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**Test Report:** 87295-1TRFWL


**Applicant:** Trilliant Networks  
950 Cowie Street  
Grandby, QC  
J2J 1P2 Canada

**Apparatus:** Q24PL

**FCC ID:** TMB-TNQ24PL

**In Accordance With:** FCC Part 22 Subpart H  
Cellular Radiotelephone Service

**Tested By:** Nemko Canada Inc.  
303 River Road  
Ottawa, Ontario  
K1V 1H2

**Authorized By:**   
Roman Kuleba, Wireless Specialist

**Date:** July 24, 2007

**Total Number of Pages:** 25

## Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 22. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

<b>Apparatus Assessed:</b>	Q24PL
<b>Specification:</b>	FCC Part 22 Subpart H Cellular Radiotelephone Service
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None
<b>Report Release History:</b>	Original Release

Author: Heng Lin    EMC / Wireless Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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## **Section 1 : Equipment Under Test**

### **1.1 Product Identification**

The Equipment Under Test was identified as follows:

QP24PL

### **1.2 Samples Submitted for Assessment**

The following samples of the apparatus have been submitted for type assessment:

<b>Sample No.</b>	<b>Description</b>	<b>Serial No.</b>
1	GSM/GPRS Radio Module QP24PL	None

The first samples were received on: May 25, 2007

**1.3 Technical Specifications of the EUT**

<b>Manufacturer:</b>	Trilliant Networks
<b>Operating Frequency:</b>	824.2-848.8MHz (Channel 128-Channel 251)
<b>Emission Designator:</b>	GXW
<b>Rated Power:</b>	32 dBm +/- 2 dBm
<b>Measured Power:</b>	32.29 dBm (conducted Output Power)
<b>Modulation:</b>	GSM/GPRS
<b>Antenna Data:</b>	(1) Whip Antenna: 5 dBi (2) Patch Antenna: 3 dBi (3) Body Mount Antenna: 3 dBi
<b>Antenna Connector:</b>	(1) Whip Antenna: FME, Mini-UHF, TNC (2) Patch Antenna: SMA/M (3) Body Mount Antenna: SMA/M
<b>Power Source:</b>	3.6VDC

## Section 2 : Test Conditions

### 2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures  
FCC Part 22 Subpart H Cellular Radiotelephone Service

### 2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

### 2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range : 15 – 30 °C  
Humidity range : 20 - 75 %  
Pressure range : 86 - 106 kPa  
Power supply range : +/- 5% of rated voltages

### 2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Wireless Communication Test set	Agilent	E5515C	1007701	Oct. 17/07
Spectrum Analyzer	Rohde & Schwarz	FSP	FA001920	March 19/08
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	Jan 16/08
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU	FA002043	Oct. 24/07
Biconical (2) Antenna	EMCO	3109	FA000904	Sept. 12/07
Log Periodic Antenna #2	EMCO	3148	FA001355	June 15/07
Horn Antenna #2	EMCO	3115	FA000825	Jan. 30/08
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 02/07
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 02/07
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	Aug. 02/07
5.0 – 18.0 GHz Amplifier	NARDA	DWT-186N23U40	FA001409	COU
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR
Multimeter	Fluke	16	FA001831	Jan 10/08

COU – Calibrate on Use

NCR – No Calibration Required

## **Section 3 : Observations**

### **3.1 Modifications Performed During Assessment**

No modifications were performed during assessment.

### **3.2 Record Of Technical Judgements**

No technical judgements were made during the assessment.

### **3.3 EUT Parameters Affecting Compliance**

The user of the apparatus could not alter parameters that would affect compliance.

### **3.4 Test Deleted**

No Tests were deleted from this assessment.

### **3.5 Additional Observations**

There were no additional observations made during this assessment.

## **Section 4 : Results Summary**

This section contains the following:

FCC Part 22 Subpart H : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.



**4.1 FCC Part 22 Subpart H : Test Results**

Clause	Test Method	Test Description	Required	Result
22.913(a)	2.1046	Effective Radiated Power Limits	Y	PASS
22.917(b)	2.1049	Occupied bandwidth	Y	PASS
22.917(a)	2.1051	Spurious Emissions at the antenna terminal	Y	PASS
22.917(a)	2.1053	Field strength of spurious radiation	Y	PASS
22.355	2.1055	Frequency stability	Y	PASS

Notes:

## Appendix A : Test Results

### Clause 22.913(a) Effective Radiated Power Limits

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

- (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
- (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

#### Test Conditions:

<b>Sample Number:</b>	1	<b>Temperature:</b>	20 °C
<b>Date:</b>	June 06, 2007	<b>Humidity:</b>	43 %
<b>Modification State:</b>	0	<b>Tester:</b>	Heng Lin
		<b>Laboratory:</b>	Ottawa

#### Test Results:

See attached table.

#### Additional Information:

The test was conducted using spectrum analyser with peak detector. The RBW/VBW setting was 1MHz/3MHz.

**Limits:** 7W (38.45dBm), ERP

**(1) Whip Antenna 5dBi, or 2.85dBd**

**Effective Radiated Power Data -GSM**

EUT Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBd)	Effective Output Power (dBm)	ERP Limit (dBm)
128	32.22	2.85	35.07	38.45
190	32.14	2.85	34.99	38.45
251	32.05	2.85	34.90	38.45

**Effective Radiated Power Data -GPRS**

EUT Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBd)	Effective Output Power (dBm)	ERP Limit (dBm)
128	32.29	2.85	35.14	38.45
190	32.18	2.85	35.03	38.45
251	32.06	2.85	34.91	38.45

**(2) Patch and Body Mount Antenna 3dBi, or 0.85dBd**

**Effective Radiated Power Data -GSM**

EUT Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBd)	Effective Output Power (dBm)	ERP Limit (dBm)
128	32.22	0.85	33.07	38.45
190	32.14	0.85	32.99	38.45
251	32.05	0.85	32.90	38.45

**Effective Radiated Power Data -GPRS**

EUT Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBd)	Effective Output Power (dBm)	ERP Limit (dBm)
128	32.29	0.85	33.14	38.45
190	32.18	0.85	33.03	38.45
251	32.06	0.85	32.91	38.45

**Clause 22.917(b) Occupied Bandwidth**

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

**Test Conditions:**

<b>Sample Number:</b>	1	<b>Temperature:</b>	20 °C
<b>Date:</b>	June 07, 2007	<b>Humidity:</b>	40 %
<b>Modification State:</b>	0	<b>Tester:</b>	Heng Lin
		<b>Laboratory:</b>	Ottawa

**Test Results:**

See attached tables and plots.

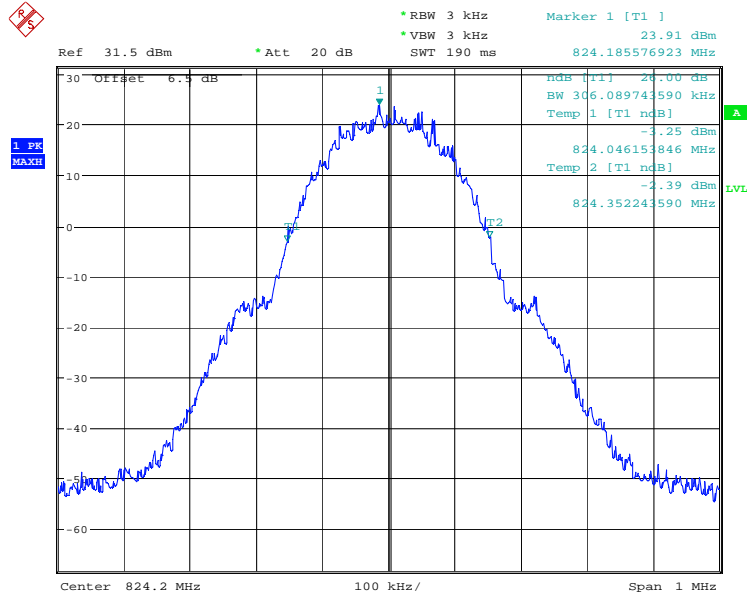
**Occupied Bandwidth- GSM**

Channel No.	Measured Occupied Bandwidth (KHz)
128	306.09
190	301.28
251	310.90

**Occupied Bandwidth- GPRS**

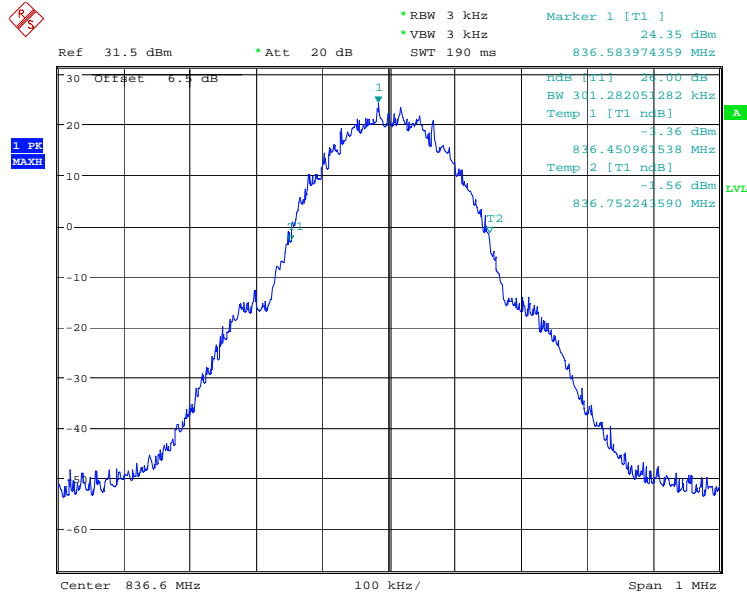
Channel No.	Measured Occupied Bandwidth (KHz)
128	309.29
190	310.90
251	307.69

GSM – Channel 128



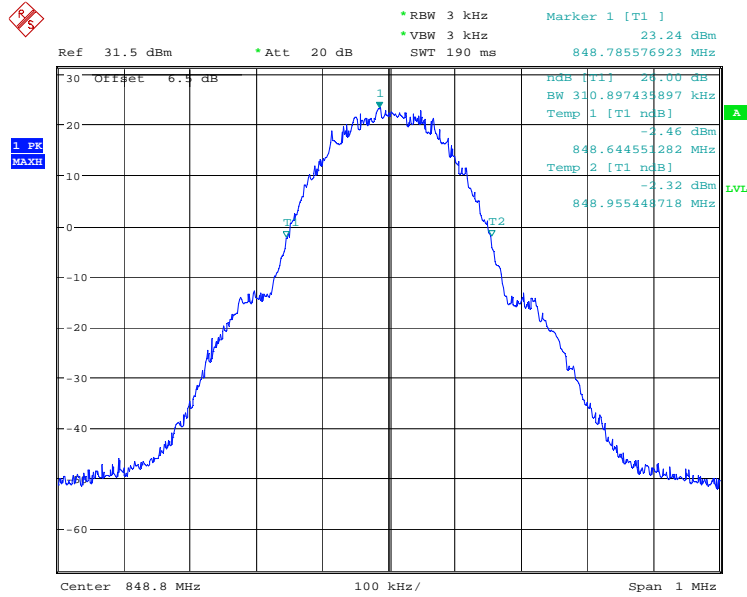
Date: 7.JUN.2007 15:47:35

GSM – Channel 190



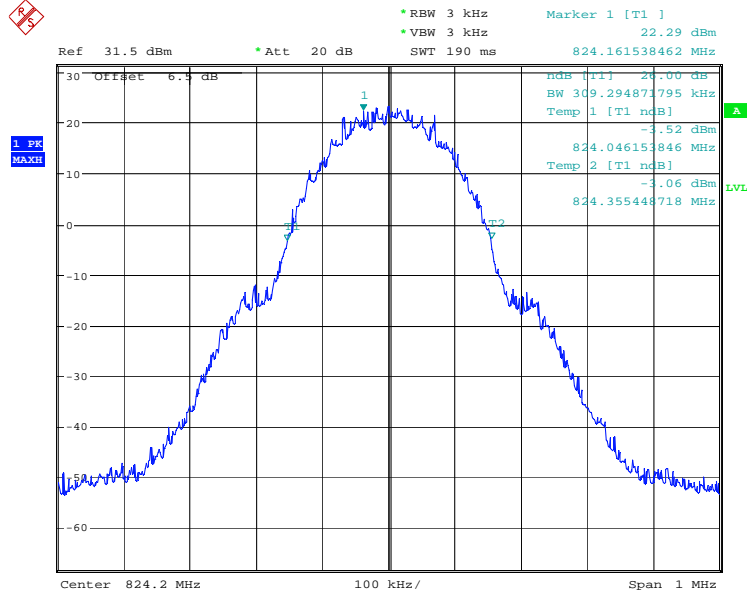
Date: 7.JUN.2007 15:46:03

GSM – Channel 251



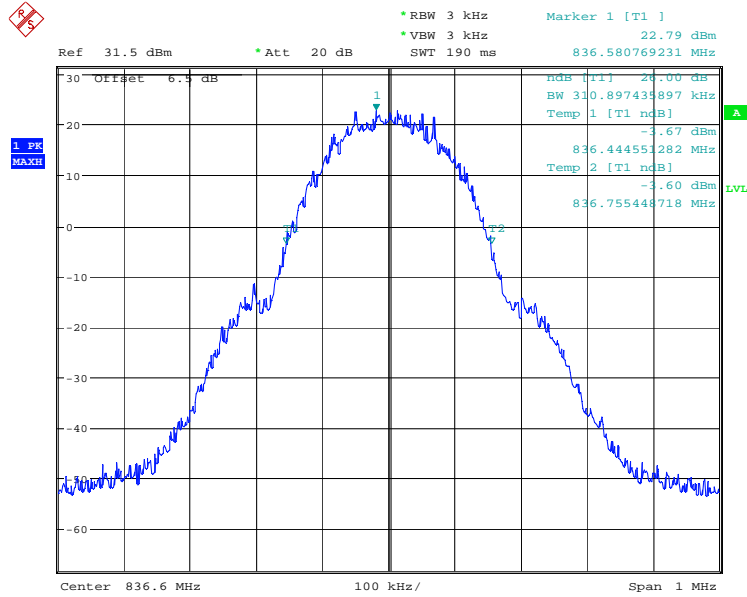
Date: 7.JUN.2007 15:44:20

GPRS – Channel 128



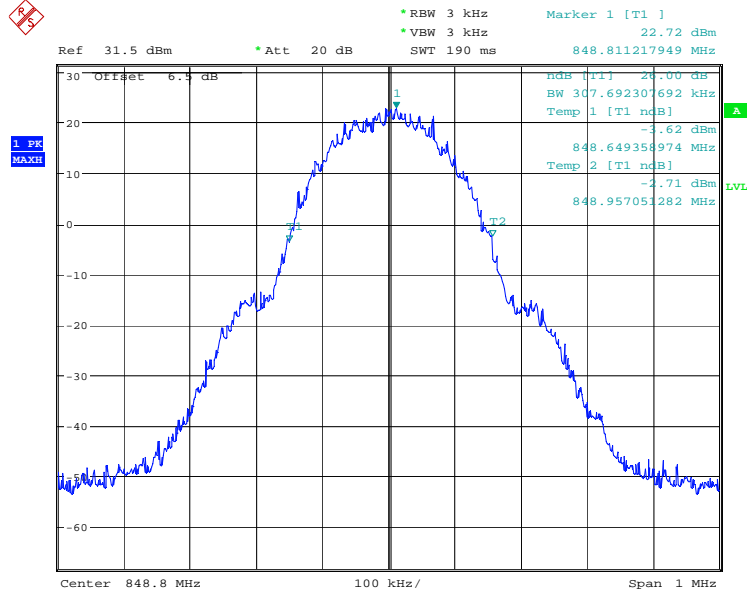
Date: 7.JUN.2007 15:23:36

GPRS – Channel 190



Date: 7.JUN.2007 15:26:00

GPRS – Channel 251



Date: 7.JUN.2007 15:27:35

**Clause 22.917(a) Spurious emissions at the antenna terminal**

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Test Conditions:**

<b>Sample Number:</b>	1	<b>Temperature:</b>	20 °C
<b>Date:</b>	June 07, 2007	<b>Humidity:</b>	40 %
<b>Modification State:</b>	0	<b>Tester:</b>	Heng Lin
		<b>Laboratory:</b>	Ottawa

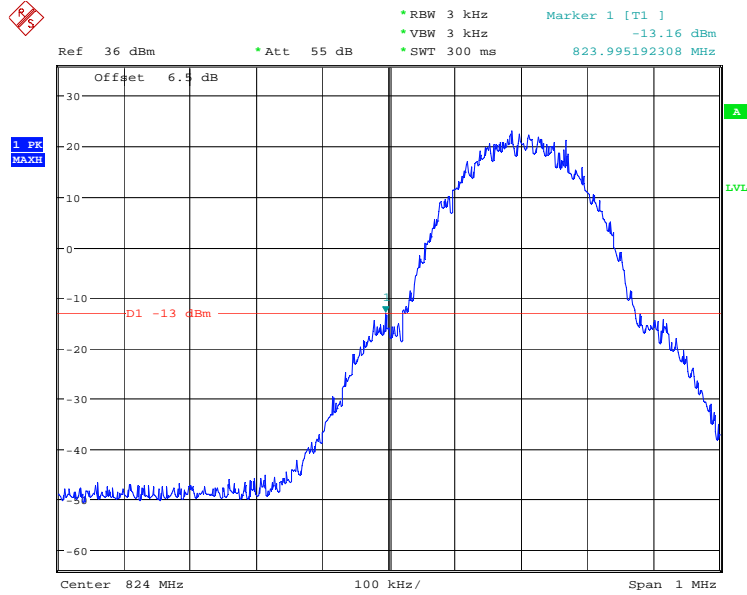
**Test Results:**

See Attached Plots.

**Limits:** -13 dBm

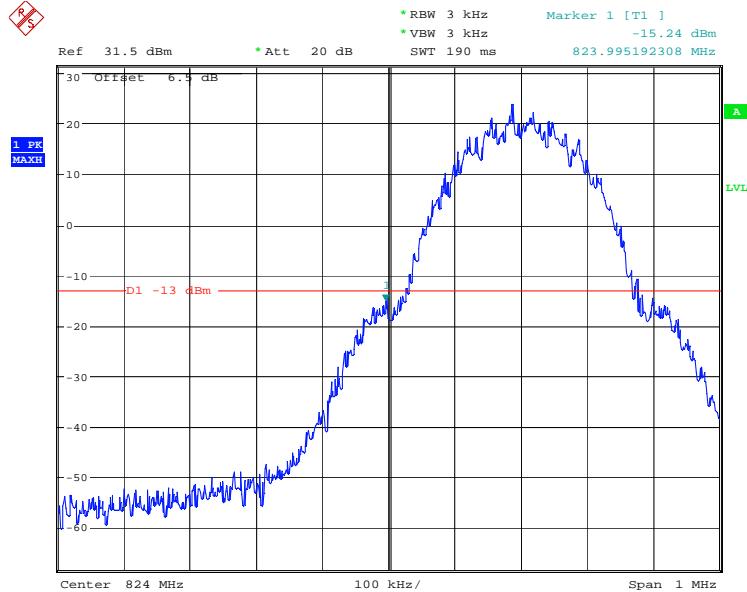


### Band Edge Checking Low Band Edge - Channel 128 GSM



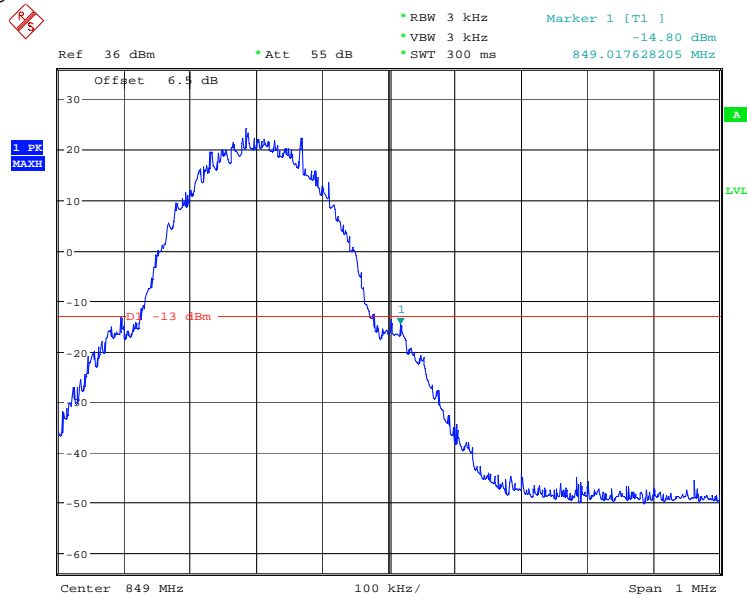
Date: 7.JUN.2007 12:35:09

### Low Band Edge - Channel 128 GPRS



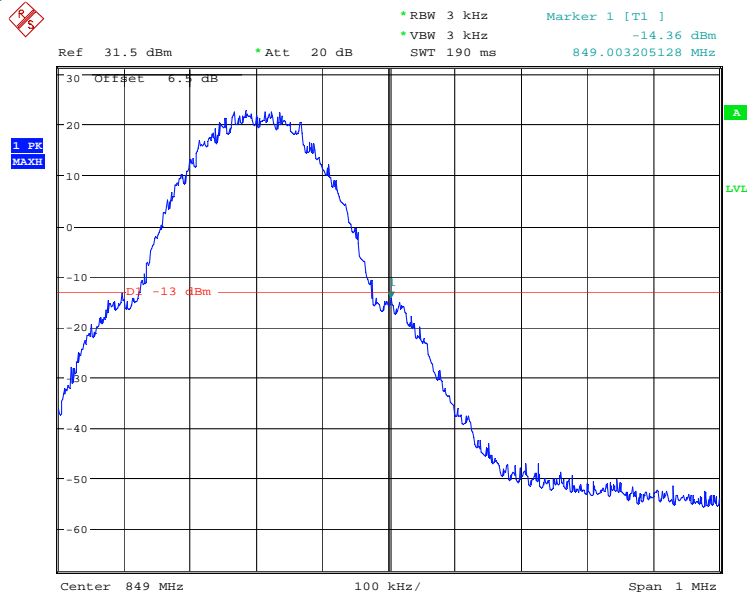
Date: 7.JUN.2007 15:59:32

High Band Edge - Channel 251 GSM



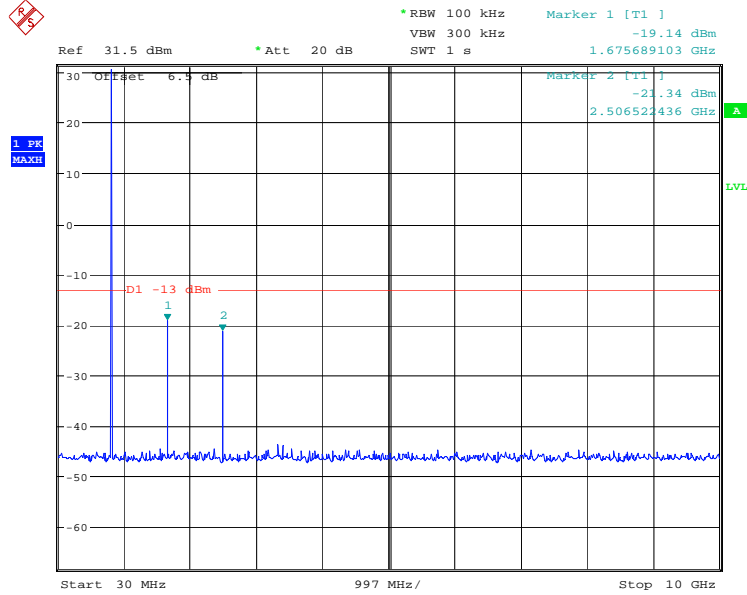
Date: 7.JUN.2007 12:37:23

High Band Edge - Channel 251 GPRS



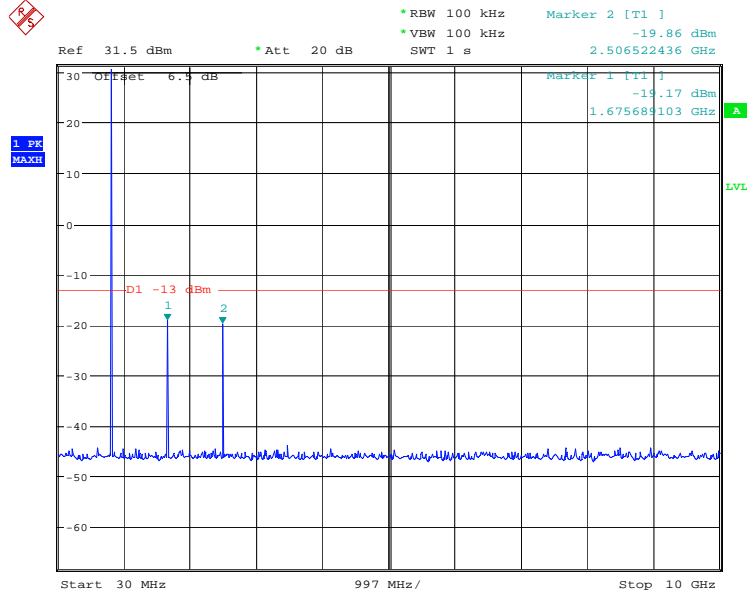
Date: 7.JUN.2007 15:57:28

Channel 190 - GSM



Date: 7.JUN.2007 14:23:59

Channel 190 - GPRS



Date: 7.JUN.2007 16:12:59

**Clause 22.917(a) Field Strength of spurious radiation**

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**Test Conditions:**

<b>Sample Number:</b>	1	<b>Temperature:</b>	20 °C
<b>Date:</b>	June 13, 2007	<b>Humidity:</b>	43 %
<b>Modification State:</b>	0	<b>Tester:</b>	Heng Lin
		<b>Laboratory:</b>	Ottawa

**Test Results:**

See attached table.

**Additional Observations:**

The Spectrum was searched from 30MHz to the 10<sup>th</sup> Harmonic.

All measurements were performed using a Peak Detector with 100 kHz RBW / VBW below 1 GHz and a 1 MHz RBW / VBW above 1 GHz at a distance of 3 meters.

The low, medium and high frequency have been evaluated.

Freq. (MHz)	Ant.	Pol. V/H	RCVD Signal (dBμV)	Sig Sub. Factor (dB)	Signal Substitution Power (dBm)	Limit (dBm)	Margin (dB)	Detector
1033.5330	Horn2	V	79.8	-119.2	-39.4	-13.0	26.4	Peak
1661.5421	Horn2	V	60.1	-118.7	-58.6	-13.0	45.6	Peak
Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole								

RF Output Signal Level (ERP)= Receiver Signal Level + Signal Substitution Factor.

Signal Substitution Factor = Reference signal level from signal generator

- Reference signal level received from spectrum analyzer reading
- +Antenna gain
- Cable loss

**Clause 22.335 Frequency Stability**

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1. - Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

**Test Conditions:**

<b>Sample Number:</b>	1	<b>Temperature:</b>	22 °C
<b>Date:</b>	June 08, 2007	<b>Humidity:</b>	45 %
<b>Modification State:</b>	0	<b>Tester:</b>	Heng Lin
		<b>Laboratory:</b>	Ottawa

**Test Results:** See Attached Table.

**Test Conditions** Ambient Temperature: 22°C  
 Extreme Temperature: -30°C to +50°C  
 Extreme Voltage Conditions: +/-15% of 3.6VDC

**Limit:** Frequency drift ± 2.5 ppm  
 Frequency range 824 MHz – 849 MHz

**Frequency Stability Test:**

Test Condition		Measured Frequency (MHz)	Frequency Drift (kHz)	Frequency Drift (ppm)
Temperature	Voltage			
+21°C	3.6VDC	F <sub>L</sub> 824.0477564	---	---
		F <sub>H</sub> 848.9522436	---	---
	4.14VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
	3.06VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
+50°C	3.6VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
+40°C	3.6VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
+30°C	3.6VDC	F <sub>L</sub> 824.0465513	-1.2	-1.46
		F <sub>H</sub> 848.9538462	1.6	1.89
+20°C	3.6VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
+10°C	3.6VDC	F <sub>L</sub> 824.0493590	1.6	1.94
		F <sub>H</sub> 848.9522436	0	0
0°C	3.6VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9538462	1.6	1.89
-10°C	3.6VDC	F <sub>L</sub> 824.0477564	0	0
		F <sub>H</sub> 848.9522436	0	0
-20°C	3.6VDC	F <sub>L</sub> 824.0493590	1.6	1.94
		F <sub>H</sub> 848.9506410	-1.6	-1.89
-30°C	3.6VDC	F <sub>L</sub> 824.0496615	1.9	2.31
		F <sub>H</sub> 848.9536462	1.4	1.65

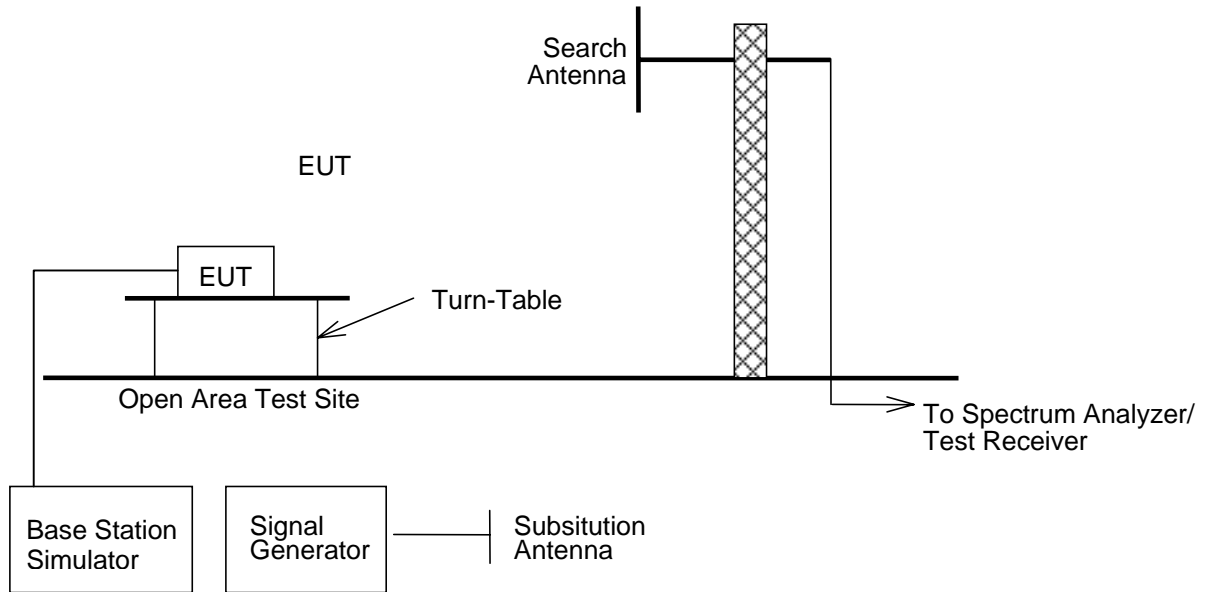
## **Appendix B : Setup Photographs**

### **Radiated Spurious Emissions Setup:**

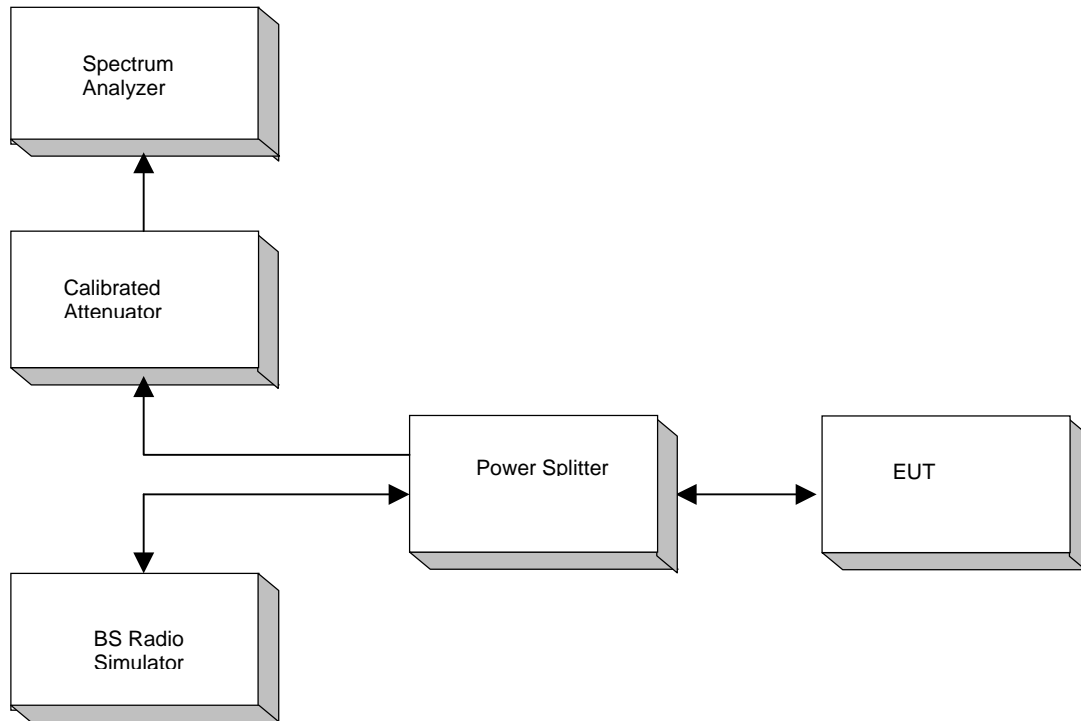


### Appendix C : Block Diagram of Test Setups

#### Test Site For Radiated Emissions



#### Conducted Measurement





### Frequency Stability Test

