



Electromagnetic Compatibility Test Report

Tests Performed on an Avidyne Corporation

Remote Control, Model MLB7XX

Radiometrics Document RP-6064



Product Detail:

FCC ID: RZYMLB7XX

Equipment type: 908 MHz Remote Control

Test Standards:

US CFR Title 47, Chapter I, FCC Part 15 Subpart C

FCC Part 15 CFR Title 47: 2007

Industry Canada RSS-210, Issue 7: 2007 as required for Category I Equipment

This report concerns: Original Grant for Certification

Tests Performed For:

Avidyne Corporation

4800 Evanswood Dr.

Columbus, OH 43229

Test Facility:

Radiometrics Midwest Corporation

12 East Devonwood

Romeoville, IL 60446

Test Date(s): (Month-Day-Year)

May 15 through June 14, 2007

Document RP-6064 Revisions:

Rev.	Issue Date	Affected Pages	Revised By
0	June 29, 2007		
1	July 6, 2007	All	Joseph Strzelecki

Table of Contents

1 ADMINISTRATIVE DATA 3

2 TEST SUMMARY AND RESULTS 3

 2.1 RF Exposure Compliance Requirements 3

3 EQUIPMENT UNDER TEST (EUT) DETAILS 4

 3.1 EUT Description 4

 3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements 4

 3.2 Related Submittals 4

4 TESTED SYSTEM DETAILS 4

 4.1 Tested System Configuration 4

 4.2 Special Accessories 5

 4.3 Equipment Modifications 5

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS..... 5

6 RADIOMETRICS' TEST FACILITIES 5

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS..... 6

8 CERTIFICATION 6

9 TEST EQUIPMENT TABLE 6

10 TEST SECTIONS 7

 10.1 Radiated RF Emissions 7

 10.1.1 Field Strength Calculation..... 7

 10.1.2 Radiated Emissions Test Results 8

 Figure 1. Drawing of Radiated Emissions Setup 10

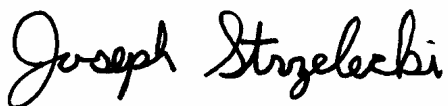
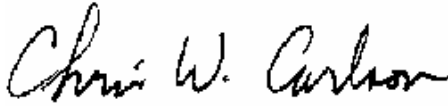
 10.2 Occupied Bandwidth Data..... 10

 Figure 2. Occupied Bandwidth Plot..... 11

Notice: This report must not be reproduced (except in full) without the written approval of Radiometrics Midwest Corporation.

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control

1 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> A Avidyne Corporation, Remote Control for a Multilink Broadcast Receiver Model: MLB7XX Serial Number: 08 This will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics: (Month-Day-Year)</i> May 15, 2007	<i>Test Date(s): (Month-Day-Year)</i> May 15 through June 14, 2007
<i>Test Report Written By:</i> Joseph Strzelecki Senior EMC Engineer	<i>Test Witnessed By:</i> Mike Penner Avidyne Corporation
<i>Radiometrics' Personnel Responsible for Test:</i>  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	<i>Test Report Approved By</i>  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Multilink Broadcast Receiver, Model MLB7XX, manufactured by Avidyne Corporation. The detailed test results are presented in a separate section. The following is a summary of the test results.

Emissions Tests Results

Environmental Phenomena	Frequency Range	Basic Standard	Test Result
RF Radiated Emissions	30-9300 MHz	RSS-210 & FCC Part 15	Pass
Occupied Bandwidth Test	Fundamental Freq.	RSS-210 & FCC Part 15	Pass

2.1 RF Exposure Compliance Requirements

The power output less than 1 mW, The EUT meets the FCC requirement for RF exposure. Since the EUT is less than 200 mW, it is exempt from RSS-102. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a 908 MHz Remote Control for a Multilink Broadcast Receiver, Model MLB7XX, manufactured by Avidyne Corporation. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The product will be professionally installed on aircraft only. The installation procedures will have instructions to use the specified antenna. Therefore, it meets the 15.203 Requirement.

3.2 Related Submittals

Avidyne Corporation is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

The EUT was tested as a stand-alone device.

Power was supplied at 28 VDC to its external power supply.

The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Multilink Broadcast Receiver	E	Avidyne Corporation	MLB-7XX P/N 700-00159-022	08

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

List of System Cables

QTY	Length (m)	Cable Description	Connected to (Item #)	Shielded?
1	6.1	Power and Control Cord	#1 and Breakout box	No
1	6.1	Sirius RF input coaxial cable	#1 and Mindready	Yes
1	6.1	Ethernet cable	#1 and Ethernet switch	Yes

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2007	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2003	2003	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-210 Issue 7	2007	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-212 Issue 1	1999	Test Methods For Radio Equipment
IC RSS-Gen Issue 2	2007	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

The test procedures used are in accordance with the Industry Canada RSS-212 and ANSI document C63.4-2003, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 1999 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois:

Chamber A: Is an anechoic chamber that measures 24' L X 12' W X 12' H. The walls and ceiling are fully lined with ferrite absorber tiles. The floor has a 10' x 10' section of ferrite absorber tiles located in the center. Panashield of Rowayton, Connecticut manufactured the chamber. The enclosure is NAMAS certified.

Chamber B: Is a shielded enclosure that measures 24' L X 12' W X 8' H. Erik A. Lindgren & Associates of Chicago, Illinois manufactured the enclosure.

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control

Chamber C: Is a shielded enclosure that measures 20' L X 10' W X 8' H. Lindgren RF Enclosures Inc. of Addison, Illinois manufactured the enclosure.

Chamber D: Is a fully anechoic chamber that measures 22' L X 10' W X 10' H. The walls, ceiling and floor are fully lined with ferrite absorber tiles. Braden Shielding Systems of Tulsa, Oklahoma manufactured the chamber.

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

Open Area Test Site (OATS): Is located on 8625 Helmar Road in Newark, Illinois, USA and measures 56' L X 24' W X 17' H. The entire open field test site has a metal ground screen. The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as file number IC3124.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	12/27/06
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	12/29/06
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	10/24/06
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	12/12/05
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	02/07/07
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	01/17/07
REC-08	Hewlett Packard	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	12 Mo.	07/05/06
THM-01	Extech Inst.	Temp/Humid Meter	4465CF	001106557	N/A	24 Mo.	03/31/06

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

10.1 Radiated RF Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. Below 1 GHz, when a radiated emission is detected approaching the specification limit, the measurement of the emission is repeated using a tuned dipole antenna with a Roberts Balun.

The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz an Anritsu Spectrum analyzer and a preamplifier with a 10 dB attenuator connected to the input. The out of band emissions and the ambient emissions were below the level of input overload (80 dBuV).

For tests from 1 to 9300 GHz, an HP8566A spectrum analyzer was used with a Celeritek uWave amplifier. The fundamental emission, out of band emissions and the ambient emissions were below the level of input overload (72 dBuV).

Radiated emission tests were performed inside of an anechoic enclosure. The frequency range from 30 to 9300 MHz was scanned using the peak detector function. The test antennas were positioned 3 meters from the EUT. Radiated emission measurements are performed with linearly polarized broadband antennas. Measurements were performed using the peak or quasi-peak detector function. The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground. All other tests are performed at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded.

10.1.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report	
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control	

10.1.2 Radiated Emissions Test Results

Test Date	6/14/2007
Test Distance	3 Meters
Specification	FCC Part 15.249 Subpart C & RSS-210
Abbreviations	P = peak; Q = QP Pol = Antenna Polarization; V = Vertical; H = Horizontal; For Antenna Type Bi-Log = (ANT-44); Horn = (ANT-13)
Configuration	The EUT was transmitting at 908.4 MHz

Freq. MHz	Meter Reading dBuV	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
		Factor dB	Pol/ Type		EUT	Limit	
49.4	28.9 P	16.7	H/44	-19.4	26.2	40.0	13.8
61.6	28.0 P	10.8	H/44	-19.1	19.6	40.0	20.4
161.2	36.3 P	10.0	H/44	-18.0	28.3	43.5	15.2
239.9	29.0 P	12.2	H/44	-17.4	23.8	46.0	22.2
258.2	28.8 P	12.8	H/44	-17.3	24.2	46.0	21.8
299.4	34.8 P	13.6	H/44	-17.1	31.3	46.0	14.7
381.4	31.7 P	16.4	H/44	-16.6	31.4	46.0	14.6
450.1	32.7 P	16.6	H/44	-16.2	33.1	46.0	12.9
479.0	37.0 P	18.0	H/44	-16.1	38.9	46.0	7.1
850.5	27.7 P	21.7	H/44	-14.2	35.2	46.0	10.8
902.0	27.5 P	22.1	H/44	-14.0	35.6	46.0	10.4
908.4	71.3 P	22.3	H/44	-13.9	79.7	94.0	14.3
928.0	25.5 P	22.5	H/44	-13.7	34.3	46.0	11.7
42.2	37.1 P	14.8	V/44	-19.4	32.5	40.0	7.5
61.4	42.6 Q	11.8	V/44	-19.1	35.2	40.0	4.8
68.4	39.6 P	8.5	V/44	-19.1	28.9	40.0	11.1
85.8	41.3 P	7.5	V/44	-18.9	29.9	40.0	10.1
94.6	34.1 P	10.3	V/44	-18.8	25.6	43.5	17.9
102.1	41.3 P	12.4	V/44	-18.7	35.0	43.5	8.5
111.6	32.6 P	13.5	V/44	-18.7	27.5	43.5	16.0
136.8	33.0 P	12.9	V/44	-18.3	27.6	43.5	15.9
143.2	34.5 P	11.7	V/44	-18.3	27.9	43.5	15.6
149.7	29.4 P	10.9	V/44	-18.3	22.0	43.5	21.5
151.0	33.4 P	10.8	V/44	-18.3	25.9	43.5	17.6
163.7	33.3 Q	11.0	V/44	-18.1	26.2	43.5	17.3
173.1	36.8 P	10.1	V/44	-18.0	28.9	43.5	14.6
185.1	27.8 P	9.9	V/44	-17.9	19.8	43.5	23.7
209.3	31.4 P	11.2	V/44	-17.7	24.9	43.5	18.6
240.0	34.8 P	12.8	V/44	-17.4	30.2	46.0	15.8
258.2	29.4 P	13.0	V/44	-17.3	25.1	46.0	20.9
282.8	35.6 P	13.2	V/44	-17.3	31.5	46.0	14.5
299.5	34.8 P	13.7	V/44	-17.1	31.4	46.0	14.6
307.2	33.0 P	14.0	V/44	-17.1	29.9	46.0	16.1
325.0	26.1 P	15.0	V/44	-17.0	24.2	46.0	21.8
349.8	27.0 P	16.7	V/44	-16.8	26.9	46.0	19.1
449.8	27.9 P	16.7	V/44	-16.2	28.4	46.0	17.6
479.0	33.5 P	17.8	V/44	-16.1	35.2	46.0	10.8

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report							
Testing of the Avidyne Corporation, Model MLB7XX, Remote Control							

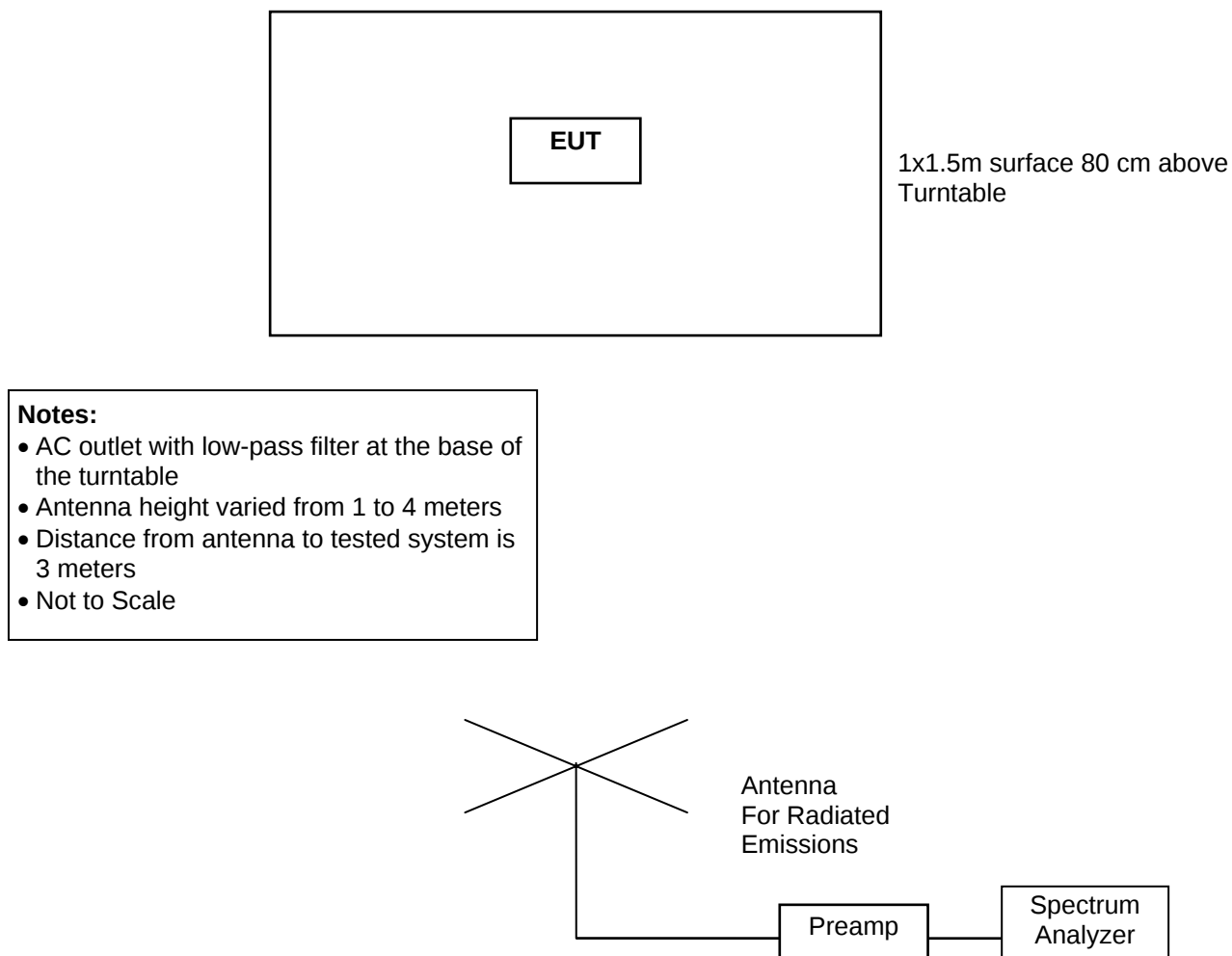
Freq. MHz	Meter Reading dBuV	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
		Factor dB	Pol/ Type		EUT	Limit	
519.8	25.9 P	18.0	V/44	-16.0	27.9	46.0	18.1
550.6	29.9 P	18.5	V/44	-15.8	32.6	46.0	13.4
720.6	25.5 P	20.2	V/44	-15.0	30.7	46.0	15.3
902.0	25.1 P	21.8	V/44	-14.0	32.9	46.0	13.1
908.4	67.7 P	21.9	V/44	-13.9	75.7	94.0	18.3
928.0	24.8 P	22.0	H/44	-13.7	33.2	46.0	12.8
950.5	25.8 P	22.1	V/44	-13.6	34.4	46.0	11.6
1816.7	37.1 P	26.6	H/13	-24.8	38.9	54.0	15.1
2726.0	36.0 P	29.2	H/13	-23.3	41.9	54.0	12.1
3632.7	34.2 P	31.7	H/13	-21.7	44.2	54.0	9.8
4542.8	33.9 P	33.5	H/13	-21.1	46.3	54.0	7.7
5449.5	32.8 P	34.4	H/13	-20.3	46.9	54.0	7.1
1816.7	38.8 P	26.6	V/13	-24.8	40.6	54.0	13.4
2724.5	36.0 P	29.2	V/13	-23.3	41.9	54.0	12.1
3633.6	34.4 P	31.7	V/13	-21.7	44.4	54.0	9.6
4541.8	33.8 P	33.5	V/13	-21.1	46.2	54.0	7.8
5449.9	33.1 P	34.4	V/13	-20.3	47.2	54.0	6.8

Judgment: Passed by 4.8 dB

No Emissions were detected from 5500 to 9300 MHz within 10 dB of the average limits.

All emissions outside of the band from 902 to 928 were below the limits of 15.209.

Since all emissions above 1 GHz met the average limit with the peak detector, no measurements with the average detector were performed.

Figure 1. Drawing of Radiated Emissions Setup

10.2 Occupied Bandwidth Data

The occupied bandwidth of the RF output was measured using a spectrum analyzer. The bandwidth was measured using the peak detector function and a narrow resolution bandwidth.

A broadband antenna was used to receive the modulated signal. The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The spectrum analyzer display was digitized and plotted. A limit was drawn on the plots based on the level of the modulated carrier. The plots of the occupied bandwidth for the EUT are supplied on the following page.

Figure 2. Occupied Bandwidth Plot

