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Test Report: 87295-2TRFWL


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

Apparatus: Q24PL

FCC ID: TMB-TNQ24PL

In Accordance With: FCC Part 24 Personal Communications Services
Subpart E Broadband PCS

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
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Authorized By: 
Roman Kuleba, Wireless Specialist

Date: August 16, 2007

Total Number of Pages: 26

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24. 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:

Apparatus Assessed:	Q24PL
Specification:	FCC Part 24 Subpart E Broadband PCS
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	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:

Q24PL

1.2 Samples Submitted for Assessment

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

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

The first samples were received on: May 25, 2007

1.3 Technical Specifications of the EUT

Manufacturer:	Trilliant Networks
Operating Frequency:	1850.2-1909.8MHz, (Channel 512 –Channel 810)
Emission Designator:	GXW
Rated Power:	30 dBm+/- 2 dBm
Measured Power:	26.82dBm
Modulation:	GSM/GPRS
Antenna Data:	(1) Whip Antenna: 5 dBi (2) Patch Antenna: 3 dBi (3) Body Mount Antenna: 5 dBi
Antenna Connector:	(1) Whip Antenna: FME, Mini-UHF, TNC (2) Patch Antenna: SMA/M (3) Body Mount Antenna: SMA/M
Power Source:	3.6 VDC

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 24 Subpart E, Broadband PCS

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 24 Subpart E : Test Results

Clause	Test Method	Test Description	Required	Result
24.232(c)	2.1046	EIRP Limits	Y	PASS
24.238(b)	2.1049	Occupied bandwidth	Y	PASS
24.238(a)	2.1051	Spurious Emissions at the antenna terminal	Y	PASS
24.238(a)	2.1053	Field strength of spurious radiation	Y	PASS
24.235	2.1055	Frequency stability	Y	PASS

Notes:

Appendix A : Test Results

Clause 24.232(C) Effective Isotropic Radiated Power Limits

Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Test Conditions:

Sample Number:	1	Temperature:	20 °C
Date:	June 06, 2007	Humidity:	43 %
Modification State:	0	Tester:	Heng Lin
		Laboratory:	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: 2W (33 dBm), EIRP

(1) Whip and Body Mount Antenna 5dBi, or 2.85dBd

Equivalent Isotropic Radiated Power Data - GSM

Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBi)	Equivalent Isotropic Output Power (dBm)	ERP Limit (dBm)
512	26.82	5	31.82	33
661	25.64	5	30.64	33
810	25.81	5	30.81	33

Equivalent Isotropic Radiated Power Data - GPRS

Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBi)	Equivalent Isotropic Output Power (dBm)	ERP Limit (dBm)
512	26.51	5	31.51	33
661	26.18	5	31.18	33
810	25.76	5	30.76	33

(2) Patch Antenna 3dBi, or 0.85dBd

Equivalent Isotropic Radiated Power Data - GSM

Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBi)	Equivalent Isotropic Output Power (dBm)	ERP Limit (dBm)
512	26.82	3	29.82	33
661	25.64	3	28.64	33
810	25.81	3	28.81	33

Equivalent Isotropic Radiated Power Data - GPRS

Channel	Measured Conducted Output Power (dBm)	Antenna Gain (dBi)	Equivalent Isotropic Output Power (dBm)	ERP Limit (dBm)
512	26.51	3	29.51	33
661	26.18	3	29.18	33
810	25.76	3	28.76	33

Clause 24.238(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:

Sample Number:	1	Temperature:	21°C
Date:	June 07, 2007	Humidity:	45%
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Data: See Attached tables and plots

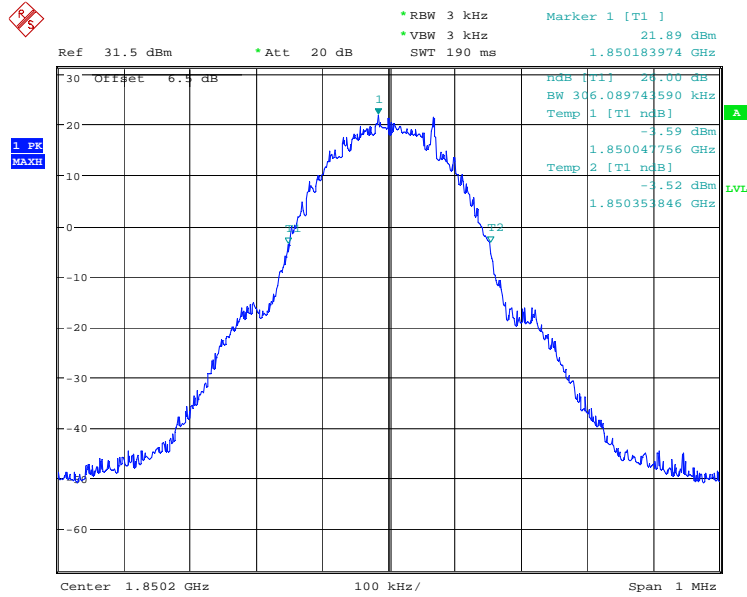
Occupied Bandwidth - GSM

Channel	Measured Occupied Bandwidth (KHz)
512	306.09
661	309.29
810	307.69

Occupied Bandwidth - GPRS

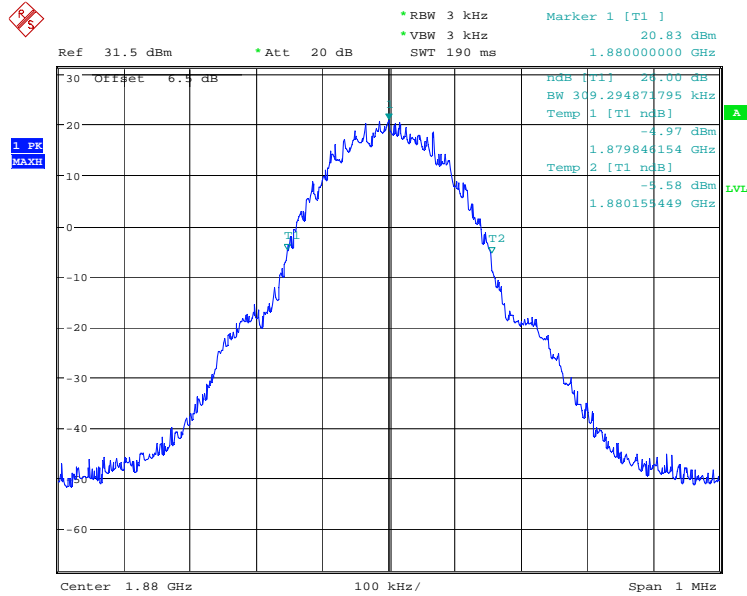
Channel	Measured Occupied Bandwidth (KHz)
512	307.69
661	309.29
810	307.69

GSM – Channel 512



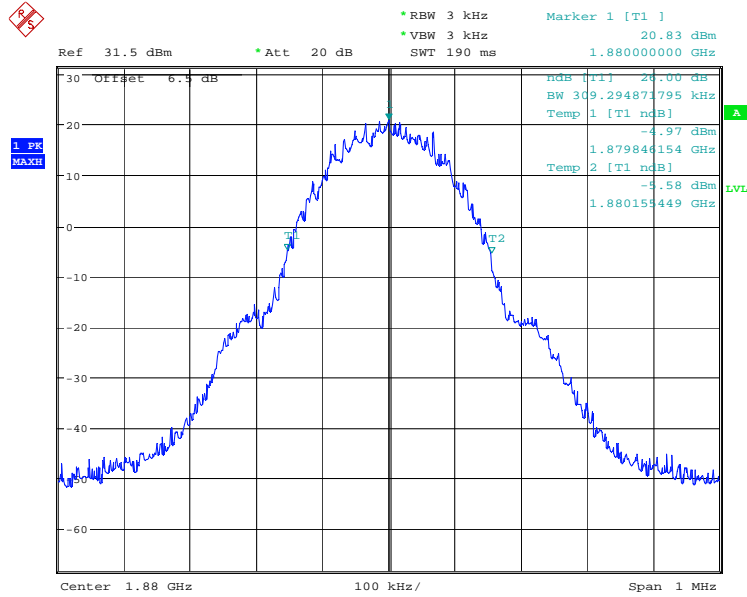
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GSM – Channel 661



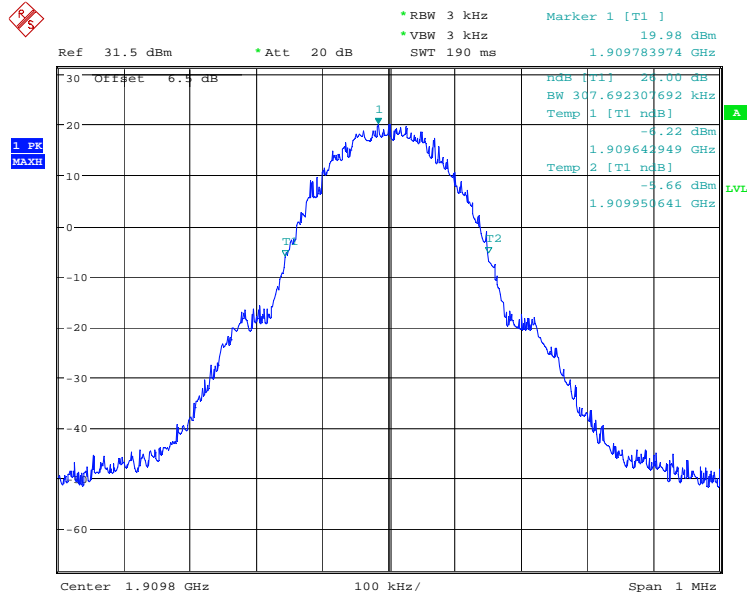
Date: 7.JUN.2007 15:17:11

GPRS – Channel 661



Date: 7.JUN.2007 15:17:11

GPRS – Channel 810



Date: 7.JUN.2007 15:20:18

Clause 24.238(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:

Sample Number:	1	Temperature:	21°C
Date:	June 07, 2007	Humidity:	45%
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

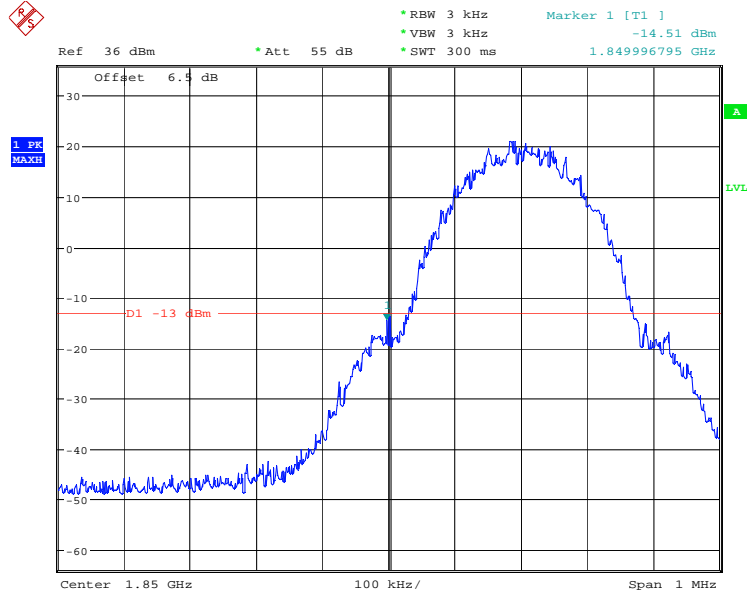
Test Results:

See Attached Plots.

Test Limit: -13dBm

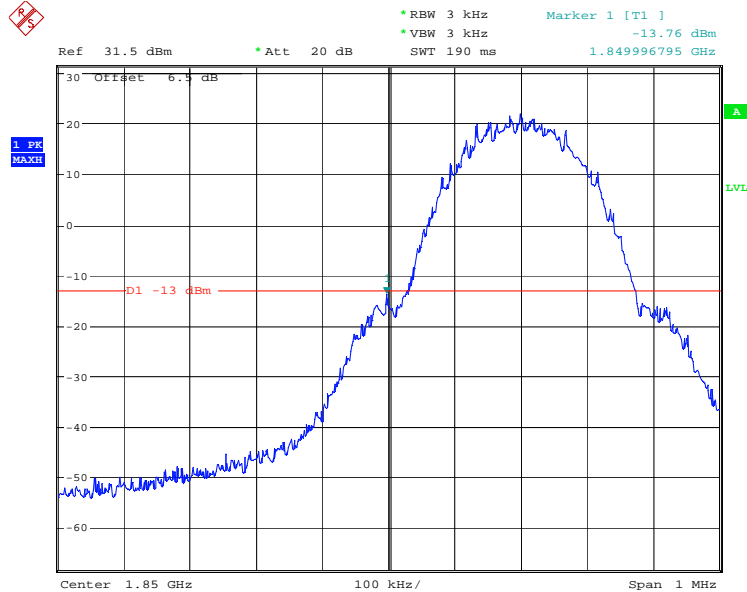
Band Edge Checking

Low Band Edge ---- Channel 512 GSM



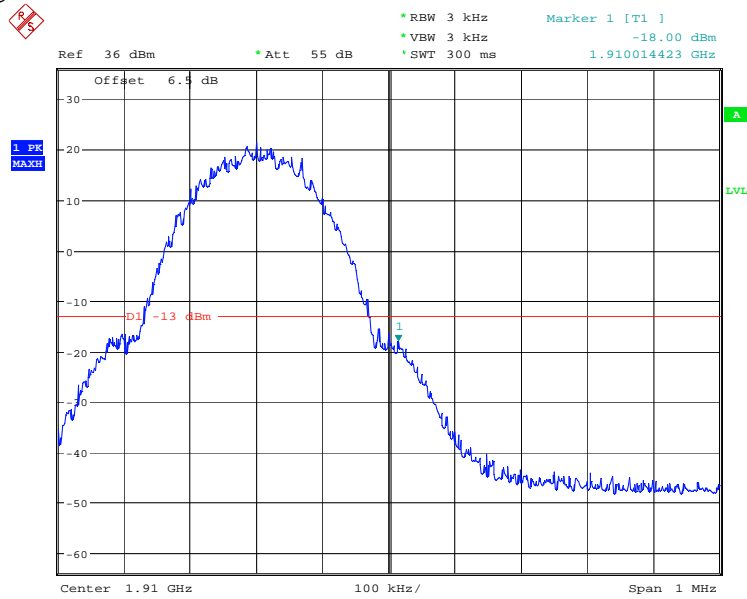
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Low Band Edge ---- Channel 512 GPRS



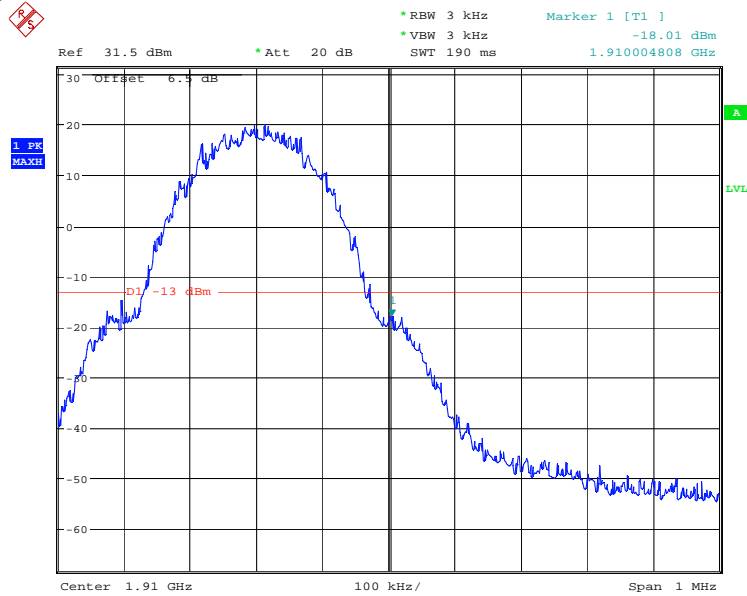
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High Band Edge ---- Channel 810 GSM



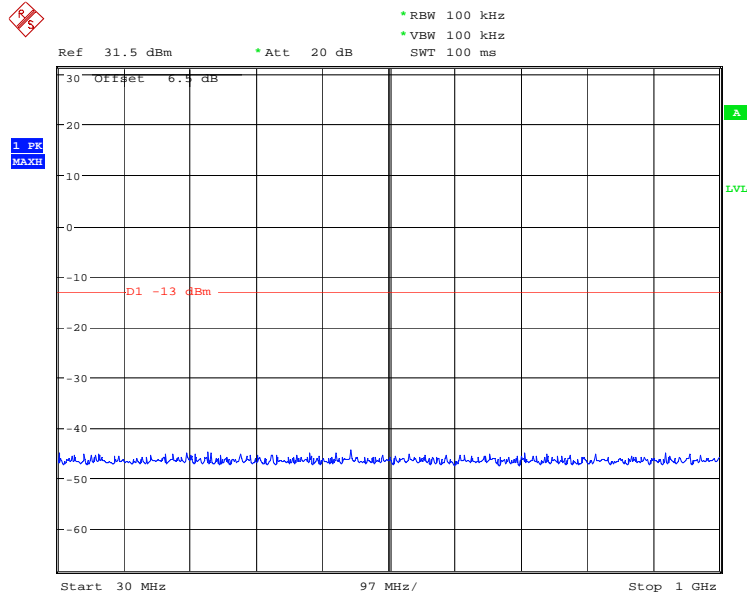
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High Band Edge ---- Channel 810 GPRS

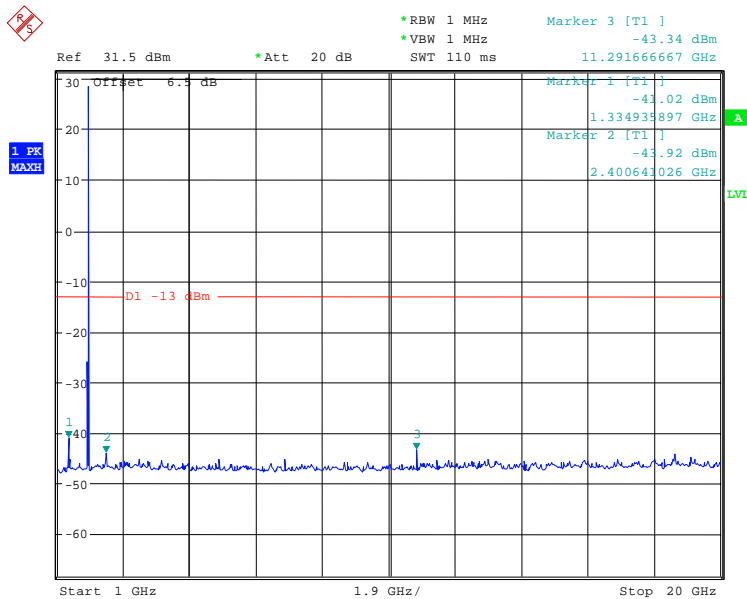


Date: 7.JUN.2007 16:03:28

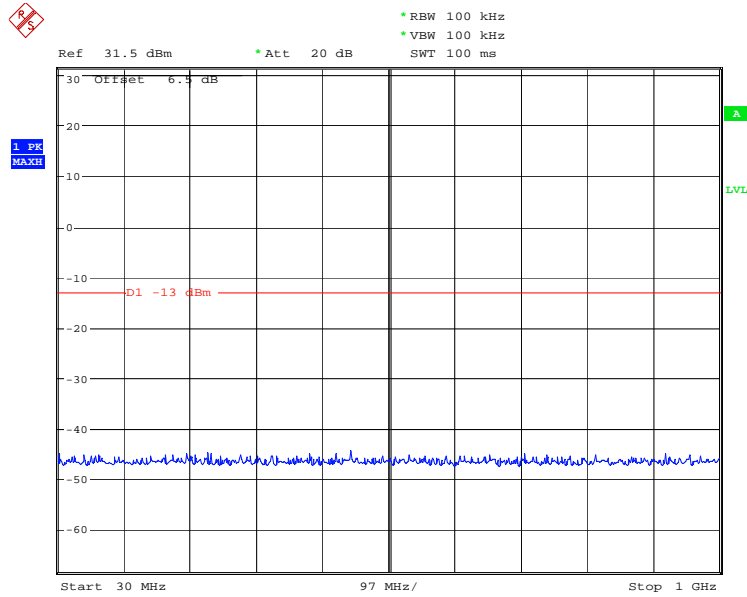
GSM – Channel 661



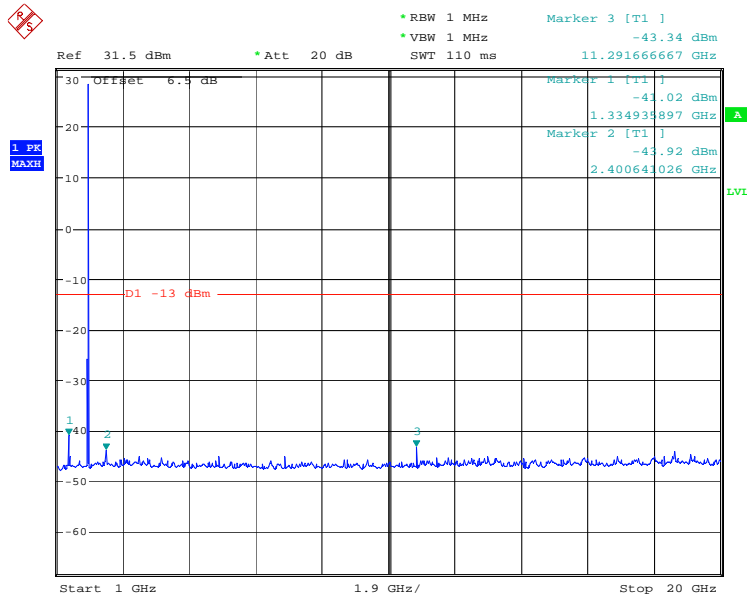
Date: 7.JUN.2007 13:05:45



GPRS – Channel 661



Date: 7.JUN.2007 13:05:45



Date: 7.JUN.2007 13:04:50

Clause 24.238(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:

Sample Number:	1	Temperature:	22°C
Date:	June 13, 2007	Humidity:	50%
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

See the attached table.

Additional Observations:

The Spectrum was searched from 30MHz to the 10th 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	79.9	-119.2	-39.3	-13.0	26.3	Peak
1566.3930	Horn2	V	53.6	-119.1	-65.5	-13.0	52.5	Peak
1799.8550	Horn2	V	73.2	-116.5	-43.3	-13.0	30.3	Peak
1880.7760	Horn2	V	52.9	-114.6	-61.6	-13.0	48.6	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 24.235(a) Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Conditions:

Sample Number:	1	Temperature:	21°C
Date:	June 08, 2007	Humidity:	50%
Modification State:	0	Tester:	Heng Lin
		Laboratory:	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 range 1850 MHz – 1910 MHz

Frequency Stability Test:

Test Condition		Measured Frequency (MHz)	Frequency Drift (kHz)	Frequency Drift (ppm)
Temperature	Voltage			
+21°C	3.6VDC	F _L 1850.047756	---	---
		F _H 1909.952244	---	---
	4.14VDC	F _L 1850.045949	-1.8	-0.98
		F _H 1909.950641	-1.6	-0.84
	3.06VDC	F _L 1850.045949	-1.8	-0.98
		F _H 1909.950641	-1.6	-0.84
+50°C	3.6VDC	F _L 1850.045949	-1.8	-0.98
		F _H 1909.950641	-1.6	0.84
+40°C	3.6VDC	F _L 1850.046154	-1.6	-0.87
		F _H 1909.953846	1.6	0.84
+30°C	3.6VDC	F _L 1850.049359	1.6	0.87
		F _H 1909.952244	0	0
+20°C	3.6VDC	F _L 1850.047756	0	0
		F _H 1909.952244	0	0
+10°C	3.6VDC	F _L 1850.046346	-1.4	-0.76
		F _H 1909.953846	1.6	0.84
0°C	3.6VDC	F _L 1850.047756	0	0
		F _H 1909.954231	1.9	1.04
-10°C	3.6VDC	F _L 1850.047756	0	0
		F _H 1909.953846	1.6	0.84
-20°C	3.6VDC	F _L 1850.050962	3.2	1.73
		F _H 1909.953846	1.6	0.84
-30°C	3.6VDC	F _L 1850.049359	1.6	0.87
		F _H 1909.955833	3.5	1.88

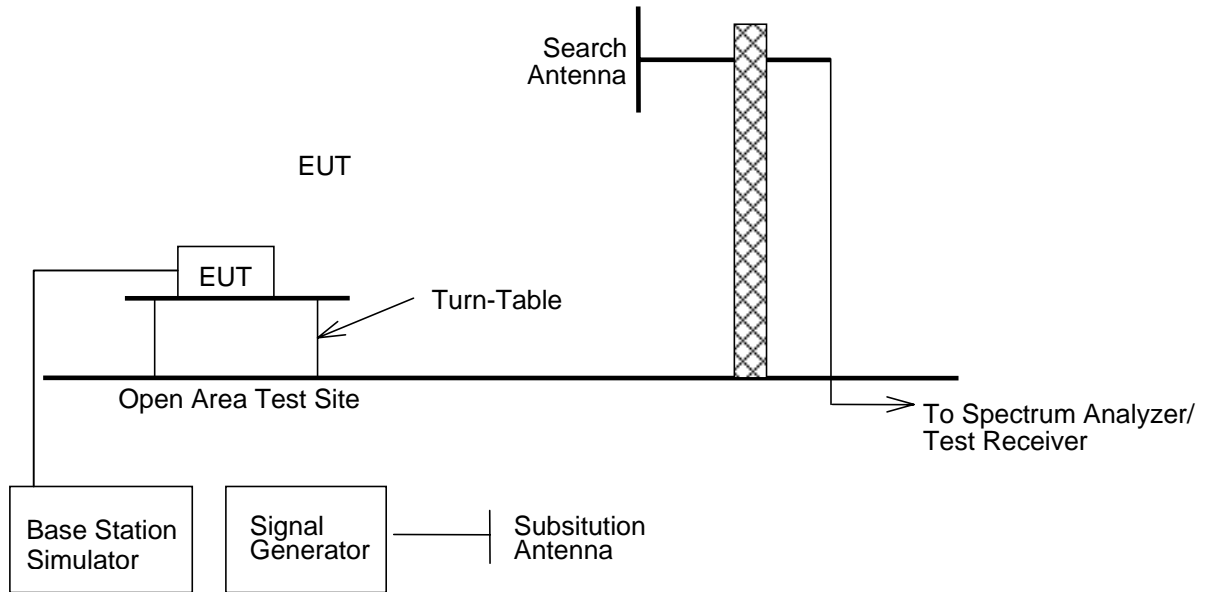
Appendix B : Setup Photographs

Radiated Spurious Emissions Setup:

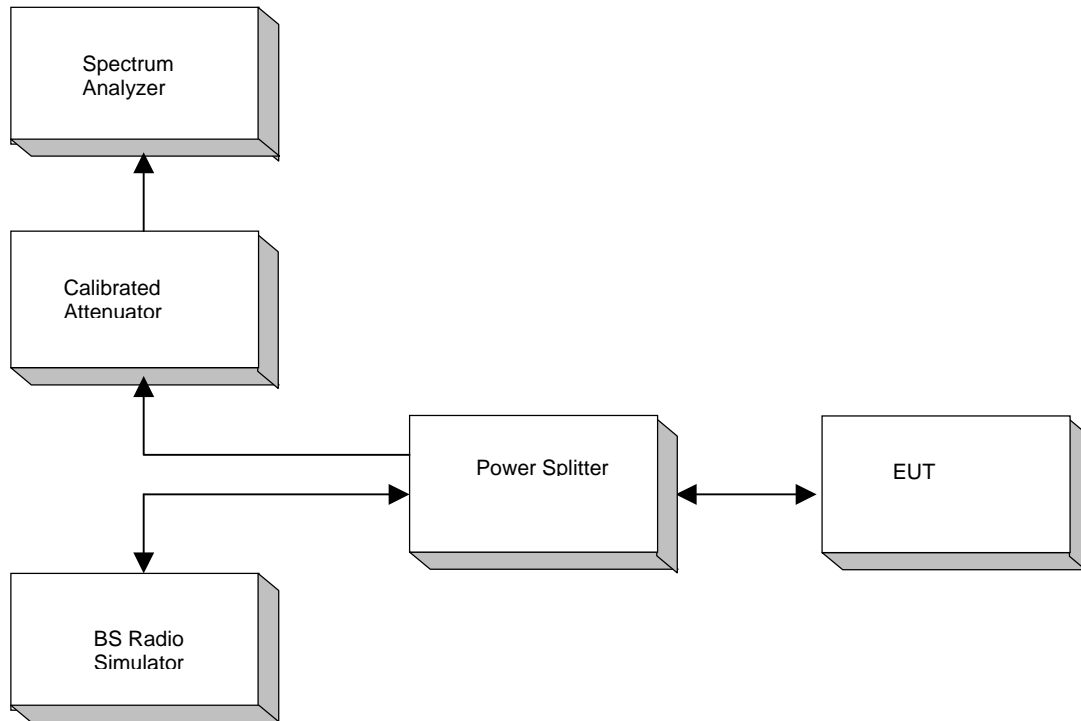


Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Measurement



Frequency Stability Test

