

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

For

GTRAN Wireless, Inc.

9605 Scranton Road, Suite 300
San Diego, CA 92121

FCC ID: PL5GPC-6210

July 29, 2002

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| This Report Concerns: <input checked="" type="checkbox"/> Original Report | Equipment Type: Wireless Data Terminal |
| Test Engineer: Benjamin Jin | |
| Report No.: R0207165 | |
| Test Date: July 18, 2002 | |
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Note: This test report is specially limited to the above client 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 endorsement by NVLAP or any agency of the U.S. Government.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant: GTRAN Wireless, Inc.
Product Description: Wireless Data Terminal
Product Name: GPC6210
FCC ID: PL5GPC-6210
Serial Number: None
Transmitter Frequency: PMS: 824~848MHz
PCS: 1850~1910MHz
Maximum Output Power: PMS: 22.67dBm (184.93mW)
PCS: 21.33dBm (135.83mW)
Dimension: 3.8" L x 2.5"W x 0.2"H approximately
Power Supply: Fed by IBM Laptop Power Adapter, M/N: 02K6549
Applicable Standard PMS: FCC CFR 47, Part 22
PCS: FCC CFR 47, Part 24

1.2 Objective

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

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

The objective of the manufacturer is to demonstrate compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, band edge, conducted and radiated margin.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 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 - Personal Communications Services

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-2000, 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.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation 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 Bay Area Compliance Laboratory Corporation 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 C63.4-2000.

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, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167.

1.6 Test Equipment List

| Manufacturer | Description | Model | Serial Number | Cal. Due Date |
|-------------------|----------------------|------------------|---------------|---------------|
| HP | Spectrum Analyzer | 8568B | 2610A02165 | 12/6/02 |
| HP | Spectrum Analyzer | 8593B | 2919A00242 | 12/20/02 |
| HP | Amplifier | 8349B | 2644A02662 | 12/20/02 |
| HP | Quasi-Peak Adapter | 85650A | 917059 | 12/6/02 |
| HP | Amplifier | 8447E | 1937A01046 | 12/6/02 |
| A.H. System | Horn Antenna | SAS0200/571 | 261 | 12/27/02 |
| Com-Power | Log Periodic Antenna | AL-100 | 16005 | 11/2/02 |
| Com-Power | Biconical Antenna | AB-100 | 14012 | 11/2/02 |
| Solar Electronics | LISN | 8012-50-R-24-BNC | 968447 | 12/28/02 |
| Com-Power | LISN | LI-200 | 12208 | 12/20/02 |
| Com-Power | LISN | LI-200 | 12005 | 12/20/02 |
| BACL | Data Entry Software | DES1 | 0001 | 12/20/02 |

* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Local Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number | FCC ID |
|--------------|-------------|--------|---------------|--------------|
| IBM | Notebook PC | 1661 | None | DOC |
| Citizen | Printer | LSP-10 | 5047999-82 | DLK66TLSP-10 |
| Belkin | USB Adapter | F5U103 | None | DOC |

1.8 External I/O Cabling

| Cable Description | Length (M) | Port/From | To |
|-------------------------|------------|----------------------|---------|
| Shielded USB Cable | 1.0 | USB Port/USB Adapter | Laptop |
| Shielded USB Cable | 1.0 | USB Port/USB Adapter | EUT |
| Shielded Parallel Cable | 2.0 | Parallel Port/Laptop | Printer |

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing in a typical fashion (as normally used in a typical application).

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

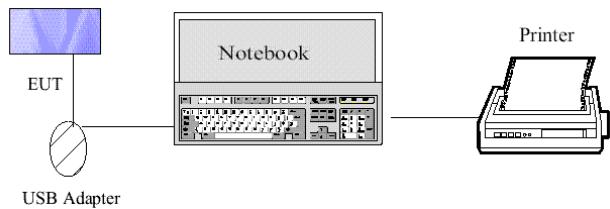
2.2 Block Diagram

Please refer to Exhibit D.

2.3 Equipment Modifications

No modifications were necessary for the EUT to comply with the applicable limits and requirements.

2.4 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

| FCC RULE | DESCRIPTION OF TEST | RESULT |
|--|--|-----------|
| § 2.1046, § 22.913 (a), § 24.232 (b) | RF power output | Compliant |
| 2.1047, 22.915 (a) | Modulation Characteristics | Compliant |
| § 2.1049 § 22.917 § 24.238 | Emission, Occupied Bandwidth | Compliant |
| § 2.1051, § 22.917 § 24.238(a) | Spurious emissions at antenna terminals | Compliant |
| § 2.1053, § 22.917 § 24.238 (a) | Field strength of spurious radiation | Compliant |
| § 2.1055 (a) § 2.1055 (d) § 22.355 § 24.235 | Frequency stability vs. temperature Frequency stability vs. voltage | Compliant |
| § 2.1093 § 24.52 | Radiofrequency radiation exposure evaluation Portable Device | Compliant |
| § 15.107 | AC Line Conducted emission | Compliant |
| § 15.109 | Radiated Emission Limit (Digital Portion) | Compliant |
| § 15.205 | Antenna Requirement | Compliant |

4 - EFFECTIVE RADIATED POWER

4.1 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 (b), mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.2 Test Procedure

The antenna was removed and SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 Ohm), the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitter.

4.3 Test Equipment

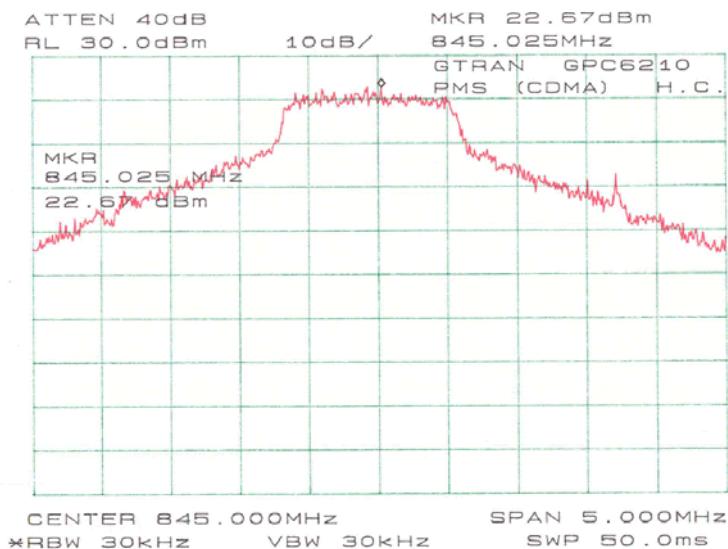
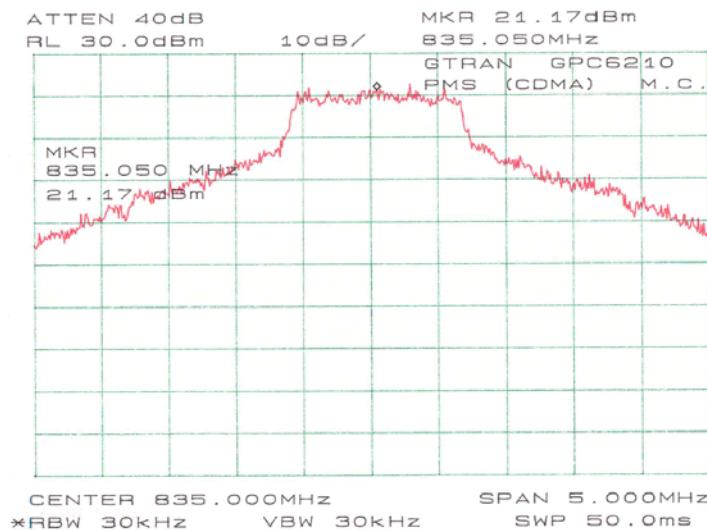
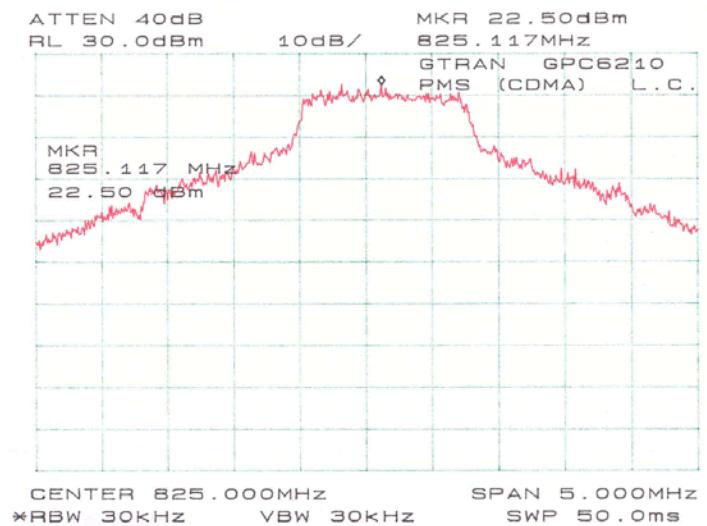
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

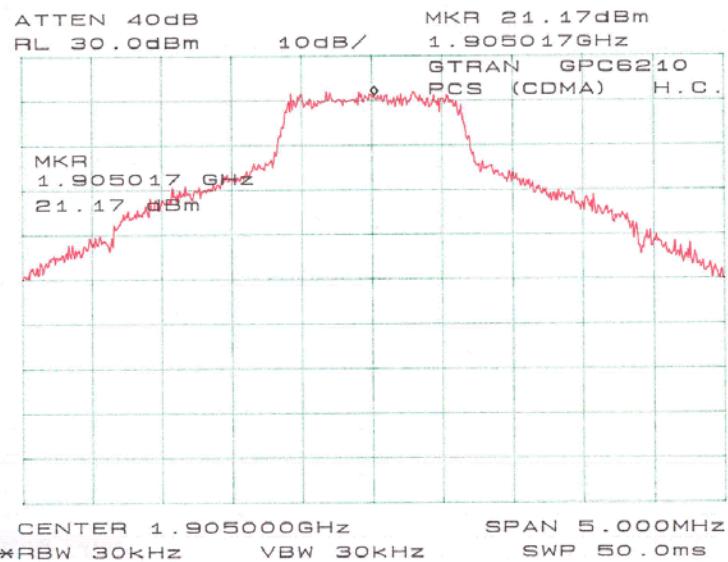
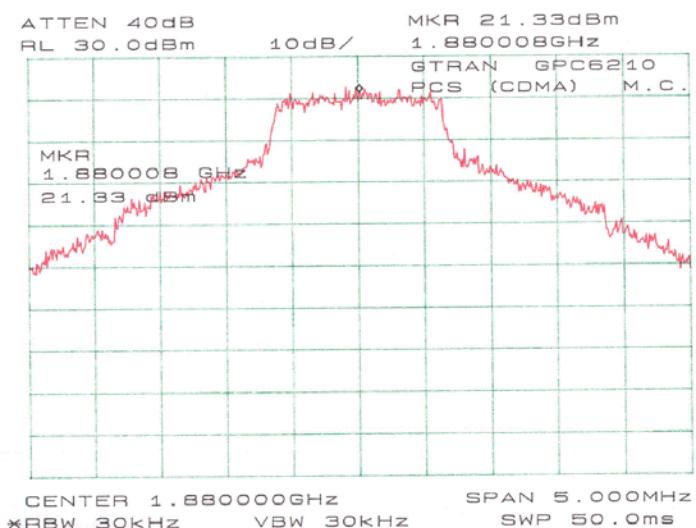
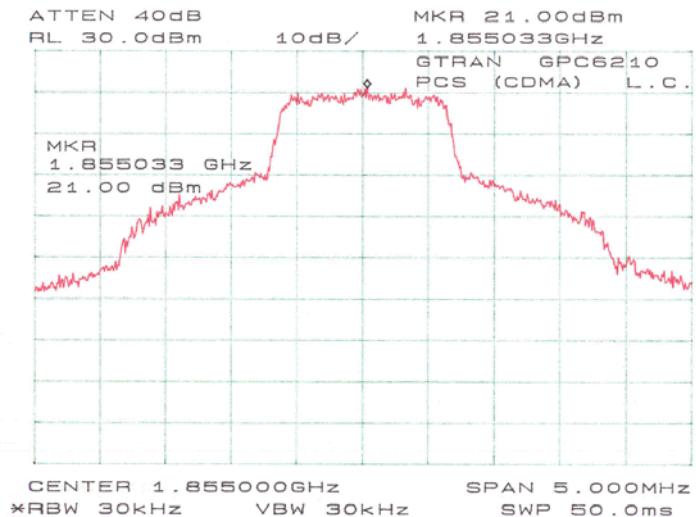
4.4 Test Results

| Modulation Type | Channel | Output Power in dBm | Output Power in mW | Standard (mW) |
|-----------------|---------|---------------------|--------------------|---------------|
| PMS | Low | 22.50 | 177.83 | 7000 |
| | Mid | 21.17 | 130.92 | 7000 |
| | High | 22.67 | 184.93 | 7000 |
| PCS | Low | 21.00 | 125.89 | 2000 |
| | Mid | 21.33 | 135.83 | 2000 |
| | High | 21.17 | 130.92 | 2000 |

4.5 Plots of Effective Radiated Power Test Results

Please refer to the hereinafter plots.





5 - OCCUPIED BANDWIDTH

5.1 Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 22.905, and Section 22.911. All channels have a bandwidth of 40kHz and are designed by their center frequencies in MegaHertz.

According to FCC §2.1049 and §24.238 (b), 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 26dB below the transmitter power.

5.2 Test Procedure

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

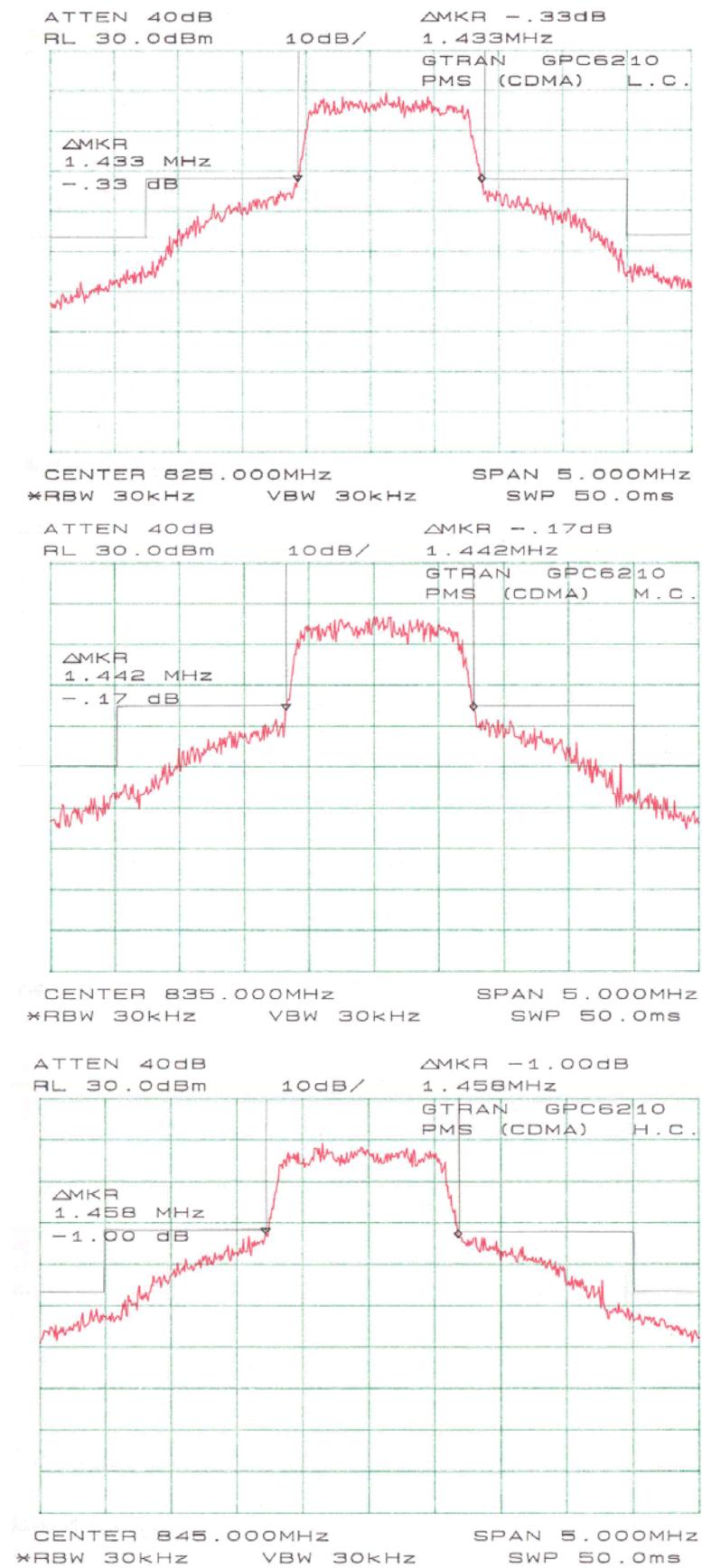
The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the spectrum was recorded in the frequency band ± 50 KHz from the carrier frequency.

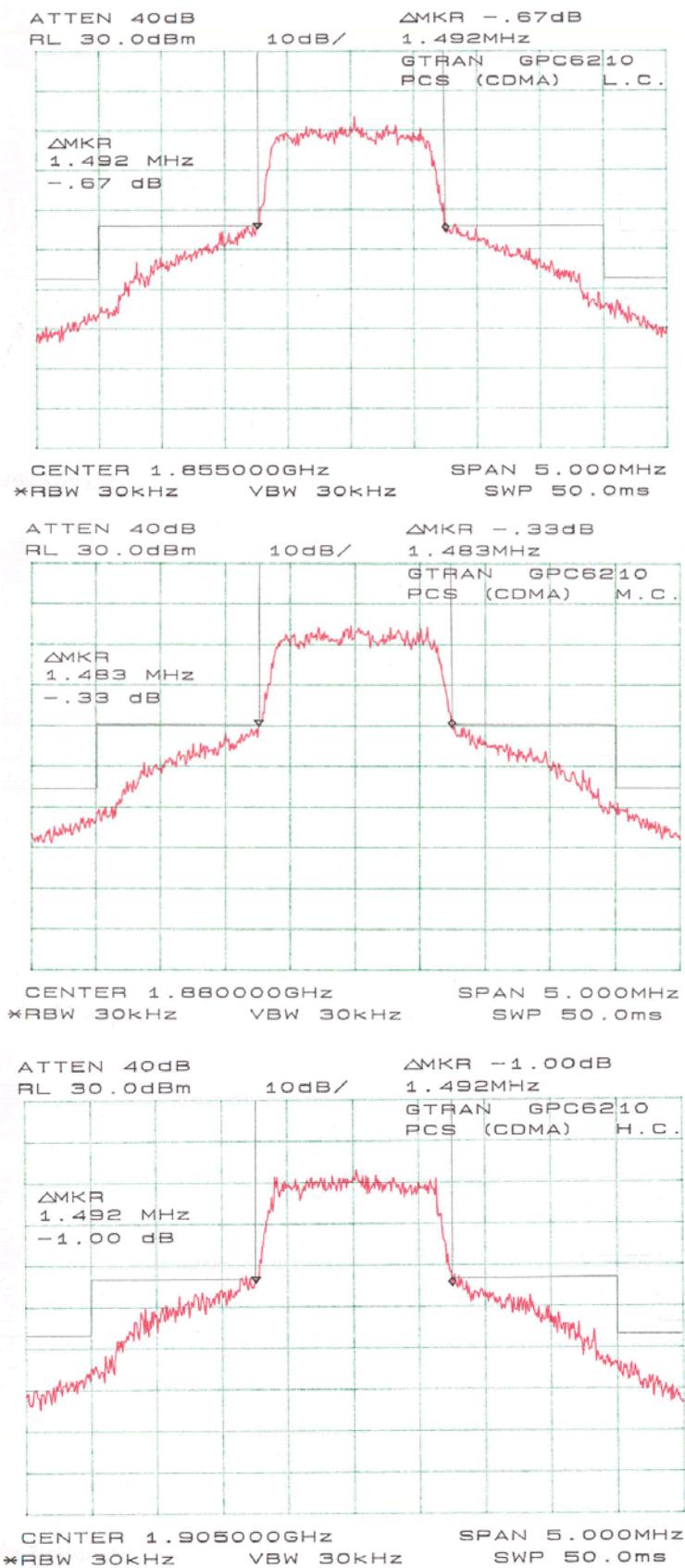
5.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

5.4 Test Results

Please refer to the hereinafter plots.





6 - MODULATION CHARACTERISTIC

6.1 Applicable Standard

Requirement: FCC § 2.1047, § 22.915(a)

6.2 Test Procedure

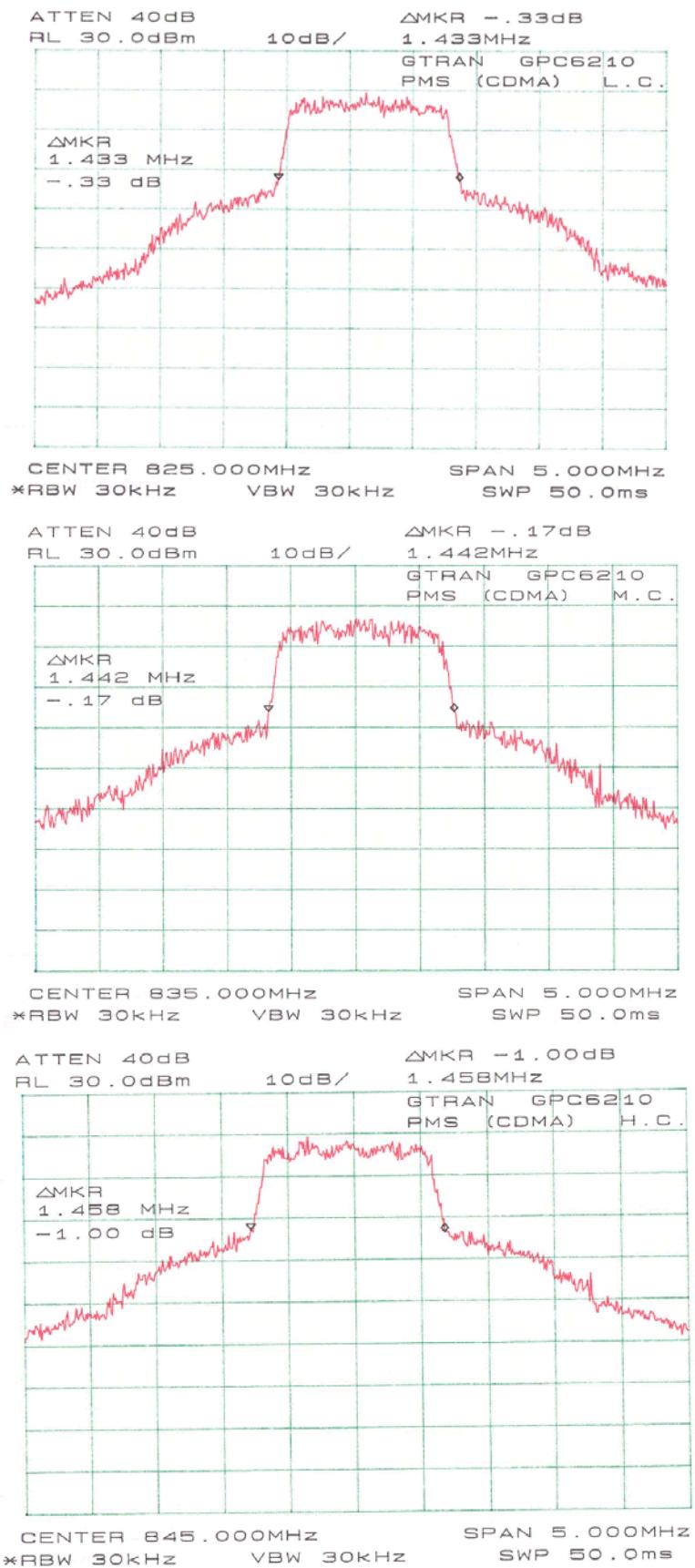
CDMA digital mode is used by EUT.

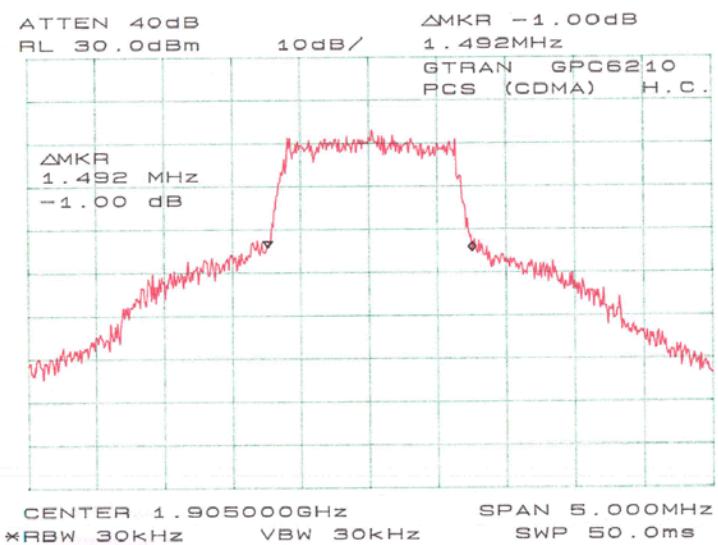
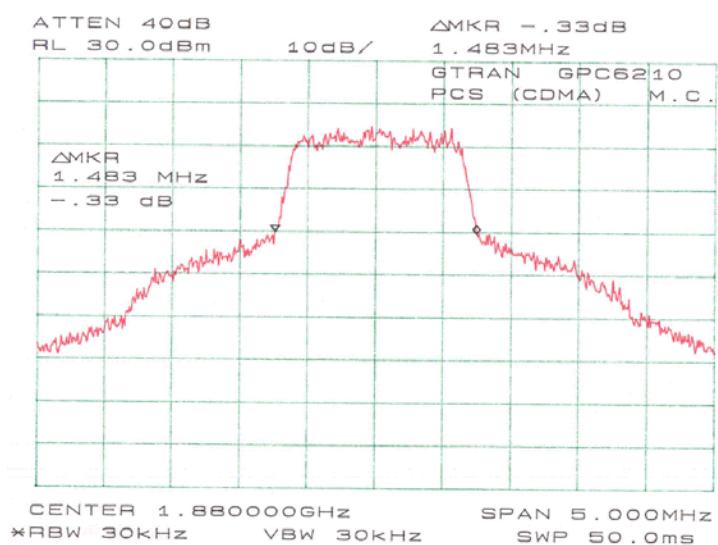
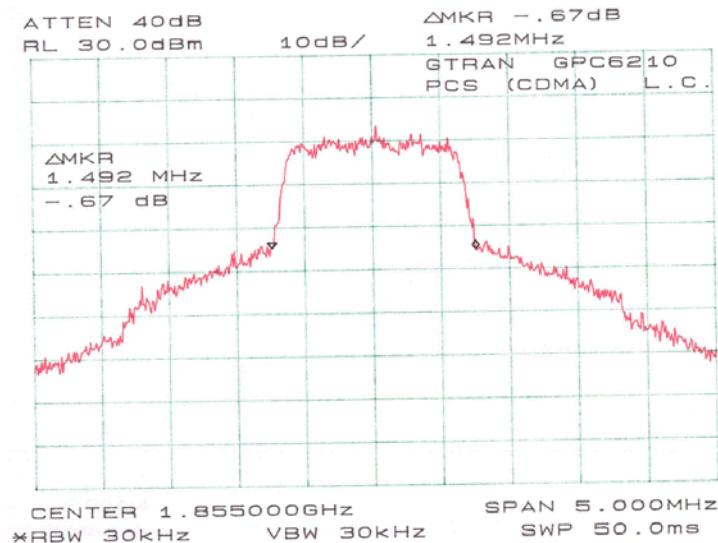
6.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

6.4 Test Results

Please refer to the hereinafter plots.





7 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Test Procedure

Requirements: CFR 47, § 22.917, § 2.1051, § 2.1057, § 24.238 (a)

(e) Out of Band Emissions.

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least $43 + 10 \log P$ dB.

(f) Mobile Emissions in Base Frequency Range.

The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049.

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

7.2 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.

7.3 Test Equipment

HP 8566B Spectrum Analyzer

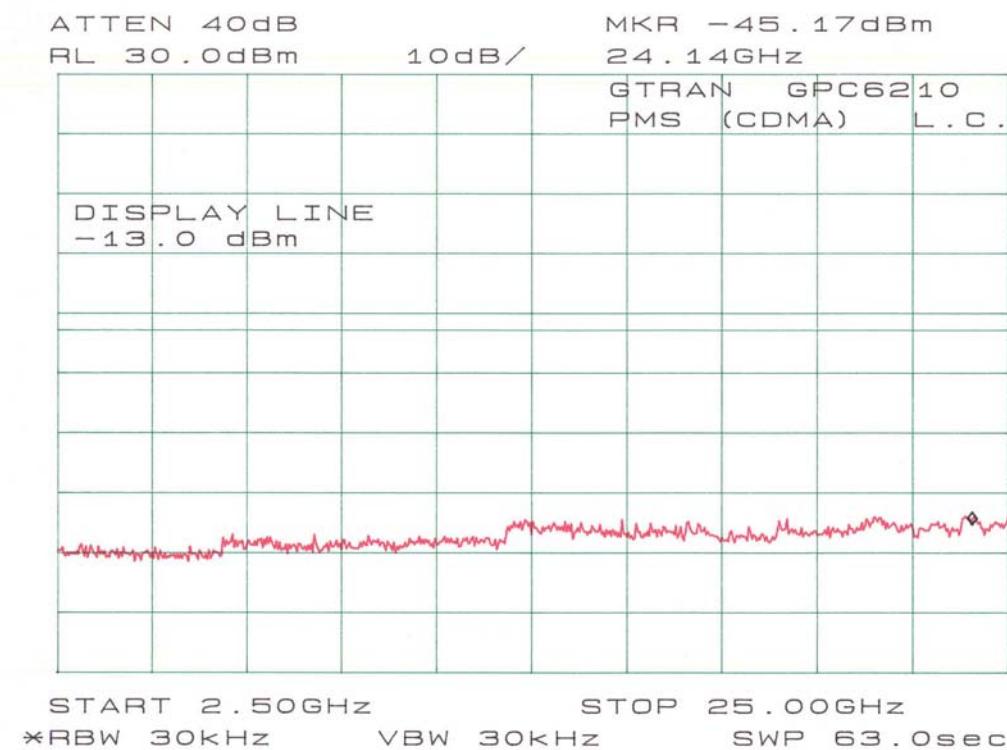
HP 7470A Plotter

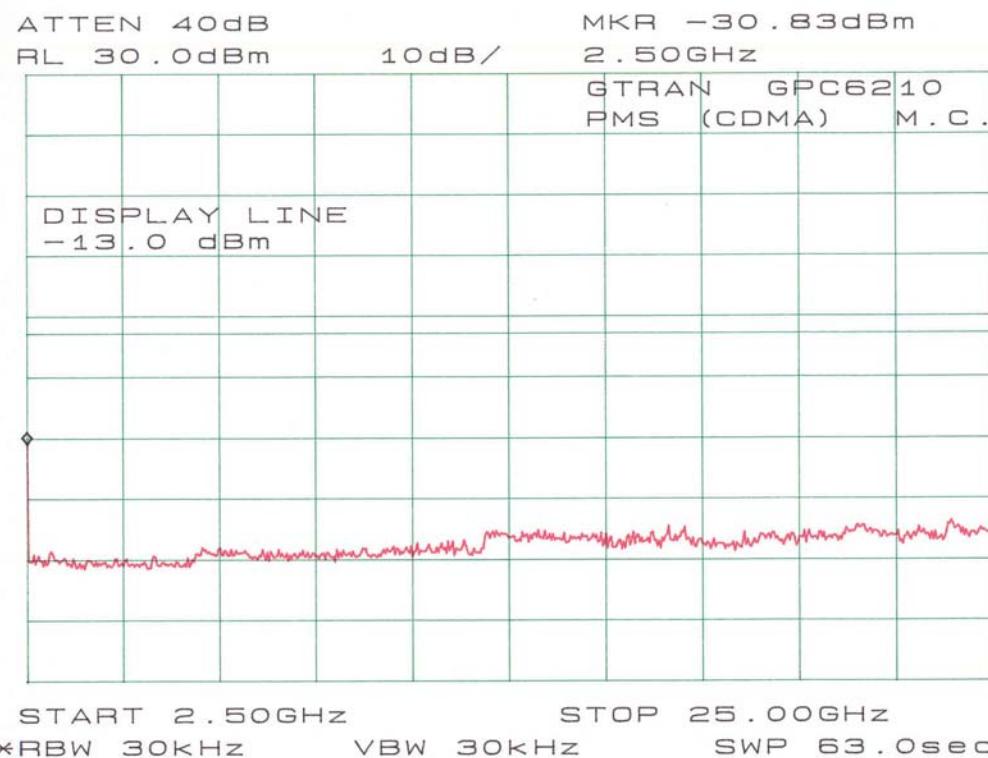
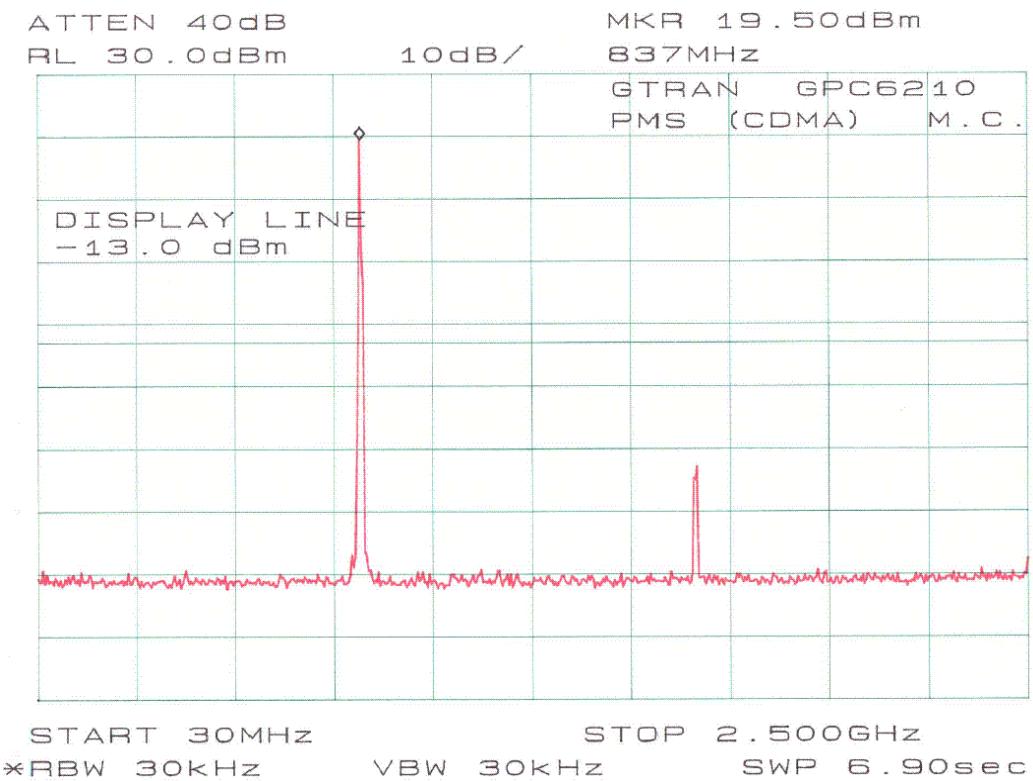
Hewlett Packard HP8566B Spectrum Analyzer

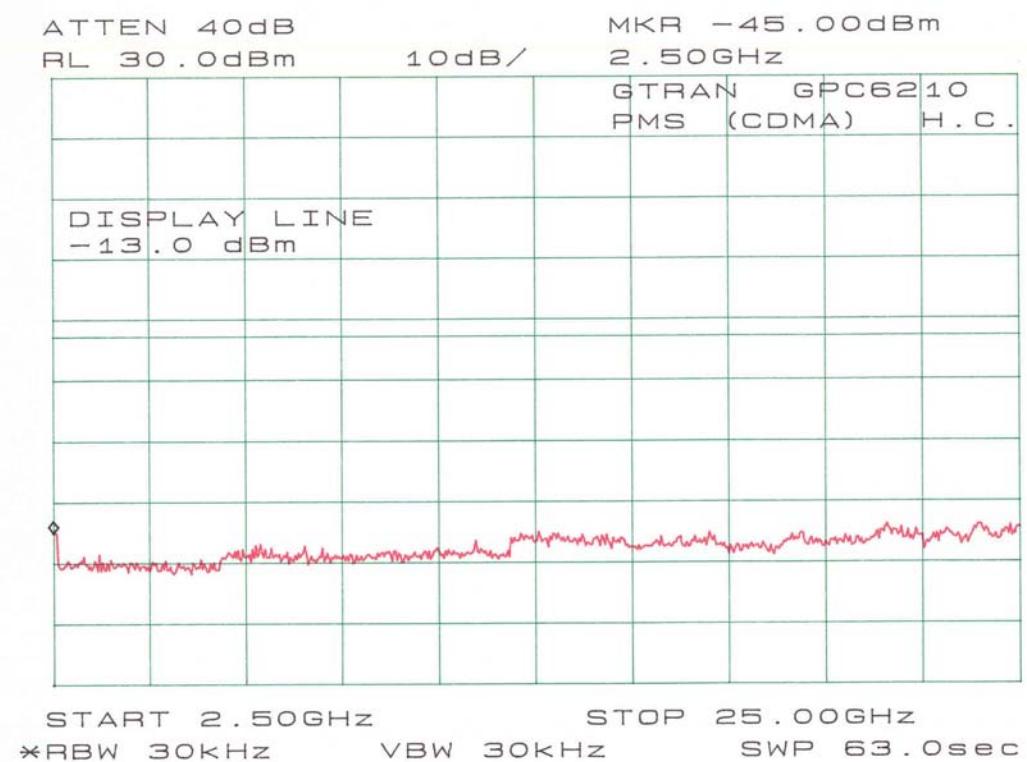
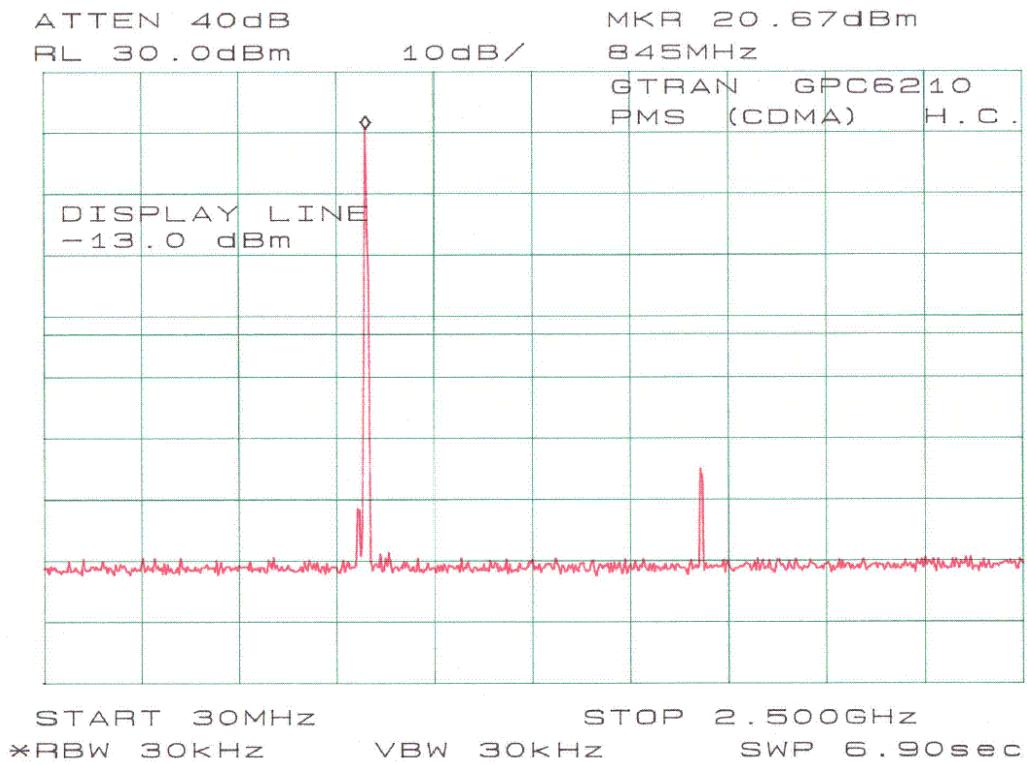
Hewlett Packard HP 7470A Plotter

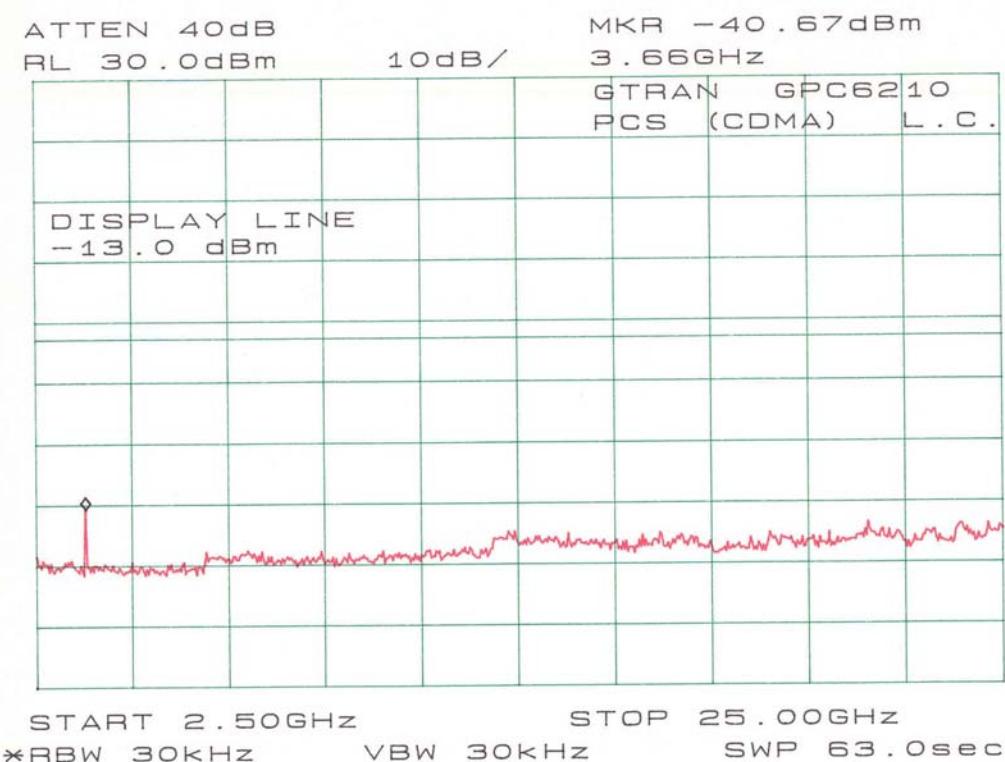
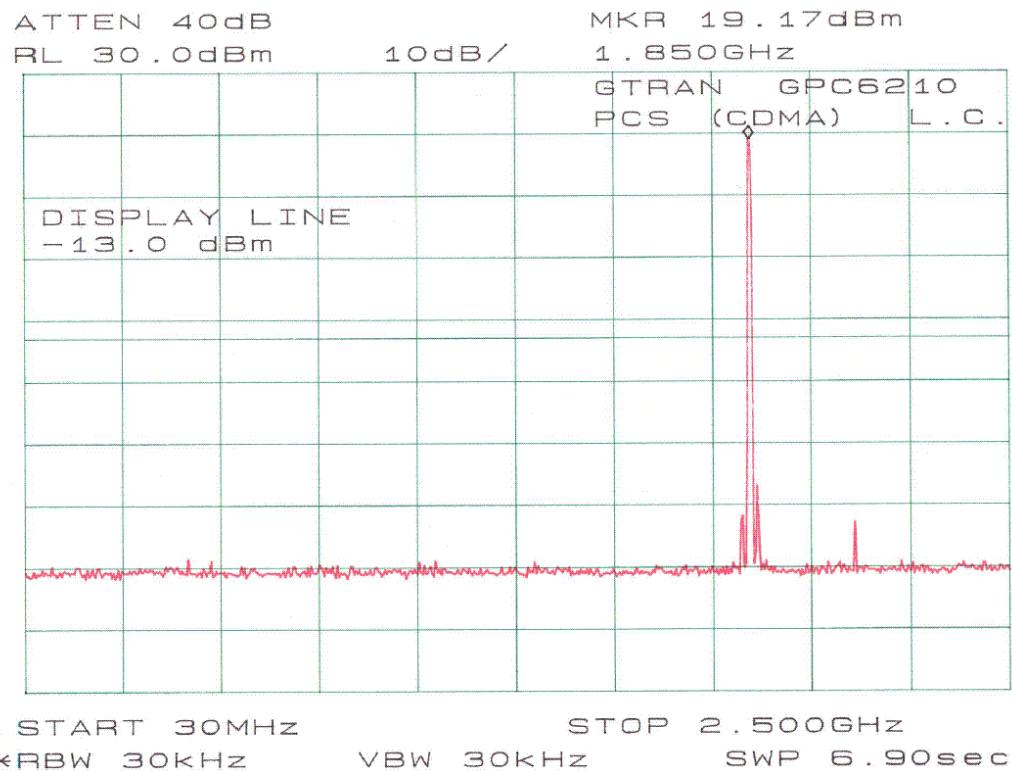
7.4 Test Results

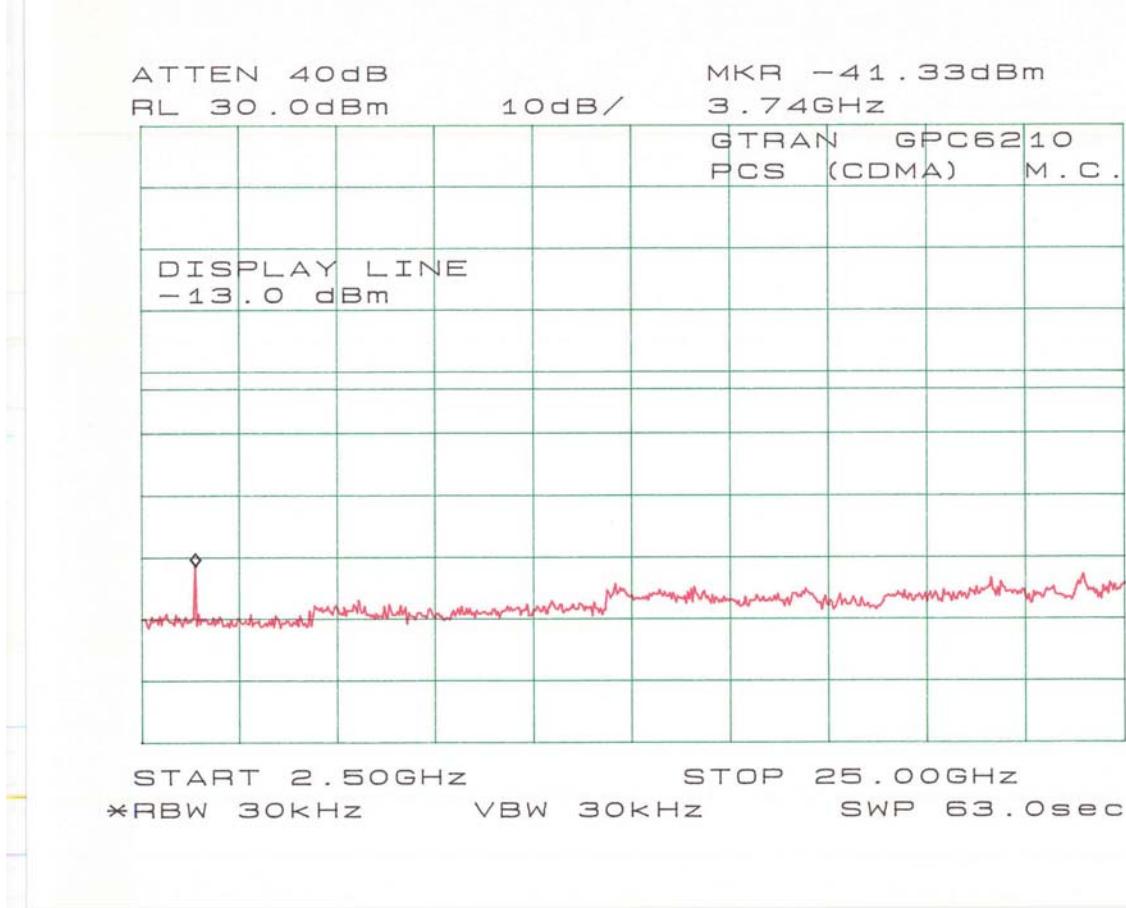
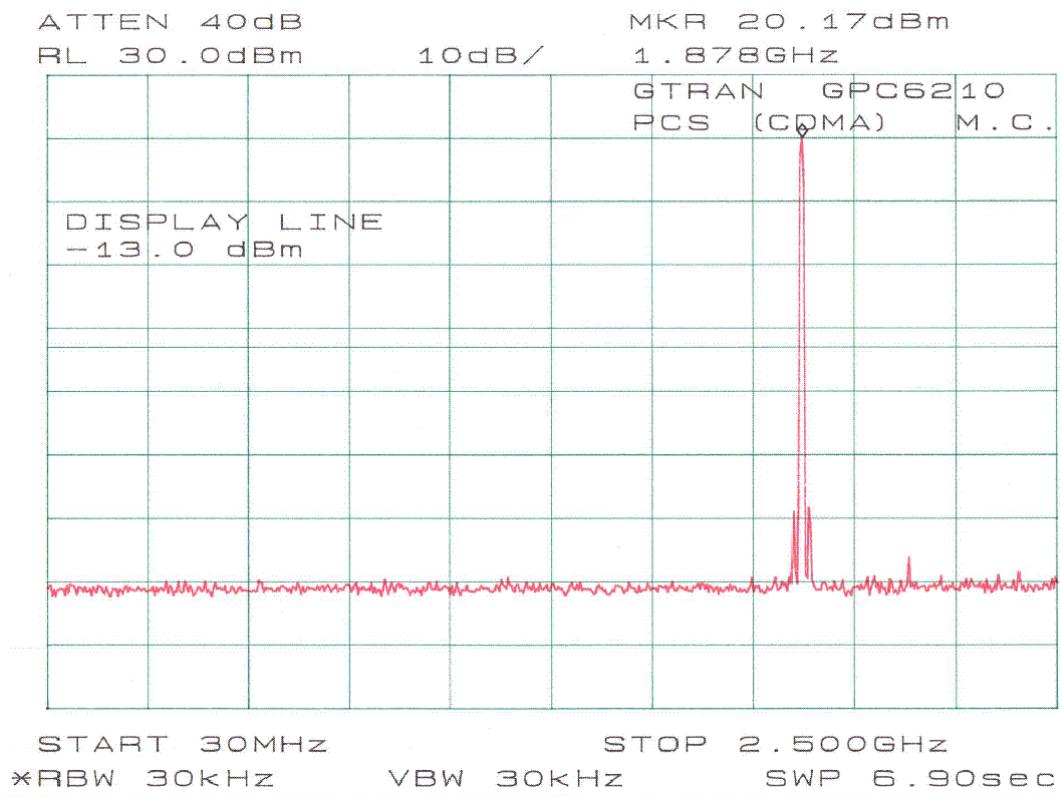
Please refer to the hereinafter plots.

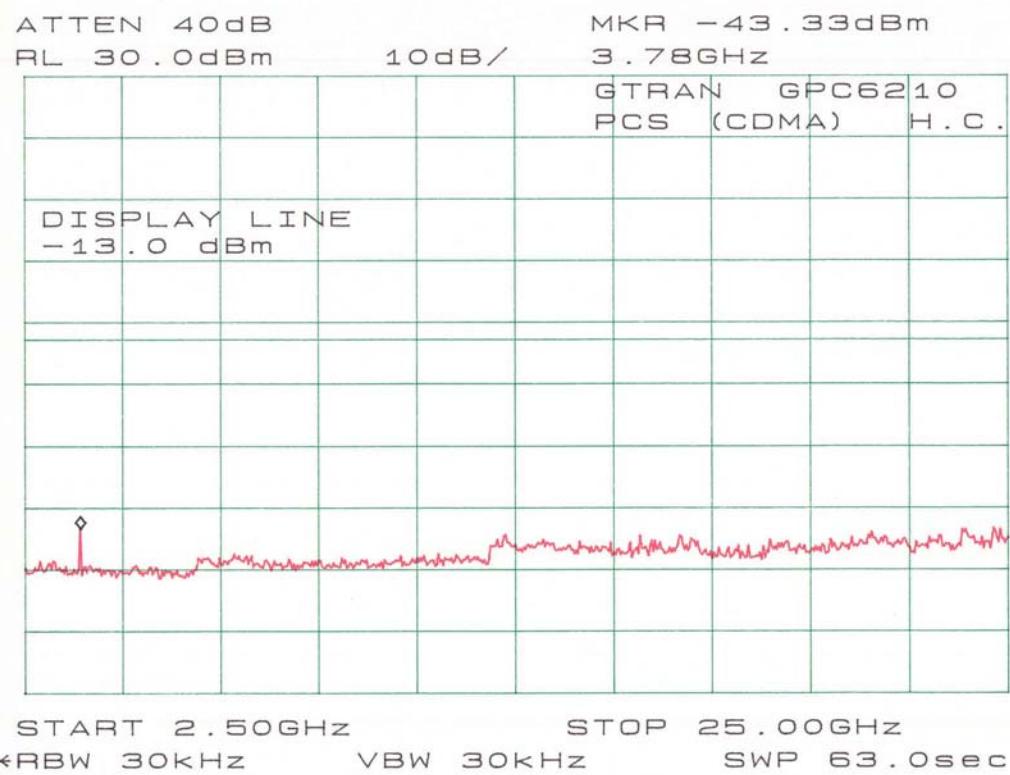
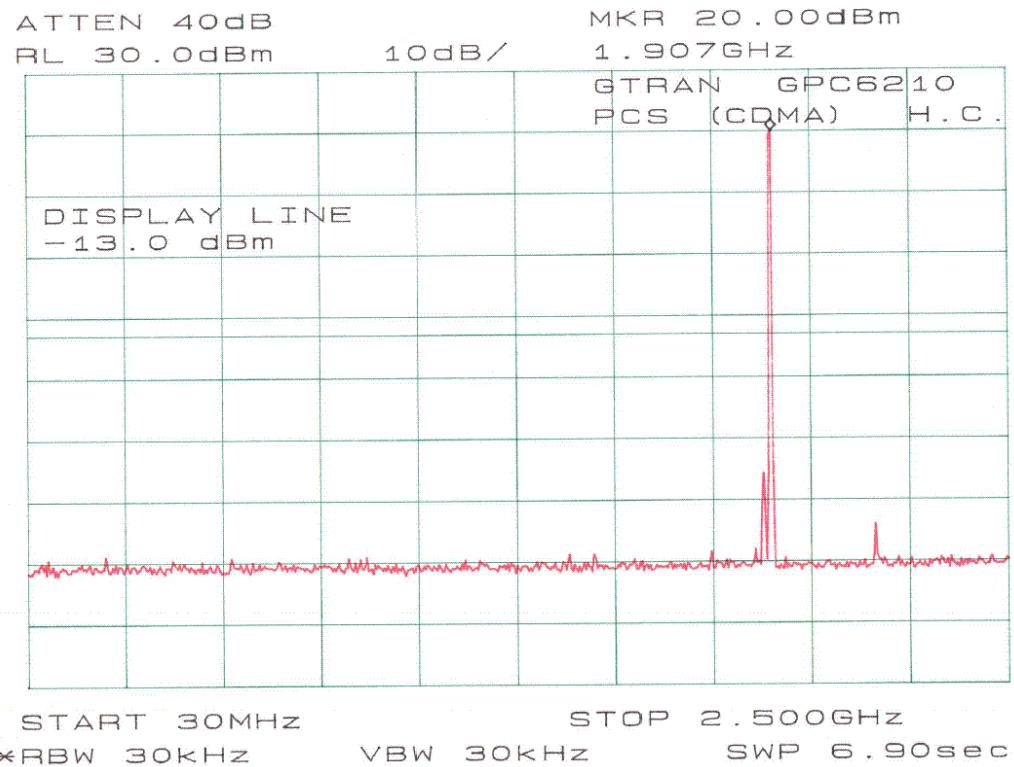












8 - FIELD STRENGTH OF SPURIOUS RADIATION

8.1 Test Procedure

Requirements: CFR 47, § 2.1053, § 22.917 and § 24.238 (a).

8.2 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 = $43 + 10 \log_{10} (\text{power out in Watts})$

8.3 Test Equipment

CDI B100/200/300 Biconical Antennas

EMCO Bi-logcon Antenna

EMCO 3115 Horn Antenna

HP 8566B Spectrum Analyzer

Preamplifiers

HP8640 Generator

Non-radiating Load

8.4 Test Result

PMS: Low Frequency: -11.3dB at 1650.00MHz

High Frequency: -7.9dB at 1690.00MHz

PCS: Low Frequency: -9.5dB at 3710.00MHz

High Frequency: -10.8dB at 3810.00MHz

Compliance Statement

According to FCC Part 15, at 3-meter distance the emission from an intentional radiator shall not exceed the field strength level 40dB_{UV}/m within 30-88MHz, 43.5dB_{UV}/m within 88-216MHz, 46dB_{UV}/m within 226-960MHz, 54dB_{UV}/m above 960MHz. The level of any unwanted emissions shall not exceed the level of the fundamental frequency.

The levels of unwanted emission of this device were below the above limits. This device was compliant with the FCC Part 15.

Primary scan at 825MHz (PMS, Low CH.)

| EUT | | | | GENERATOR | | | | | | | | Absolute Level dBm | Spurious Emissions dB | FCC | |
|-------------------------|--------------|--------------|-------|---------------------------|-----------|---------------------------|-----------|----------------|-----------|--------------|-----------|--------------------|-----------------------|----------|-----------------|
| Indicated Frequency MHz | Ampl. dBuV/m | Angle Degree | Table | Test Antenna Height Meter | Polar H/V | Substituted Frequency MHz | Level dBm | Half-wavel. cm | Polar H/V | Height Meter | Polar H/V | Test Antenna dB | Correction Factor | Limit dB | Margin dB |
| 825 | 115.3 | 30 | 1.2 | v | | 825 | 29.2 | 25 | v | 1.5 | v | 6.3 | 0.5 | 22.37 | |
| 825 | 113.8 | 270 | 1.5 | h | | 825 | 28.9 | 25 | h | 1.5 | h | 6.3 | 0.5 | 22.14 | |
| 1650 | 64.4 | 0 | 1 | v | | 1650 | -16.1 | 9 | v | 1.2 | v | 7.5 | 0.7 | -24.3 | 46.7 35.4 -11.3 |
| 1650 | 62.9 | 30 | 1.2 | h | | 1650 | -18 | 9 | h | 1.5 | h | 7.5 | 0.7 | -26.2 | 48.6 35.4 -13.2 |
| 2475 | 55.3 | 180 | 1.2 | v | | 2475 | -17.2 | 6 | v | 1.5 | v | 11.4 | 0.9 | -29.5 | 51.9 35.4 -16.5 |
| 2475 | 50.2 | 210 | 1.5 | h | | 2475 | -22.4 | 6 | h | 1.8 | h | 11.4 | 0.9 | -34.7 | 57.1 35.4 -21.7 |
| | | | | | | | | | | | | | | | |

Primary scan at 845MHz (PMS, High CH.)

| EUT | | | | GENERATOR | | | | | | | | Absolute Level dBm | Spurious Emissions dB | FCC | |
|-------------------------|--------------|--------------|-------|---------------------------|-----------|---------------------------|-----------|----------------|-----------|--------------|-----------|--------------------|-----------------------|----------|-----------------|
| Indicated Frequency MHz | Ampl. dBuV/m | Angle Degree | Table | Test Antenna Height Meter | Polar H/V | Substituted Frequency MHz | Level dBm | Half-wavel. cm | Polar H/V | Height Meter | Polar H/V | Test Antenna dB | Correction Factor | Limit dB | Margin dB |
| 845 | 113.2 | 90 | 1.2 | v | | 845 | 28.9 | 25 | v | 1.5 | v | 6.3 | 0.5 | 22.08 | |
| 845 | 111.8 | 70 | 1.5 | h | | 845 | 28 | 25 | h | 1.8 | h | 6.3 | 0.5 | 21.15 | |
| 1690 | 63.5 | 270 | 1.2 | v | | 1690 | -12.8 | 9 | v | 1.2 | v | 7.5 | 0.7 | -21 | 43 35.1 -7.9 |
| 1690 | 62.4 | 290 | 1.5 | h | | 1690 | -13.6 | 9 | h | 1.5 | h | 7.5 | 0.7 | -21.8 | 43.9 35.1 -8.8 |
| 2535 | 51.7 | 330 | 1.2 | v | | 2535 | -15.3 | 6 | v | 1.5 | v | 11.4 | 0.9 | -27.6 | 49.7 35.1 -14.6 |
| 2535 | 46.3 | 270 | 1.2 | h | | 2535 | -20 | 6 | h | 1.5 | h | 11.4 | 0.9 | -32.3 | 54.4 35.1 -19.3 |
| | | | | | | | | | | | | | | | |

Primary scan at 1855MHz (PCS, Low CH.)

| EUT | | | | GENERATOR | | | | | | | | Absolute Level dBm | Spurious Emissions dB | FCC | |
|-------------------------|--------------|--------------|-------|---------------------------|-----------|---------------------------|-----------|----------------|-----------|--------------|-----------|--------------------|-----------------------|----------|-----------------|
| Indicated Frequency MHz | Ampl. dBuV/m | Angle Degree | Table | Test Antenna Height Meter | Polar H/V | Substituted Frequency MHz | Level dBm | Half-wavel. cm | Polar H/V | Height Meter | Polar H/V | Test Antenna dB | Correction Factor | Limit dB | Margin dB |
| 1855 | 111.4 | 270 | 1.2 | v | | 1855 | 29.7 | 8 | v | 1.5 | v | 8.2 | 0.7 | 20.76 | |
| 1855 | 97.6 | 230 | 1.5 | h | | 1855 | 26.9 | 8 | h | 1.5 | h | 8.2 | 0.7 | 17.95 | |
| 3710 | 51.9 | 0 | 1 | v | | 3710 | -7.8 | 3.5 | v | 1.2 | v | 13.5 | 1.2 | -22.5 | 43.3 33.8 -9.5 |
| 3710 | 45.2 | 30 | 1.2 | h | | 3710 | -14.4 | 3.5 | h | 1.5 | h | 13.5 | 1.2 | -29.1 | 49.9 33.8 -16.1 |
| 5565 | 40.1 | 180 | 1.2 | v | | 5565 | -12.1 | 3.3 | v | 1.5 | v | 16.1 | 1.5 | -29.7 | 50.5 33.8 -16.7 |
| 5565 | 37.8 | 210 | 1.5 | h | | 5565 | -14.3 | 3.3 | h | 1.8 | h | 16.1 | 1.5 | -31.9 | 52.7 33.8 -18.9 |
| | | | | | | | | | | | | | | | |

Primary scan at 1905MHz (PCS, High CH.)

| EUT | | | | GENERATOR | | | | | | | | Absolute Level dBm | Spurious Emissions dB | FCC | |
|-------------------------|--------------|--------------|-------|---------------------------|-----------|---------------------------|-----------|----------------|-----------|--------------|-----------|--------------------|-----------------------|----------|-----------------|
| Indicated Frequency MHz | Ampl. dBuV/m | Angle Degree | Table | Test Antenna Height Meter | Polar H/V | Substituted Frequency MHz | Level dBm | Half-wavel. cm | Polar H/V | Height Meter | Polar H/V | Test Antenna dB | Correction Factor | Limit dB | Margin dB |
| 1905 | 112.2 | 30 | 1.2 | v | | 1905 | 29.9 | 8 | v | 1.5 | v | 8.2 | 0.7 | 21.03 | |
| 1905 | 102.3 | 45 | 1.5 | h | | 1905 | 27.4 | 8 | h | 1.8 | h | 8.2 | 0.7 | 18.54 | |
| 3810 | 51.5 | 270 | 1.2 | v | | 3810 | -9.2 | 3.5 | v | 1.5 | v | 13.5 | 1.2 | -23.9 | 44.9 34.1 -10.8 |
| 3810 | 47.1 | 290 | 1.5 | h | | 3810 | -13.7 | 3.5 | h | 1.2 | h | 13.5 | 1.2 | -28.4 | 49.4 34.1 -15.3 |
| 5715 | 40.2 | 330 | 1.2 | v | | 5715 | -12.6 | 3.3 | v | 1.2 | v | 16.1 | 1.5 | -30.2 | 51.2 34.1 -17.1 |
| 5715 | 39.4 | 270 | 1.2 | h | | 5715 | -13.8 | 3.3 | h | 1.5 | h | 16.1 | 1.5 | -31.4 | 52.4 34.1 -18.3 |
| | | | | | | | | | | | | | | | |

9 - FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) and § 24.235

9.2 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.

9.3 Test Equipment

Temperature Chamber -50°C to $+100^{\circ}\text{C}$
Hewlett Packard 5383A Frequency Counter
Goldstar DC Power Supply, GR303

9.4 Test Results

PMS: Frequency Stability Versus Input Voltage

| Reference Frequency: 825.00 MHz, Limit: 2.5ppm | | | |
|--|-------------------------|-------------------------------------|-----------|
| Environment Temperature (°C) | Power Supplied (Vdc) | Frequency Measure with Time Elapsed | |
| | | MCF (MHz) | PPM Error |
| 50 | New Batt. | 825.000 | 0.0 |
| 40 | New Batt. | 825.002 | 1.1 |
| 30 | New Batt. | 825.001 | 0.5 |
| 20 | New Batt. | 825.001 | 0.5 |
| 10 | New Batt. | 825.000 | 0.0 |
| 0 | New Batt. | 824.999 | -0.5 |
| -10 | New Batt. | 825.000 | 0.0 |
| -20 | New Batt. | 824.999 | -0.5 |
| -30 | New Batt. | 825.000 | 0.0 |

PMS: Frequency Stability Versus Input Voltage

| Reference Frequency: 825.00 MHz, Limit: 2.5ppm | | | | | | |
|--|-------------------------------------|-----|-----------|------|------------|-----|
| Power Supplied (Vdc) | Frequency Measure with Time Elapsed | | | | | |
| | 2 Minutes | | 5 Minutes | | 10 Minutes | |
| | MHz | PPM | MHz | PPM | MHz | PPM |
| 115% of 120Vac | 825.000 | 0.0 | 824.999 | -0.5 | 825.001 | 0.5 |
| 100% of 120Vac | 825.001 | 0.5 | 825.000 | 0.0 | 825.000 | 0.0 |
| 85% of 120Vac | 825.001 | 0.5 | 825.001 | 0.5 | 825.000 | 0.0 |

PCS: Frequency Stability Versus Input Voltage

| Reference Frequency: 1850.00 MHz, Limit: 2.5ppm | | | |
|---|-------------------------|-------------------------------------|-----------|
| Environment Temperature (°C) | Power Supplied (Vdc) | Frequency Measure with Time Elapsed | |
| | | MCF (MHz) | PPM Error |
| 50 | New Batt. | 1850.002 | 1.1 |
| 40 | New Batt. | 1850.000 | 0.0 |
| 30 | New Batt. | 1850.001 | 0.5 |
| 20 | New Batt. | 1850.000 | 0.0 |
| 10 | New Batt. | 1850.001 | 0.5 |
| 0 | New Batt. | 1849.999 | -0.5 |
| -10 | New Batt. | 1850.000 | 0.0 |
| -20 | New Batt. | 1849.999 | -0.5 |
| -30 | New Batt. | 1850.000 | 0.0 |

PCS: Frequency Stability Versus Input Voltage

| Reference Frequency: 1850.00 MHz, Limit: 2.5ppm | | | | | | |
|---|-------------------------------------|-----|-----------|------|------------|-----|
| Power Supplied (Vdc) | Frequency Measure with Time Elapsed | | | | | |
| | 2 Minutes | | 5 Minutes | | 10 Minutes | |
| | PPM | % | PPM | % | PPM | % |
| 115% of 120Vac | 1850.000 | 0.0 | 1849.999 | -0.5 | 1850.000 | 0.0 |
| 100% of 120Vac | 1850.002 | 1.1 | 1850.000 | 0.0 | 1850.000 | 0.0 |
| 85% of 120Vac | 1850.001 | 0.5 | 1850.001 | 0.5 | 1850.001 | 0.5 |

Conclusion: The EUT complied with the applicable Frequency Stability Limits.

10 - CONDUCTED EMISSIONS

10.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

10.2 EUT Setup

The measurement was performed at the **Open Area Test Site**, using the same setup per ANSI C63.4-2000 measurement procedure. The specification used was with FCC Class B limits.

The spacing between peripheral was 10cm.

The external I/O cables were draped and bundled when necessary.

The laptop utilized 120Vac/60Hz power source.

10.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

| | |
|------------------------------------|---------|
| Start Frequency..... | 450 kHz |
| Stop Frequency..... | 30 MHz |
| Sweep Speed..... | Auto |
| IF Bandwidth..... | 10 kHz |
| Video Bandwidth..... | 10 kHz |
| Quasi-Peak Adapter Bandwidth | 9 kHz |
| Quasi-Peak Adapter Mode..... | Normal |

10.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB μ V of specified limits). Quasi-peak readings are distinguished with a "Qp".

10.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

-3.5 dB μ V at 0.75 MHz in the Line mode

10.6 Conducted Emissions Test Data

| LINE CONDUCTED EMISSIONS | | | | FCC CLASS B | |
|--------------------------|-------------------------|-------------------------|-----------------------|---------------------|--------------|
| Frequency MHz | Amplitude dB μ V | Detector Qp/Ave/Peak | Phase Line/Neutral | Limit dB μ V | Margin dB |
| 0.75 | 44.5 | QP | Line | 48 | -3.5 |
| 7.64 | 43.5 | QP | Neutral | 48 | -4.5 |
| 8.43 | 42.7 | QP | Line | 48 | -5.3 |
| 0.71 | 42.7 | QP | Neutral | 48 | -5.3 |
| 22.80 | 23.3 | QP | Neutral | 48 | -24.7 |
| 29.60 | 20.5 | QP | Line | 48 | -27.5 |

10.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

