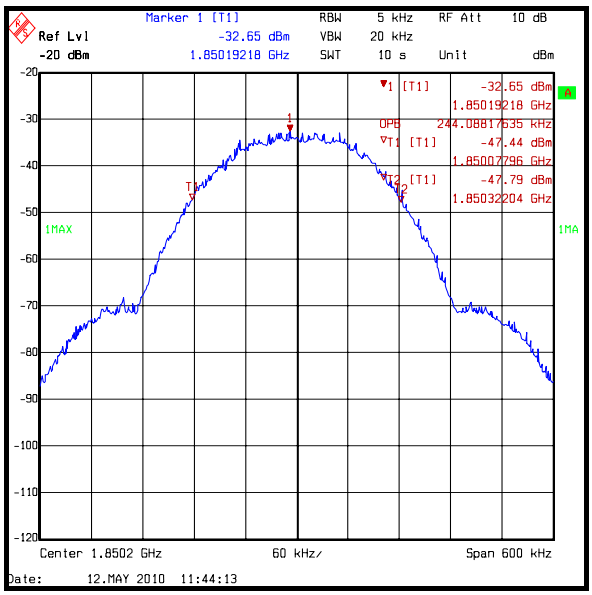
Results: GPRS

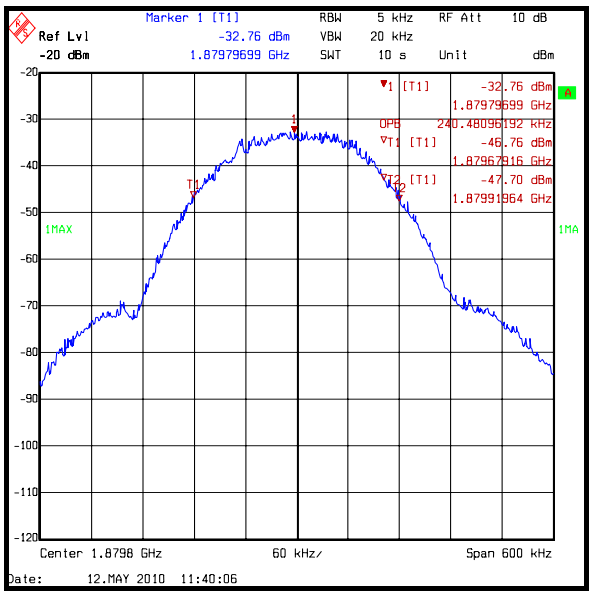
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	244.088
Middle	1879.8	240.481
Top	1909.8	240.481

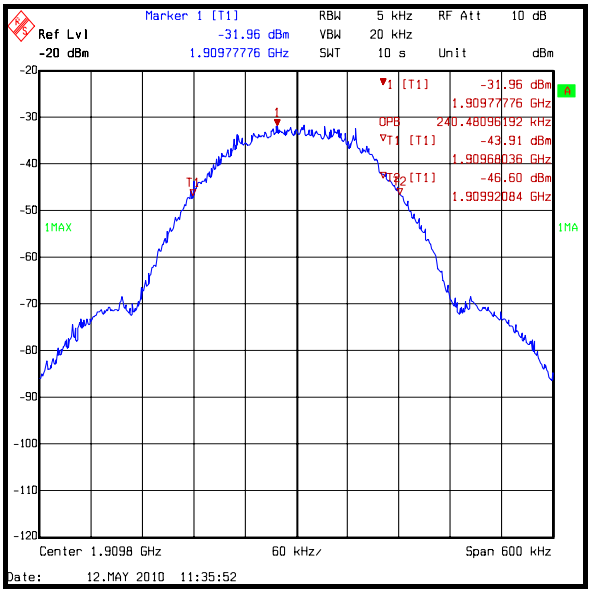
Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section13.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.

Transmitter Occupied Bandwidth (continued)







5.3.5. Transmitter Out of Band Conducted Emissions

Test Summary:

FCC Part:	2.1051 & 24.238
Frequency Range:	9 kHz to 20 GHz
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC CFR Part 2.1051

Environmental Conditions:

Temperature (°C):	27
Relative Humidity (%):	30

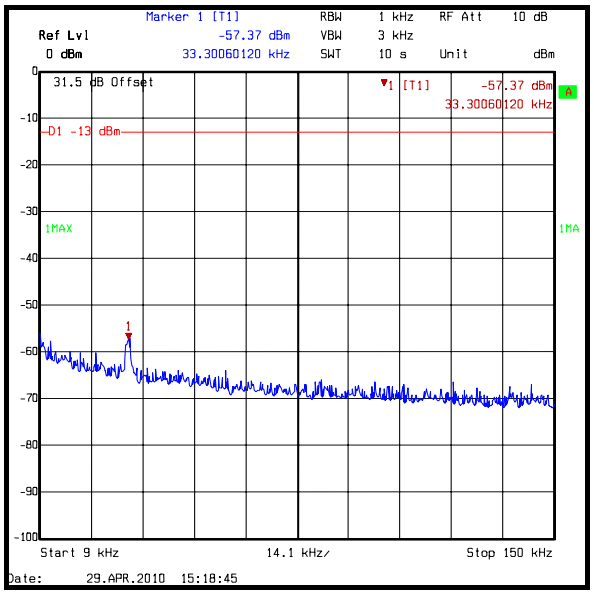
Results: Top Channel

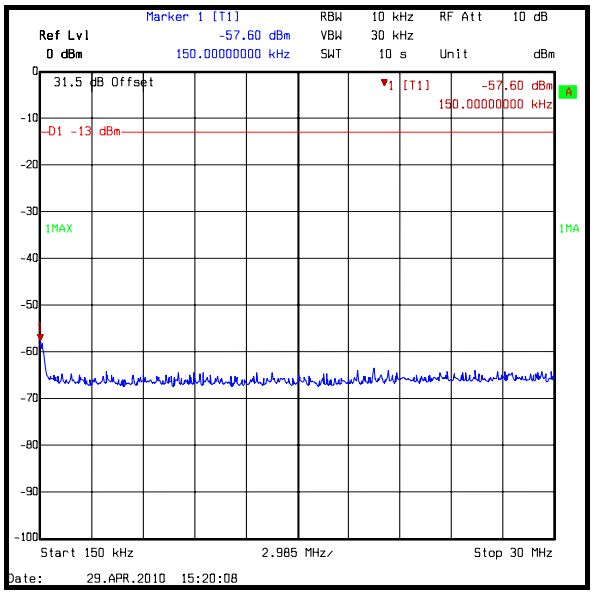
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
9551.603	-40.8	-13.0	27.8	Complied

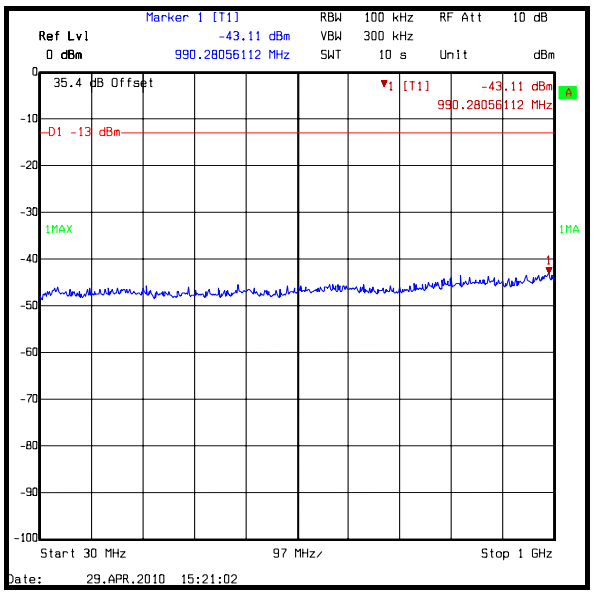
Note(s):

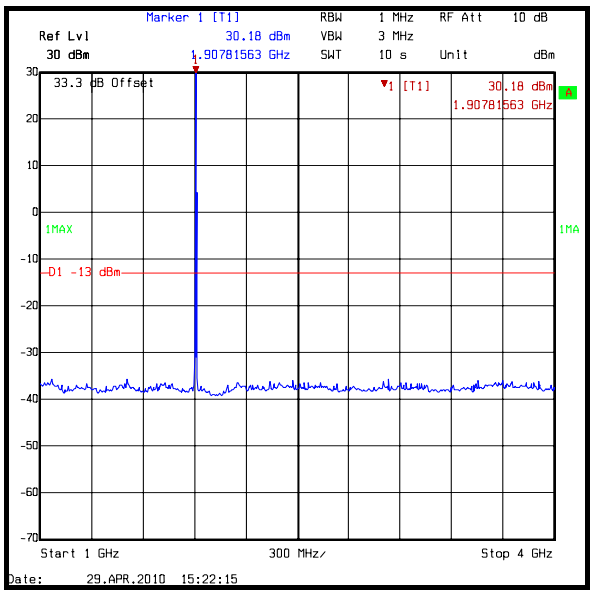
1. All emissions were investigated and found to be at least 20 dB below the specified limit; therefore the highest emission level was recorded as shown in the table above.
2. The emission shown at approximately 1907.8 MHz on the 1 MHz to 4 GHz plot is the carrier.

Transmitter Out of Band Conducted Emissions (continued)

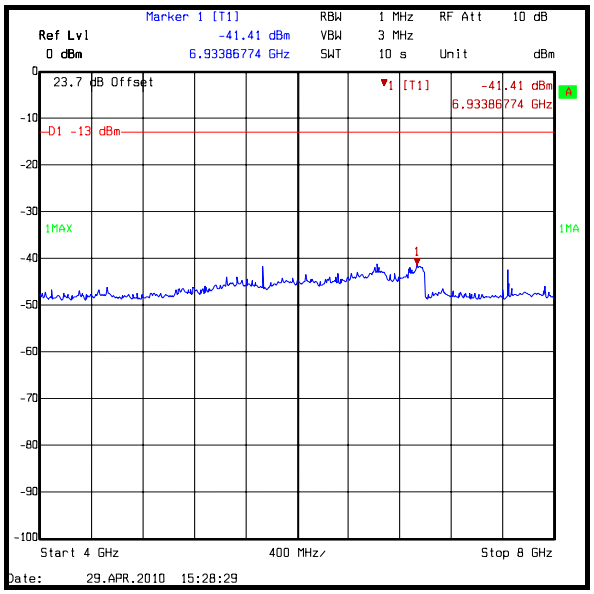


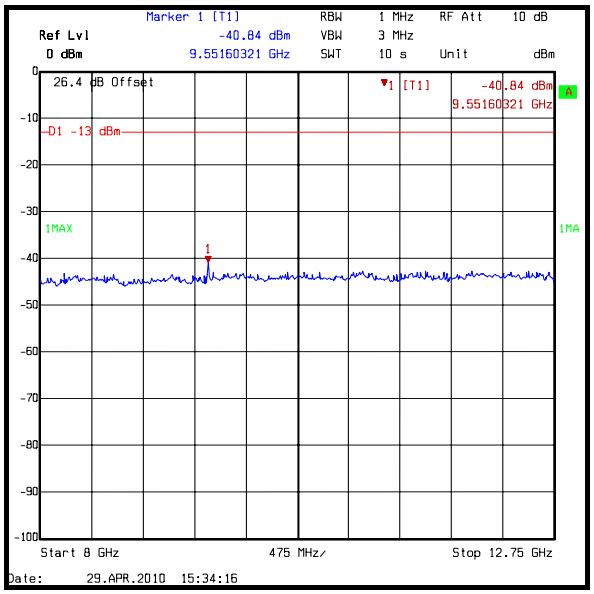


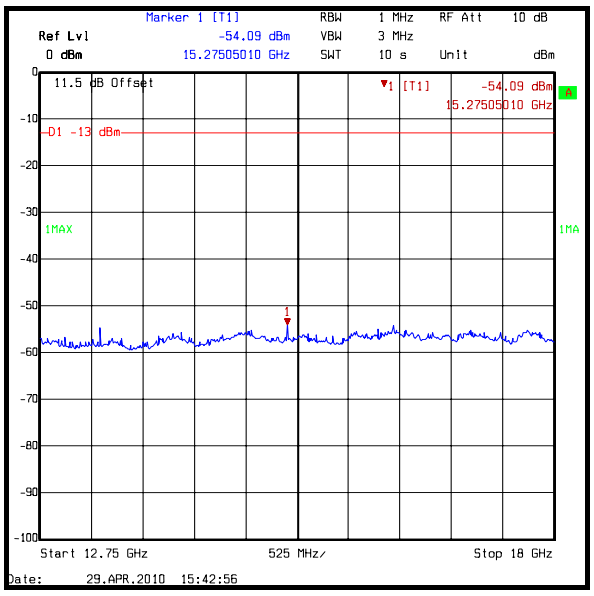


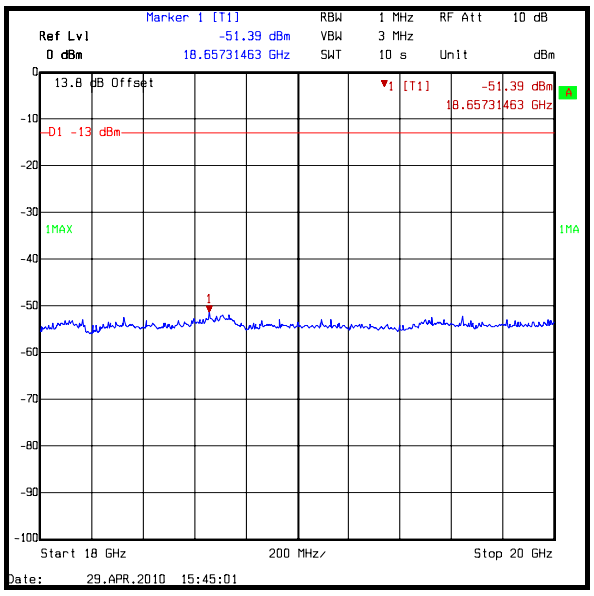


Transmitter Out of Band Conducted Emissions (continued)









5.3.6. Transmitter Conducted Emissions at Band Edges

Test Summary:

FCC Part:	2.1051 & 24.238
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC CFR Part 2.1051 and 24.238

Environmental Conditions:

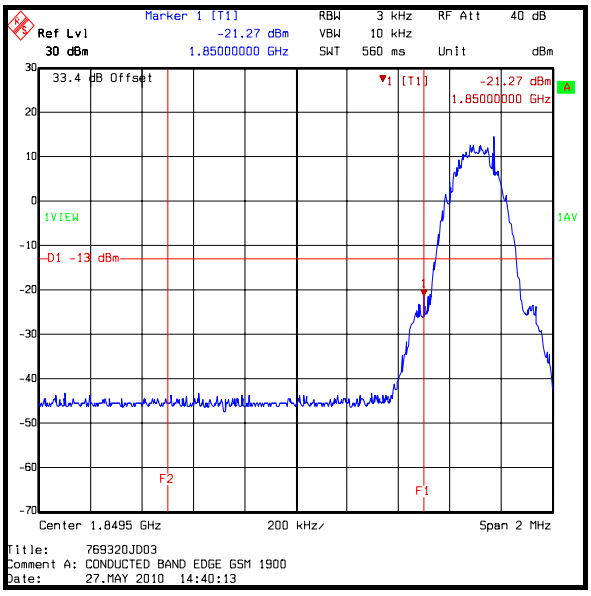
Temperature (°C):	28
Relative Humidity (%):	26

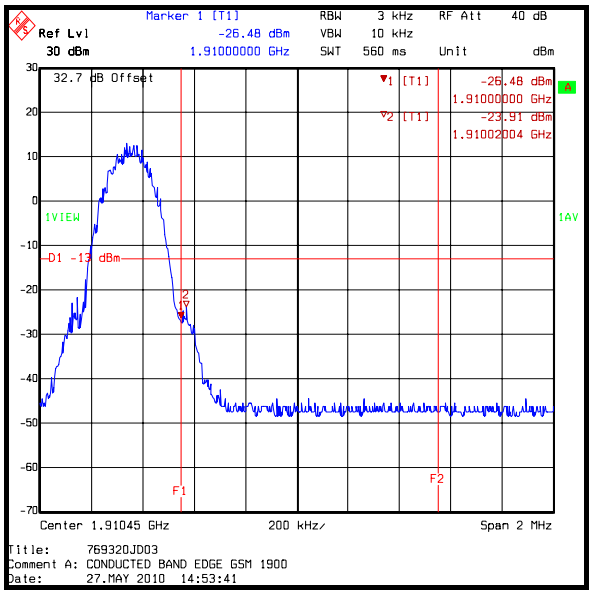
Results: GSM Circuit Switched Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1850	-21.3	-13.0	8.3	Complied

Results: GSM Circuit Switched Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1910	-26.5	-13.0	13.5	Complied
1910.024	-23.9	-13.0	10.9	Complied





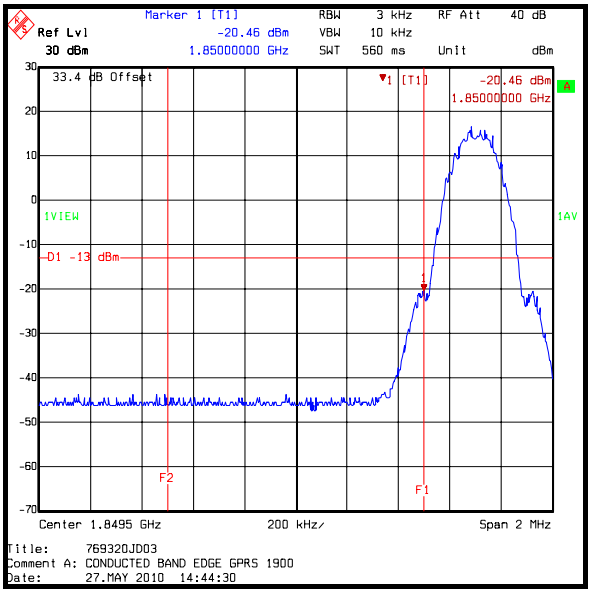
Transmitter Conducted Emissions at Band Edges (continued)

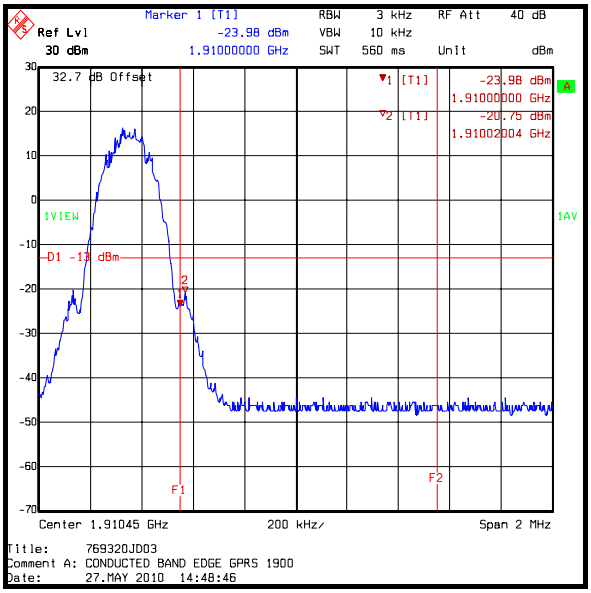
Results: GPRS Lower Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1850	-20.5	-13.0	7.5	Complied

Results: GPRS Upper Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Band edge limit (dBm)	Margin (dB)	Result
1910	-24.0	-13.0	11.0	Complied
1910.020	-20.8	-13.0	7.8	Complied





5.3.7. Transmitter Out of Band Radiated Emissions

Test Summary:

FCC Part:	2.1053 & 24.238
Frequency Range:	30 MHz to 20 GHz
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):	28
Relative Humidity (%):	23

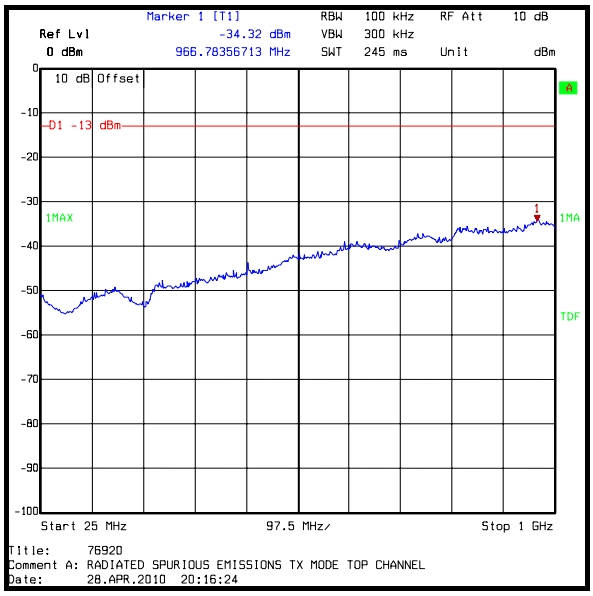
Results: Top Channel

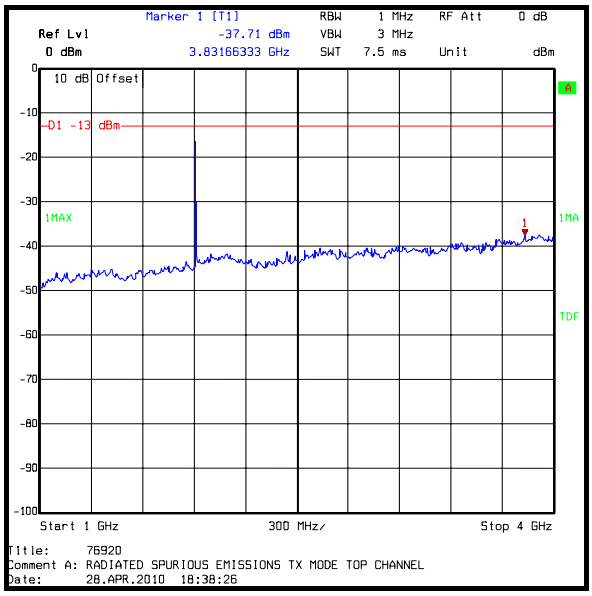
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
18000.000	-24.9	-13.0	11.9	Complied

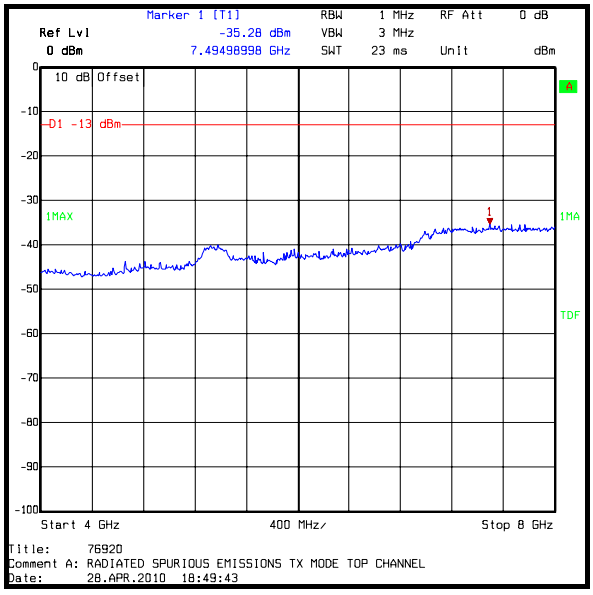
Note(s):

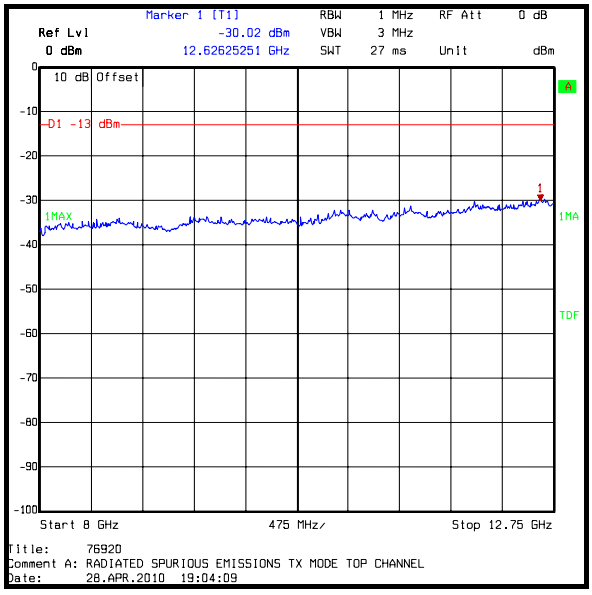
1. All emissions were below the noise floor of the measuring receiver; therefore the highest level of noise floor level was recorded in the table above.
2. The transmitter fundamental is shown on the 1 GHz to 4 GHz plot at approximately 1907.8 MHz

Transmitter Out of Band Radiated Emissions (continued)

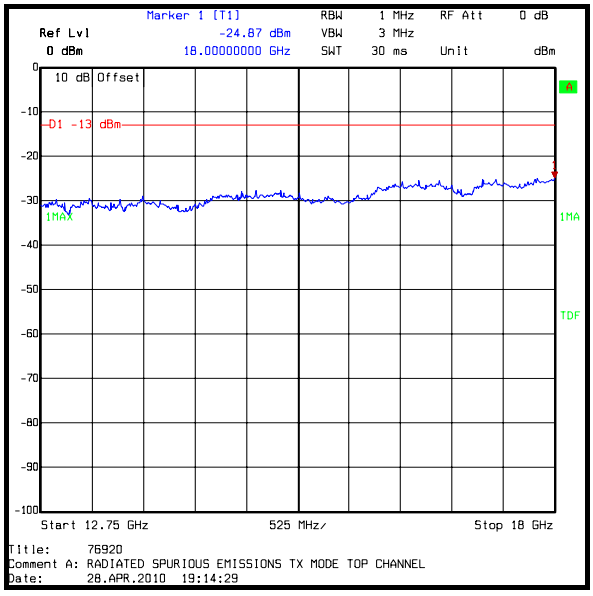


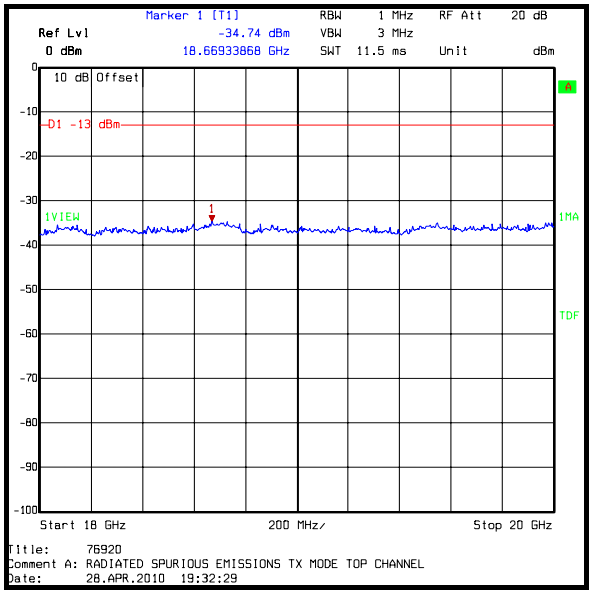






Transmitter Out of Band Radiated Emissions (continued)





5.3.8. 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):	28
Relative Humidity (%):	23

Results: GSM Circuit Switched - Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
See note below				

Results: GSM Circuit Switched - Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dBm)	Result
See note below				

Note(s):

1. Transmitter Band Edge Radiated Emissions was not performed for GSM1900, 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.

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
Conducted Output Power	Not applicable	95%	±0.28 dB
Frequency Stability	Not applicable	95%	±0.92 ppm
Occupied Bandwidth	Not applicable	95%	±0.92 ppm
Conducted Spurious Emissions	9 kHz to 20 GHz	95%	±2.64 dB
Radiated Spurious Emissions	30 MHz 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 Calibration Due	Cal. Interval (Months)
A1391	Attenuator	Huber & Suhner	757987	6810.17.B	Calibrated before use	-
A1392	Attenuator	Huber & Suhner	757456	6820.17.B	Calibrated before use	-
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	Calibrated before use	-
A1537	Directional Coupler	Hewlett Packard	778D	1144A05122	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2010	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	19 Aug 2010	12
A288	Antenna	Chase	CBL6111A	1589	16 Mar 2011	12
A436	Antenna	Flann	20240-20	330	11 May 2013	36
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2010	12
L1005	Radio Comms Tester	Rohde & Schwarz	CMU200	116284	23 Mar 2010	12
M1068	Thermometer	Iso-Tech	RS55	93102884	01 Oct 2010	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M122	Digital Voltmeter	Fluke	77	64910017	23 Jun 2010	12
M1223	Votsch VT4002	Votsch	VT4002	585660727 20010	03 Dec 2008	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	18 Mar 2011	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	10 Jul 2010	12
S0537	Power Supply	TTI	EL302D	249928	Calibrated before use	-

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