SOLECTRON

Certification Report for M/A-COM MASTRIII 800 MHz Base Station

FCC Part 90 & Industry Canada RSS-119

Document Number:	**KP000908-CR-RAD-01-01**
Release Date:	**September 21, 2004**
Prepared for:	**M/A-COM, Inc.** **221 Jefferson Ridge Parkway** **Lynchburg, Virginia** **U.S.A., 24501**
Author:	**Denis Lalonde** Radio Compliance Discipline Leader

C-MAC Engineering Inc.
A Solectron Company
21 Richardson Side Road,
Kanata, Ontario, K2K 2C1
http://www.solectrontechnicalctr.com/

Release Control Record

This document is based on CEI document template KG000347-TR-EMC-03.

Release no.	Reason for change	Date released
01	Original Release	September 21, 2004

Approvals

Function	Name	Job title	Signature
Document Release Approval	Simon Richardson	Project Manager	SEPT 21, 2004
Author	Denis Lalonde	Radio Compliance Discipline Leader	Sept 21, 2004
Technical Reviewer	Jacques Rollin	EMC Advisor	Sept 21 2004

Accreditations

C-MAC Engineering test facilities are accredited by the Standards Council of Canada (SCC) in accordance with the scope of accreditation outlined at the following web site http://www.scc.ca/scopes/reg126-eng-s.pdf. [1]. The SCC is a member of the APLAC [13] and ILAC [14] organizations which, through mutual recognition arrangements, provide accreditation of test facilities in the member countries.

The Solectron Technical Centre 10-meter Ambient Free Chamber (AFC) complies with the Industry Canada (IC) requirements for Test Facilities and Test Methods [15] under reference file number 4180. Through IC MRAs, EMC measurements are accepted in the following countries: USA, Australia, Singapore, Chinese Taipei (Taiwan), and the Republic of Korea. Further information can be found at the IC Certification and Engineering Bureau web site http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/Home under the "conformity assessment bodies" link.

The VCCI [11] lab registration numbers associated with our test facilities are: R-1641, C-1749, C-1750, T-148, and T-149.

C-MAC Engineering is ISO 9001:2000 and ISO-IEC 17025 certified and its processes are documented in the C-MAC Engineering Quality Manual [2] and Lab Operations Manual [3].

Table of Contents

RELEASE CONTROL RECORD 2
APPROVALS 2
ACCREDITATIONS 2
TABLE OF CONTENTS 3
LIST OF FIGURES 5
LIST OF TABLES 6
1. EXECUTIVE SUMMARY 9
2. COMPLIANCE SUMMARY 10
3. EQUIPMENT UNDER TEST (EUT) 11
3.1 PRODUCT FUNCTIONAL DESCRIPTION 11
3.2 MANUFACTURER INFORMATION 11
3.3 TRANSMITTER SPECIFICATIONS 11
3.4 SYSTEM COMPONENTS 12
3.5 SUPPORT EQUIPMENT 12
3.6 SYSTEM SET-UP AND TEST CONFIGURATIONS 12
3.7 EUT INTERFACES AND CABLES 14
3.8 SYSTEM MODIFICATIONS 14
4. GENERAL TEST CONDITIONS 15
4.1 TEST FACILITY 15
4.2 MEASUREMENT INSTRUMENTATION 15
5. DETAILED TEST RESULTS 16
5.1 RF POWER 16
5.1.1 Test Specification 16
5.1.1.1 Limits 16
5.1.2 Test Facility Information 16
5.1.3 Test Procedure 16
5.1.4 Test Results 16
5.1.5 Test Conclusion 17
5.1.6 Test Equipment List 17
5.2 CONDUCTED SPURIOUS EMISSIONS 17
5.2.1 Test Specification 17
5.2.1.1 Limits 17
5.2.2 Test Facility Information 18
5.2.3 Test Procedure 18
5.2.4 Test Results 18

5.2.5 Test Conclusion 19
5.2.6 Test Equipment List 19
5.3 EMISSION MASK 19
5.3.1 Test Specification 19
5.3.1.1 Limits 19
5.3.2 Test Facility Information 20
5.3.3 Test Procedure 20
5.3.4 Test Results 20
5.3.5 Test Conclusion 21
5.3.6 Test Equipment List 21
5.4 FIELD STRENGTH OF SPURIOUS EMISSIONS 21
5.4.1 Test Specification 21
5.4.1.1 Limits 22
5.4.2 Test Facility Information 22
5.4.3 Test Procedure 22
5.4.4 Test Results 23
5.4.5 Test Conclusion 23
5.4.6 Test Equipment List 24
5.5 FREQUENCY STABILITY 25
5.5.1 Test Specification 25
5.5.1.1 Limits 25
5.5.2 Test Facility Information 25
5.5.3 Test Procedure 25
5.5.4 Test Results 26
5.5.5 Test Conclusion 27
5.5.6 Test Equipment List 28
5.6 AUDIO FREQUENCY RESPONSE 28
5.6.1 Test Specification 28
5.6.1.1 Limits 28
5.6.2 Test Facility Information 29
5.6.3 Test Procedure 29
5.6.4 Test Results 29
5.6.5 Test Conclusion 30
5.6.6 Test Equipment List 30
5.7 AUDIO LOW PASS FILTER RESPONSE 30
5.7.1 Test Specification 30
5.7.1.1 Limits 30
5.7.2 Test Facility Information 31
5.7.3 Test Procedure 31
5.7.4 Test Results 31
5.7.5 Test Conclusion 32
5.7.6 Test Equipment List 32

5.8 MODULATION LIMITING.......... 32
5.8.1 Test Specification.......... 32
5.8.1.1 Limits.......... 32
5.8.2 Test Facility Information.......... 33
5.8.3 Test Procedure.......... 33
5.8.4 Test Results.......... 33
5.8.5 Test Conclusion.......... 34
5.8.6 Test Equipment List.......... 34
5.9 OCCUPIED BANDWIDTH.......... 35
5.9.1 Test Specification.......... 35
5.9.2 Test Facility Information.......... 35
5.9.3 Test Procedure.......... 35
5.9.4 Test Results.......... 36
5.9.5 Test Equipment List.......... 37
6. REFERENCES.......... 38
7. APPENDICES.......... 39
7.1 APPENDIX A: GLOSSARY.......... 39
7.2 APPENDIX B: TEST SET-UP PHOTOGRAPHS.......... 40
7.3 APPENDIX C: CONDUCTED SPURIOUS EMISSIONS PLOTS.......... 41
7.4 APPENDIX D: EMISSION MASK PLOTS.......... 50
7.5 APPENDIX E: FIELD STRENGTH OF SPURIOUS EMISSIONS PLOTS.......... 53
7.6 APPENDIX D: OCCUPIED BANDWIDTH PLOTS.......... 57

List of Figures

FIGURE 3-1 PRODUCT DESCRIPTION.......... 11
FIGURE 3-2: MODULE CONFIGURATION.......... 13
FIGURE 3-3: SYSTEM CONFIGURATION.......... 13
FIGURE 5-1: FREQUENCY RESPONSE RESULTS.......... 29
FIGURE 5-2 AUDIO LOW PASS FILTER RESPONSE.......... 31
FIGURE 5-3 MODULATION LIMITING, POSITIVE PEAK.......... 33
FIGURE 5-4 MODULATION LIMITING, NEGATIVE PEAK.......... 34
FIGURE 7-1: M/A-COM MASTRIII 800 MHZ BASE STATION RADIATED EMISSIONS SET-UP.......... 40
FIGURE 7-2: TX AT 851.0125 MHZ, 100 W POWER, 30 MHZ TO 1 GHZ.......... 41
FIGURE 7-3: TX AT 851.0125 MHZ, 100 W POWER, 1 GHZ TO 2.75 GHZ.......... 41
FIGURE 7-4: TX AT 851.0125 MHZ, 100 W POWER, 2.75 GHZ TO 8.7 GHZ.......... 42
FIGURE 7-5: TX AT 851.0125 MHZ, 10 W POWER, 30 MHZ TO 1 GHZ.......... 42
FIGURE 7-6: TX AT 851.0125 MHZ, 10 W POWER, 1 GHZ TO 2.75 GHZ.......... 43

FIGURE 7-7: TX AT 851.0125 MHZ, 10 W POWER, 2.75 GHZ TO 8.7 GHZ 43
FIGURE 7-8: TX AT 860.0 MHZ, 100 W POWER, 30 MHZ TO 1 GHZ 44
FIGURE 7-9: TX AT 860.0 MHZ, 100 W POWER, 1 GHZ TO 2.75 GHZ 44
FIGURE 7-10: TX AT 860.0 MHZ, 100 W POWER, 2.75 GHZ TO 8.7 GHZ 45
FIGURE 7-11: TX AT 860.0 MHZ, 10 W POWER, 30 MHZ TO 1 GHZ 45
FIGURE 7-12: TX AT 860.0 MHZ, 10 W POWER, 1 GHZ TO 2.75 GHZ 46
FIGURE 7-13: TX AT 860.0 MHZ, 10 W POWER, 2.75 GHZ TO 8.7 GHZ 46
FIGURE 7-14: TX AT 869.9875 MHZ, 100 W POWER, 30 MHZ TO 1 GHZ 47
FIGURE 7-15: TX AT 869.9875 MHZ, 100 W POWER, 1 GHZ TO 2.75 GHZ 47
FIGURE 7-16: TX AT 869.9875 MHZ, 100 W POWER, 2.75 GHZ TO 8.7 GHZ 48
FIGURE 7-17: TX AT 869.9875 MHZ, 10 W POWER, 30 MHZ TO 1 GHZ 48
FIGURE 7-18: TX AT 869.9875 MHZ, 10 W POWER, 1 GHZ TO 2.75 GHZ 49
FIGURE 7-19: TX AT 869.9875 MHZ, 10 W POWER, 2.75 GHZ TO 8.7 GHZ 49
FIGURE 7-20: 2500 HZ AUDIO SIGNAL 50
FIGURE 7-21: 2 LEVEL 9600 BAUD SIGNAL WITH 3 KHZ DEVIATION 50
FIGURE 7-22: 2 LEVEL 9600 BAUD SIGNAL WITH 1.9 KHZ DEVIATION 51
FIGURE 7-23: C4FM SIGNAL 51
FIGURE 7-24: NPSPAC (9600 BAUD) SIGNAL 52
FIGURE 7-25: NPSPAC (ANALOG) SIGNAL 52
FIGURE 7-26: FIELD STRENGTH WITH 100 W TX, 30 MHZ TO 1 GHZ 53
FIGURE 7-27: FIELD STRENGTH WITH 100 W TX, 1 GHZ TO 10 GHZ 54
FIGURE 7-28: FIELD STRENGTH WITH 10 W TX, 30 MHZ TO 1 GHZ 55
FIGURE 7-29: FIELD STRENGTH WITH 10 W TX, 1 GHZ TO 10 GHZ 56
FIGURE 7-30: 2500 HZ AUDIO SIGNAL 57
FIGURE 7-31: 2 LEVEL 9600 BAUD SIGNAL WITH 3 KHZ DEVIATION 57
FIGURE 7-32: 2 LEVEL 9600 BAUD SIGNAL WITH 1.9 KHZ DEVIATION 58
FIGURE 7-33: C4FM SIGNAL 58
FIGURE 7-34: NPSPAC (9600 BAUD) SIGNAL 59
FIGURE 7-35: NPSPAC (ANALOG) SIGNAL 59

List of Tables

TABLE 2-1: COMPLIANCE RESULTS SUMMARY 10
TABLE 3-1: TRANSMITTER SPECIFICATIONS 11
TABLE 3-2: MASTRIII 800 MHZ BTS COMPONENTS 12

TABLE 3-3: SUPPORT EQUIPMENT 12
TABLE 3-4: SYSTEM CABLES 14
TABLE 5-1: RF POWER REQUIREMENTS 16
TABLE 5-2: RF POWER LIMIT 16
TABLE 5-3: RF POWER LEVELS 17
TABLE 5-4: TEST EQUIPMENT USED FOR RF POWER 17
TABLE 5-5: CONDUCTED SPURIOUS EMISSIONS REQUIREMENT 17
TABLE 5-6: CONDUCTED SPURIOUS EMISSION LIMIT 18
5.2.2 TABLE 5-7TEST FACILITY INFORMATION 18
TABLE 5-8: CONDUCTED SPURIOUS EMISSIONS 18
TABLE 5-9: TEST EQUIPMENT USED FOR CONDUCTED SPURIOUS EMISSIONS 19
TABLE 5-10: EMISSION MASK REQUIREMENT 19
TABLE 5-11: EMISSION MASK LIMITS 19
TABLE 5-12: EMISSION MASK RESULTS 21
TABLE 5-H13: TEST EQUIPMENT USED FOR EMISSION MASK 21
TABLE 5-14: EMISSION MASK REQUIREMENT 21
TABLE 5-15: FIELD STRENGTH OF SPURIOUS EMISSIONS LIMIT 22
TABLE 5-16: FIELD STRENGTH OF SPURIOUS EMISSIONS 23
TABLE 5-17: TEST EQUIPMENT USED FOR FIELD STRENGTH OF SPURIOUS EMISSIONS 24
TABLE 5-18: FREQUENCY STABILITY REQUIREMENT 25
TABLE 5-19: FREQUENCY STABILITY LIMITS 25
TABLE 5-20: FREQUENCY STABILITY RESULTS (LINEAR POWER SUPPLY) 26
TABLE 5-21: FREQUENCY STABILITY RESULTS (SWITCHING MODE POWER SUPPLY) 27
TABLE 5-22: FREQUENCY STABILITY RESULTS (DC OPERATION ON THE SWITCHING MODE POWER SUPPLY) 27
TABLE 5-23: TEST EQUIPMENT USED FOR SIGNAL LEADS CONDUCTED EMISSIONS 28
TABLE 5-24: FREQUENCY RESPONSE REQUIREMENT 28
TABLE 5-25: FREQUENCY RESPONSE LIMIT 28
TABLE 5-26: TEST EQUIPMENT USED FOR FREQUENCY RESPONSE MEASUREMENT 30
TABLE 5-27: AUDIO LOW PASS FILTER RESPONSE REQUIREMENT 30
TABLE 5-28: AUDIO LOW PASS FILTER RESPONSE LIMIT 30
TABLE 5-29: TEST EQUIPMENT USED FOR AUDIO LOW PASS FILTER RESPONSE MEASUREMENT 32
TABLE 5-30: MODULATION LIMITING REQUIREMENT 32
TABLE 5-31: MODULATION LIMITING LIMIT 32
TABLE 5-32: TEST EQUIPMENT USED FOR AUDIO LOW PASS FILTER RESPONSE MEASUREMENT 34
TABLE 5-33: OCCUPIED BANDWIDTH 35

TABLE 5-34: OCCUPIED BANDWIDTH VALUES 36
TABLE 5-H35: TEST EQUIPMENT USED FOR OCCUPIED BANDWIDTH 37

1. Executive Summary

This test report documents the measurements performed on the M/A-COM MASTRIII 800 MHz Base Station as part of a Original Equipment FCC and Industry Canada application.

The FCCID and Industry Canada certification number for this equipment are the following:

- FCCID: OWDTR-0036-E
- CANADA: 3636B-0036

On the basis of measurements performed in the period of July to September 2004, the M/A-COM MASTRIII 800 MHz Base Station is verified to be compliant with FCC Part 90 and Industry Canada RSS-119 requirements. The test data included in this report apply to the product titled above manufactured by M/A-COM, Inc. A detailed summary of compliance results is found in Table 2-1.

2. Compliance Summary

This section summarizes all the measurements performed on M/A-COM MASTRIII 800 MHz Base Station and its compliance to FCC Part 90 and Industry Canada RSS-119.

Table 2-1: Compliance Results Summary

Product Summary			
Product Name:	M/A-COM MASTRIII 800 MHz Base Station	Project Manager:	Simon Richardson
Product Code:		Measurements by :	Denis Lalonde
Product Status:	GA	Date:	July 22 to Sept. 17, 2004

Test Cases					
Performed	**Description**	**Specification**	**Test Results**		**Notes**
			Pass	Fail	
■	RF Power	FCC Part 90.205 and 2.1046 RSS-119 sect. 5.4	■	□	
■	Conducted Spurious Emissions	FCC Part 90.210 and 2.1051 RSS-119 sect. 6.3	■	□	
■	Emission Mask	FCC Part 90.210 and 2.1049 RSS-119 sect. 6.4	■	□	
■	Field Strength of Spurious Emissions	FCC Part 90.210 and 2.1053	■	□	
■	Frequency Stability	FCC Part 90.213 and 2.1055 RSS-119 sect. 7	■	□	
■	Audio Frequency Response	FCC 2.1047	■	□	
■	Audio Low Pass Filter	FCC 2.1047 RSS-119 sect. 6.6	■	□	
■	Modulation Limiting	FCC 2.1047	■	□	
■	Occupied Bandwidth	FCC 2.202 RSP 100 sect. 7.2	■	□	
□	RF Exposure	FCC 1.1310 RSS-119 Sect. 9.0	□	□	To be evaluated during licensing of equipment

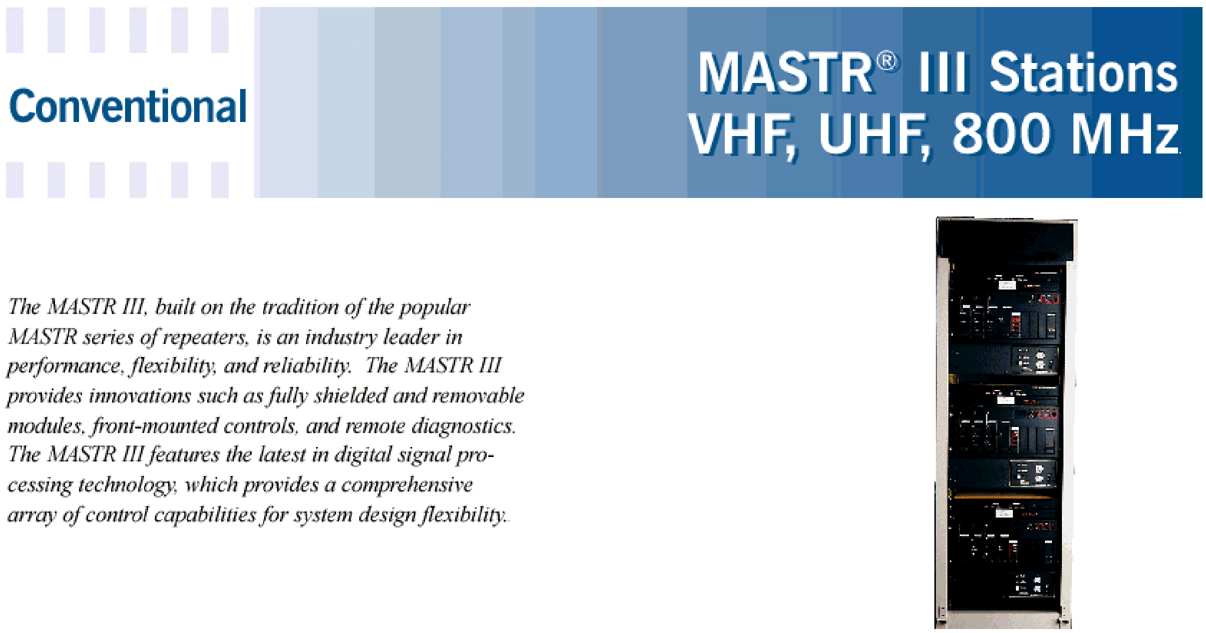
3. Equipment Under Test (EUT)

3.1 Product Functional Description

The product trade name of the unit tested was "M/A-COM MASTRIII 800 MHz Base Station".

Figure 3-1 provides a brief description of the tested product.

Figure 3-1 Product Description



3.2 Manufacturer Information

Company Name	M/A-COM, Inc.
Mailing Address	221 Jefferson Ridge Parkway, Lynchburg, Virginia, U.S.A., 24501
Product Name	M/A-COM MASTRIII 800 MHz Base Station

3.3 Transmitter Specifications

Table 3-1 lists the specifications of the transmitter under test.

Table 3-1: Transmitter Specifications

Circuit Pack	Fundamental Frequencies (MHz)
Tx power	10 to 100 W
Tx frequency	851 to 870 MHz
Channel spacing	851 – 866 MHz: 25 kHz 866 – 869 MHz: 12.5 kHz (NPSPAC)

3.4 System Components

The system tested consists of the following units, as shown in Table 3-2.

Table 3-2: MASTRIII 800 MHZ BTS Components

Component	Model	Serial Number
MASTRIII shelf	SXGPNX	9861756
Tx Synthesizer module	EA101685V5	SLR 04111439
Rx Synthesizer module	EA101684V5	SLR 04111322
Rx Front End module	19D902782G5	SLR 03182064
IF module	EA101794V1	SLR 03190963
System module	19D902590G6	SLR 02512492
DSP module	EA101800V1	SLR 03084077
Power module	19D902589G2	CKA 01390368
12 V Battery	Dynasty TEL 12-125	NR
Switching Power supply	PS103010V120	QG12659
Linear Power supply	19A149979P1	31725690
SitePro shelf	EA101209V1 R1B	SLR 02190892
SSI	CB101869V1/R1A	NR
Controller board	CB101069V2 P3A	NR
Analog board	CB10170V1 R6A	NR
RF Power Amplifier	EA101292V1	05322580

NR:not required

3.5 Support Equipment

The support equipment used for operation and monitoring of the EUT is described in Table 3-3.

Table 3-3: Support equipment

Description	Model Number
DELL Optiplex	GXpro
IBM Thinkpad PC	600E

3.6 System Set-up and Test Configurations

The system configuration used for all test cases is presented in Figure 3-2 and Figure 3-3.

Figure 3-2: Module configuration

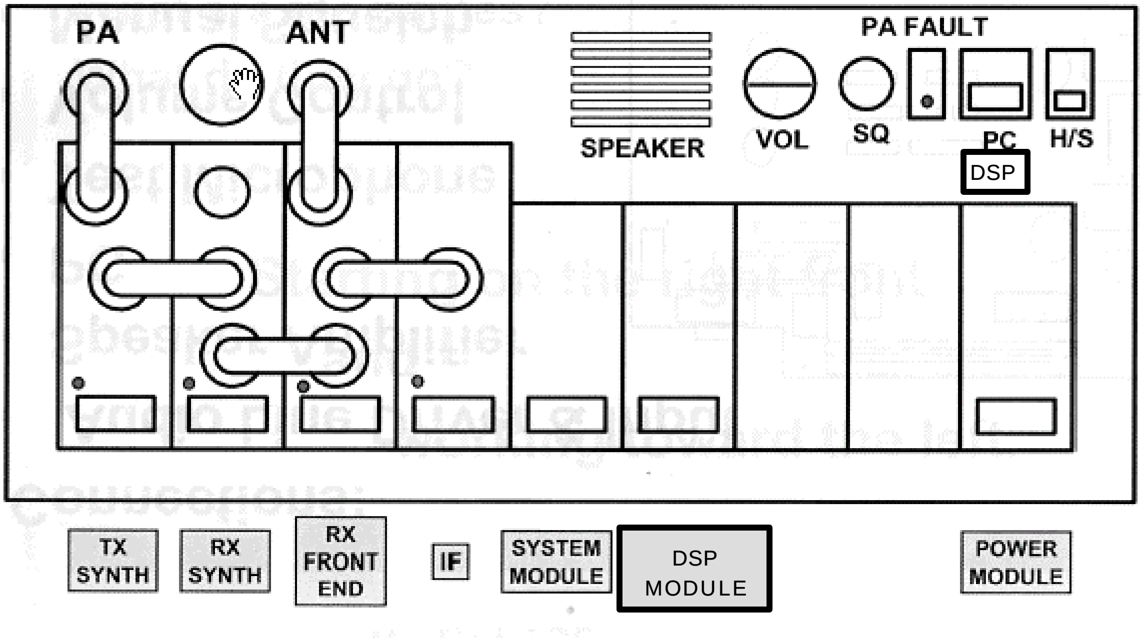
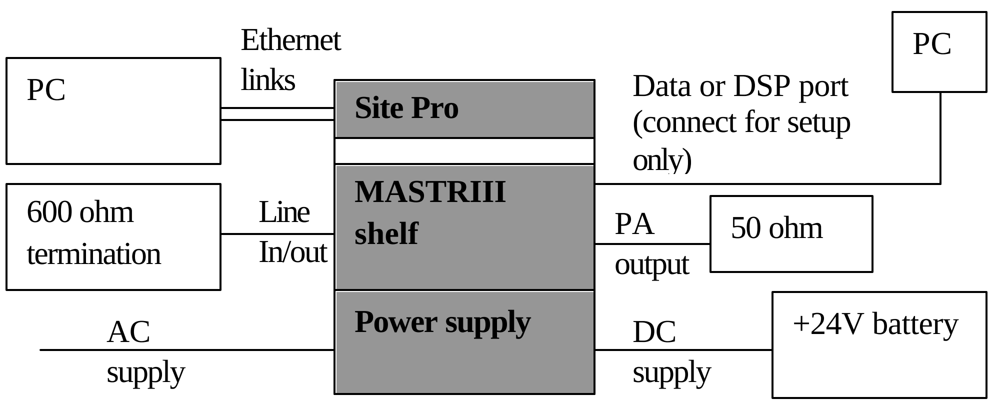


Figure 3-3: System Configuration



The BTS can be installed with 2 types of power supplies.

1. A switching mode power supply which includes a +24 V DC port for battery backup.
2. A linear power supply with no battery backup capability.

Both types of power supplies were evaluated, the results in this report are from the supply which had the highest emissions (linear supply).

A photograph of the test setup used in this test report is presented in Appendix B: Test Set-up Photographs, on page 40.

3.7 EUT Interfaces and Cables

The system contains the following interfaces, as shown in Table 3-4.

Table 3-4: System Cables

Interface Type	EUT Connection	Description	Type	Length	Qty
AC Mains	AC power supply	3 wire AC cord	unshielded	6 feet	1
DC Mains (only on the new version of the supply)	Battery connector of power supply	2 wire battery cable	unshielded	12 feet	1
Ethernet link	SitePro Ethernet 0 and 1 ports	Category 5 twisted pairs	unshielded	50 feet	2
Telephone line in/out	MASTRIII shelf	2 twisted pair	unshielded	6 feet	1

3.8 System Modifications

No modifications were required to pass the requirements.

4. General Test Conditions

4.1 Test Facility

Radiated emissions testing was performed in a 10-meter Ambient Free Chamber (AFC) located at 21 Richardson Side road, Kanata, Ontario, Canada. The AFC consists of a shielded room lined with ferrite tiles and anechoic material.

These test facilities are accredited by the Standards Council of Canada (SCC) [1]. Through a Mutual Recognition Agreement (MRA) between the National Voluntary Laboratory Accreditation Program (NVLAP) and SCC, the accreditation status of the AFC facility is valid for the U.S.

4.2 Measurement Instrumentation

The measurement instrumentation conforms to ANSI C63.2 [5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5. Detailed Test Results

5.1 RF Power

5.1.1 Test Specification

The system was tested to the requirements listed in Table 5-1:

Table 5-1: RF Power Requirements

Requirement	Part / Section
FCC	90.205, 2.1046
RSS-119	5.4

5.1.1.1 Limits

The system was tested to the rated power of the EUT, listed in Table 5-2.

Table 5-2: RF Power Limit

Rated power
10 to 100 W

5.1.2 Test Facility Information

Location: Solectron Technical Centre Lab 1

Date tested: July 22, 2004

Tested by: Denis Lalonde

5.1.3 Test Procedure

The output of the power amplifier was connected to a power meter using a calibrated RF attenuator and cable.

The unmodulated RF signal was set at both extremities and in the middle of the frequency band. The lowest and highest possible power levels were evaluated.

5.1.4 Test Results

Test results are shown in Table 5-3.

Table 5-3: RF Power Levels

Channel (MHz)	Low Power (dBm)	Hi Power (dBm)
851.0125	40.2	50.0
860.0	40.1	50.0
869.9875	40.1	50.0

5.1.5 Test Conclusion

The test results met the requirement.

5.1.6 Test Equipment List

Table 5-4: Test Equipment used for RF Power

Category	Manufacture	Model Number	Description	Serial Number	Cal. Due
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Power meter	Anritsu	M2438A	Power meter	SSG012588	27 April 2005
Power sensor	Anritsu	M2424A	Power sensor	SSG012587	27 April 2005

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6].Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.2 Conducted Spurious Emissions

5.2.1 Test Specification

The system was tested to the limits of the requirements listed in Table 5-5:

Table 5-5: Conducted Spurious Emissions Requirement

Requirement	Part / Section
FCC	90.210, 2.1051
RSS-119	6.3

5.2.1.1 Limits

The following specification levels are applicable to this test:

Table 5-6: Conducted Spurious Emission Limit

Frequency Range (MHz)	Limit (dBm)
30 to 8690	-13

5.2.2 Test Facility Information

Location:	Solectron Technical Centre Lab 1
Date tested:	July 29 & 30, 2004
Tested by:	Denis Lalonde

5.2.3 Test Procedure

Conducted spurious emissions were measured at the bottom, middle, and top of the 851 to 870 MHz frequency band. The measurement was repeated while the power amplifier was operating at 10 W and 100 W.

The signal used for measurements at 851.0125 and 860.0 MHz was a Digital pseudo-random signal (2 level, 9600 baud with +/-3000 Hz deviation). The signal used at 869.9875 MHz was a NPSPAC pseudo-random signal (2 level, 9600 baud with +/-2400 Hz deviation).

The measurement was separated in 3 frequency bands;

1. 30 MHz to 1 GHz: the power amplifier output is connected to the spectrum analyzer through a 10 dB and a 20 dB attenuator.
2. 1 GHz to 2.75 GHz: the power amplifier output is connected to the spectrum analyzer through a 10 dB attenuator and a notch filter.
3. 2.75 GHz to 8.7 GHz: the power amplifier output is connected to the spectrum analyzer through a 10 dB attenuator and a high-pass filter.

5.2.4 Test Results

The test result are shown in Table 5-7.

Table 5-7: Conducted Spurious Emissions

Channel (MHz)	Highest Emission Low Power Mode (dBm)	Highest Emission Hi Power Mode (dBm)	Reference
851.0125	-29.7 dBm	-23.2 dBm	Figure 7-2 to Figure 7-7
860.0	-30.0 dBm	-23.8 dBm	Figure 7-8 to Figure 7-13
869.9875	-29.5 dBm	-23.7 dBm	Figure 7-14 to Figure 7-19

5.2.5 Test Conclusion

The test results met the requirement.

5.2.6 Test Equipment List

Table 5-8: Test Equipment used for Conducted Spurious Emissions

Category	Manufacture	Model Number	Description	Serial Number	Cal. Due
Attenuator	Weinschel	53-10-33	10 dB, 500 W	KT039	11 Feb. 2005
Attenuator	Weinschel	6070-20	20 dB, 25 W	BE0847	22 Apr. 2005
Spectrum analyzer	HP	8564E	40 GHz	SSG012069	28 Apr. 2005
High Pass filter	FSY Microwave	HR2380-11XNXN	2.5 GHz high pass	002	NA
Notch filter	Wainwrigth Instruments	WRCAS915/960-0.2/40-6EE	Tunable notch filter	1	NA
Signal generator	HP	83732A	20 GHz	3314A00190	4 Nov. 2004

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.3 Emission Mask

5.3.1 Test Specification

The system was tested to the limits of the requirements listed in Table 5-9:

Table 5-9: Emission Mask Requirement

Requirement	Part / Section
FCC	90.210, 2.1049
RSS-119	6.4

5.3.1.1 Limits

The specification levels in Table 5-10 were used.

Table 5-10: Emission Mask Limits

Frequency Range (MHz)	Audio modulation	2 level/9600 baud modulation, C4FM modulation, NPSPAC modulation
851 to 866	Mask B	Mask G
866 to 869	Mask B	Mask H

5.3.2 Test Facility Information

Location: Solectron Technical Centre Lab 1

Date tested: July 23, 2004

Tested by: Denis Lalonde

5.3.3 Test Procedure

Four emission mask measurements were performed at 860 MHz and two at 869.9875 MHz. The six different modulated signals were evaluated as follows:

1. Analog signal: the power amplifier output was modulated with a 2500 Hz signal which had a level 16 dB higher than what was required to produce a deviation of 50% of rated system deviation (5 kHz) at 1 kHz. Tested at 860 MHz.
2. Two level/9600 baud modulation: the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 3 kHz deviation. Tested at 860 MHz.
3. Two level/9600 baud modulation: the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 1.9 kHz deviation. Tested at 860 MHz.
4. C4FM modulation: the power amplifier output was modulated with a C4FM pseudo-random signal which had the level required for a maximum of +/- 2826 Hz deviation. Tested at 860 MHz.
5. NPSPAC modulation (9600 baud): the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 2.4 kHz deviation. Tested at 869.9875 MHz.
6. NPSPAC modulation (analog) : the power amplifier output was modulated with a 2500 Hz signal which had a level 16 dB higher than what was required to produce a deviation of 50% of rated system deviation (4 kHz) at 1 kHz. Tested at 869.9875 MHz.

For all of these measurements, the power amplifier output was connected to the spectrum analyzer through a 10 dB and a 20 dB attenuator.

5.3.4 Test Results

Table 5-11 lists the highest emissions measured:

Table 5-11: Emission Mask Results

Type of signal	Test result	Reference
2500 Hz Audio	Pass	Figure 7-20
2 level 9600 baud / 3 KHz deviation	Pass	Figure 7-21
2 level 9600 baud / 1.9 KHz deviation	Pass	Figure 7-22
C4FM	Pass (99% bandwidth = 8.2 kHz)	Figure 7-23
NPSPAC (9600 baud)	Pass	Figure 7-24
NPSPAC (analog)	Pass	Figure 7-25

5.3.5 Test Conclusion

The test results met the requirement.

5.3.6 Test Equipment List

Table 5-h12: Test Equipment used for Emission Mask

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Spectrum analyzer	HP	8564E	40 GHz	SSG012069	28 Apr. 2005

The measurement instrumentation conforms to ANSI C63.2[5]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.4 Field Strength of Spurious Emissions

5.4.1 Test Specification

The system was tested to the limits of the following requirements:

Table 5-13: Emission Mask Requirement

Requirement	Part / Section
FCC	90.210, 2.1053

5.4.1.1 Limits

The following specification levels are worst-case limits taken from all test specifications.

Table 5-14: Field Strength of Spurious Emissions Limit

Frequency Range (MHz)	ERP Limit (dBm)
30 to 8690	-13

5.4.2 Test Facility Information

Location: Solectron Technical Centre 10m Ambient Free Chamber

Date tested: September 17, 2004

Tested by: Stirling Cullen and Denis Lalonde

5.4.3 Test Procedure

Verifications of the test equipment and AFC were performed prior to the installation of the EUT in accordance with the quality assurance procedures in KP000270-LP-EMC-01-DF [7]. The test was performed as per the relevant Test procedures: ANSI C63.4 [4].

The system was tested in the following manner:

- The EUT was placed on a turntable inside the AFC and it was configured as in normal operation. The system and its cables were separated from the ground plane by an insulating support 10 mm in height. The system was grounded in accordance with its normal installation specifications. No additional grounding connections are allowed.
- For tests between 30 MHz and 1 GHz a broadband bilog antenna was placed at a 10 m distance; a horn antenna, placed also at 10 m distance from the EUT, was used for measurements between 1 GHz and 8.7 GHz.
- A pre-scan was performed to find emissions (frequencies) requiring detail measurement. The pre-scan (using a peak detector) was performed by rotating the system 360 degrees while recording all emissions (frequency and amplitude). This procedure was repeated for antenna heights of 1 to 4 meters, in steps of 1 meter, and for horizontal and vertical polarizations of the receiving antenna (for measurements above 30 MHz).
- Prescan optimization was performed based on the pre-scan data. All frequencies, having emission levels within 10 dB of the specification(s) limits, were optimized. For each such frequency, the EUT was rotated in azimuth over 360 degrees and the direction of maximum emission was noted. Antenna height was then varied from 1 to 4 meters at this azimuth to obtain maximum emissions. The procedure was repeated for both horizontal and vertical polarizations of the search antenna. Then the maximum level measured was recorded.
- The frequency range investigated was 30 MHz to 8.7 GHz.

- Between 30 MHz and 1 GHz, a resolution bandwidth of 120 kHz was used.
- Above 1 GHz, a 1 MHz resolution bandwidth and 1 MHz video bandwidth were used.
- The highest emissions were evaluated using the substitution method. This is accomplished by replacing the EUT by a calibrated antenna, cable and signal generator. This equipment is used to transmit a signal that will generate a RF meter reading level identical to the one recorded when the EUT was present. The signal generator power level, the calibration data of the cable and antenna is then used to evaluate the Effective Radiated Power (ERP) of the EUT. The following formula is used:

ERP = Signal generator level – Cable losses + Antenna gain (dBi) – Gain of tuned dipole (dBi)

Margin = Limit – ERP

The measurement was performed while the power amplifier was operating at 10 W and 100 W. A 9600 baud 2 level digital signal at 860 MHz was used for this test. A 50 ohm load was connected to the power amplifier output.

5.4.4 Test Results

Table 5-15 lists the highest emissions measured, all other emission had more than 20 dB margin:

Table 5-15: Field Strength of Spurious Emissions

Freq. of Emission (MHz)	Signal Generator Level Hi Power (dBm)	Antenna Gain (dBi)	Cable losses (dB)	ERP Low Power (dBm)	ERP Hi Power (dBm)	Margin (dB)	Reference
1720	-36.8	8.5	1.3	<-38	-31.8	18.8	Figure 7-26 to Figure 7-29
2580	-30.2	9.7	1.3	<-44	-24.0	11.0	Figure 7-26 to Figure 7-29
3440	-41.2	9.8	2.3	<-35	-35.9	22.9	Figure 7-26 to Figure 7-29
4300	-42.4	10.4	2.6	<-46.8	-36.8	23.8	Figure 7-26 to Figure 7-29
5160	-40.1	10.8	3.0	<-44.5	-34.5	21.5	Figure 7-26 to Figure 7-29
6020	-37.9	11.3	3.5	<-52.3	-32.3	19.3	Figure 7-26 to Figure 7-29
7740	-46.7	11.3	3.0	<-50.6	-40.6	27.6	Figure 7-26 to Figure 7-29

5.4.5 Test Conclusion

The test results met the requirement.

5.4.6 Test Equipment List

Table 5-16: Test Equipment used for Field Strength of Spurious Emissions

Description	Manufacture	Model	Serial Number	Cal. Due
Bilog Antenna	Antenna Research	LPB 2520A	SSG012299	2-Mar-05
Double Ridged Horn	Emco	3115	SSG012298	29-Dec-04
Pre-Amplifier	BNR	LNA	SSG012360	11-Feb-05
Quasi-Peak Adapter, HP85650A, (EMI # 2)	HP	85650A	SSG013046	25-Nov-04
RF Amplifier, HP8447 # 1	Agilent	8447D	SSG013045	25-Oct-04
Signal Generator	Anritsu	68247B	SSG012401	13-Feb-05
Spec. A, RF PreSelector, HP85685A (AFC #1)	HP	85685A	SSG012010	29-Apr-05
Spectrum Analyzer Display, HP 85662A	HP	85662A	SSG012433	29-Apr-05
Spectrum Analyzer, HP8566B, (AFC #1)	HP	8566B	SSG012521	29-Apr-05
Sucoflex Cable	Huber & Suhner	104PEA	SSG012219	6-Nov-04
Sucoflex Cable, EMC Cable # 1	Huber & Suhner	106A	SSG012454	12-Feb-05
Sucoflex Cable, EMC Cable # 2	Huber & Suhner	106A	SSG012453	12-Feb-05
Sucoflex Cable, EMC Cable # 5	Huber & Suhner	104PEA	SSG012359	11-Feb-05
Sucoflex Cable, EMC Cable # 6	Huber & Suhner	106A	SSG012456	12-Feb-05
Sucoflex Cable, EMC Cable # 8	Huber & Suhner	104	SSG012302	29-Dec-04
Sunol Sciences	SC99V	Dual mast & turntable ctrl'r	120498-1	Not Required
UL	EMI Software		V 3.02	Not Required
Utiflex Cable, EMC Cable # 4	Micro-Coax	UFA 147B-1-0300-70X70	SSG012309	24-Jan-05
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846
Double Ridged Horn	Emco	3115	SSG012508	24-Feb-05
Signal Generator	Wiltron	69369A	SSG012138	25-Oct-04

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.5 Frequency Stability

5.5.1 Test Specification

The system was tested to the limits of the following requirements:

Table 5-17: Frequency Stability Requirement

Requirement	Part / Section
FCC	90.213, 2.1055
RSS-119	7.0

5.5.1.1 Limits

The specification levels are listed in Table 5-18.

Table 5-18: Frequency Stability Limits

Frequency Range (MHz)	Minimum Frequency Stability (ppm)
851 to 866	1.5
866 to 869 MHz	1.0

5.5.2 Test Facility Information

Location: Solectron Technical Centre Lab 9

Date tested: August 5 to 18, 2004

Tested by: Denis Lalonde

5.5.3 Test Procedure

The unmodulated output of the power amplifier was connected through attenuators into a frequency counter. A 10 MHz rubidium frequency reference was used to provide improved frequency accuracy to the counter.

The base station was installed in an environmental chamber. The temperature was changed from – 30 degree Celsius up to 50 degree Celsius in 10 degree increments while the EUT was powered off. The temperature was allowed to stabilize for 1 hour after changing the temperature. The measurement of frequency was done 5 minutes after the base station was powered on.

The frequency accuracy was tested while the BTS was powerered by:

- Linear AC power supply
- AC Switching Mode power supply
- DC operation on the Switching Mode power supply

Frequency accuracy measurement were also performed at 25 degree Celsius while modifying the voltage of the mains from 85% to 115% of the nominal value.

5.5.4 Test Results

Table 5-19 to Table 5-21 lists the frequency stability measurement results:

Table 5-19: Frequency Stability Results (Linear Power Supply)

Temperature (degree. Celsius)	AC Supply Voltage (V)	Frequency (MHz)	Frequency Error (ppm)
-30	120	860.000788	0.92
-20	120	860.000755	0.88
-10	120	860.000519	0.60
0	120	860.000317	0.37
10	120	860.000360	0.42
20	120	860.000310	0.36
30	120	860.000580	0.67
40	120	860.000562	0.65
50	120	860.000402	0.47
25	102	860.000410	0.48
25	120	860.000412	0.48
25	138	860.000411	0.48

Table 5-20: Frequency Stability Results (Switching Mode Power Supply)

Temperature (degree. Celsius)	AC Supply Voltage (V)	Frequency (MHz)	Frequency Error (ppm)
-30	120	860.000711	0.83
-20	120	860.000760	0.88
-10	120	860.000566	0.66
0	120	860.000346	0.40
10	120	860.000341	0.40
20	120	860.000301	0.35
30	120	860.000456	0.53
40	120	860.000510	0.59
50	120	860.000348	0.40
25	102	860.000414	0.48
25	120	860.000413	0.48
25	138	860.000414	0.48

Table 5-21: Frequency Stability Results (DC Operation on the Switching Mode Power Supply)

Temperature (degree. Celsius)	DC Supply Voltage (V)	Frequency (MHz)	Frequency Error (ppm)
-30	24	860.000680	0.79
-20	24	860.000669	0.78
-10	24	860.000396	0.46
0	24	860.000261	0.30
10	24	860.000249	0.29
20	24	860.000329	0.38
30	24	860.000388	0.45
40	24	860.000430	0.50
50	24	860.000286	0.33
25	20.4	860.000393	0.46
25	24	860.000399	0.46
25	27.6	860.000388	0.45

5.5.5 Test Conclusion

The test results met the requirement.

5.5.6 Test Equipment List

Table 5-22: Test Equipment used for Signal Leads Conducted Emissions

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Frequency Reference	UCT	2008	Rubidium 10 MHz	A1010	April 27, 2005
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Environmental Chamber	Sexton Espec			15	April 23, 2005
Multimeter	Fluke	83		SSG0012586	April 20, 2005
Variac	EAB	FW20 HMT 3A		SSG0013038	NA
Frequency Counter	HP	5385A		SSG0012633	April 27, 2005

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.6 Audio Frequency Response

5.6.1 Test Specification

The system was tested to the limits of the following requirement:

Table 5-23: Frequency Response Requirement

Requirement	Part / Section
FCC	2.1047

5.6.1.1 Limits

The specification levels are listed in Table 5-24.

Table 5-24: Frequency Response Limit

Frequency Range (kHz)	TIA 603-b [11] Recommended Response (dB)
0.3 to 2.5	+1 dB or -3 dB from a true 6 dB per octave pre-emphasis characteristic as referenced to the 1000 Hz level. The exception is from 500 Hz to 300 Hz, where an additional 6 dB per octave rolloff is allowed.
2.5 to 3	An additional 6 dB per octave attenuation is allowed

5.6.2 Test Facility Information

Location: Solectron Technical Centre Lab 1

Date tested: July 23, 2004

Tested by: Denis Lalonde

5.6.3 Test Procedure

The frequency deviation of the transmitter output was initially set to 20% of the rated system deviation at 1 kHz by varying the level in the audio input signal to the base station. The frequency of the input signal was then swept from 100 Hz to 5 kHz while keeping the input level constant. The frequency deviation was recorded as the input frequency was changed.

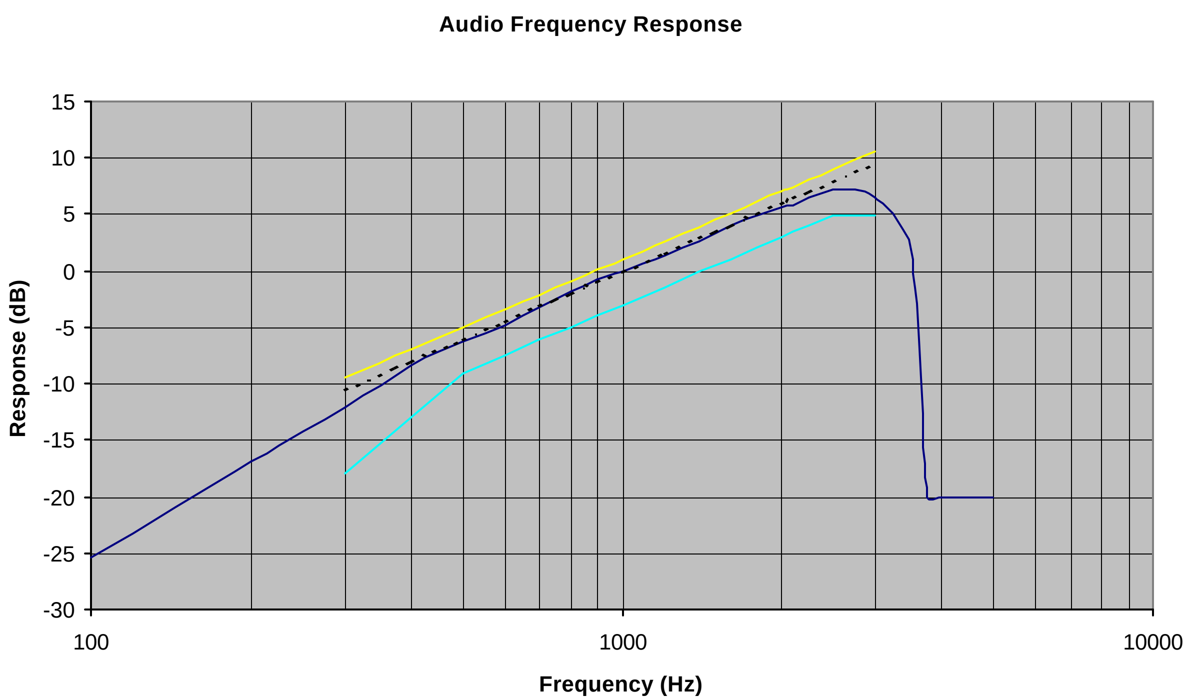
The frequency response was determined by the following formula.

Response (dB) = 20 log (measured frequency deviation/frequency deviation at 1 kHz)

5.6.4 Test Results

Figure 5-1 illustrates the frequency response of the system:

Figure 5-1: Frequency Response Results



5.6.5 Test Conclusion

The test results met the requirement.

5.6.6 Test Equipment List

Table 5-25: Test Equipment used for Frequency Response Measurement

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Modulation Domain analyzer	HP	53310A		3121A01217	14/08/2004
Transmission Test Set	HP	4934A		3547U12666	23 Feb. 2005
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.7 Audio Low Pass Filter Response

5.7.1 Test Specification

The system was tested to the limits of the following requirements:

Table 5-26: Audio Low Pass Filter Response Requirement

Requirement	Part / Section
FCC	2.1047
RSS-119	6.6

5.7.1.1 Limits

The specification levels are listed in Table 5-27.

Table 5-27: Audio Low Pass Filter Response Limit

Frequency Range (kHz)	RSS-119 Recommended Attenuation (dB)
3 to 20	60 log (freq.(Hz)/3000)
20 to 30	50

5.7.2 Test Facility Information

Location:	Solectron Technical Centre Lab 1
Date tested:	July 23, 2004
Tested by:	Denis Lalonde

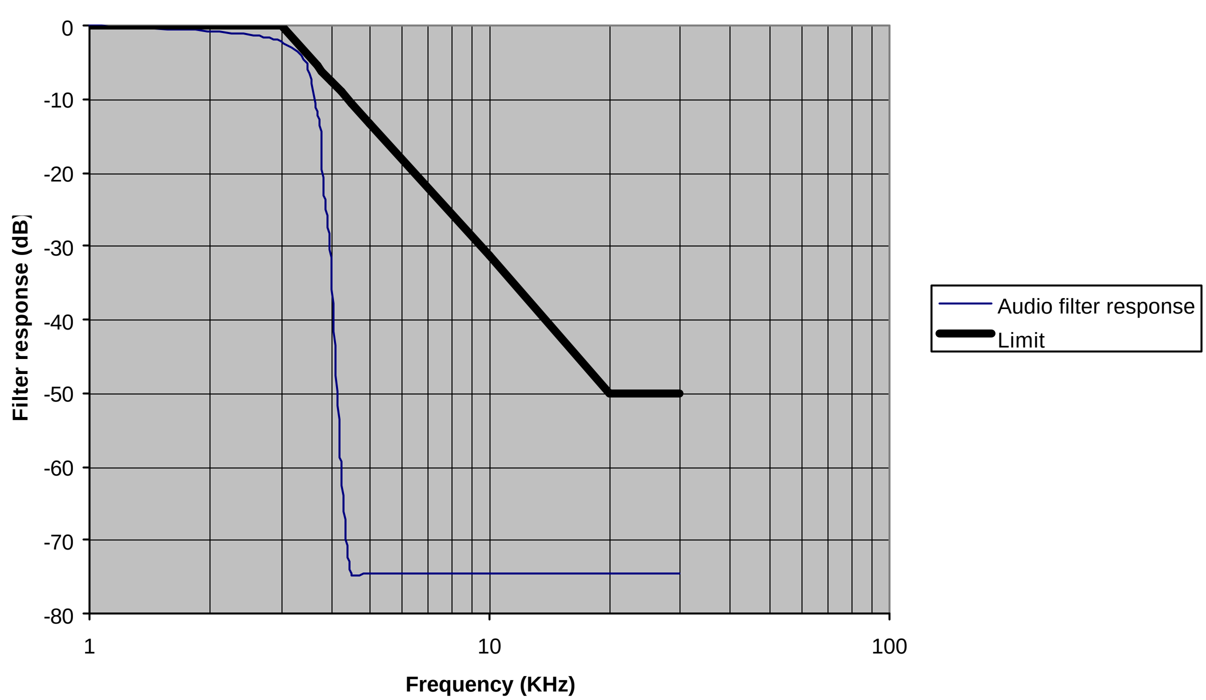
5.7.3 Test Procedure

The system was initially set to transmit a signal with a deviation of 60% of the system rated deviation at 1 kHz. The output of the power amplifier was connected to a FM demodulator. The demodulated output was then fed into an audio signal analyzer. The audio signal analyzer measured the amplitude of the demodulated audio signal while the frequency of the transmitter audio signal was increased from 1 kHz to 30 kHz. The measured amplitude of the audio signal amplitude was recorded for each frequency measurement.

5.7.4 Test Results

Figure 5-2 shows the low pass filter response measurement results.

Figure 5-2 Audio Low Pass Filter Response



5.7.5 Test Conclusion

The test results met the requirement.

5.7.6 Test Equipment List

Table 5-28: Test Equipment used for Audio Low Pass Filter Response Measurement

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Spectrum analyzer	HP	3585A	40 MHz, 1 Mohm IN	1750A02942	13/08/2004
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Modulation Domain analyzer	HP	53310A		3121A01217	14/08/2004
Transmission Test Set	HP	4934A		3547U12666	23 Feb. 2005

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.8 Modulation Limiting

5.8.1 Test Specification

The system was tested to the limits of the following requirements:

Table 5-29: Modulation Limiting Requirement

Requirement	Part / Section
FCC	2.1047

5.8.1.1 Limits

The specification levels are listed in Table 5-30.

Table 5-30: Modulation Limiting Limit

Relative input signal level (dB)	Deviation (kHz)
-20 to 20	< rated deviation (5 kHz)

5.8.2 Test Facility Information

Location: Solectron Technical Centre Lab 1

Date tested: July 23, 2003

Tested by: Denis Lalonde

5.8.3 Test Procedure

The system was initially set to transmit a signal with a deviation of 60% of the system rated deviation at 1 kHz. The input level required for this deviation was then recorded as the reference level. The positive peak and negative peak frequency deviation was then recorded while the input signal was changed from –20 dB to 20 dB relative to the reference level. This was repeated for an input signal of 300 Hz and 2500 Hz.

5.8.4 Test Results

Figure 5-3 and Figure 5-4 shows the modulation limiting measurement results:

Figure 5-3 Modulation Limiting, Positive Peak

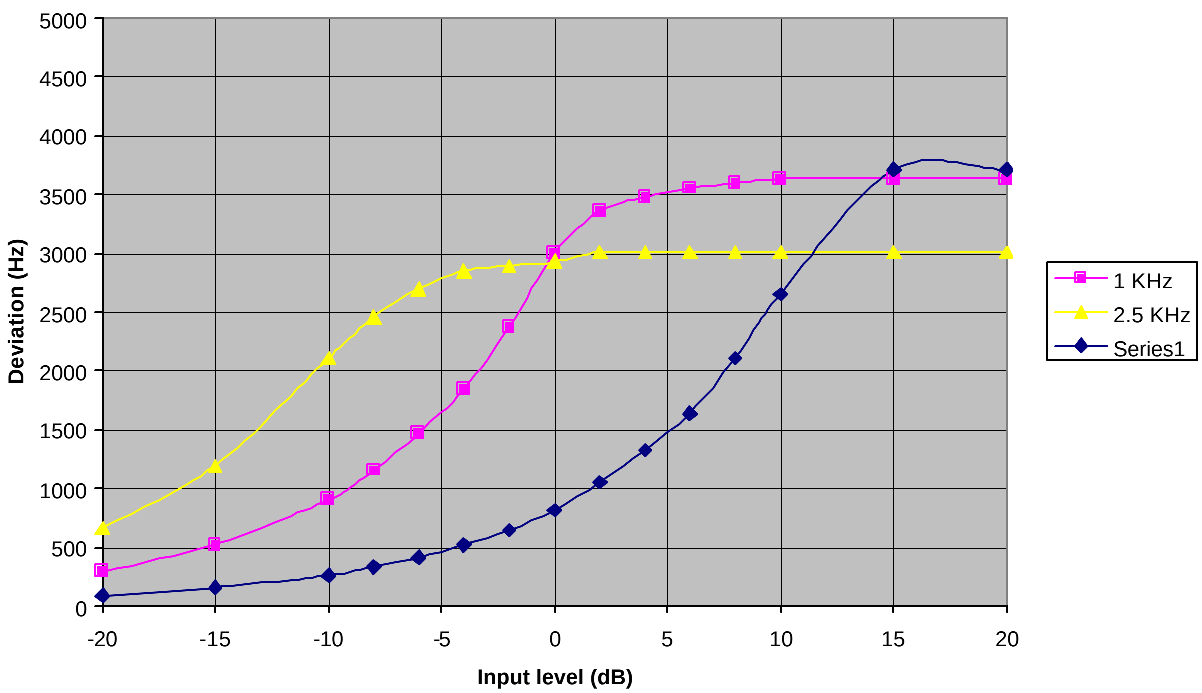
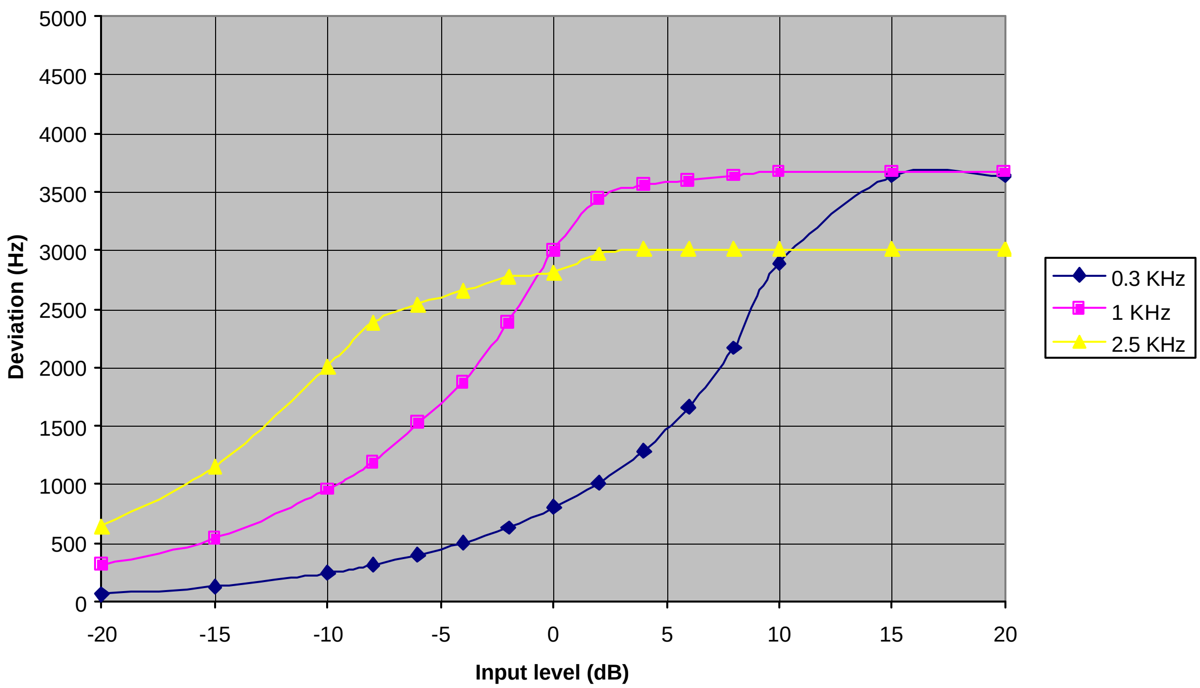


Figure 5-4 Modulation Limiting, Negative Peak



5.8.5 Test Conclusion

The test results met the requirement.

5.8.6 Test Equipment List

Table 5-31: Test Equipment used for Audio Low Pass Filter Response Measurement

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Modulation Domain analyzer	HP	53310A		3121A01217	14/08/2004
Transmission Test Set	HP	4934A		3547U12666	23 Feb. 2005

The measurement instrumentation conforms to ANSI C63.2[5] and CISPR 16 [6]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

5.9 Occupied Bandwidth

5.9.1 Test Specification

The system occupied bandwidth was evaluated according to the specifications listed in Table 5-32.

Table 5-32: Occupied Bandwidth

Requirement	Part / Section
FCC	2.202
RSP-100	7.2

5.9.2 Test Facility Information

Location: Solectron Technical Centre Lab 1

Date tested: July 23, 2004

Tested by: Denis Lalonde

5.9.3 Test Procedure

Four occupied bandwidth measurements were performed at 860 MHz and two at 869.9875 MHz. The six different modulated signals were evaluated as follows:

1. Analog signal: the power amplifier output was modulated with a 2500 Hz signal which had a level 16 dB higher than what was required to produce a deviation of 50% of rated system deviation (5 kHz) at 1 kHz. Tested at 860 MHz.
2. Two level/9600 baud modulation: the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 3 kHz deviation. Tested at 860 MHz.
3. Two level/9600 baud modulation: the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 1.9 kHz deviation. Tested at 860 MHz.
4. C4FM modulation: the power amplifier output was modulated with a C4FM pseudo-random signal which had the level required for a maximum of +/- 2826 Hz deviation. Tested at 860 MHz.
5. NPSPAC modulation (9600 baud): the power amplifier output was modulated with a 2 level 9600 baud pseudo-random signal which had the level required for +/- 2.4 kHz deviation. Tested at 869.9875 MHz.
6. NPSPAC modulation (analog) : the power amplifier output was modulated with a 2500 Hz signal which had a level 16 dB higher than what was required to produce a deviation of 50% of rated system deviation (4 kHz) at 1 kHz. Tested at 869.9875 MHz.

For all of these measurements, the power amplifier output was connected to the spectrum analyzer through a 10 dB and a 20 dB attenuator.

The occupied bandwidth was measured using the 99% bandwidth measuring feature of the spectrum analyzer.

5.9.4 Test Results

Table 5-33 lists the occupied bandwidth calculated and measured:

Table 5-33: Occupied bandwidth values

Type of signal	Calculation	Measurement (kHz)	Emission designator
Audio	Max. modulation (M) = 3 kHz Max. deviation (D) = 5 kHz K = 1 Bn = 2M + 2DK Bn = 16 kHz	10.4 kHz Figure 7-30 (measured with 2.5 kHz tone)	16K0F3E
2 level 9600 baud / 3 KHz deviation	Max. modulation (B) = 9.6 kHz Max. deviation (D) = 3 kHz K = 1 Bn = B + 2DK Bn = 15.6 kHz	10.8 kHz Figure 7-31	10K8F1D 10K8F1E
2 level 9600 baud / 1.9 KHz deviation	Max. modulation (B) = 9.6 kHz Max. deviation (D) = 1.9 kHz K = 1 Bn = B + 2DK Bn = 13.44 kHz	8.2 kHz Figure 7-32	8K2F1D 8K2F1E
C4FM	Max. modulation (B) = 4.8 kHz Max. deviation (D) = 2.826 kHz K = 1 Bn = B + 2DK Bn = 10.452 kHz	7.8 kHz Figure 7-33	7K8F1D 7K8F1D
NPSPAC (9600 baud)	Max. modulation (B) = 9.6 kHz Max. deviation (D) = 2.4 kHz K = 1 Bn = B + 2DK Bn = 14.4 kHz	10.5 kHz Figure 7-34	10K5F1D 10K5F1E
NPSPAC (analog)	Max. modulation (M) = 3 kHz Max. deviation (D) = 4 kHz K = 1 Bn = 2M + 2DK Bn = 14 kHz	10.2 kHz Figure 7-35 (measured with 2.5 kHz tone)	14K0F3E

5.9.5 Test Equipment List

Table 5-34: Test Equipment used for Occupied bandwidth

Category	Manufacture	Model	Description	Serial Number	Cal. Due
Attenuator	Weinschel	53-20-33	20 dB, 500 W	KW975	22 April 2005
Attenuator	Weinschel	6070-10	10 dB, 25 W	BE0846	25 Oct. 2005
Spectrum analyzer	HP	8564E	40 GHz	3835A01346	03/09/2004

The measurement instrumentation conforms to ANSI C63.2[5]. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

6. References

1. Standards Council of Canada Scope of Accreditation Letter SCC 1003-15/163 dated 2002-12-16 (Scope of accreditation is effective until 2005-10-05 and includes FCC Part 15 and ICES-003). This scope of accreditation is outlined at the following web site http://www.scc.ca/scopes/reg126-eng-s.pdf.
2. C-MAC Engineering Inc. Quality Manual, K0000608-QD-QM-01-07, July 2004.
3. C-MAC Engineering Inc. Lab Operations Manual KG000347-QD-LAB-01-05, June 7, 2004.
4. ANSI C63.4-2001, 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, 17 June 2001.
5. ANSI C63.2-1996, American National Standard for Electromagnetic Noise and Field Strength Instrumentation, 10 Hz to 40 GHz – Specifications.
6. CISPR 16-1, Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1: Radio Disturbance and Immunity Measuring Apparatus, Edition 2.0, 1999-10.
7. C-MAC Engineering Inc., EMC General Lab Test Procedure, KP000270-LP-EMC-01-04, July 2004.
8. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations), Part 2, U.S. Federal Communications Commission.
9. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations), Part 90, U.S. Federal Communications Commission.
10. RSS-119, Issue 6, "Land Mobile and Fixed Radio, Transmitters and Receivers, 27.41 to 960 MHz" March 25, 2000.
11. ANSI/TIA-603-B-2002, "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards", November 7, 2002
12. VCCI, V-3/02.04 16th edition, April 2002.Title: AGREEMENT OF VOLUNTARY CONTROL COUNCIL FOR INTERFERENCE BY INFORMATION TECHNOLOGY EQUIPMENT
13. APLAC, Asia Pacific Laboratory Accreditation Cooperation, Website (February 10th, 2004): http://www.aplac.org.
14. ILAC, International Laboratory Accreditation Cooperation, Website (February 10th, 2004): http://www.ilac.org/
15. Industry Canada, RSS 212, Test Facilities and Test Methods for Radio Equipment, Issue 1 (Provisional), February 27, 1999.

7. Appendices

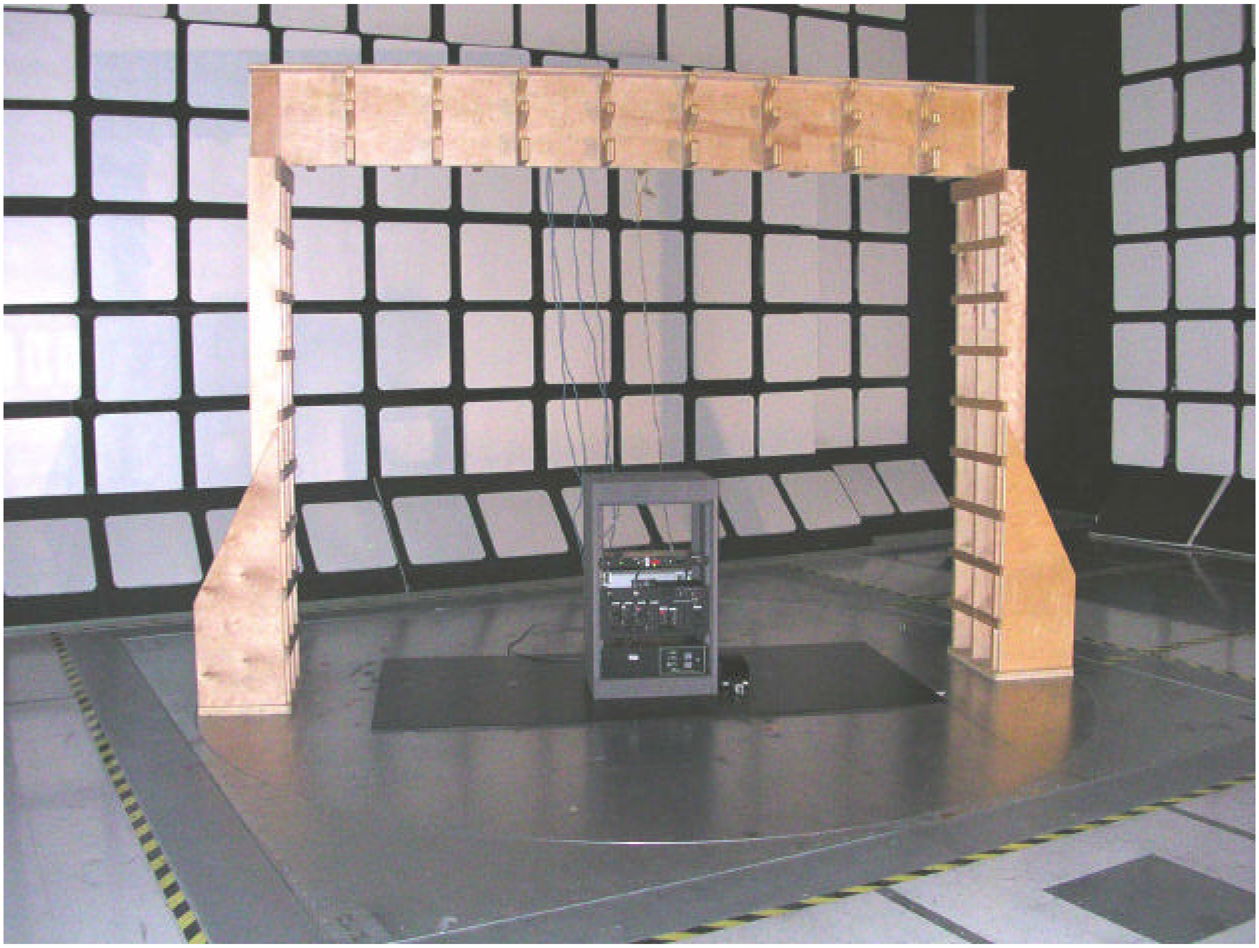
7.1 Appendix A: Glossary

Included below are definitions and abbreviations of terms used in this document.

Term	Definition
AC	Alternating Current
AFC	Ambient Free Chamber
AM	Amplitude modulation
ANSI	American National Standards Institute
AVG	Average detector
CISPR	Comité International Spécial Perturbation Radioélectrique (International Special Committee on Radio Interference)
Class A	Class A Limits for typical commercial establishments
Class B	Class B Limits for typical domestic and residential establishments
dB	Decibel
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EN	European Normative
EUT	Equipment Under Test
FCC	Federal Communications Commission, USA
GND	Ground
IC	Industry Canada
PA	Broadband Power Amplifier
RBW	Resolution Bandwidth
RF	Radio-Frequency
RFI	Radio-Frequency Interference
SCC	Standards Council of Canada

7.2 Appendix B: Test Set-up Photographs

Figure 7-1: M/A-COM MASTRIII 800 MHz Base Station Radiated Emissions Set-up



7.3 Appendix C: Conducted Spurious Emissions Plots

Figure 7-2: Tx at 851.0125 MHz, 100 W Power, 30 MHz to 1 GHz

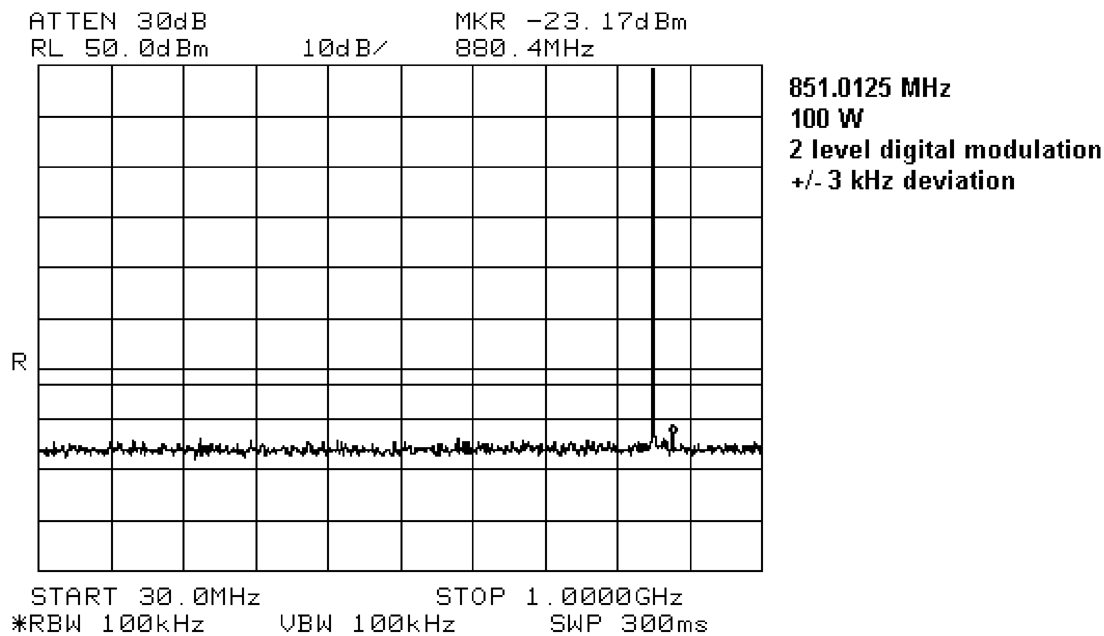


Figure 7-3: Tx at 851.0125 MHz, 100 W Power, 1 GHz to 2.75 GHz

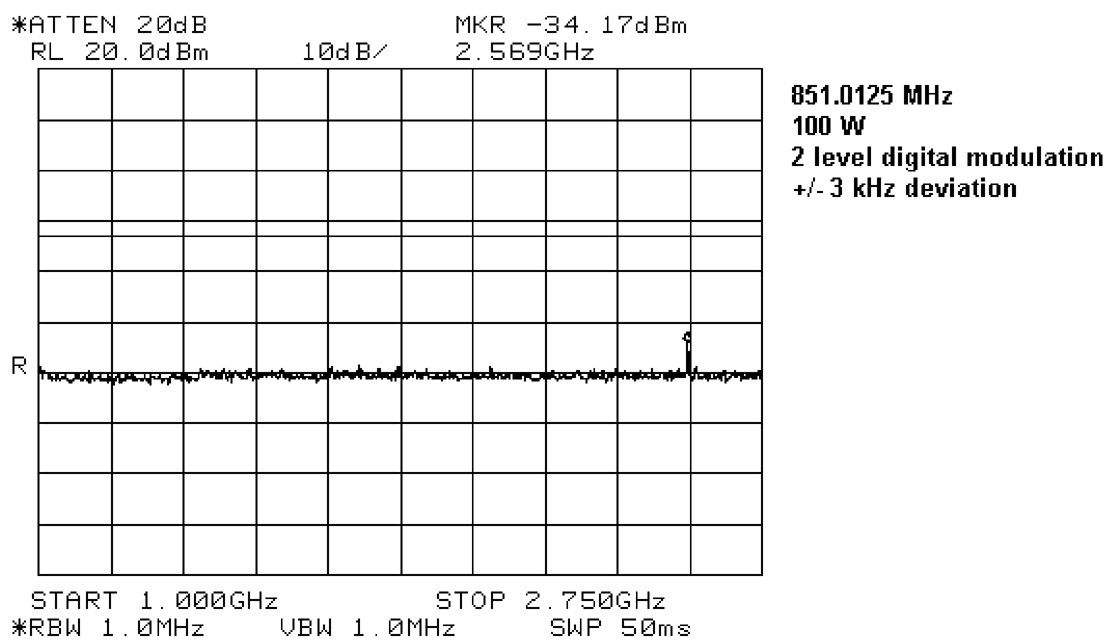


Figure 7-4: Tx at 851.0125 MHz, 100 W Power, 2.75 GHz to 8.7 GHz

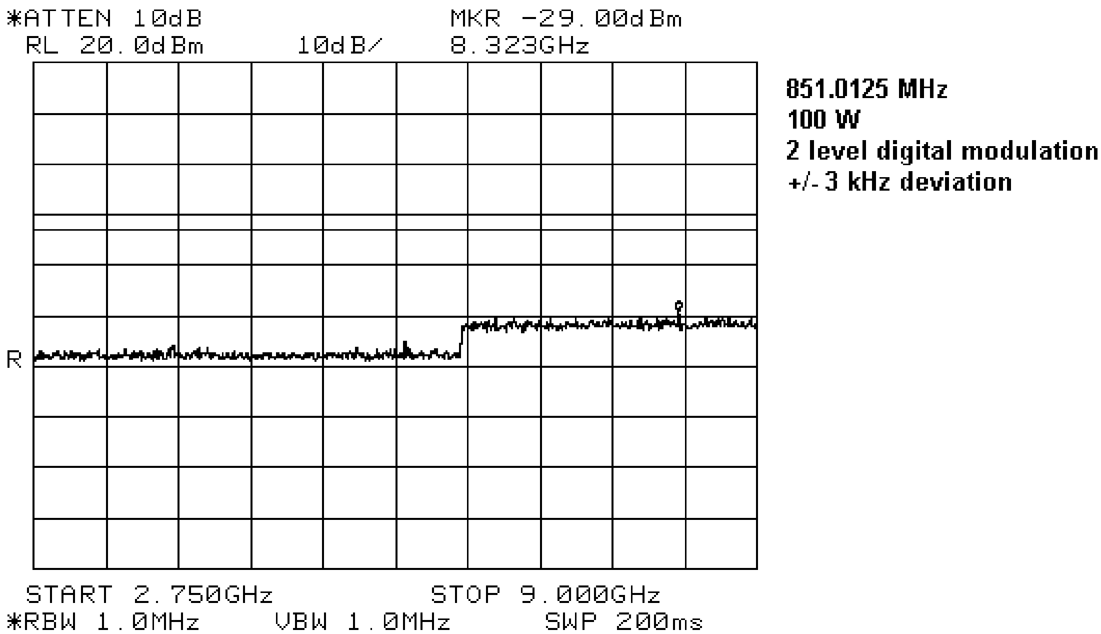


Figure 7-5: Tx at 851.0125 MHz, 10 W Power, 30 MHz to 1 GHz

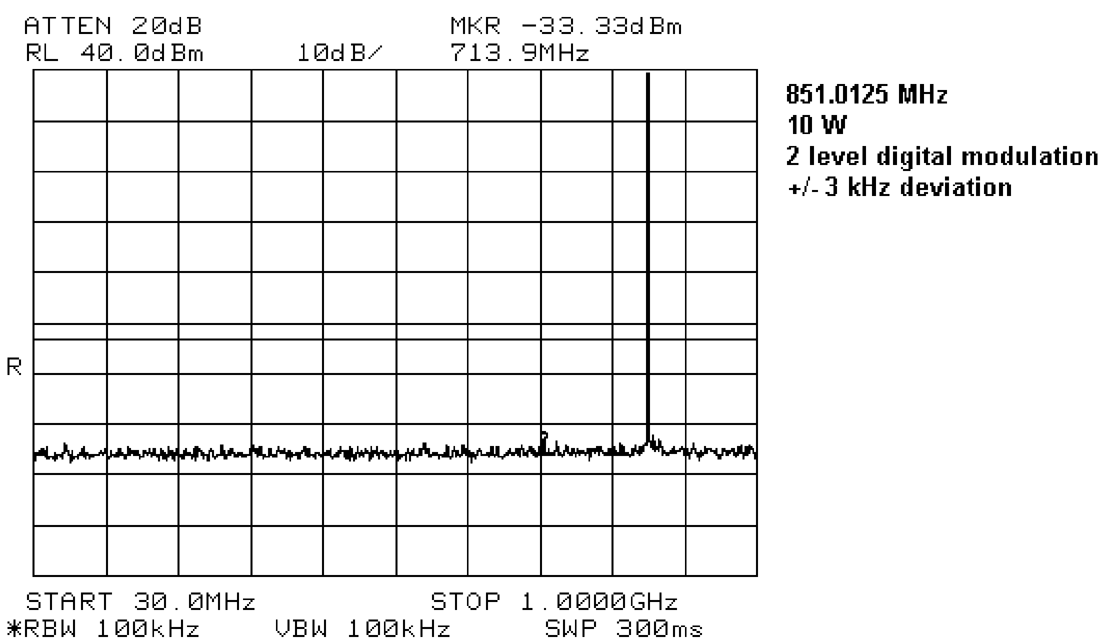


Figure 7-6: Tx at 851.0125 MHz, 10 W Power, 1 GHz to 2.75 GHz

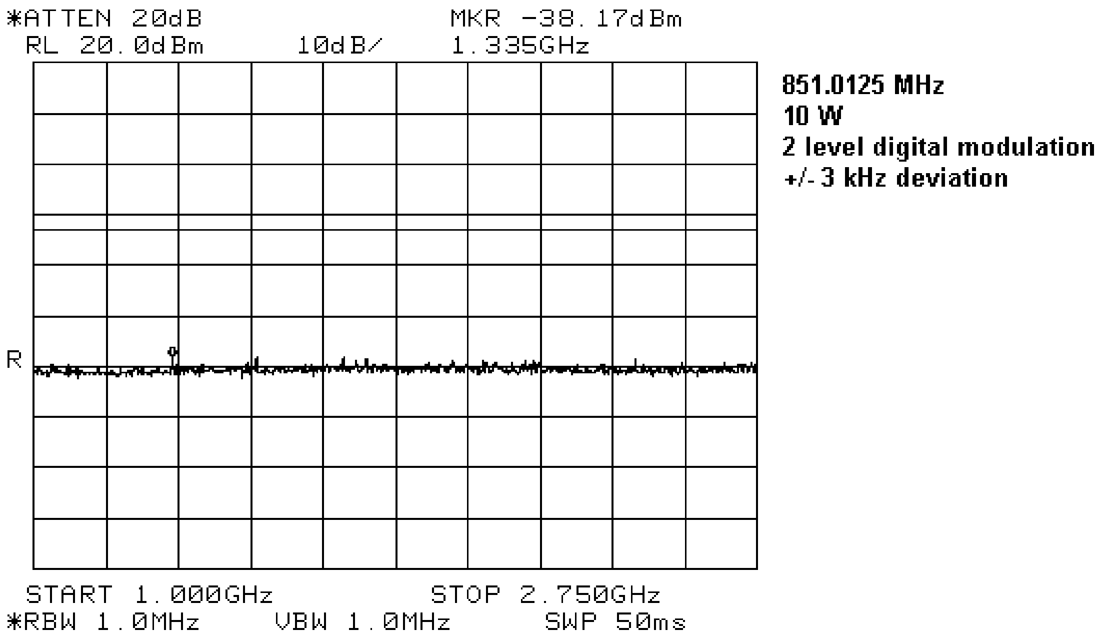


Figure 7-7: Tx at 851.0125 MHz, 10 W Power, 2.75 GHz to 8.7 GHz

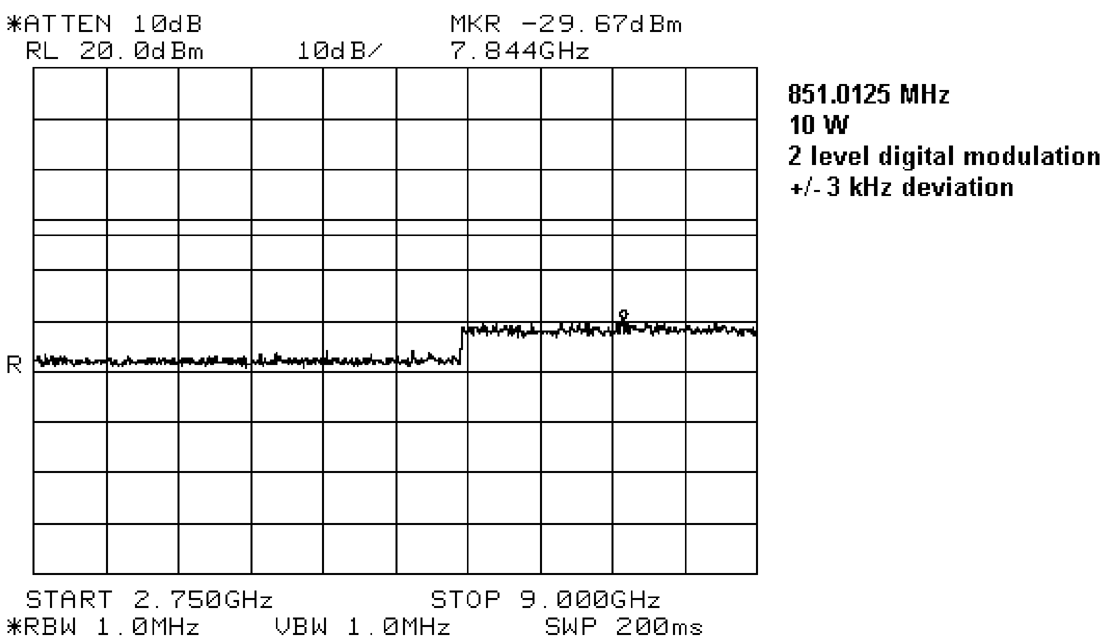


Figure 7-8: Tx at 860.0 MHz, 100 W Power, 30 MHz to 1 GHz

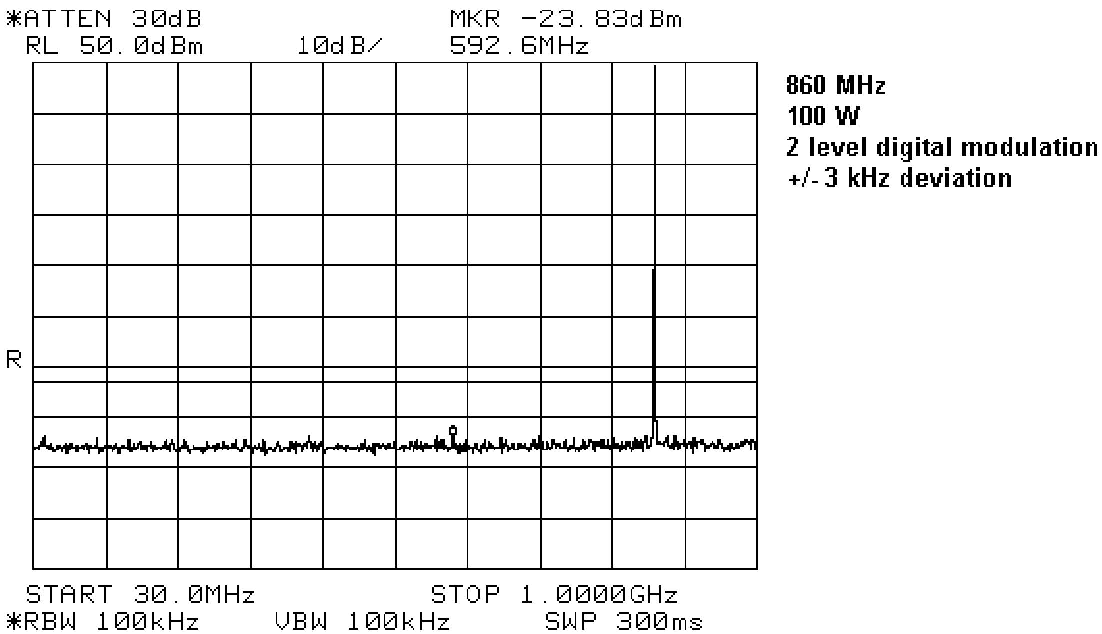


Figure 7-9: Tx at 860.0 MHz, 100 W Power, 1 GHz to 2.75 GHz

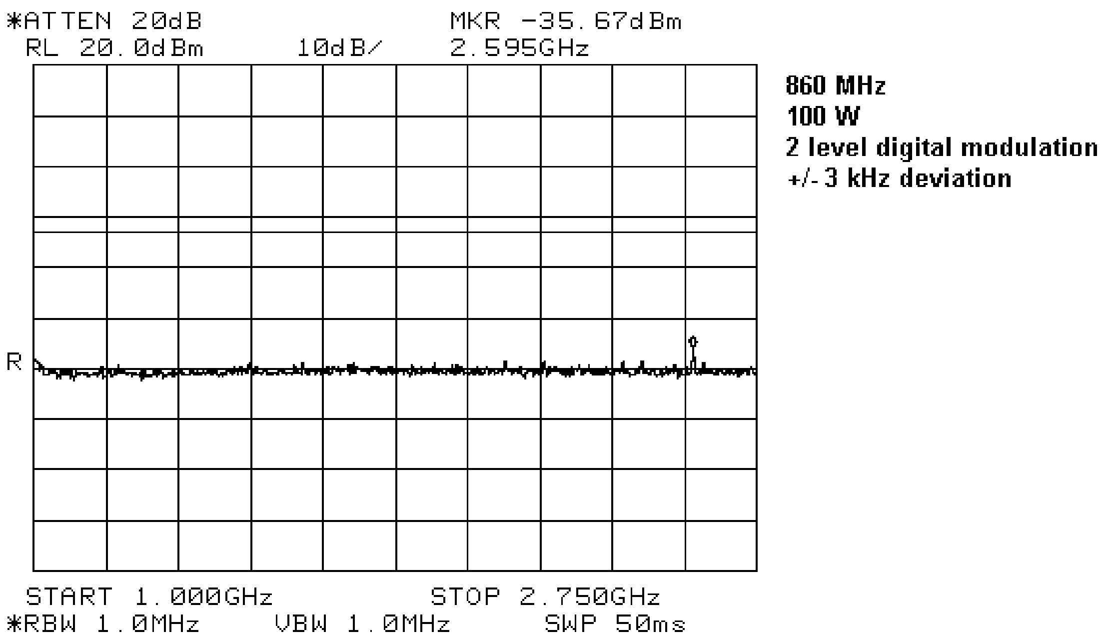


Figure 7-10: Tx at 860.0 MHz, 100 W Power, 2.75 GHz to 8.7 GHz

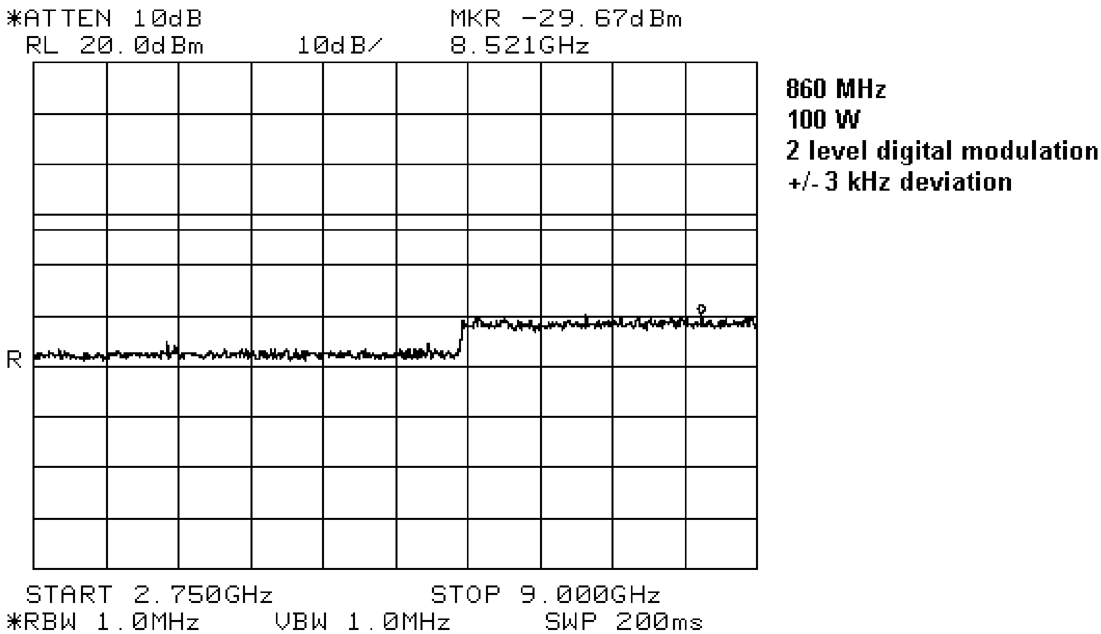


Figure 7-11: Tx at 860.0 MHz, 10 W Power, 30 MHz to 1 GHz

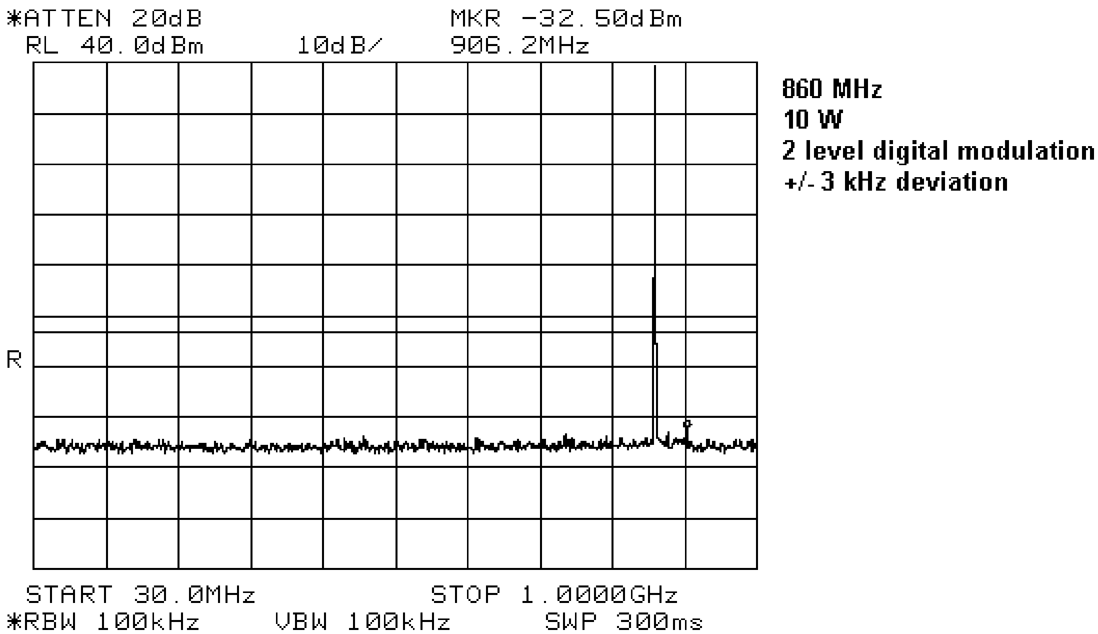


Figure 7-12: Tx at 860.0 MHz, 10 W Power, 1 GHz to 2.75 GHz

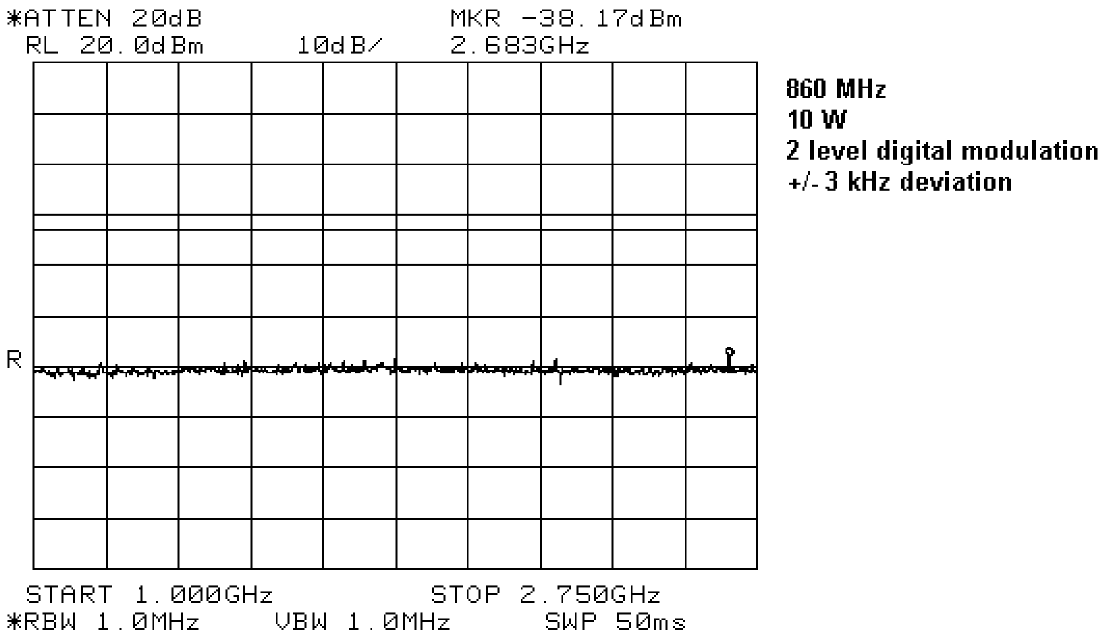


Figure 7-13: Tx at 860.0 MHz, 10 W Power, 2.75 GHz to 8.7 GHz

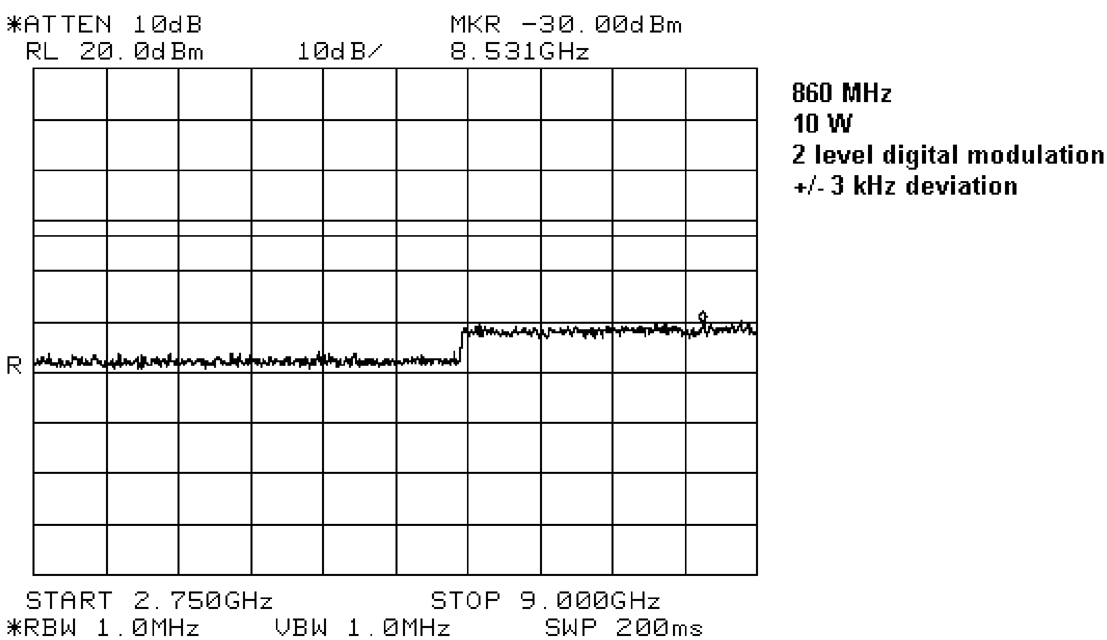


Figure 7-14: Tx at 869.9875 MHz, 100 W Power, 30 MHz to 1 GHz

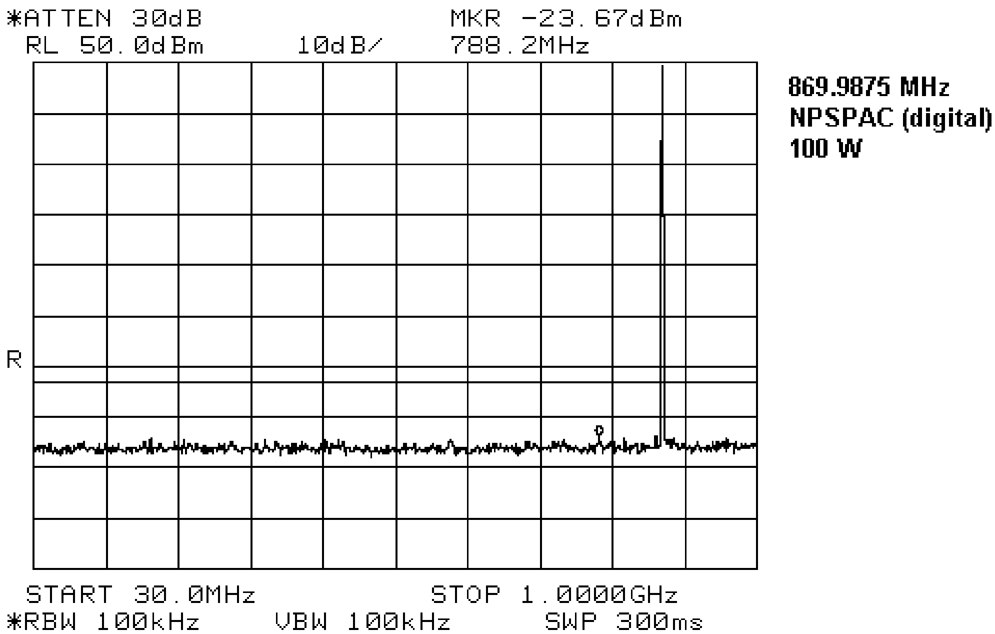


Figure 7-15: Tx at 869.9875 MHz, 100 W Power, 1 GHz to 2.75 GHz

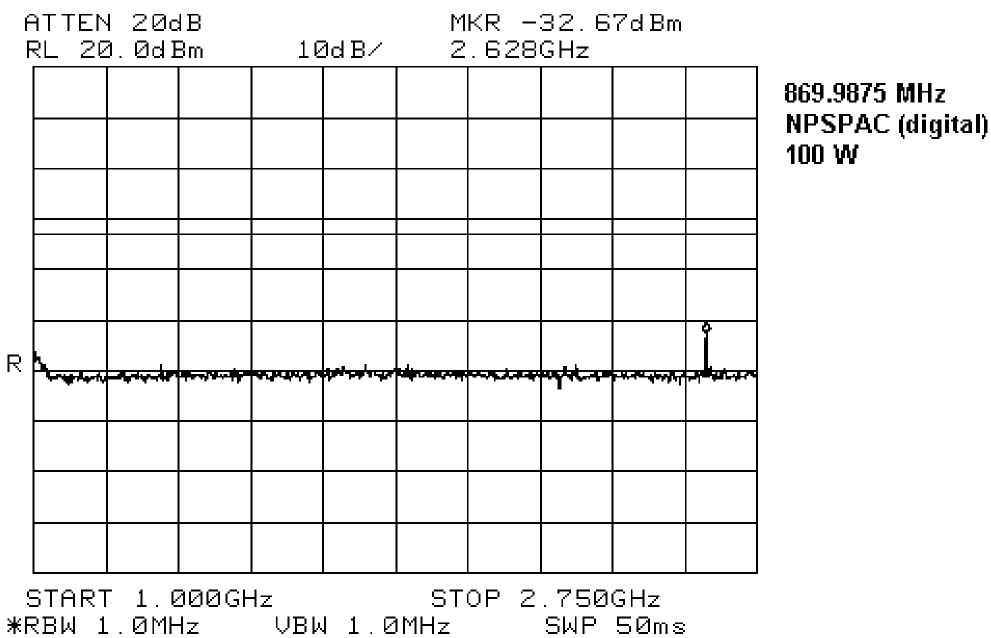


Figure 7-16: Tx at 869.9875 MHz, 100 W Power, 2.75 GHz to 8.7 GHz

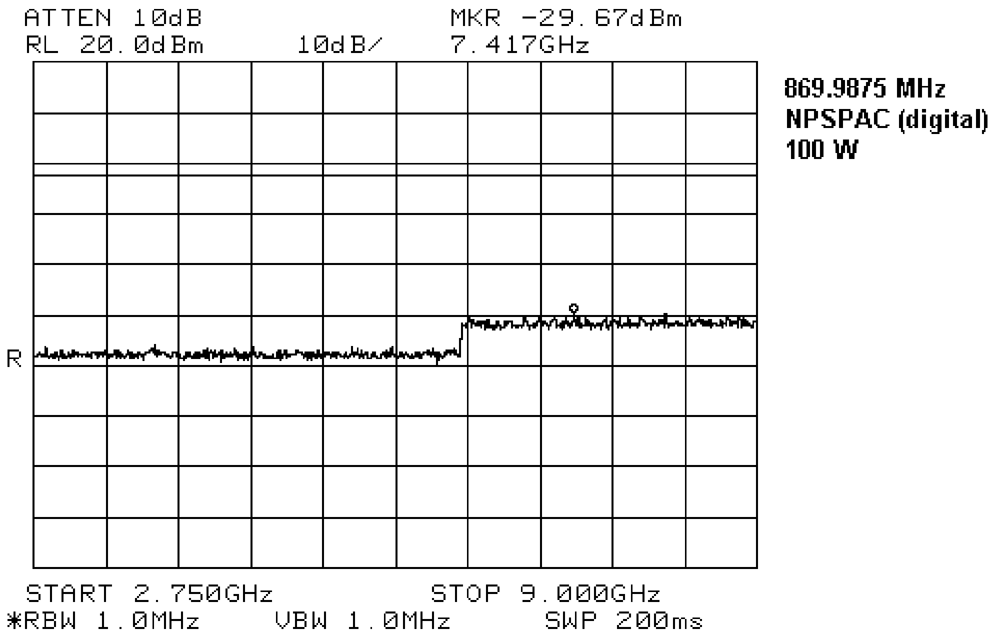


Figure 7-17: Tx at 869.9875 MHz, 10 W Power, 30 MHz to 1 GHz

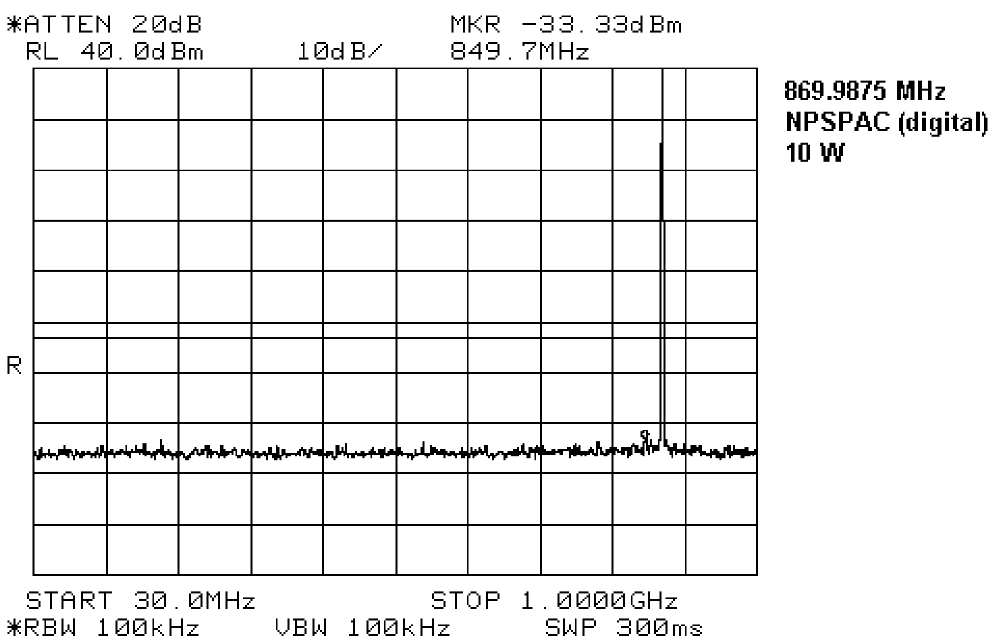


Figure 7-18: Tx at 869.9875 MHz, 10 W Power, 1 GHz to 2.75 GHz

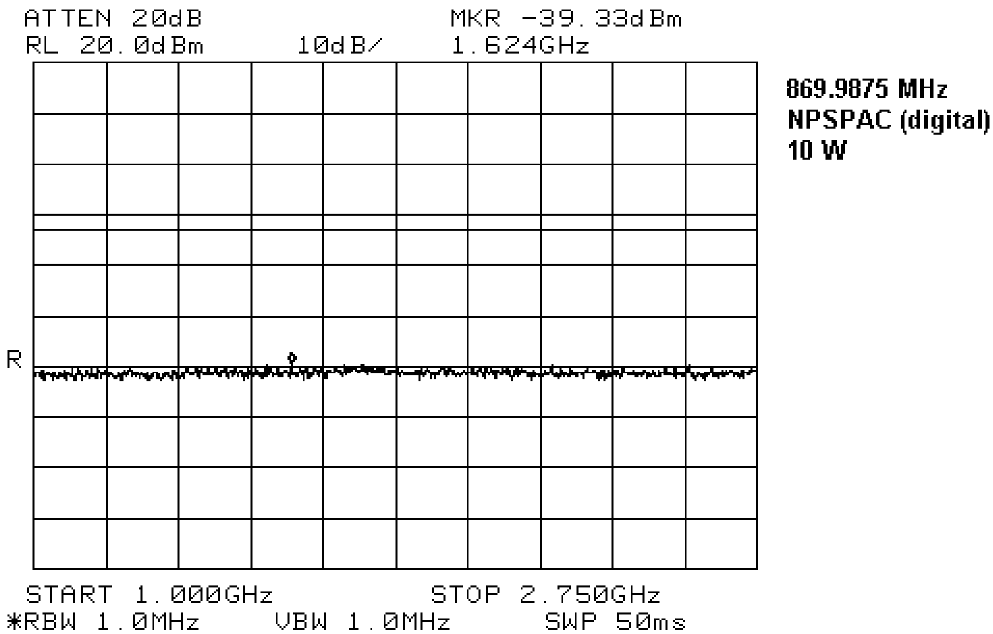
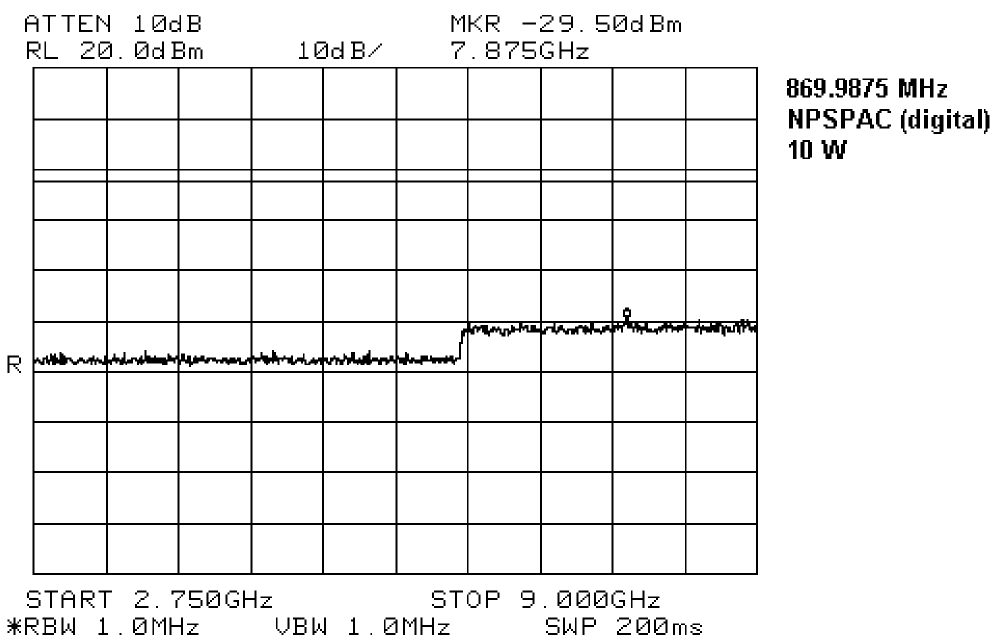


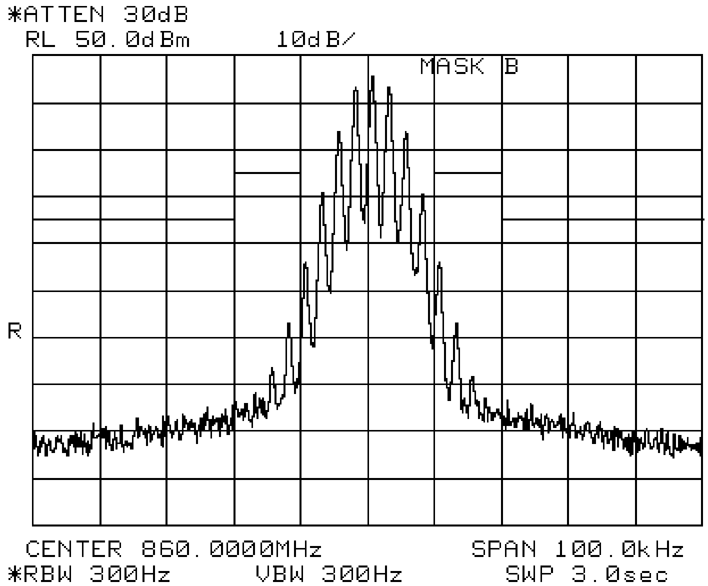
Figure 7-19: Tx at 869.9875 MHz, 10 W Power, 2.75 GHz to 8.7 GHz



7.4 Appendix D: Emission Mask Plots

This appendix presents all emission mask plots for the test cases measured.

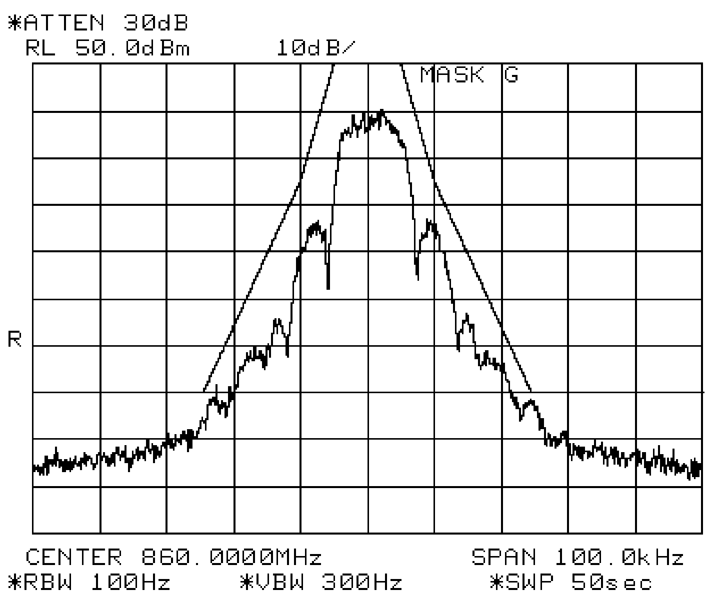
Figure 7-20: 2500 Hz Audio Signal



860 MHz Analog wideband
100 W

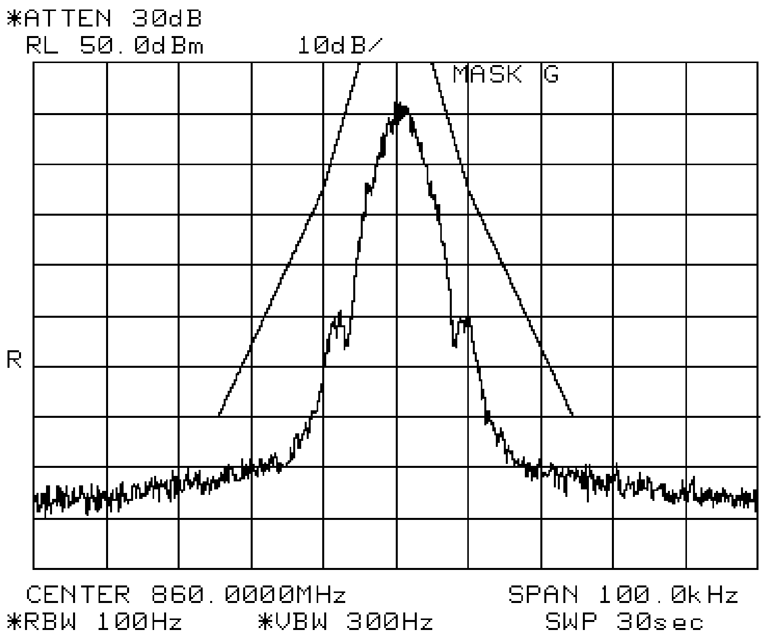
2500 Hz audio level is 16 dB higher than required for 50% deviation at 1 kHz

Figure 7-21: 2 level 9600 baud Signal With 3 kHz Deviation



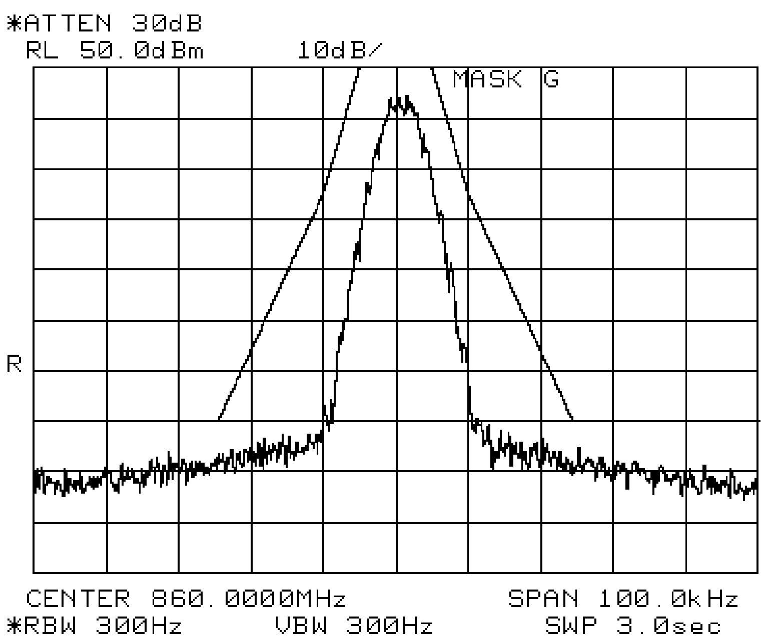
860 MHz
100 W
2 level digital modulation
9600 bits/sec
+/- 3 kHz deviation

Figure 7-22: 2 level 9600 baud Signal With 1.9 kHz Deviation



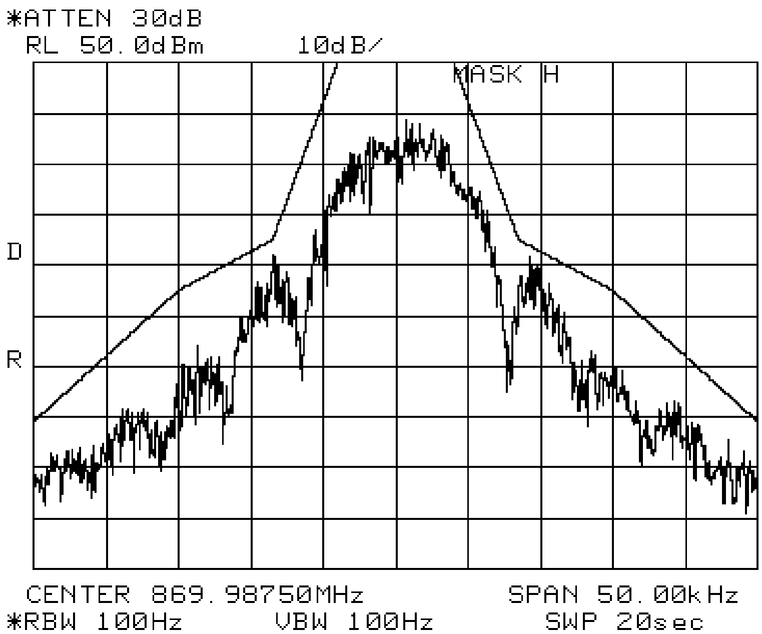
860 MHz
100 W
2 level digital modulation
9600 bits/sec
+/- 1.9 kHz deviation

Figure 7-23: C4FM Signal



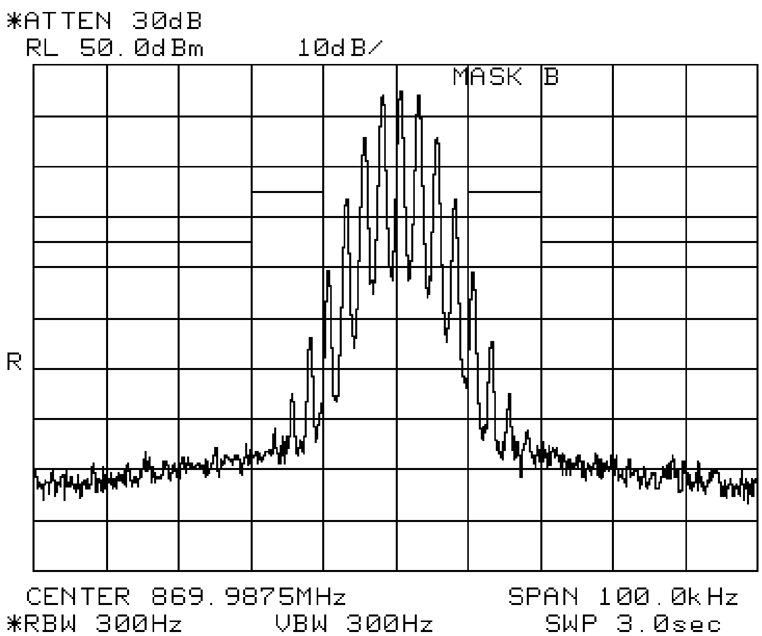
860 MHz
100 W
C4FM

Figure 7-24: NPSPAC (9600 baud) Signal



869.9875 MHz
100 W
NPSPAC digital modulation
+/- 2.4 kHz deviation

Figure 7-25: NPSPAC (Analog) signal



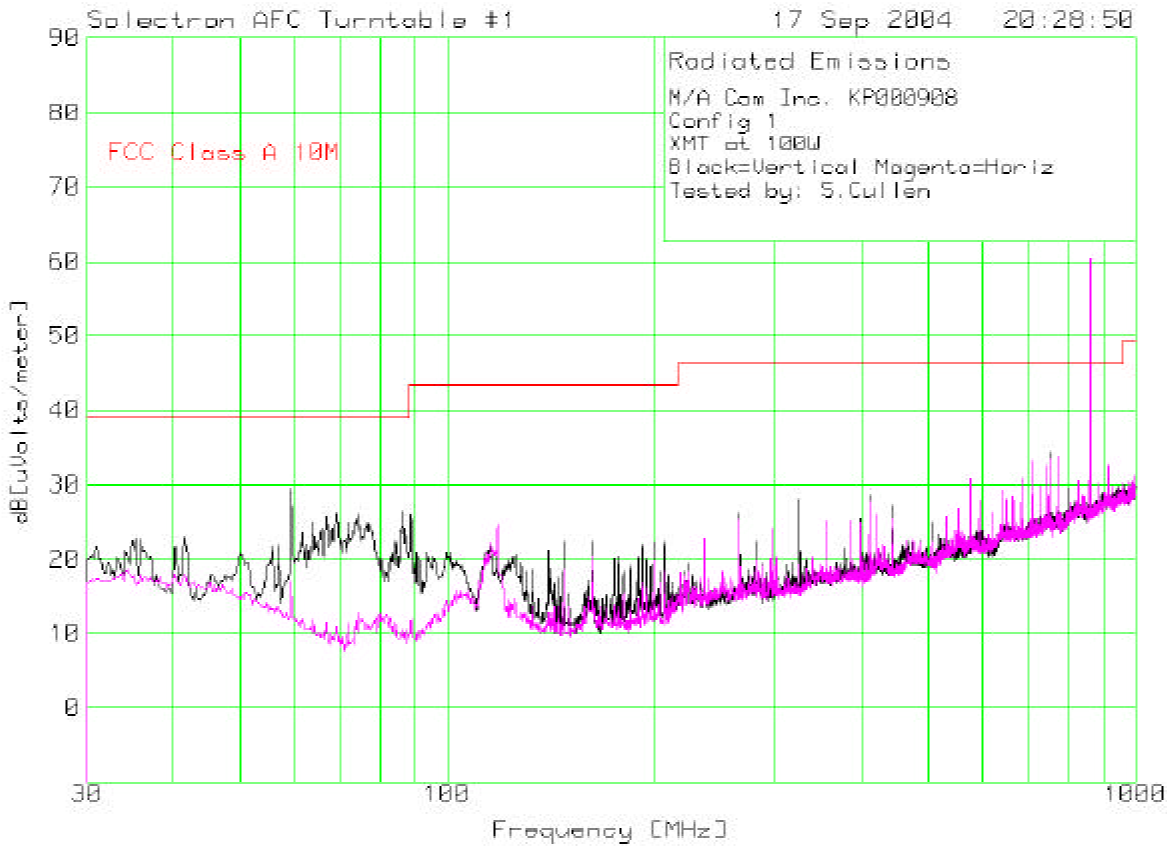
NPSPAC / analog
100 W
modulated with 2500 Hz

level is 16 dB higher than required for 50% deviation at 1 kHz

7.5 Appendix E: Field Strength of Spurious Emissions Plots

This appendix presents all field strength plots for the test cases measured.

Figure 7-26: Field Strength With 100 W Tx, 30 MHz to 1 GHz



Note: the emissions at 860 MHz is leakage of the transmitted signal

Figure 7-27: Field Strength With 100 W Tx, 1 GHz to 10 GHz

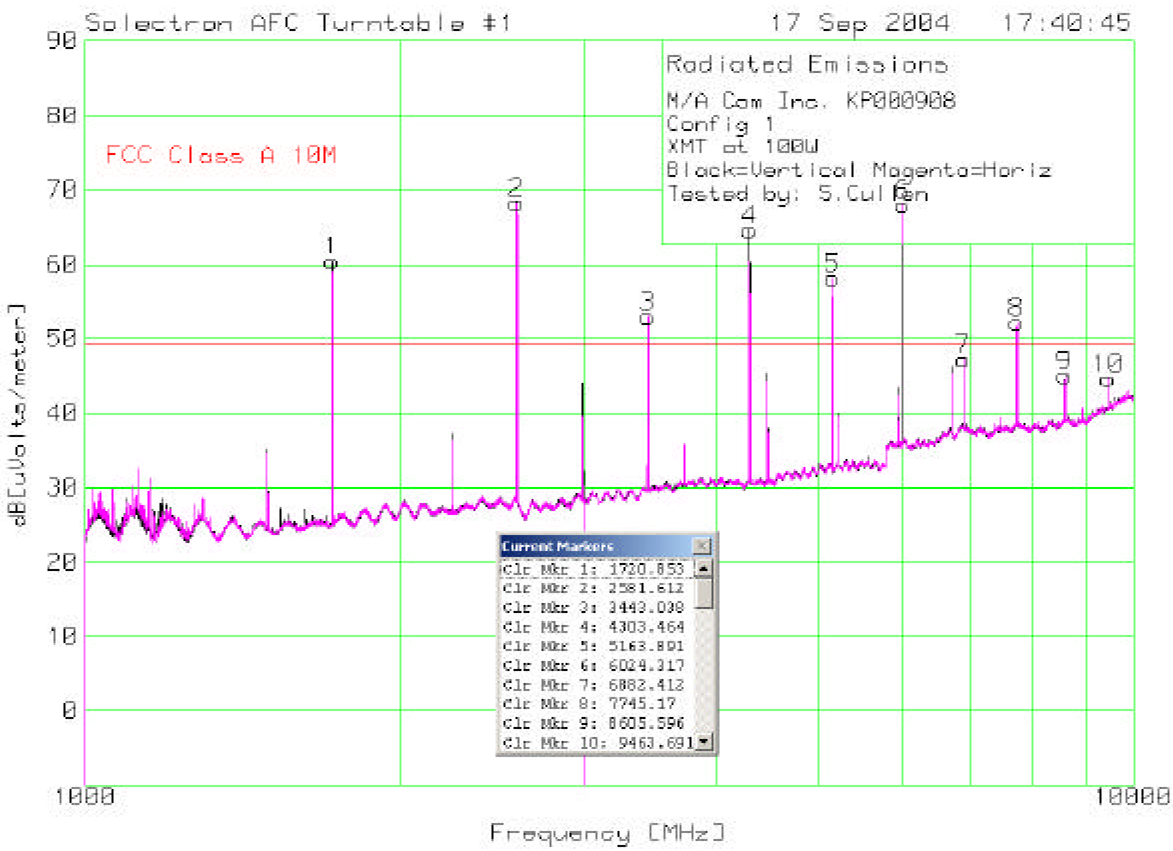
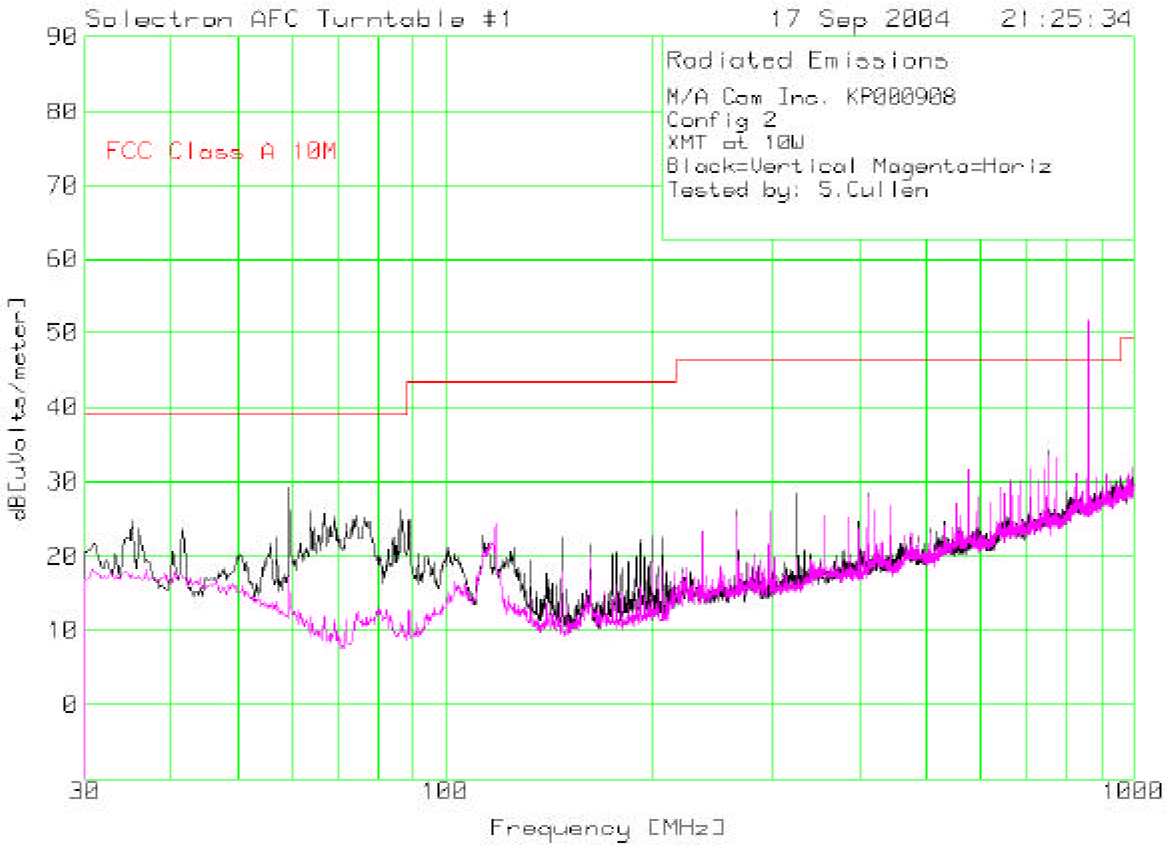
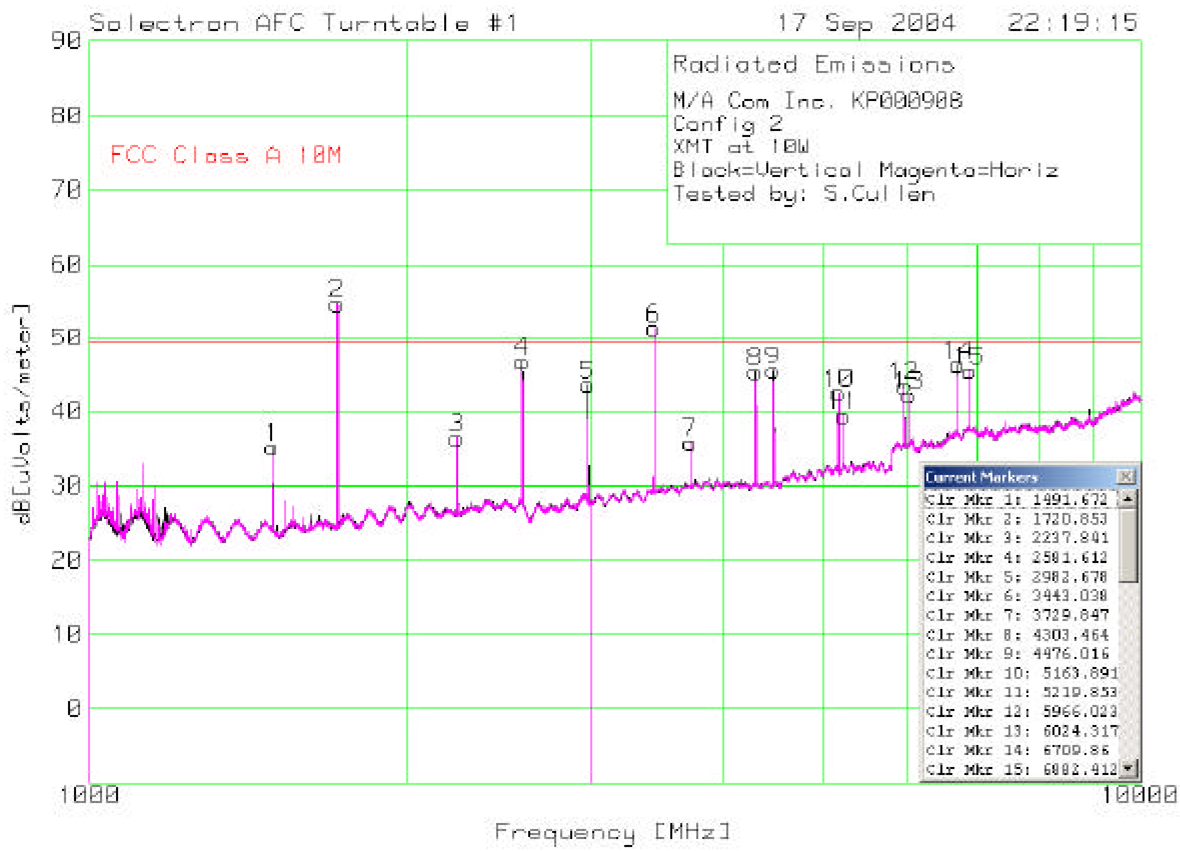


Figure 7-28: Field Strength With 10 W Tx, 30 MHz to 1 GHz



Note: the emissions at 860 MHz is leakage of the transmitted signal

Figure 7-29: Field Strength With 10 W Tx, 1 GHz to 10 GHz



7.6 Appendix D: Occupied Bandwidth Plots

This appendix presents all occupied bandwidth plots for the test cases measured.

Figure 7-30: 2500 Hz Audio Signal

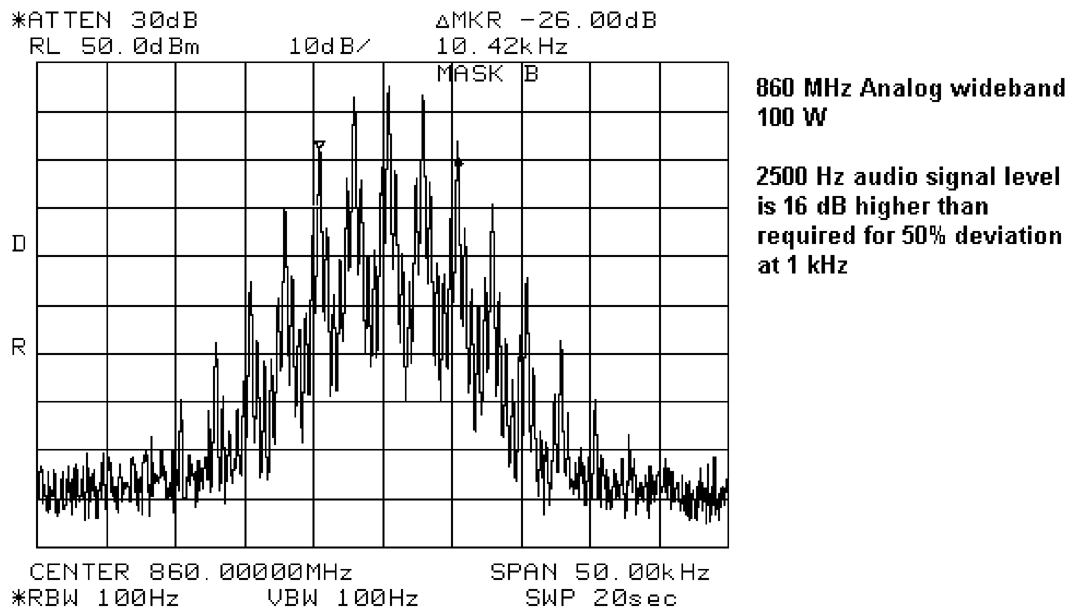


Figure 7-31: 2 Level 9600 baud Signal With 3 kHz Deviation

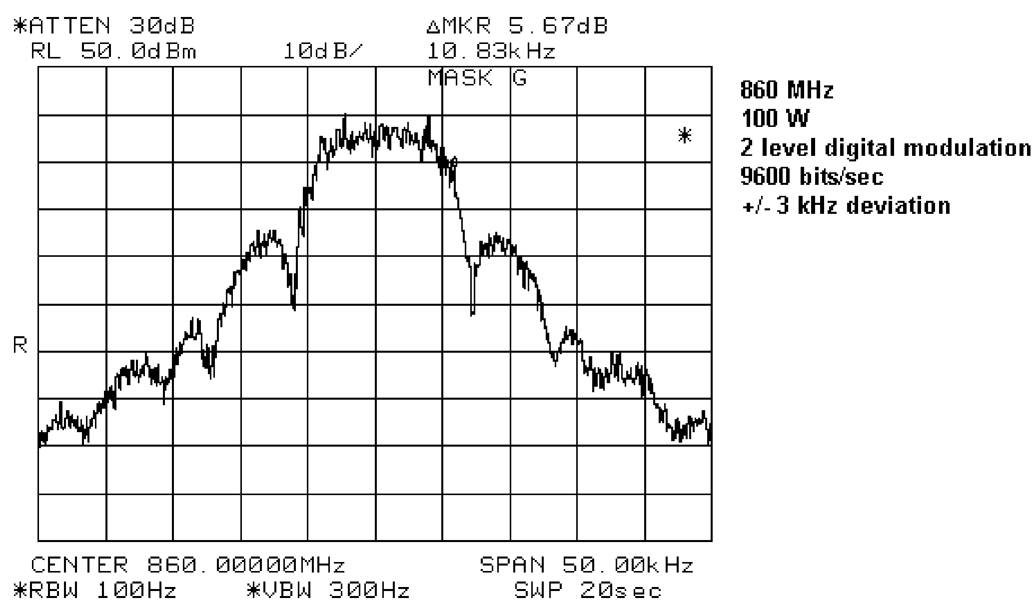


Figure 7-32: 2 Level 9600 baud Signal With 1.9 kHz Deviation

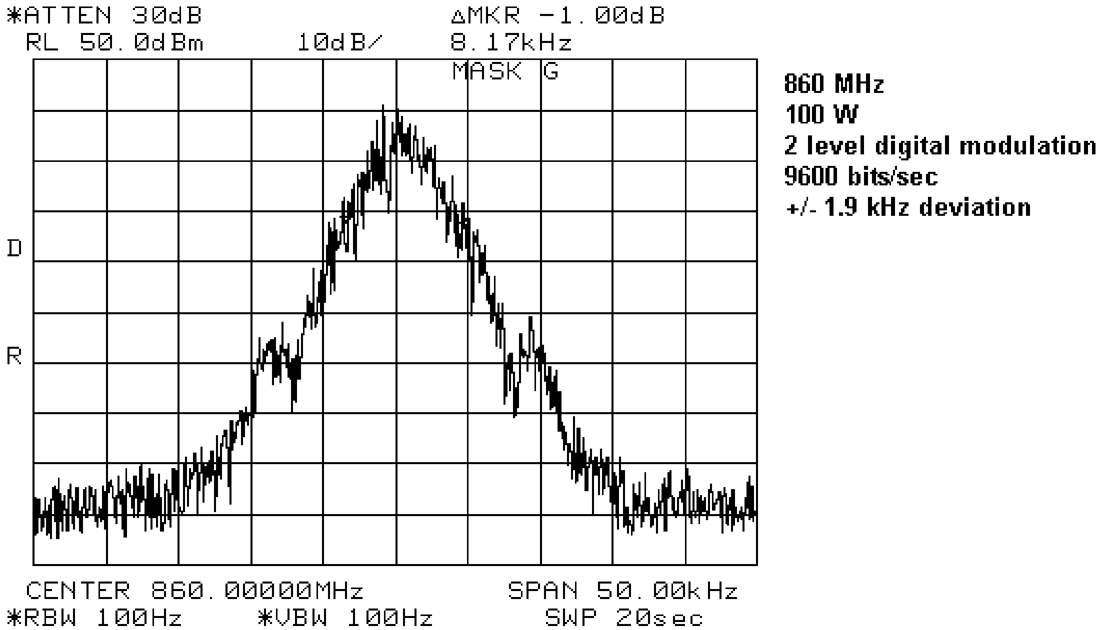


Figure 7-33: C4FM Signal

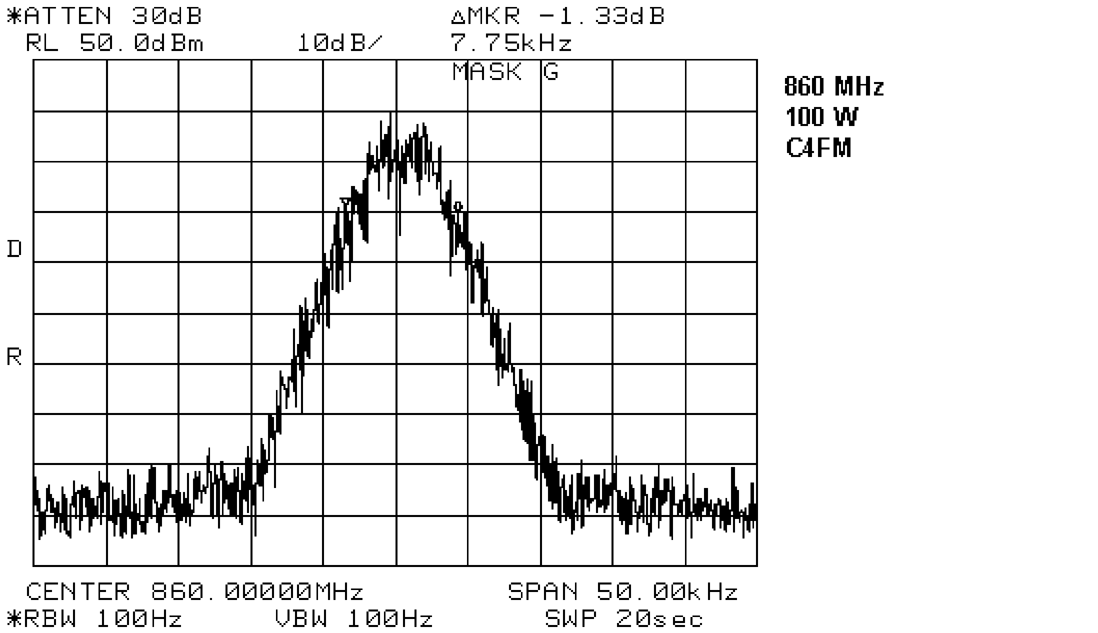


Figure 7-34: NPSPAC (9600 baud) Signal

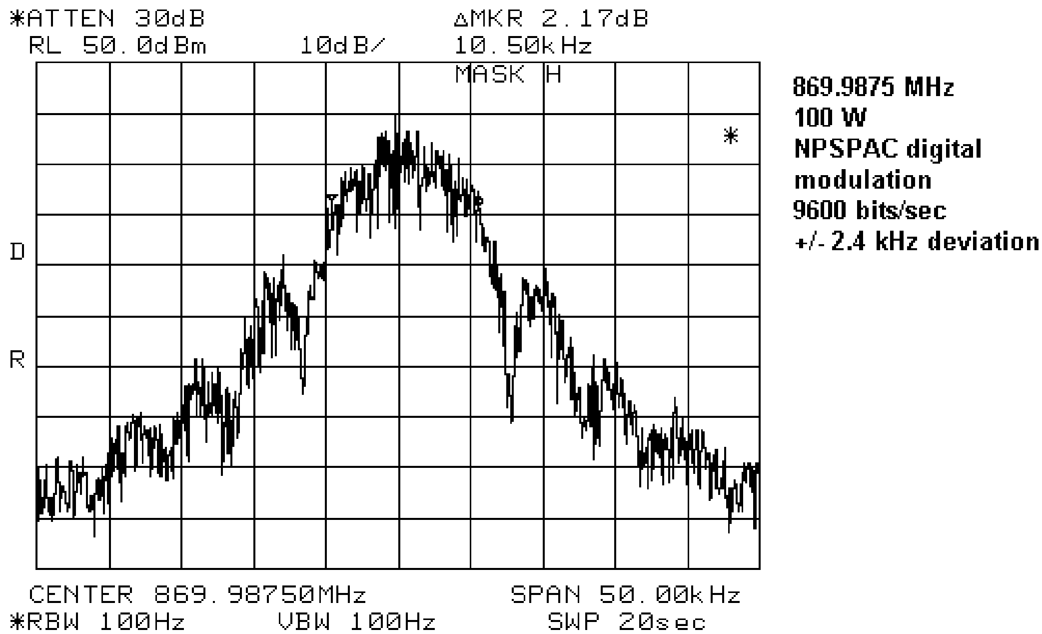
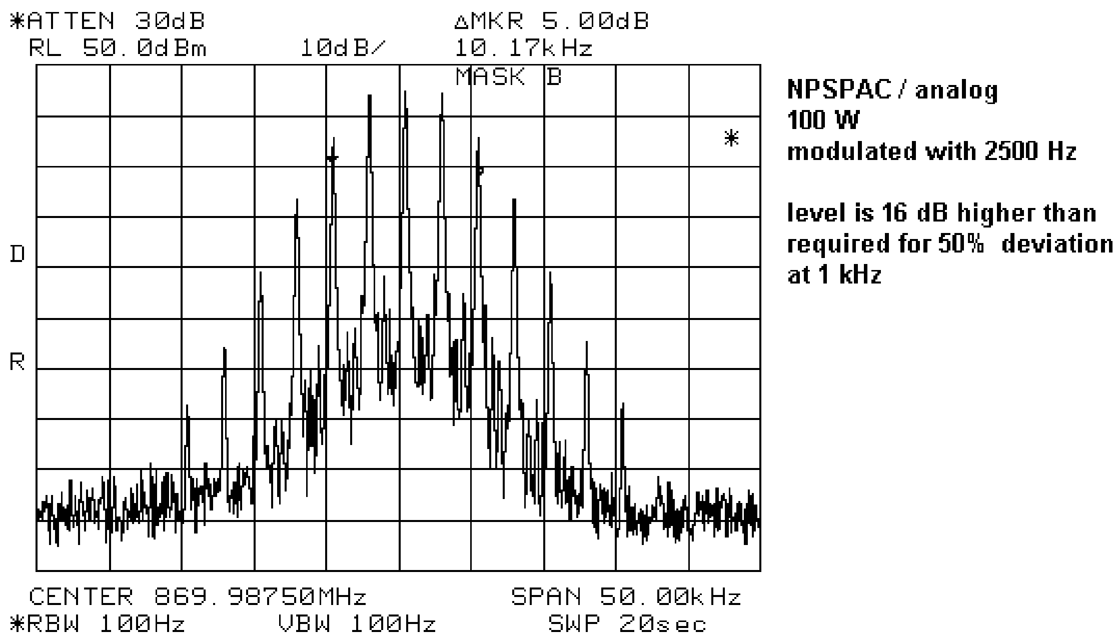


Figure 7-35: NPSPAC (Analog) Signal



C-MAC ENGINEERING INC.
A Solectron Company

Certification Report for M/A-COM MASTRIII 800 MHz Base Station
FCC Part 90 & Industry Canada RSS-119