Standards Council of Canada
Accredited Laboratory
Scope of Accreditation 75

Conseil canadien des normes
Laboratoire accrédité
Portée d'accréditation 75

TM

Test Report:	5W51402
Applicant:	Dekolink Wireless Ltd 16 Bazel St, Qiryat-Arieh, Petah-Tikva, 49510 Israel
Apparatus:	High Selectivity Mini Repeater DEKO2119
FCC ID:	OIWCCSRPCS1W70
In Accordance With:	FCC Part 24, Boosters Public Mobile Services
Tested By:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Authorized By:	Jason Nixon, Telecom/Wireless Specialist
Date:	21 September 2005
Total Number of Pages:	41

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted is 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:	High Selectivity Mini Repeater DEKO2119
Specification:	FCC Part 24 Public Mobile Services
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Roman Kuleba, 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:

High Selectivity Mini Repeater DEKO2119 (Model No.: MW-CCSR-PCS-1W70).

1.2 Samples Submitted for Assessment

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

Sample No.	Description	Serial No.
1	High Selectivity Mini Repeater DEKO2119	S/N:0506D9048
2	Black Power Cord	N/A
3	Black Female/Female RS-232 Cable	N/A
4	Green Flathead Screwdriver	N/A
5	Test Software (on CD-ROM): RMS 650	N/A

The first samples were received on: September 7, 2005

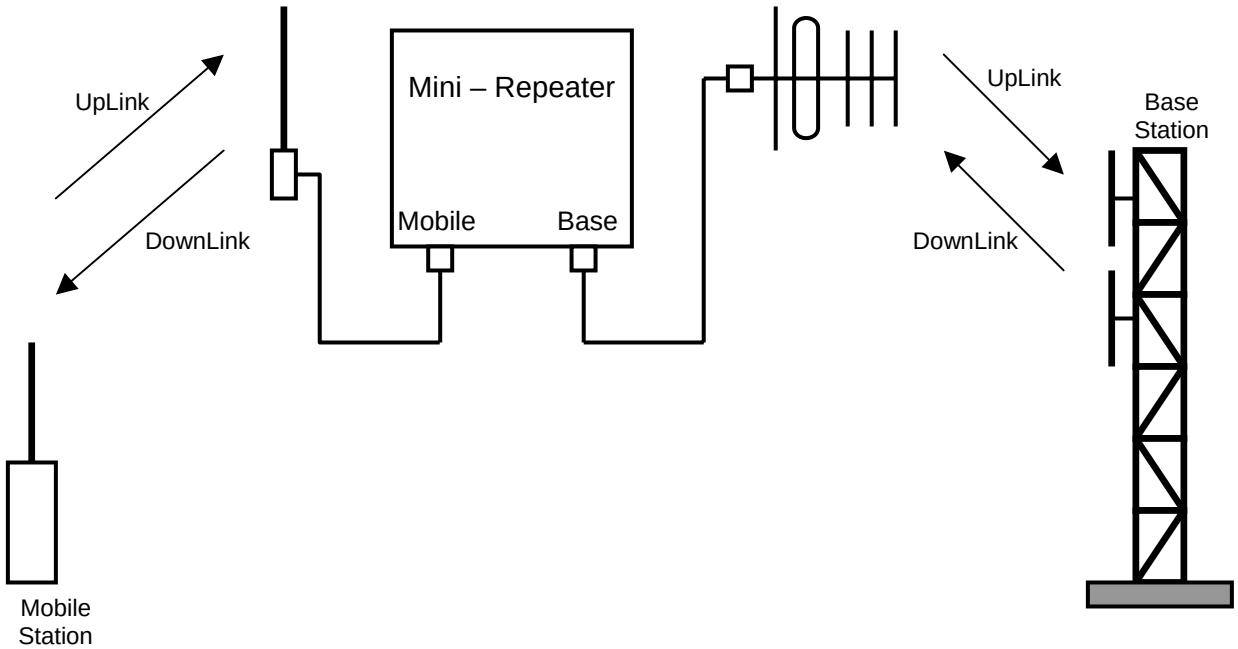
1.3 Theory of Operation

The DUT is a repeater designed for deployment in dense urban environments, tunnels and other areas where physical structures cause low field strengths. It works as a high selectivity amplifier that amplifies signals bi-directionally between base stations and mobile handsets, in cellular and other wireless systems.

1.4 Technical Specifications of the EUT

Manufacturer:	Dekolink Wireless Ltd.
Operating Frequency:	Uplink: 1850 – 1910 MHz Downlink: 1930 – 1990 MHz
Emission Designator:	G7W
Rated Power:	21.0 dBm
Measured Power:	21.3 dBm
Modulation:	CDMA, WCDMA (UMTS), GSM
Power Source:	120 VAC

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 24, Public Mobile Services
FCC 2-11-04/EAB/RF Amplifier, Booster, and Repeater Reminder Sheet

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 ^{o}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.	Last Cal.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSP	FA001920	Mar 22/05	Mar 22/06
Spectrum Analyzer	Rohde & Schwarz	FSU	FA001877	May 18/05	May 18/06
Power Meter	HP	E4418B	FA001413	May 17/05	May 17/06
Power Sensor	HP	8487A	FA001908	Mar 10/05	Mar 10/06
Signal Generator	Rohde & Schwarz	SMIQ 03E	FA001269	March 3/05	March 3/06
Signal Generator	Rohde & Schwarz	SMIQ 03	FA001091	Aug 20/05	Aug 20/06
Signal Generator	Rohde & Schwarz	SMIQ 06B	FA001878	June 10/05	June 10/06
Receiver	Rohde & Schwarz	ESVS-30	FA001437	July 27//05	July 27/06
Biconical (1) Antenna	EMCO	3109	FA000805	April 22/05	April 22/06
Horn Antenna #2	EMCO	3115	FA000825	Dec. 14/04	Dec. 14/05
1.0 – 2.0 GHz Amplifier	JCA	12-400	FA001498	June 18/04	June 18/06
2.0 – 4.0 GHz Amplifier	JCA	24-600	FA001496	June 18/04	June 18/06
4.0 – 8.0 GHz Amplifier	JCA	48-600	FA001497	June 18/04	June 18/06

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

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

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 24: Test Results

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

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

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

4.1 FCC Part 24: Test Results

Clause	Test Method	Test Description	Required	Result
22.913 & 24.232	2.1046	Output Power	Y	Complies
2-11-04/EAB/RF	2.1049	Occupied Bandwidth	Y	Complies
22.917 & 24.238	2.1051	Conducted Spurious Emissions at Antenna Terminal	Y	Complies
22.917 & 24.238	2.1053	Field Strength of Spurious Emissions (Radiated Spur. Emiss.)	Y	Complies
2-11-04/EAB/RF	—	Out of band rejection	Y	Complies
22.355, 24.135 and 24.235	2.1055	Frequency stability	Y	Complies

Notes:

Appendix A : Test Results

Clauses 22.355, 24.135 and 24.235 Frequency Stability

§22.355 Except as otherwise provided in this part, 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)	Base, fixed (ppm)	Mobile, >3 Watts (ppm)	Mobile, <=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

Part 24 Subpart D: Narrowband PCS – personal communications services authorized in the 901-902, 930-931, and 940-941 MHz bands (900 MHz band):
§24.135 Frequency stability.
(a) The frequency stability of the transmitter shall be maintained within ±0.0001 percent (±1 ppm) of the center frequency over a temperature variation of -30° Celsius to +50° Celsius at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20° Celsius.
(b) For battery operated equipment, the equipment tests shall be performed using a new battery without any further requirement to vary supply voltage.
(c) It is acceptable for a transmitter to meet this frequency stability requirement over a narrower temperature range provided the transmitter ceases to function before it exceeds these frequency stability limits.

Part 24 Subpart E: Broadband PCS – personal communications services authorized in the 1850-1910 and 1930-1990 MHz bands:
§24.235 Frequency stability.
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Conditions:

Sample Number:	1	**Temperature:**	23 °C
Date:	September 14, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Complies

Additional Observations:

The tested repeater uses the same LO for frequency conversion; therefore the transmitted signal is identical in frequency to the received signal. This was verified by measuring the transmitted (output) signal frequency with a frequency counter that was phase-locked to a signal generator used to generate input RF signal. Measured frequency deviation was 0 Hz and the DUT was deemed to comply with frequency stability requirement.

Clauses 22.913 and 24.232 Output Power

§22.913 (a) Maximum ERP.
In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

§24.232 Power and antenna height limits.
(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) of this section. See §24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power; (see Table 1 of this section). In no case may the peak output power of a base station transmitter exceed 100 watts.

Test Conditions:

Sample Number:	1	**Temperature:**	23 °C
Date:	September 15, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Complies (see tables and calculations).

Note: Measured at 1 dB compression point.

UpLink:

Channel Frequency (MHz)	Measured Power (dBm)	Rated Maximum Power (dBm)
1851	19.7	21.0
1860	20.3	21.0
1870	19.5	21.0
1880	19.4	21.0
1890	19.7	21.0
1900	17.8	21.0
1909	15.9	21.0

DownLink:

Channel Frequency (MHz)	Measured Power (dBm)	Rated Maximum Power (dBm)
1931	20.4	21.0
1940	21.1	21.0
1950	20.8	21.0
1960	20.5	21.0
1970	20.8	21.0
1980	21.3	21.0
1989	20.5	21.0

Output Power, Continued

On Page 14 of the *Product Manual* the following types of the antenna are proposed:

UpLink (towards Base):	Directional – Yagi or Panel (Gain: 8 – 13 dBi)
DownLink (towards Mobile):	Omni-directional (Gain: 0 – 2 dBi)

Maximum EIRP:

UpLink: EIRP = Max.Output Power + Ant.Gain = 20.3 dBm + 13 dBi = 33.3 dBm = 2.14 W
DownLink: EIRP = Max.Output Power + Ant.Gain = 21.3 dBm + 2 dBi = 23.3 dBm = 0.214 W

Clauses 22.917 and 24.238 Conducted Spurious Emissions

§22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§24.238 Emission limitations for Broadband PCS equipment.
The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.
(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test Conditions:

Sample Number:	1	**Temperature:**	23 °C
Date:	September 16, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

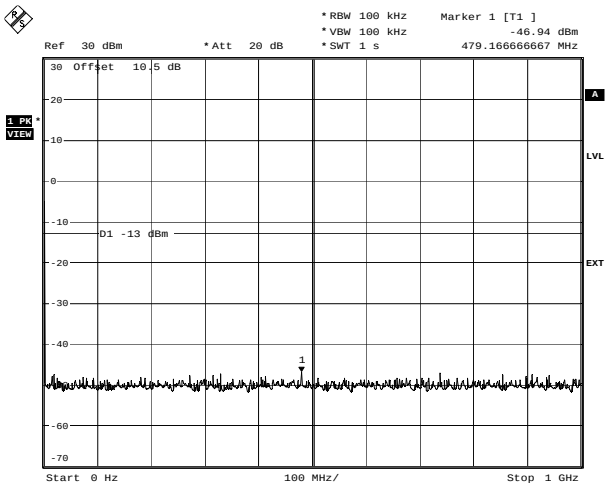
Criteria: -13 dBm

Test Results: Complies.

Additional Observations: The spectrum was investigated for spurious emissions from 30 MHz to the 10th harmonic. Test data is presented on the plots below.

Conducted Spurious Emissions, Continued

DownLink
Modulation: WCDMA



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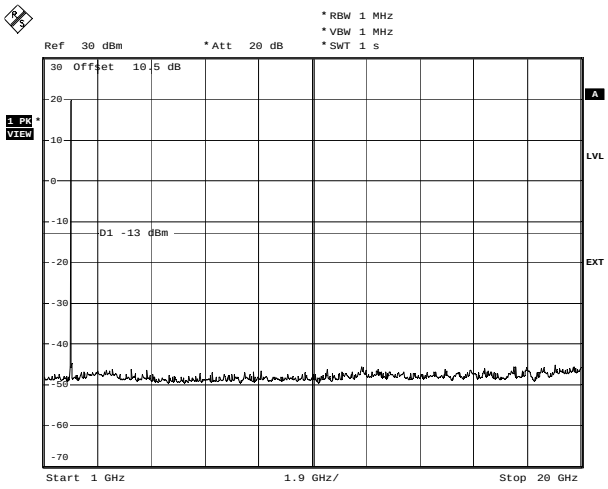

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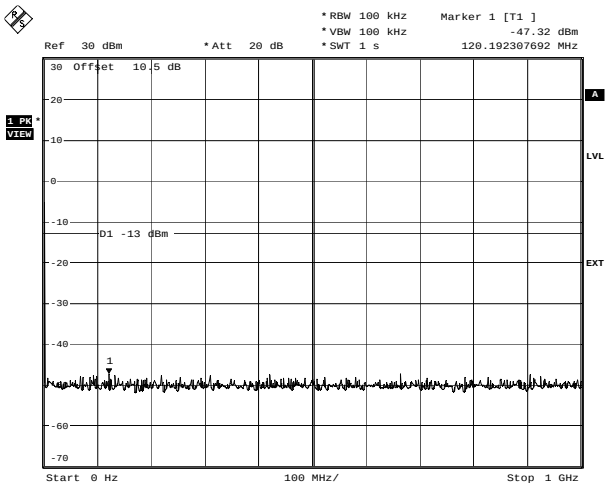
Conducted Spurious Emissions, Continued

DownLink
Modulation: CDMA



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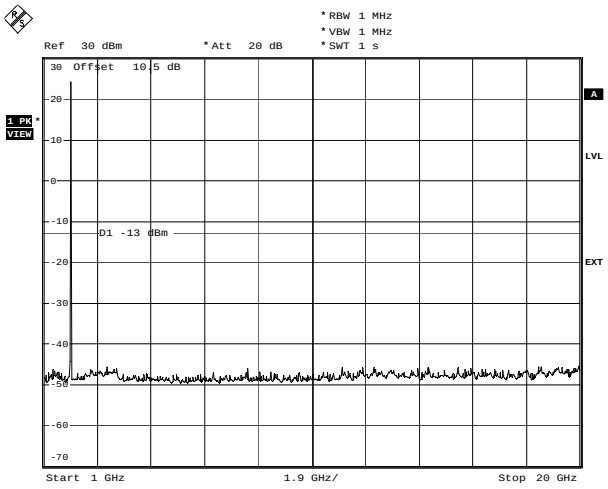

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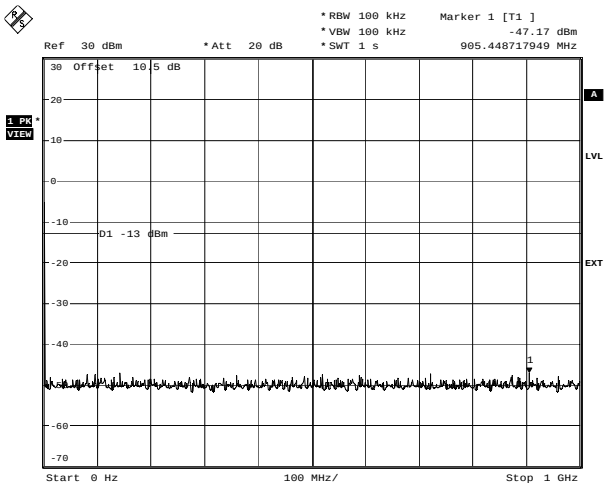
Conducted Spurious Emissions, Continued

DownLink
Modulation: GSM



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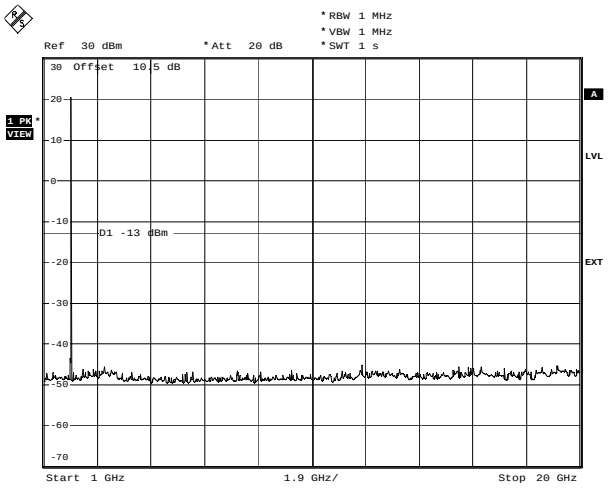

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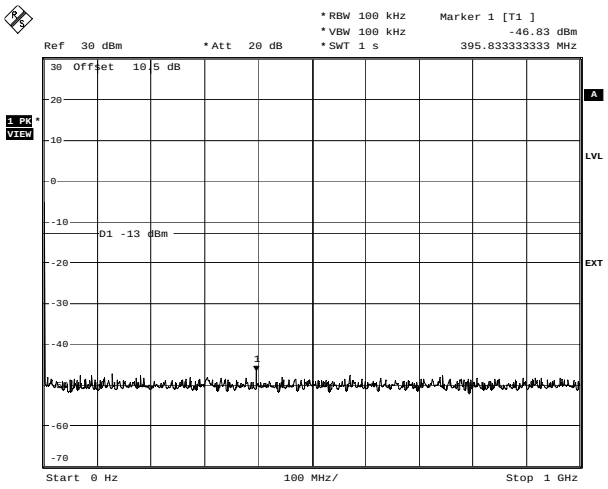
Conducted Spurious Emissions, Continued

UpLink
Modulation: WCDMA



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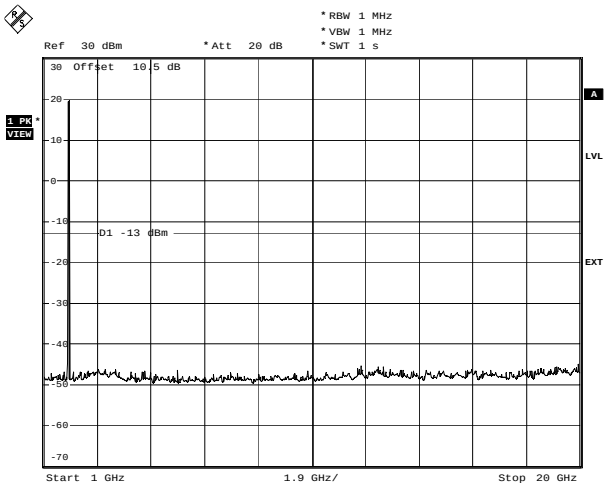

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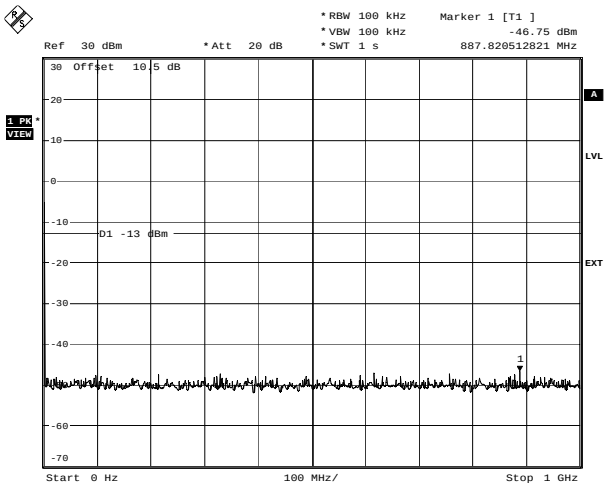
Date: 16.SEP.2005 11:12:59

Conducted Spurious Emissions, Continued

UpLink
Modulation: CDMA



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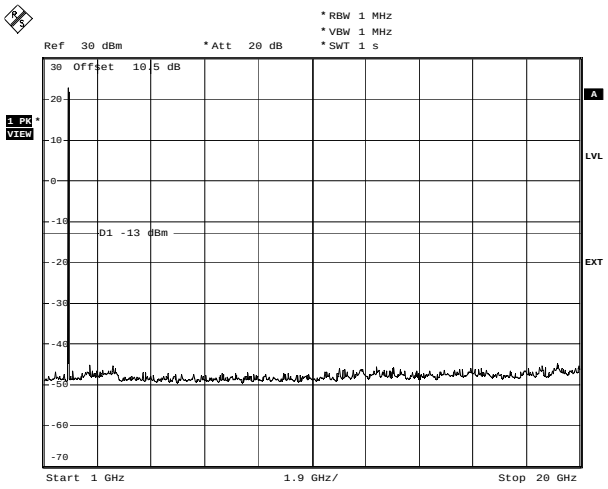

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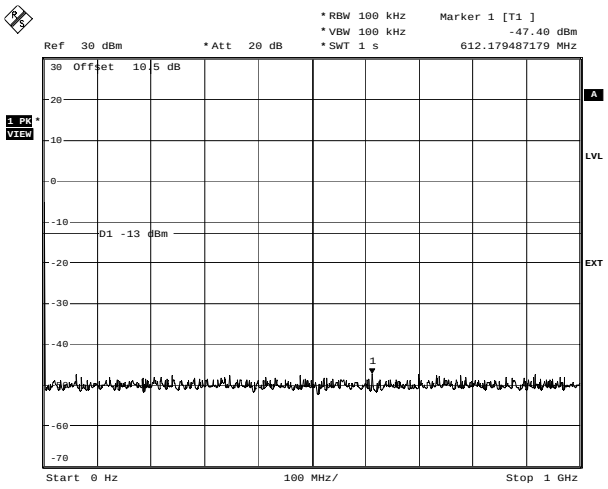
Conducted Spurious Emissions, Continued

UpLink
Modulation: GSM



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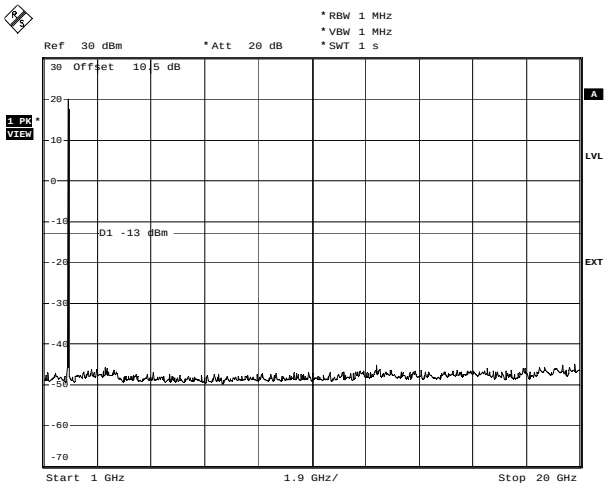

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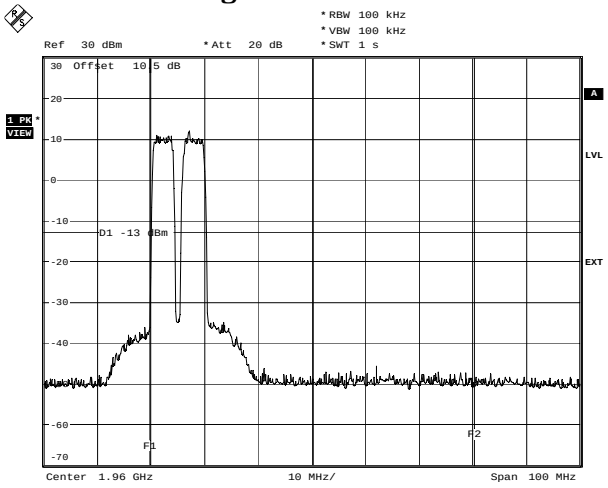
Out of Band Emissions

3rd Order IM Products
DownLink, Modulation: WCDMA

Lower Band Edge



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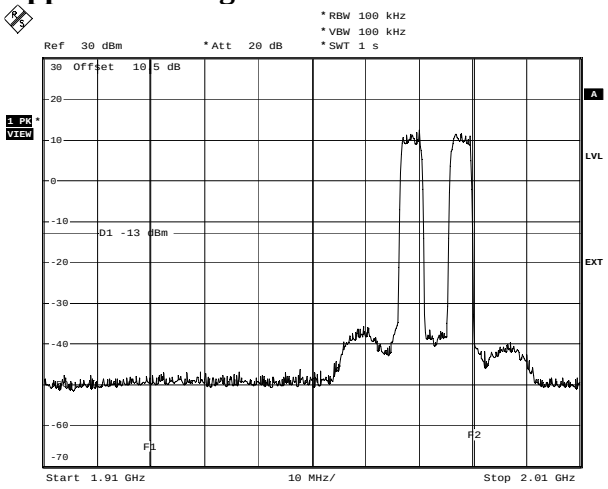
Upper Band Edge



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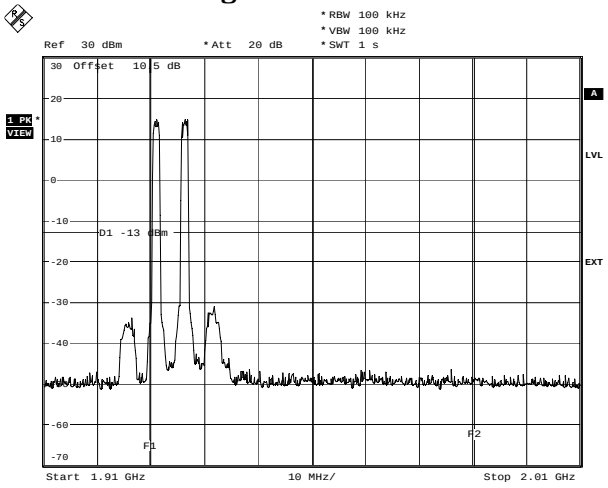
Out of Band Emissions, Continued

3rd Order IM Products
DownLink, Modulation: CDMA

Lower Band Edge



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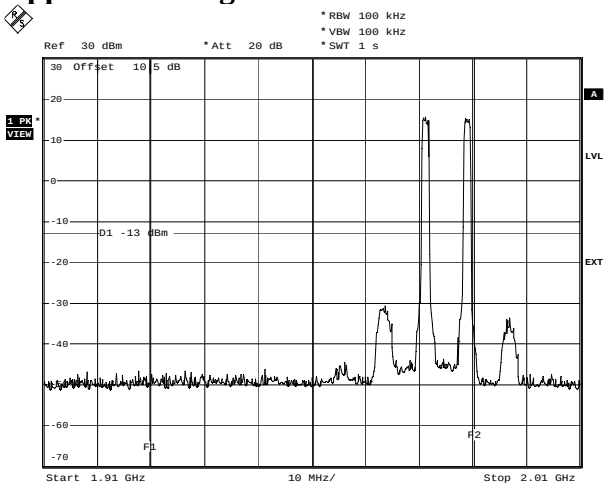
Upper Band Edge



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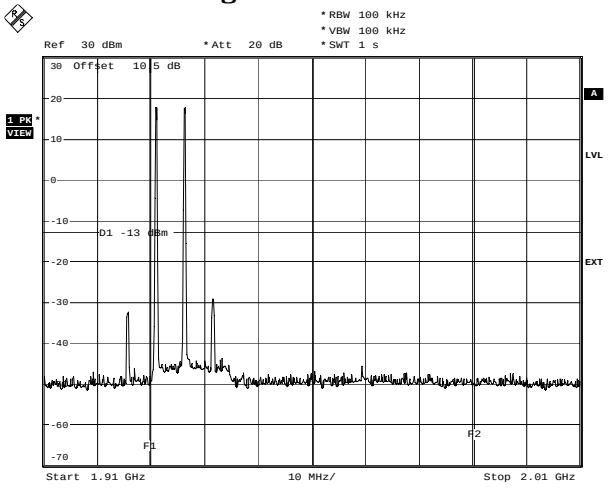
Out of Band Emissions, Continued

3rd Order IM Products
DownLink, Modulation: GSM

Lower Band Edge



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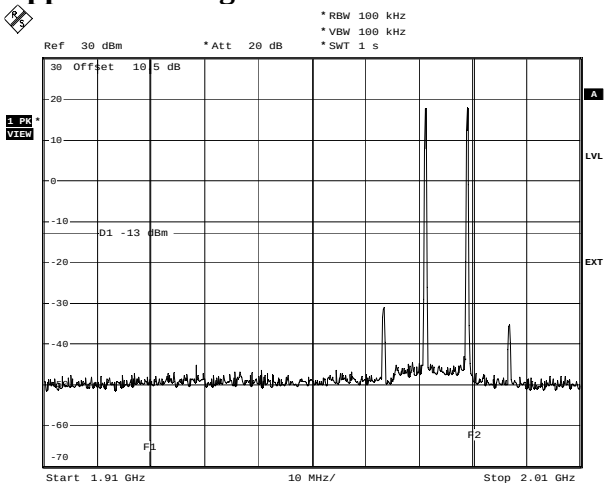

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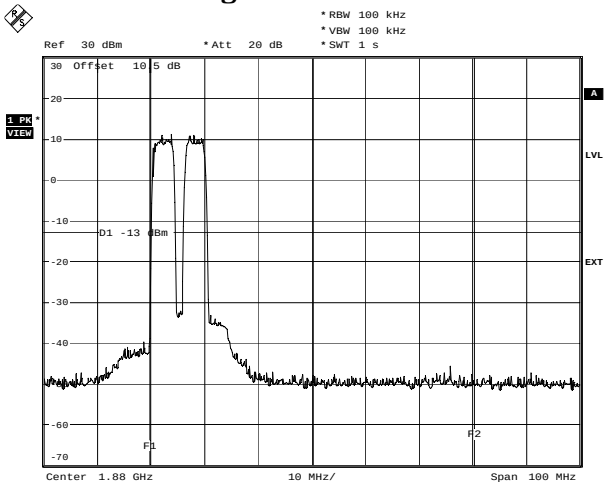
Out of Band Emissions, Continued

3rd Order IM Products
UpLink, Modulation: WCDMA

Lower Band Edge



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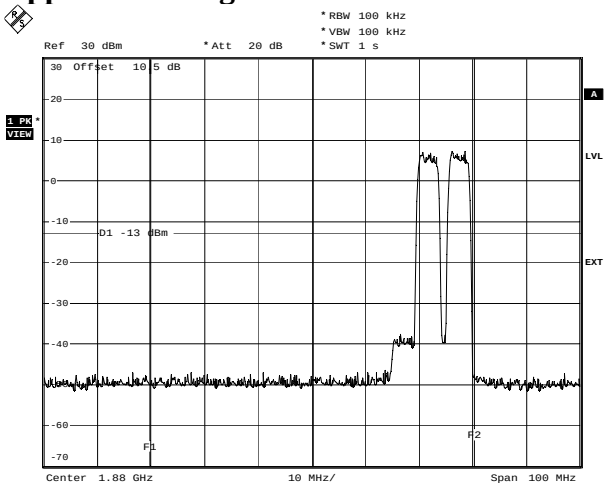

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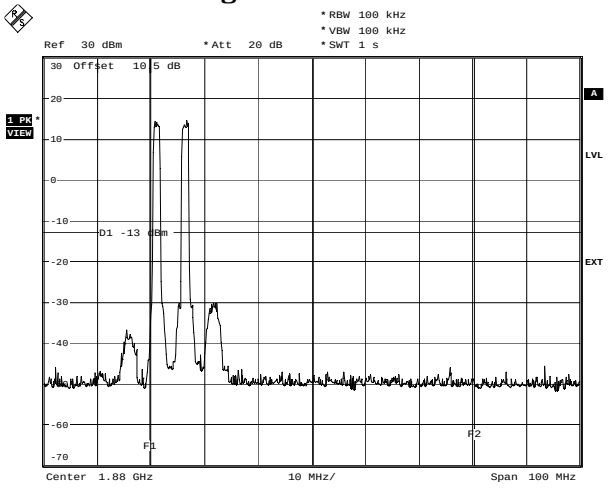
Out of Band Emissions, Continued

3rd Order IM Products
UpLink, Modulation: CDMA

Lower Band Edge



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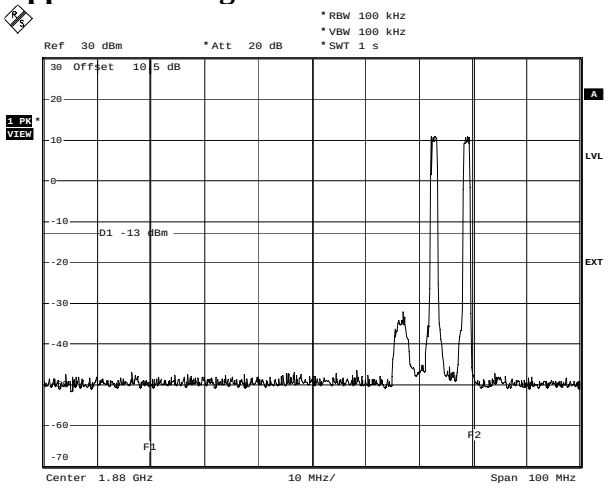
Upper Band Edge



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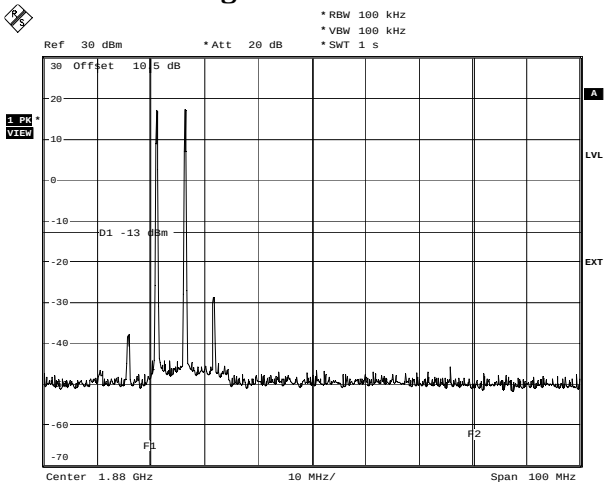
Out of Band Emissions, Continued

3rd Order IM Products
UpLink, Modulation: GSM

Lower Band Edge



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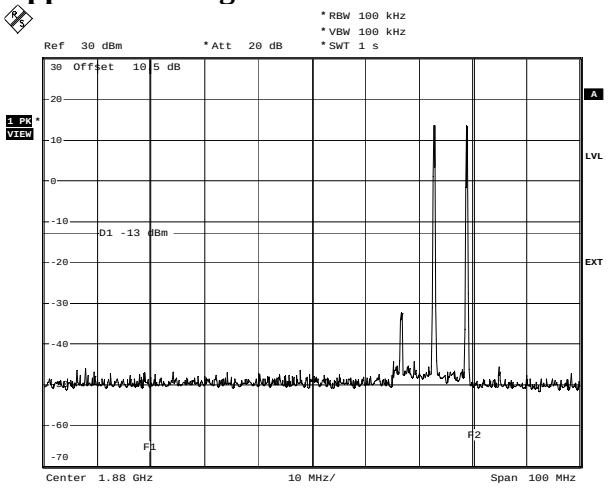
Upper Band Edge



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Clauses 22.917 and 24.238 Radiated Spurious Emissions

§22.917 (a) Out of band emissions.
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
§24.238 (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified).

Test Conditions:

Sample Number:	1	**Temperature:**	23 °C
Date:	September 16, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Complies (no emissions were detected within 20 dB below the limit).

Additional Observations:

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

The EUT was measured on three orthogonal axis.

All measurements were performed using a Peak Detector with 100 kHz RBW below 1 GHz and a 1 MHz RBW above 1 GHz at a distance of 3 meters.

Clause 2-11-04/EAB/RF Occupied Bandwidth

Using an RBW of 300Hz or 1% of the emission bandwidth, The spectral shape of the output should look similar to the input for all modulations.

Test Conditions:

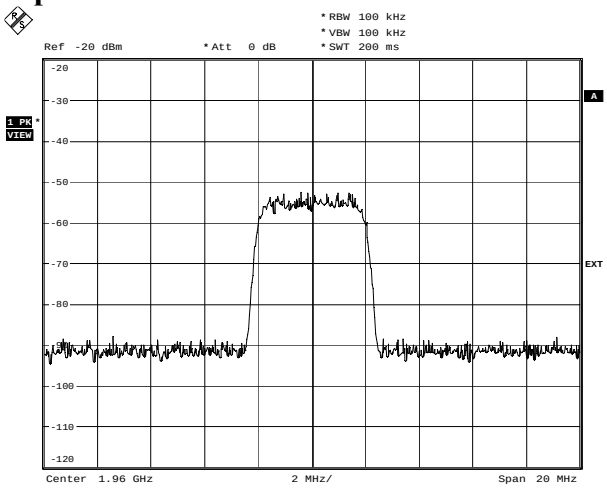
Sample Number:	1	**Temperature:**	23 °C
Date:	September 16, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Complies (see attached plots).

Occupied Bandwidth, Continued

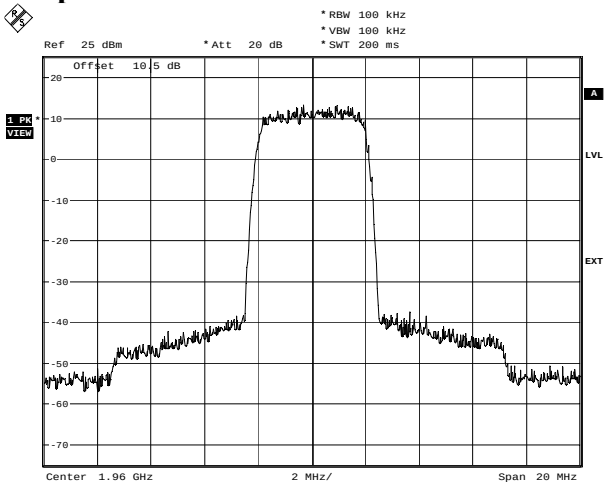
DownLink
Modulation: WCDMA

Input



Dekolink DEKO2119
Date: 16.SEP.2005 10:20:38

Output

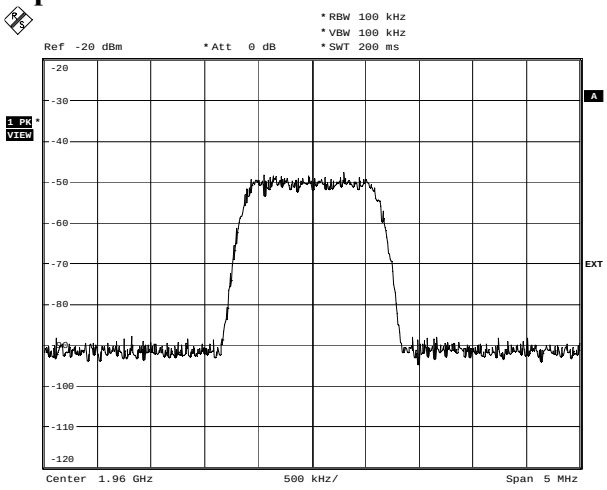


Dekolink DEKO2119
Date: 16.SEP.2005 10:16:56

Occupied Bandwidth, Continued

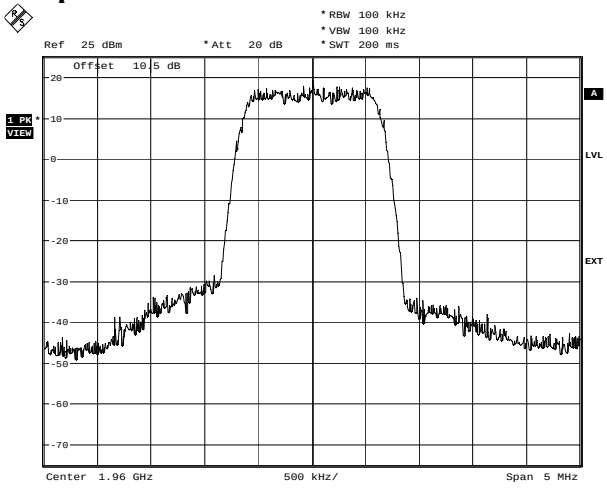
DownLink
Modulation: CDMA

Input



Dekolink DEKO2119
Date: 16.SEP.2005 10:22:47

Output

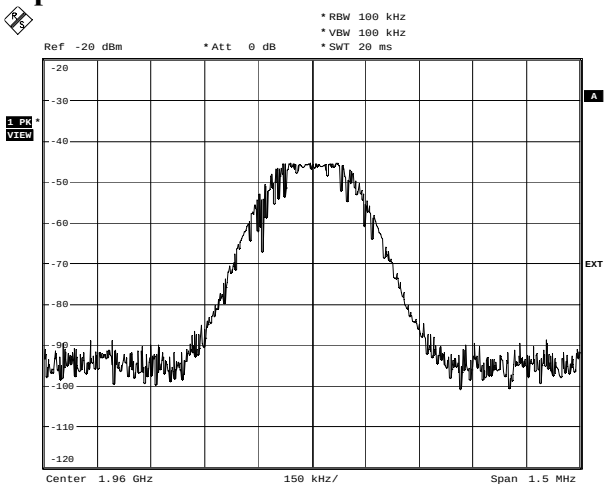


Dekolink DEKO2119
Date: 16.SEP.2005 10:15:19

Occupied Bandwidth, Continued

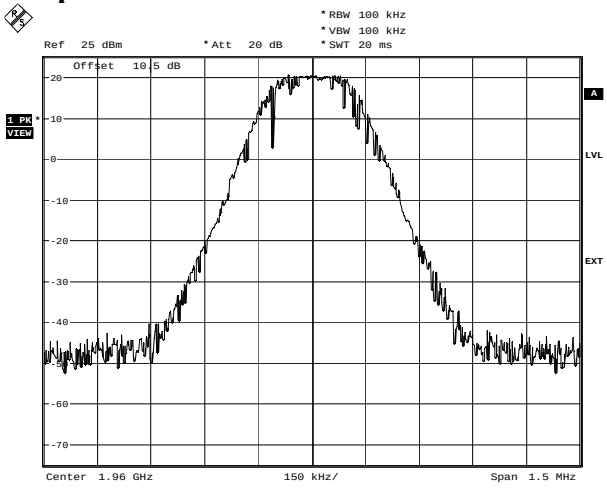
DownLink
Modulation: GSM

Input



Dekolink DEKO2119
Date: 16.SEP.2005 10:25:08

Output

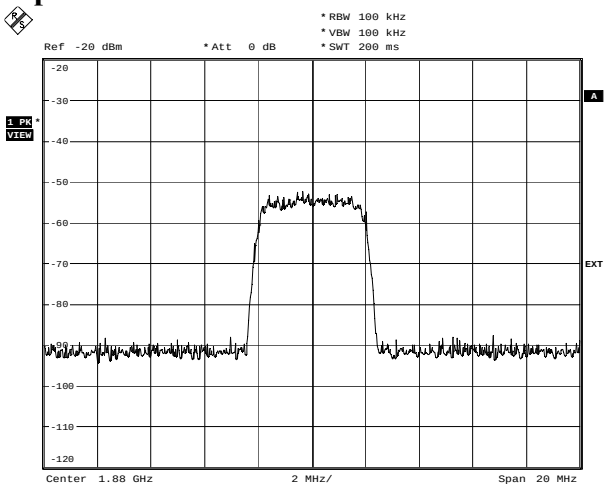


Dekolink DEKO2119
Date: 16.SEP.2005 10:13:32

Occupied Bandwidth, Continued

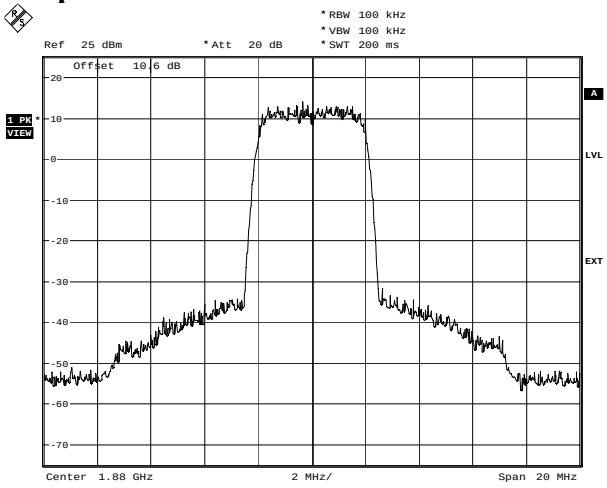
UpLink
Modulation: WCDMA

Input



Dekolink DEKO2119
Date: 16.SEP.2005 09:31:13

Output

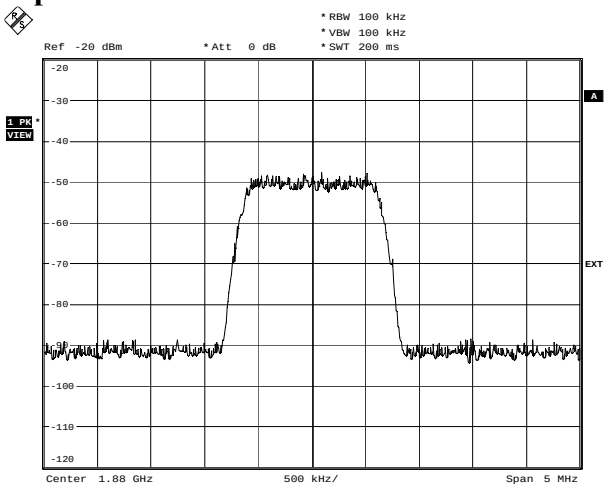


Dekolink DEKO2119
Date: 16.SEP.2005 08:56:22

Occupied Bandwidth, Continued

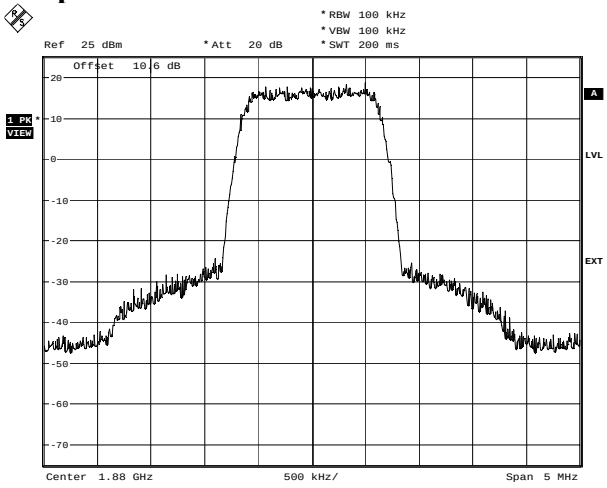
UpLink
Modulation: CDMA

Input



Dekolink DEKO2119
Date: 16.SEP.2005 09:29:02

Output

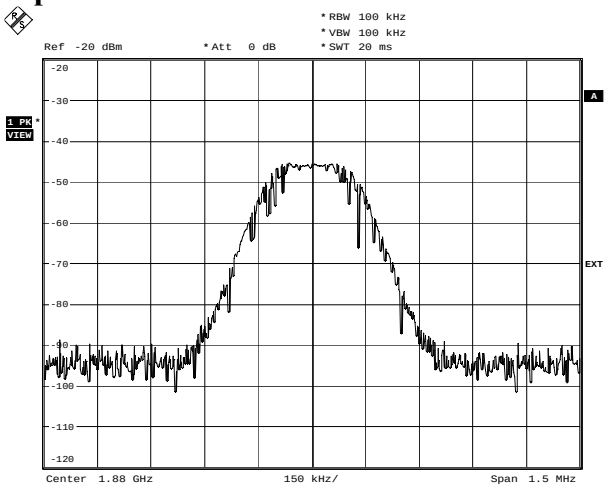


Dekolink DEKO2119
Date: 16.SEP.2005 08:58:51

Occupied Bandwidth, Continued

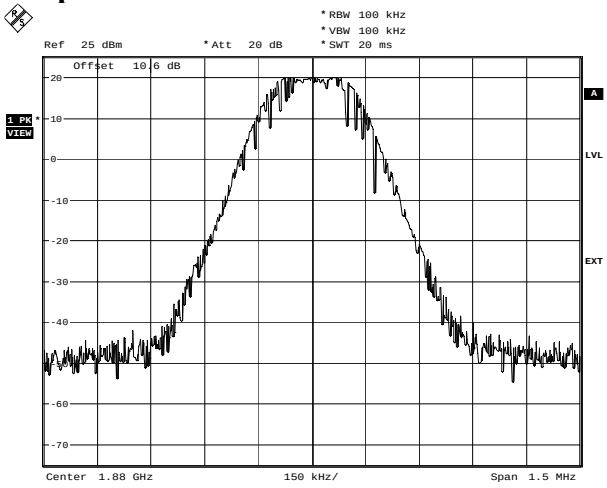
UpLink
Modulation: GSM

Input



Dekolink DEKO2119
Date: 16.SEP.2005 09:27:13

Output



Dekolink DEKO2119
Date: 16.SEP.2005 09:19:27

Clause 2-11-04/EAB/RF Out of Band Rejection

Plots showing the filter frequency response.

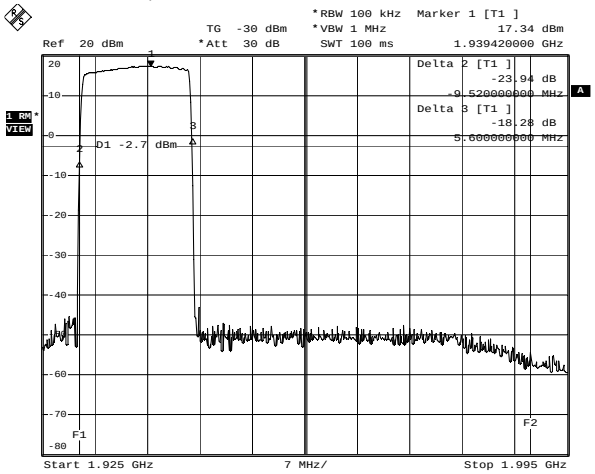
Test Conditions:

Sample Number:	1	**Temperature:**	23 °C
Date:	September 15, 2005	**Humidity:**	45 %
Modification State:	0	**Tester:**	Roman Kuleba
		Laboratory:	Ottawa

Test Results: Complies (See Attached Plots).

Out of Band Rejection, Continued

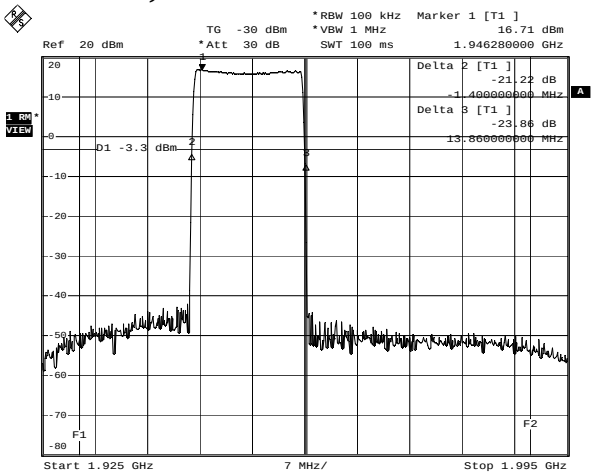
DownLink, Band A: 1930.000 – 1944.975 MHz



Dekolink DEKO 2119

Date: 15.SEP.2005 22:51:13

DownLink, Band B: 1944.975 – 1959.975 MHz

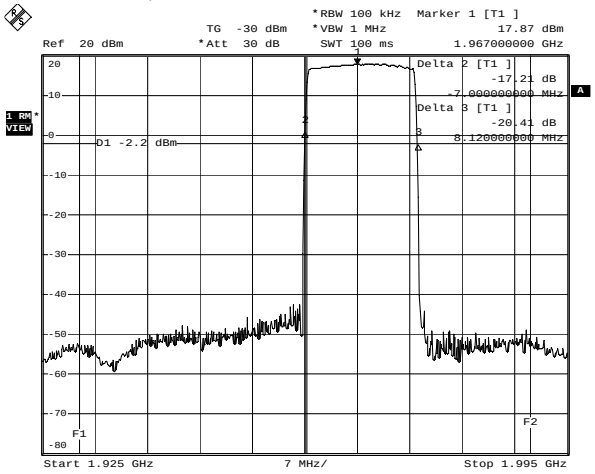


Dekolink DEKO 2119

Date: 15.SEP.2005 22:46:58

Out of Band Rejection, Continued

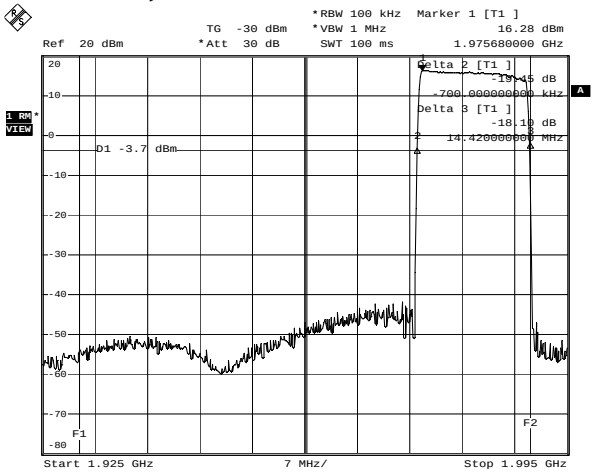
DownLink, Band C: 1959.975 – 1974.975 MHz



Dekolink DEKO 2119

Date: 15.SEP.2005 22:57:07

DownLink, Band D: 1974.975 – 1989.975 MHz

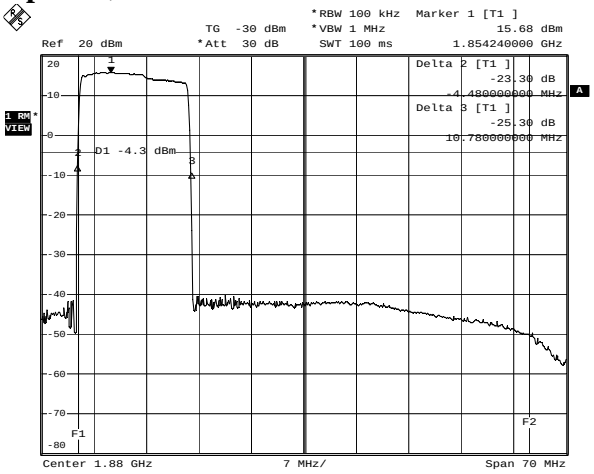


Dekolink DEKO 2119

Date: 15.SEP.2005 23:08:21

Out of Band Rejection, Continued

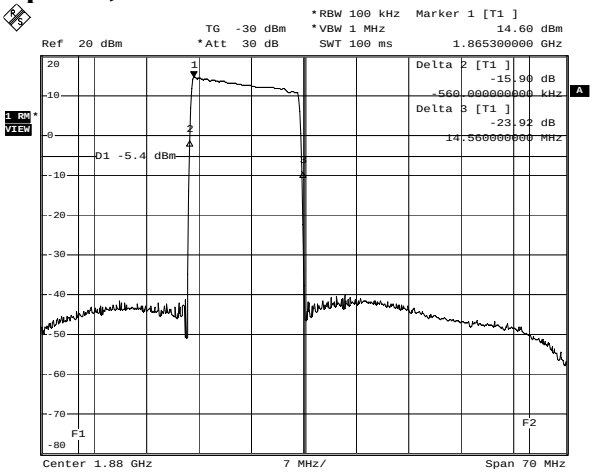
UpLink, Band A: 1850.000 – 1864.975 MHz



Dekolink DEKO 2119

Date: 15.SEP.2005 23:29:19

UpLink, Band B: 1864.975 – 1879.975 MHz

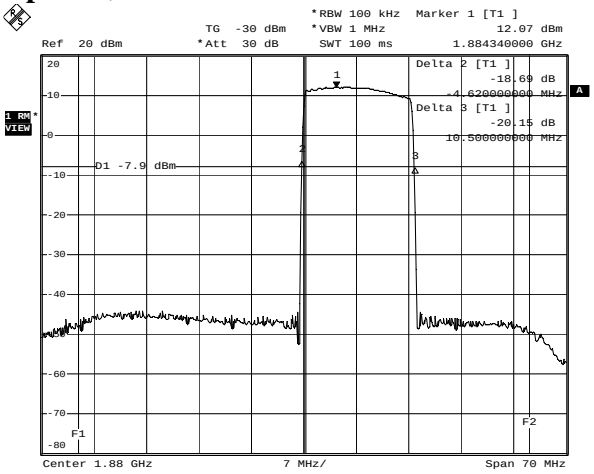


Dekolink DEKO 2119

Date: 15.SEP.2005 23:37:29

Out of Band Rejection, Continued

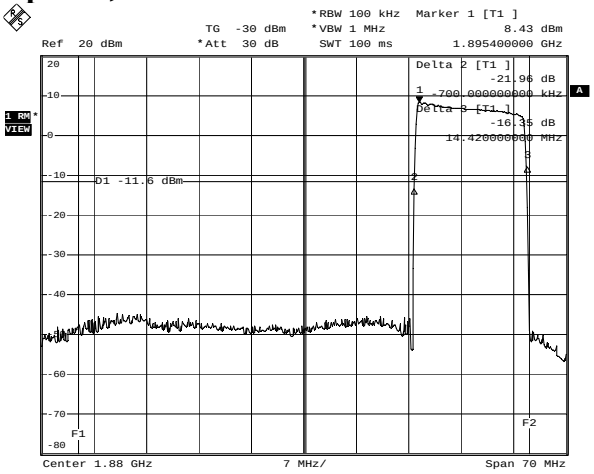
UpLink, Band C: 1879.975 – 1894.975 MHz



Dekolink DEKO 2119

Date: 15.SEP.2005 23:43:06

UpLink, Band D: 1894.975 – 1909.975 MHz

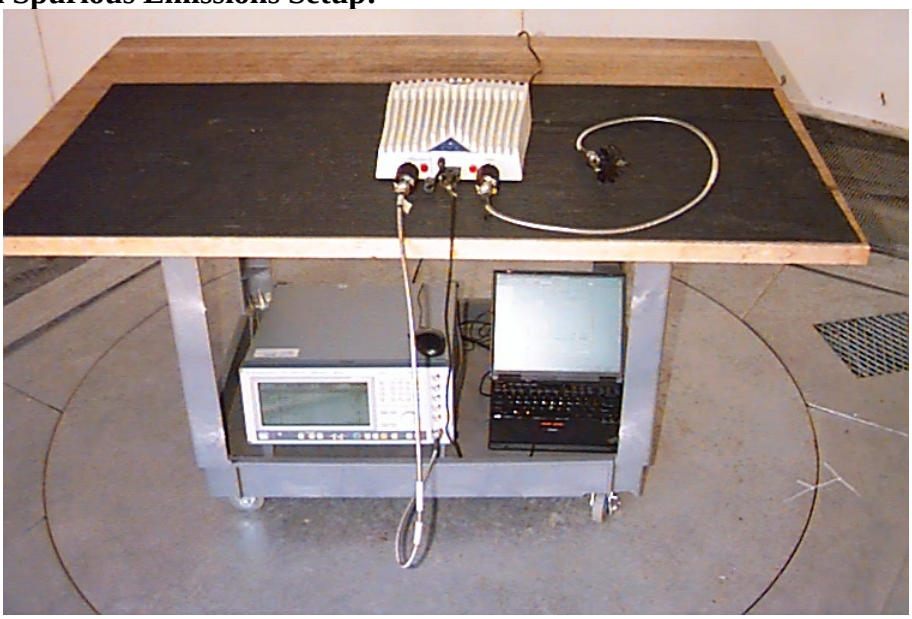


Dekolink DEKO 2119

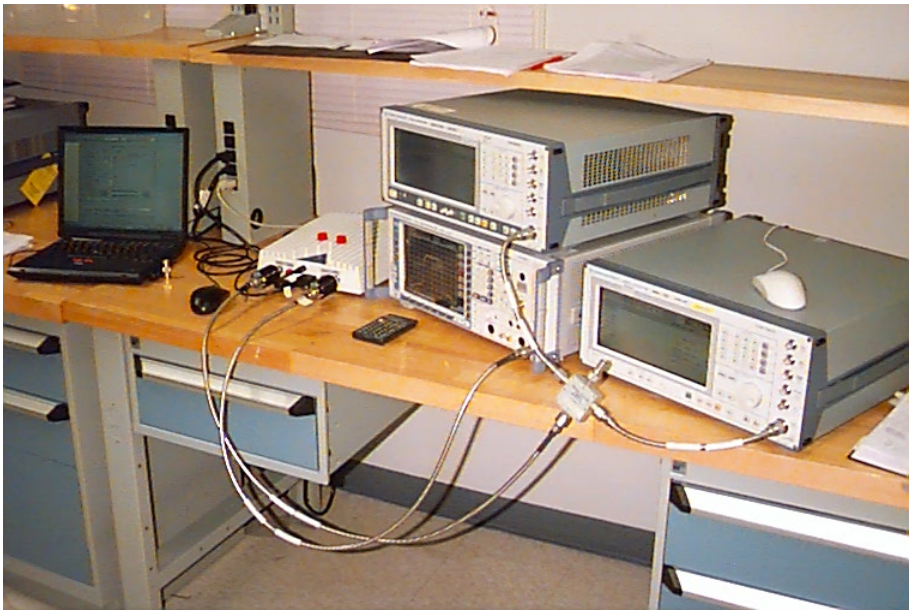
Date: 15.SEP.2005 23:47:56

Appendix B : Setup Photographs

Radiated Spurious Emissions Setup:

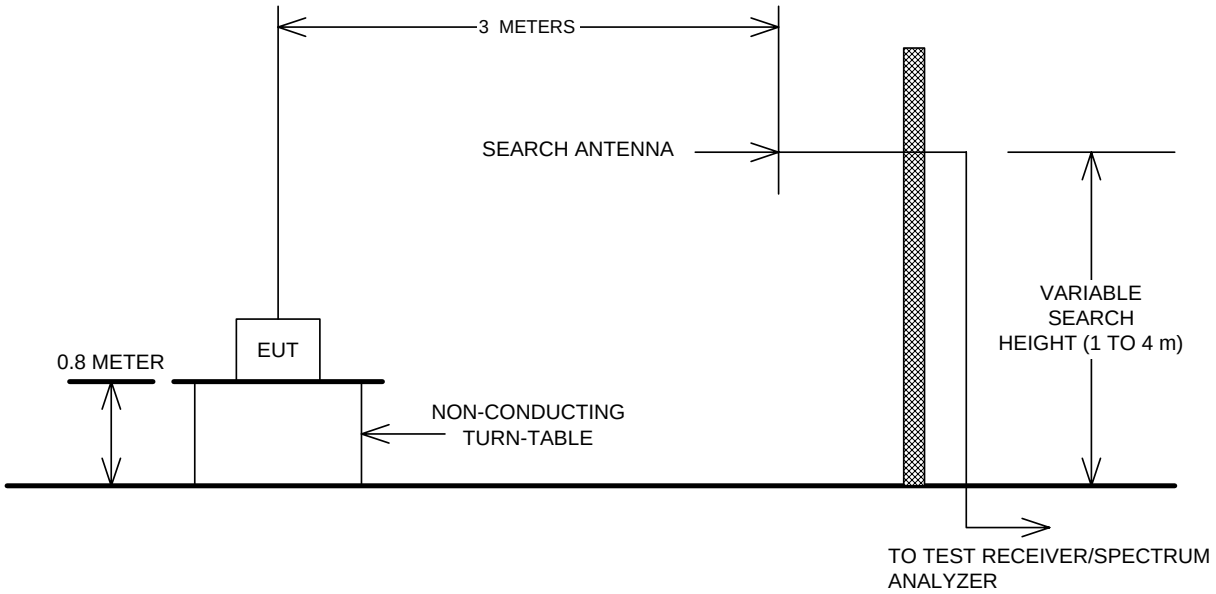


Conducted Measurement at Antenna Port:



Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions, Output power, Occupied Bandwidth and Out of Band Rejection