

FCC PART 22, 24 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

For

Blue Tree Wireless Data Inc.

2405,46th Avenue Ville Lachine, Quebec Canada, H87 3C9

FCC ID: QWV-BT2000

This Report Concerns: ☒ Original Report	Equipment Type: GSM/GPRS Wireless modem
Test Engineer: Ling Zhang / 	
Report No.: R0406073	
Report Date: 2004-06-28	
Reviewed By: Ming Jing / 	
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Note: The test report is specially limited to the above company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Blue Tree Wireless Data Inc.* 's product, FCC ID: QWV-BT2000 or the "EUT" as referred to in this report is a GSM/GPRS Wireless modem, which measures approximately 140mm x 90mm x 37mm.

The EUT operates at the frequency of 8242 – 848.8 MHz, output power 29.1 dBm (0.813W), frequency tolerance 2.5ppm, and emission designator 240KGXW & 1850.2 – 1909.8 MHz, output power 28.3 dBm (0.676W), frequency tolerance 2.5ppm, and emission designator 236KGXW.

** The test data gathered are from typical production sample, serial number: BTW-30014950007 provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Blue Tree Wireless Data Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B, Part 22 Subpart H, and Part 24 Subpart E of the Federal Communication Commissions rules.

It is also prepared in accordance with Part 2, Subpart J, Part 15, Subparts A and B, Part 22 Subpart H and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, and conducted and radiated margin.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 15 Subpart B – Unintentional Radiators

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - PCS

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, 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 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Open Area Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997, Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA 603A.

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Agilent	Wireless communication test set	8960	GB44051221	DOC
SONY	Notebook PC	PCG-F150	28986303404240	DOC
HP	Printer	2225C	N/A	DOC

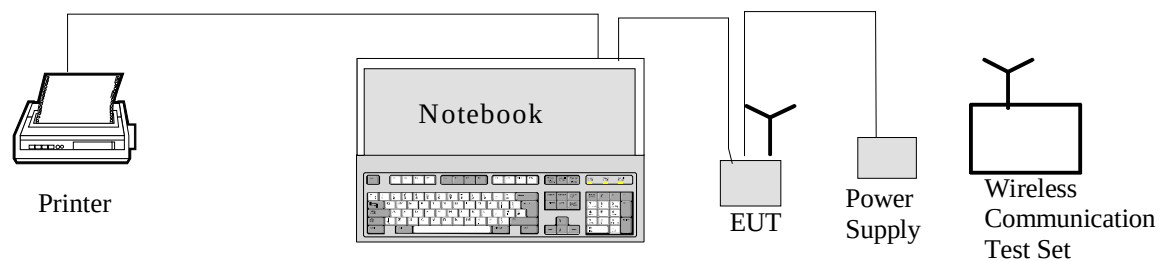
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Printer Cable	1.5	Parallel Port/Notebook PC	Printer
Shielded Serial Cable	1.5	Serial Port/Notebook PC	EUT

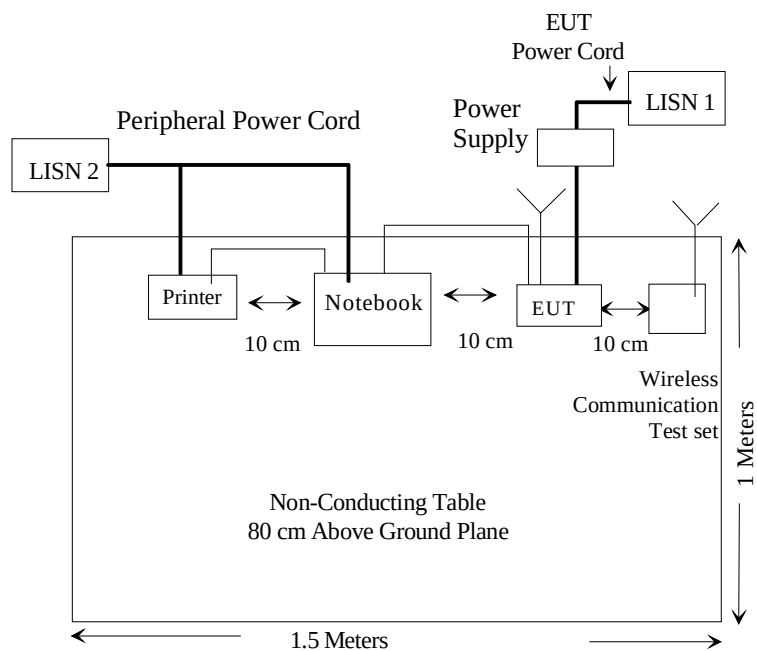
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
ELPAC POWER SYSTEMS	AC/DC POWER SUPPLY	MI2815	064235	DOC

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: *BTW-30014950007*

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1093	RF Exposure	Compliant
§ 15.107	Conducted Emissions	Compliant
§ 2.1046, § 22.912 (d) § 24.232	RF Output Power	Compliant
§ 2.1046, § 22.913 (a) § 24.232	Conducted Output Power	Compliant
§ 2.1049 § 22.917 § 22.905 § 24.238	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917 § 24.238(a)	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355 § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§ 22.917 §24.238	Band Edge	Compliant

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

CDMA digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

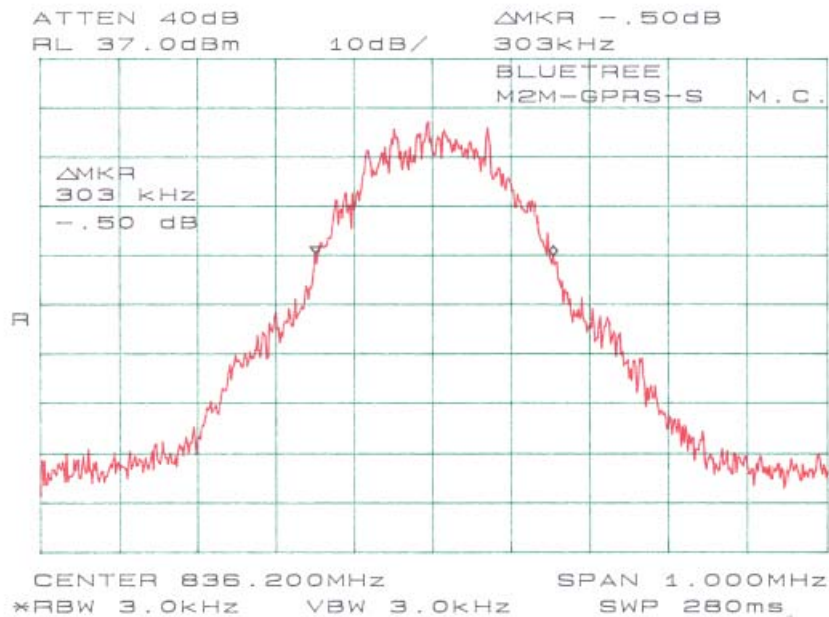
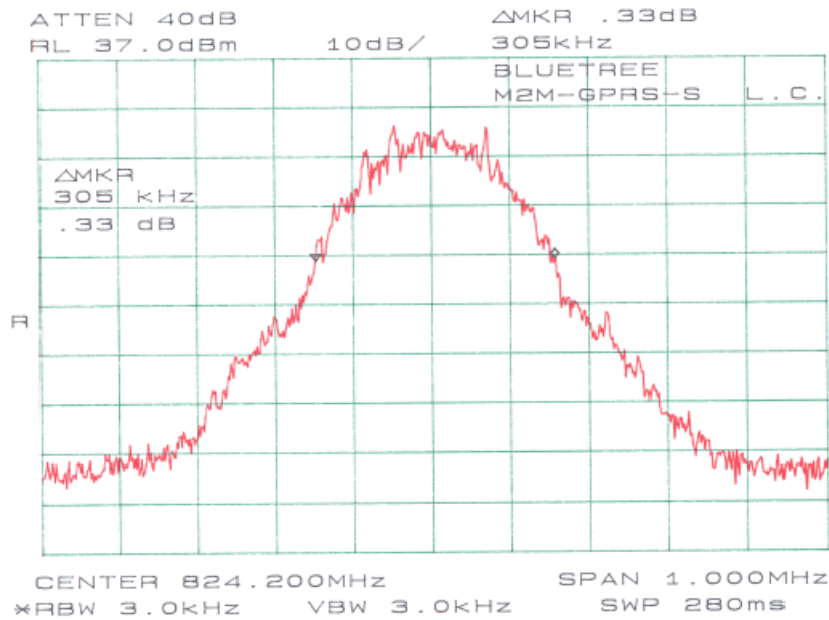
Environmental Conditions

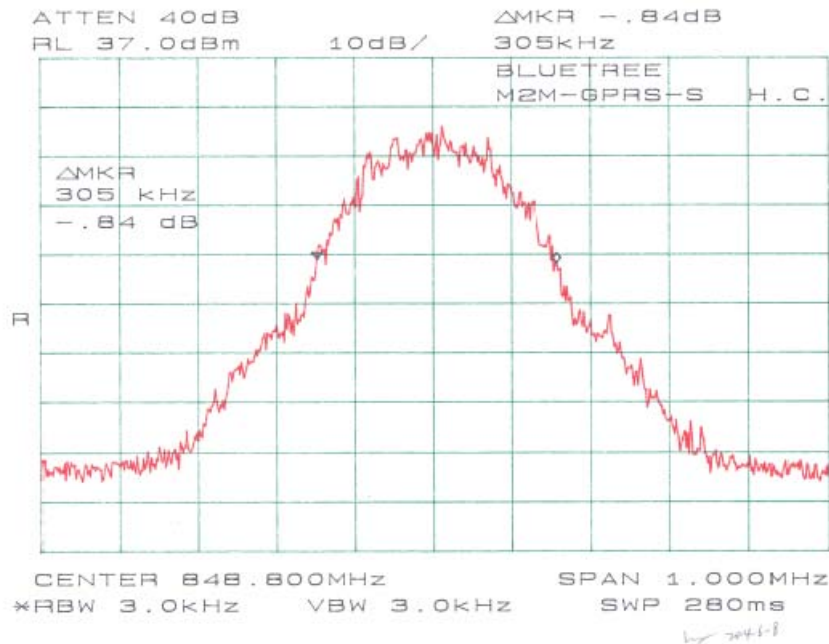
Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

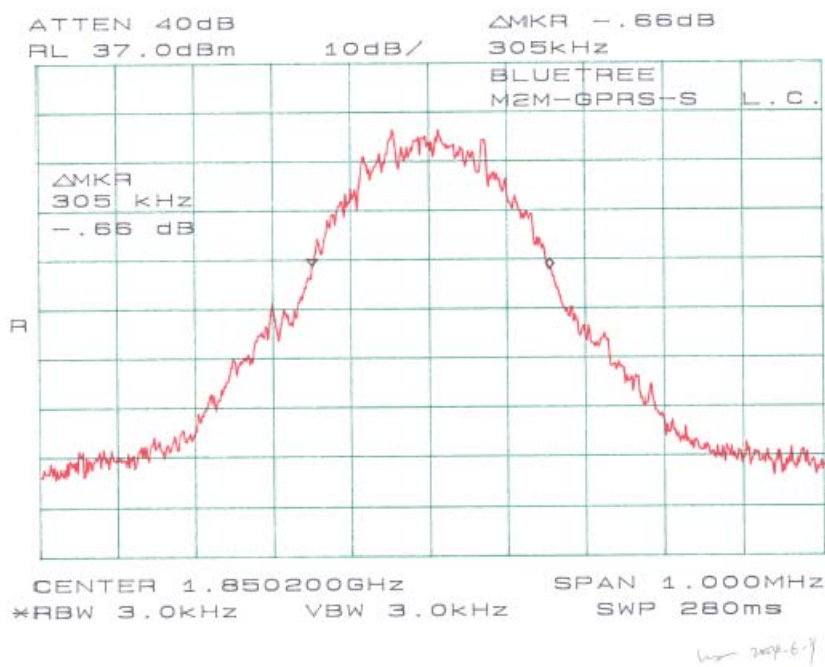
Test Results

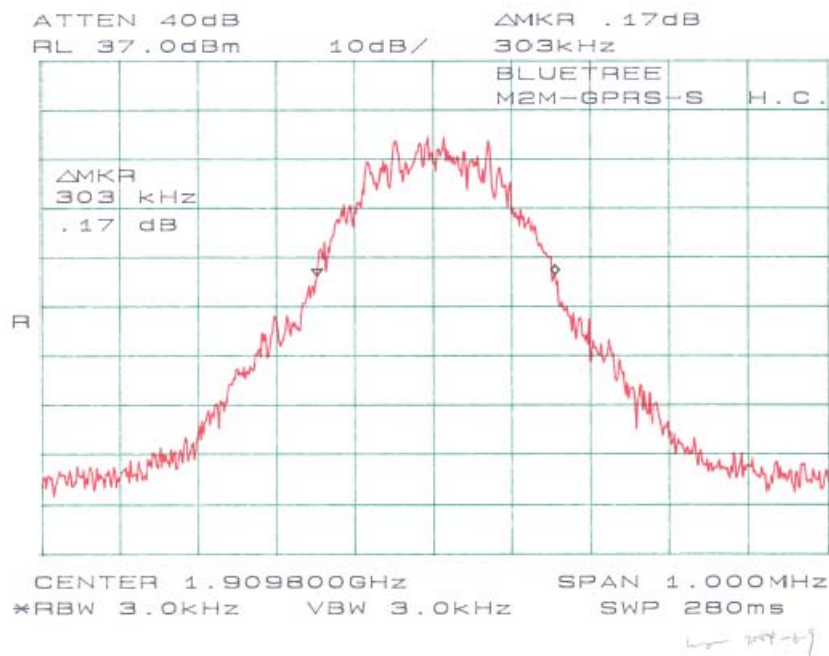
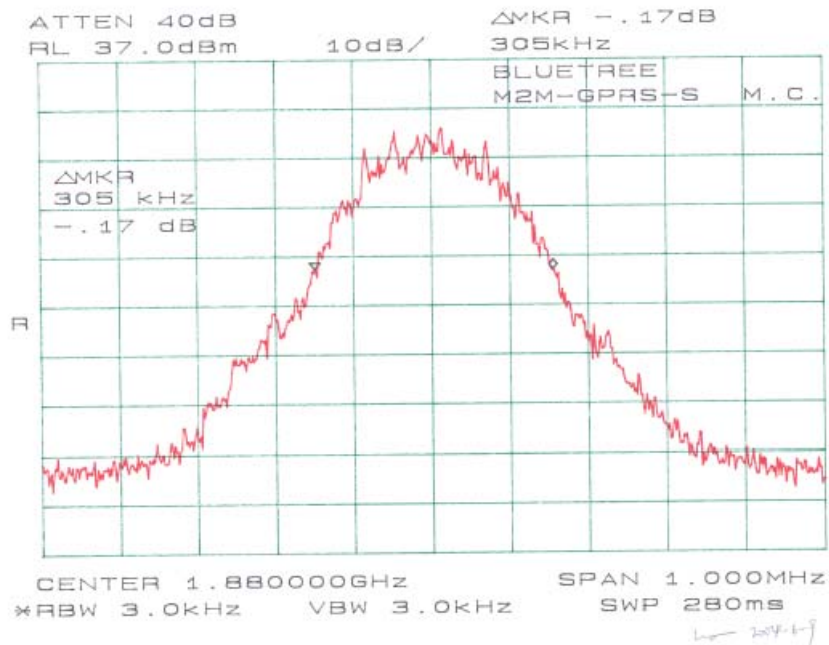
Please refer to the hereinafter plots.

Plots of Modulation Characteristic for GPRS 850, Part22



Plots of Modulation Characteristic for GPRS 1900





§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{ Log}_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2003-07-03
HP	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2003-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11
AH System	Horn Antenna	SAS-200/511	261	2003-08-02

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

Test Result

FCC Part 22: GPRS 850

Low Frequency: -28.2 dBm at 1648.4 MHz
Middle Frequency: -27.8 dBm at 1672.4 MHz
High Frequency: -28.1 dBm at 1697.6 MHz

FCC Part 24: GPRS 1900

Low Frequency: -27.00 dBm at 7400.8 MHz
Middle Frequency: -27.60 dBm at 7520.0 MHz
High Frequency: -27.80 dBm at 7639.2 MHz

Test Data for GPRS 850

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dBm	Level dB	Limit dBm	Margin DBm
Low Channel											
824.2	128	90	1	v	824.2	29.8	0	0.8	29.0		
824.2	128	90	1	h	824.2	29.7	0	0.8	28.9		
1648.4	56	330	1	v	1648.4	-46.8	6.8	1.2	-41.2	-13	-28.2
1648.4	55.83	150	1.4	h	1648.4	-47.3	6.8	1.2	-41.7	-13	-28.7
2472.6	47.67	330	1.5	v	2472.6	-53.9	7.6	1.5	-47.8	-13	-34.8
2472.6	46.5	15	1.5	h	2472.6	-55.3	7.6	1.5	-49.2	-13	-36.2
MIDDLE CHANNEL											
836.2	128.17	0	1.5	v	836.2	29.9	0	0.8	29.1		
836.2	127.83	150	1.4	h	836.2	29.6	0	0.8	28.8		
1672.4	56.67	0	1.4	v	1672.4	-46.4	6.8	1.2	-40.8	-13	-27.8
1672.4	54.33	150	1.4	h	1672.4	-48.5	6.8	1.2	-42.9	-13	-29.9
2508.6	47.33	60	1.5	v	2508.6	-54.5	7.6	1.5	-48.4	-13	-35.4
2508.6	46.67	0	1.5	h	2508.6	-55.8	7.6	1.5	-49.7	-13	-36.7
HIGH CHANNEL											
848.8	128.17	30	1.4	v	848.8	29.9	0	0.8	29.1		
848.8	128	150	1.6	h	848.8	29.8	0	0.8	29		
1697.6	56.5	45	1.5	v	1697.6	-46.7	6.8	1.2	-41.1	-13	-28.1
1697.6	55.17	120	1.4	h	1697.6	-48.0	6.8	1.2	-42.4	-13	-29.4
2546.4	48.17	60	1.6	v	2546.4	-53.6	7.6	1.5	-47.5	-13	-34.5
2546.4	47.33	30	1.4	h	2546.4	-54.5	7.6	1.5	-48.4	-13	-35.4

Test Data for CDMA1900

EUT					Substitution		Generator			Standard	
Indicated		Table	Test Antenna				Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain Corrected	Loss dBm	Level dB	Limit dBm	Margin DBm
Low Channel											
1850.2	126.67	30	1.6	v	1850.2	21.2	8.3	1.3	28.2		
1850.2	124.17	90	1.4	h	1850.2	18.8	8.3	1.3	25.8		
7400.8	54.83	0	1.6	v	7400.8	-46.9	10.2	3.3	-40	-13	-27.00
7400.8	51.33	30	1.8	h	7400.8	-50.5	10.2	3.3	-43.6	-13	-30.60
3700.4	48.83	60	1.8	h	3700.4	-52.0	10.3	2	-43.7	-13	-30.70
3700.4	49.17	60	1.6	v	3700.4	-52.3	10.3	2	-44	-13	-31.00
5550.6	46.5	330	1.2	v	5550.6	-53.2	10.6	2.55	-45.15	-13	-32.15
5550.6	45.67	0	1.6	h	5550.6	-55.0	10.6	2.55	-46.95	-13	-33.95
MIDDLE CHANNEL											
1880	126.67	45	1.4	v	1880	21.2	8.3	1.3	28.2		
1880	124.33	90	1.4	h	1880	19	8.3	1.3	26		
7520	53.67	0	1.8	v	7520	-47.5	10.2	3.3	-40.6	-13	-27.60
7520	51.33	30	1.6	h	7520	-50.2	10.2	3.3	-43.3	-13	-30.30
3760	48.33	60	1.5	v	3760	-52.3	10.3	2	-44	-13	-31.00
3760	47.83	45	1.2	h	3760	-52.8	10.3	2	-44.5	-13	-31.50
5640	46.17	0	2	v	5640	-53.9	10.6	2.55	-45.85	-13	-32.85
5640	45.17	0	1.6	h	5640	-54.7	10.6	2.55	-46.65	-13	-33.65
HIGH CHANNEL											
1909.8	126.67	60	1.6	v	1909.8	21.3	8.3	1.3	28.3		
1909.8	123	30	1.6	h	1909.8	18	8.3	1.3	25		
7639.2	53.17	30	1.6	v	7639.2	-47.7	10.2	3.3	-40.8	-13	-27.80
7639.2	51.5	60	2	h	7639.2	-50.0	10.2	3.3	-43.1	-13	-30.10
3819.6	48.17	60	1.6	v	3819.6	-52.5	10.3	2	-44.2	-13	-31.20
3819.6	46.83	60	1.6	h	3819.6	-53.7	10.3	2	-45.4	-13	-32.40
5729.4	46.5	60	1.8	v	5729.4	-53.5	10.6	2.55	-45.45	-13	-32.45
5729.4	46.5	30	1.6	h	5729.4	-53.6	10.6	2.55	-45.55	-13	-32.55

§2.1046, §22.912(d), & §24.232 - RF POWER OUTPUT

Applicable Standard

According to FCC §2.1046 and §24.232 (1), mobile/portable stations are limited to 2 watts EIRP.
According to FCC §22.912(d), the ERP of mobile transmitters must not exceed 7 watts.

Test Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a dipole antenna (substitution antenna).
10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2003-07-03
HP	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2003-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11
AH System	Horn Antenna	SAS-200/511	261	2003-08-02

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

Test Results*For GPRS850:*

FREQUENCY (MHZ)	SUBSTITUTION READING (dBm)	SUBSTITUTION ANTENNA GAIN	SUBSTITUTION CABLE LOSS (dB)	ERP (dBm)
824.2	29.8	0	0.8	29.0
836.2	29.9	0	0.8	29.1
848.8	29.9	0	0.8	29.1

For GPRS1900:

FREQUENCY (MHZ)	SUBSTITUTION READING (dBm)	SUBSTITUTION ANTENNA GAIN	SUBSTITUTION CABLE LOSS (dB)	EIRP (dBm)
1850.2	21.2	8.3	1.3	28.2
1880.0	21.2	8.3	1.3	28.2
1909.8	21.3	8.3	1.3	28.3

Sample calculation:

Absolute level = substitution reading + antenna gain - cable loss

For example:

$$29.9 + 0 - 0.8 = 29.1$$

§2.1046, §22.913(a), & §24.232 – CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (a), in no case may the peak output power of a base station transmitter exceed 100 watt.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
A.H. Systems	Horn Antenna	SAS200	261	2004-05-31
ETS	Logperiodic Antenna	3148	0004-1155	2003-10-11
EMCO	Biconical Antenna	3110B	9603-2315	2003-10-11

*** Statement of Traceability:** **BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

Test Results

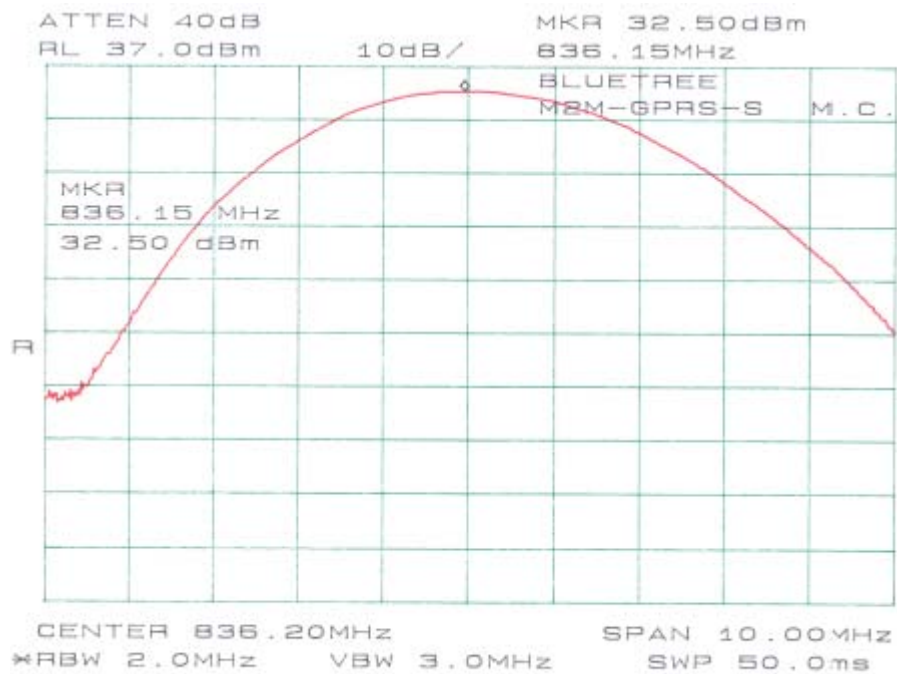
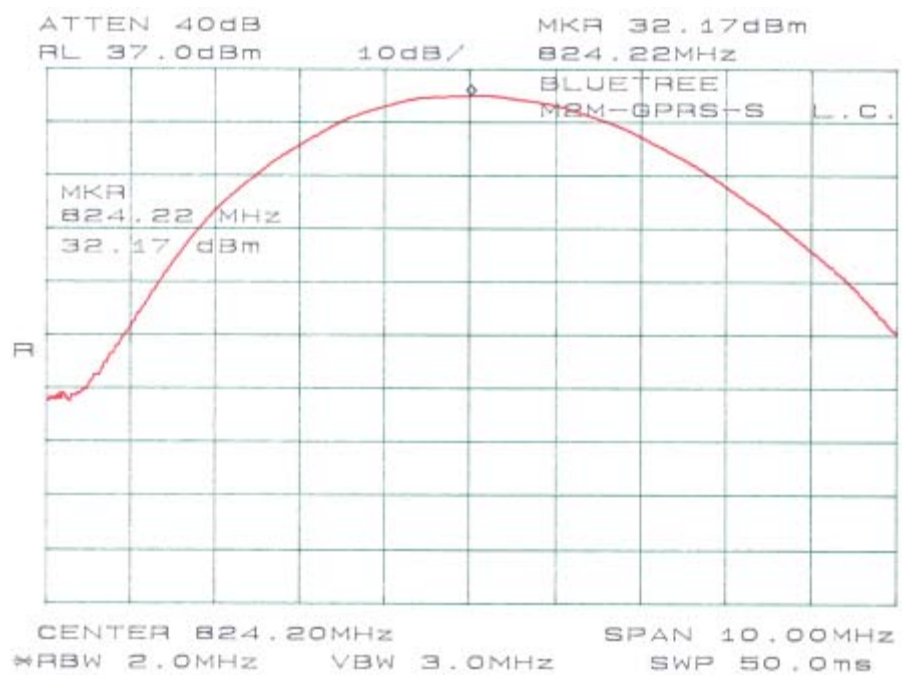
Part 22:

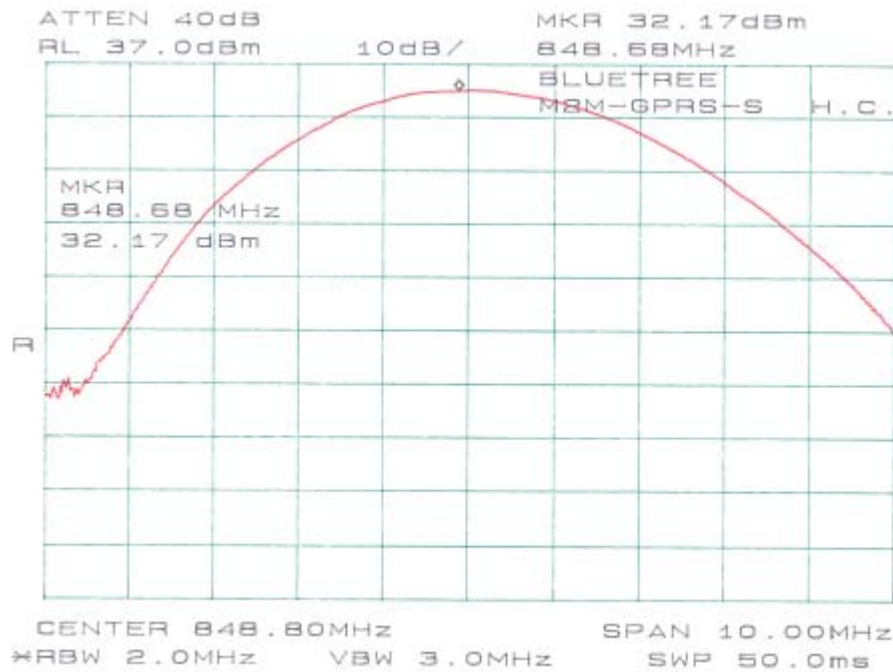
Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	824.20	32.17	1.648	7
MIDDLE	836.20	32.50	1.778	7
HIGH	848.80	32.17	1.648	7

Part 24:

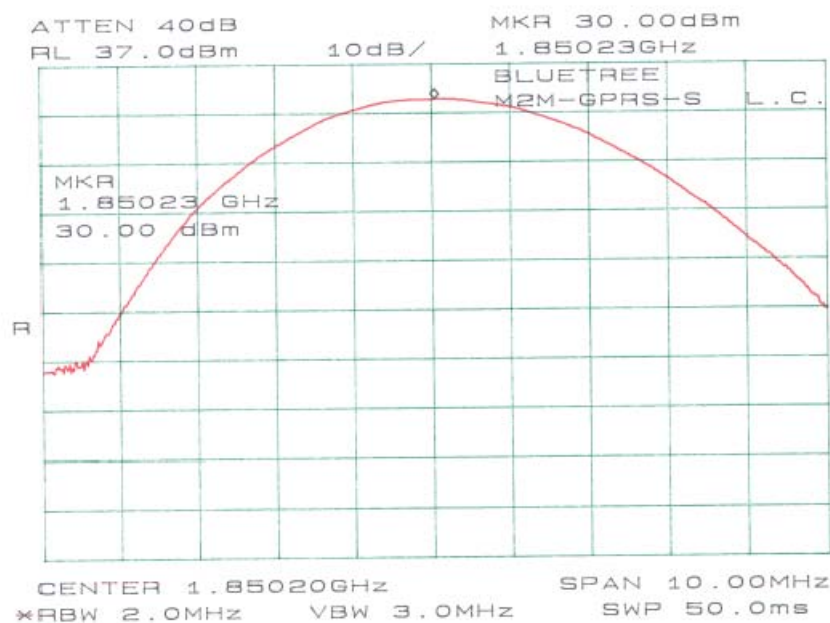
Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	1850.20	30.00	1.000	100
MIDDLE	1880.00	29.50	0.891	100
HIGH	1909.80	29.57	0.906	100

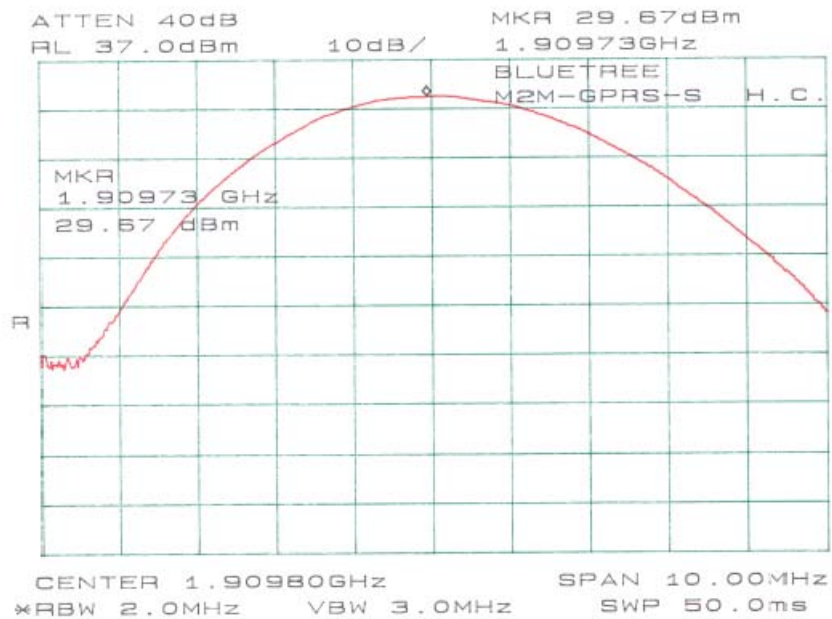
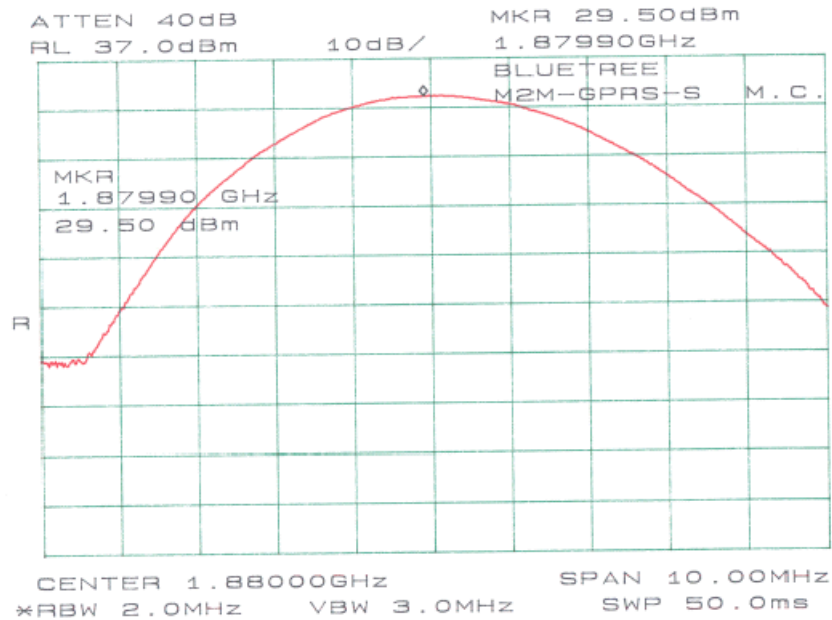
Plots of Conducted Output Power for GPRS 850





Plots of Conducted Output Power for GPRS 1900





§2.1049, §22.917, §22.905, & §24.238 - OCCUPIED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 22.901, Section 22.917 and Section 24.238.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

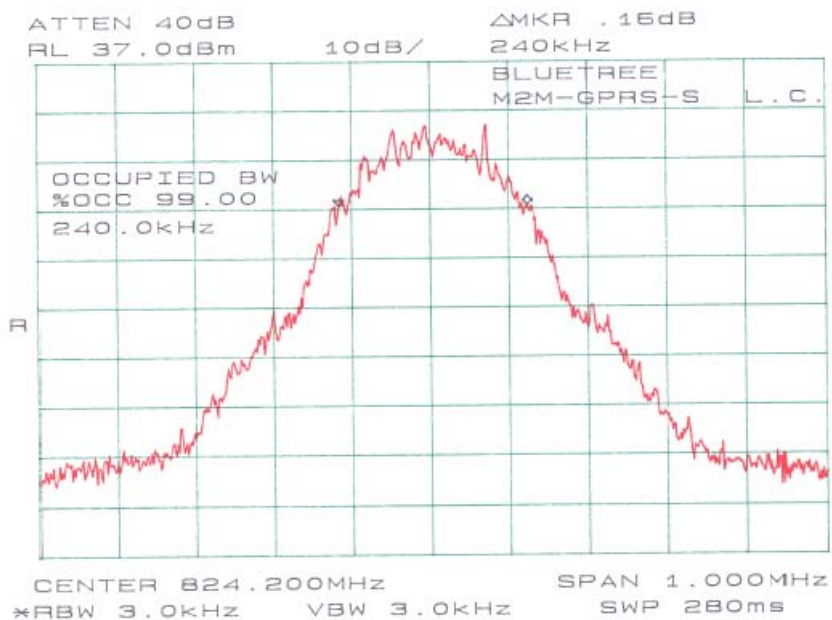
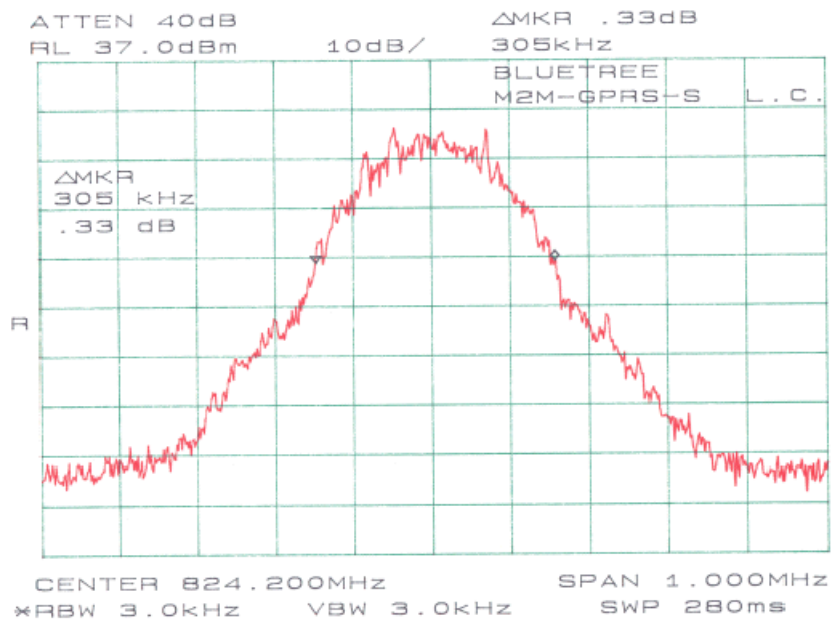
Environmental Conditions

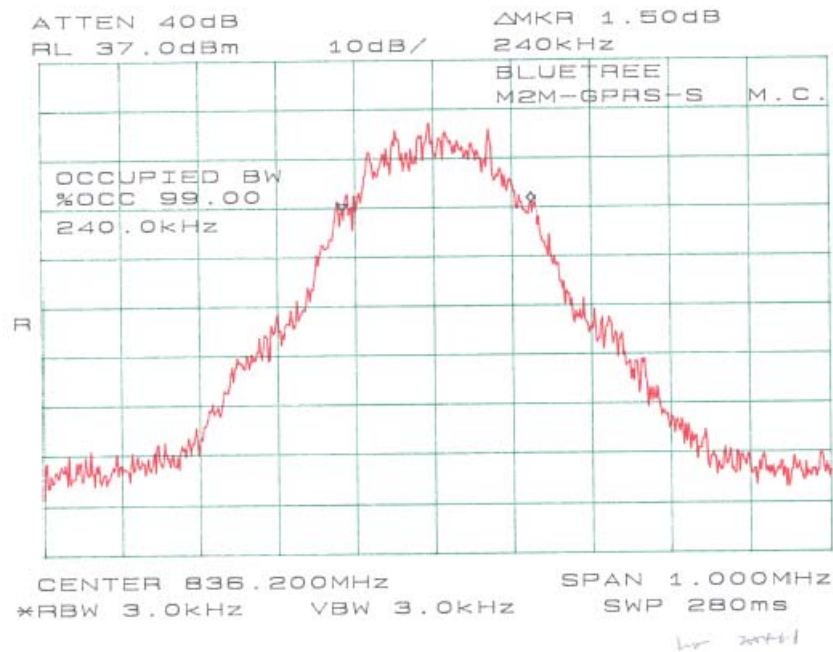
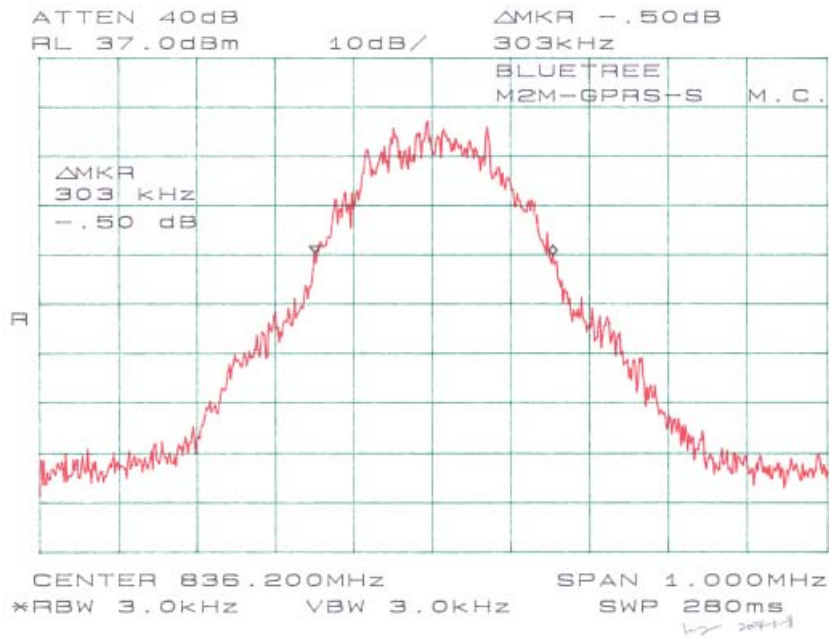
Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

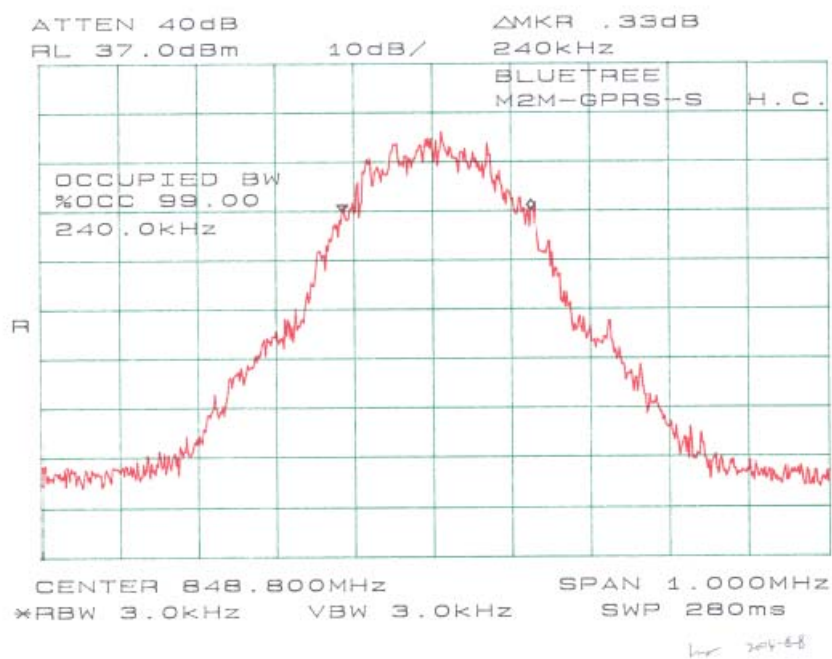
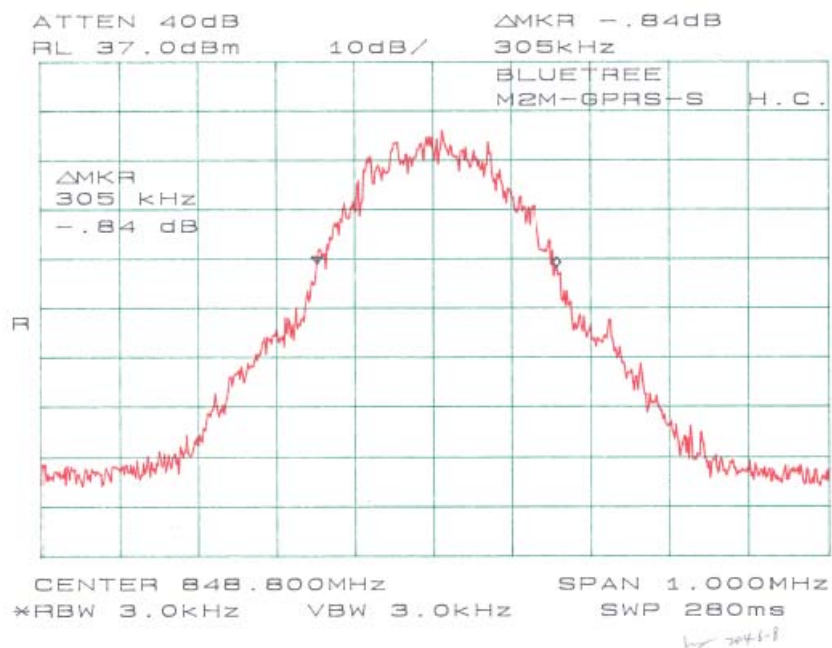
The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

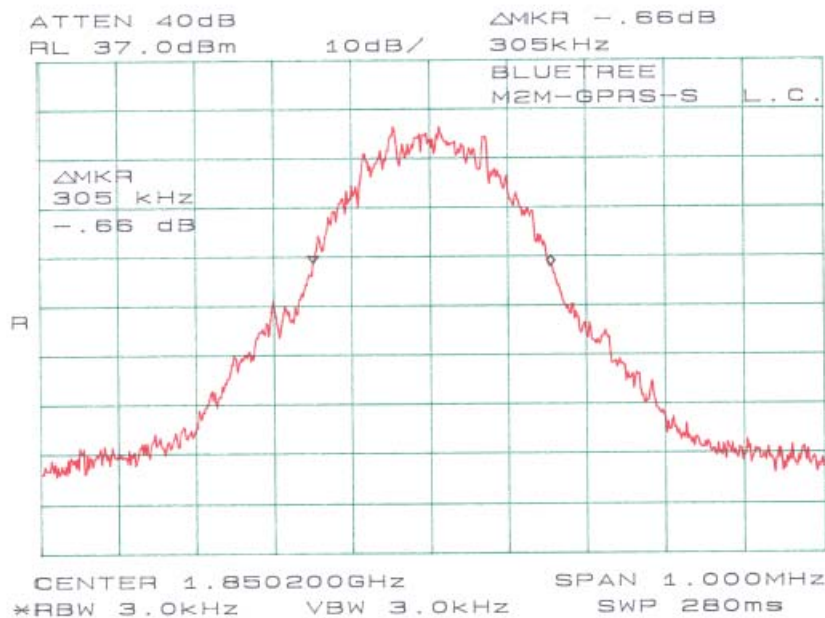
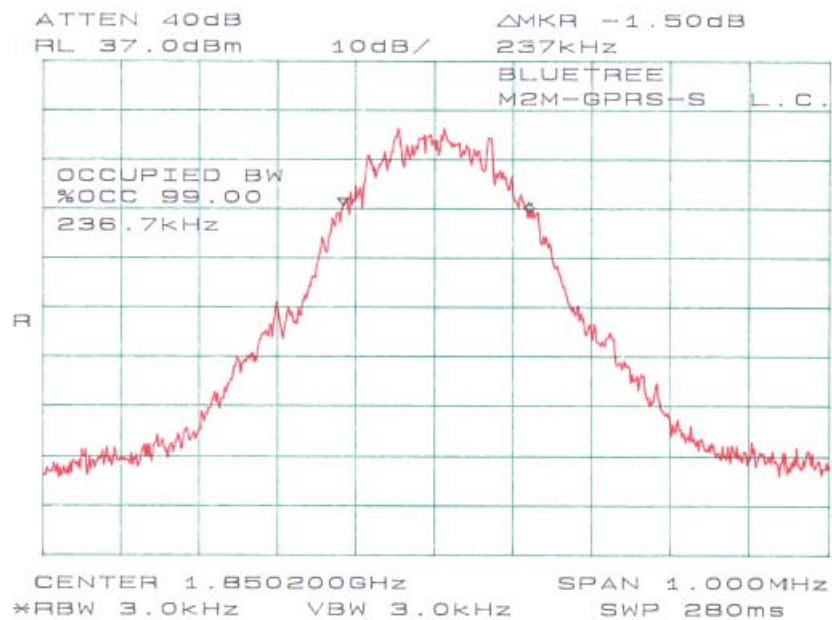
Test Results

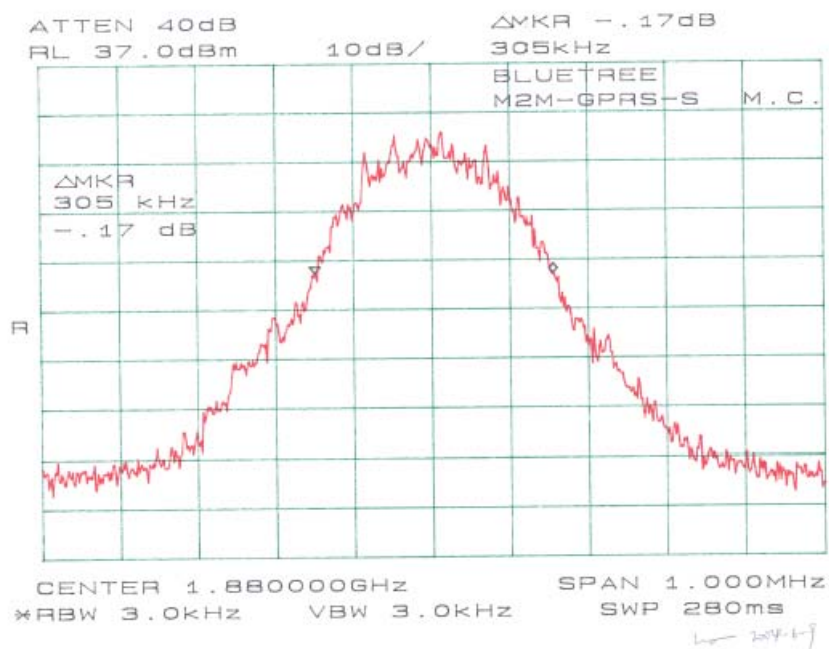
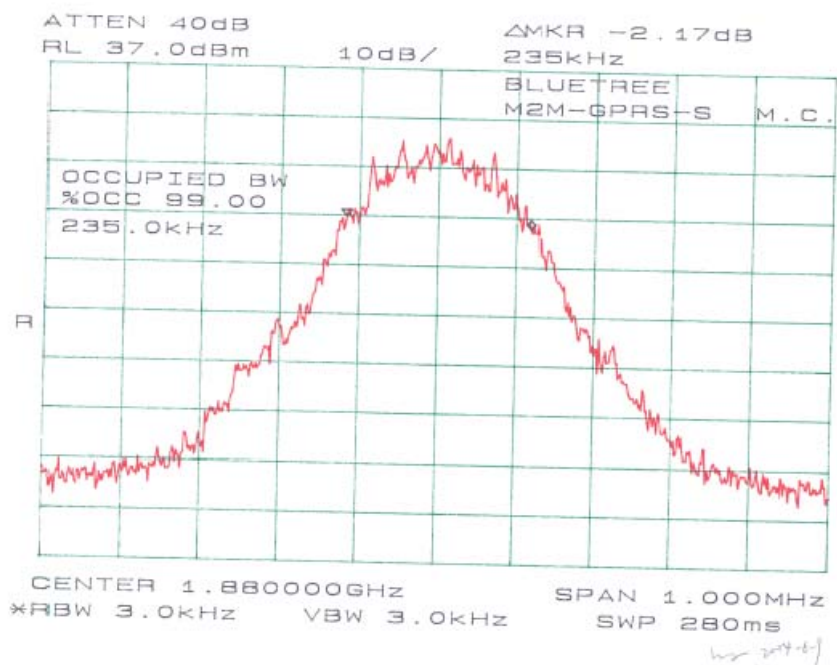
Please refer to the following plots.

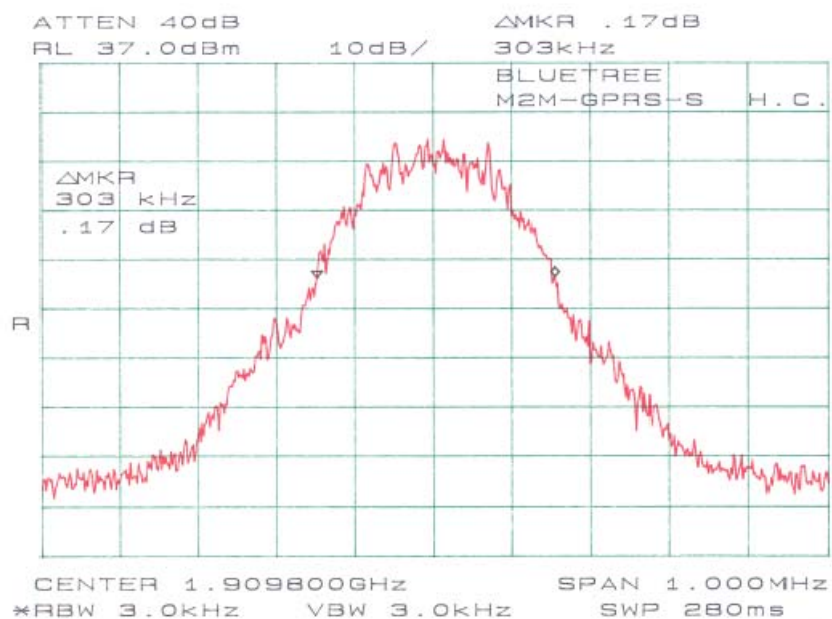
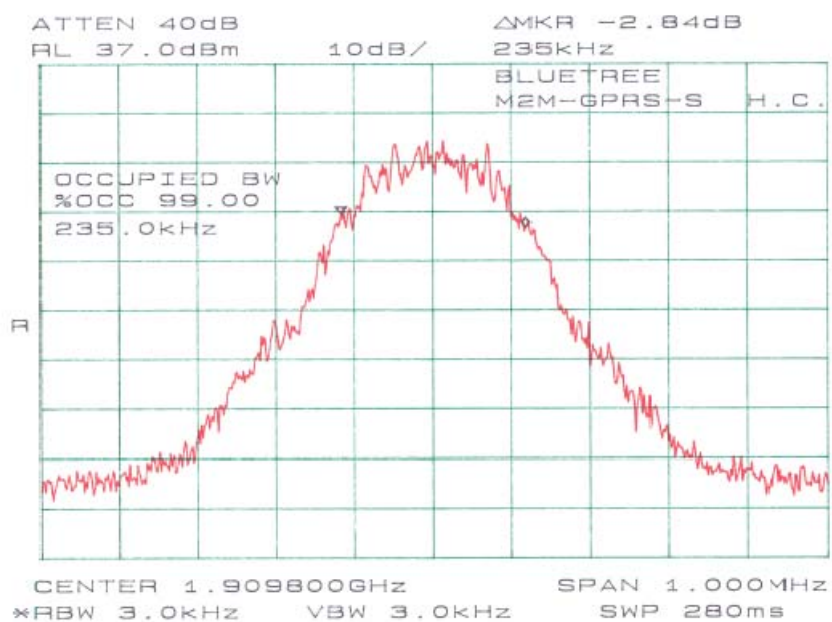
Plots of Modulation Characteristic for GPRS 850





Plots of Modulation Characteristic for GPRS 1900





§2.1051, §22.917, & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Requirements: CFR 47, § 2.1051, § 22.917 & §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

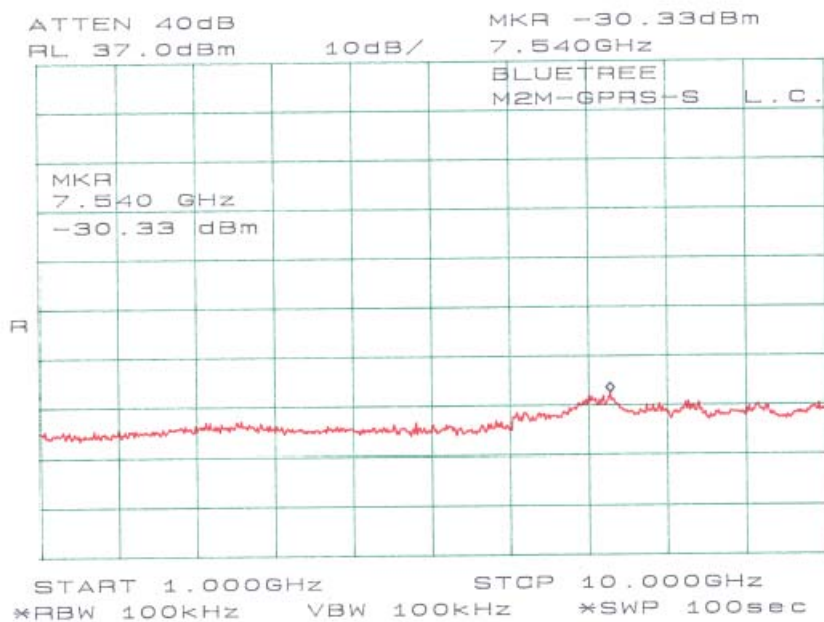
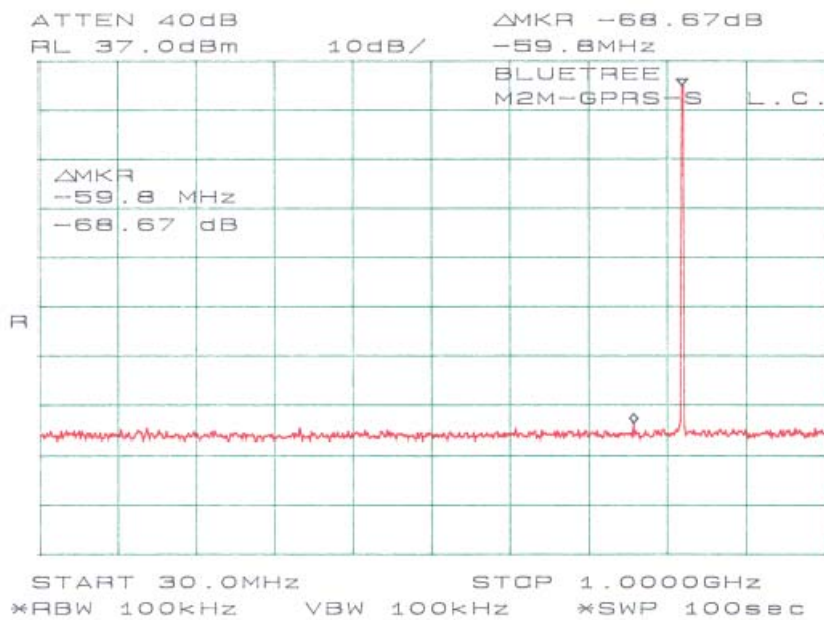
Environmental Conditions

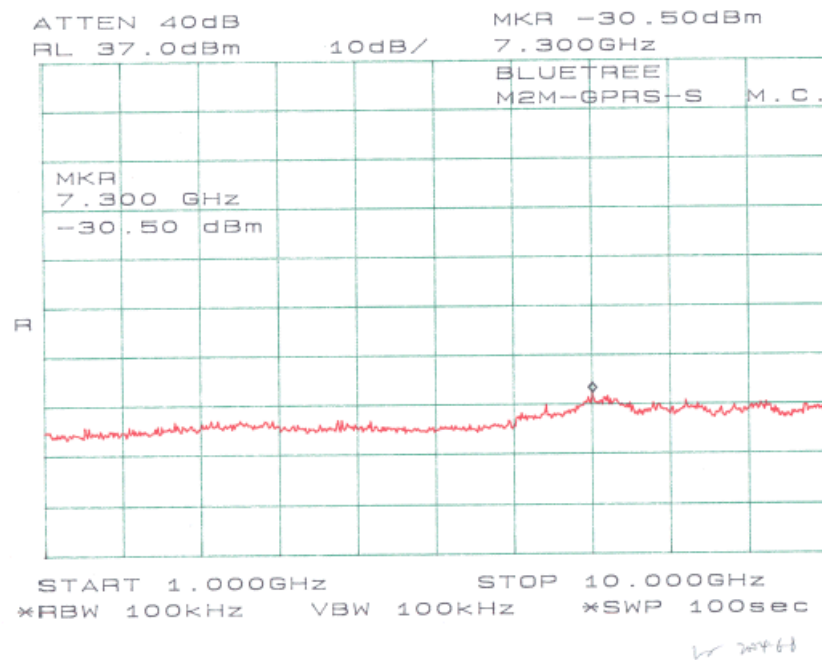
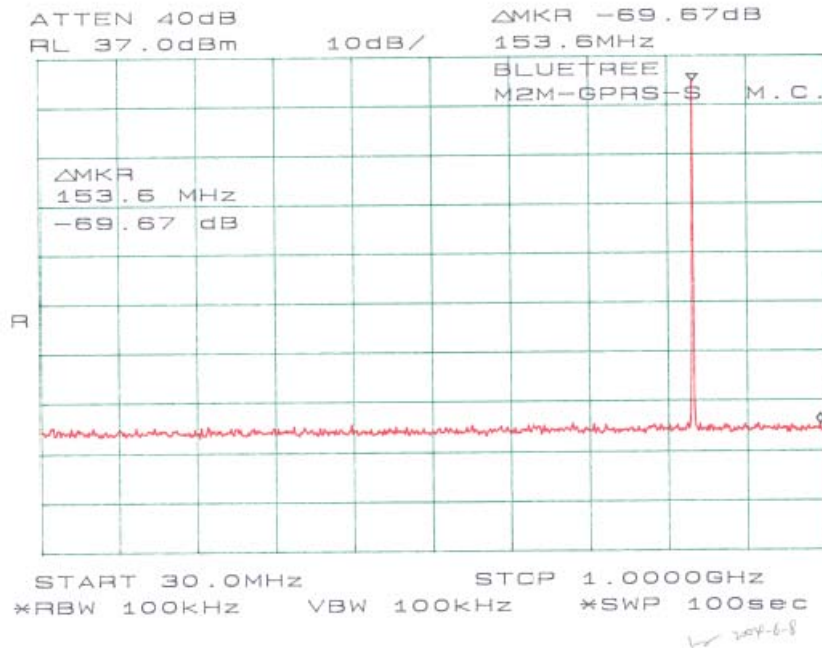
Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

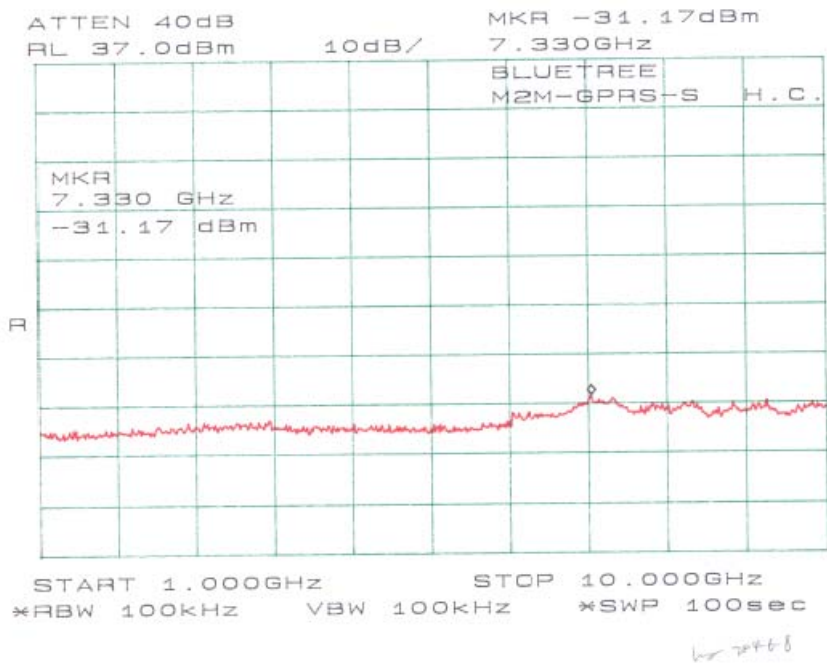
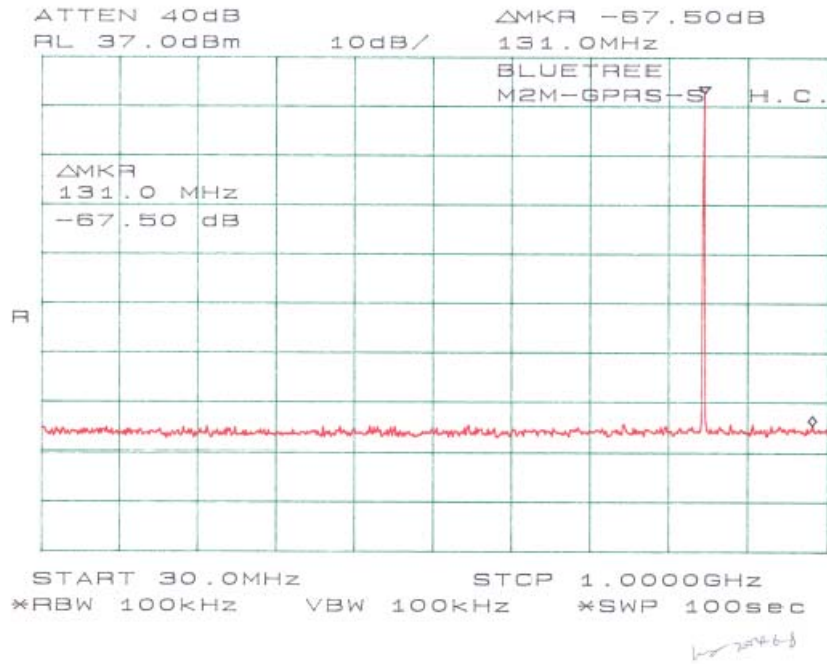
The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

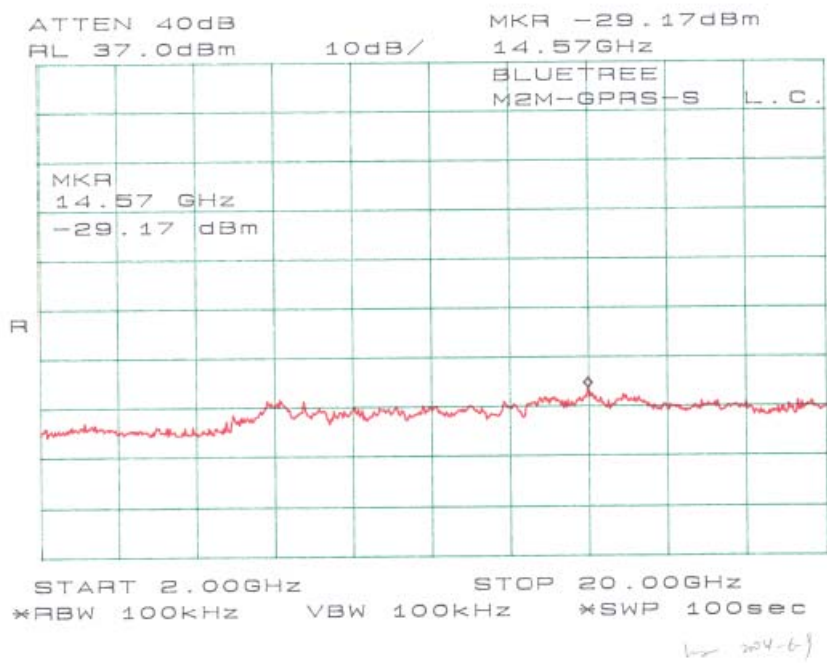
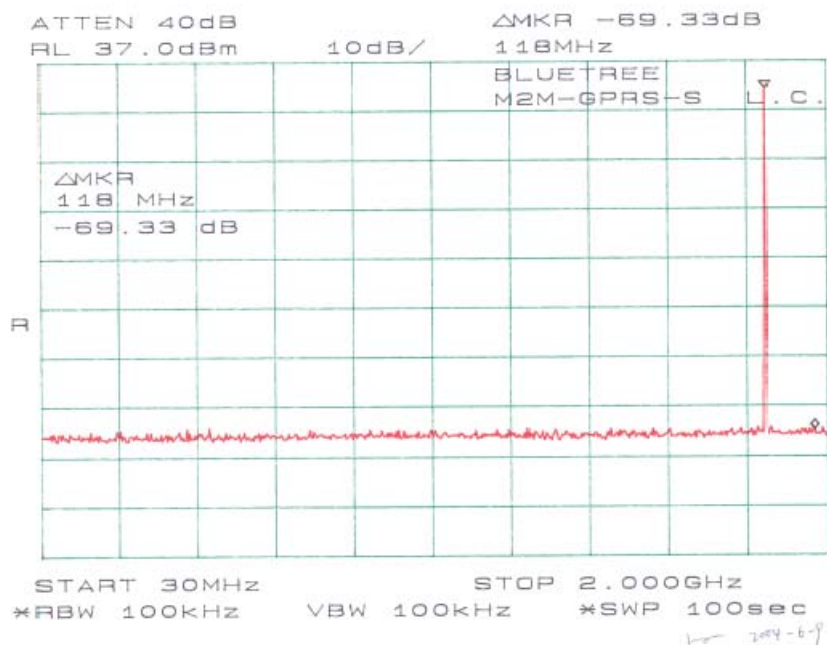
Test Results

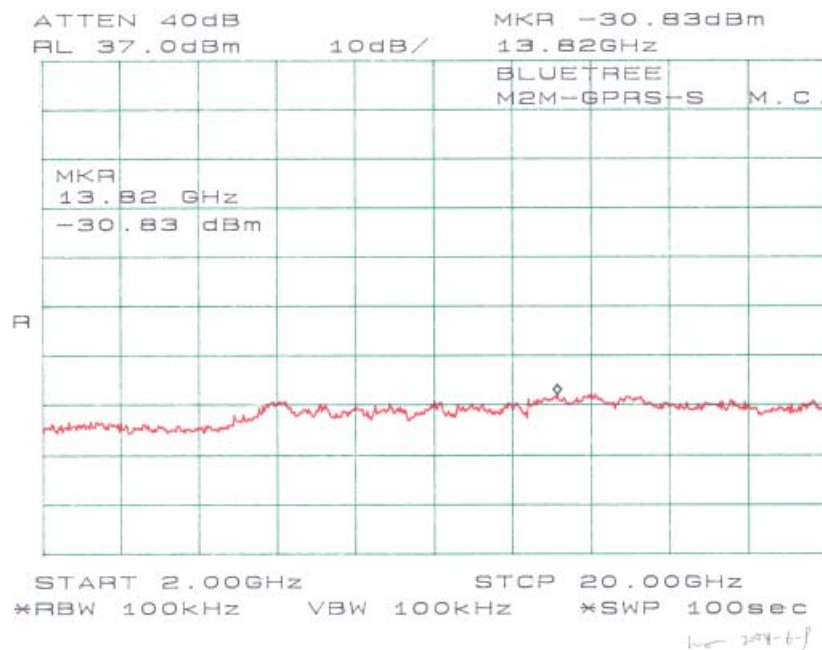
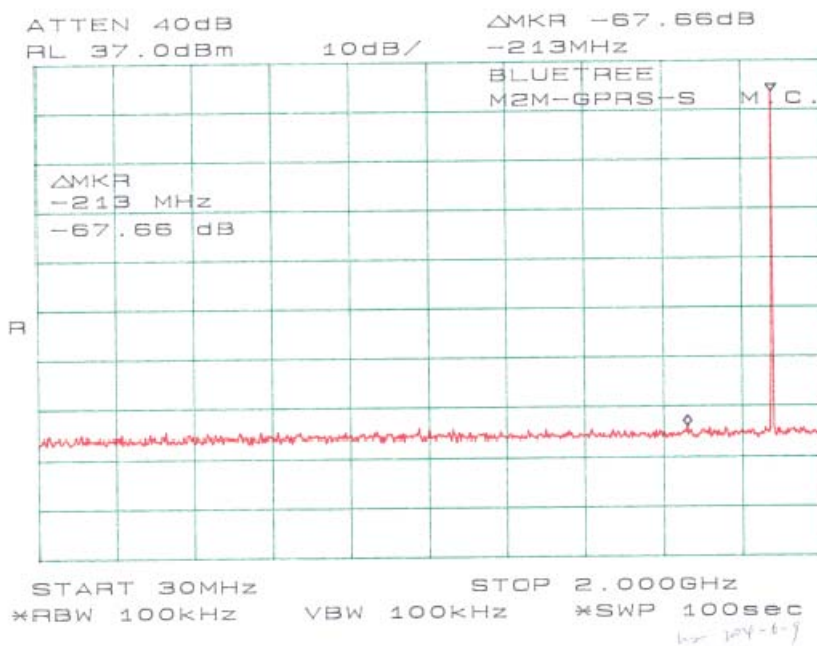
Please refer to the hereinafter plots.

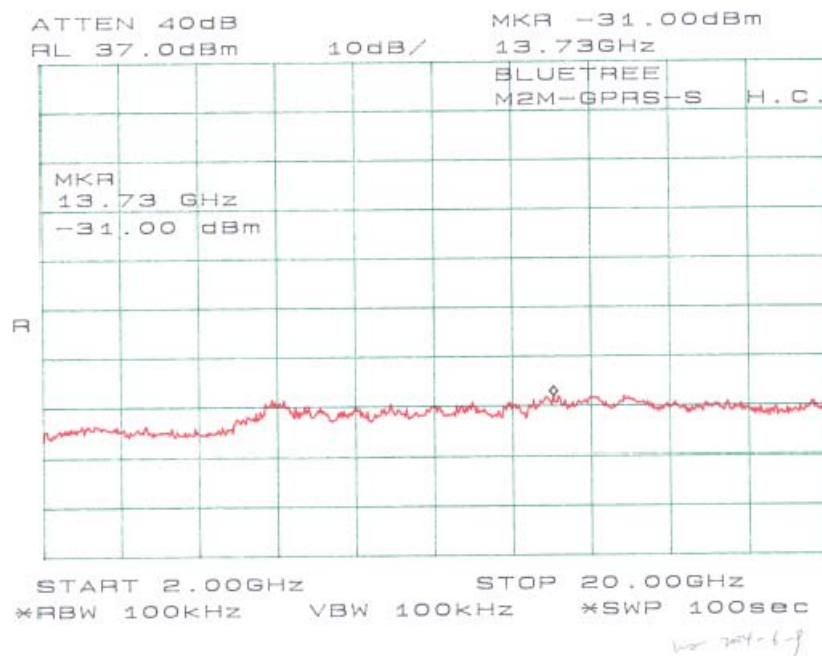
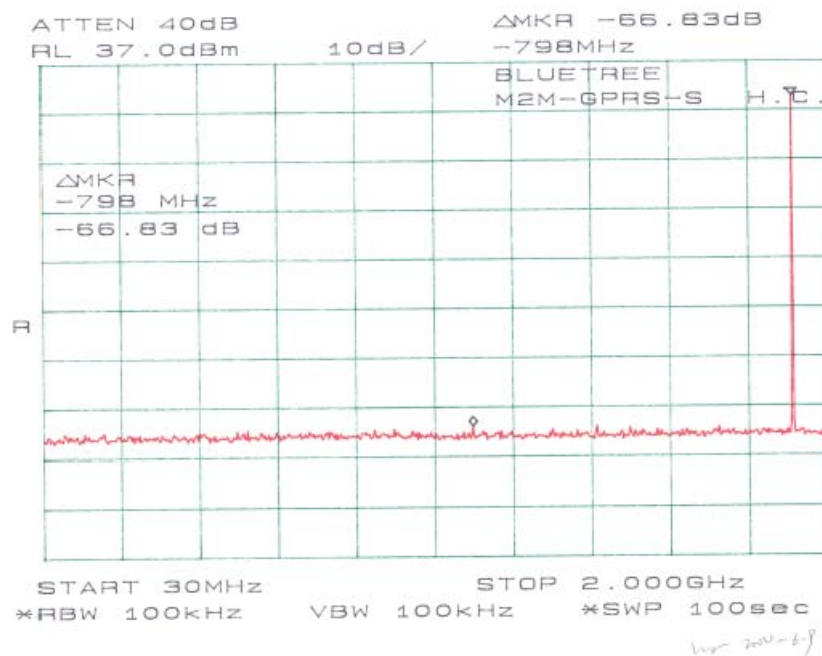
Plots of Spurious Emission for GPRS 850





Plots of Spurious Emission for GPRS 1900





§2.1055 (a), §2.1055 (d), §22.355, & §24.235 - FREQUENCY STABILITY

Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §22.355, 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)	Mobile Base, fixed	[SU][le]/ (ppm)	Mobile SU/3 watts [le]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

According to §24.235, The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
Tenney	Oven, Temperature	VersaTenn	12222-193	6/4/2004

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

Test Results

Test Result for GPRS 850

Frequency Stability Versus Temperature

Reference Frequency: 836.2 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MHz	PPM Error
50	15	836.20070	0.84
40	15	836.20053	0.63
30	15	836.20042	0.50
20	15	836.20037	0.44
10	15	836.20028	0.33
0	15	836.19978	-0.26
-10	15	836.19964	-0.43
-20	15	836.19961	-0.47
-30	15	836.19955	-0.54

Frequency Stability Versus Battery Voltage

Reference Frequency: 836.2MHz, Limit: 2.5ppm			
Power Supplied (Vdc)	Environment Temperature (°C)	MHz	
		ppm	
12.75	20	836.20077	0.92
17.25	20	836.20058	0.69

Test Result for GPRS1900

Frequency Stability Versus Temperature

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MHz	PPM Error
50	15	1880.00048	0.26
40	15	1880.00042	0.22
30	15	1880.00033	0.18
20	15	1880.00028	0.15
10	15	1879.99983	-0.09
0	15	1879.99967	-0.18
-10	15	1879.99960	-0.21
-20	15	1879.99952	-0.26
-30	15	1879.99949	-0.27

Frequency Stability Versus Battery Voltage

Reference Frequency: 1880MHz, Limit: 2.5ppm			
Power Supplied (Vdc)	Environment Temperature (°C)	MHz	
		ppm	
12.75	20	1879.99955	-0.24
17.25	20	1879.99962	-0.20

Normal operation voltage: 15Vdc

Operation Voltage range: 12.75-17.25 Vdc

§22.917 & §24.238 – BAND EDGE

Applicable Standard

According to § 22.917, 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.

According to §24.238, 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 Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

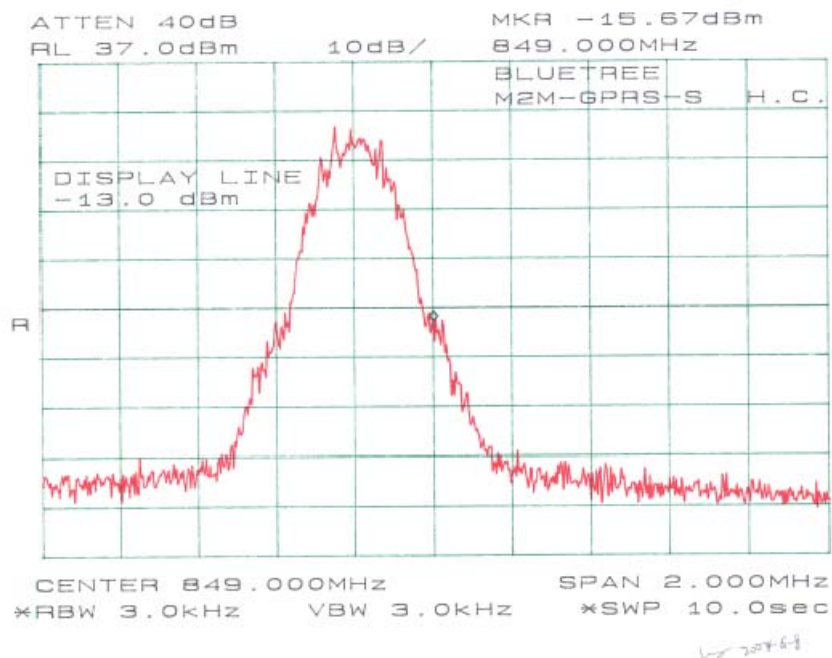
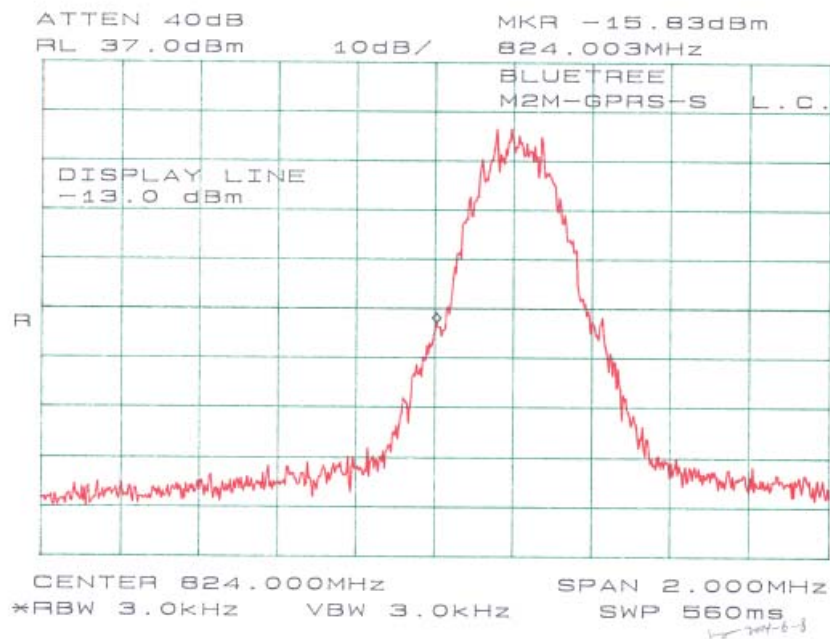
Environmental Conditions

Temperature:	18° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

The testing was performed by Ling Zhang on 2004-06-08 & 2004-06-09.

Test Results

Please refer to the following plots.

Plots of Band Edge for GPRS 850

Plots of Band Edge for GPRS 1900