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Test Report: 82729-1TRFWL


Applicant: Load Systems International Inc
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Québec, QC
Canada
G1P 2J7

Apparatus: GS550, GS550-07, GS550-08
GS550-09, GS550-10

FCC ID: QVBGS550

In Accordance With: FCC Part 15 Subpart C, 15.247
FHSS System and Digitally Modulated Radiators
902-928MHz, 2400 - 2483.5 MHz, 5725-5850MHz

Tested By: Nemko Canada Inc.
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Ottawa, Ontario
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Authorized By: 
Jason Nixon, Telecom Specialist

Date: April 25, 2007

Total Number of Pages: 23

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	GS550, GS550-07, GS550-08 GS550-09, GS550-10
Specification:	FCC Part 15 Subpart C, 15.247
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Heng Lin EMC / Wireless Specialist

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

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

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

GS550

1.2 Samples Submitted for Assessment

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

Sample No.	Description	Serial No.
1	Display unit GS550	G194

The first samples were received on: March 12, 2007

1.3 Technical Specifications of the EUT

Manufacturer:	Load Systems International Inc
Operating Frequency:	902.7 MHz – 927.3 MHz
Peak Output Power:	14.37 dBm (Conducted Output Power)
Emission Designator	F1D
Modulation:	FSK
Antenna Data:	$\frac{1}{4}$ wave Straight : 0.7 dBi $\frac{1}{2}$ wave Swivel: 2.0 dBi
Antenna Connector:	Detachable (Reverse SMA)
Power Source:	12VDC or 24VDC

Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247

FHSS System and Digitally Modulated Radiators
902-928MHz, 2400 - 2483.5 MHz, 5725-5850MHz

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

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

2.4 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	Jan. 16/08
Receiver	Rohde & Schwarz	ESVS-30	FA001445	July 14/07
Biconical (1) Antenna	EMCO	3109	FA000805	May 03/07
Log Periodic Antenna #2	EMCO	3148	FA001355	May 16/07
Horn Antenna #1	EMCO	3115	FA000649	Feb. 26/08
Horn Antenna #2	EMCO	3115	FA000825	Jan. 30/08
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	Aug. 02/07
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	Aug. 02/07
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	Aug. 02/07
5.0 – 18.0 GHz Amplifier	NARDA	DWT-186N23U40	FA001409	COU

COU – Calibrate on Use

NCR – No Calibration Required

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

As the manufacturer declared, the difference between all models is only the software and the graphic design of the membrane. Therefore only GS550-CE was tested to represent others for compliance assessment.

3.3 EUT Parameters Affecting Compliance

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

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

No additional observations were made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

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

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

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

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of power supply	Y	PASS
15.207(a)	Powerline Conducted Emissions	N	
15.209(a)	Radiated Emissions within Restricted Bands	Y	PASS
15.247(a)(1)	Frequency hopping systems	N	
15.247(a)(1)(i)	Frequency hopping systems operating in the 902-928 MHz band	N	
15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725-5850 MHz band	N	
15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400-2483.5 MHz band	N	
15.247(a)(2)	Systems using digital modulation techniques	Y	PASS
15.247(b)(1)	Maximum peak output power of Frequency hopping systems operating in the 2400-2483.5 MHz band and 5725-5850 MHz band	N	
15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902-928 MHz band	N	
15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands	Y	PASS
15.247(b)(4)	Maximum peak output power	Y	PASS
15.247(c)(1)	Fixed point-to-point Operation with directional antenna gains greater than 6 dBi	N	
15.247(c)(2)	Transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams	N	
15.247(d)	Radiated Emissions Not in Restricted Bands	Y	PASS
15.247(e)	Power Spectral Density for Digitally Modulated Devices	Y	PASS
15.247(f)	Time of Occupancy for Hybrid Systems	N	

Notes:

The testing was performed using the swivel antenna, which has higher gain.

Appendix A : Test Results

Clause 15.209(a) Radiated Emissions within Restricted Bands

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvoltsmeter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Conditions:

Sample Number:	1	Temperature:	22
Date:	March 20, 2007	Humidity:	45
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

Complied.

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic.

These results apply to emissions found in the Restricted Bands defined in FCC Part 15 Subpart C, 15.205.

All measurements for radiated emissions within the restricted bands were performed using a Peak detector with 100kHz RBW below 1GHz and a Peak and Average Detector with 1MHz RBW above 1GHz.

No emission was observed within 20dB below the limit line in the restricted bands.

Clause 15.247(a)(2) Systems using digital modulation techniques

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Conditions:

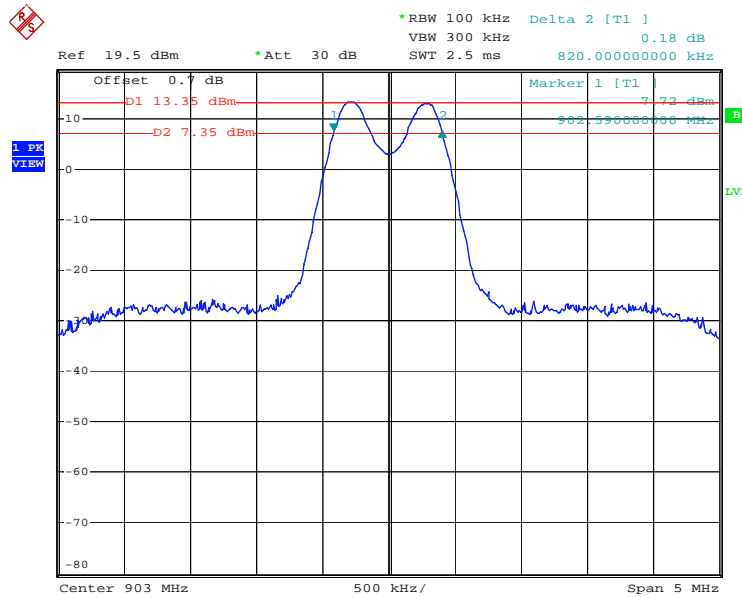
Sample Number:	1	Temperature:	22
Date:	April 25, 2007	Humidity:	45
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

6dB Bandwidth:

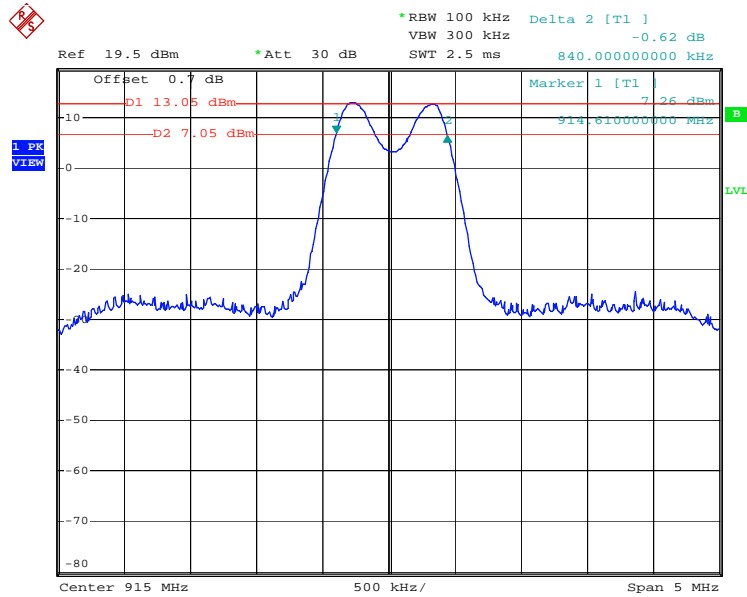
Channel	Low	Mid	High
Bandwidth (kHz)	820.00	840.00	850.00

Low Channel



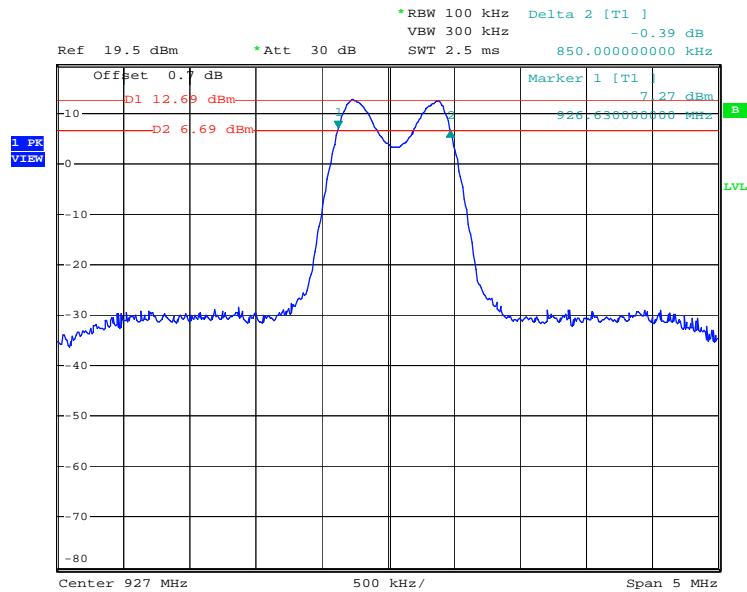
Date: 25.APR.2007 09:19:21

Mid Channel



Date: 25.APR.2007 09:13:40

High Channel



Date: 25.APR.2007 09:16:57

Clause 15.247(b)(3) Maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Conditions:

Sample Number:	1	Temperature:	22
Date:	March 23, 2007	Humidity:	45
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

See Attached Table and Plots.

Conducted Output Power:

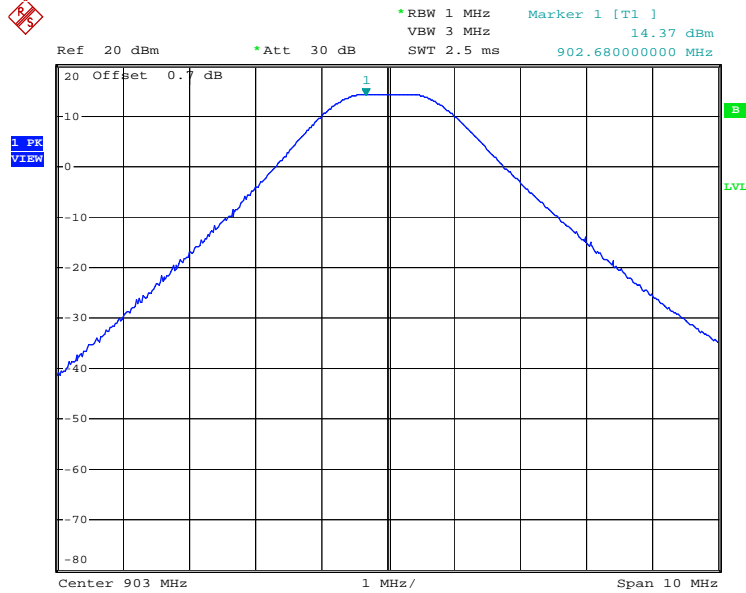
The output power was measured at +/-15% of the supply voltage and found that there was no change.

Channel Range	Measured Output Power	
	dBm	(W)
Low	14.37	0.0274
Mid	14.12	0.0258
High	13.78	0.0239

For swivel antenna:

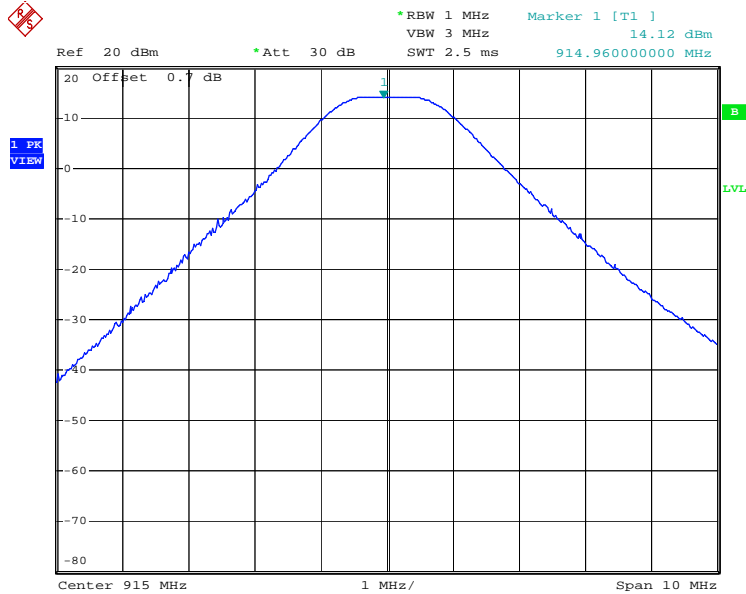
Measured output power = 14.37 dBm
 Maximum output power = 14.37 dBm + 2.0 dBi = 16.37 dBm (EIRP)
 Limit = 36 dBm (EIRP)

Low Channel:



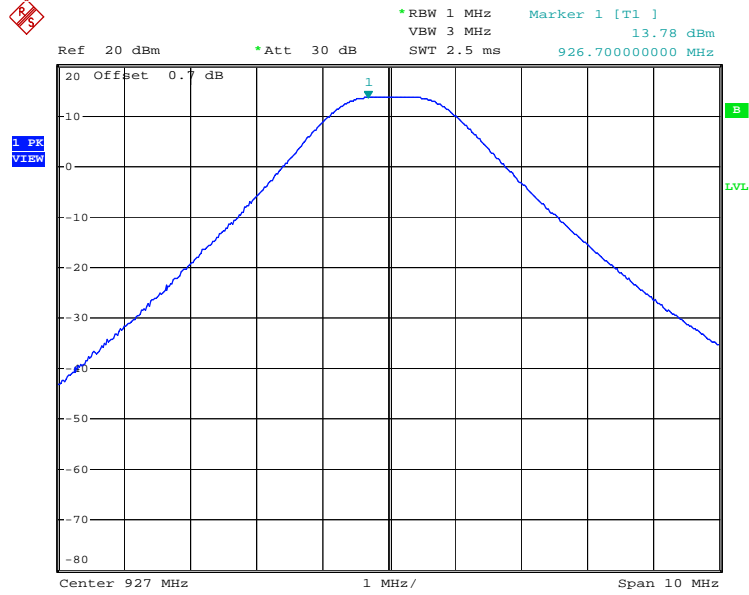
Date: 25.APR.2007 09:21:50

Mid Channel:



Date: 25.APR.2007 09:22:33

High Channel:



Date: 25.APR.2007 09:23:49

Clause 15.247(d) Radiated Emissions Not in Restricted Bands

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

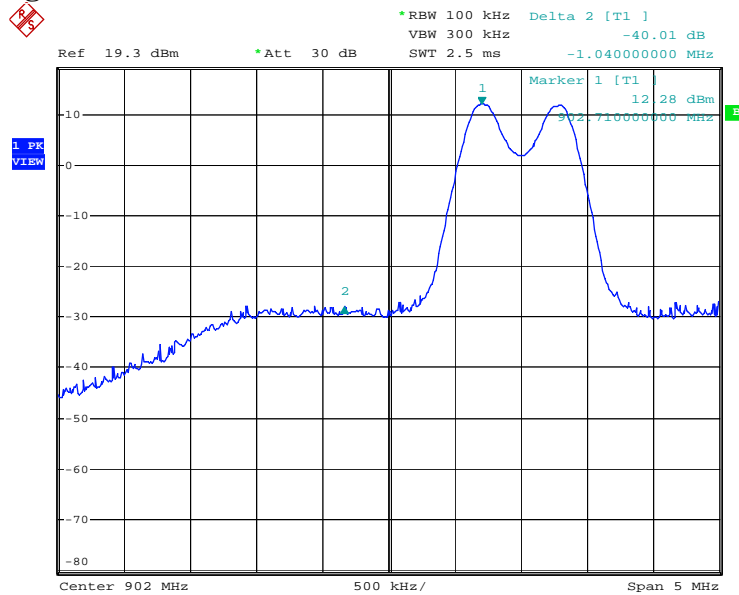
Test Conditions:

Sample Number:	1	Temperature:	22
Date:	March 14, 2007	Humidity:	45
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

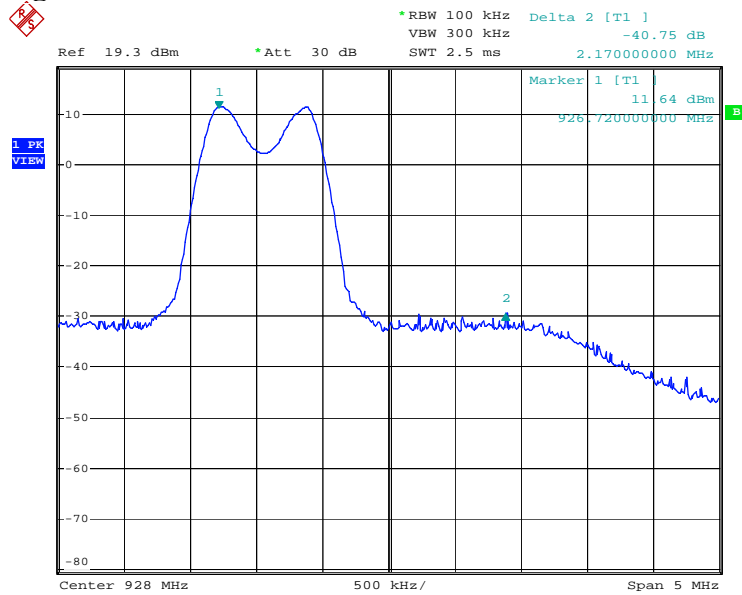
See Attached Plots.

Lower Band Edge



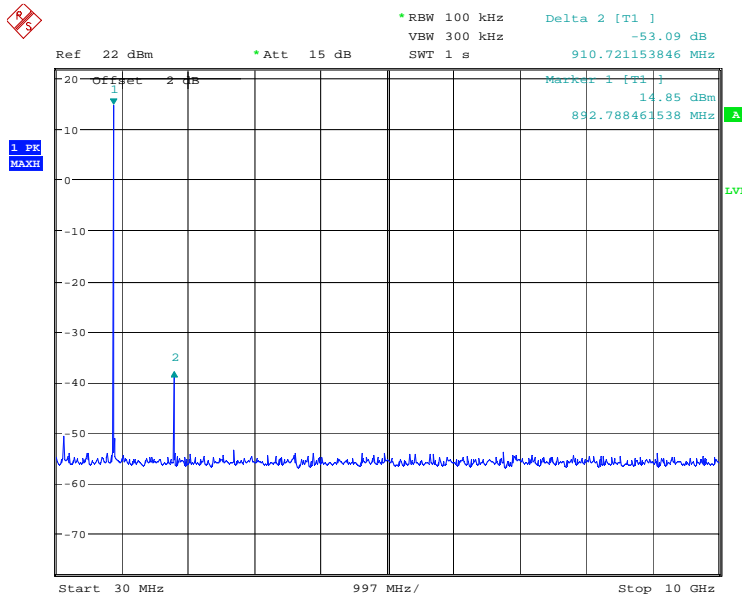
Date: 25.APR.2007 14:49:03

Higher Band Edge



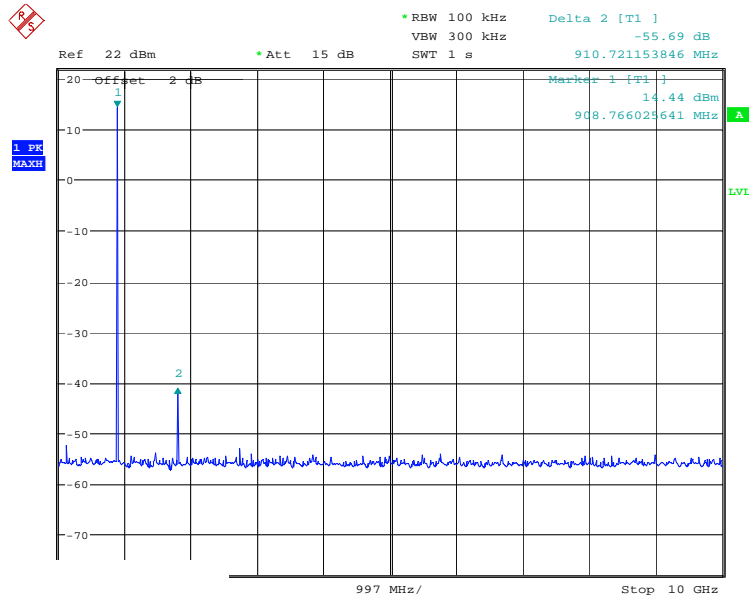
Date: 25.APR.2007 14:50:41

Conducted Emissions Low Channel



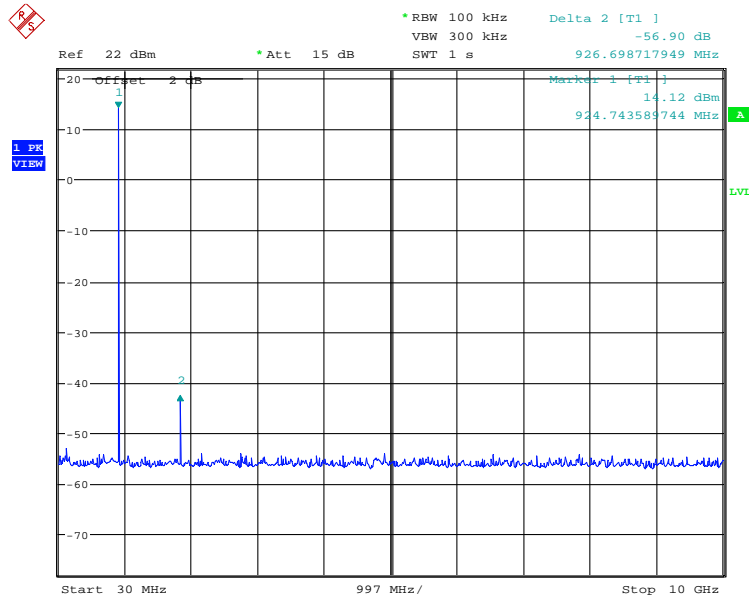
Date: 14.MAR.2007 15:03:12

Mid Channel



Date: 14.MAR.2007 15:07:18

High Channel



Date: 14.MAR.2007 15:01:43

Radiated Spurious Emissions

The Spectrum was searched from 30MHz to the 10th Harmonic.

All measurements for radiated emissions within the restricted bands were performed using a Quasi-Peak detector with 120kHz RBW below 1GHz and a Peak and Average Detector with 1MHz RBW above 1GHz.

All measurements were performed at 3m.

Freq. (MHz)	Ant	Pol. V/H	RCVD Signal (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	Cable Loss (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
31.6013	BC1	V	25.7	11.8	N/A	0.6	38.1	40.0	1.9
30.0936	BC1	V	23.5	11.8	N/A	0.6	36.0	40.0	4.0
32.1016	BC1	V	22.9	11.8	N/A	0.6	35.3	40.0	4.7
32.6022	BC1	V	18.2	11.8	N/A	0.6	30.6	40.0	9.4
64.7034	BC1	V	17.6	8.0	N/A	0.9	26.5	40.0	13.5
64.2025	BC1	V	15.4	8.0	N/A	0.9	24.3	40.0	15.7
147.4651	BC1	V	11.2	12.9	N/A	1.3	25.4	43.5	18.1

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
 Note 2: Positive Peak detector used

Clause 15.247(e) Power Spectral Density for Digitally Modulated Devices

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

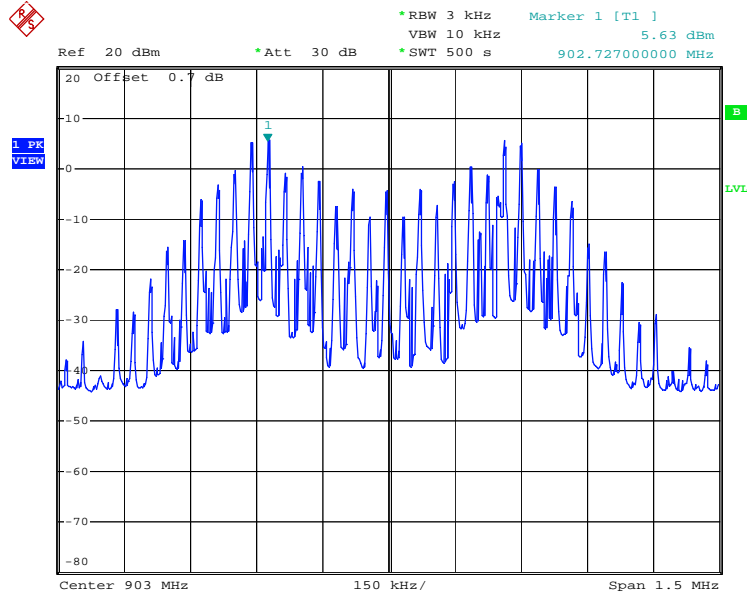
Test Conditions:

Sample Number:	1	Temperature:	22
Date:	April 24, 2007	Humidity:	45
Modification State:	0	Tester:	Heng Lin
		Laboratory:	Ottawa

Test Results:

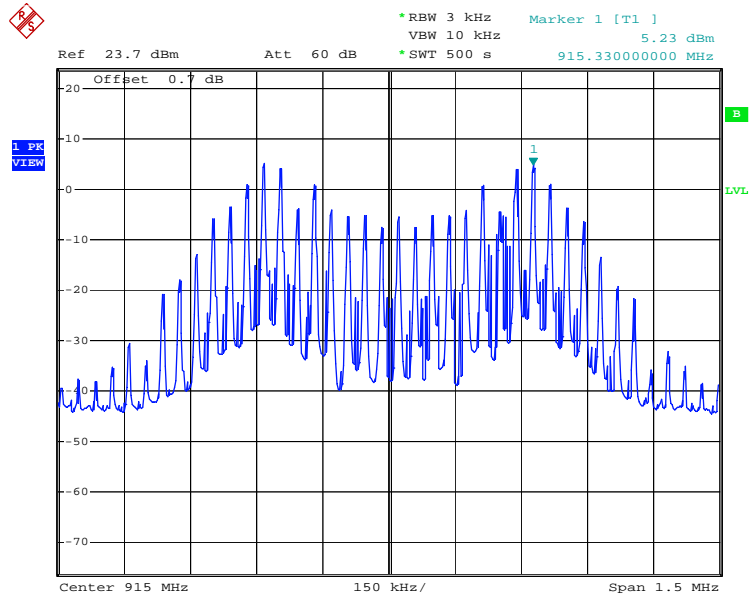
See Attached Plots.

**Power Spectral Density
Low Channel**



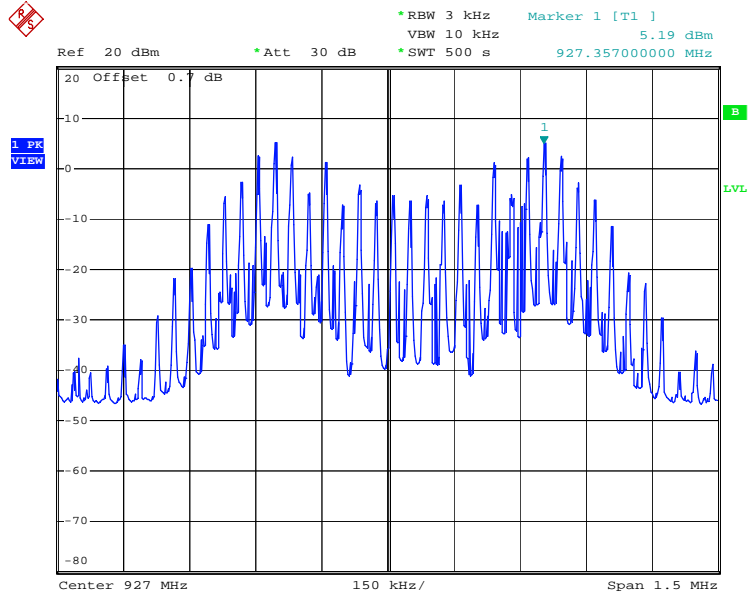
Date: 25.APR.2007 10:01:01

Mid Channel



Date: 24.APR.2007 12:06:14

High Channel



Date: 25.APR.2007 09:43:51

Appendix B : Setup Photographs

Conducted Emissions Setup:

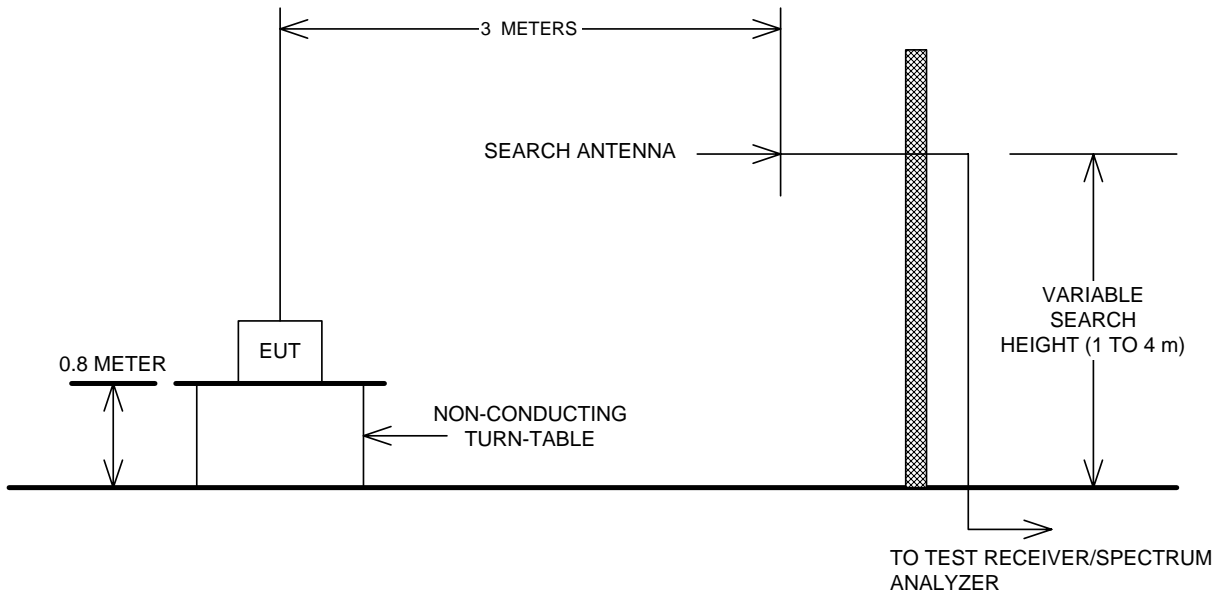


Spurious Emissions Setup:



Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions

