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

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless Data Terminal

Test Engineer:	Benjamin Jin
Report No.:	R0207165
Test Date:	July 18, 2002
Reviewed By:	Jeff Lee
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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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: 22.37dBm (172.58mW)
	PCS: 22.14dBm (163.68mW)
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.

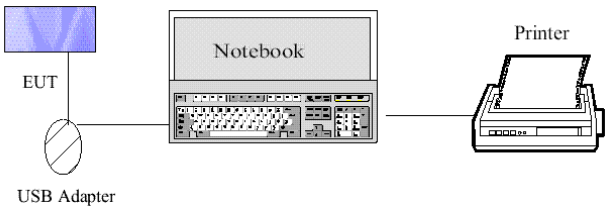
2.2 Block Diagram

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 - 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

1. The EUT shall be placed on a wooden turntable at a test site.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT.
3. The output of the test antenna shall be connected o the measuring receiver.
4. The transmitter (EUT) shall be switched on.
5. The test antenna shall be raised and lowered until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then 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 until a maximum signal level is detected and documented.
8. The EUT shall be replaced by a substitution antenna (dipole fro ERP, or horn for EIRP). The substitution antenna shall be orientated for vertical polarization.
9. The substitution antenna shall be connected to a signal generator.
10. The test antenna shall be raised and lowered again until a maximum signal level is received.
11. Then 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 documented while the transmitter radiated power was measured.
12. The input level to the substitution antenna shall be recorded as power level in dBm.
13. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
14. The measure of the radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for both substitution antenna gain and cable loss.

4.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
A.H. System SAS0200 Horn Antenna
Com-Power AB-100 Dipole Antenna

4.4 Test Results

Modulation Type	Channel	Output Power in dBm	Output Power in mW	Standard (mW)
PMS	825	22.50	177.83	7000
	835	21.17	130.92	7000
	845	22.67	184.93	7000
PCS	1855	20.76	119.12	2000
	1880	22.14	163.68	2000
	1905	21.03	126.77	2000

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.

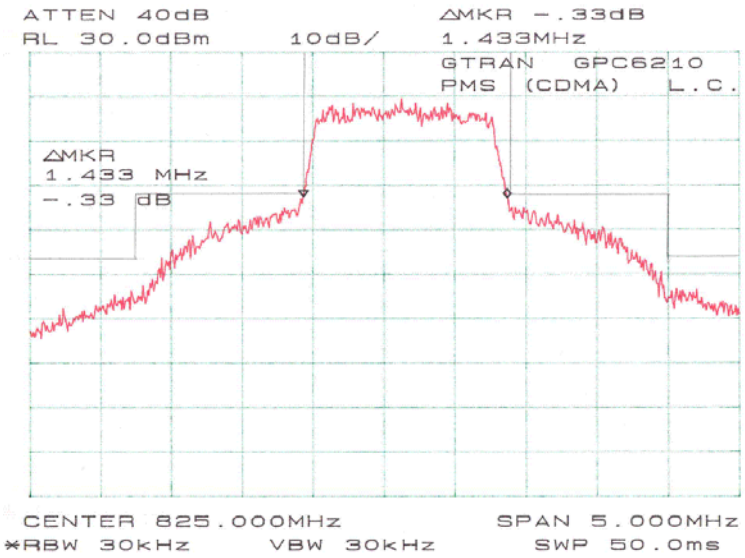
The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the spectrum was recorded in the frequency band ±50 KHz from the carrier frequency.

5.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

5.4 Test Results

Please refer to the hereinafter plots.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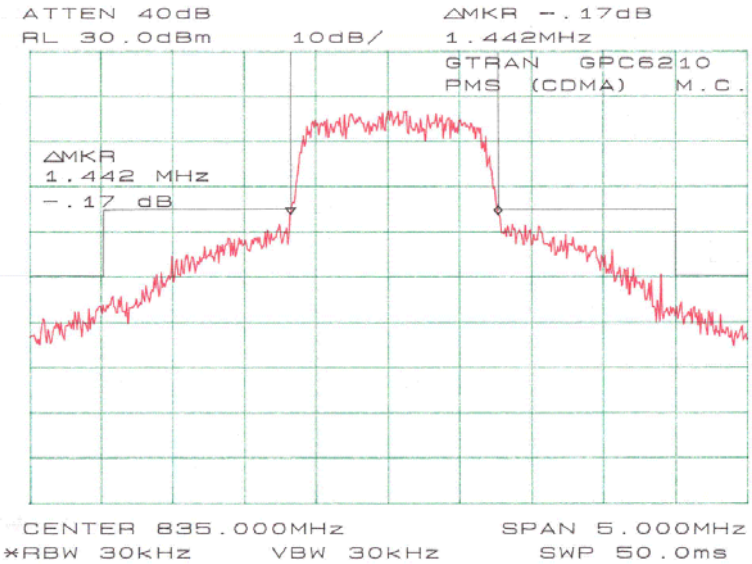
RL 30.0dBm
10dB/
ΔMKR -.33dB
1.433MHz
GTRAN GPC6210
PMS (CDMA) L.C.
ΔMKR
1.433 MHz
-.33 dB
CENTER 825.000MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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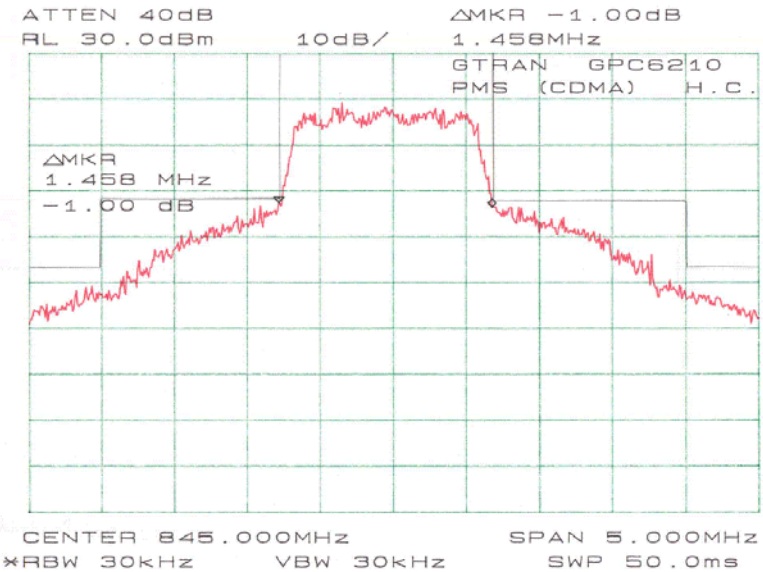
RL 30.0dBm
10dB/
ΔMKR -.17dB
1.442MHz
GTRAN GPC6210
PMS (CDMA) M.C.
ΔMKR
1.442 MHz
-.17 dB
CENTER 835.000MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
ΔMKR -1.00dB
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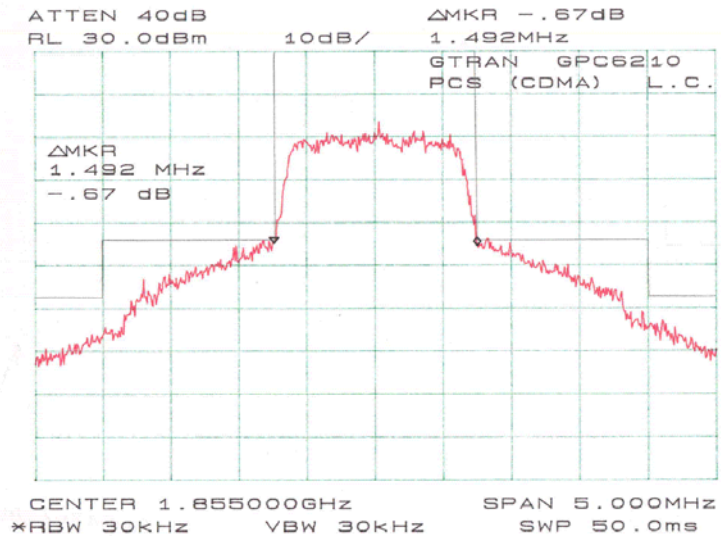
PMS (CDMA) H.C.
ΔMKR
1.458 MHz
-1.00 dB
CENTER 845.000MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
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GTRAN GPC6210
PCS (CDMA) L.C.
ΔMKR
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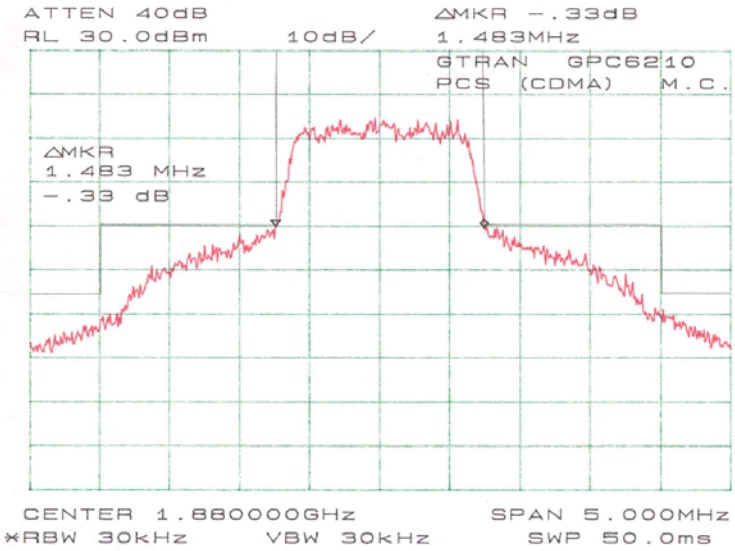
-.67 dB
CENTER 1.855000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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PCS (CDMA) M.C.
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-.33 dB
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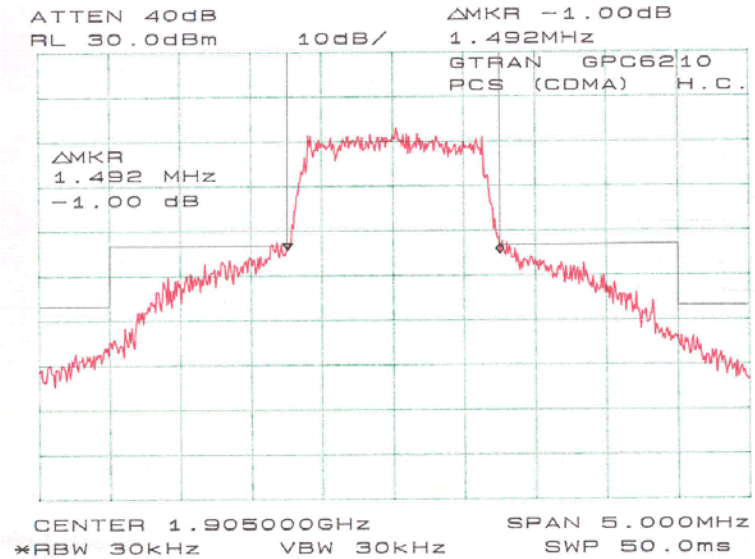
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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RL 30.0dBm
10dB/
ΔMKR -1.00dB
1.492MHz
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PCS (CDMA) H.C.
ΔMKR
1.492 MHz
-1.00 dB
CENTER 1.905000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

6 - MODULATION CHARACTERISTIC

6.1 Applicable Standard

Requirement: FCC § 2.1047, § 22.915(a)

6.2 Test Procedure

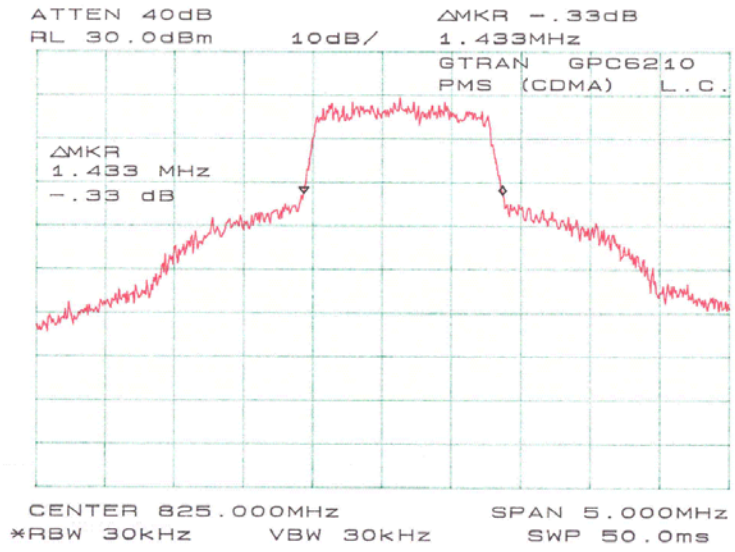
CDMA digital mode is used by EUT.

6.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

6.4 Test Results

Please refer to the hereinafter plots.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SPAN 5.000MHz
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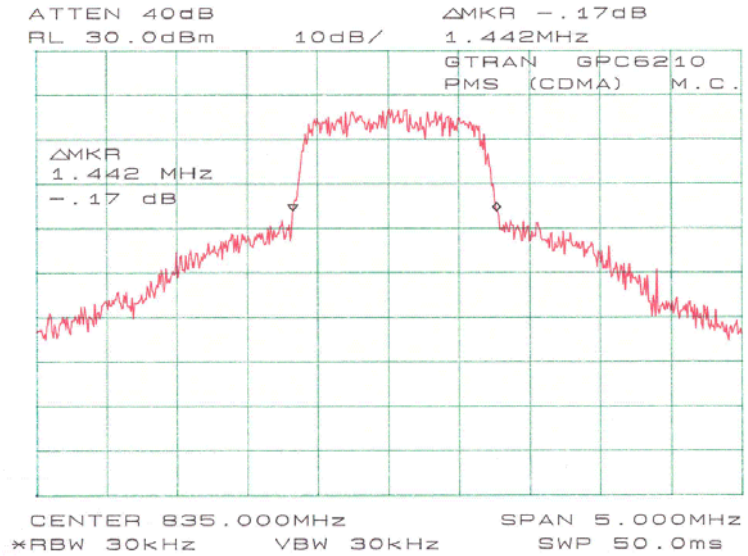
VBW 30kHz
SWP 50.0ms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ΔMKR
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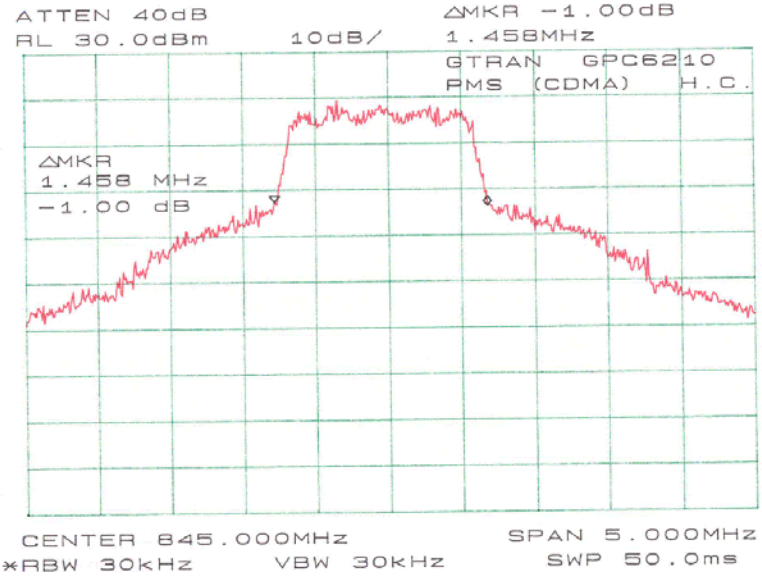
CENTER 835.000MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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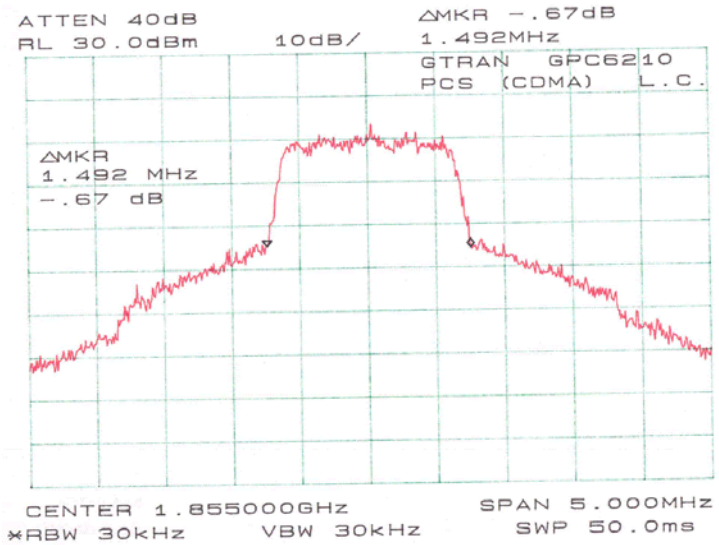
RL 30.0dBm
10dB/
ΔMKR -1.00dB
1.458MHz
GTRAN GPC6210
PMS (CDMA) H.C.
ΔMKR
1.458 MHz
-1.00 dB
CENTER 845.000MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
ΔMKR -.67dB
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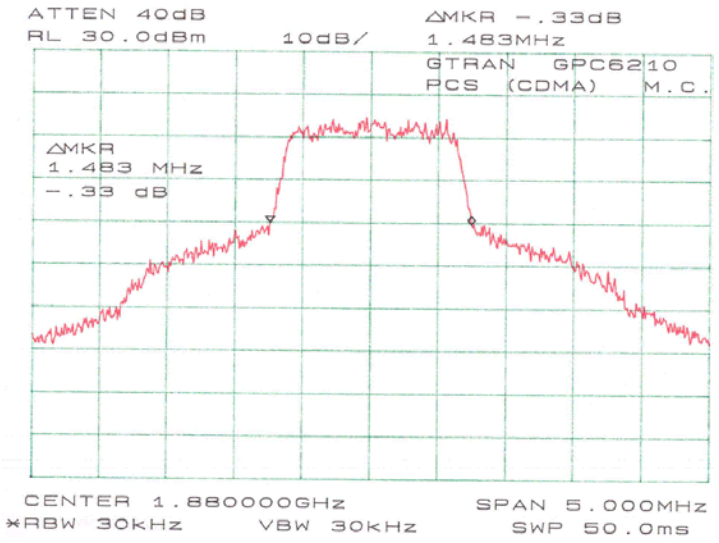
GTRAN GPC6210
PCS (CDMA) L.C.
ΔMKR
1.492 MHz
-.67 dB
CENTER 1.855000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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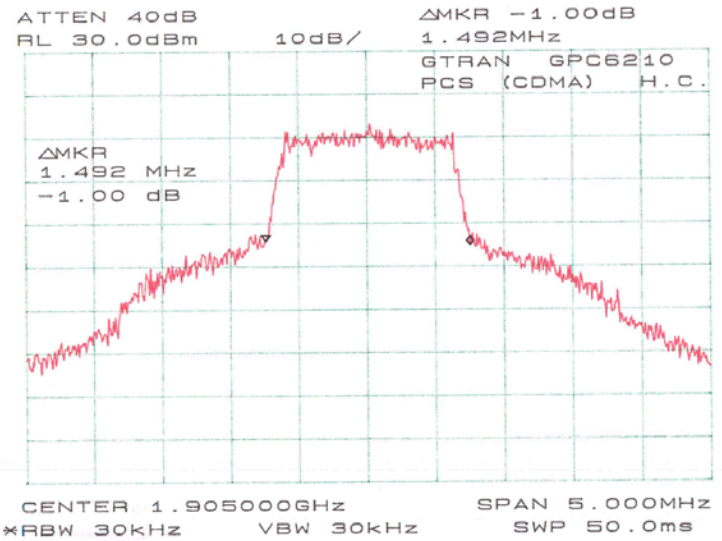
10dB/
ΔMKR -.33dB
1.483MHz
GTRAN GPC6210
PCS (CDMA) M.C.
ΔMKR
1.483 MHz
-.33 dB
CENTER 1.880000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
ΔMKR -1.00dB
1.492MHz
GTRAN GPC6210
PCS (CDMA) H.C.
ΔMKR
1.492 MHz
-1.00 dB
CENTER 1.905000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

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 means 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

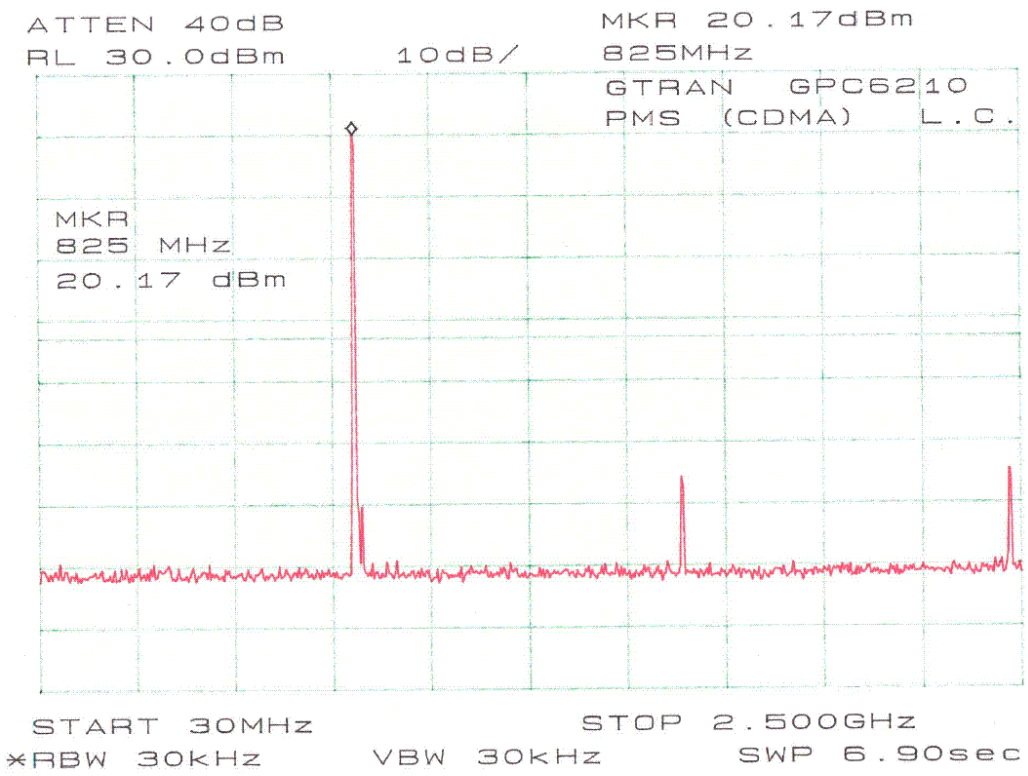
The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

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.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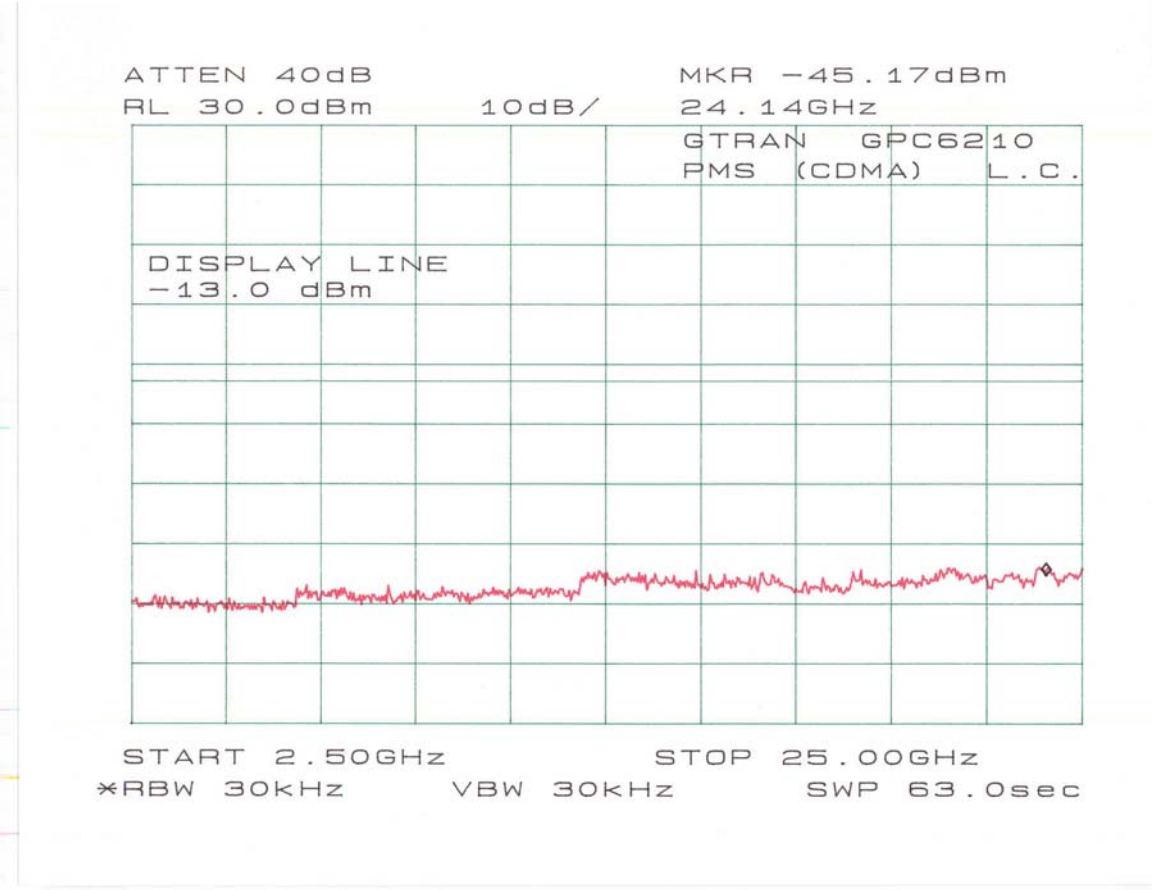
RL 30.0dBm
10dB/
MKR 20.17dBm
825MHz
GTRAN GPC6210
PMS (CDMA) L.C.
MKR
825 MHz
20.17 dBm
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec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10dB/
MKR -45.17dBm
24.14GHz
GTRAN GPC6210
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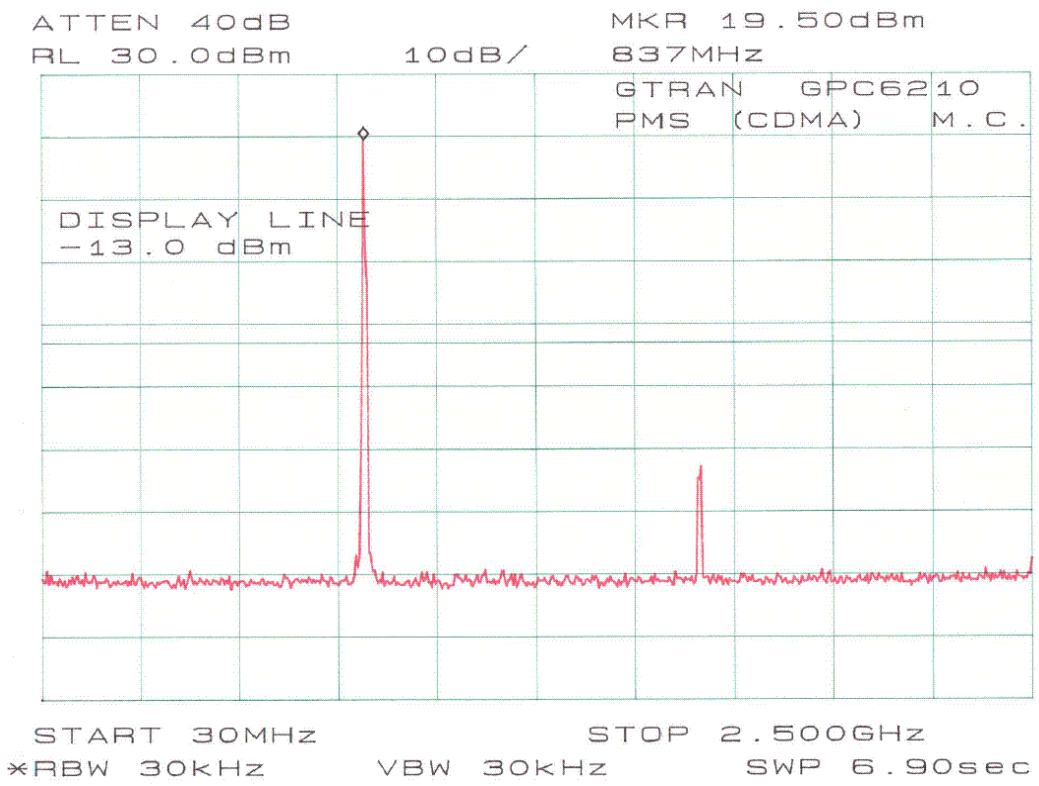
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec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10dB/
MKR 19.50dBm
837MHz
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PMS (CDMA) M.C.
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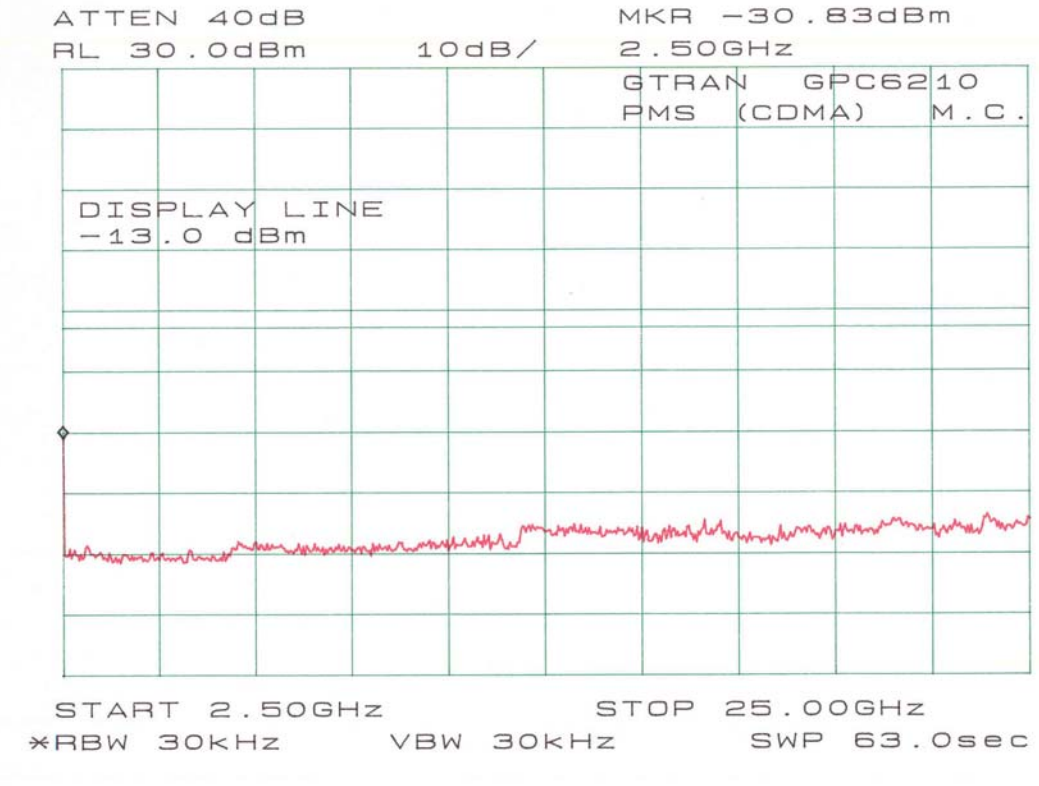
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec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10dB/
MKR -30.83dBm
2.50GHz
GTRAN GPC6210
PMS (CDMA) M.C.
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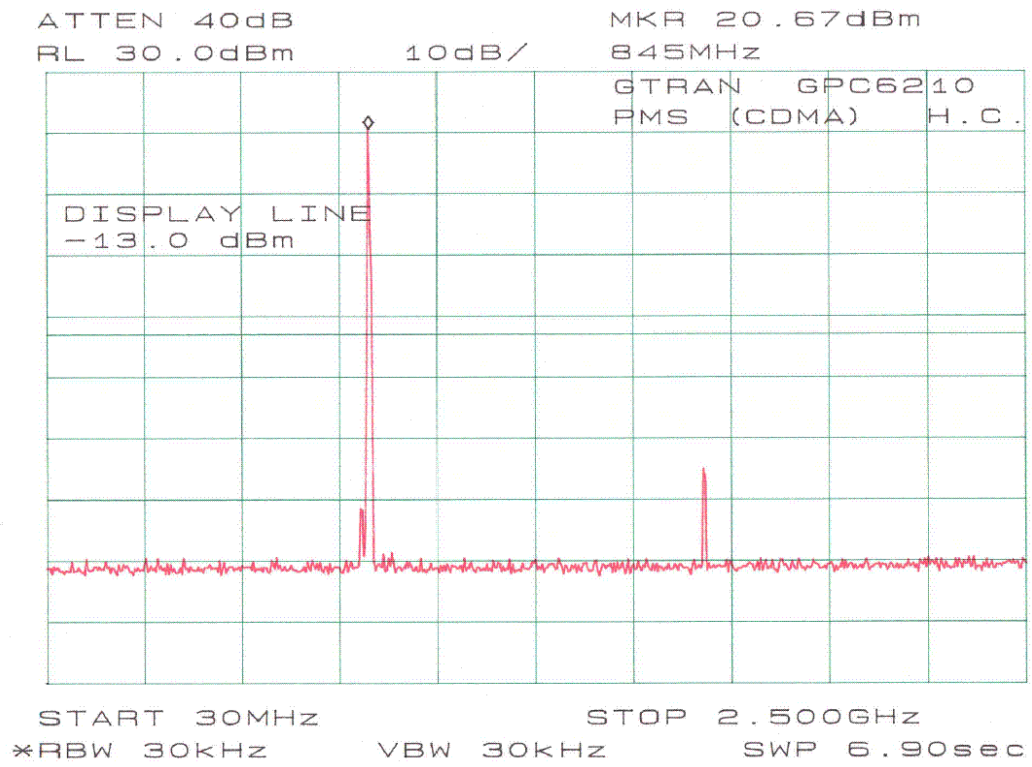
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec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10dB/
MKR 20.67dBm
845MHz
GTRAN GPC6210
PMS (CDMA) H.C.
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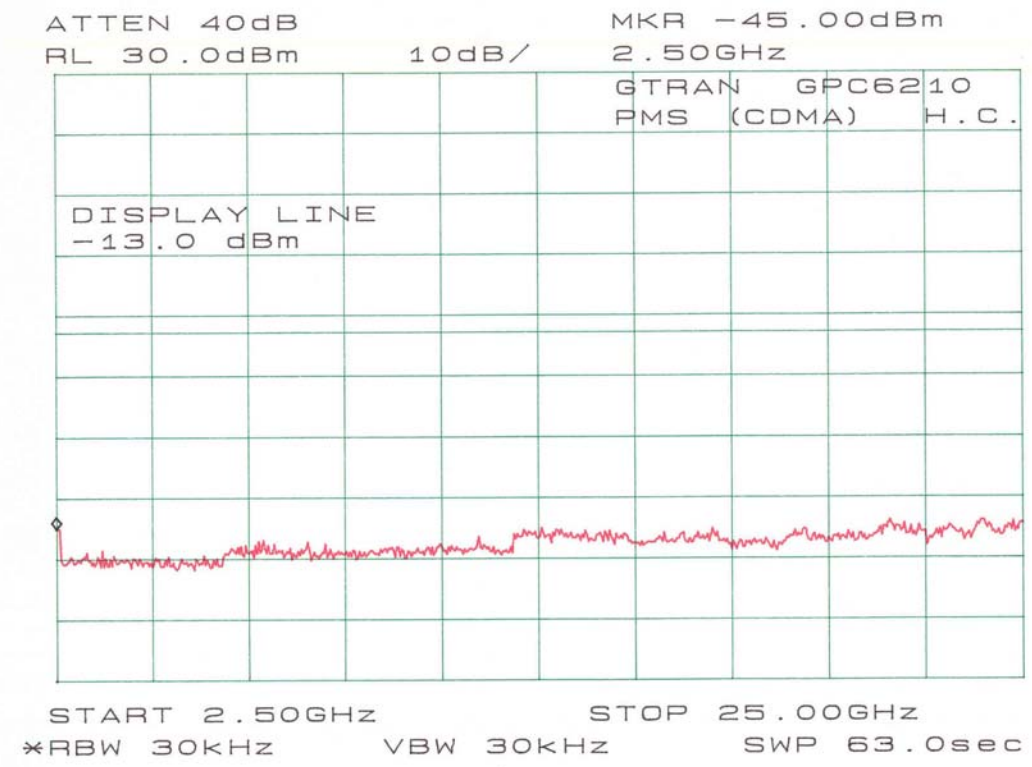
-13.0 dBm
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec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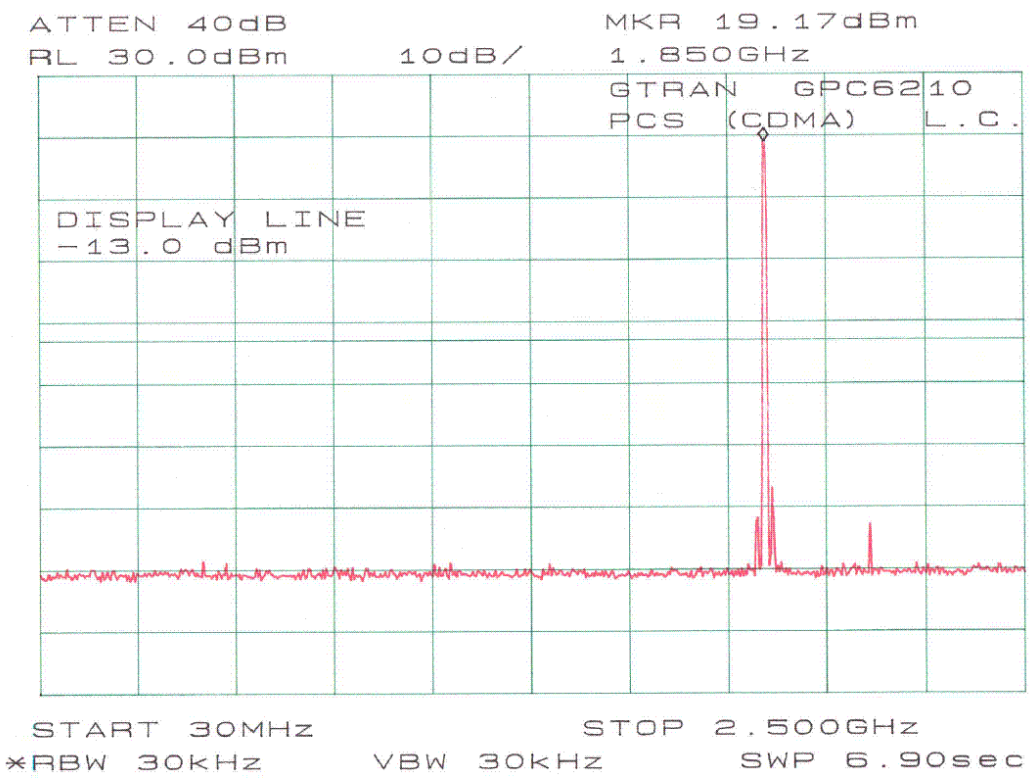
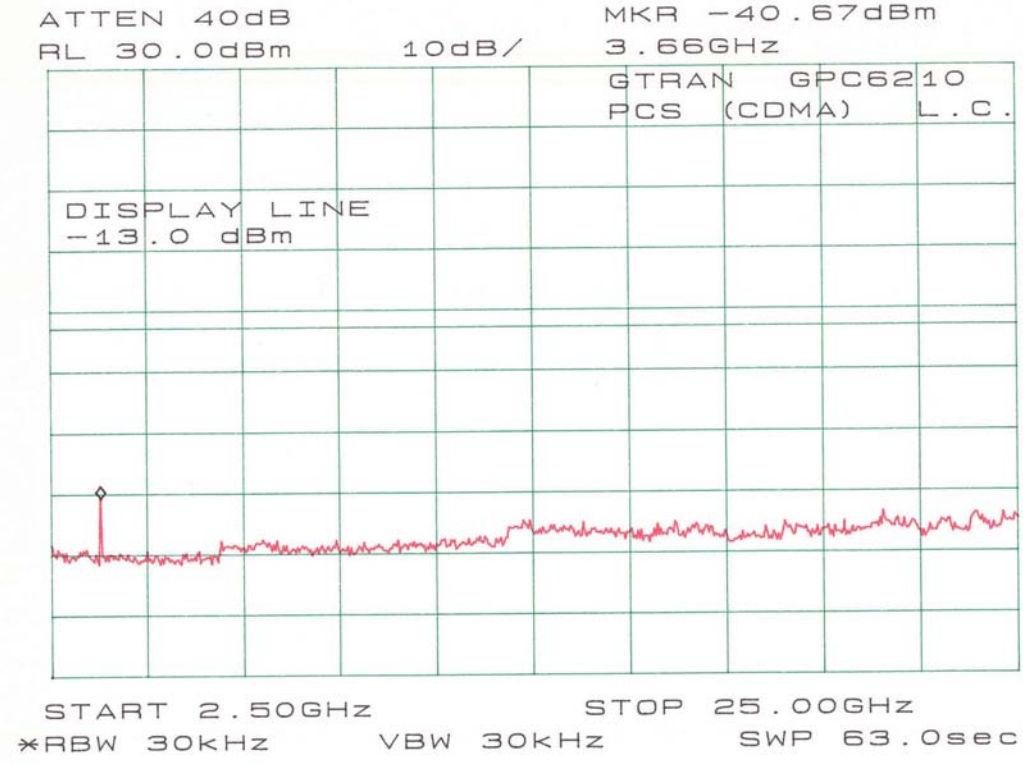
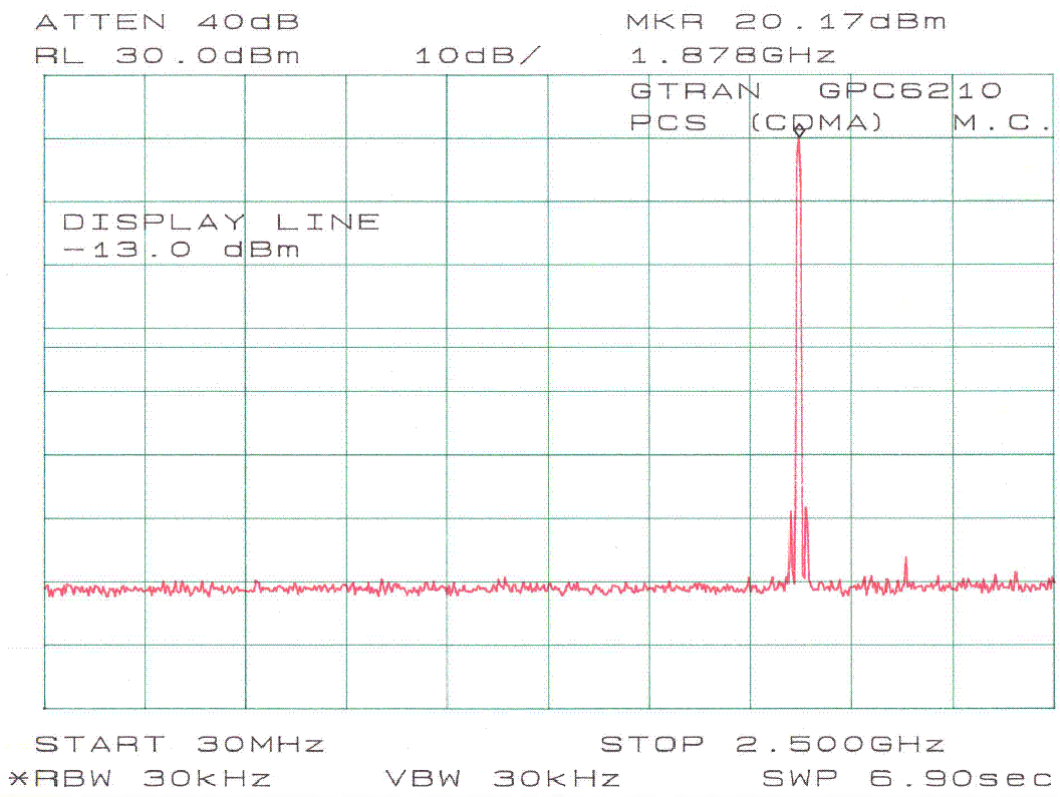
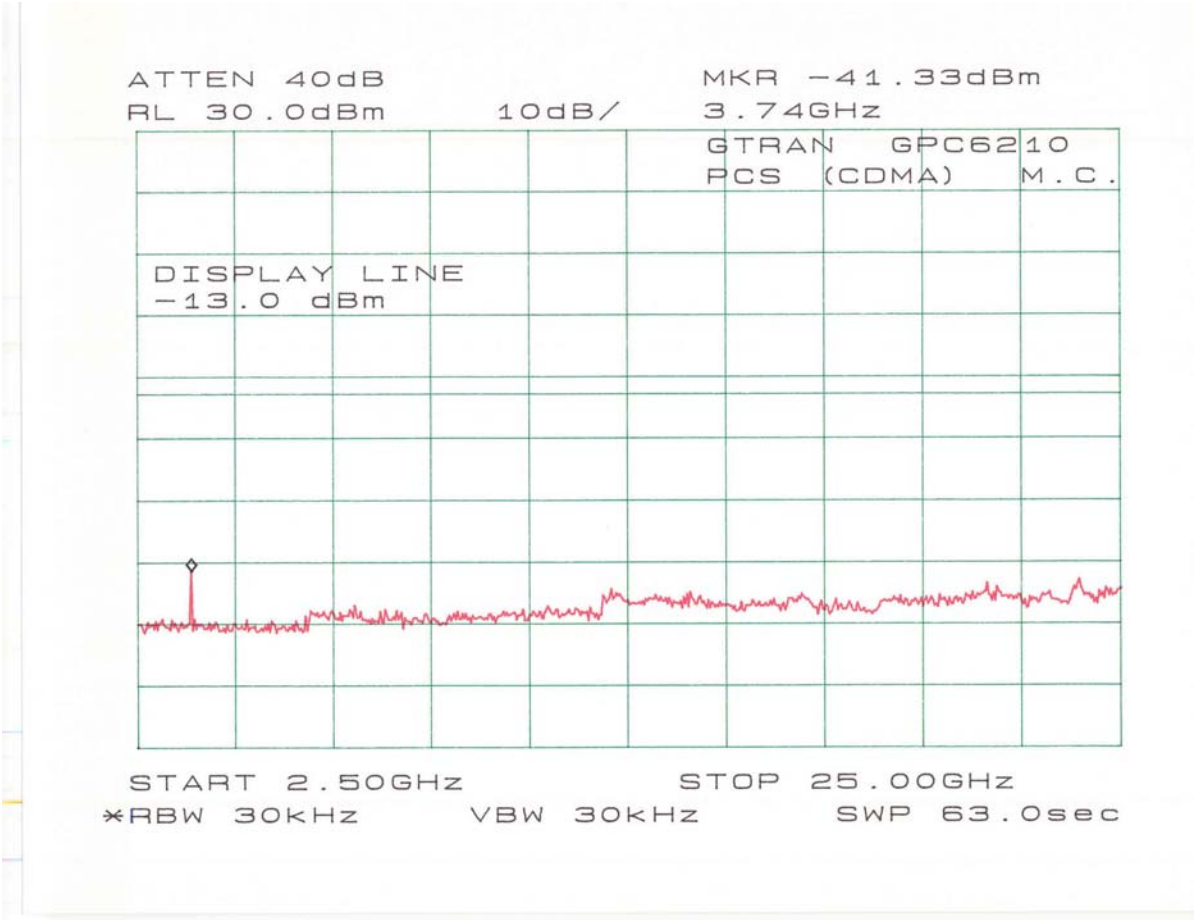
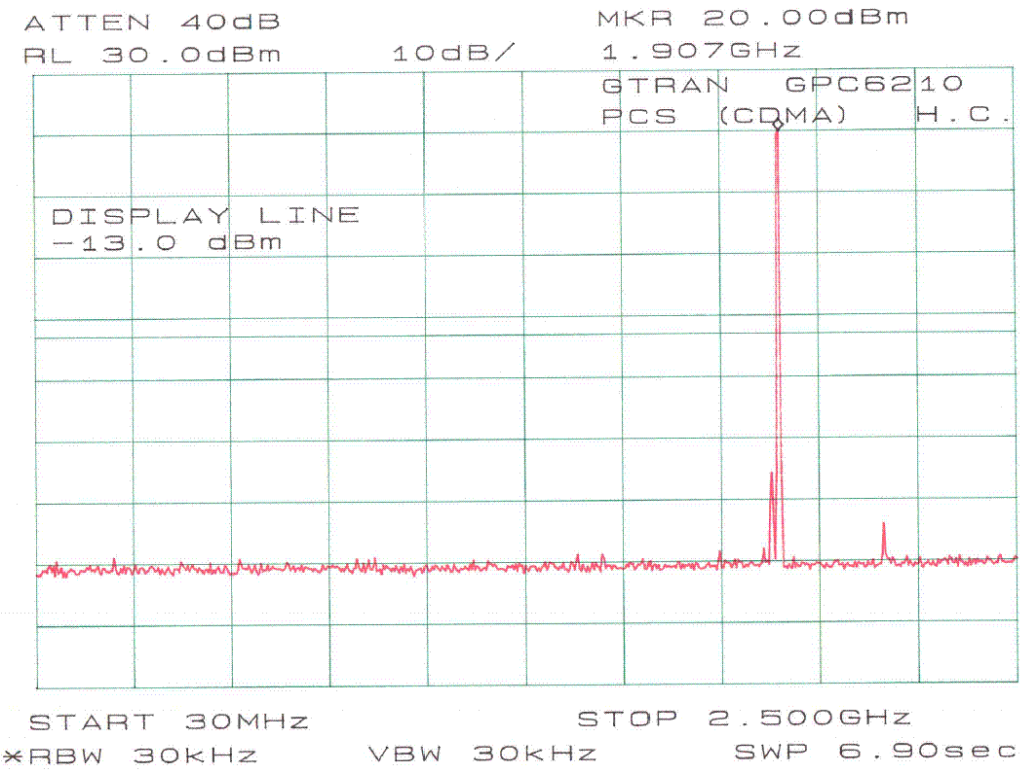
10dB/
MKR -45.00dBm
2.50GHz
GTRAN GPC6210
PMS (CDMA) H.C.
DISPLAY LINE
-13.0 dBm
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec

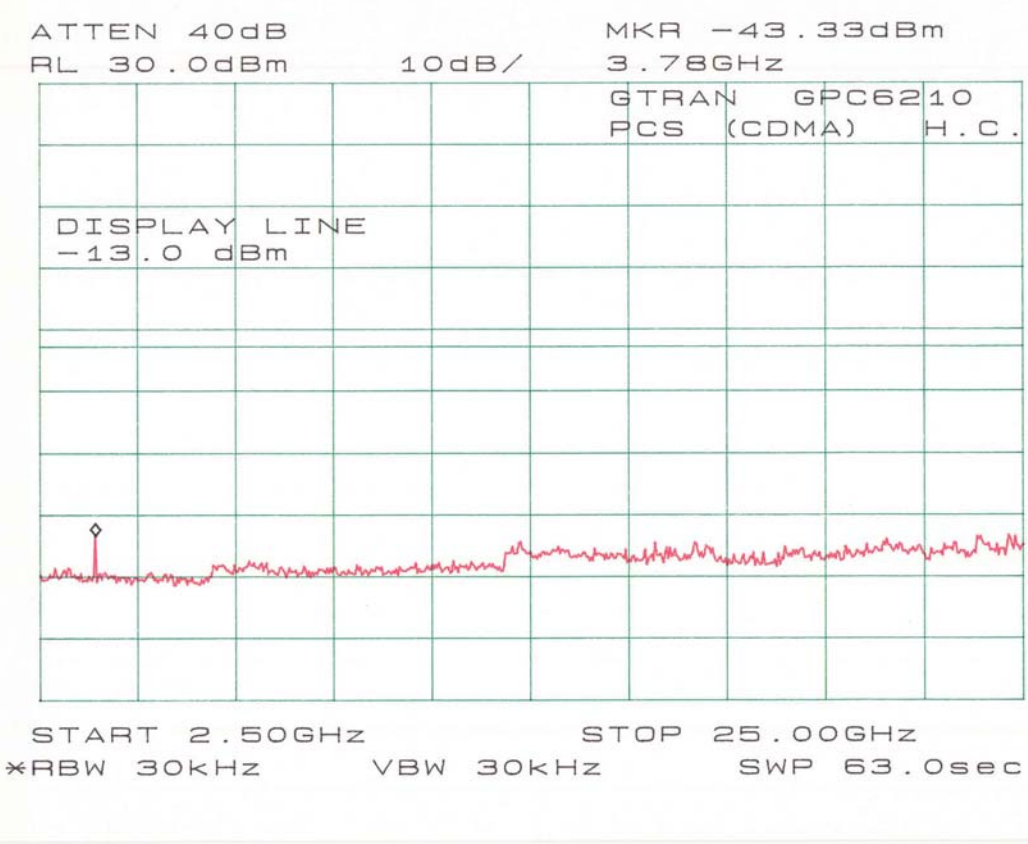

ATTEN 40dB
RL 30.0dBm
10dB/
MKR 19.17dBm
1.850GHz
GTRAN GPC6210
PCS (CDMA) L.C.
DISPLAY LINE
-13.0 dBm
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -40.67dBm
3.66GHz
GTRAN GPC6210
PCS (CDMA) L.C.
DISPLAY LINE
-13.0 dBm
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 20.17dBm
1.878GHz
GTRAN GPC6210
PCS (CDMA) M.C.
DISPLAY LINE
-13.0 dBm
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -41.33dBm
3.74GHz
GTRAN GPC6210
PCS (CDMA) M.C.
DISPLAY LINE
-13.0 dBm
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 20.00dBm
1.907GHz
GTRAN GPC6210
PCS (CDMA) H.C.
DISPLAY LINE
-13.0 dBm
START 30MHz
STOP 2.500GHz
*RBW 30kHz
VBW 30kHz
SWP 6.90sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -43.33dBm
3.78GHz
GTRAN GPC6210
PCS (CDMA) H.C.
DISPLAY LINE
-13.0 dBm
START 2.50GHz
STOP 25.00GHz
*RBW 30kHz
VBW 30kHz
SWP 63.0sec

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 (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (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 1650MHz
Middle Frequency: -11.5dB at 1670MHz
High Frequency: -7.9dB at 1690MHz

PCS: Low Frequency: -9.5dB at 3710MHz
Middle Frequency: -9.7dB at 3760MHz
High Frequency: -10.8dB at 3810MHz

Compliance Statement

According to FCC Part 15, at 3-meter distance the emission from an intentional radiator shall not exceed the field strength level 40dBuV/m within 30-88MHz, 43.5dBuV/m within 88-216MHz, 46dBuV/m within 226-960MHz, 54dBuV/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.

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

EUT					GENERATOR									FCC		
Indicated		Table	st Antenna		Substituted	Substitution Antenna			Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
825	115.3	30	1.2	v	825	20.77	25	v	1.5	v	2.1	-0.5	22.37			
825	113.8	270	1.5	h	825	20.54	25	h	1.5	h	2.1	-0.5	22.14			
1650	64.4	0	1	v	1650	-31.1	9	v	1.2	v	7.5	-0.7	-24.3	46.7	-13	-11.3
1650	62.9	30	1.2	h	1650	-33	9	h	1.5	h	7.5	-0.7	-26.2	48.6	-13	-13.2
2475	55.3	180	1.2	v	2475	-40	6	v	1.5	v	11.4	-0.9	-29.5	51.9	-13	-16.5
2475	50.2	210	1.5	h	2475	-45.2	6	h	1.8	h	11.4	-0.9	-34.7	57.1	-13	-21.7

Final scan at 835MHz (PMS, Mid CH.)

EUT					GENERATOR									FCC		
Indicated		Table	Test Antenna		Substituted	Substitution Antenna			Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
835	112.6	250	1.5	v	835	20.35	25	v	1.5	v	2.1	-0.5	21.95			
835	110.4	270	1.5	h	835	19.13	25	h	1.5	h	2.1	-0.5	20.73			
1670	64.2	60	1.2	v	1670	-31.3	9	v	1.2	v	7.5	-0.7	-24.5		-13	-11.5
1670	62.3	30	1.2	h	1670	-33.2	9	h	1.5	h	7.5	-0.7	-26.4		-13	-13.4
2505	54.9	180	1.2	v	2505	-39.7	6	v	1.5	v	11.4	-0.9	-29.2		-13	-16.2
2505	50.6	210	1.5	h	2505	-43.3	6	h	1.8	h	11.4	-0.9	-32.8		-13	-19.8

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

EUT					GENERATOR									FCC		
Indicated		Table	st Antenna		Substituted	Substitution Antenna			Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
845	113.2	90	1.2	v	845	20.48	25	v	1.5	v	2.1	-0.5	22.08			
845	111.8	70	1.5	h	845	19.55	25	h	1.5	h	2.1	-0.5	21.15			
1690	63.5	270	1.2	v	1690	-27.7	9	v	1.2	v	7.5	-0.7	-20.9	43	-13	-7.9
1690	62.4	290	1.5	h	1690	-28.6	9	h	1.5	h	7.5	-0.7	-21.8	43.9	-13	-8.8
2535	51.7	330	1.2	v	2535	-38.1	6	v	1.5	v	11.4	-0.9	-27.6	49.7	-13	-14.6
2535	46.3	270	1.2	h	2535	-42.8	6	h	1.8	h	11.4	-0.9	-32.3	54.4	-13	-19.3

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

EUT					GENERATOR									FCC	
Indicated		Table	Test Antenna		Substituted		Substitution Antenna		Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
1855	111.4	270	1.2	v	1855	13.26	8	v	1.5	v	8.2	-0.7	20.76			
1855	97.6	230	1.5	h	1855	10.45	8	h	1.5	h	8.2	-0.7	17.95			
3710	51.9	0	1.0	v	3710	-34.8	3.5	v	1.2	v	13.5	-1.2	-22.5	43.3	-13	-9.5
3710	45.2	30	1.2	h	3710	-41.4	3.5	h	1.5	h	13.5	-1.2	-29.1	49.9	-13	-16.1
5565	40.1	180	1.2	v	5565	-44.3	3.3	v	1.5	v	16.1	-1.5	-29.7	50.5	-13	-16.7
5565	37.8	210	1.5	h	5565	-46.5	3.3	h	1.8	h	16.1	-1.5	-31.9	52.7	-13	-18.9

Final scan at 1880MHz (PCS, Mid CH.)

EUT					GENERATOR									FCC	
Indicated		Table	Test Antenna		Substituted		Substitution Antenna		Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
1880	111.3	210	1.2	v	1880	14.64	8	v	1.5	v	8.2	-0.7	22.14			
1880	97.2	230	1.5	h	1880	10.53	8	h	1.5	h	8.2	-0.7	18.03			
3760	51.5	90	1.0	v	3760	-35	3.5	v	1.2	v	13.5	-1.2	-22.7	43.3	-13	-9.7
3760	45.3	30	1.2	h	3760	-41.6	3.5	h	1.5	h	13.5	-1.2	-29.3	49.9	-13	-16.3
5640	40.6	180	1.2	v	5640	-44.7	3.3	v	1.5	v	16.1	-1.5	-30.1	50.5	-13	-17.1
5640	38.2	150	1.5	h	5640	-46	3.3	h	1.8	h	16.1	-1.5	-31.4	52.7	-13	-18.4

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

EUT					GENERATOR									FCC	
Indicated		Table	Test Antenna		Substituted		Substitution Antenna		Test Antenna		Antenna	Cable	Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Gain Correction	Loss dB	Leval dBm	Emissions dB	dBm	dB
1905	112.2	30	1.2	v	1905	13.5	8	v	1.5	v	8.2	-0.7	21.03			
1905	102.3	45	1.5	h	1905	11	8	h	1.8	h	8.2	-0.7	18.54			
3810	51.5	270	1.2	v	3810	-36.1	3.5	v	1.5	v	13.5	-1.2	-23.8	44.9	-13	-10.8
3810	47.1	290	1.5	h	3810	-40.6	3.5	h	1.2	h	13.5	-1.2	-28.3	49.4	-13	-15.3
5715	40.2	330	1.2	v	5715	-44.7	3.3	v	1.2	v	16.1	-1.5	-30.1	51.2	-13	-17.1
5715	39.4	270	1.2	h	5715	-45.9	3.3	h	1.5	h	16.1	-1.5	-31.3	52.4	-13	-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 -50^0 to $+100^0$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 **O**pen **A**rea **T**est **S**ite, 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 dBμV 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 dBμV at 0.75 MHz in the Line mode

10.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	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.