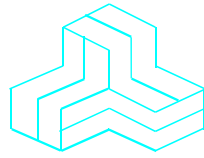


ENGINEERING TEST REPORT



NBS55XX
Model No.: NBS55XXTXXX-B
FCC ID: O3JNBS55XXB

Applicant:

NBS Technologies Inc.
703 Evans Avenue, Suite 400
Toronto, Ontario
Canada M9C 5E9

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, PARTS 2, 22 (Subpart H) and 24 (Subpart E)

UltraTech's File No.: MIS-061FCC22H24E

This Test report is Issued under the Authority of
Tri M. Luu, Professional Engineer,
Vice President of Engineering
UltraTech Group of Labs



Date: July 31, 2007

Report Prepared by: Dan Huynh

Tested by: Wayne Wu, RFI/EMI Technician

Issued Date: July 31, 2007

Test Dates: May 17 - June 12 & July 31, 2007

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech

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Tel.: (905) 829-1570 Fax.: (905) 829-8050
Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com



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SL2-IN-E-1119R

TABLE OF CONTENTS

EXHIBIT 1.	SUBMITTAL CHECK LIST	1
EXHIBIT 2.	INTRODUCTION.....	2
2.1.	SCOPE	2
2.2.	RELATED SUBMITTAL(S)/GRANT(S).....	2
2.3.	NORMATIVE REFERENCES	2
EXHIBIT 3.	PERFORMANCE ASSESSMENT	3
3.1.	CLIENT INFORMATION.....	3
3.2.	EQUIPMENT UNDER TEST (EUT) INFORMATION.....	3
3.3.	EUT'S TECHNICAL SPECIFICATIONS.....	4
3.4.	LIST OF EUT'S PORTS.....	4
3.5.	ANCILLARY EQUIPMENT	4
EXHIBIT 4.	EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS.....	5
4.1.	CLIMATE TEST CONDITIONS	5
4.2.	OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS	5
EXHIBIT 5.	SUMMARY OF TEST RESULTS.....	6
5.1.	LOCATION OF TESTS.....	6
5.2.	APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS.....	6
5.3.	MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES.....	6
5.4.	DEVIATION OF STANDARD TEST PROCEDURES	6
EXHIBIT 6.	MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS.....	7
6.1.	TEST PROCEDURES	7
6.2.	MEASUREMENT UNCERTAINTIES	7
6.3.	MEASUREMENT EQUIPMENT USED	7
6.4.	ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER	7
6.5.	RF POWER OUTPUT [§§ 2.1046 & 22.913 & 24.232].....	8
6.6.	OCCUPIED BANDWIDTH [§ 2.1049].....	10
6.7.	SPURIOUS EMISSIONS AT ANTENNA TERMINALS [§§ 2.1051 22.917 & 24.238].....	17
6.8.	FIELD STRENGTH OF SPURIOUS RADIATION [§§ 2.1053, 22.917 & 24.238].....	43
EXHIBIT 7.	MEASUREMENT UNCERTAINTY.....	47
7.1.	RADIATED EMISSION MEASUREMENT UNCERTAINTY.....	47

EXHIBIT 1. SUBMITTAL CHECK LIST

Annex No.	Exhibit Type	Description of Contents	Quality Check (OK)
--	Test Report	Exhibit 1: Submittal check lists Exhibit 2: Introduction Exhibit 3: Performance Assessment Exhibit 4: EUT Operation and Configuration during Tests Exhibit 5: Summary of test Results Exhibit 6: Measurement Data Exhibit 7: Measurement Uncertainty	OK
1	Test Setup Photos	Radiated Emission Setup Photos	OK
2	External Photos of EUT	External EUT Photos	OK
3	Internal Photos of EUT	Internal EUT Photos	OK
4	Cover Letters	Letter from Ultratech for Certification Request Letter from the Applicant to appoint Ultratech to act as an agent Letters from the Applicant to request for Confidentiality Filing	OK
5	Attestation Statements	--	--
6	ID Label/Location Info	ID Label Location of ID Label	OK
7	Block Diagrams	<ul style="list-style-type: none"> ▪ NBS Technologies Inc. Wireless POS terminal Block Diagram ▪ Wavecom Radio Module Block Diagram 	OK
8	Schematic Diagrams	<ul style="list-style-type: none"> ▪ NBS Technologies Inc. Wireless POS terminal Schematics ▪ Wavecom Radio Module Schematics 	OK
9	Parts List/Tune Up Info	<ul style="list-style-type: none"> ▪ NBS Technologies Inc. Wireless POS terminal Parts List/Tune Up Info ▪ Wavecom Radio Module Parts List/Tune Up Info 	OK
10	Operational Description	<ul style="list-style-type: none"> ▪ NBS Technologies Inc. Wireless POS terminal Operational Description ▪ Wavecom Radio Module Operational Description 	OK
11	RF Exposure Info	SAR Test Report	OK
12	Users Manual	NBS55XX Terminal Installation and Operation Manual	OK

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EXHIBIT 2. INTRODUCTION

2.1. SCOPE

Reference:	FCC Parts 2, 22 and 24
Title:	Telecommunication – 47 Code of Federal Regulations (CFR), Parts 2, 22 & 24
Purpose of Test:	To gain FCC Certification Authorization for Radio operating in the frequency bands 824.7 - 848.31 MHz and 1850.25 - 1908.75 MHz.
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.

2.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

2.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19 and 20 - 39	2006	Code of Federal Regulations – Telecommunication
ANSI C63.4	2003	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
CISPR 22 & EN 55022	2006 2006	Information Technology Equipment - Radio Disturbance Characteristics – Limits and Methods of Measurement
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
TIA-603-C	2004	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards

EXHIBIT 3. PERFORMANCE ASSESSMENT

3.1. CLIENT INFORMATION

APPLICANT	
Name:	NBS Technologies Inc.
Address:	703 Evans Avenue, Suite 400 Toronto, Ontario Canada M9C 5E9
Contact Person:	Mr. Dragoslav Jovanovic Phone #: 416-621-1911 Fax #: 416-621-8875 Email Address: djovanovic@nbstech.com

MANUFACTURER	
Name:	SAGEM Monotel
Address:	1, Rue Claude Chappe – BP346 07503 Guilherand-Granges France
Contact Person:	Mr. Clement Lormeau Phone #: +33 4 75 81 40 47 Fax #: +33 4 75 81 41 57 Email Address: clement.lormeau@sagem.com

3.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	NBS
Product Name:	NBS55XX
Model Name or Number:	NBS55XTXXX-B
Serial Number:	Preproduction
Type of Equipment:	Non-broadcast Radio Communication Equipment
Power Supply:	3.6 Vdc, 1.5Ah - Ni-MH Battery
Transmitting/Receiving Antenna Type:	Integral
Primary User Functions of EUT:	Wireless point-of-sale (POS) terminal to provide processing of payments.
Operating temperature range:	+5 °C to +45 °C

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EXHIBIT 4. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

4.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa
Power input source:	3.6 V Ni-MH battery

4.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	None.
Special Hardware Used:	None.
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use.

Transmitter Test Signals	
Frequency Band(s):	<ul style="list-style-type: none"> ▪ 824.7 - 848.31 MHz ▪ 1850.25 - 1908.75 MHz
Frequency(ies) Tested: (Near lowest, near middle & near highest frequencies in the frequency range of operation.)	<ul style="list-style-type: none"> ▪ 824.70 MHz, 836.52 MHz, 848.31 MHz ▪ 1851.25 MHz, 1880.00 MHz, 1908.75 MHz
RF Power Output (measured maximum output power):	<ul style="list-style-type: none"> ▪ 0.597 W ERP (Cellular Band) ▪ 1.028 W EIRP (PCS Band)
Normal Test Modulation:	CDMA
Modulating Signal Source:	Internal

EXHIBIT 5. SUMMARY OF TEST RESULTS

5.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada Site No.: 2049A-2, Expiry Date: July 4, 2008).

5.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Applicability (Yes/No)
1.1307, 1.1310, 2.1091 & 2.1093	RF Exposure Limit	Yes
2.1046, 22.913 & 24.232	RF Power Output	Yes
2.1047(a)	Audio Frequency Response	See original filing test report
2.1047(b)	Modulation Limiting	See original filing test report
2.1049	Occupied Bandwidth	Yes
2.1051, 2.1057, 22.917 & 24.238	Spurious emissions at antenna terminals	Yes
2.1053, 2.1057, 22.917 & 24.238	Field strength of spurious radiation	Yes
2.1055	Frequency Stability	See original filing test report
NBS55XX Terminal , by NBS Technologies Inc. , has also been tested and found to comply with FCC Part 15, Subpart B – Class A Digital Devices.		

5.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

5.4. DEVIATION OF STANDARD TEST PROCEDURES

None.

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July 31, 2007

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EXHIBIT 6. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

6.1. TEST PROCEDURES

Refer to Ultratech Test Procedures, File # ULTR P001-2004, ANSI C63.4, TIA-603-C.

6.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 7 for Measurement Uncertainties.

6.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

6.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER

The EUT is the industry's latest generation wireless point-of-sale (POS) terminal designed to provide convenient and efficient processing of payments and value-added services to mobile merchants.

6.5. RF POWER OUTPUT [§§ 2.1046 & 22.913 & 24.232]

6.5.1. Limit(s)

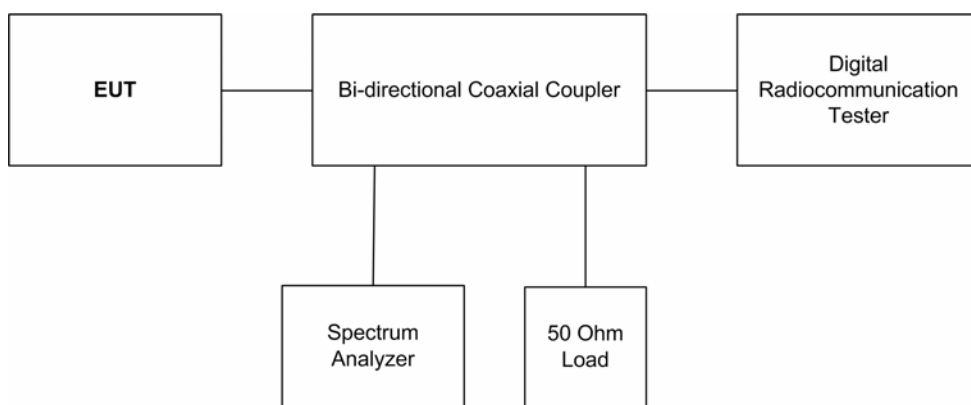
§22.913 (a) The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

§ 24.232 (c) 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.

6.5.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004 and TIA-603-C.

6.5.3. Test Arrangement



6.5.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rhode & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz
Bi-Directional Coaxial Coupler	Narda	3022	75262	1.0 – 4.0 GHz
Bi-Directional Coaxial Coupler	Narda	3020	35482	50 – 1000 MHz
Digital Radiocommunication Tester	Rohde & Schwarz	CMD-80	DE29573	869 – 1990 MHz

6.5.5. Test Data

Remarks:

Antenna Gain: 1.6 dBi Max in 824 - 849 MHz band
2.2 dBi Max. in 1850 - 1910 MHz band

Cellular Band: 824 – 849 MHz

Transmitter Channel Output	Fundamental Frequency (MHz)	Measured Peak Conducted Power (dBm)	* Calculated ERP (dBm)	ERP Limit (dBm)
Lowest	824.70	28.31	27.76	38.45
Middle	836.52	28.10	27.55	38.45
Highest	848.31	27.78	27.23	38.45

*ERP = (peak conducted power in dBm) + (antenna gain in dBi) - 2.15

PCS Band: 1850 – 1910 MHz

Transmitter Channel Output	Fundamental Frequency (MHz)	Measured Peak Conducted Power (dBm)	*Calculated e.i.r.p. (dBm)	e.i.r.p. Limit
Lowest	1851.25	27.42	29.62	33.0
Middle	1880.00	27.92	30.12	33.0
Highest	1908.75	27.00	29.20	33.0

* e.i.r.p. = (peak conducted power in dBm) + (antenna gain in dBi)

6.6. OCCUPIED BANDWIDTH [§ 2.1049]

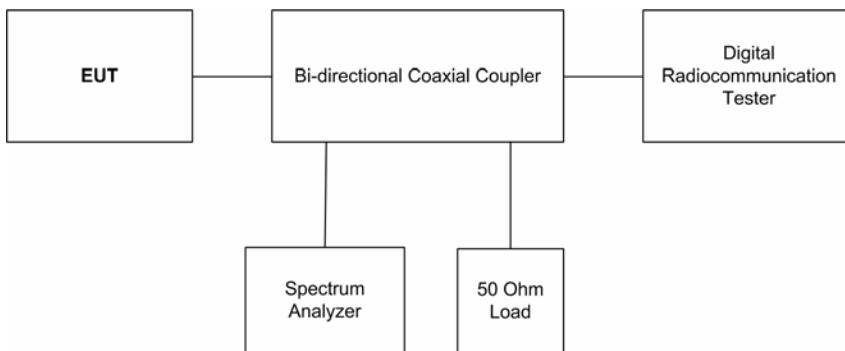
6.6.1. Limit(s)

Occupied bandwidth for emission designator.

6.6.2. Method of Measurements

ULTRATECH Test Procedures, File # ULTR P001-2004.

6.6.3. Test Arrangement



6.6.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rhode & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz
Bi-Directional Coaxial Coupler	Narda	3022	75262	1.0 – 4.0 GHz
Bi-Directional Coaxial Coupler	Narda	3020	35482	50 – 1000 MHz
Digital Radiocommunication Tester	Rohde & Schwarz	CMD-80	DE29573	869 – 1990 MHz

6.6.5. Test Data

Frequency (MHz)	Measured 99% Occupied Bandwidth (MHz)	Measured 26 dB Emission Bandwidth (MHz)
824.7 - 848.31 MHz band (Cellular Band)		
824.70	1.27	1.36
836.52	1.27	1.35
848.31	1.27	1.35
1850.25 - 1908.75 MHz (PCS Band)		
1851.25	1.27	1.36
1880.00	1.28	1.36
1908.75	1.29	1.37

See the following plots for details.

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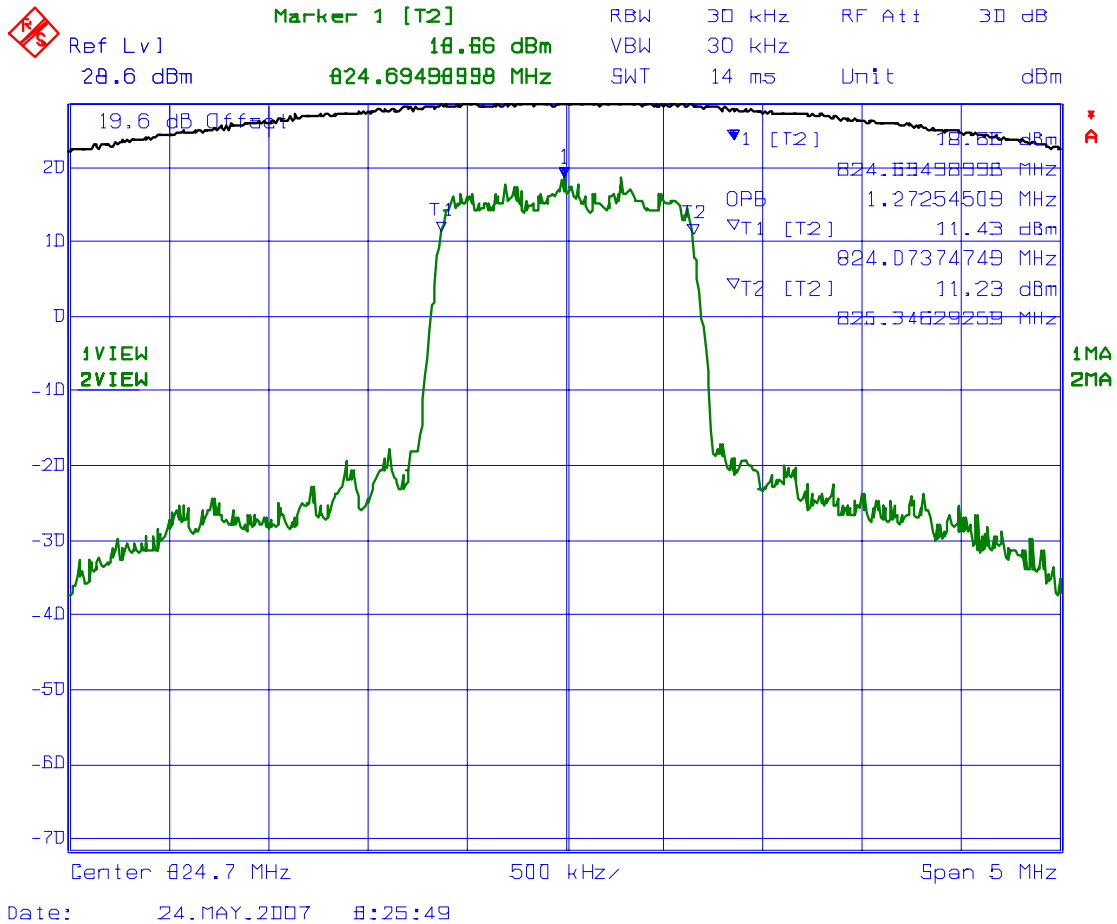
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
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Plot 6.6.5.1 99% Occupied Bandwidth
 Test Frequency 824.70 MHz



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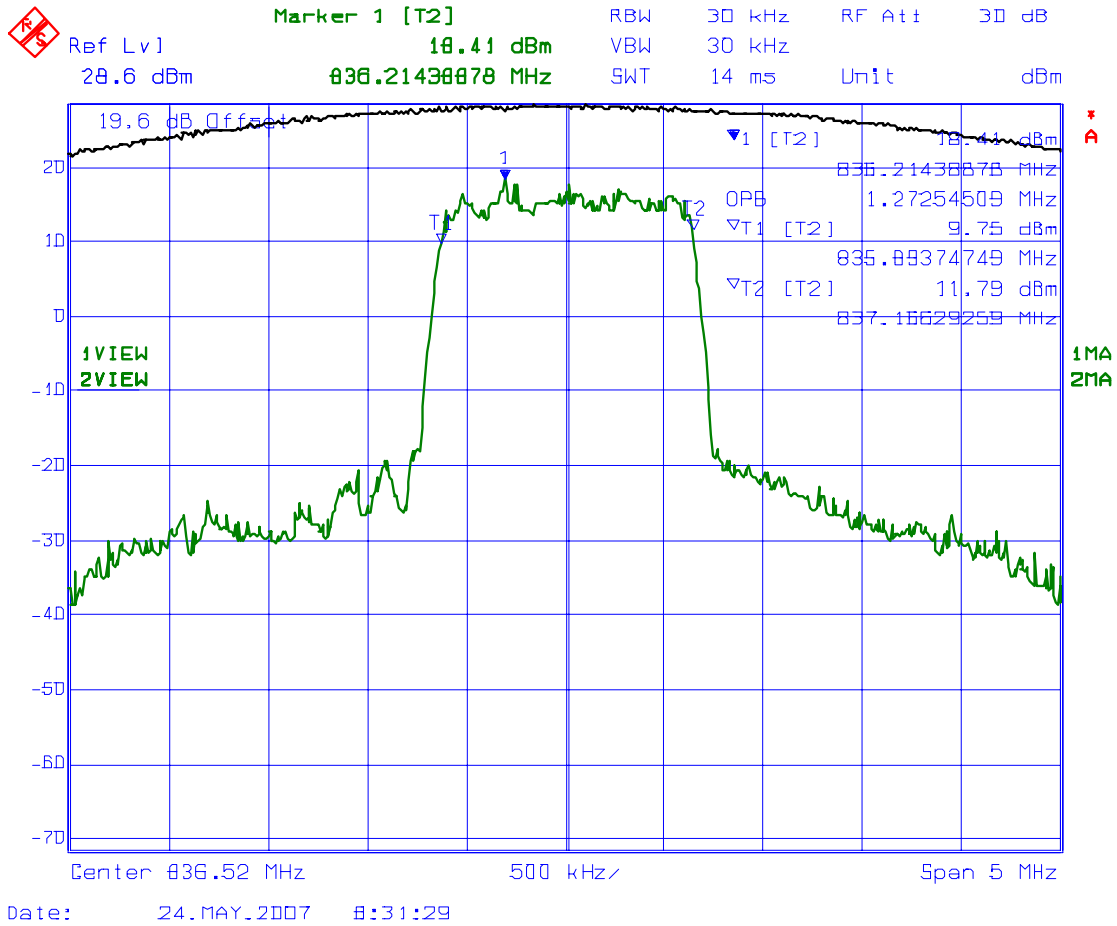
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Plot 6.6.5.2 99% Occupied Bandwidth
 Test Frequency 836.52 MHz



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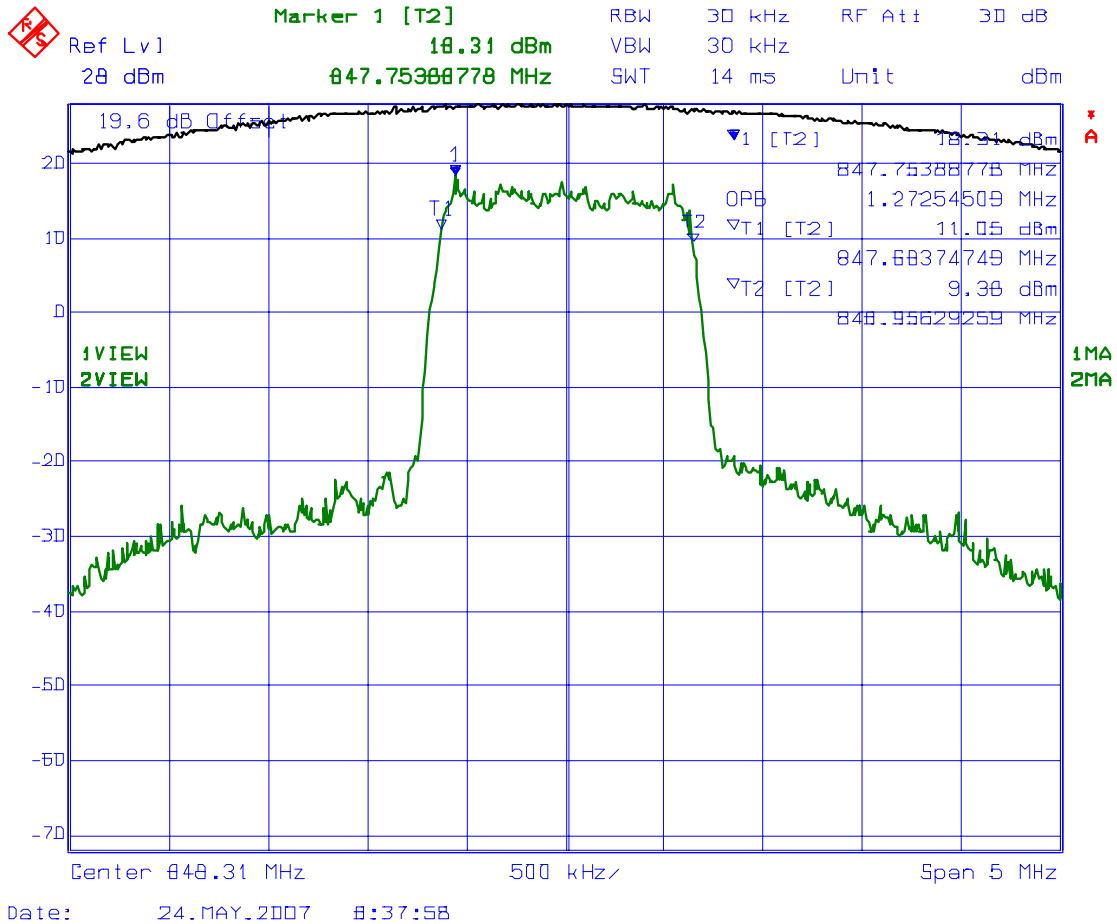
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 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 6.6.5.3 99% Occupied Bandwidth
 Test Frequency 848.31 MHz



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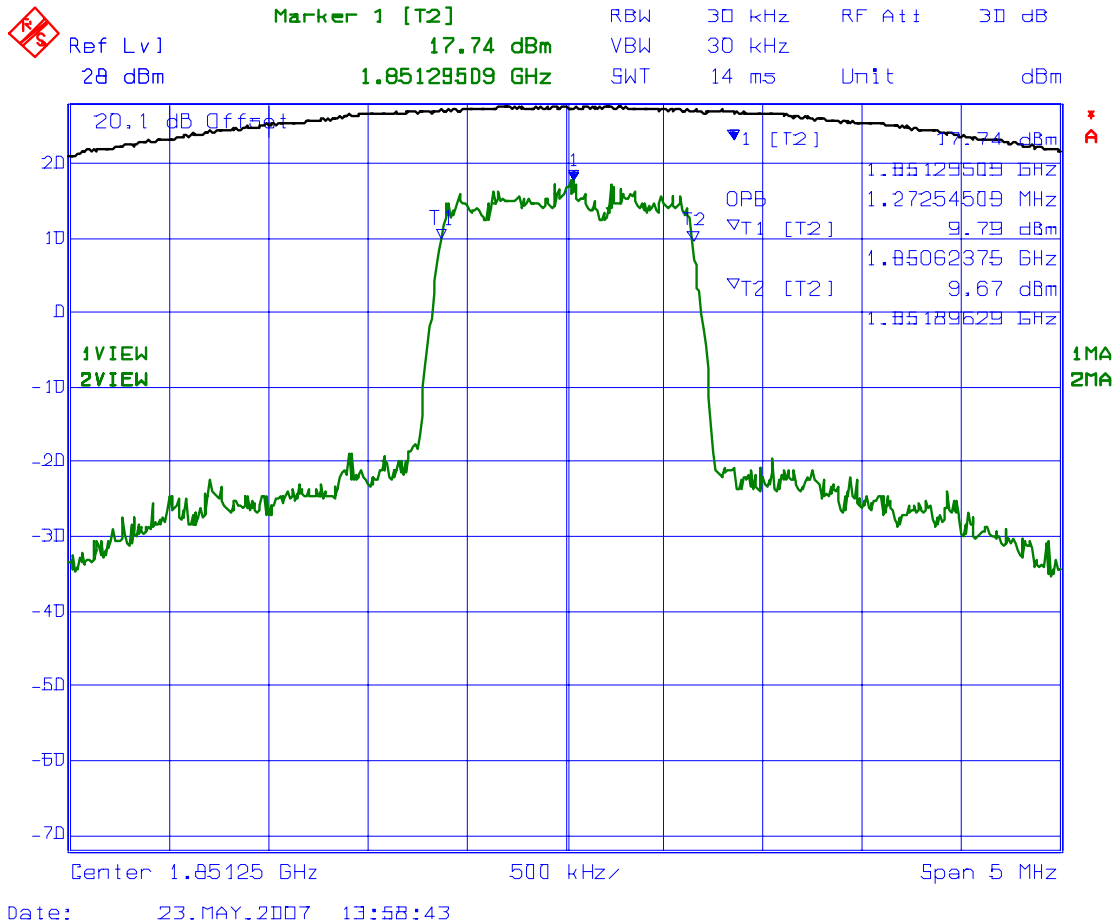
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Plot 6.6.5.4 99% Occupied Bandwidth
 Test Frequency: 1851.25 MHz



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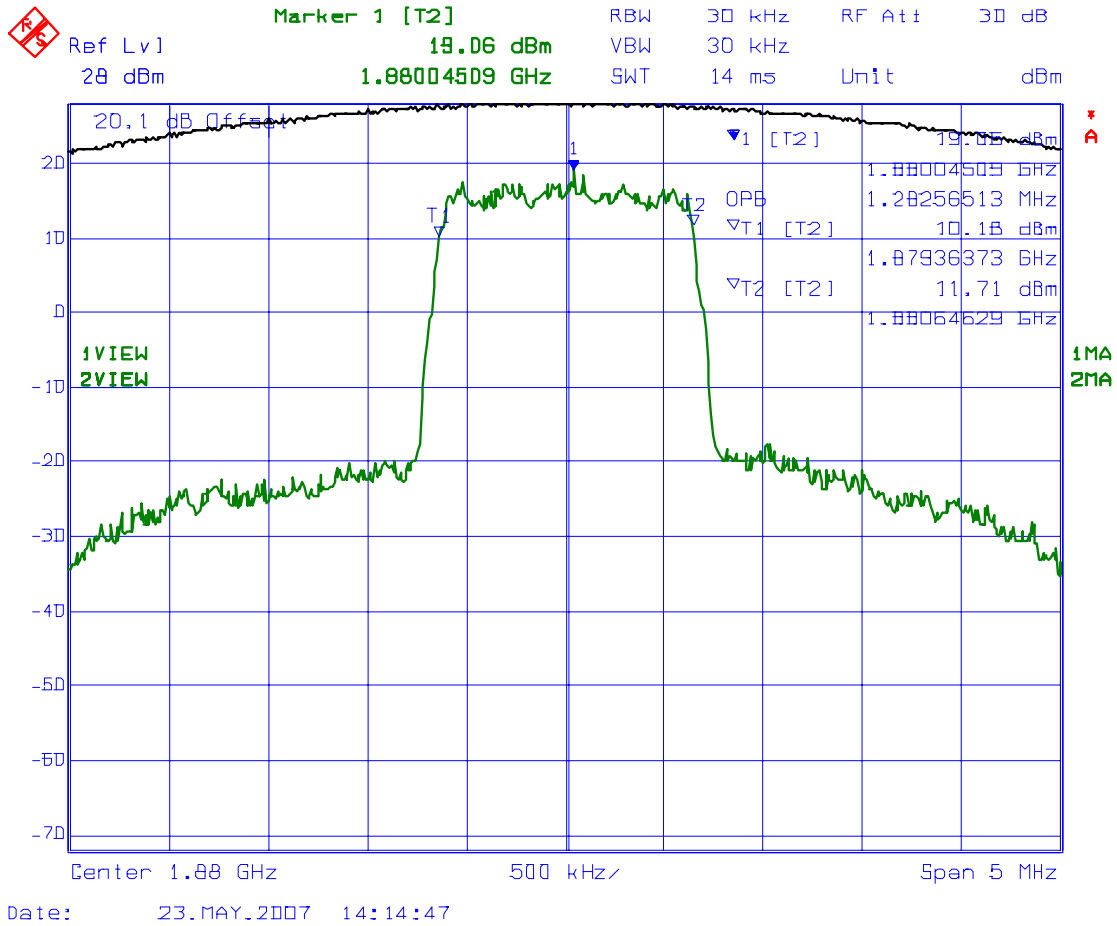
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 6.6.5.5 99% Occupied Bandwidth
 Test Frequency: 1880.00 MHz



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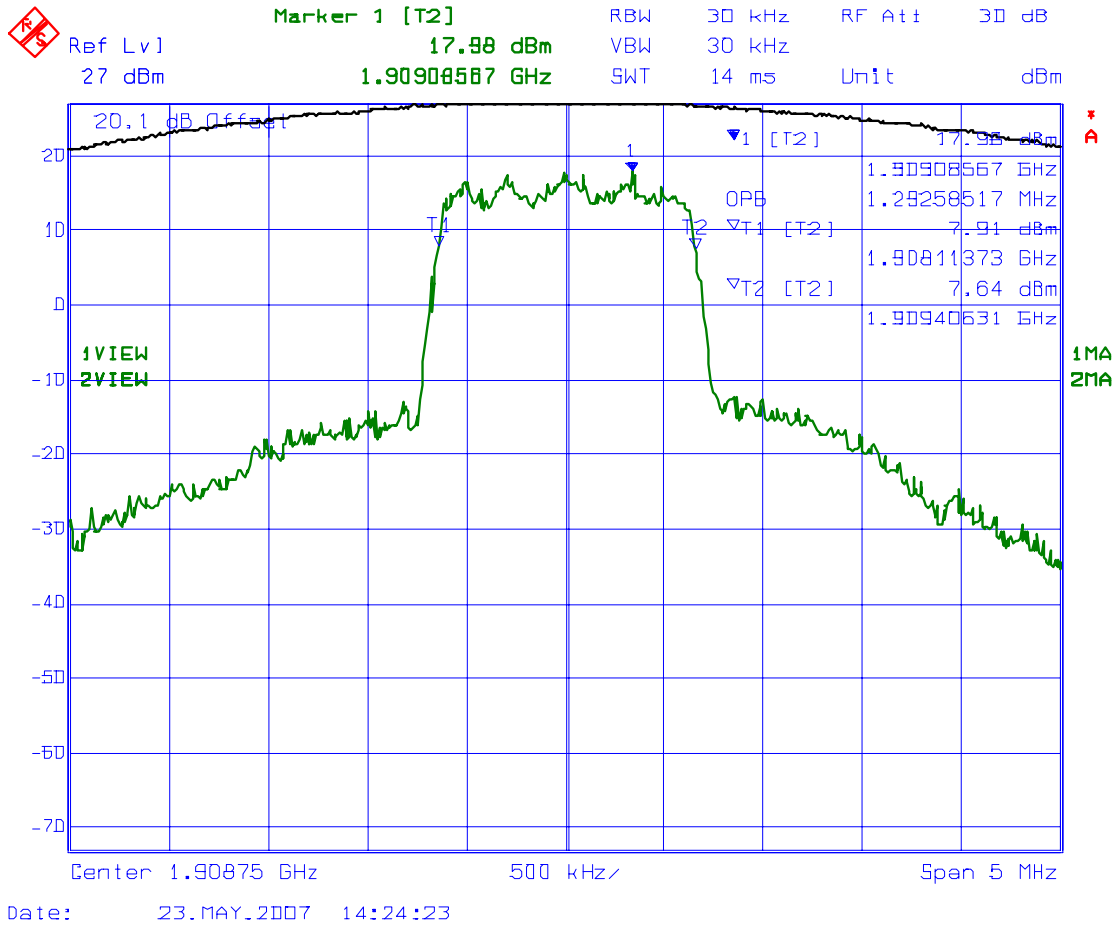
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 6.6.5.6 99% Occupied Bandwidth
 Test Frequency: 1908.75 MHz



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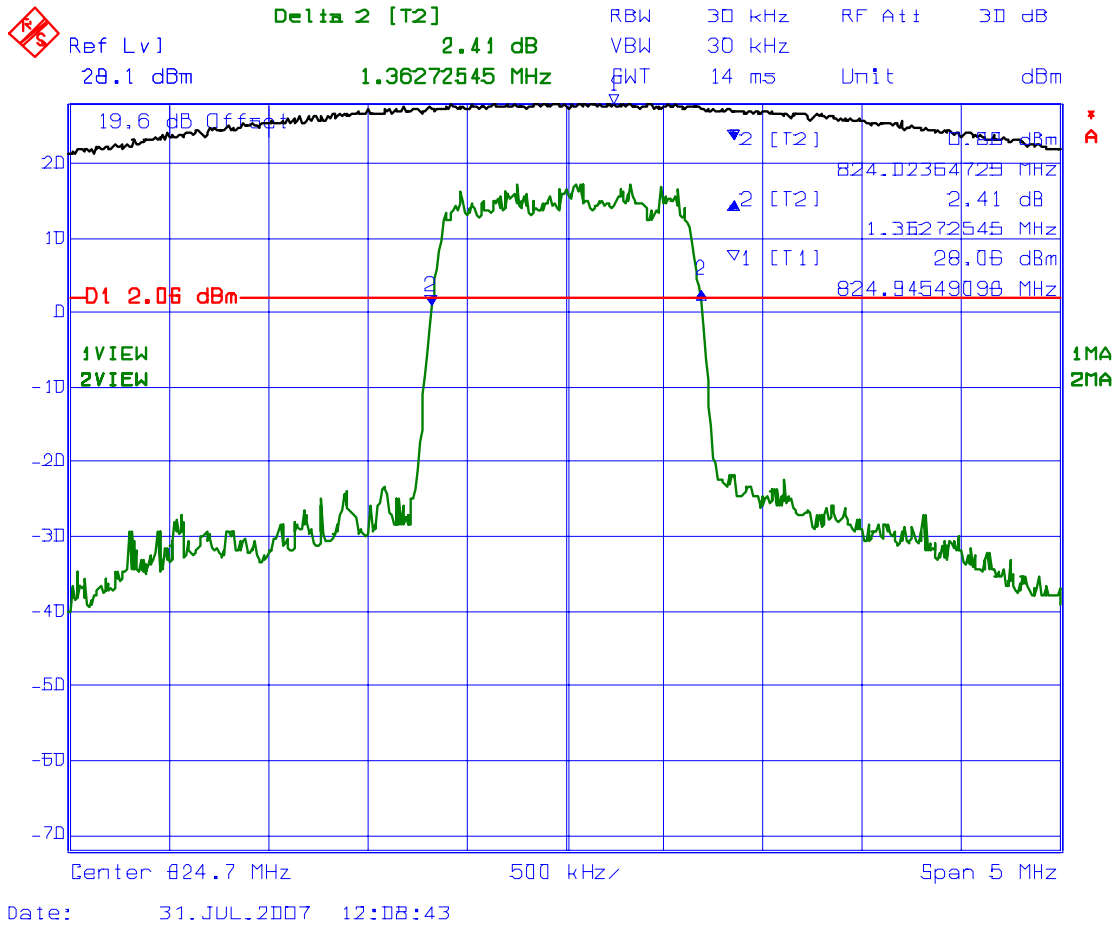
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Plot 6.6.5.7 26 dB Emission Bandwidth
 Test Frequency 824.70 MHz



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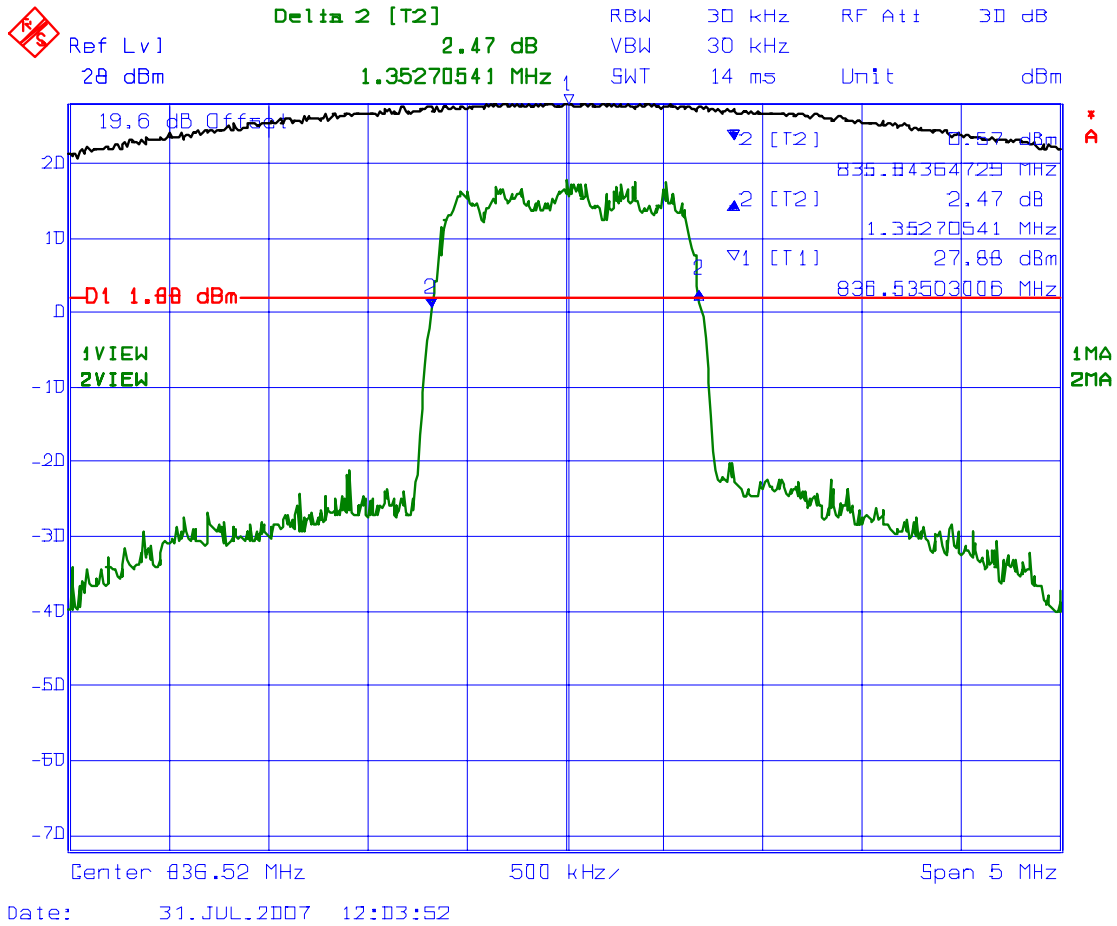
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

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Plot 6.6.5.8 26 dB Emission Bandwidth
 Test Frequency 836.52 MHz



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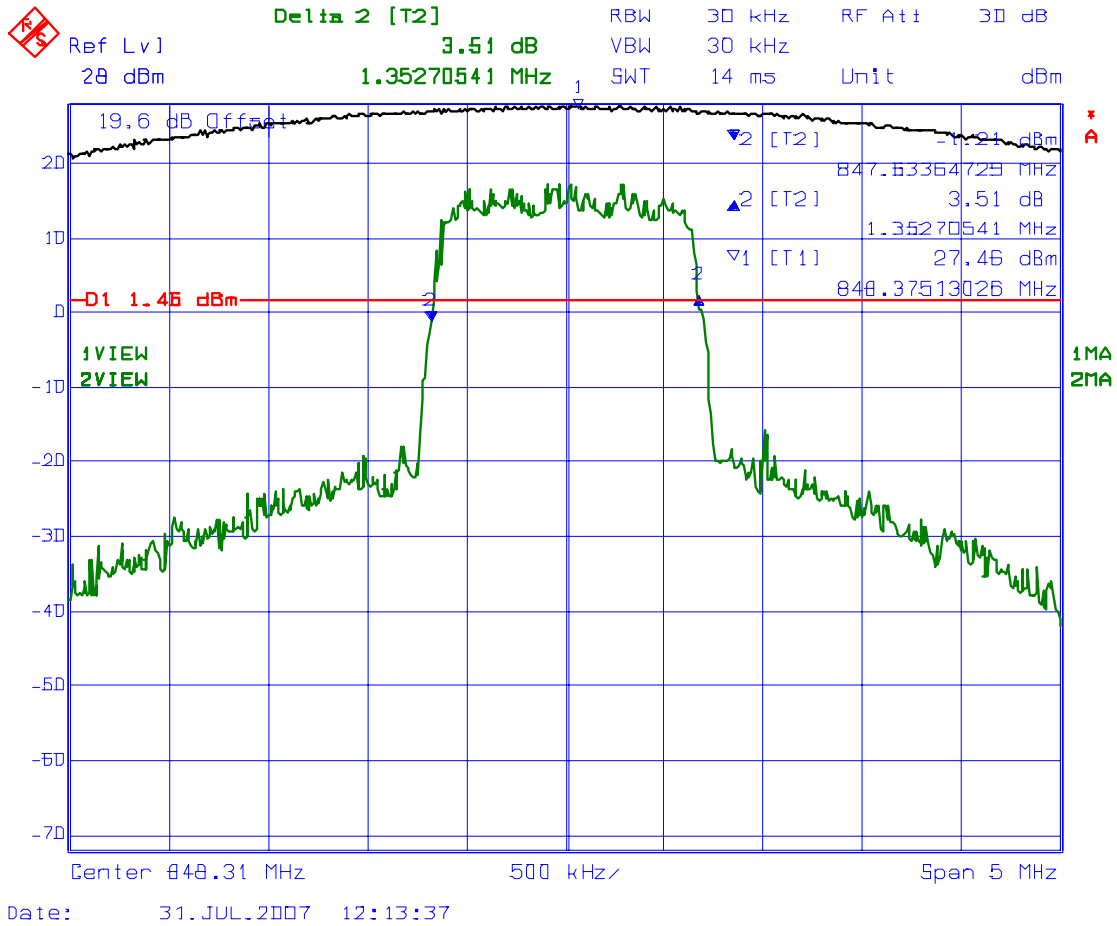
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

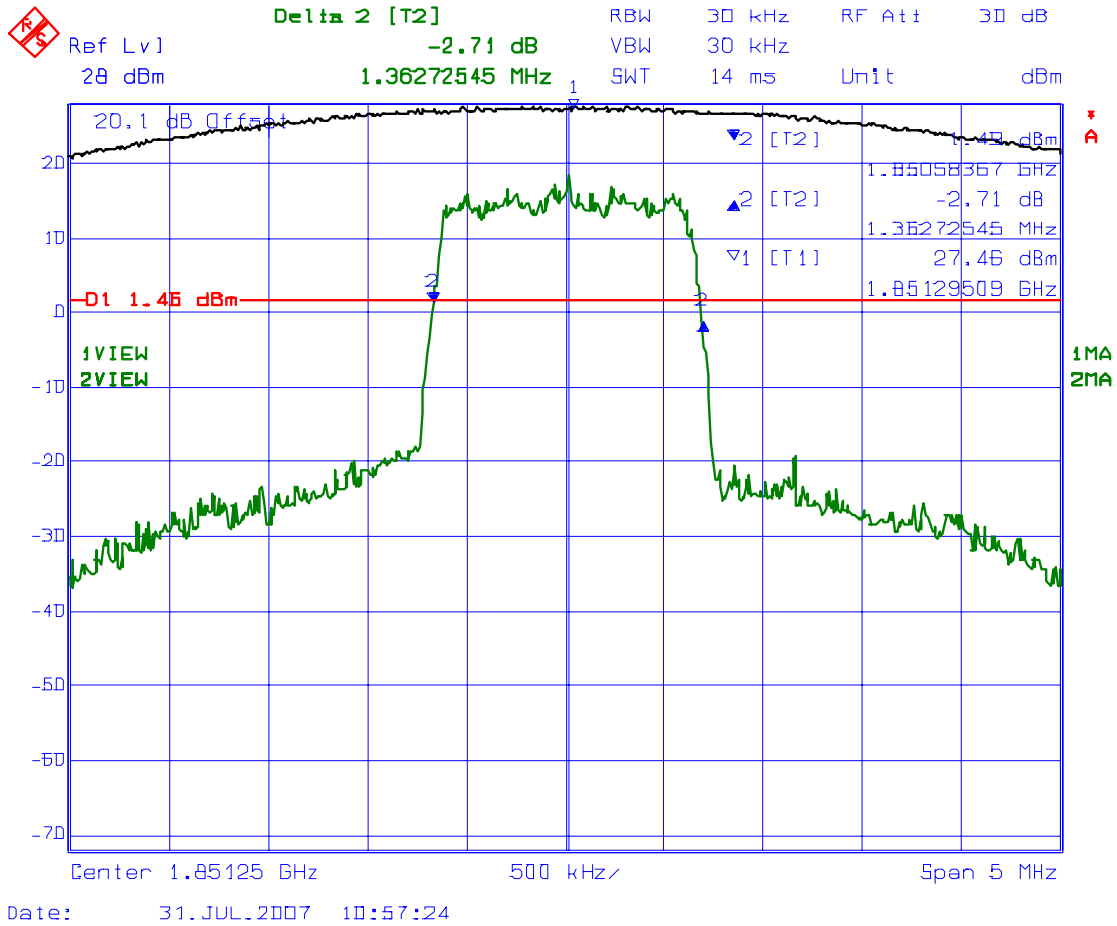
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Plot 6.6.5.9 26 dB Emission Bandwidth
 Test Frequency 848.31 MHz



Plot 6.6.5.10 26 dB Emission Bandwidth
 Test Frequency: 1851.25 MHz



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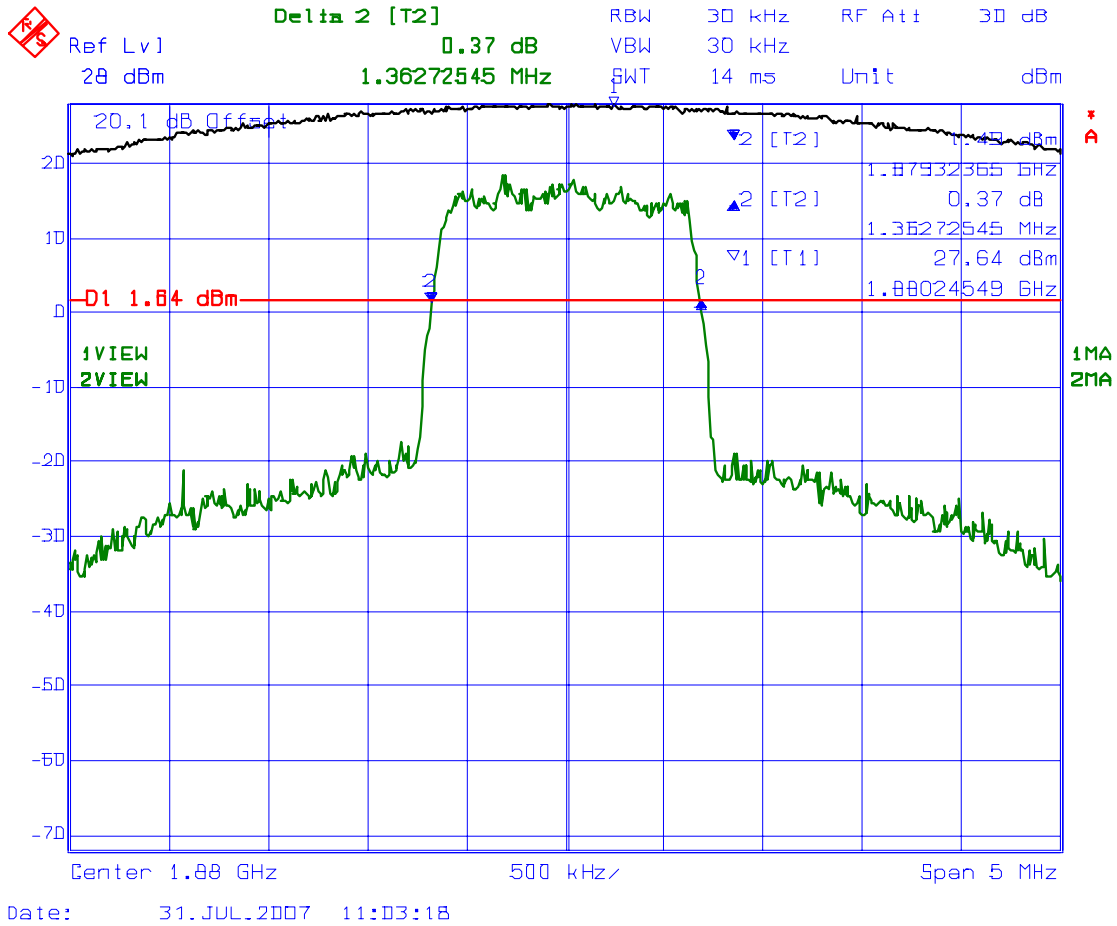
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 6.6.5.11 26 dB Emission Bandwidth
 Test Frequency: 1880.00 MHz



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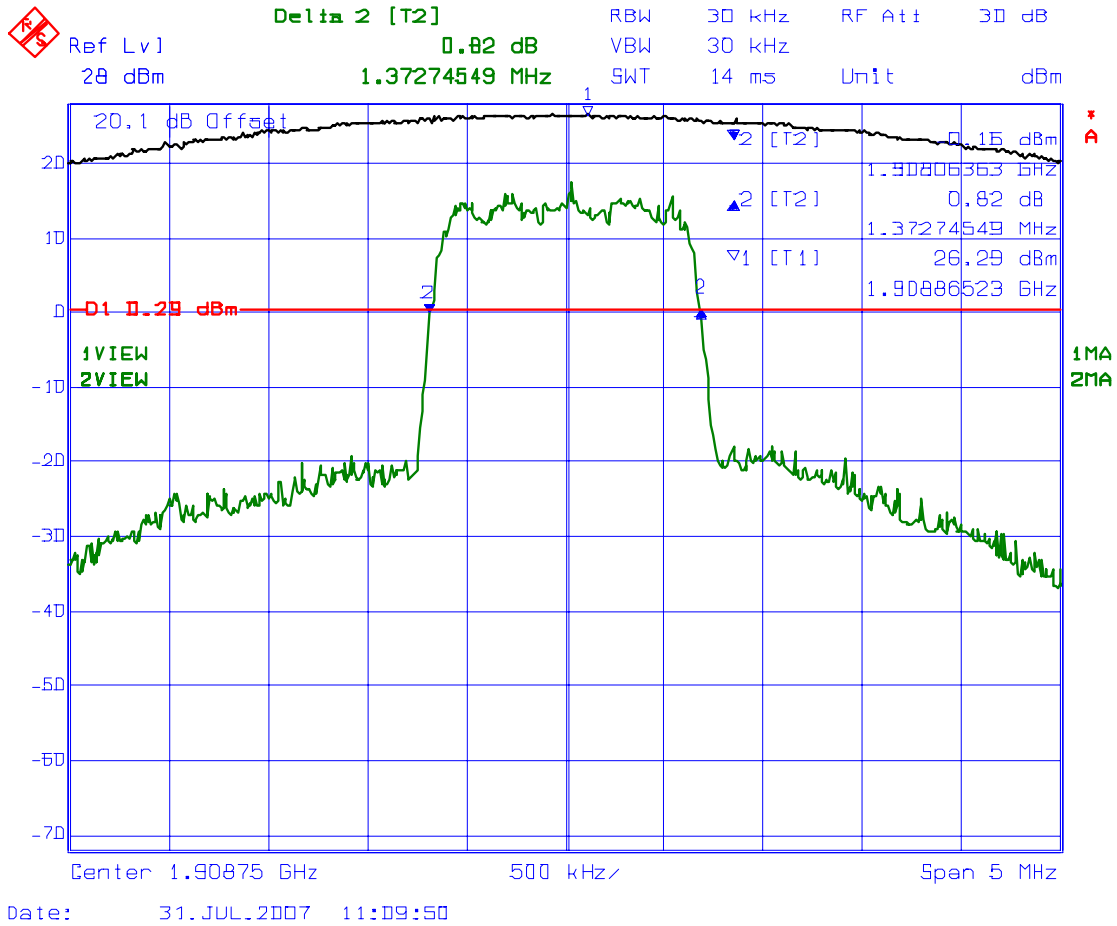
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 6.6.5.12 26 dB Emission Bandwidth
 Test Frequency: 1908.75 MHz



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File #: MIS-061FCC22H24E

July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.7. SPURIOUS EMISSIONS AT ANTENNA TERMINALS [§§ 2.1051 22.917 & 24.238]

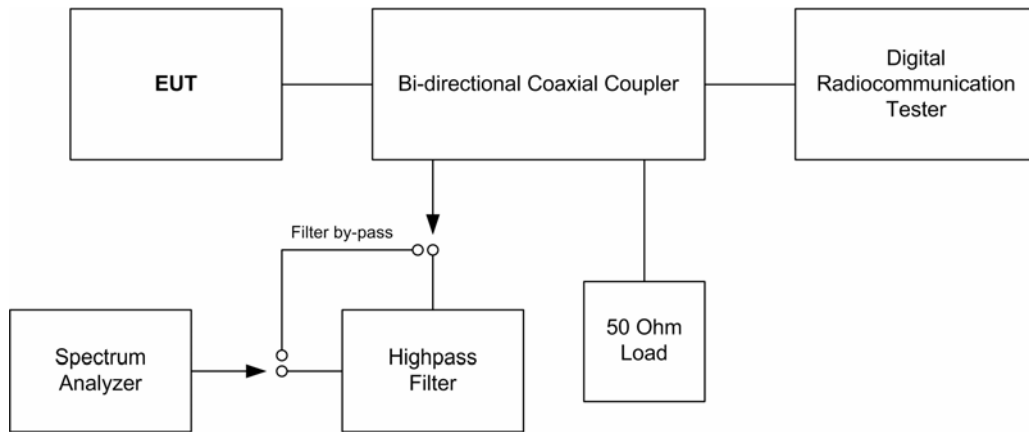
6.7.1. Limit(s)

§§22.917 (a) & 24.238 (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43+10\log(P)$ dB (P = transmitter conducted power in watts).

6.7.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004 and TIA-603-C

6.7.3. Test Arrangement



6.7.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rhode & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz
Bi-Directional Coaxial Coupler	Hewlett-Packard	11692D	1212A03620	2 – 18 GHz
Bi-Directional Coaxial Coupler	Narda	3022	75262	1.0 – 4.0 GHz
Bi-Directional Coaxial Coupler	Narda	3020	35482	50 – 1000 MHz
Digital Radiocommunication Tester	Rohde & Schwarz	CMD-80	DE29573	869 – 1990 MHz
Highpass Filter	K & L Microwave	11SH10-1500/T8000-O/O	2	Cut Off at 1.5 GHz
Highpass Filter	K & L Microwave	11SH10-3000/T18000-O/O	4	Cut Off at 2.7 GHz

6.7.5. Test Data

6.7.5.1. Band-Edge RF Conducted Emissions

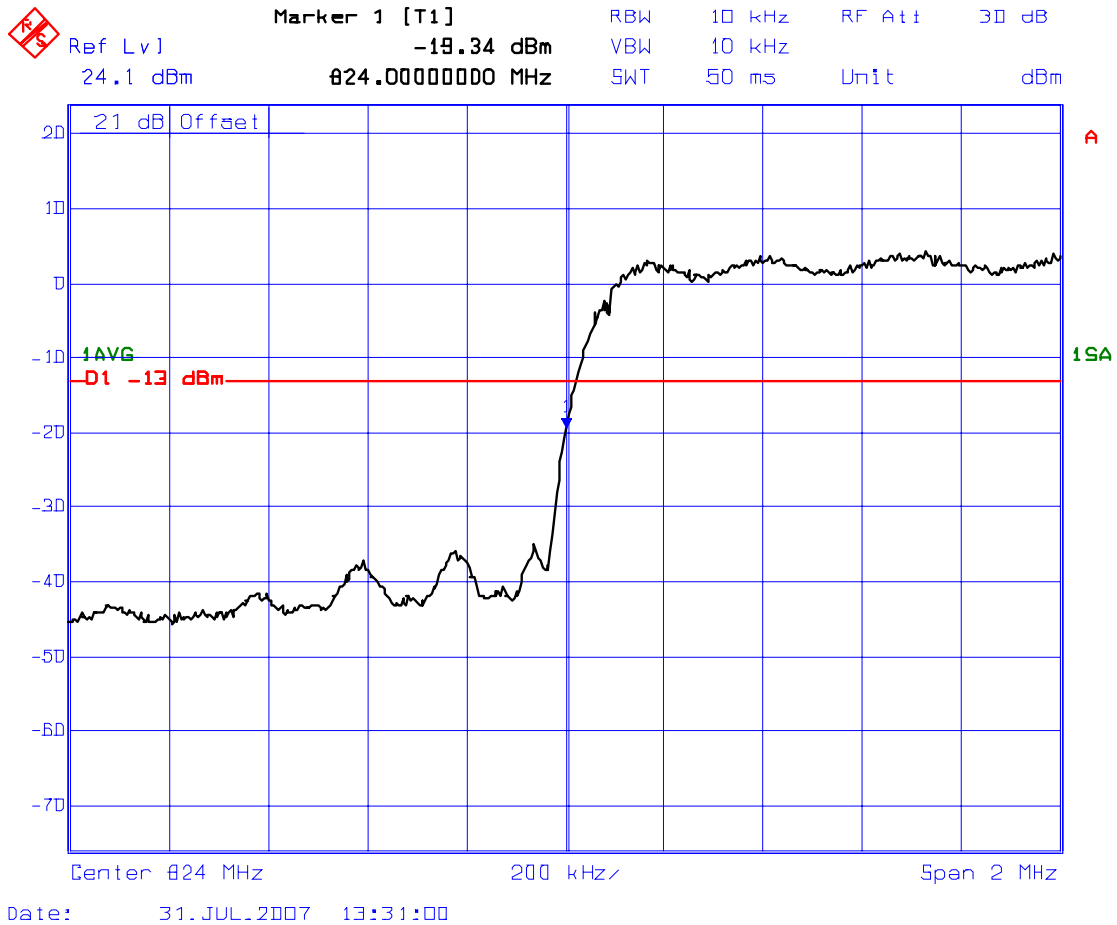
Remarks:

26 dB EBW = 1.37 MHz

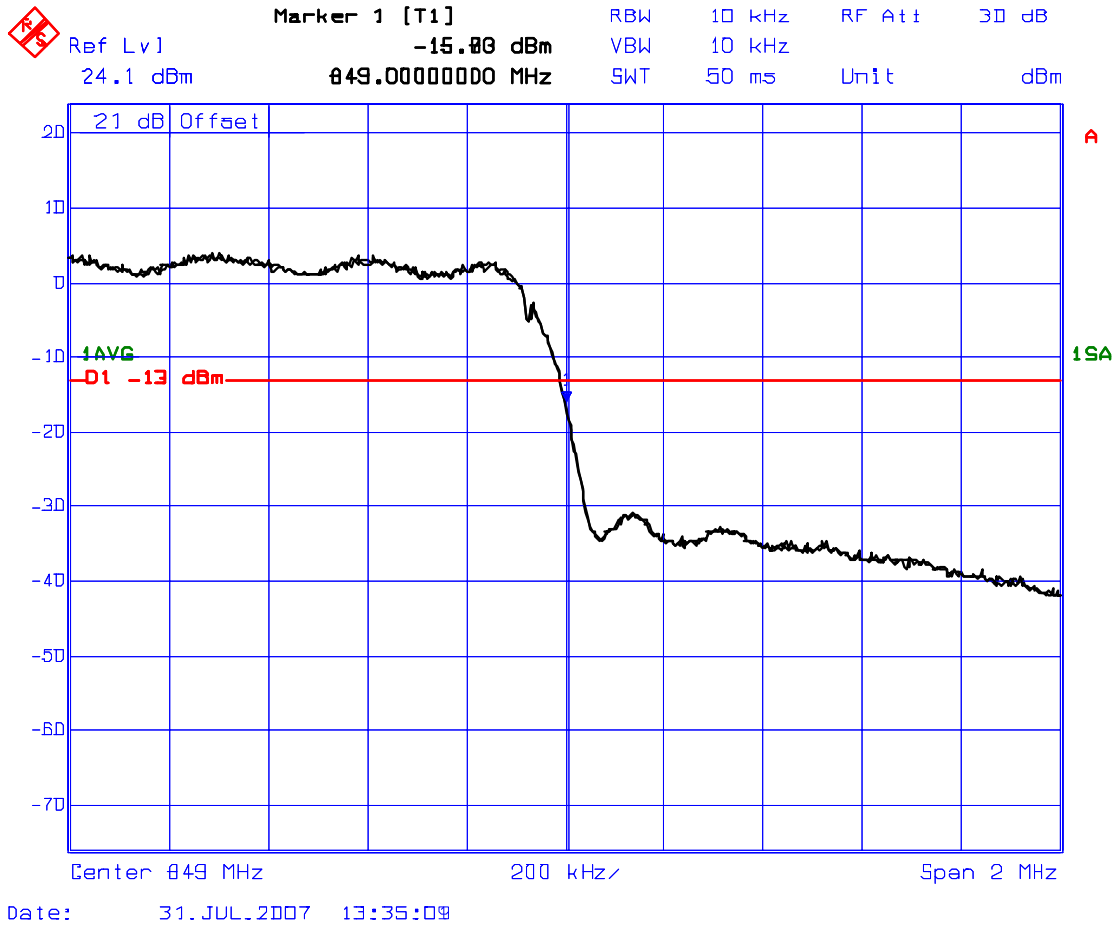
The analyzer setting of RBW = 10kHz and VBW = 10kHz was used with power correction factor of 10 Log (1% of the 26dB / 10kHz) = 10 Log (13.7 kHz / 10 kHz) ~ 1.4 dB and sample average 100 sweeps.

Offset: for cellular band = 19.6 dB (Bi-Directional Coaxial Coupler) + 1.4 dB (correction factor) = 21 dB
for PCS band = 20.1 dB (Bi-Directional Coaxial Coupler) + 1.4 dB (correction factor) = 21.5 dB

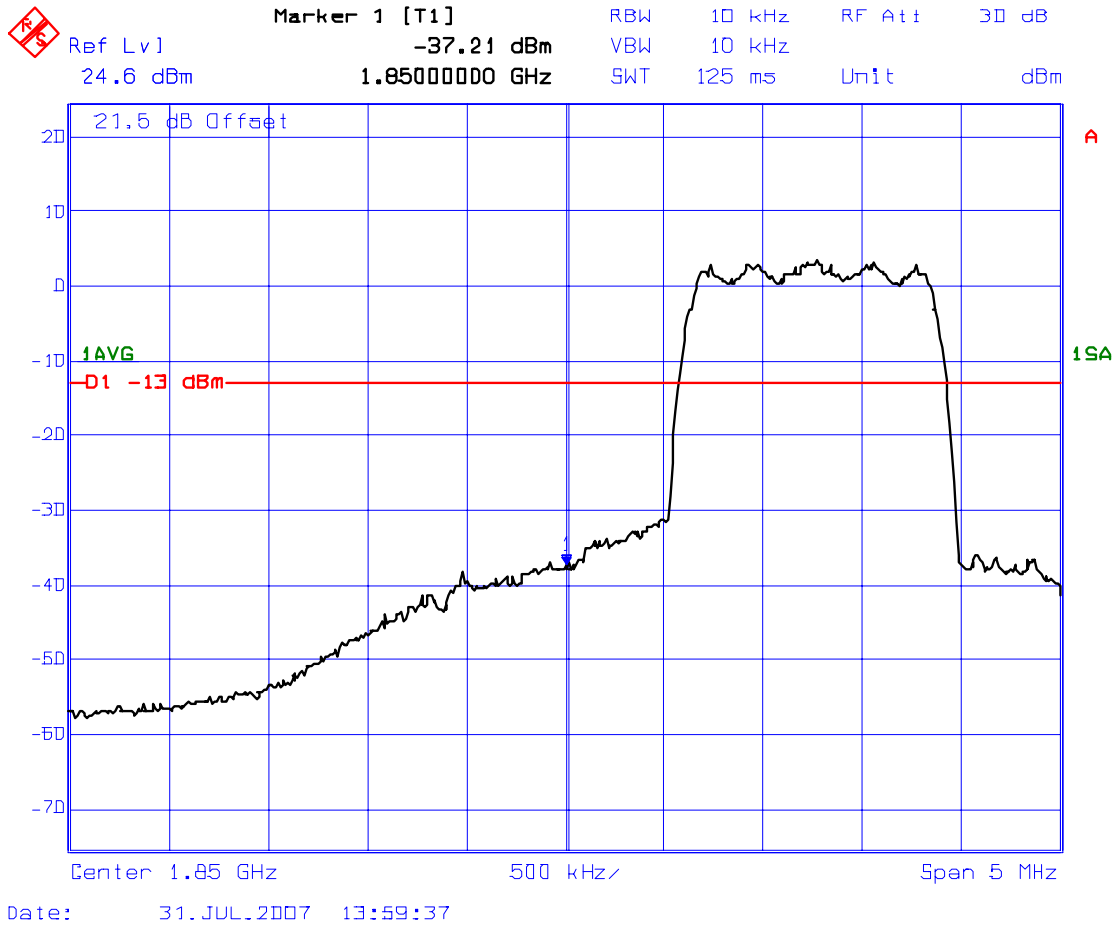
Plot 6.7.5.1.1 Band-Edge RF Conducted Emissions (824.7 - 848.31 MHz Band)
Low End of Frequency Band



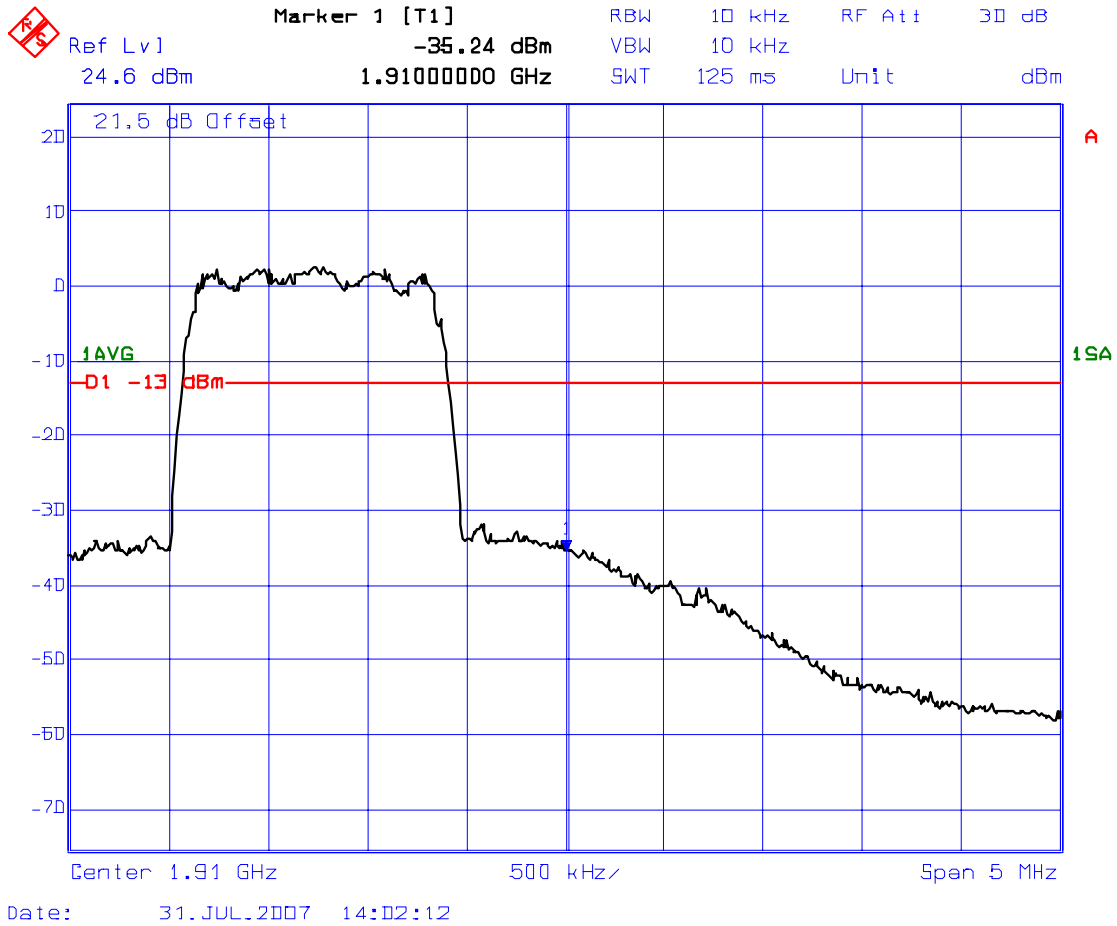
Plot 6.7.5.1.2 Band-Edge RF Conducted Emissions (824.7 - 848.31 MHz Band)
High End of Frequency Band, Sample Averaging in 100 Sweeps.



Plot 6.7.5.1.3 Band-Edge RF Conducted Emissions (1850.25 - 1908.75 MHz Band)
Low End of Frequency Band, Sample Averaging in 100 Sweeps

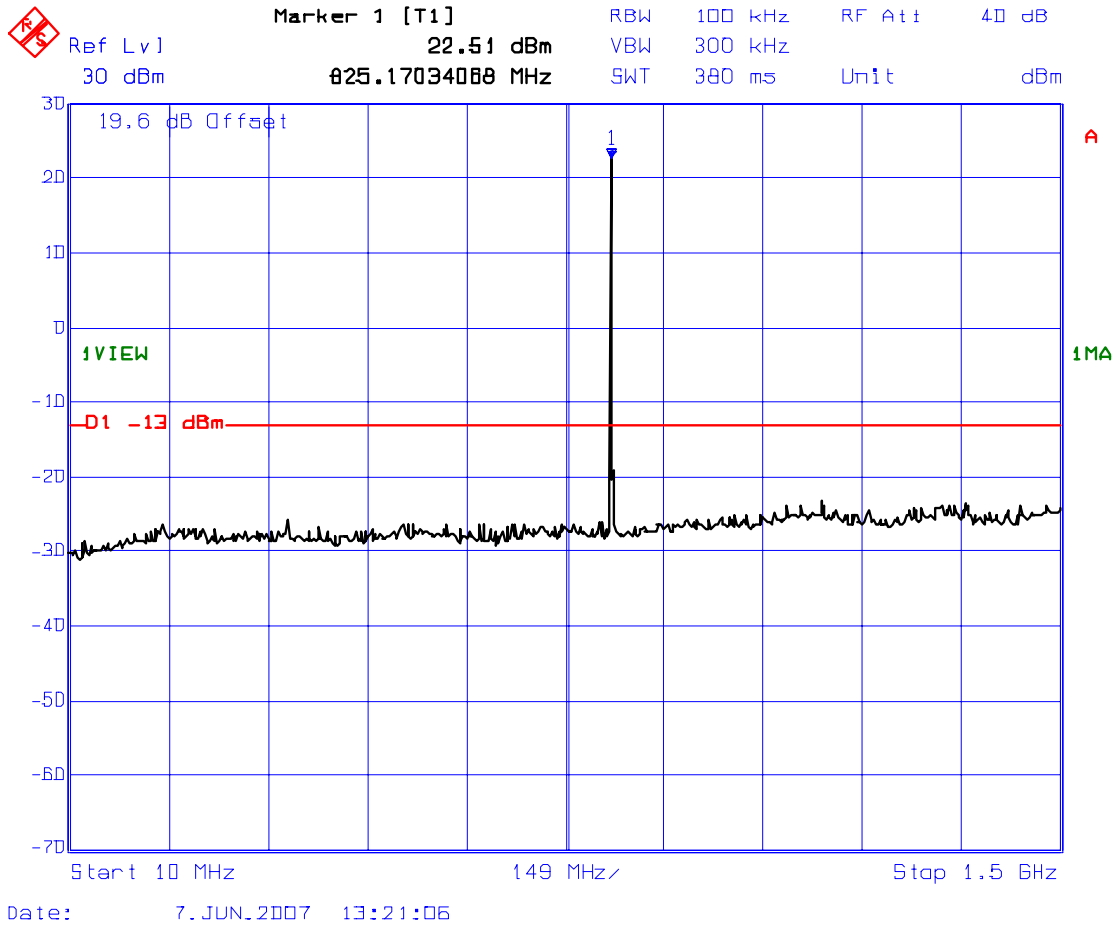


Plot 6.7.5.1.4 Band-Edge RF Conducted Emissions (1850.25 - 1908.75 MHz Band)
High End of Frequency Band, Sample Averaging in 100 Sweeps

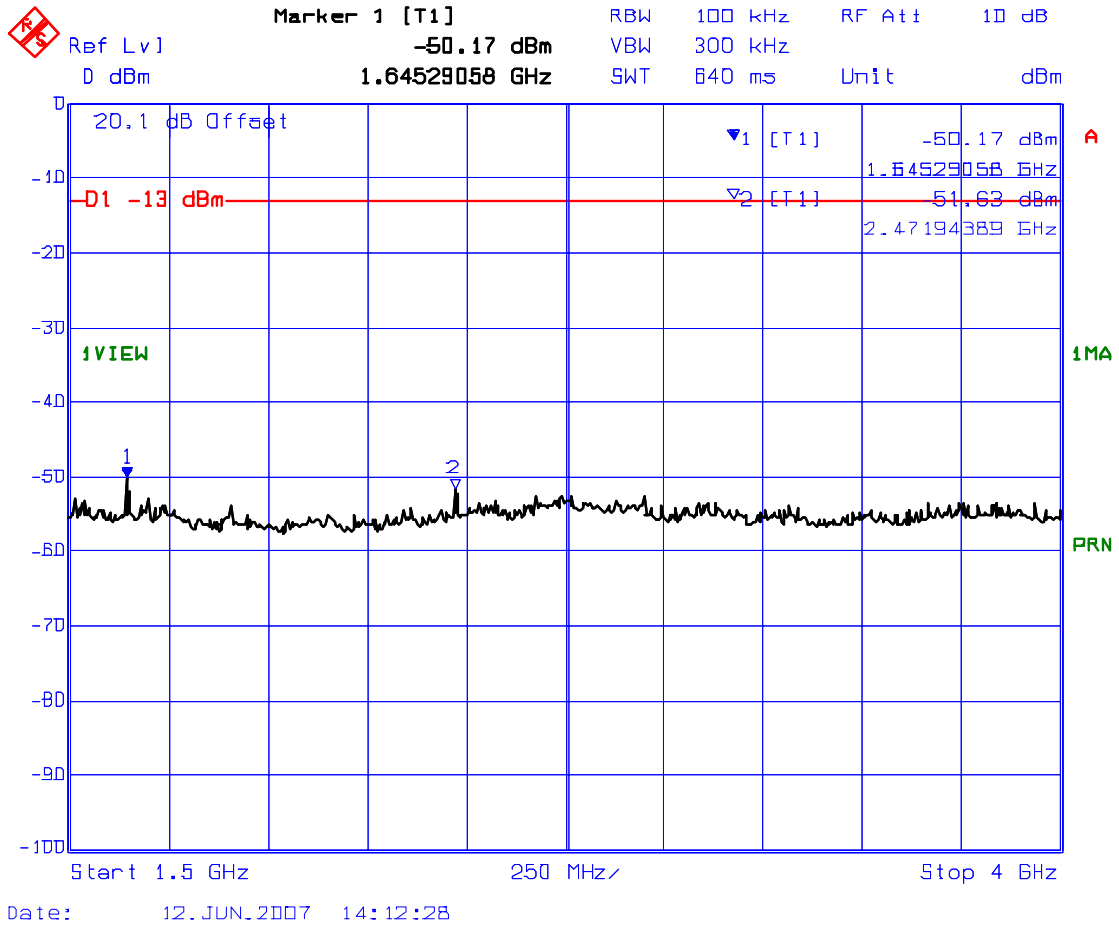


6.7.5.2. Spurious RF Conducted Emissions

Plot 6.7.5.2.1(a) Spurious RF Conducted Emissions
Test Frequency: 824.70 MHz



Plot 6.7.5.2.1(b) Spurious RF Conducted Emissions
 Test Frequency: 824.70 MHz



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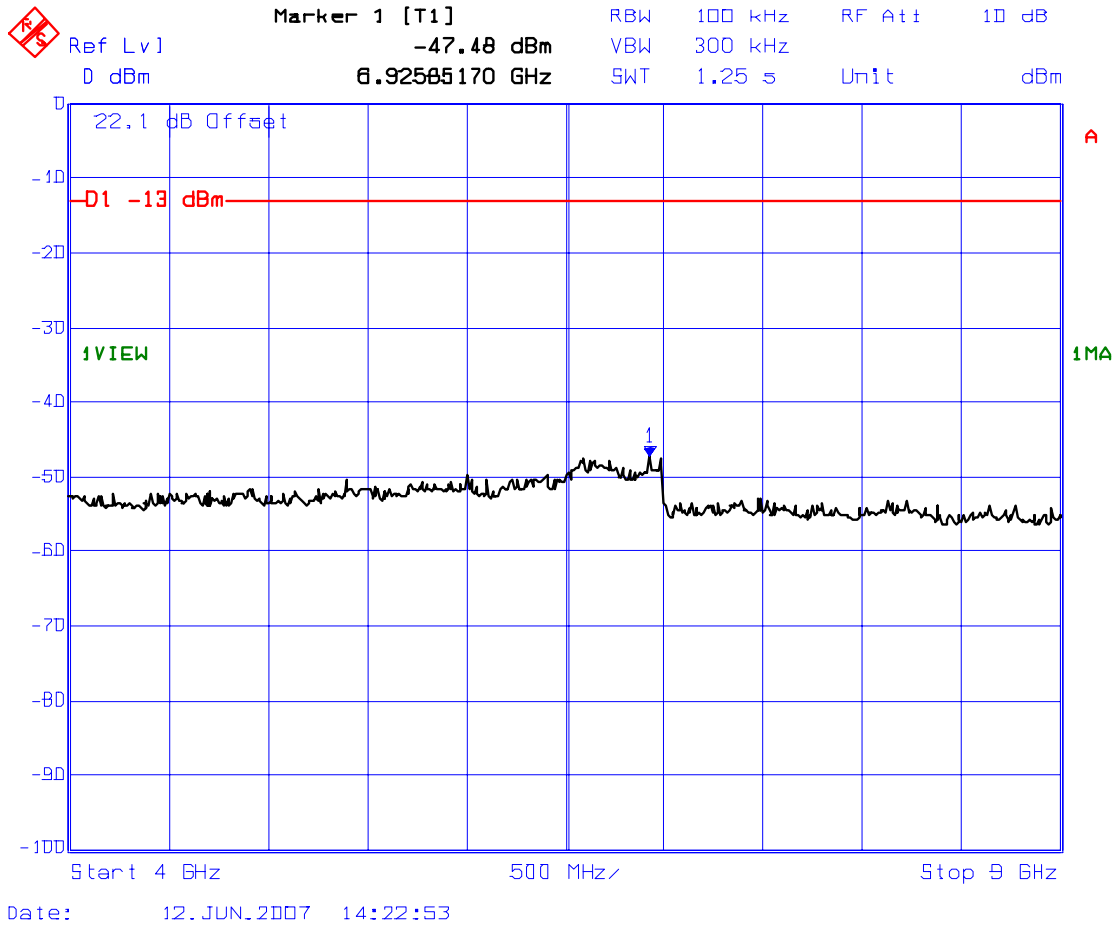
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

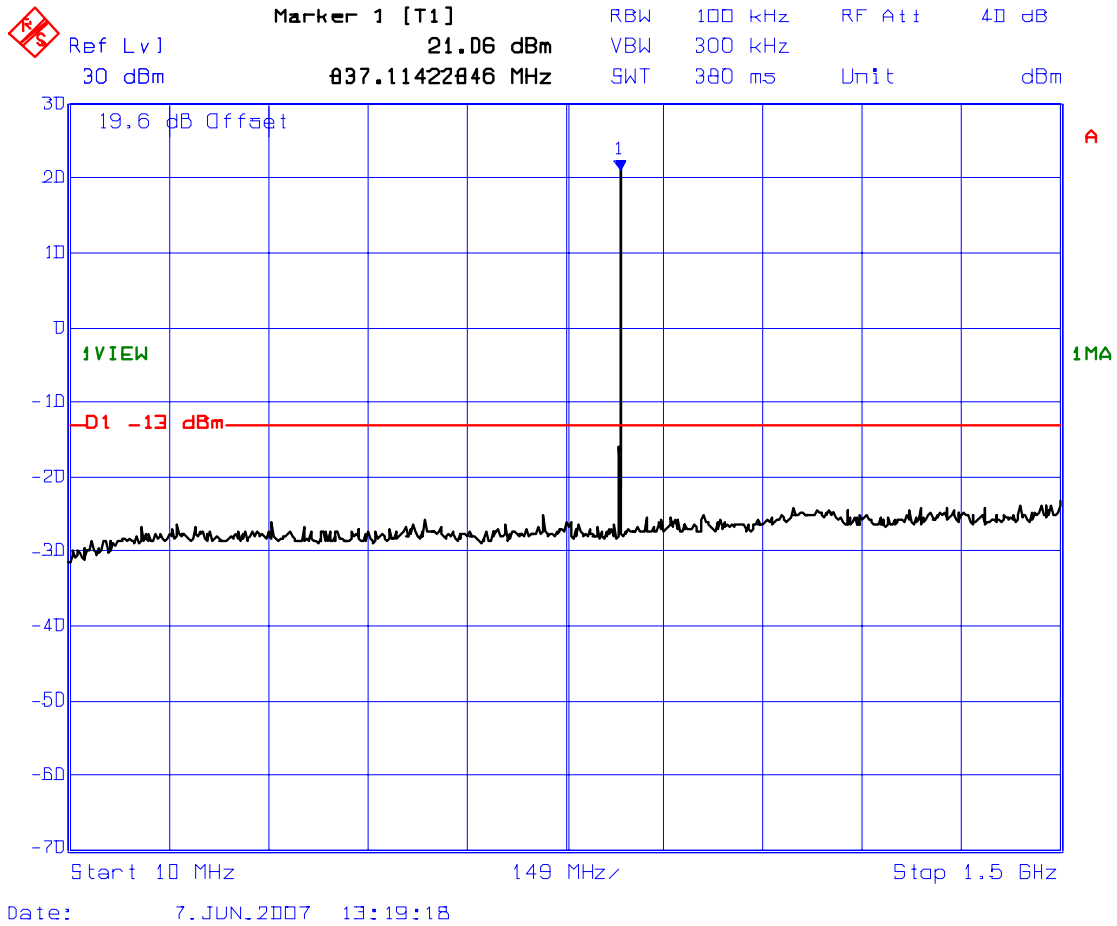
July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 6.7.5.2.1(c) Spurious RF Conducted Emissions
Test Frequency: 824.70 MHz



Plot 6.7.5.2(a) Spurious RF Conducted Emissions
Test Frequency: 836.52 MHz



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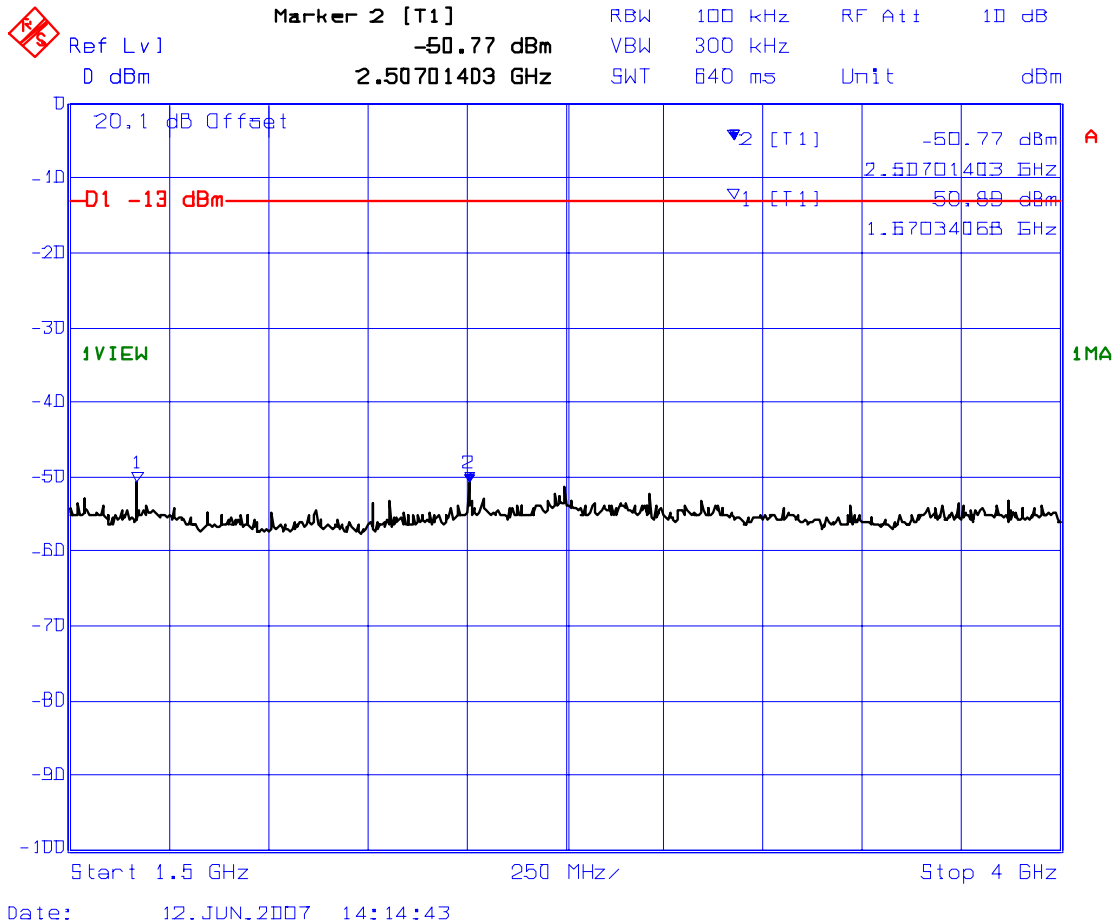
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

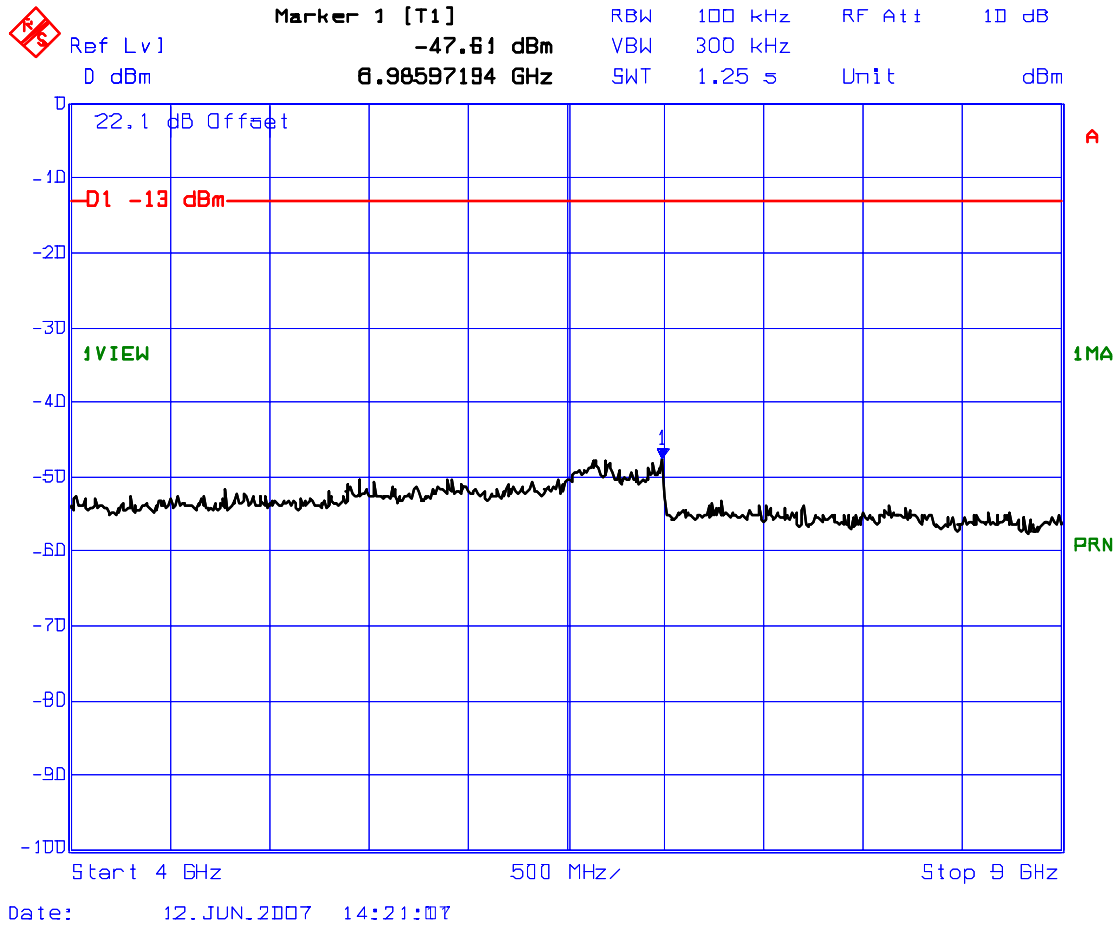
July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

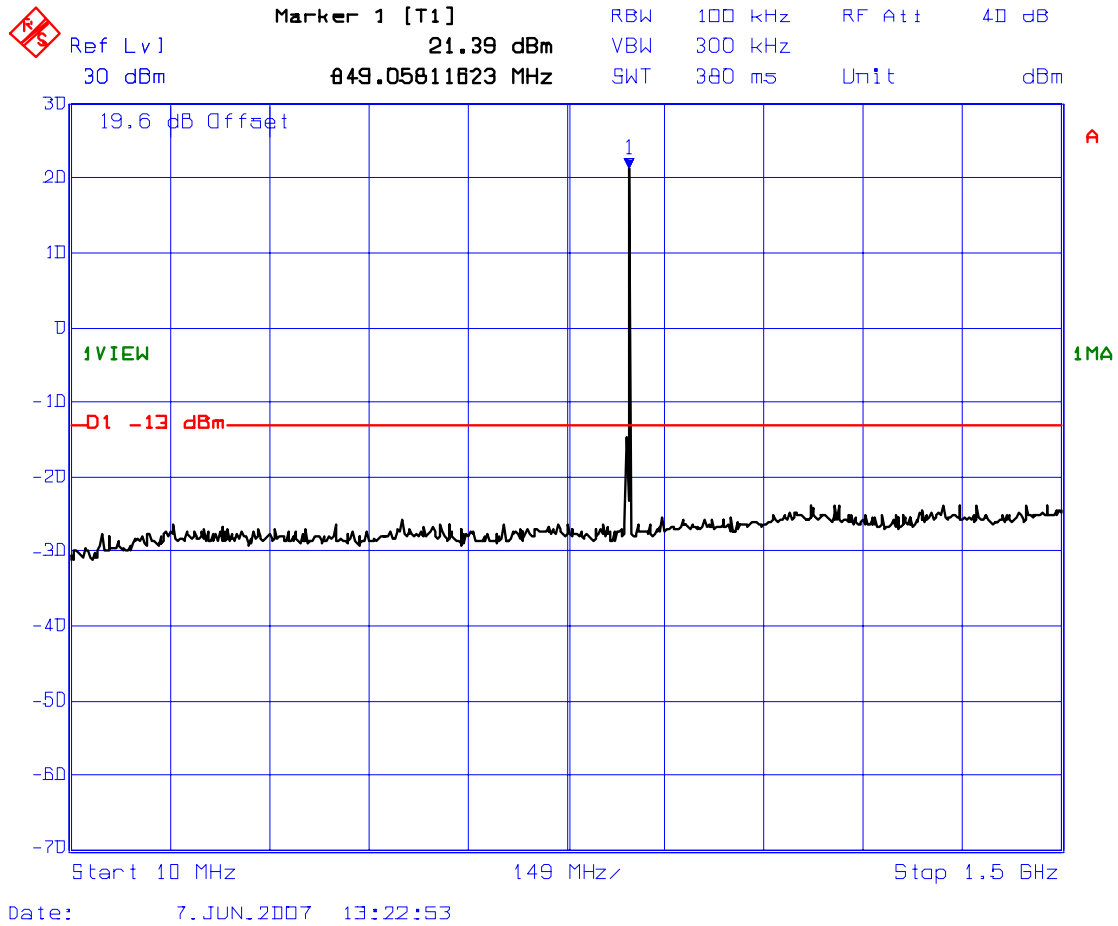
Plot 6.7.5.2.2(b) Spurious RF Conducted Emissions
 Test Frequency: 836.52 MHz



Plot 6.7.5.2.2(c) Spurious RF Conducted Emissions
Test Frequency: 836.52 MHz



Plot 6.7.5.2.3(a) Spurious RF Conducted Emissions
Test Frequency: 848.31 MHz



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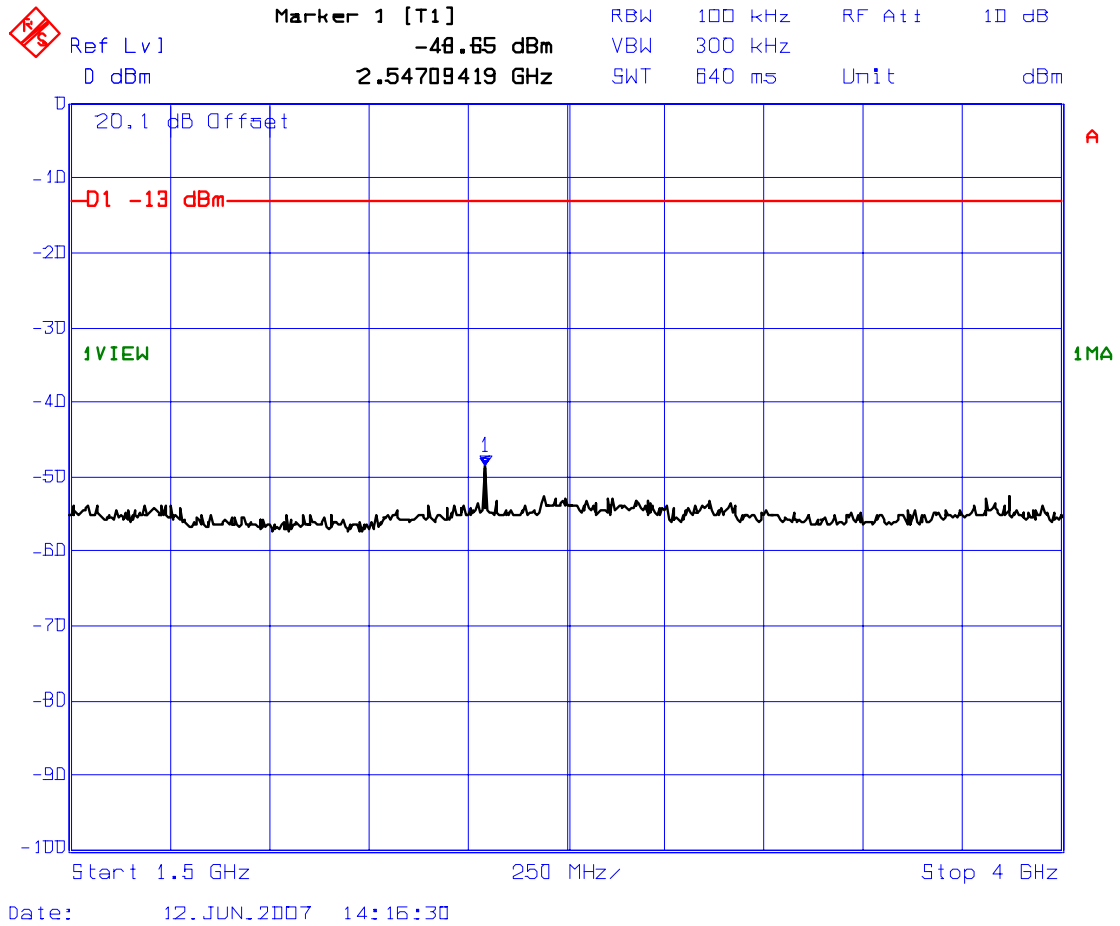
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

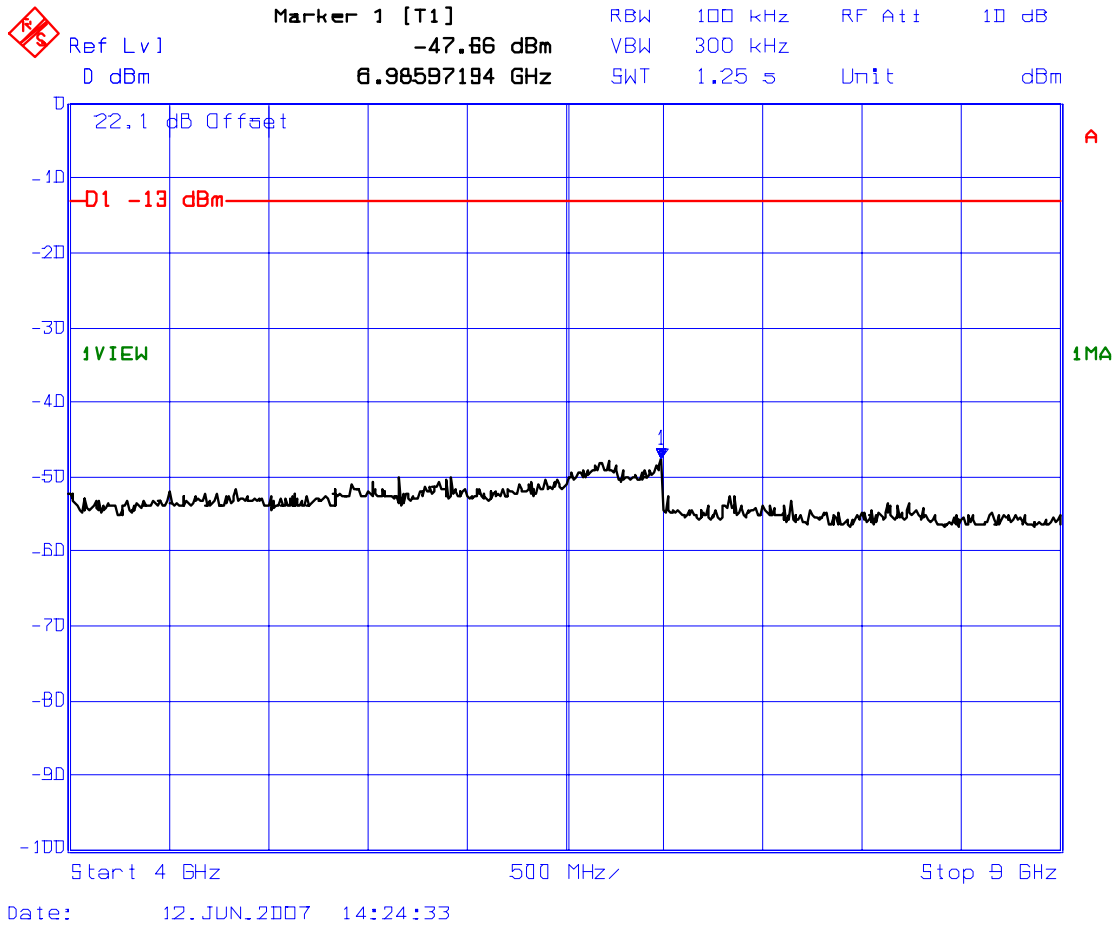
July 31, 2007

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Plot 6.7.5.2.3(b) Spurious RF Conducted Emissions
Test Frequency: 848.31 MHz



Plot 6.7.5.2.3(c) Spurious RF Conducted Emissions
Test Frequency: 848.31 MHz



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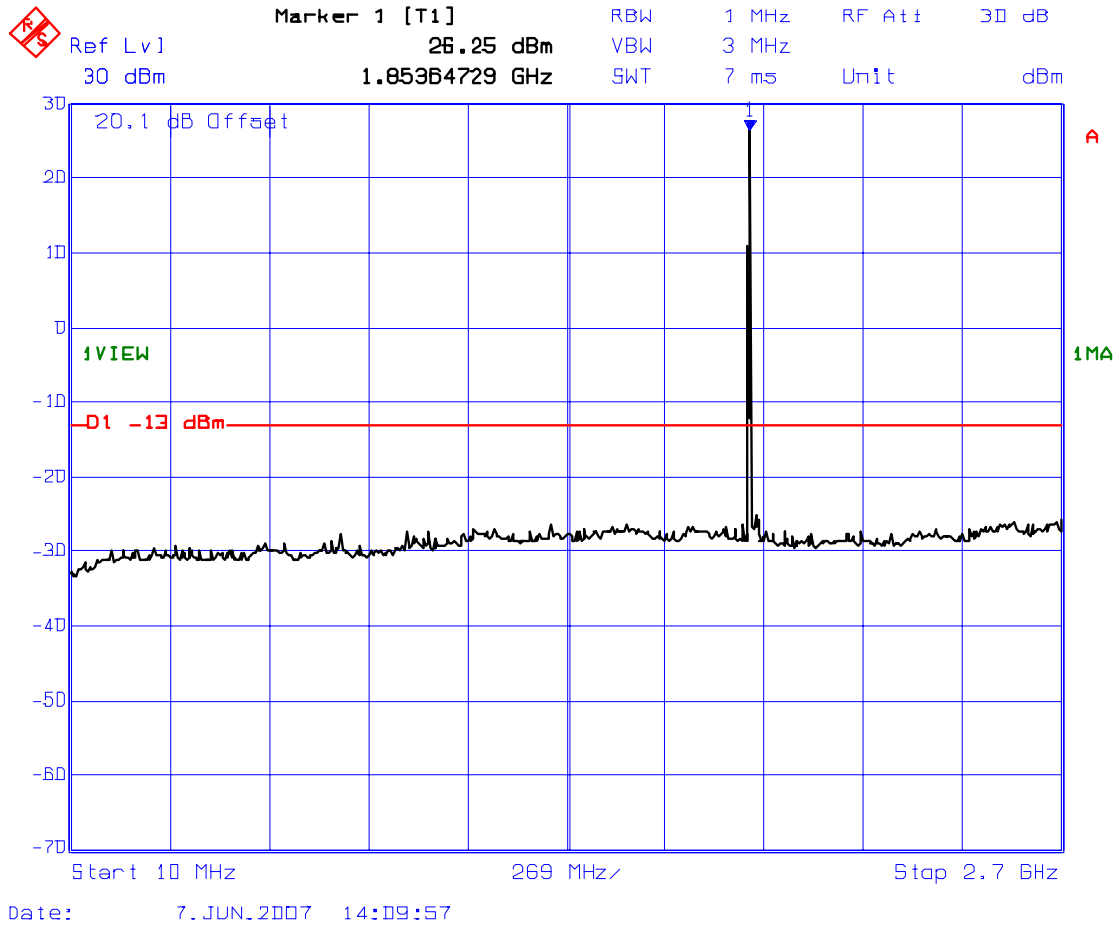
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

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Plot 6.7.5.2.4(a) Spurious RF Conducted Emissions
Test Frequency: 1851.25 MHz



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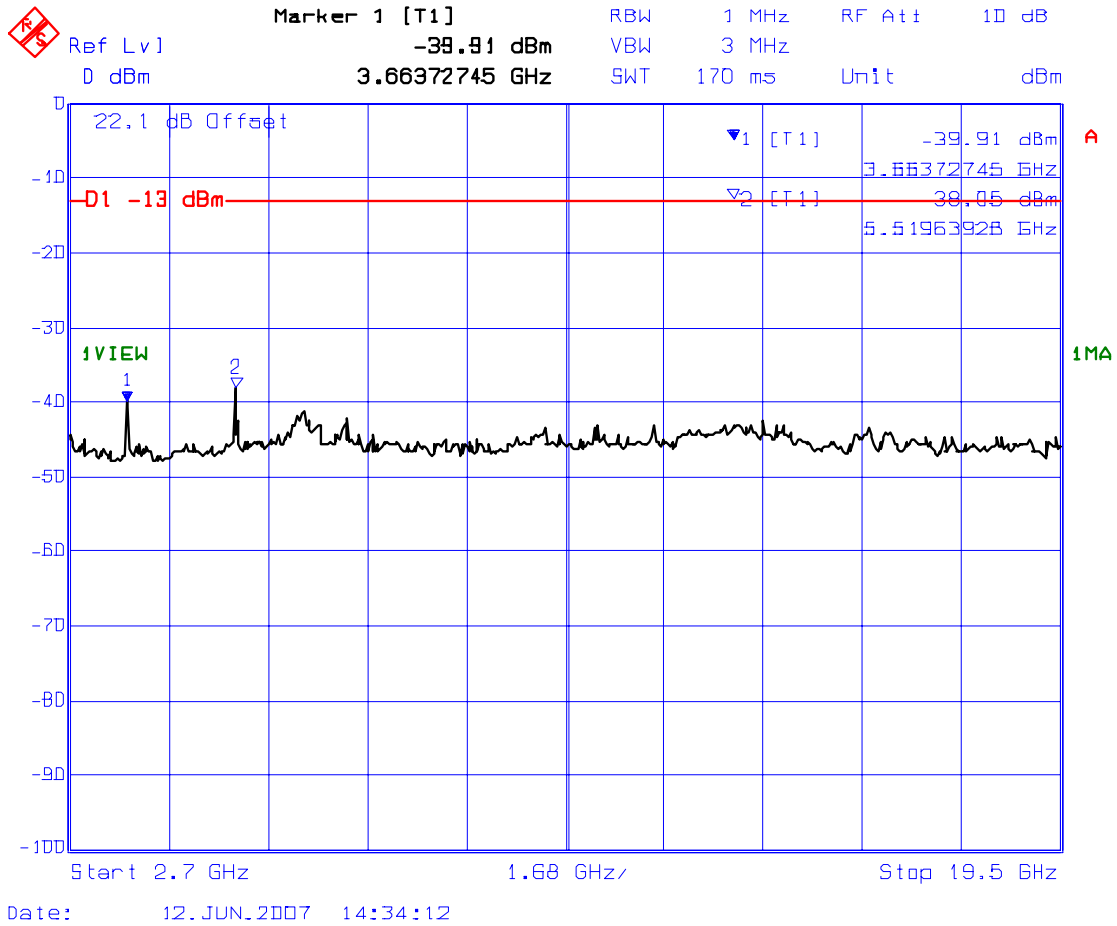
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

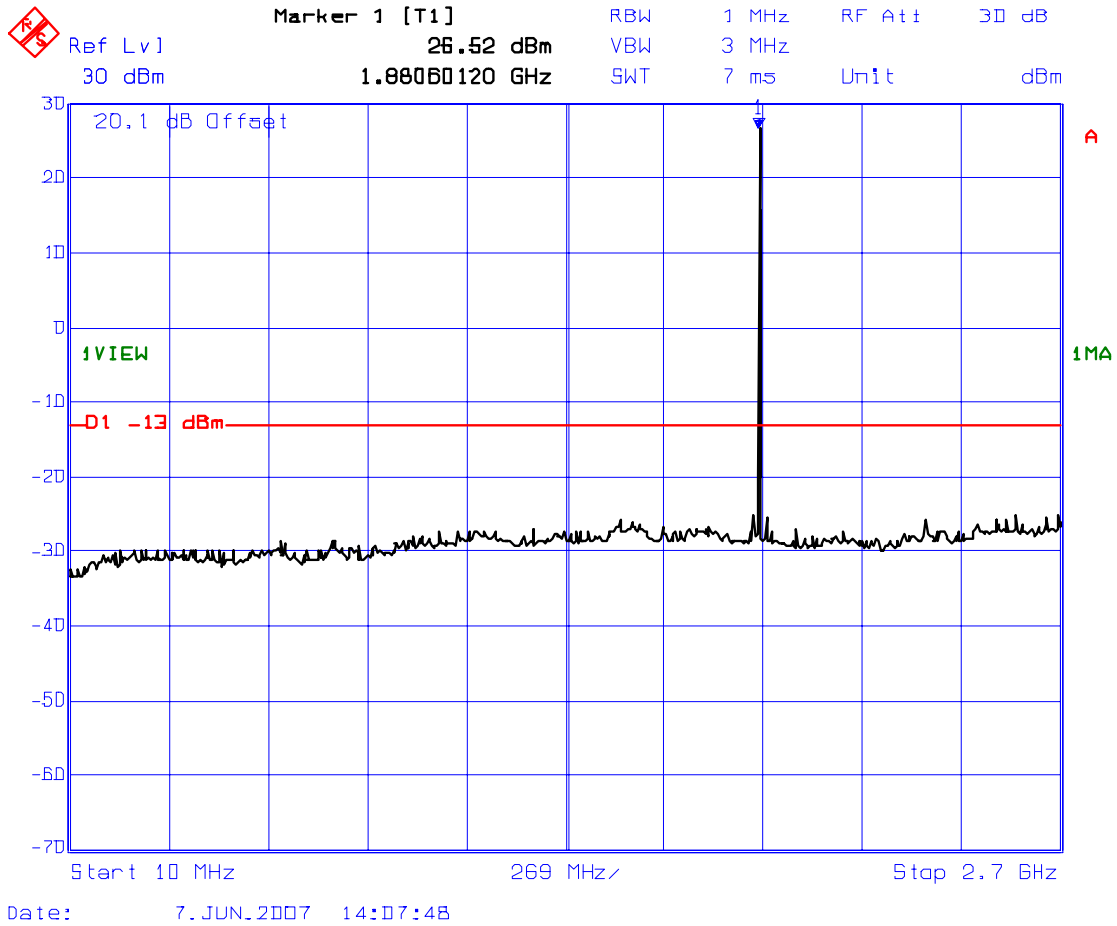
July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

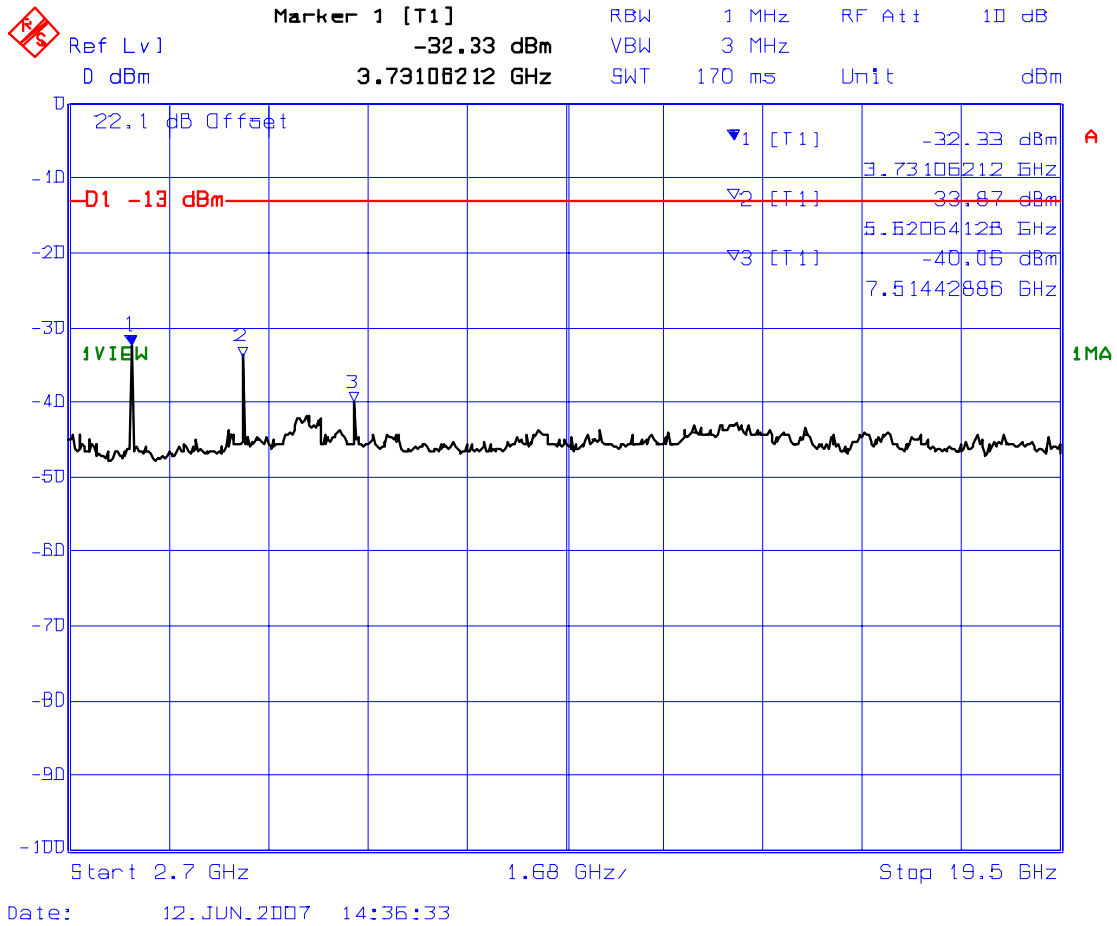
Plot 6.7.5.2.4(b) Spurious RF Conducted Emissions
 Test Frequency: 1851.25 MHz



Plot 6.7.5.2.5(a) Spurious RF Conducted Emissions
Test Frequency: 1880.00 MHz



Plot 6.7.5.2.5(b) Spurious RF Conducted Emissions
 Test Frequency: 1880.00 MHz



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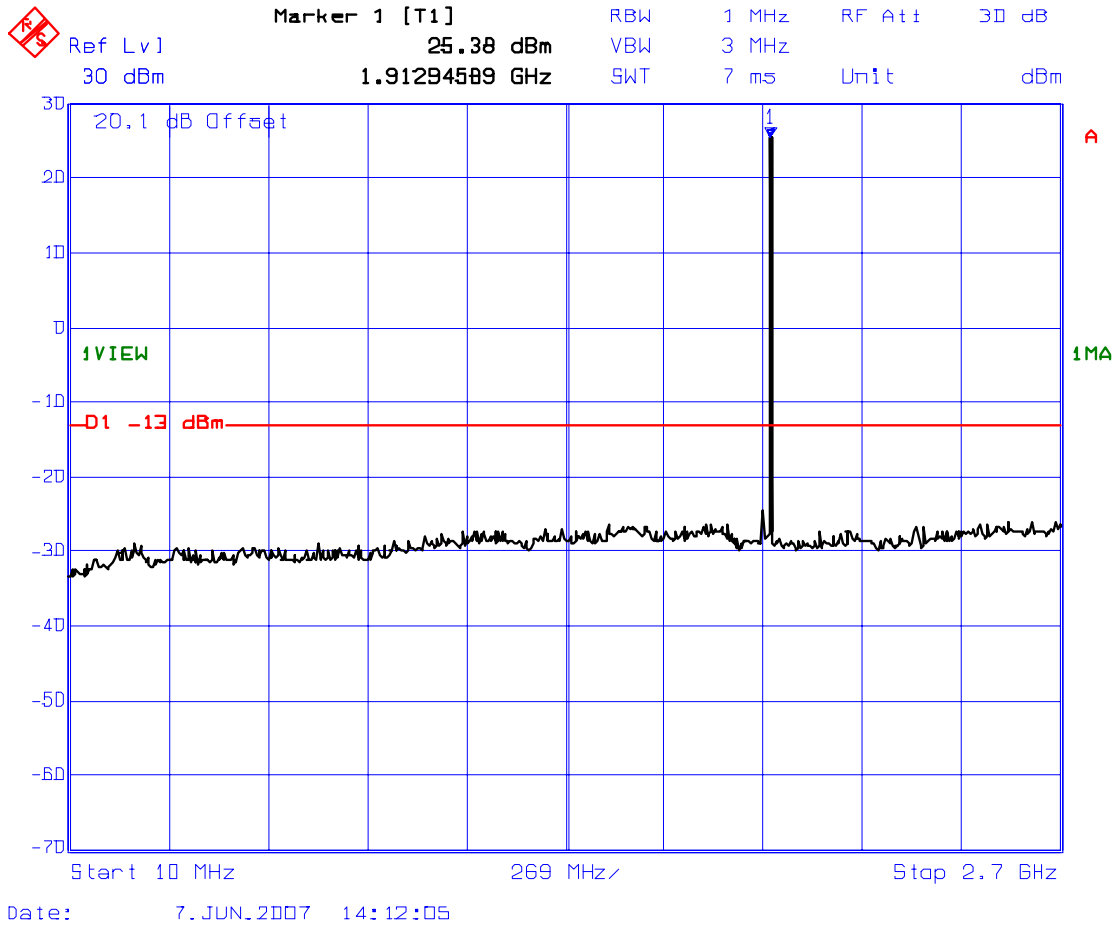
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 6.7.5.2.6(a) Spurious RF Conducted Emissions
Test Frequency: 1908.75 MHz



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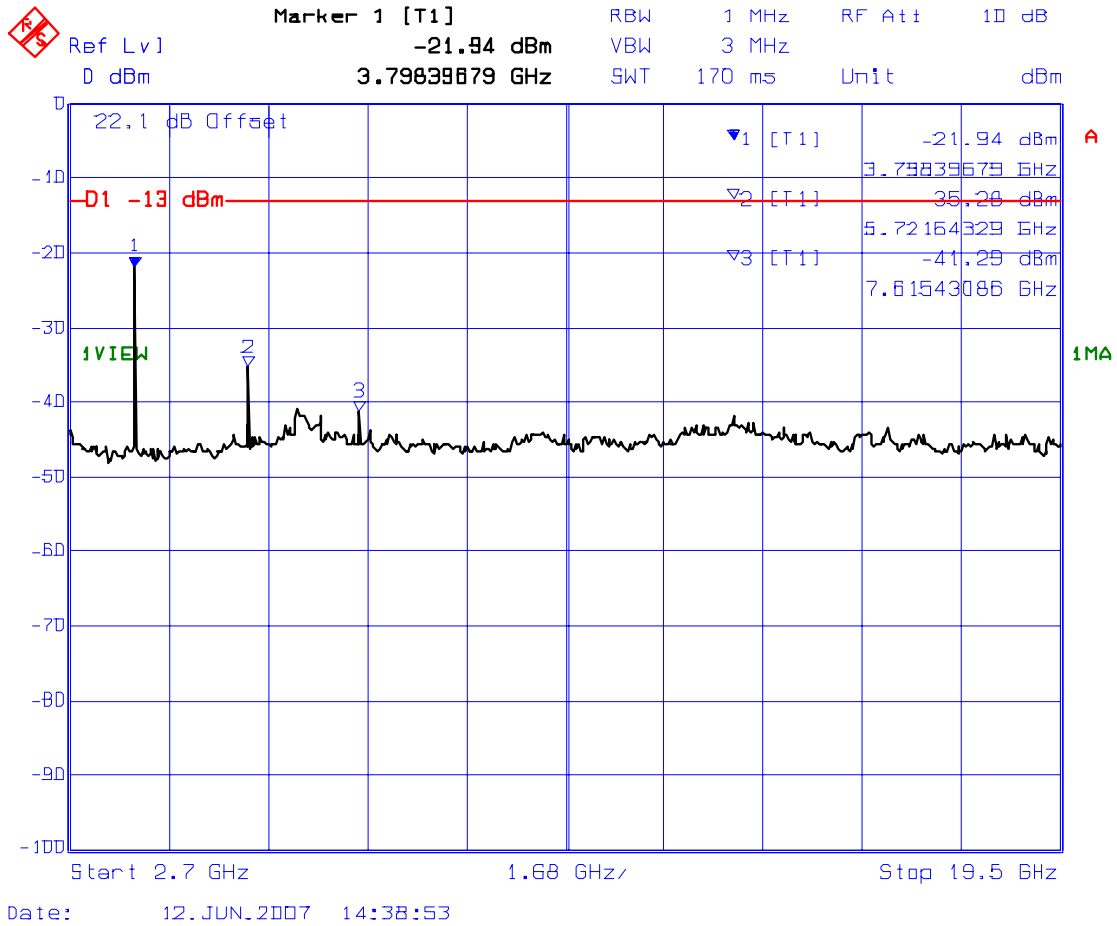
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

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Plot 6.7.5.2.6(b) Spurious RF Conducted Emissions
 Test Frequency: 1908.75 MHz



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 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

File #: MIS-061FCC22H24E

July 31, 2007

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

6.8. FIELD STRENGTH OF SPURIOUS RADIATION [§§ 2.1053, 22.917 & 24.238]

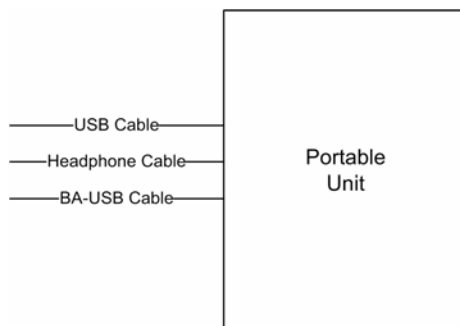
6.8.1. Limit(s)

§§22.917 (a) & 24.238 (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43+10\log(P)$ dB (P = transmitter conducted power in watts).

6.8.2. Method of Measurements

Refer to ULTRATECH Test Procedures, File # ULTR P001-2004 and TIA-603-C

6.8.3. Test Arrangement



6.8.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rohde & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz
RF Amplifier	Com-Power	PA-102		1 MHz to 1 GHz, 30 dB gain nominal
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz, 30 dB nominal
RF Signal Generator	Hewlett Packard	HP 83752B	3610A00457	0.01 – 20 GHz
Biconilog Antenna	EMCO	3142	10005	30 MHz to 2 GHz
Dipole Antenna	EMCO	3121C	8907-434	30 GHz – 1 GHz
Dipole Antenna	EMCO	3121C	8907-440	30 GHz – 1 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3155	9911-5955	1 GHz – 18 GHz
Horn Antenna	EMCO	3160-09	..	18 GHz – 26.5 GHz
Horn Antenna	EMCO	3160-10	..	26.5 GHz – 40 GHz
Mixer	Tektronix	118-0098-00	..	18 GHz – 26.5 GHz
Mixer	Tektronix	119-0098-00	..	26.5 GHz – 40 GHz

6.8.5. Test Data

6.8.5.1. Cellular Band (824.70 - 848.31 MHz)

Carrier Frequency:	824.70 MHz						
Transmitter Conducted Power	0.678 W (28.31 dBm)						
Limit:	$43+10\log(P_{in\ watt}) = 43+10\log(0.678) = 41.31\ dBc$						
Test Frequency Range:	30 MHz to the tenth harmonic						
Frequency (MHz)	E-Field (dBμV/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method (dBm) (dBc)		Limit (dBc)	Margin (dB)
No significant emissions found, all emissions are more than 20 dB below the specified limit.							

Carrier Frequency:	836.52 MHz						
Transmitter Conducted Power	0.646 W (28.10 dBm)						
Limit:	$43+10\log(P_{in\ watt}) = 43+10\log(0.646) = 41.10\ dBc$						
Test Frequency Range:	30 MHz to the tenth harmonic						
Frequency (MHz)	E-Field (dBμV/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method (dBm) (dBc)		Limit (dBc)	Margin (dB)
No significant emissions found, all emissions are more than 20 dB below the specified limit.							

Carrier Frequency:	848.31 MHz						
Transmitter Conducted Power	0.600 W (27.78 dBm)						
Limit:	$43+10\log(P_{in\ watt}) = 43+10\log(0.600) = 40.78\ dBc$						
Test Frequency Range:	30 MHz to the tenth harmonic						
Frequency (MHz)	E-Field (dBμV/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method (dBm) (dBc)		Limit (dBc)	Margin (dB)
No significant emissions found, all emissions are more than 20 dB below the specified limit.							

6.8.5.2. PCS Band (1851.25 - 1908.75 MHz)

Carrier Frequency:	1851.25 MHz						
Transmitter Conducted Power	0.552 W (27.42 dBm)						
Limit:	$43+10\log(P_{in\ watt}) = 43+10\log(0.552) = 40.42\ dBc$						
Test Frequency Range:	30 MHz to the tenth harmonic						
Frequency (MHz)	E-Field (dBμV/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method		Limit (dBc)	Margin (dB)
				(dBm)	(dBc)		
1851.25	--	--	--	--	--	--	--
1851.25	--	--	--	--	--	--	--
3702.50	67.97	Peak	V	-34.38	61.80	40.42	21.4
3702.50	68.59	Peak	H	-33.94	61.36	40.42	20.9
5553.75	68.57	Peak	V	-33.68	61.10	40.42	20.7
5553.75	66.08	Peak	H	-35.18	62.60	40.42	22.2
All significant emissions are recorded in the above table.							

Carrier Frequency:	1880.00						
Transmitter Conducted Power	0.619 W (27.92 dBm)						
Limit:	$43+10\log(P_{in\ watt}) = 43+10\log(0.619) = 40.92\ dBc$						
Test Frequency Range:	30 MHz to the tenth harmonic						
Frequency (MHz)	E-Field (dBμV/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method		Limit (dBc)	Margin (dB)
				(dBm)	(dBc)		
1880.00	--	--	--	--	--	--	--
1880.00	--	--	--	--	--	--	--
3760.00	71.33	Peak	V	-31.55	59.47	40.92	18.6
3760.00	71.03	Peak	H	-30.45	58.37	40.92	17.5
5640.00	69.99	Peak	V	-33.12	61.04	40.92	20.1
5640.00	70.86	Peak	H	-32.94	60.86	40.92	19.9
All significant emissions are recorded in the above table.							

Carrier Frequency: 1908.75 MHz
 Transmitter Conducted Power 0.501 W (27.00 dBm)
 Limit: $43+10\log(P_{in \text{ watt}}) = 43+10\log(0.501) = 40.00 \text{ dBc}$
 Test Frequency Range: 30 MHz to the tenth harmonic

Frequency (MHz)	E-Field (dB μ V/m)	EMI Detector (Peak/QP)	Antenna Polarization (H/V)	ERP measured by Substitution Method		Limit (dBc)	Margin (dB)
				(dBm)	(dBc)		
1908.75	--	--	--	--	--	--	--
1908.75	--	--	--	--	--	--	--
3817.50	77.05	Peak	V	-27.21	54.21	40.00	14.2
3817.50	80.35	Peak	H	-22.95	49.95	40.00	10.0
5726.25	68.31	Peak	V	-35.75	62.75	40.00	22.8
5726.25	69.25	Peak	H	-33.85	60.85	40.00	20.9

All significant emissions are recorded in the above table.

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994)

7.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (+ dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	<u>+1.0</u>	<u>+1.0</u>
Cable Loss Calibration	Normal (k=2)	<u>+0.3</u>	<u>+0.5</u>
EMI Receiver specification	Rectangular	<u>+1.5</u>	<u>+1.5</u>
Antenna Directivity	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	<u>+2.0</u>	<u>+0.5</u>
Antenna phase center variation	Rectangular	0.0	<u>+0.2</u>
Antenna factor frequency interpolation	Rectangular	<u>+0.25</u>	<u>+0.25</u>
Measurement distance variation	Rectangular	<u>+0.6</u>	<u>+0.4</u>
Site imperfections	Rectangular	<u>+2.0</u>	<u>+2.0</u>
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67(Bi) 0.3 (Lp)$ Uncertainty limits $20\text{Log}(1+\Gamma_1\Gamma_R)$	U-Shaped	+1.1 -1.25	<u>+0.5</u>
System repeatability	Std. Deviation	<u>+0.5</u>	<u>+0.5</u>
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k = 2 is used:

$$U = 2u_c(y) = 2x(+2.19) = +4.38 \text{ dB} \quad \text{And} \quad U = 2u_c(y) = 2x(-2.21) = -4.42 \text{ dB}$$