



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 W. PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

March 18, 2009

Tyco Electronics
221 Jefferson Ridge Parkway
Lynchburg, VA 24501

Dear Neil Leitch,

Enclosed is the EMC Wireless test report for compliance testing of the Tyco Electronics, MASTR V 800 MHz, tested to the requirements of Title 47 of the Code of Federal Regulations (CFR), Part 90 Subpart for Land Mobile Radio Services, Part 15 Subpart B, and RSS-119, Issue 9, June 2007 for a Class A Digital Device.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Tyco Electronics\EMC25980-FCC90 Rev. 2)

Certificates and reports shall not be reproduced except in full, without the written permission of MET Laboratories, Inc.



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 W. PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

Electromagnetic Compatibility Criteria Test Report

For the

**Tyco Electronics
Model MASTR V 800 MHz**

Tested under

**The FCC Verification Rules
Contained in Title 47 of the CFR, Part 90
for Private Land Mobile Radio Services,
Part 15, Subpart B and RSS-119, Issue 9, June 2007 for a Class A Digital Device**

MET Report: EMC25980-FCC90 Rev. 2

March 18, 2009

**Prepared For:
Tyco Electronics
221 Jefferson Ridge Parkway
Lynchburg, VA 24501**

**Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230**



Electromagnetic Compatibility Criteria Test Report

For the

**Tyco Electronics
Model MASTR V 800 MHz**

Tested under

**The FCC Verification Rules
Contained in Title 47 of the CFR, Part 90
for Private Land Mobile Radio Services
Part 15, Subpart B and RSS-119, Issue 9, June 2007 for a Class A Digital Device**

MET Report: EMC25980-FCC90 Rev. 2

Dusmantha Tennakoon
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is / is not capable of operation in accordance with the requirements of Part 90, Part 15, Subpart B of the FCC Rules and RSS-119, Issue 9, June 2007 under normal use and maintenance.

Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab



Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	March 5, 2009	Initial Issue.
1	March 17, 2009	Added Mask D data.
2	March 18, 2009	Corrected Power data.



Table of Contents

1. Executive Summary	1
1.1. Testing Summary	2
2. Equipment Configuration.....	3
2.1. Overview	4
2.2. Test Site	5
2.3. Description of Test Sample	5
2.4. Equipment Configuration	5
2.5. Card Identification	5
2.6. Support Equipment	7
2.7. Ports and Cabling Information	7
2.8. Method of Monitoring EUT Operation	14
2.9. Mode of Operation	14
2.10. Modifications	15
2.10.1. Modifications to EUT	15
2.10.2. Modifications to Test Standard	15
2.11. Disposition of EUT	15
3. Electromagnetic Compatibility Criteria for Unintentional Radiators	16
3.1. Conducted Emissions Limits.....	17
3.2. Radiated Emissions Limits.....	25
4. Electromagnetic Compatibility Criteria for Intentional Radiators	34
5. Electromagnetic Compatibility Occupied Bandwidth Requirements.....	48
5.1. Occupied Bandwidth (Emission Masks)	48
6. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements	68
6.1. Spurious Emissions at Antenna Terminals.....	68
7. Electromagnetic Compatibility Radiated Emissions Requirements	88
7.1. Radiated Spurious Emissions	88
8. Electromagnetic Compatibility Frequency Stability Requirements	102
8.1. Frequency Stability	102
9. Test Equipment	105
10. Certification Label & User's Manual Information	106
10.1. Verification Information	107
10.2. Label and User's Manual Information	111

All references to section numbers are taken directly from the standard/specification used. Only sections requiring testing or evaluation are included.



List of Tables

Table 1. Card Identification.....	5
Table 2. Support Equipment.....	7
Table 3. Ports and Cabling Information, Internal.....	7
Table 4. Ports and Cabling Information, External.....	8
Table 5. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)	17
Table 6. Conducted Emissions - Voltage, AC Power, Phase Line, 120 VAC, 60 Hz	18
Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line, 120 VAC, 60 Hz.....	21
Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)	25
Table 9. Radiated Emissions Limits, Test Results, All Transmitters Off, FCC	26
Table 10. Radiated Emissions Limits, Test Results, All Transmitters On, FCC	27
Table 11. Radiated Emissions Limits, Test Results, All Transmitters Off, ICES-003	28
Table 12. Radiated Emissions Limits, Test Results, All Transmitters On, ICES-003.....	29
Table 13. Temperature vs. Frequency Test Results.....	103
Table 14. Frequency vs. Voltage Test Results	103

List of Figures

Figure 1. Station Layout.....	6
Figure 2. Block Diagram of Test Configuration, Transmitter Chain, Linear	9
Figure 3. Block Diagram of Test Configuration, Receiver.....	9
Figure 4. Block Diagram of Test Configuration, Traffic Controller	10
Figure 5. Block Diagram of Test Configuration, Ethernet Switch	11
Figure 6. Block Diagram of Test Configuration, Transmit Module	11
Figure 7. Block Diagram of Test Configuration, Linearizer	12
Figure 8. Block Diagram of Test Configuration, Power Amplifier.....	12
Figure 9. Block Diagram of Test Configuration, Baseband Module.....	13
Figure 10. Block Diagram of Test Configuration, Power Supply	14
Figure 11. RF Power Output Test Setup.....	35
Figure 12. Occupied Bandwidth (Emission Mask) Test Setup.....	67
Figure 13. Spurious Emissions at Antenna Terminals Test Setup.....	87

List of Photographs

Photograph 1. Conducted Emissions, Test Setup	24
Photograph 2. Radiated Emission Limits, Test Setup	33
Photograph 3. Radiated Emissions, Test Setup	101
Photograph 4. Frequency Stability, Test Setup	104



List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
d	Measurement Distance
dB	Decibels
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBμA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
DC	Direct Current μ
E	Electric Field
ESD	Electrostatic Discharge
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μH	microhenry
μ	microfarad
μs	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane



Executive Summary



1. Testing Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90. All tests were conducted using measurement procedure from ANSI TIA/EIA-603-A-2004 and ANSI C63.4-2003 as appropriate.

Title 47 of the CFR, Part 90	IC Reference	Conformance			Comments
		Yes	No	N/A	
		<i>Yes - Equipment complies with the Requirement</i> <i>No - Equipment does not comply with the Requirement</i> <i>N/A - Not applicable to the equipment under tests</i>			
2.1046; 90.205 Peak Power Output		✓			Measured emissions below applicable limits.
2.1047(a) Modulation Characteristics				✓	EUT is non-voice, data only.
2.1049; 90.210 Occupied Bandwidth (Emission Mask)		✓			Measured emissions below applicable limits.
2.1051; 90.210 Spurious Emissions at Antenna Terminals		✓			Measured emissions below applicable limits.
2.1053; 90.210 Radiated Spurious Emissions		✓			Measured emissions below applicable limits.
2.1055(a) (1); 90.213 Frequency Stability over Temperature Variations		✓			Measured values below applicable limits.
2.1055(d) Frequency Stability over Voltage Variations		✓			Measured values below applicable limits.
90.214 Transient Frequency Behavior				✓	EUT does not operate in the 150-174 MHz or 421-512 MHz bands
47 CFR Part 15.107 (a) Conducted Emission Limits for a Class A Digital Device		✓			AC Power Line Conducted Emissions for intentional radiators
47 CFR Part 15.109 (a) Radiated Emission Limits for a Class A Digital Device		✓			Radiated Spurious Emissions for unintentional radiators

Equipment Configuration

2. Equipment Configuration

2.1. Overview

MET Laboratories, Inc. was contracted by Tyco Electronics to perform testing on the MASTR V 800 MHz under purchase order number 2TYC0206R2.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Tyco Electronics., MASTR V 800 MHz.

An EMC evaluation to determine compliance of the MASV-800M1 with the requirements of Part 90 was conducted. (All references are to the most current version of Title 47 of the Code of Federal Regulations in effect). In accordance with §2.1033, the following data is presented in support of the Certification of the MASV-800M1. Tyco Electronics. should retain a copy of this document and it should be kept on file for at least five years after the manufacturing of the EUT has been **permanently** discontinued. The results obtained relate only to the item(s) tested.

Product Name:	MASTR V		
Model(s) Tested:	MASV-800M1		
EUT Specifications:	Primary Power Source: 120 VAC, 60 Hz		
	FCC ID: OWDTR-0053-E		
	Type of Modulations:	C4FM, WCQPSK, HDQPSK	
	Peak Output Power:	Low	HDQPSK – 52.28 dBm CQPSK – 52.15 dBm C4FM – 49.99 dBm
		Mid	HDQPSK – 52.48 dBm CQPSK – 52.34 dBm C4FM – 50.28 dBm
		High	HDQPSK – 52.20 dBm CQPSK – 52.34 dBm C4FM – 49.75 dBm
	Equipment Code:	TNB	
EUT Frequency Ranges:	851-869 MHz		
Analysis:	The results obtained relate only to the item(s) tested.		
Environmental Test Conditions:	Temperature (15-35° C):		
	Relative Humidity (30-60%):		
	Barometric Pressure (860-1060 mbar):		
Evaluated by:	Dusmantha Tennakoon		
Test Date(s):	12/19/2008 – 12/29/2008		

2.2. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

2.3. Description of Test Sample

The Tyco Electronics MASTR V 800 MHz, is a Radio Base Station/Repeater designed for communications in the Land Mobile Radio environment. The primary communication users are Public Safety, Utility and Military Commercial off the Shelf.

2.4. Equipment Configuration

The EUT was set up as outlined in Figure 2 - Figure 10, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT are included in the following section.

2.5. Card Identification

Ref. ID *	Name / Description	Model Number	Serial Number
TX #1	TRANSMIT MODULE #1	EA-555008-012	MACM0006VN
TX #2	TRANSMIT MODULE #2	EA-555008-012	MACM0006Y8
TX #3	TRANSMIT MODULE #3	EA-555008-012	MACM0006Y7
TX #4	TRANSMIT MODULE #4	EA-555008-012	MACM0006Y3
PA #1	POWER AMPLIFIER #1	EA-555014-012	MACM0006X0
PA #2	POWER AMPLIFIER #2	EA-555014-012	MACM0006WY
PA #3	POWER AMPLIFIER #3	EA-555014-012	MACM0006WT
PA #4	POWER AMPLIFIER #4	EA-555014-012	MACM0006WC
RX #1	RECEIVE MODULE #1	EA-555007-011	MACM00070V
RX #2	RECEIVE MODULE #2	EA-555007-011	MACM0006RR
RX #3	RECEIVE MODULE #3	EA-555007-011	MACM0006U0
RX #4	RECEIVE MODULE #4	EA-555007-011	MACM000719
BB #1	BASEBAND MODULE #1	EA-555005	MACM0006E8
BB #2	BASEBAND MODULE #2	EA-555005	MACM0006F4
TC #1	TRAFFIC CONTROLLER #1	EA-555004	MACM0006QI
TC #2	TRAFFIC CONTROLLER #2	EA-555004	MACM0006QG
TC #3	TRAFFIC CONTROLLER #3	EA-555004	MACM0006PC
TC #4	TRAFFIC CONTROLLER #4	EA-555004	MACM0006QQ
ES #1	E-SWITCH (PRIMARY)	EA-555012	MACM000A7E
ES #2	E-SWITCH (REDUNDANT)	EA-555012	MACM000A7G
PS #1	POWER SUPPLY #1	EA-555011-001	UC28080
PS #2	POWER SUPPLY #2	EA-555011-001	UF26097
PS #3	POWER SUPPLY #3	EA-555011-001	UC28066
PS #4	POWER SUPPLY #4	EA-555011-001	UF26096

Table 1. Card Identification

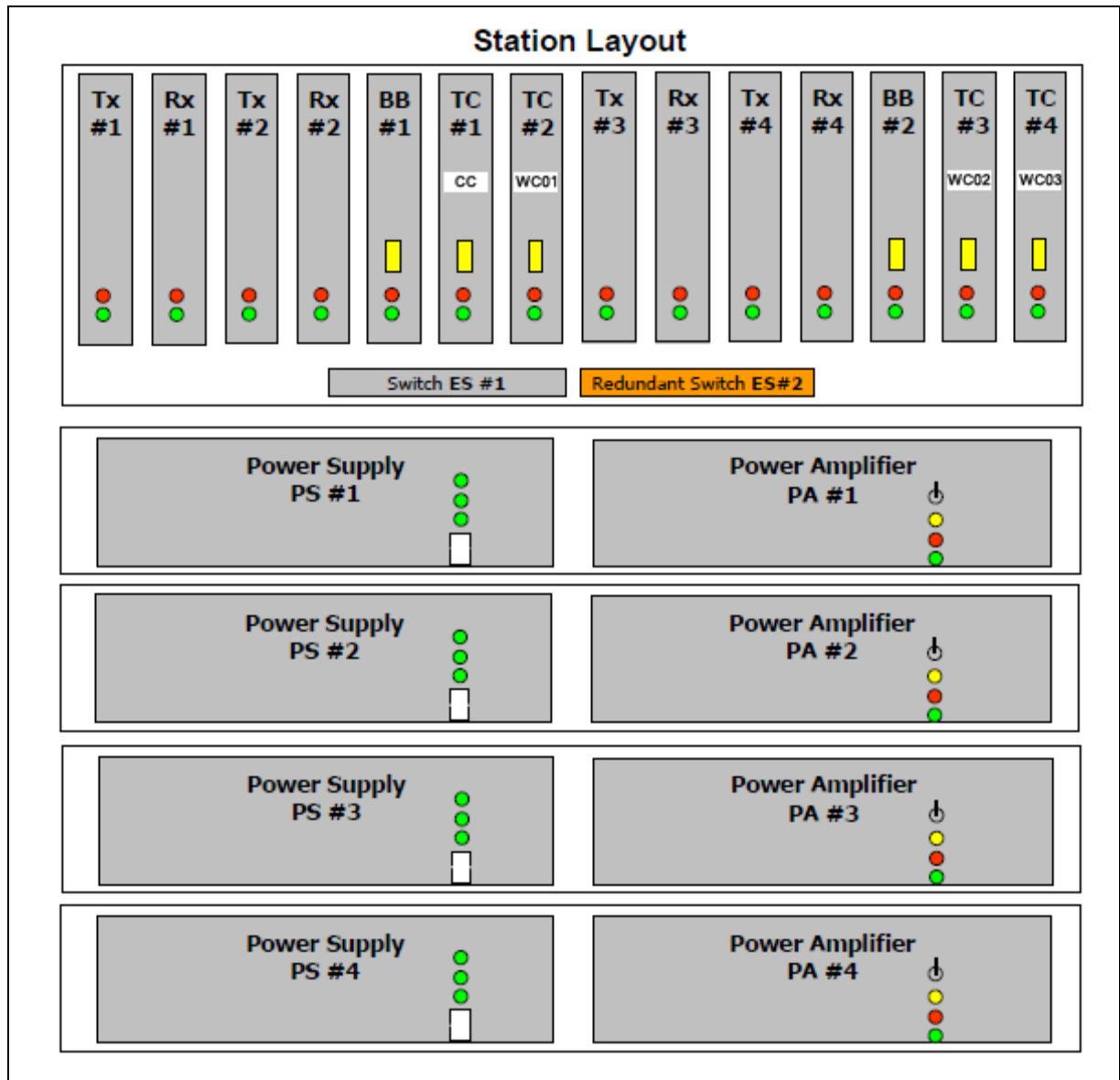


Figure 1. Station Layout

2.6. Support Equipment

Tyco Electronics supplied support equipment necessary for the operation and testing of the MASTR V 800 MHz. All support equipment supplied is listed in the following Support Equipment List.

Name / Description	Manufacturer	Model Number	Serial Number
HANDHELD BARCODE SCANNER	HP	LS2208-SR20361RSBRE	NONE
100 WATT DUMMY LOAD (QTY 4)	N/A	N/A	NONE
LAPTOP	DELL	INSPIRON 2600	899029300023

Table 2. Support Equipment

2.7. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
TX #1	RF OUT	COAXIAL CABLE	1	1	Y	PA #1 RF IN
TX #2	RF OUT	COAXIAL CABLE	1	1	Y	PA #2 RF IN
TX #3	RF OUT	COAXIAL CABLE	1	1	Y	PA #3 RF IN
TX #4	RF OUT	COAXIAL CABLE	1	1	Y	PA #4 RF IN
PA #1	RF IN	COAXIAL CABLE	1	1	Y	TX #1 RF OUT
PA #1	CONTROL	15 CONDUCTOR	1	1	Y	BACKPLANE, J21
PA #2	RF IN	COAXIAL CABLE	1	1	Y	TX #2 RF OUT
PA #2	CONTROL	15 CONDUCTOR	1	1	Y	BACKPLANE, J22
PA #3	RF IN	COAXIAL CABLE	1	1	Y	TX #3 RF OUT
PA #3	CONTROL	15 CONDUCTOR	1	1	Y	BACKPLANE, J23
PA #4	RF IN	COAXIAL CABLE	1	1	Y	TX #4 RF OUT
PA #4	CONTROL	15 CONDUCTOR	1	1	Y	BACKPLANE, J24
PS #1	HPA	28 VDC POWER	1	0.5	N	PA #1, POWER
PS #1	SHELF	5V/12V DC POWER	1	1	N	BACKPLANE, J30
PS #2	HPA	28 VDC POWER	1	0.5	N	PA #2, POWER
PS #2	SHELF	5V/12V DC POWER	1	1	N	BACKPLANE, J31
PS #3	HPA	28 VDC POWER	1	0.5	N	PA #3, POWER
PS #4	HPA	28 VDC POWER	1	0.5	N	PA #4, POWER

Table 3. Ports and Cabling Information, Internal

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
PA #1	RF Out	Coaxial Cable	1	3	Y	100W Dummy Load
PA #2	RF Out	Coaxial Cable	1	1	Y	100W Dummy Load
PA #3	RF Out	Coaxial Cable	1	1	Y	100W Dummy Load
PA #4	RF Out	Coaxial Cable	1	1	Y	100W Dummy Load
Rx #1	RF In	none, terminated	1	-	Y	50Ω Dummy Load
Rx #1	Audio	none, bench test only	0	-	-	-
Rx #2	RF In	none, terminated	1	-	Y	50Ω Dummy Load
Rx #2	Audio	none, bench test only	0	-	-	-
Rx #3	RF In	none, terminated	1	-	Y	50Ω Dummy Load
Rx #3	Audio	none, bench test only	0	-	-	-
Rx #4	RF In	none, terminated	1	-	Y	50Ω Dummy Load
Rx #4	Audio	none, bench test only	0	-	-	-
BB #1	M-LAN	Ethernet Cable, CAT5	1	3	N	none
BB #1	Simulcast	15-Conductor Cable	2	3	Y	none
BB #1	COMM	none, test/local control	0	-	-	-
BB #1	Ref In	none, terminated	1	-	Y	50Ω Dummy Load
BB #2	M-LAN	Ethernet Cable, CAT5	1	3	N	none
BB #2	Simulcast	15-Conductor Cable	2	3	Y	none
BB #2	COMM	none, test/local control	0	-	-	-
BB #2	Ref In	none, terminated	1	-	Y	50Ω Dummy Load
TC #1	M-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #1	P-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #1	COMM	none, test/local prog	0	-	-	-
TC #2	M-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #2	P-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #2	COMM	none, test/local prog	0	-	-	-
TC #3	M-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #3	P-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #3	COMM	none, test/local prog	0	-	-	-
TC #4	M-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #4	P-LAN	Ethernet Cable, CAT5	1	3	N	none
TC #4	COMM	none, test/local prog	0	-	-	-
PS #1	A/C In	A/C Power Cord	1	1	N	110 VAC Power
PS #1	5V,12V VDC AUX	none, unused	0	-	-	-
PS #2	A/C In	A/C Power Cord	1	1	N	110 VAC Power
PS #2	5V,12V VDC AUX	none, unused	0	-	-	-
PS #3	A/C In	A/C Power Cord	1	1	N	110 VAC Power
PS #3	5V,12V VDC AUX	none, unused	0	-	-	-
PS #4	A/C In	A/C Power Cord	1	1	N	110 VAC Power
PS #4	5V,12V VDC AUX	none, unused	0	-	-	-
TP	Test Port	none, unused	0	-	-	on Backplane

Table 4. Ports and Cabling Information, External

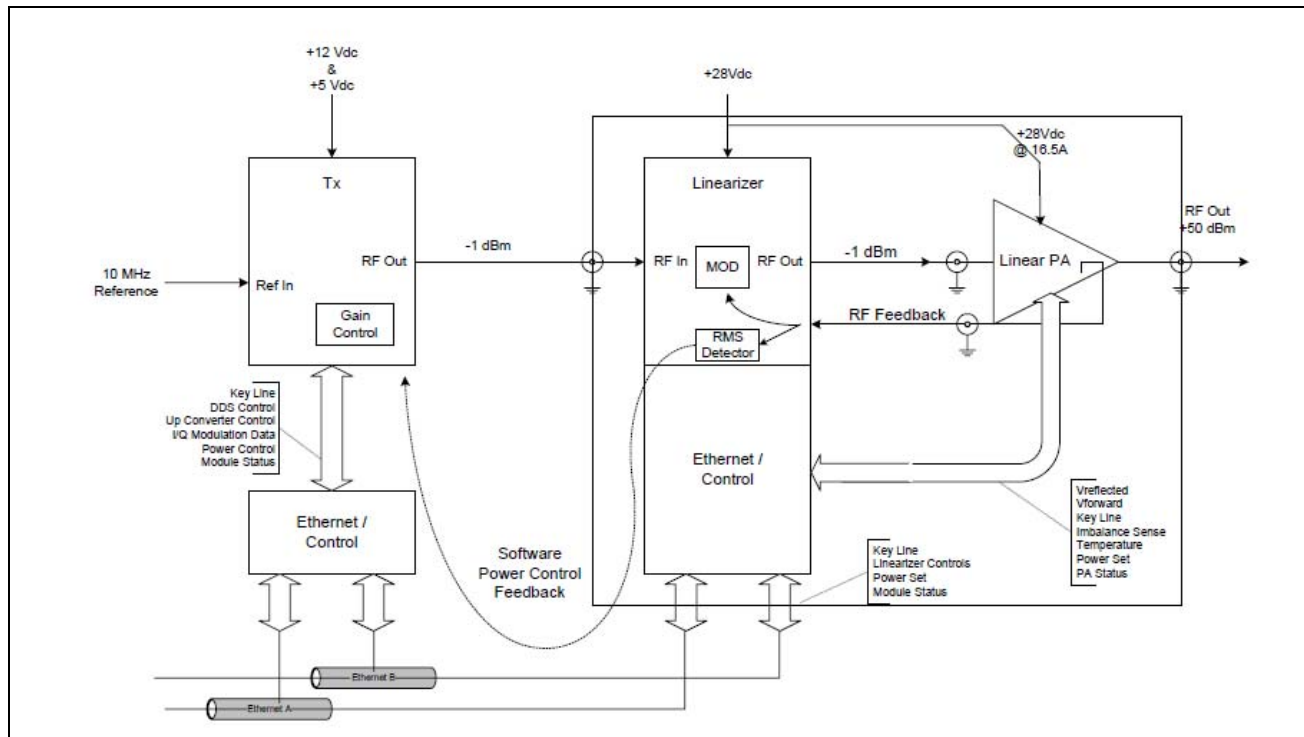


Figure 2. Block Diagram of Test Configuration, Transmitter Chain, Linear

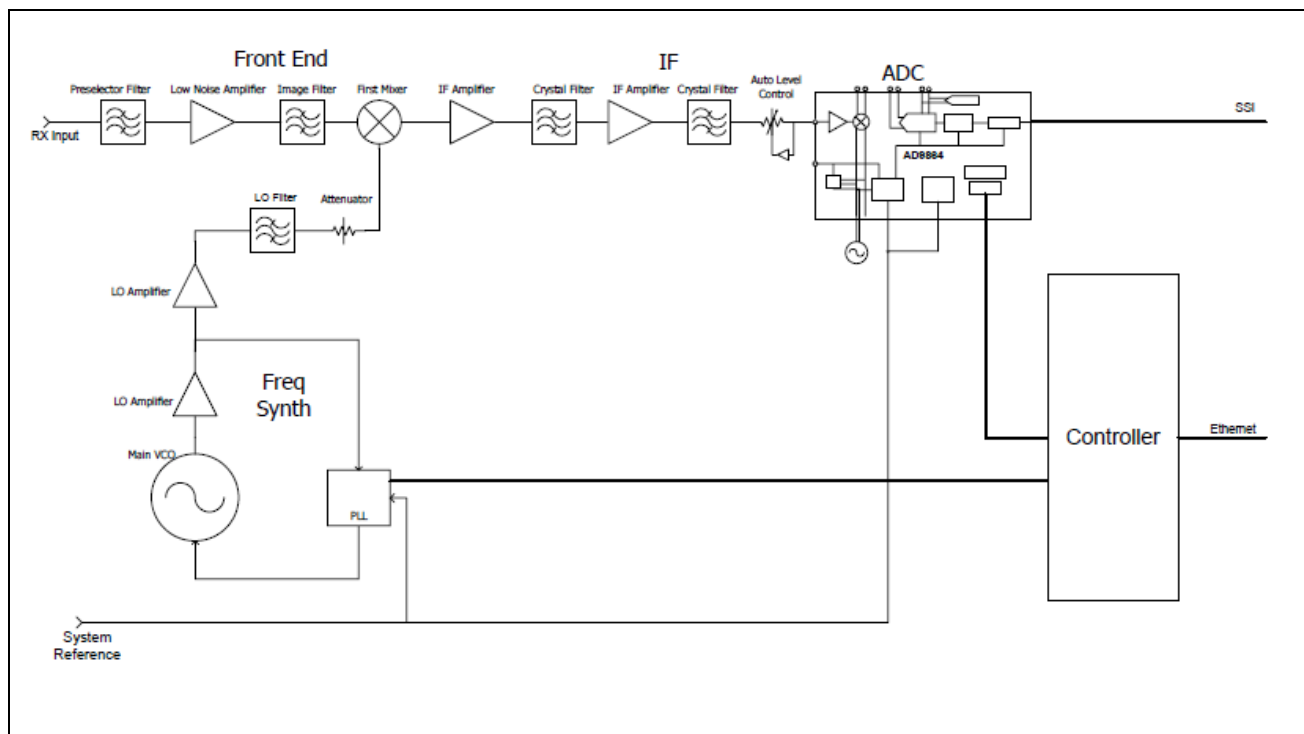


Figure 3. Block Diagram of Test Configuration, Receiver

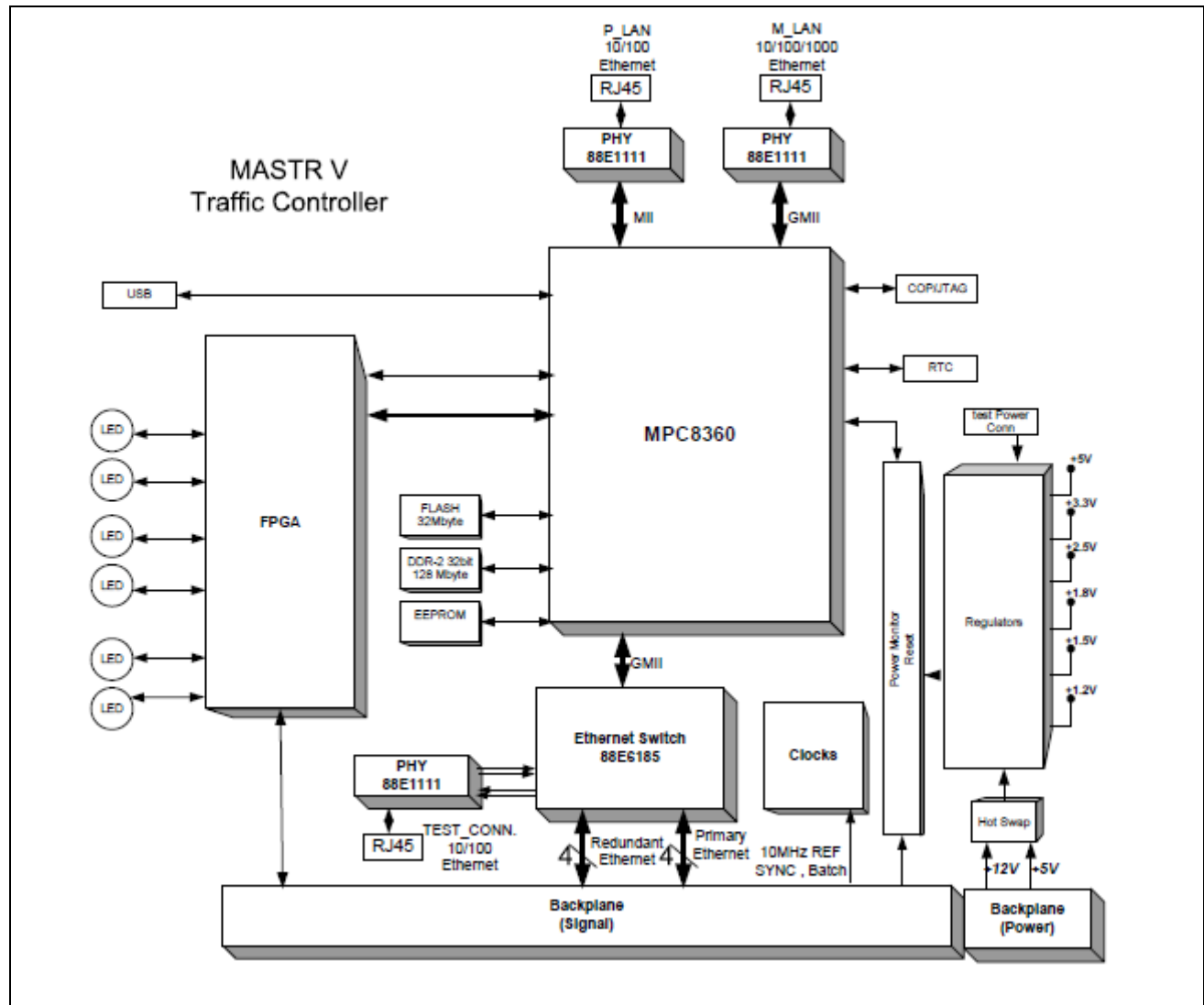


Figure 4. Block Diagram of Test Configuration, Traffic Controller

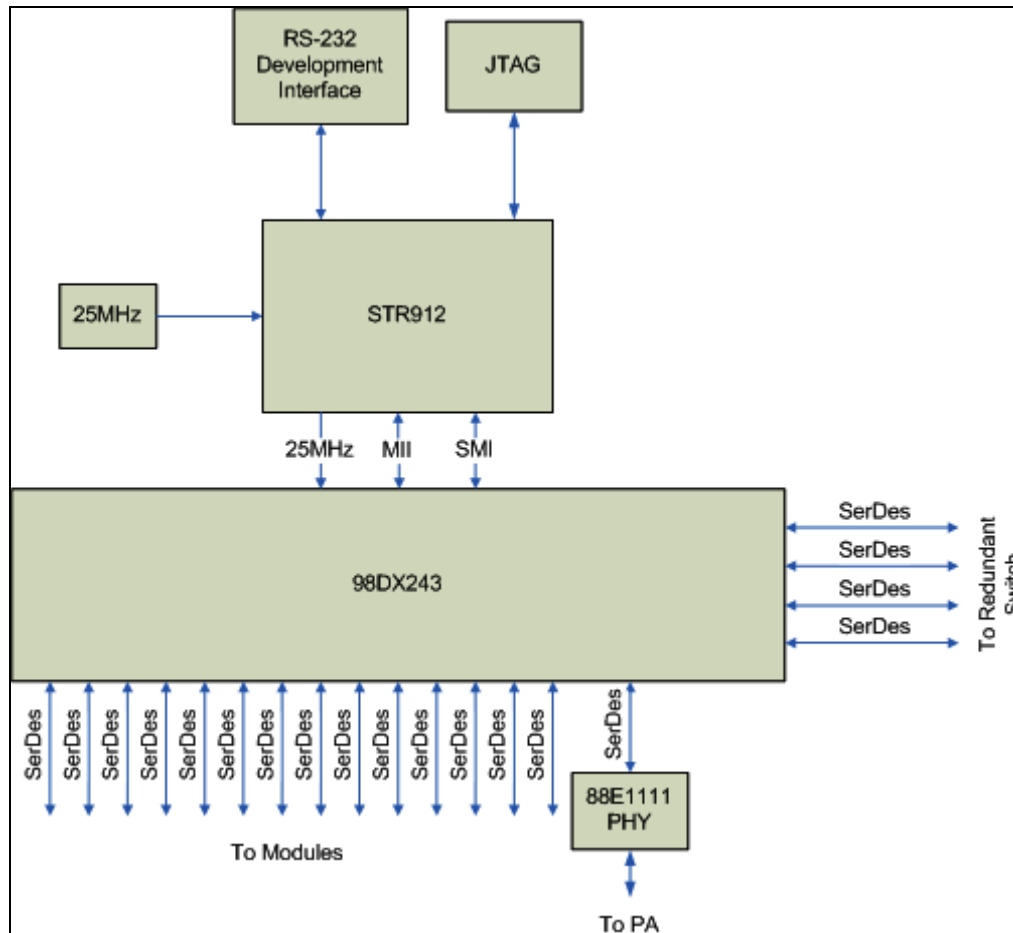


Figure 5. Block Diagram of Test Configuration, Ethernet Switch

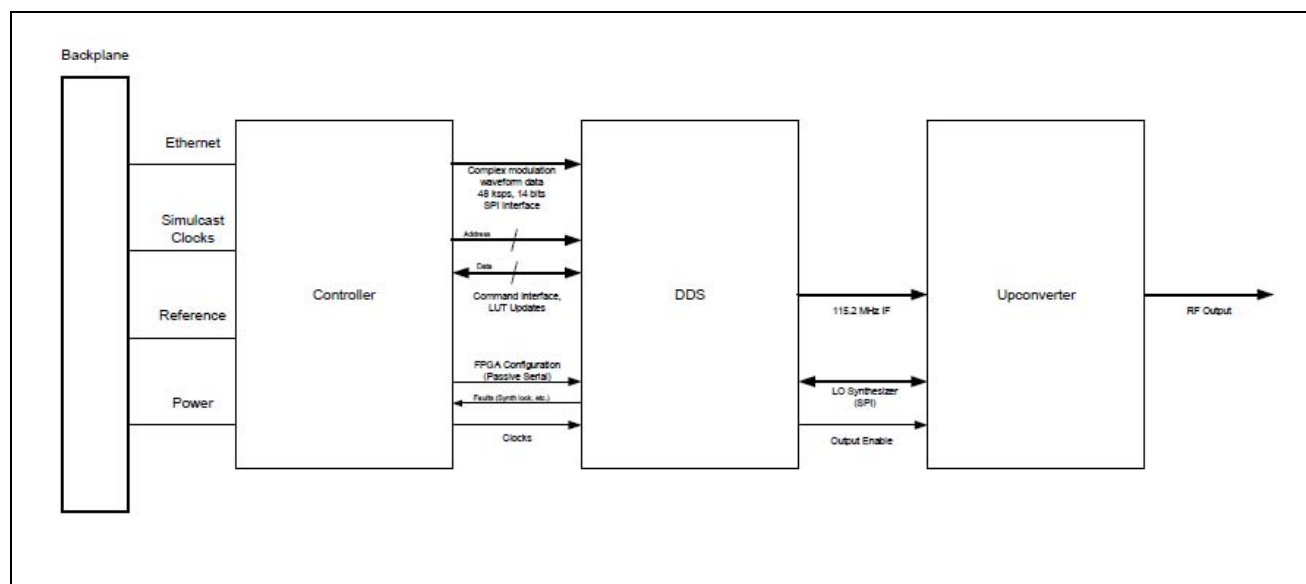


Figure 6. Block Diagram of Test Configuration, Transmit Module

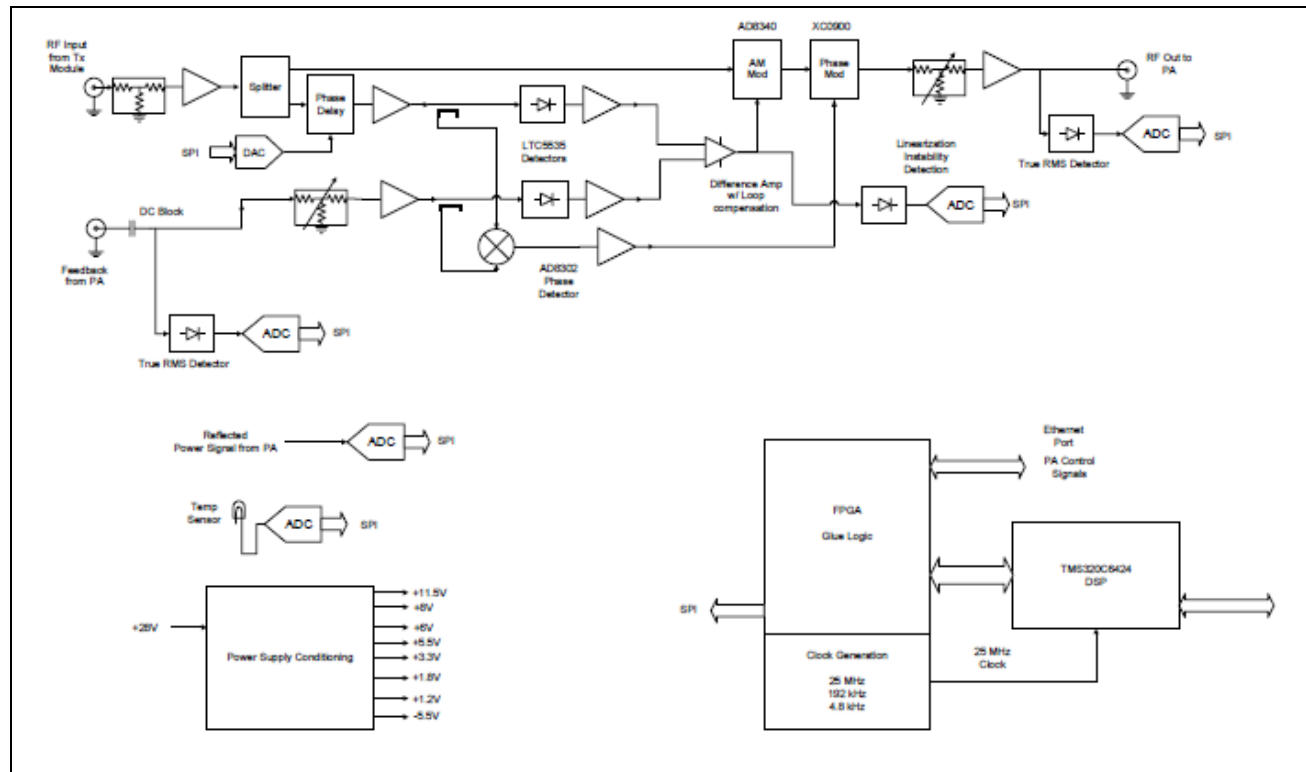


Figure 7. Block Diagram of Test Configuration, Linearizer

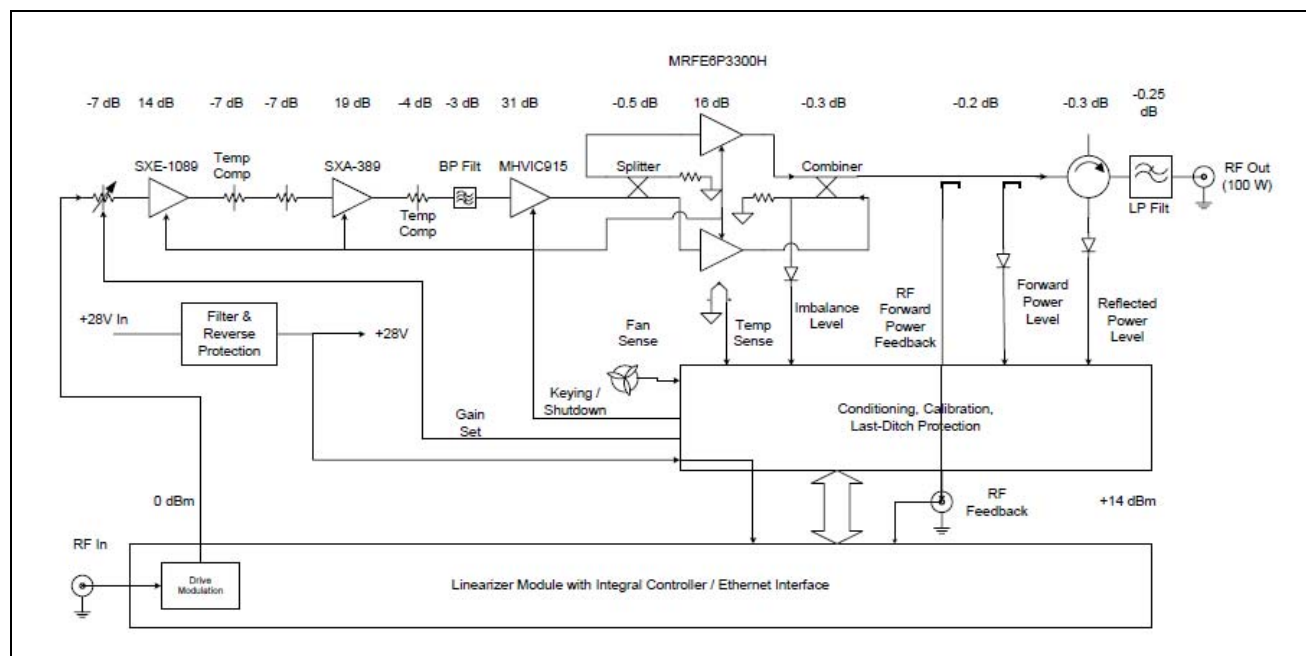


Figure 8. Block Diagram of Test Configuration, Power Amplifier

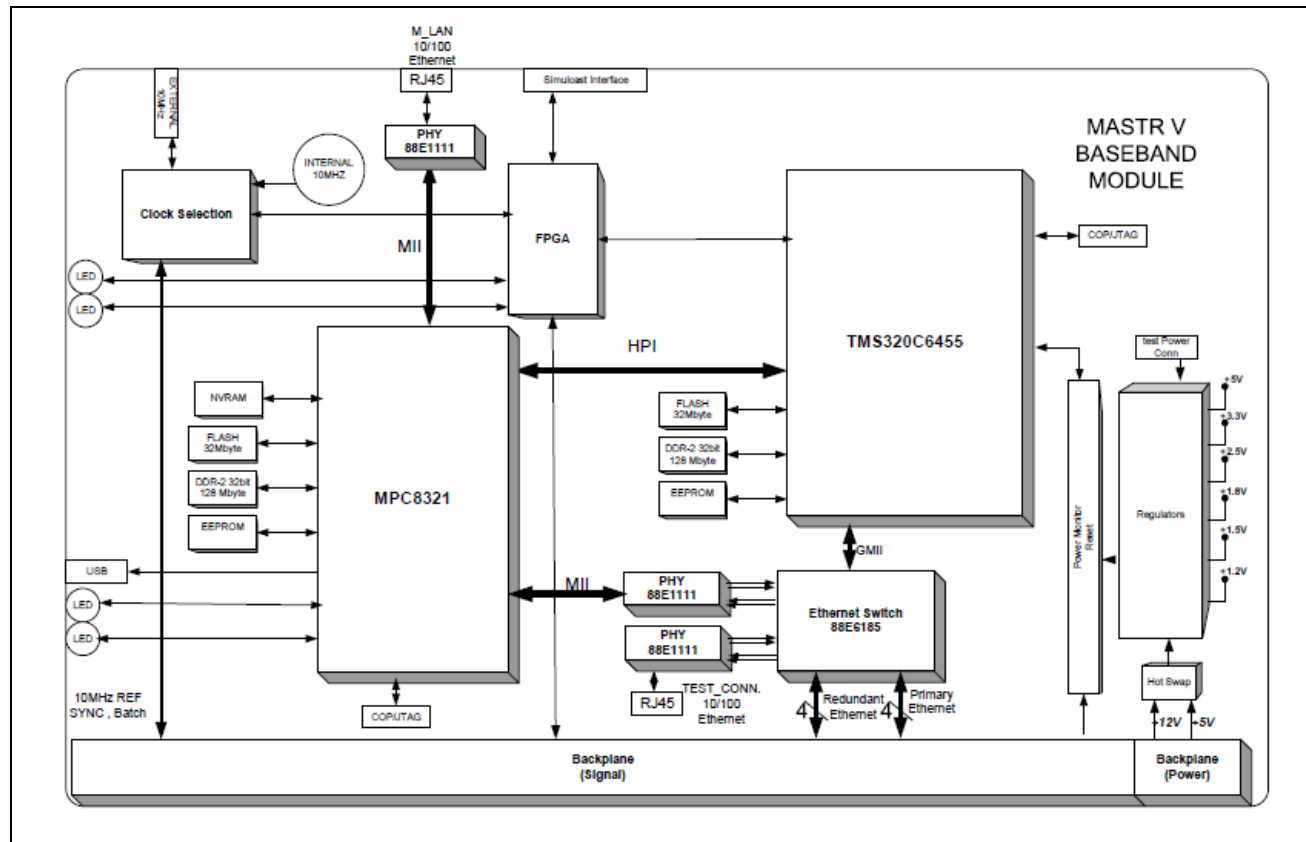


Figure 9. Block Diagram of Test Configuration, Baseband Module

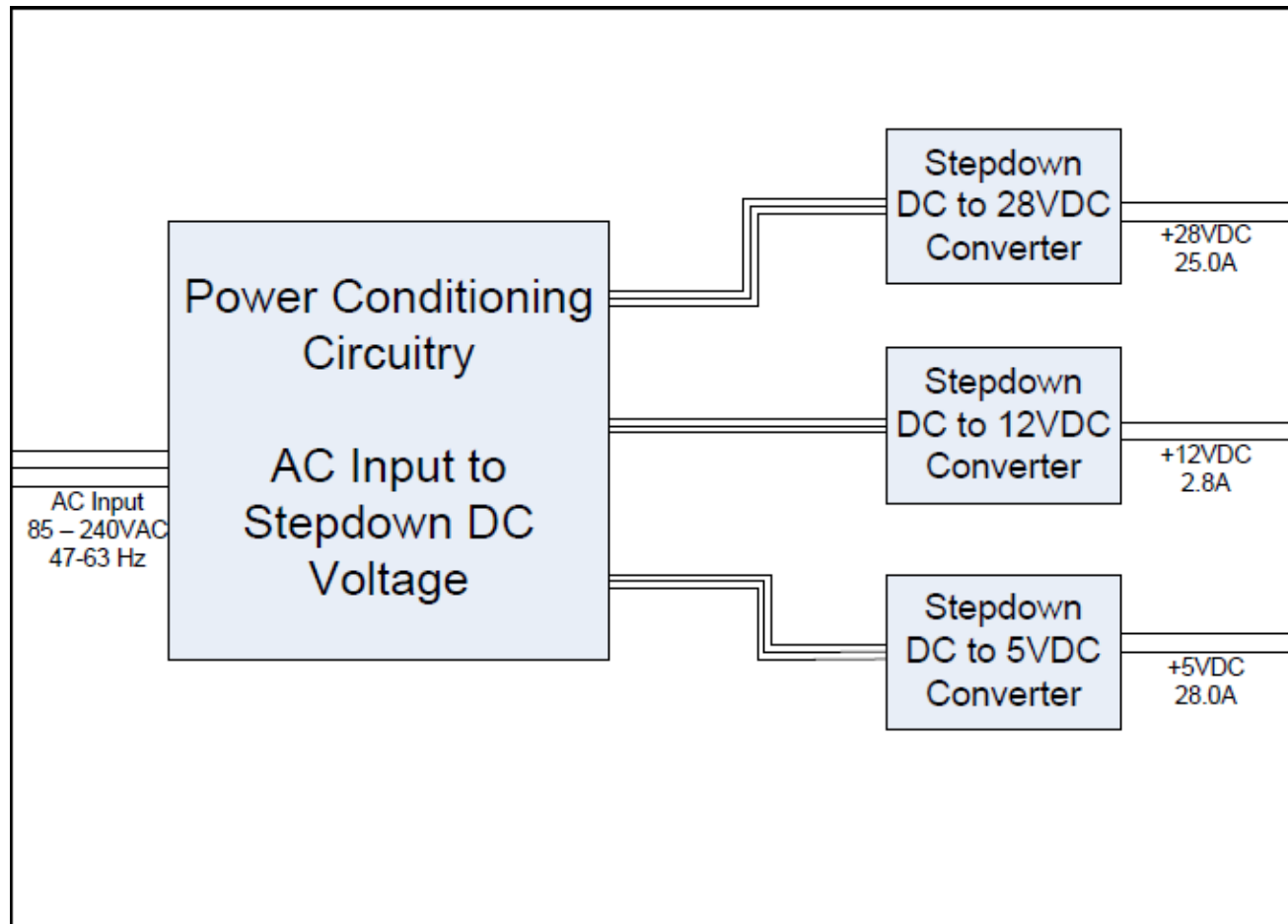


Figure 10. Block Diagram of Test Configuration, Power Supply

2.8. Method of Monitoring EUT Operation

A “STATUS” LED is part of each of the following modules: Tx Module, PA Module, Rx Module, Baseband Module, Traffic Controller and E-Switch. A Red indication on the “STATUS” LED indicates that the module is not functioning properly and the associated channel is taken “Out Of Service”

2.8 Mode of Operation

The MASTR V can generate internal Test Patterns for each modulation mode, selecting the mode and enabling the transmitter is controller with a Bar Code Scanner connected via a standard Laptop PC to M-LAN port of the Baseband Module. No special software was required, all the commands were sent using a Telnet session.

There are three modes of operation:

P25 Phase I – modulation C4FM

P25 Linear Simulcast – modulation WCQPSK

P25 Phase II – modulation HDQPSK

2.9 Modifications

2.9.1 Modifications to EUT

The following modifications were made to the EUT for compliance to Radiated Emissions:

1. Open Rack
Changed the open rack from a desktop type to a section of the open rack structure that will actually be used in the manufacturing and installed setup. Note that this rack also includes the Ground Bar.
2. Ground Bar
Addition of a single ground bar to allow improved grounding of all the chassis.
3. HPA Shelf Internal Ground Strap
Addition of a copper ground strap to connect the Power Supply, High Power Amplifier and 2 rack unit shelf together.
4. HPA Shelf Ground Strap
Addition of a copper ground strap to connect the HPA Shelf to the ground bar.
5. 14-Slot Chassis Ground Strap
Addition of a copper ground strap to connect the 14-Slot Chassis to the ground bar.
6. 14-Slot Chassis Backplate
Addition of a backplate to the 14-Slot Chassis to completely screen the backplane.
7. 14-Slot Chassis Paint Removal
Removal of paint from the inside front edge of the 14-Slot Chassis to allow front chassis grounding.
8. HPA Shelf Paint Removal
Removal of paint from the inside front edge of the HPA Shelf Chassis to allow front chassis grounding.
9. Ethernet Switch Paint Removal
Removal of paint from the inside front edge of the Ethernet Switches to allow front grounding to the 14-Slot Chassis.
10. Replaced Ethernet Switch
The Ethernet Switch board layout was modified to move all high speed communication busses to inner layers. These new Ethernet Switches were included after the first Pre-Scan.
11. SerDes Levels Reduced
The level of the SerDes was reduced on each of the modules (a resistor change). This change was made on every module after the first Pre-Scan.
12. Compact PCI Shields
A shield was added to each Compact PCI connector on each module. This change was made on every module after the first Pre-Scan.
13. Module Finger Shield
A finger stock shield was added to the front of each module (Tx, Rx, BB and TC) to improve shielding. This change was made on every module after the first Pre-Scan. file: MASTR V Radiation Modifications.doc 2/13/2009
14. Power Supply Modifications
Three internal bypass capacitors (1000pF, 0.1uF, 0.022uF) to the +5V, +12V and +28V outputs of the Power Supply to improve low frequency radiation
15. Shortened chassis ground wire to 62".

2.9.2 Modifications to Test Standard

No modifications were made to the test standard.

2.10 Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Tyco Electronics upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

3. Electromagnetic Compatibility Criteria for Unintentional Radiators

3.1. Conducted Emissions Limits

Test Requirement(s): **15.107 (a)** “Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.”

15.107 (b) “For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.”

Frequency range (MHz)	15.107(b), Class A Limits (dBμV)		15.107(a), Class B Limits (dBμV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15- 0.5	79	66	66 - 56	56 - 46
0.5 – 5.0	73	60	56	46
5.0 - 30	73	60	60	50
Note — The lower limit shall apply at the transition frequencies.				

Table 5. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)

Test Procedures: The EUT was placed on a 0.8m-high wooden table inside a shielded chamber. The method of testing, test conditions, and test procedures of ANSI C63.4 were used. The EUT was powered through a 50Ω/50μH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. Multiple scans were performed with various loading. All peak emissions within 6 dB of the limit were re-measured using a quasi-peak and/or average detector as appropriate.

Test Results: The EUT was compliant with the Class A requirement(s) of this section.

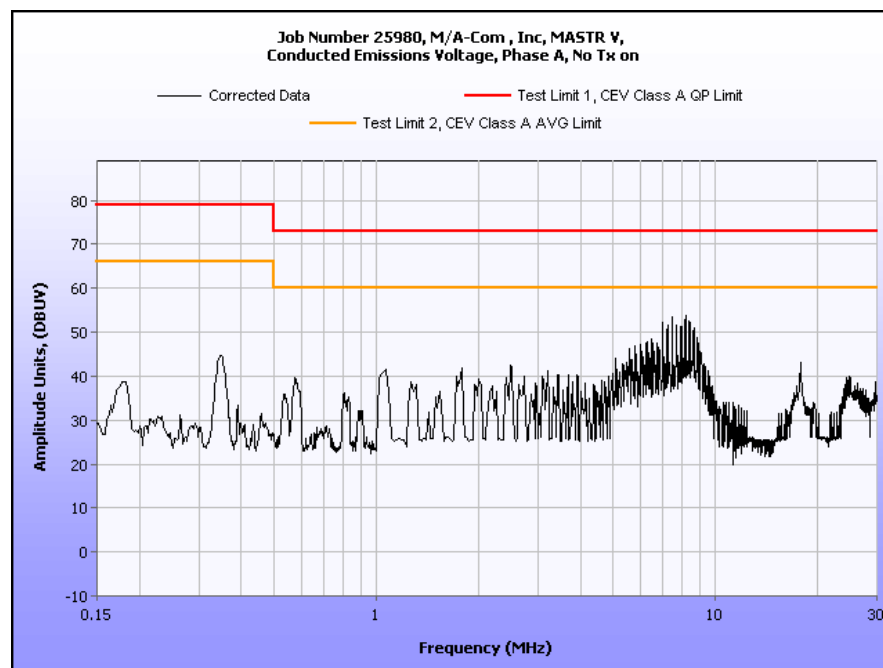
Test Engineer(s): Len Knight

Test Date(s): 02/12/09

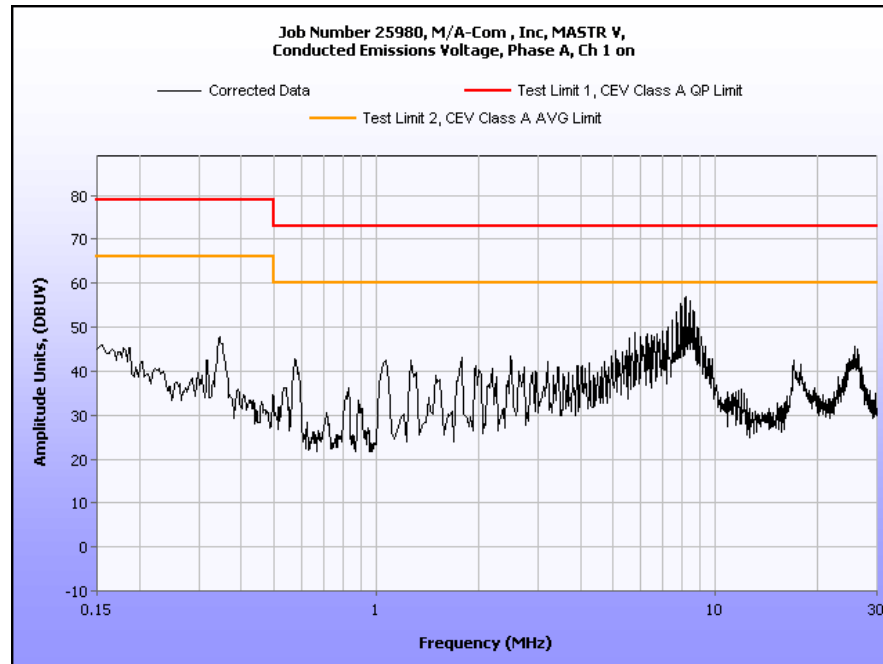
Conducted Emissions - Voltage, AC Power

FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.189	27.44	79	PASS	-51.56	20.46	66	PASS	-45.54
0.229	28.81	79	PASS	-50.19	21.65	66	PASS	-44.35
8.4	51.51	73	PASS	-21.49	44.85	60	PASS	-15.15
8.17	51.39	73	PASS	-21.61	46.06	60	PASS	-13.94

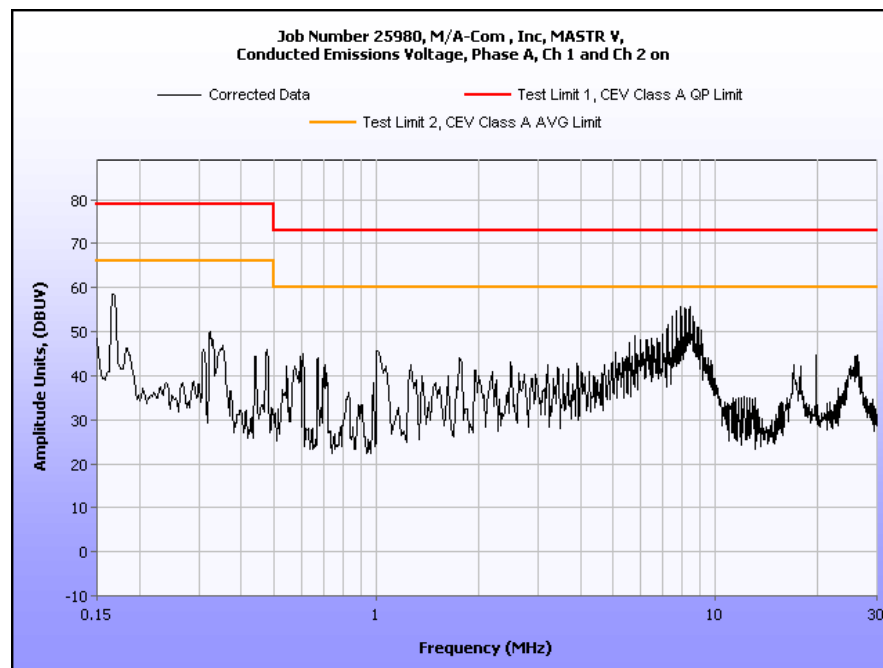
Table 6. Conducted Emissions - Voltage, AC Power, Phase Line, 120 VAC, 60 Hz



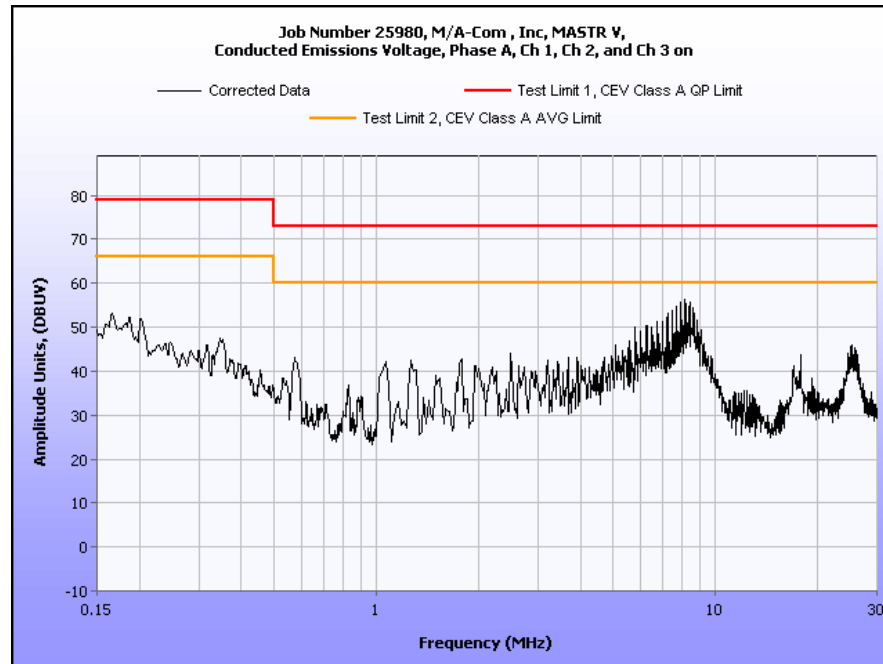
Plot 1. Conducted Emissions, Phase Line, No Transceiver On



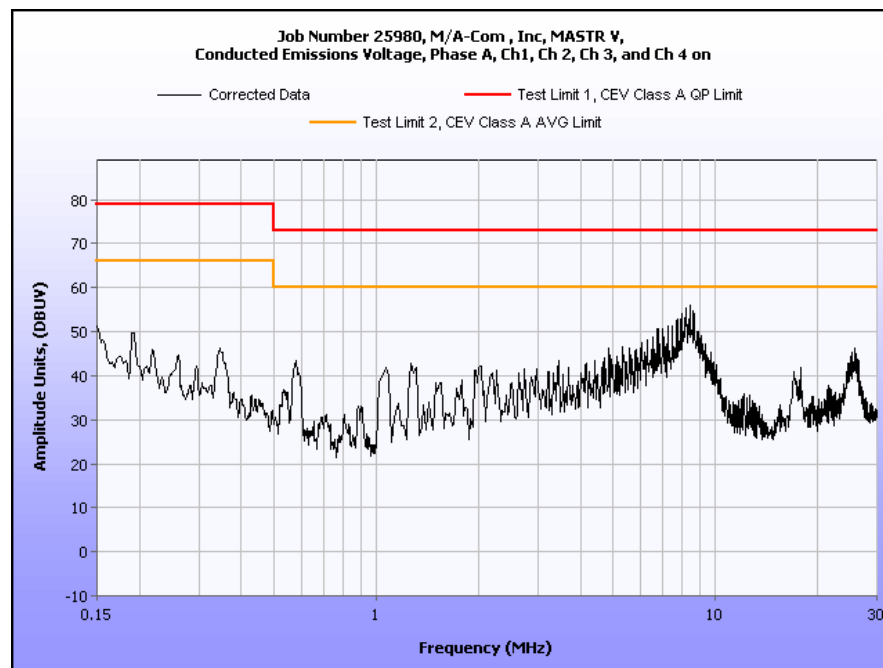
Plot 2. Conducted Emissions, Phase Line, Channel 1 On



Plot 3. Conducted Emissions, Phase Line, Channels 1 and 2 On



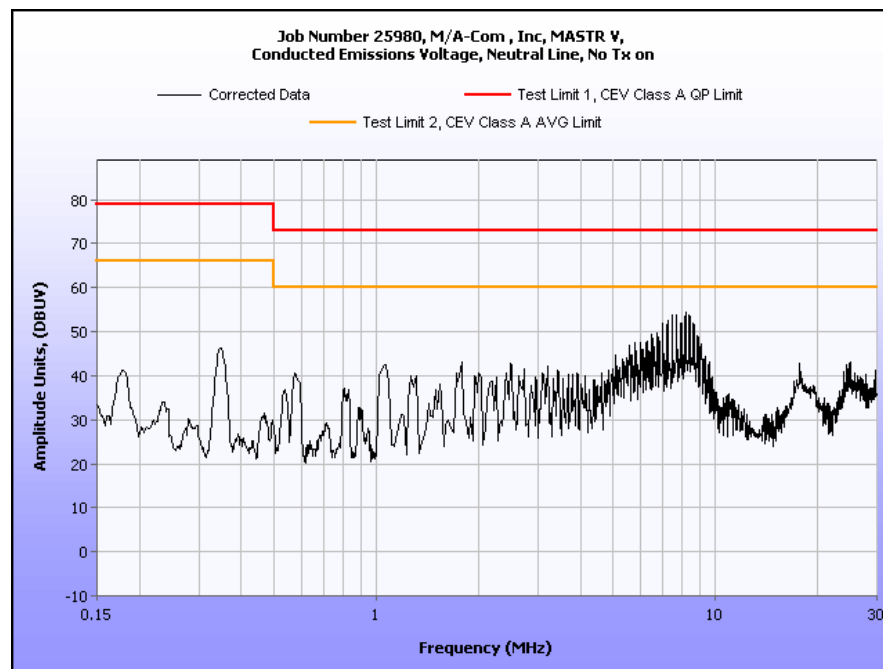
Plot 4. Conducted Emissions, Phase Line, Channels 1, 2, and 3 On



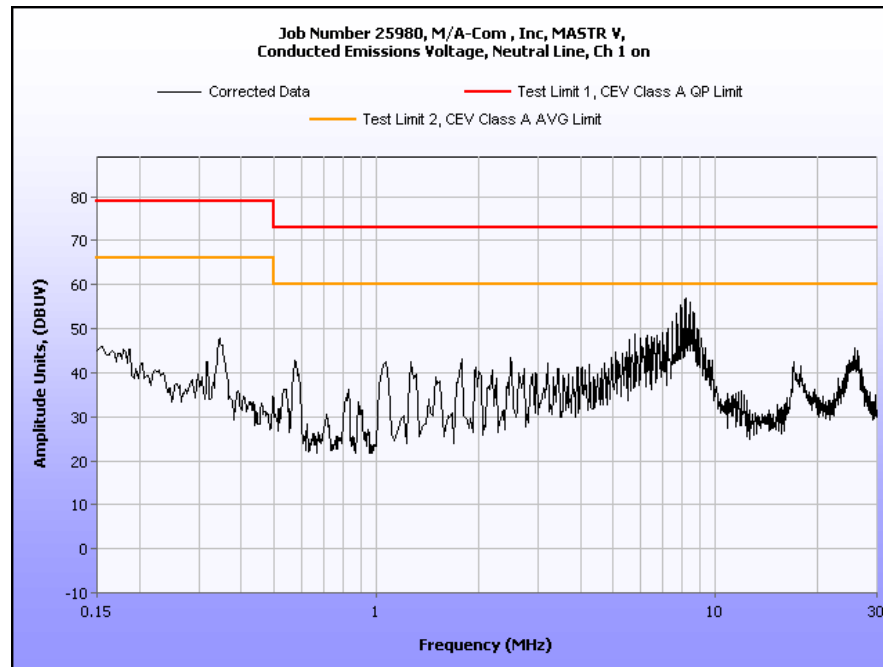
Plot 5. Conducted Emissions, Phase Line, Channels 1, 2, 3, and 4 On

FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.181	39.43	79	PASS	-39.57	34.70	66	PASS	-31.30
0.237	28.16	79	PASS	-50.84	22.71	66	PASS	-43.29
8.867	41.89	73	PASS	-31.11	36.12	60	PASS	-23.88
8.17	50.89	73	PASS	-22.11	46.77	60	PASS	-13.23

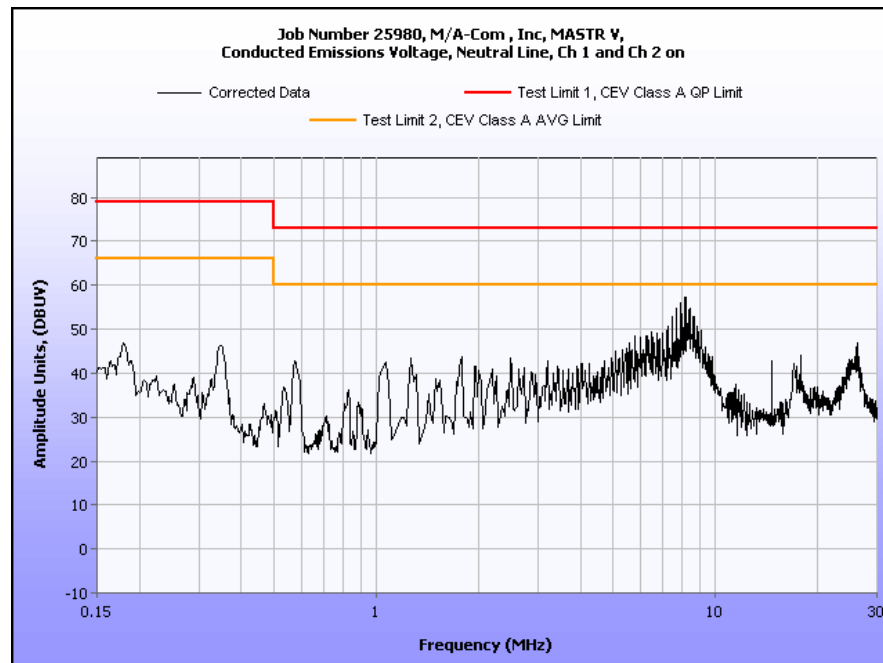
Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line, 120 VAC, 60 Hz



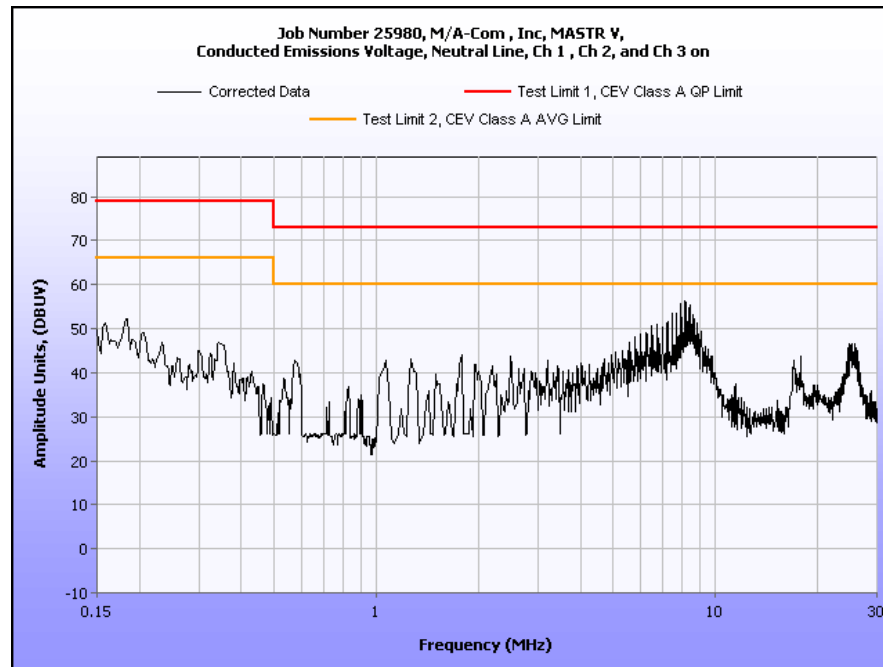
Plot 6. Conducted Emissions, Neutral Line, No Transceiver On



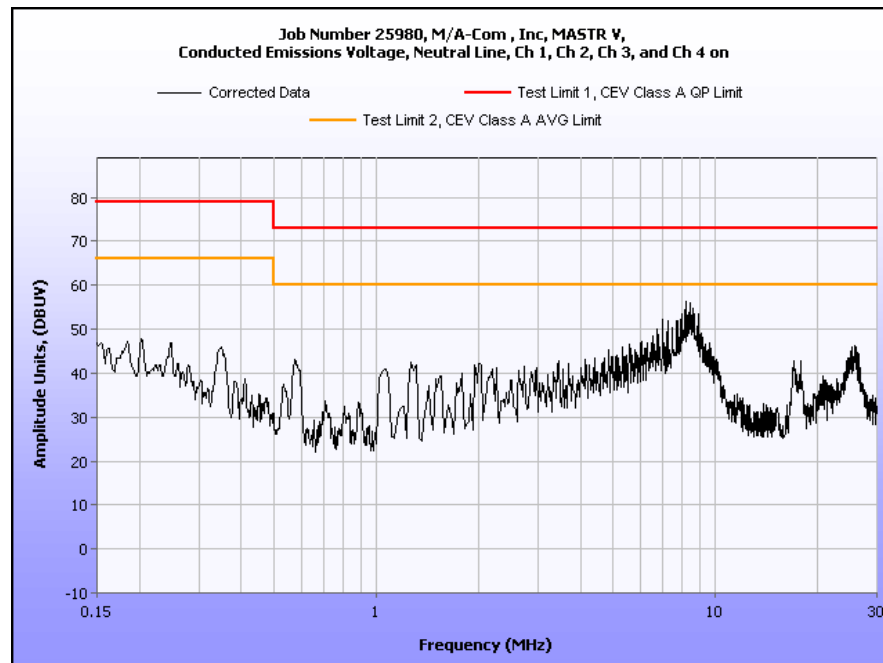
Plot 7. Conducted Emissions, Neutral Line, Channel 1 On



Plot 8. Conducted Emissions, Neutral Line, Channels 1 and 2 On



Plot 9. Conducted Emissions, Neutral Line, Channels 1, 2, and 3 On



Plot 10. Conducted Emissions, Neutral Line, Channels 1, 2, 3, and 4 On

Conducted Emission Limits Test Setup



Photograph 1. Conducted Emissions, Test Setup

3.2. Radiated Emissions Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class A limits expressed in Table 8.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 8.

Frequency (MHz)	Field Strength (dB μ V/m)	
	§15.109 (b), Class A Limit (dB μ V) @ 10m	§15.109 (a), Class B Limit (dB μ V) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a 0.8m-high non-conductive table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

Scans were performed with the transmitters turned off. After this, scans were performed turning one transmitter on at a time. These scans were used to perform final emissions on frequencies of interest.

Test Results: The EUT was compliant with the Class A requirement(s) of this section.

Test Engineer(s): Len Knight

Test Date(s): 02/10/09

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.018	118	H	3.40	17.67	7.07	0.14	10.46	14.42	39.00	-24.58
34.018	86	V	1.00	31.28	5.81	0.14	10.46	26.77	39.00	-12.23
39.439	72	H	1.63	16.39	8.67	0.19	10.46	14.79	39.00	-24.21
39.439	33	V	1.01	30.63	7.54	0.19	10.46	27.91	39.00	-11.09
39.515	53	H	2.85	19.16	8.68	0.20	10.46	17.58	39.00	-21.42
39.515	125	V	1.00	35.00	7.56	0.20	10.46	32.30	39.00	-6.70
41.984	122	H	3.41	16.01	9.00	0.20	10.46	14.75	39.00	-24.25
41.984	124	V	1.01	31.22	7.90	0.20	10.46	28.86	39.00	-10.14
56.573	62	H	3.50	27.21	9.99	0.23	10.46	26.98	39.00	-12.02
56.573	0	V	1.00	32.44	9.32	0.23	10.46	31.53	39.00	-7.47
126.152	44	H	2.66	27.11	7.50	0.33	10.46	24.48	43.50	-19.02
126.152	341	V	0.99	28.16	7.95	0.33	10.46	25.97	43.50	-17.53
144.709	88	H	1.68	38.02	7.89	0.41	10.46	35.86	43.50	-7.64
144.709	343	V	1.00	40.15	7.90	0.41	10.46	38.00	43.50	-5.50
199.990	111	H	1.36	29.57	10.40	0.39	10.46	29.90	43.50	-13.60
199.990	268	V	1.00	29.41	10.20	0.39	10.46	29.54	43.50	-13.96
249.989	258	H	1.33	30.41	12.90	1.30	10.46	34.15	46.40	-12.25
249.989	0	V	1.00	27.93	13.00	1.30	10.46	31.77	46.40	-14.63
329.991	191	H	1.68	25.64	13.70	1.60	10.46	30.48	46.40	-15.92
329.991	113	V	1.01	26.55	14.30	1.60	10.46	31.99	46.40	-14.41
375.019	200	H	2.08	25.49	14.80	1.76	10.46	31.59	46.40	-14.81
375.019	113	V	1.00	27.92	14.90	1.76	10.46	34.12	46.40	-12.28
399.989	220	H	1.19	29.45	15.50	1.87	10.46	36.36	46.40	-10.04
399.989	182	V	1.00	27.62	15.50	1.87	10.46	34.53	46.40	-11.87
499.991	215	H	2.77	25.49	17.30	2.27	10.46	34.60	46.40	-11.80
499.991	59	V	1.00	24.96	17.40	2.27	10.46	34.17	46.40	-12.23
625.001	214	H	1.77	28.78	19.70	2.41	10.46	40.43	46.40	-5.97
625.001	314	V	1.09	27.18	20.10	2.41	10.46	39.23	46.40	-7.17
687.490	62	H	2.47	23.45	20.25	2.58	10.46	35.82	46.40	-10.58
687.490	337	V	1.00	28.14	20.25	2.58	10.46	40.51	46.40	-5.89
749.995	157	H	1.14	29.36	21.00	2.94	10.46	42.84	46.40	-3.56
749.995	138	V	1.00	26.54	21.20	2.94	10.46	40.22	46.40	-6.18

Table 9. Radiated Emissions Limits, Test Results, All Transmitters Off, FCC

Note: The EUT was tested at 3 m. The data has been corrected for comparison with the 10 m limit using the formula: $20\log(3\text{ m}/10\text{ m})$ as expressed in the 'Distance Correction' column.

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.240	114	H	2.95	12.39	5.03	0.10	10.46	7.06	39.00	-31.94
30.240	165	V	1.01	35.68	3.92	0.10	10.46	29.24	39.00	-9.76
34.930	323	H	2.77	20.57	7.56	0.15	10.46	17.82	39.00	-21.18
34.930	323	V	1.00	39.03	6.27	0.15	10.46	34.98	39.00	-4.02
143.531	106	H	1.71	37.84	7.87	0.40	10.46	35.65	43.50	-7.85
143.531	345	V	1.00	39.20	7.90	0.40	10.46	37.04	43.50	-6.46

Table 10. Radiated Emissions Limits, Test Results, All Transmitters On, FCC

Note: The EUT was tested at 3 m. The data has been corrected for comparison with the 10 m limit using the formula: $20\log(3\text{ m}/10\text{ m})$ as expressed in the 'Distance Correction' column.

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.018	118	H	3.40	17.67	7.07	0.14	10.46	14.42	40.00	-25.58
34.018	86	V	1.00	31.28	5.81	0.14	10.46	26.77	40.00	-13.23
39.439	72	H	1.63	16.39	8.67	0.19	10.46	14.79	40.00	-25.21
39.439	33	V	1.01	30.63	7.54	0.19	10.46	27.91	40.00	-12.09
39.515	53	H	2.85	19.16	8.68	0.20	10.46	17.58	40.00	-22.42
39.515	125	V	1.00	35.00	7.56	0.20	10.46	32.30	40.00	-7.70
41.984	122	H	3.41	16.01	9.00	0.20	10.46	14.75	40.00	-25.25
41.984	124	V	1.01	31.22	7.90	0.20	10.46	28.86	40.00	-11.14
56.573	62	H	3.50	27.21	9.99	0.23	10.46	26.98	40.00	-13.02
56.573	0	V	1.00	32.44	9.32	0.23	10.46	31.53	40.00	-8.47
126.152	44	H	2.66	27.11	7.50	0.33	10.46	24.48	40.00	-15.52
126.152	341	V	0.99	28.16	7.95	0.33	10.46	25.97	40.00	-14.03
144.709	88	H	1.68	38.02	7.89	0.41	10.46	35.86	40.00	-4.14
*144.709	343	V	1.00	40.15	7.90	0.41	10.46	38.00	40.00	-2.00
199.990	111	H	1.36	29.57	10.40	0.39	10.46	29.90	40.00	-10.10
199.990	268	V	1.00	29.41	10.20	0.39	10.46	29.54	40.00	-10.46
249.989	258	H	1.33	30.41	12.90	1.30	10.46	34.15	47.00	-12.85
249.989	0	V	1.00	27.93	13.00	1.30	10.46	31.77	47.00	-15.23
329.991	191	H	1.68	25.64	13.70	1.60	10.46	30.48	47.00	-16.52
329.991	113	V	1.01	26.55	14.30	1.60	10.46	31.99	47.00	-15.01
375.019	200	H	2.08	25.49	14.80	1.76	10.46	31.59	47.00	-15.41
375.019	113	V	1.00	27.92	14.90	1.76	10.46	34.12	47.00	-12.88
399.989	220	H	1.19	29.45	15.50	1.87	10.46	36.36	47.00	-10.64
399.989	182	V	1.00	27.62	15.50	1.87	10.46	34.53	47.00	-12.47
499.991	215	H	2.77	25.49	17.30	2.27	10.46	34.60	47.00	-12.40
499.991	59	V	1.00	24.96	17.40	2.27	10.46	34.17	47.00	-12.83
625.001	214	H	1.77	28.78	19.70	2.41	10.46	40.43	47.00	-6.57
625.001	314	V	1.09	27.18	20.10	2.41	10.46	39.23	47.00	-7.77
687.490	62	H	2.47	23.45	20.25	2.58	10.46	35.82	47.00	-11.18
687.490	337	V	1.00	28.14	20.25	2.58	10.46	40.51	47.00	-6.49
749.995	157	H	1.14	29.36	21.00	2.94	10.46	42.84	47.00	-4.16
749.995	138	V	1.00	26.54	21.20	2.94	10.46	40.22	47.00	-6.78

Table 11. Radiated Emissions Limits, Test Results, All Transmitters Off, ICES-003

Note 1: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

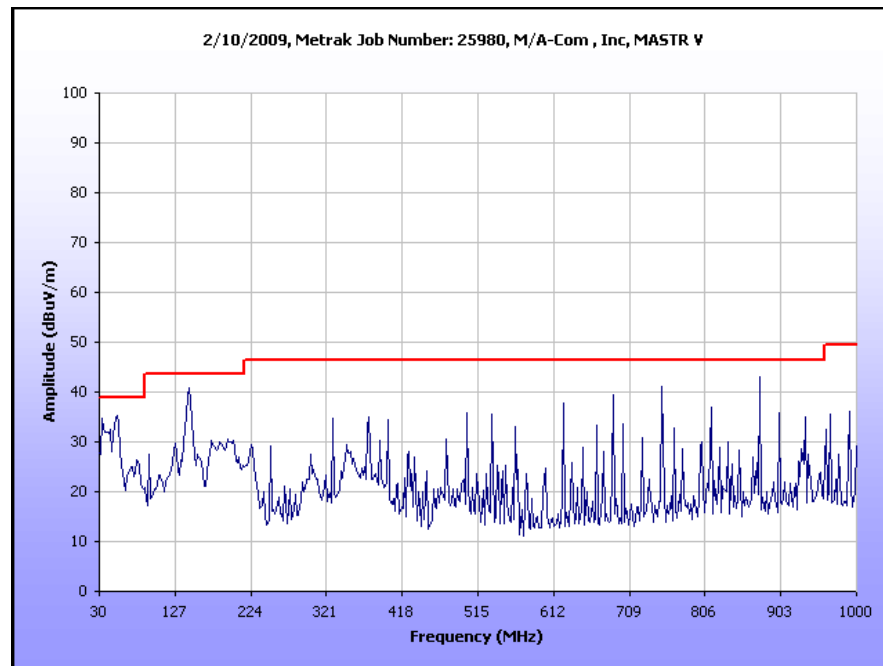
Note 2: The EUT was tested at 3 m. The data has been corrected for comparison with the 10 m limit using the formula: $20\log(3\text{ m}/10\text{ m})$ as expressed in the 'Distance Correction' column.

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.240	114	H	2.95	12.39	5.03	0.10	10.46	7.06	40.00	-32.94
30.240	165	V	1.01	35.68	3.92	0.10	10.46	29.24	40.00	-10.76
34.930	323	H	2.77	20.57	7.56	0.15	10.46	17.82	40.00	-22.18
34.930	323	V	1.00	39.03	6.27	0.15	10.46	34.98	40.00	-5.02
143.531	106	H	1.71	37.84	7.87	0.40	10.46	35.65	40.00	-4.35
*143.531	345	V	1.00	39.20	7.90	0.40	10.46	37.04	40.00	-2.96

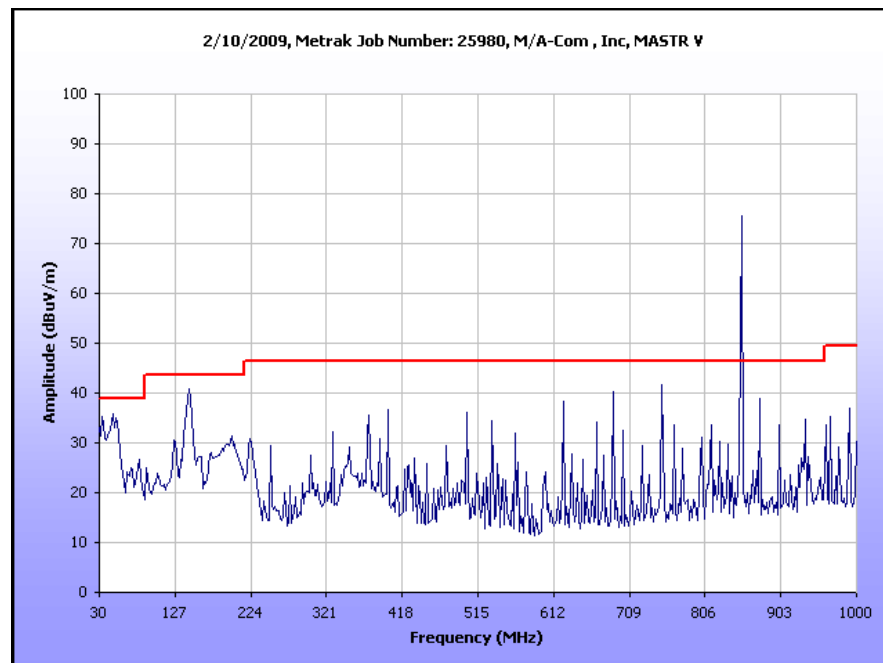
Table 12. Radiated Emissions Limits, Test Results, All Transmitters On, ICES-003

Note 1: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

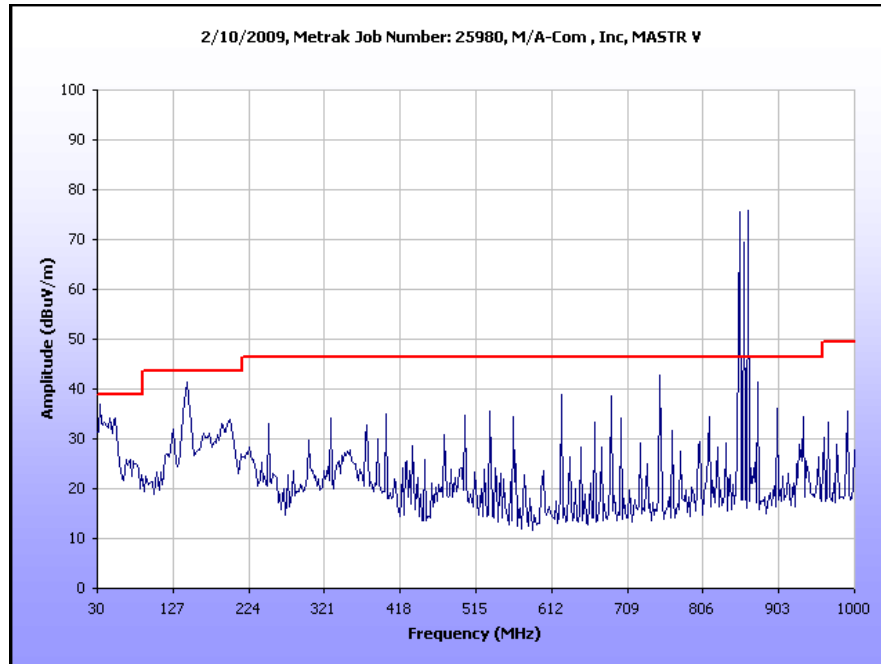
Note 2: The EUT was tested at 3 m. The data has been corrected for comparison with the 10 m limit using the formula: $20\log(3\text{ m}/10\text{ m})$ as expressed in the 'Distance Correction' column.



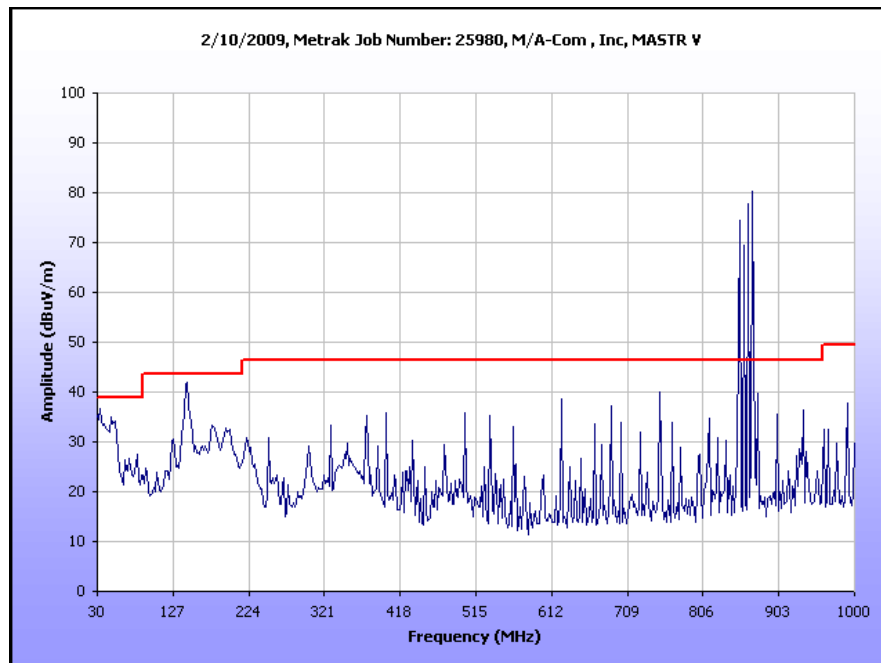
Plot 11. Radiated Emissions, Pre-Scan, All Transmitters Off



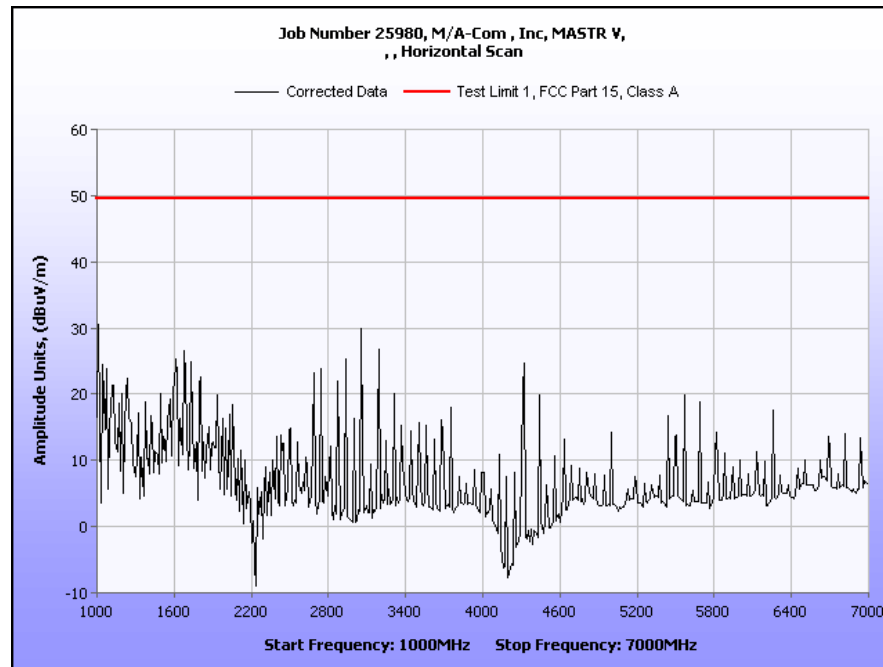
Plot 12. Radiated Emissions, Pre-Scan, Channel 1 On



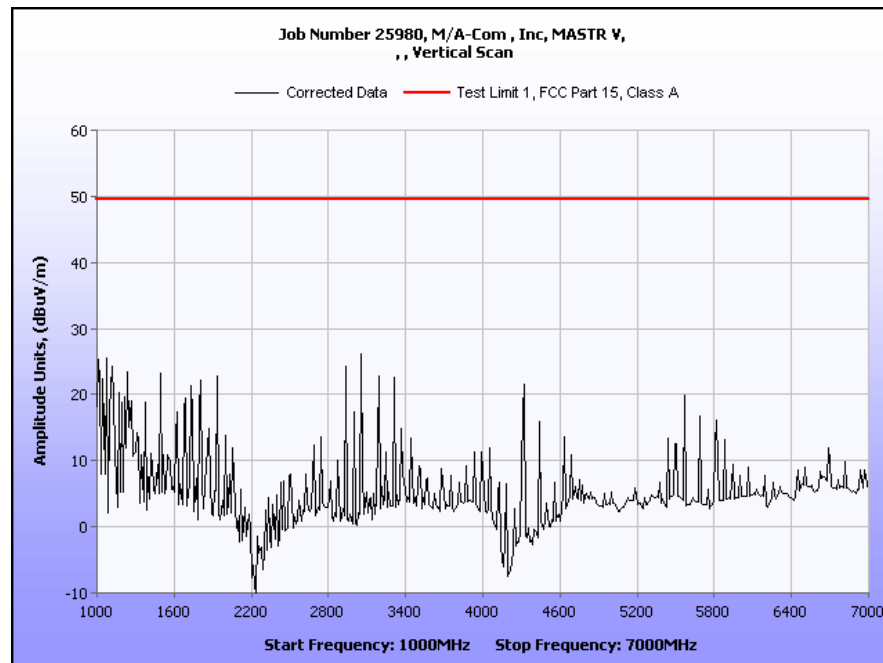
Plot 13. Radiated Emissions, Pre-Scan, Channels 1, 2 & 3 On



Plot 14. Radiated Emissions, Pre-Scan, Channels 1, 2, 3 & 4 On

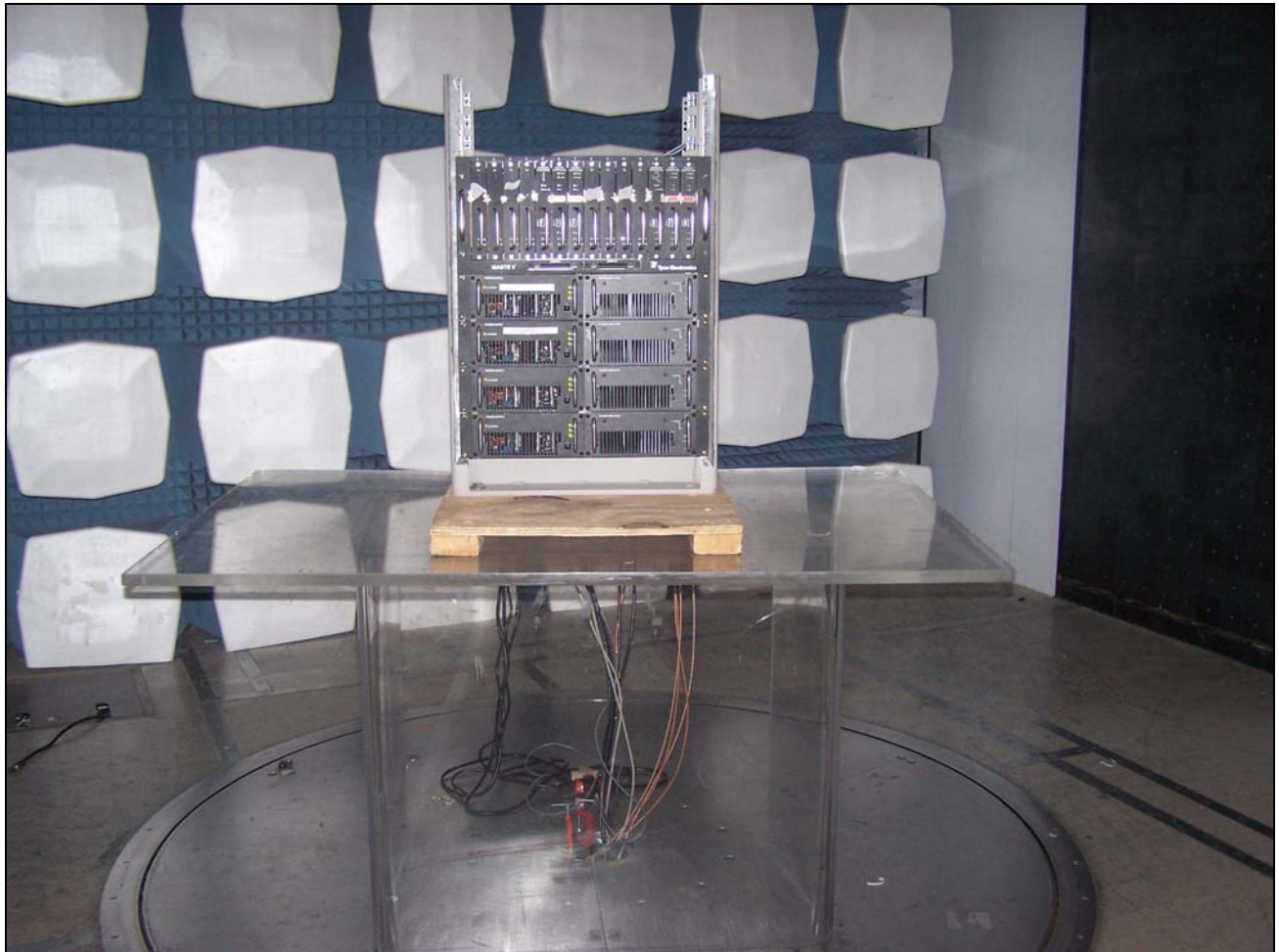


Plot 15. Radiated Emissions, Average Scan, Horizontal Scan, 1 GHz – 7 GHz



Plot 16. Radiated Emissions, Average Scan, Vertical Scan, 1 GHz – 7 GHz

Radiated Emission Limits Test Setup



Photograph 2. Radiated Emission Limits, Test Setup



IV. Electromagnetic Compatibility Criteria for Intentional Radiators



4. Electromagnetic Compatibility RF Power Output Requirements

4.1. RF Power Output

Test Requirement(s): §2.1046 and §90.215

Test Procedures: As required by 47 CFR 2.1046, *RF power output measurements* were made at the RF output terminals of the EUT.

A laptop was connected to EUT to control the RF power output, modulation, and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer capable of making power measurements. The EUT power was adjusted enough to produce maximum output power as specified in the owner's manual. The output power was then recorded with peak and average reading. Measurements were made at the low, mid, and high channels.

Test Results: Equipment complies with 47CFR 2.1046 and 90.215.

Frequency (MHz)	Modulation	Measured Avg. power		Measured Peak Power	
		dBm	Watts	dBm	Watts
851	HDQPSK	49.88	97	52.28	169
	CQPSK	50.08	102	52.15	164
	C4FM	49.89	97	49.99	100
857	HDQPSK	50.32	108	52.48	177
	CQPSK	50.17	104	52.34	171
	C4FM	49.95	99	50.09	102
863	HDQPSK	50.3	107	52.07	161
	CQPSK	50.37	109	52.25	168
	C4FM	50.12	103	50.28	107
869	HDQPSK	49.93	98	52.2	166
	CQPSK	49.9	98	52.34	171
	C4FM	49.85	97	49.75	94

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 12/19/2008

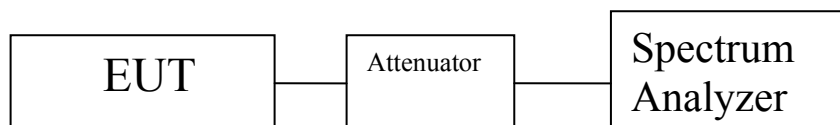
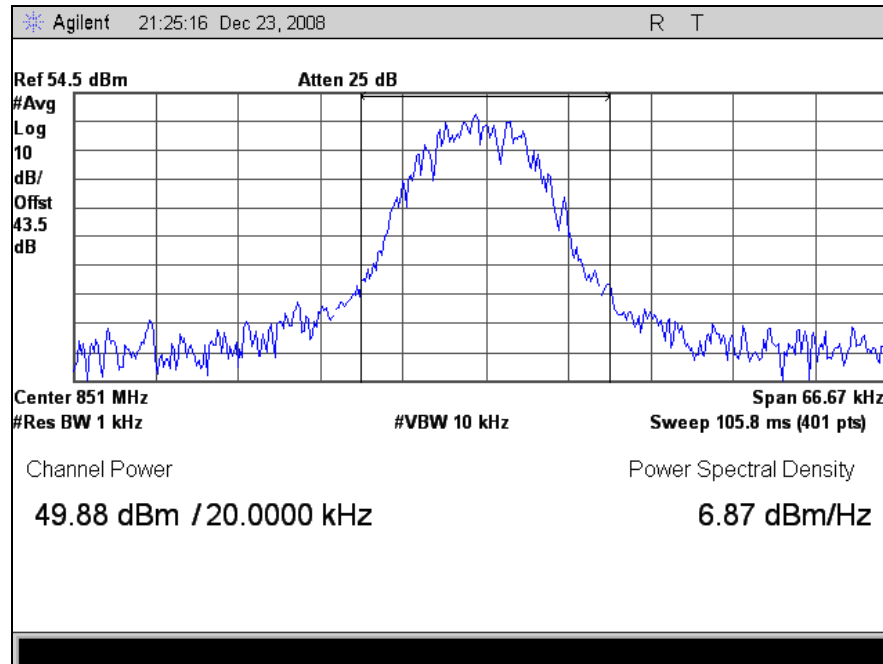
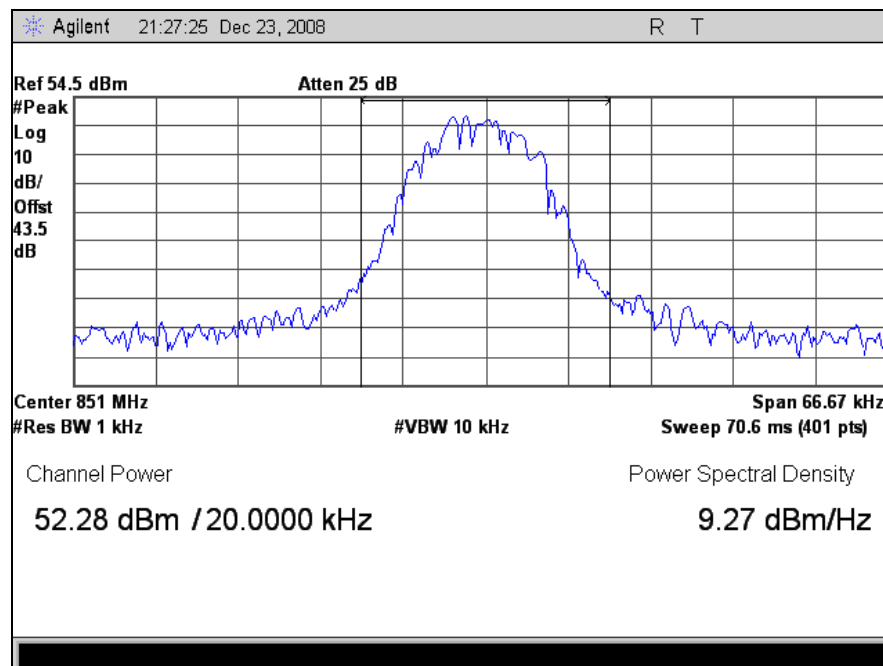


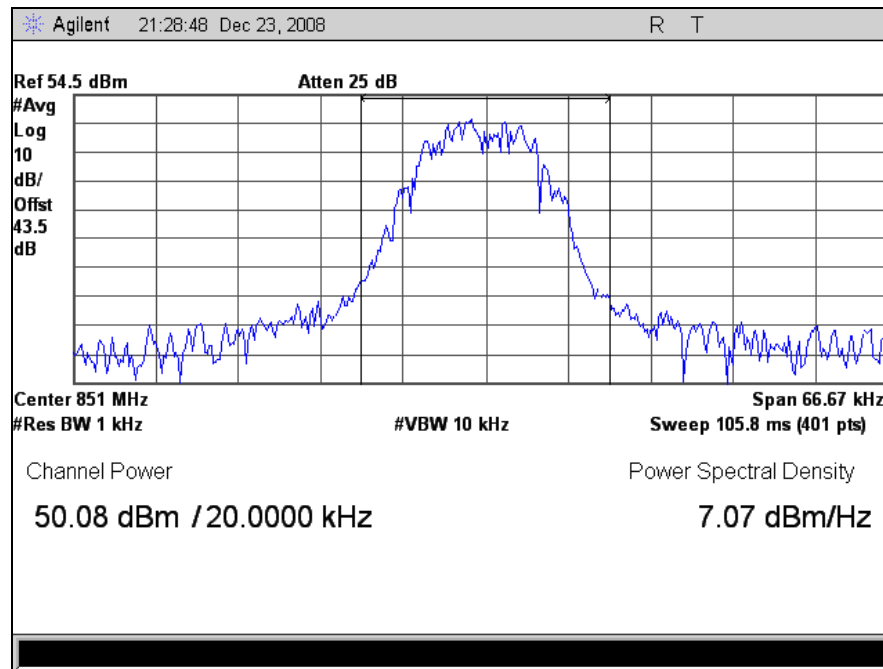
Figure 11. RF Power Output Test Setup



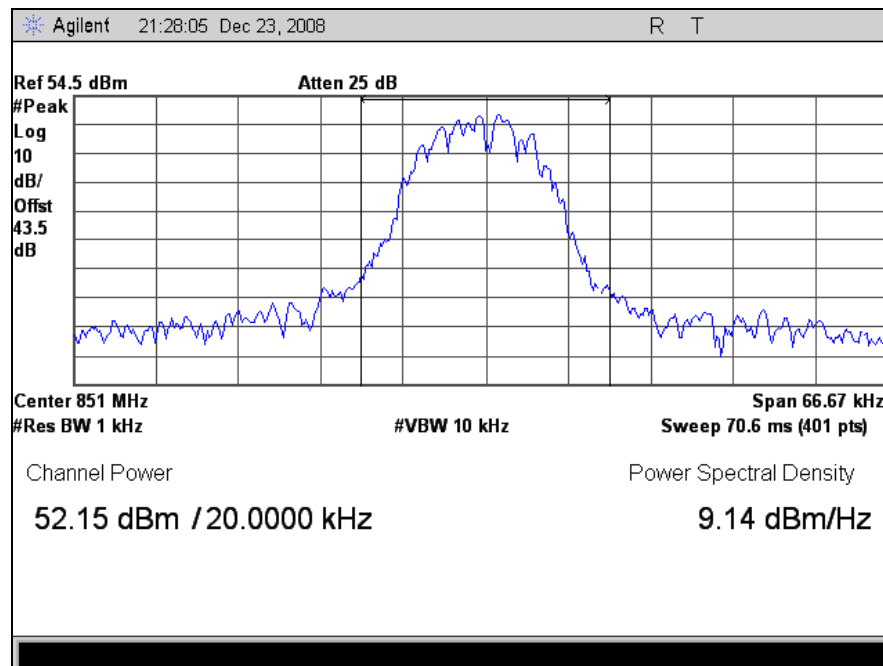
Plot 17. RF Power Output, Channel 1, HDQPSK, Avg.



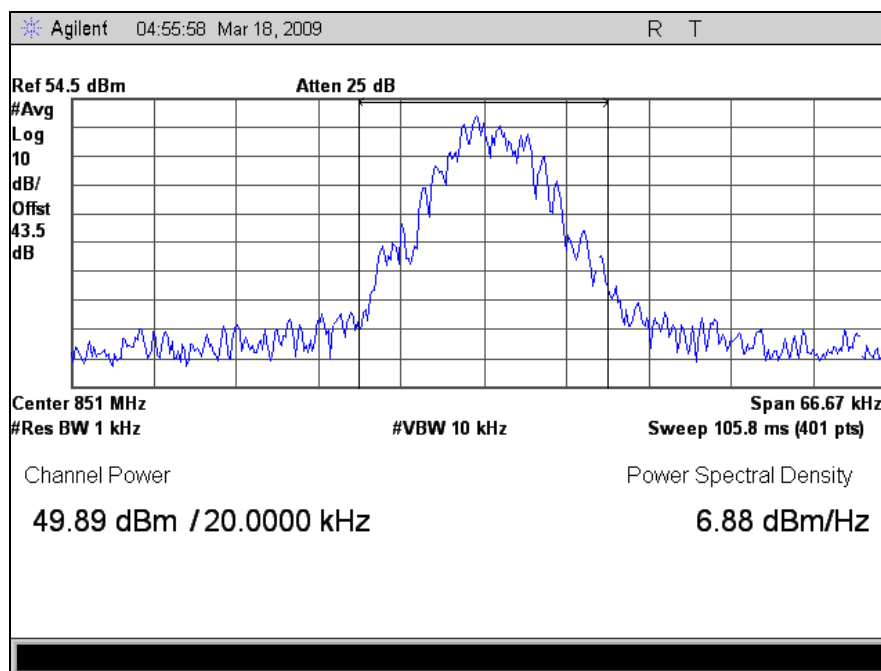
Plot 18. RF Power Output, Channel 1, HDQPSK, Peak



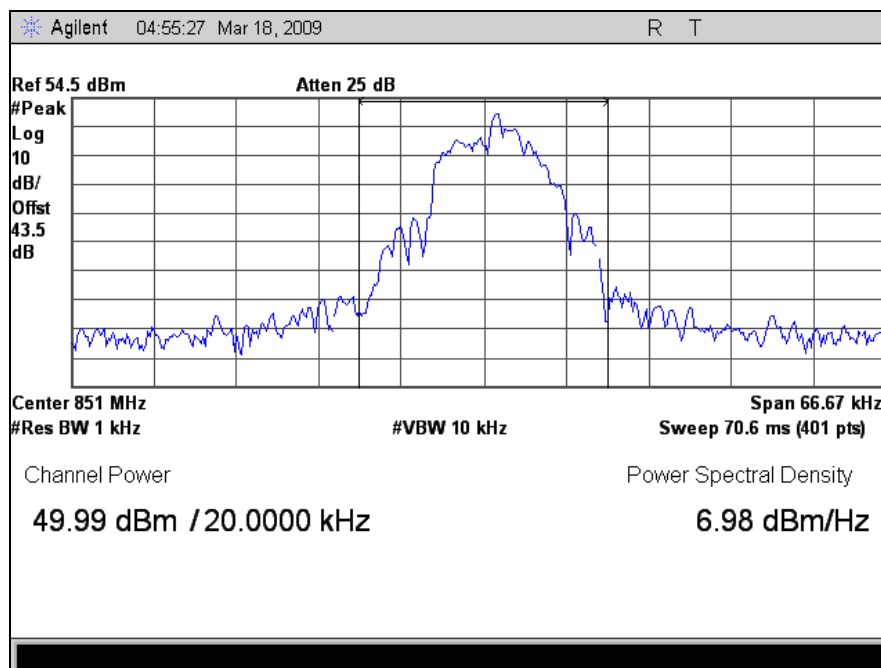
Plot 19. RF Power Output, Channel 1, CQPSK, Avg.



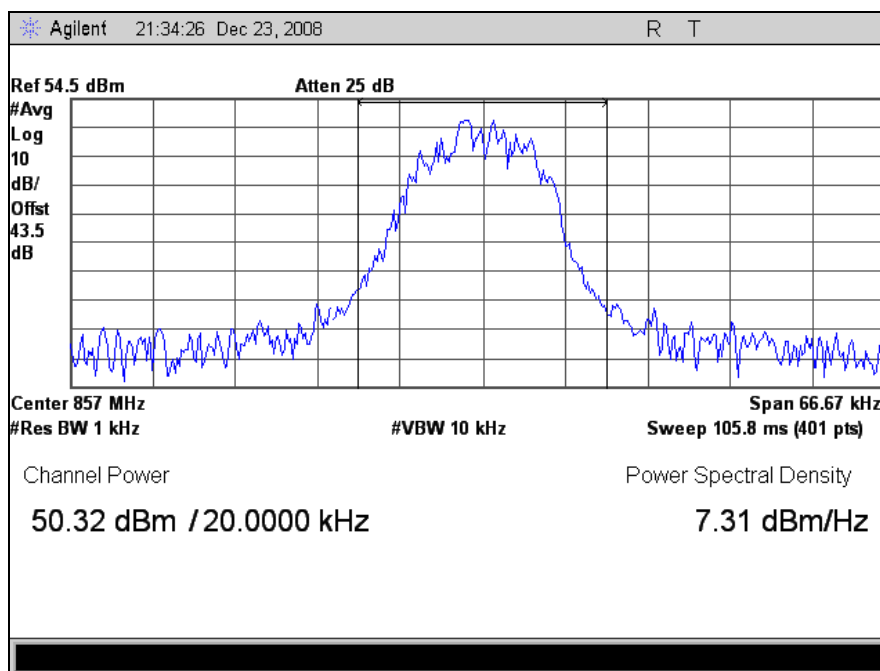
Plot 20. RF Power Output, Channel 1, CQPSK, Peak



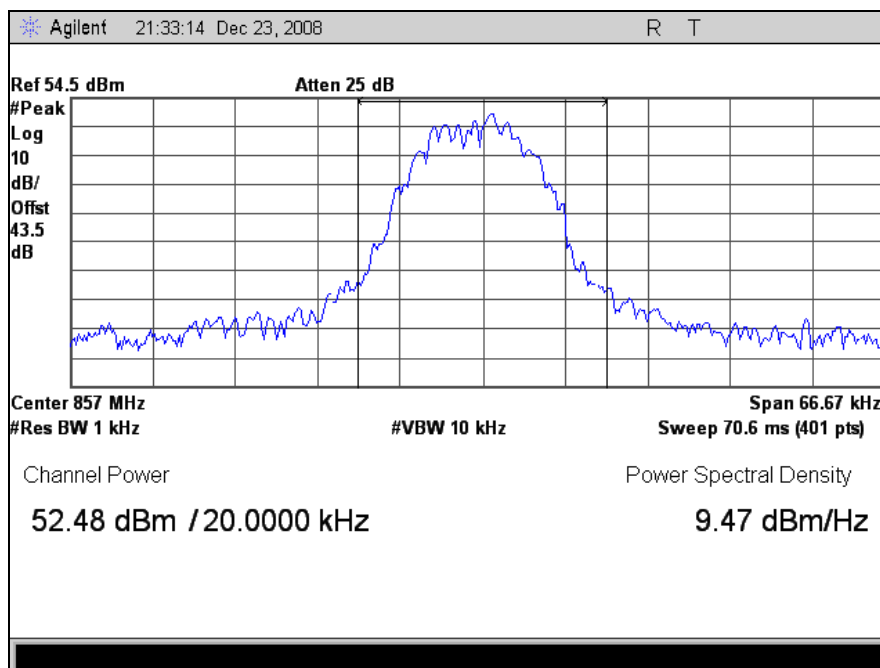
Plot 21. RF Power Output, Channel 1, C4FM, Avg.



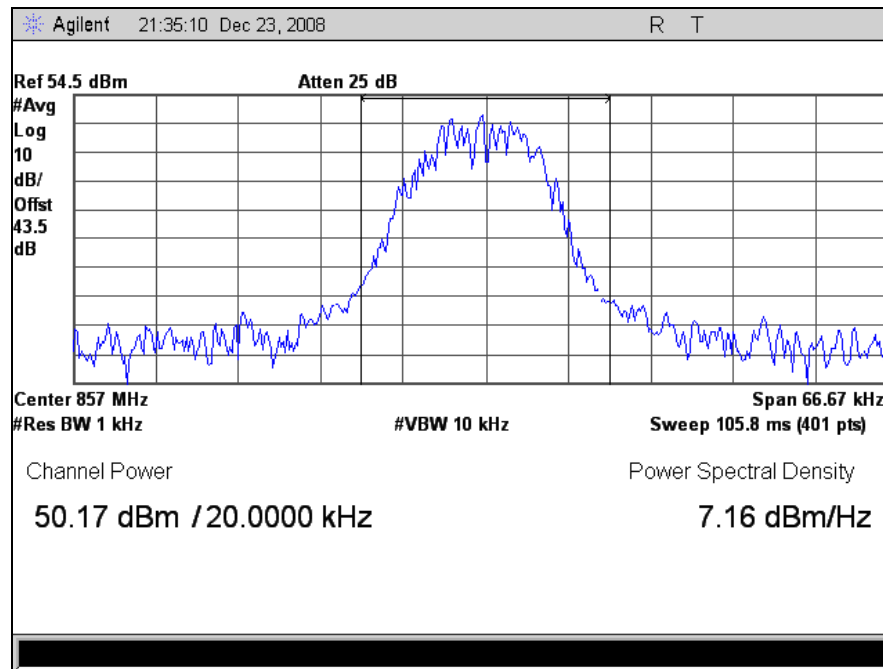
Plot 22. RF Power Output, Channel 1, C4FM, Peak



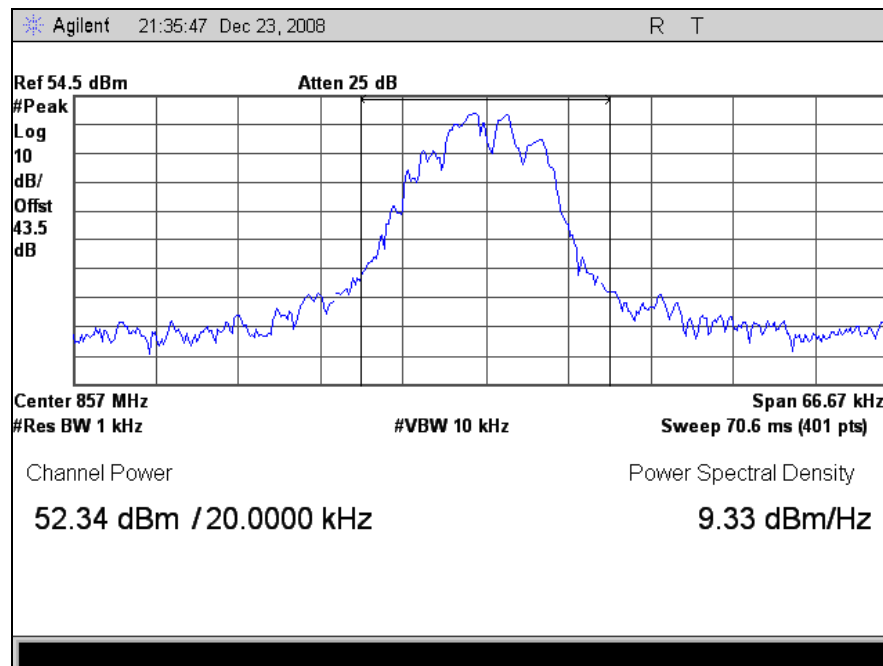
Plot 23. RF Power Output, Channel 2, HDQPSK, Avg.



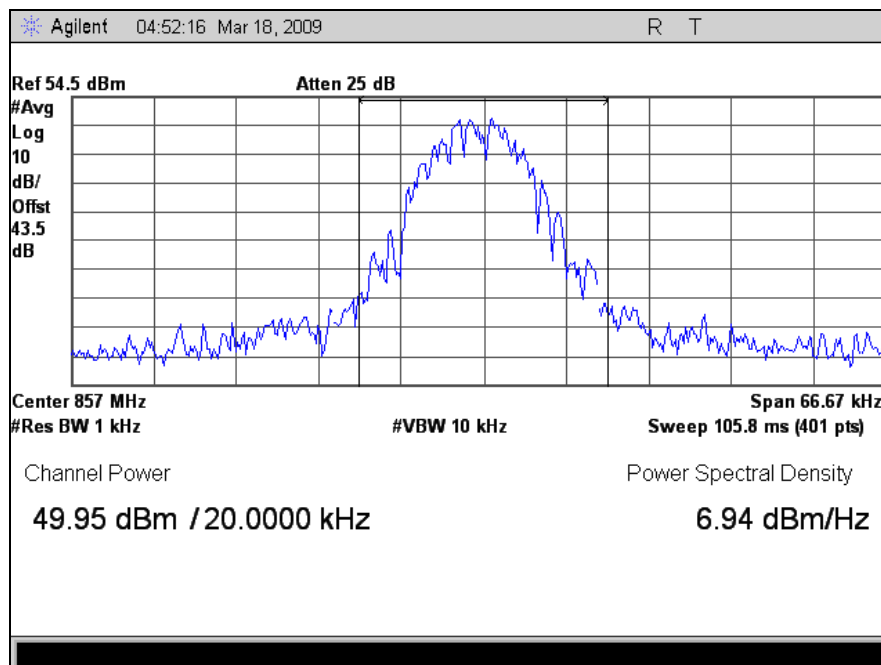
Plot 24. RF Power Output, Channel 2, HDQPSK, Peak



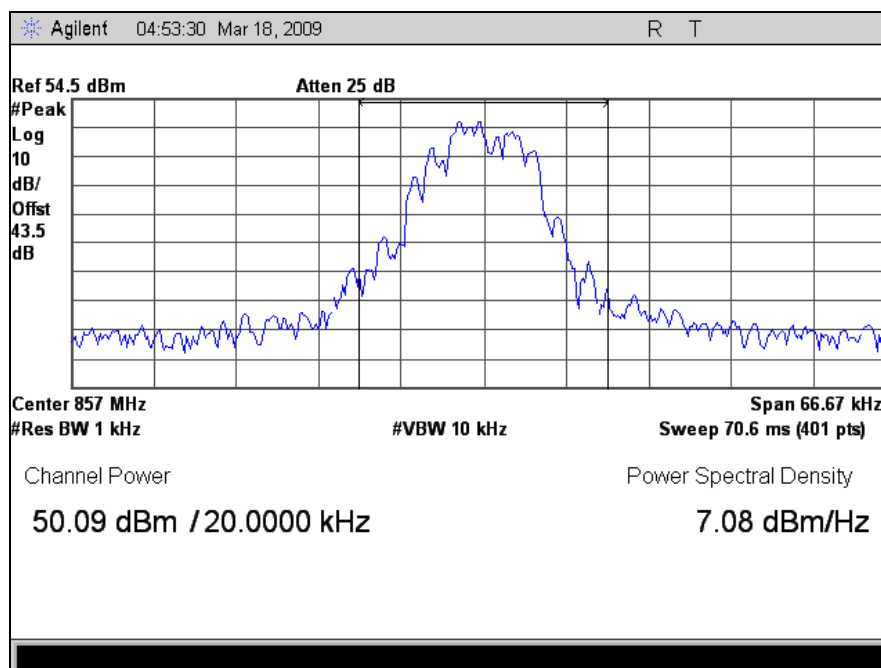
Plot 25. RF Power Output, Channel 2, CQPSK, Avg.



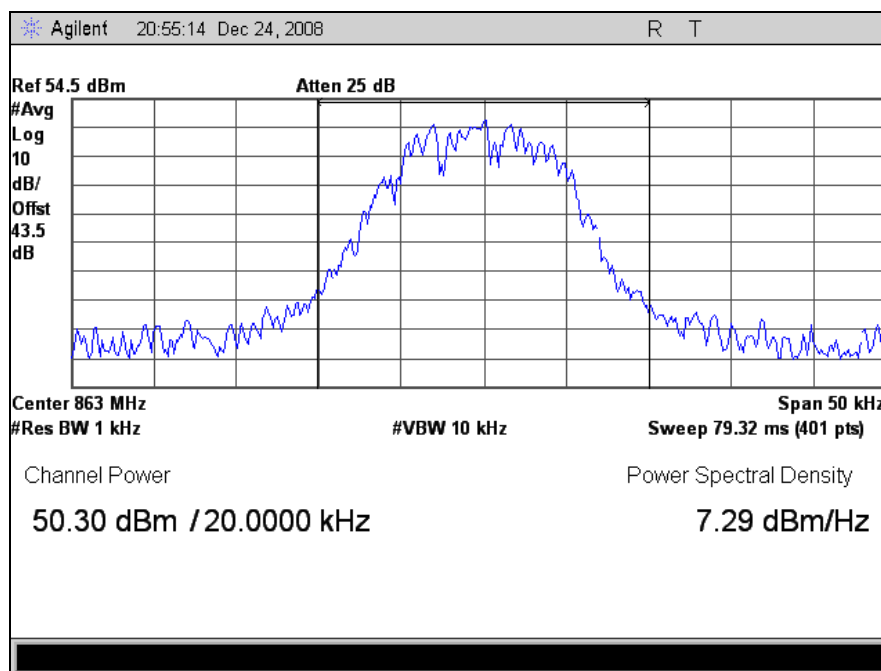
Plot 26. RF Power Output, Channel 2, CQPSK, Peak



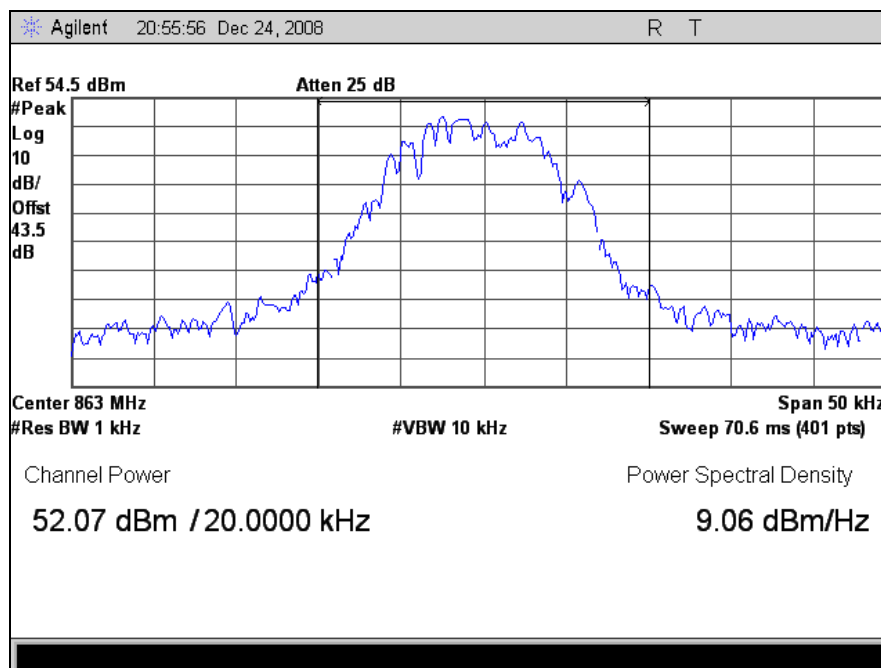
Plot 27. RF Power Output, Channel 2, C4FM, Avg.



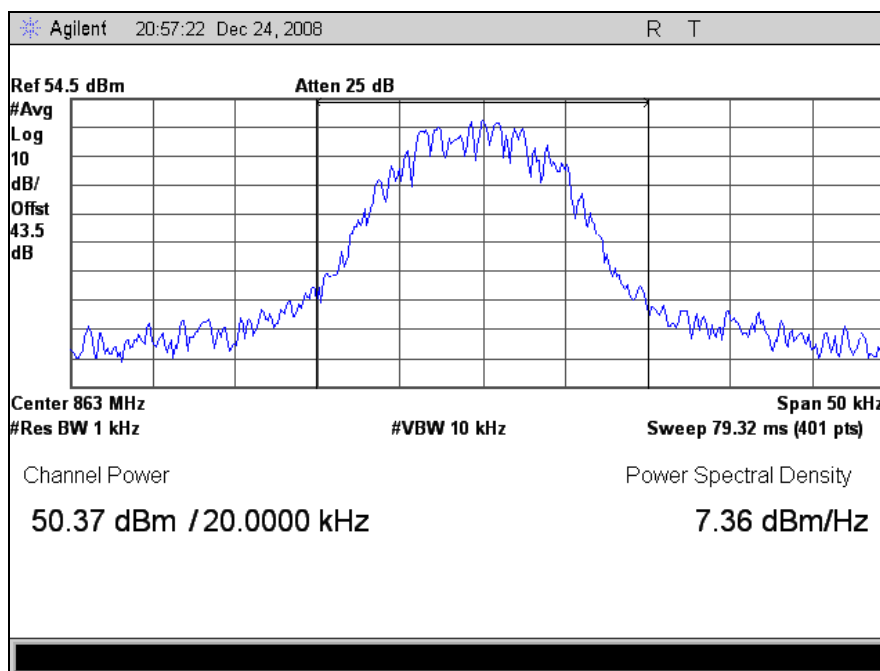
Plot 28. RF Power Output, Channel 2, C4FM, Peak



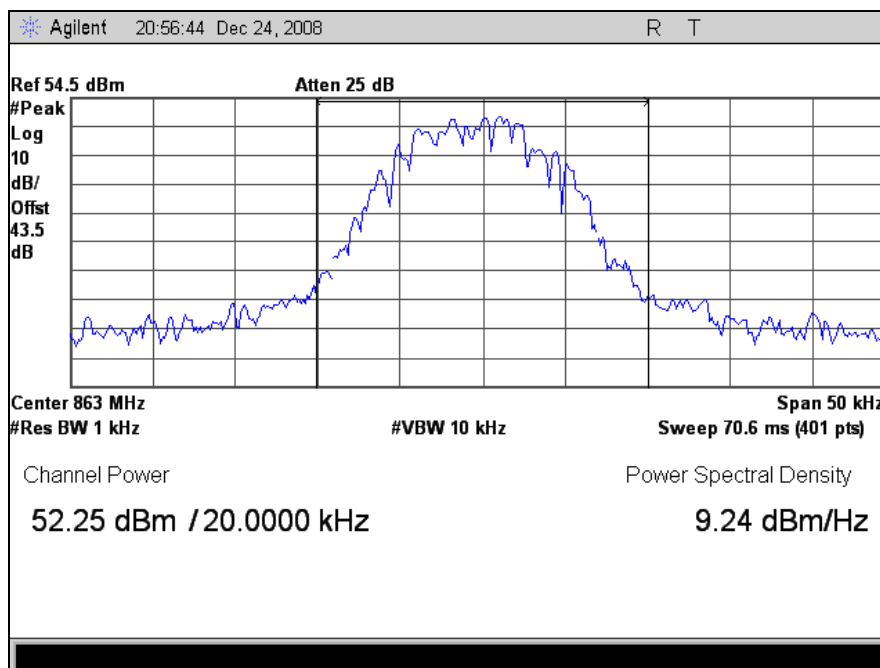
Plot 29. RF Power Output, Channel 3, HDQPSK, Avg.



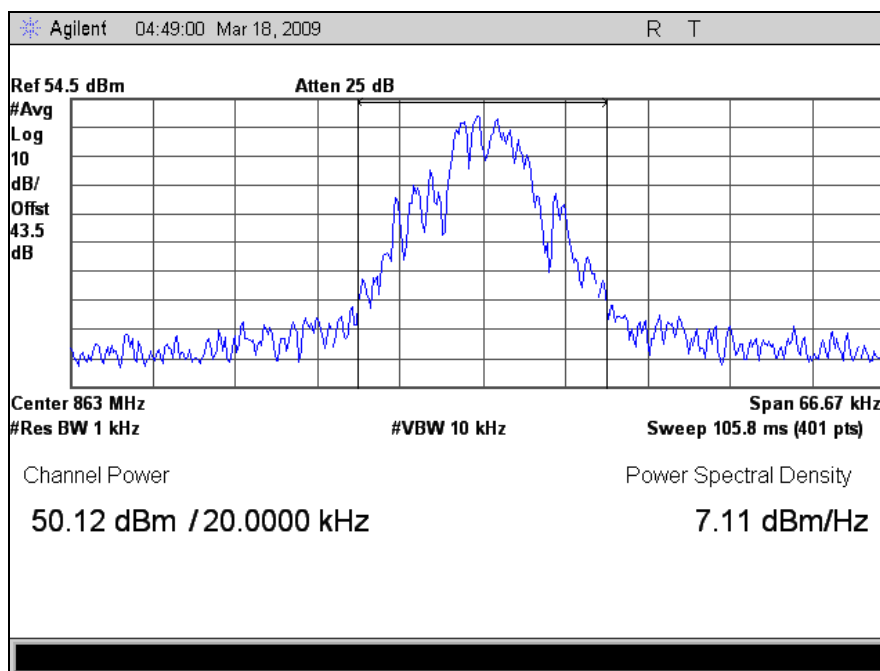
Plot 30. RF Power Output, Channel 3, HDQPSK, Peak



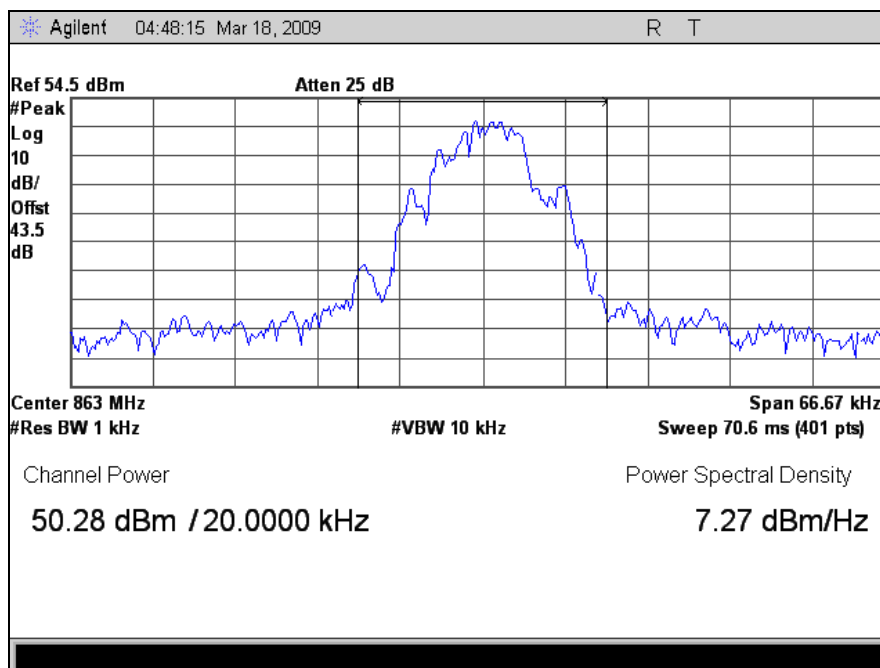
Plot 31. RF Power Output, Channel 3, CQPSK, Avg.



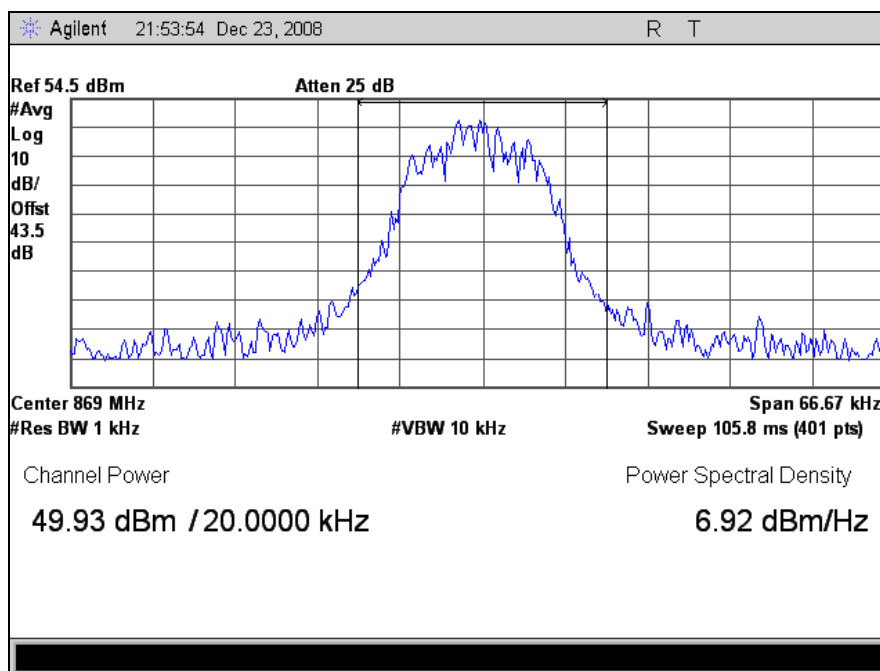
Plot 32. RF Power Output, Channel 3, CQPSK, Peak



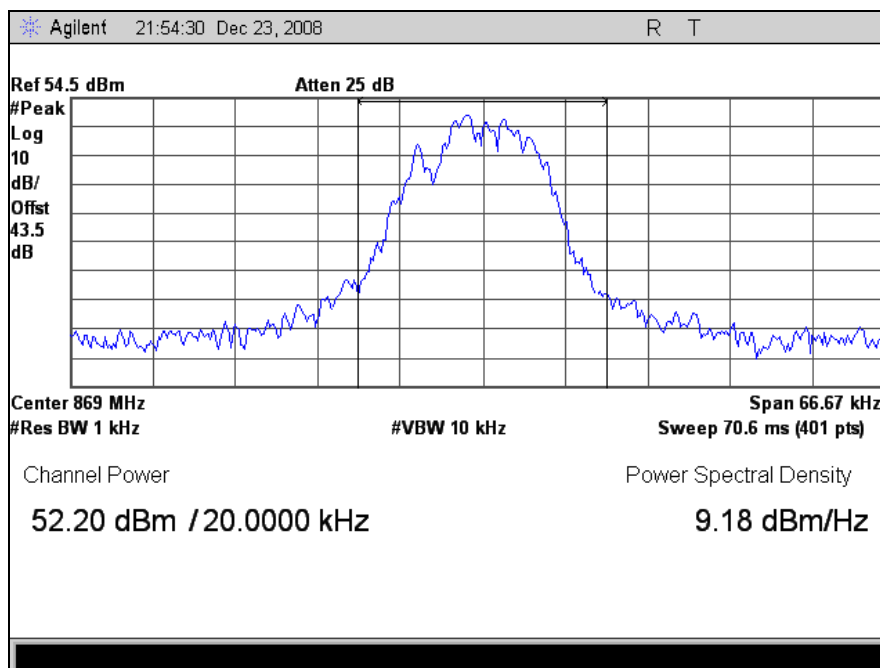
Plot 33. RF Power Output, Channel 3, C4FM, Avg.



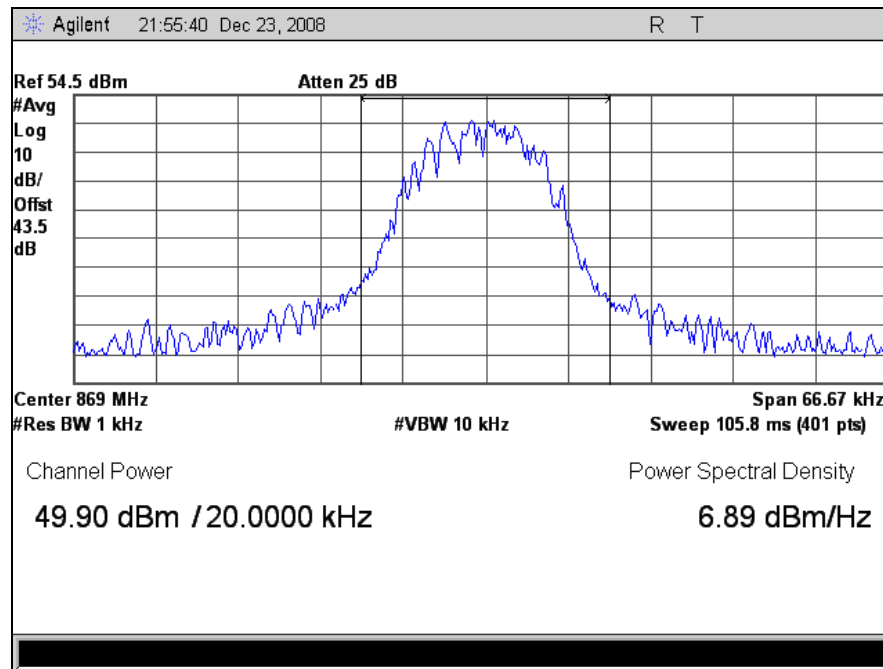
Plot 34. RF Power Output, Channel 3, C4FM, Peak



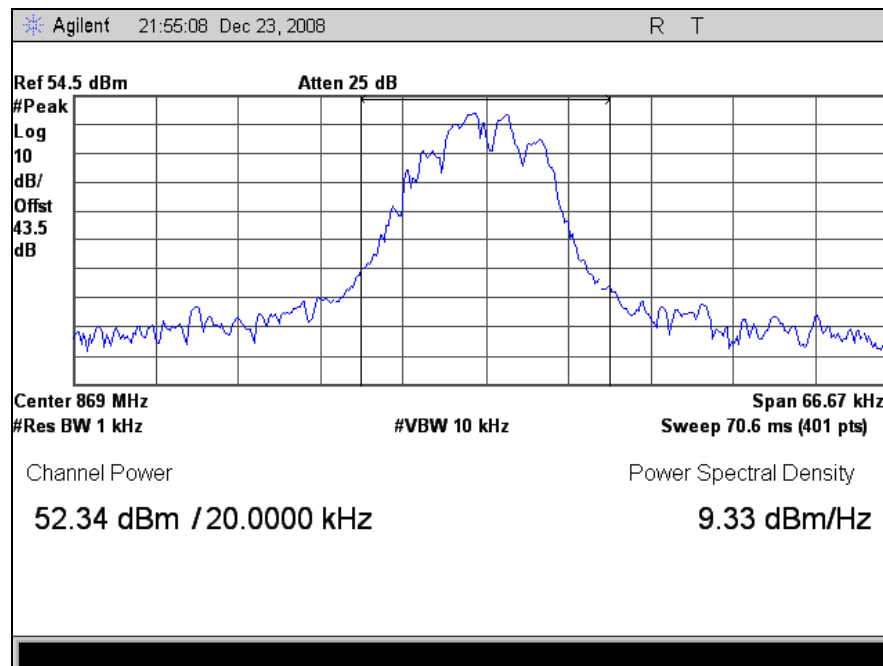
Plot 35. RF Power Output, Channel 4, HDQPSK, Avg.



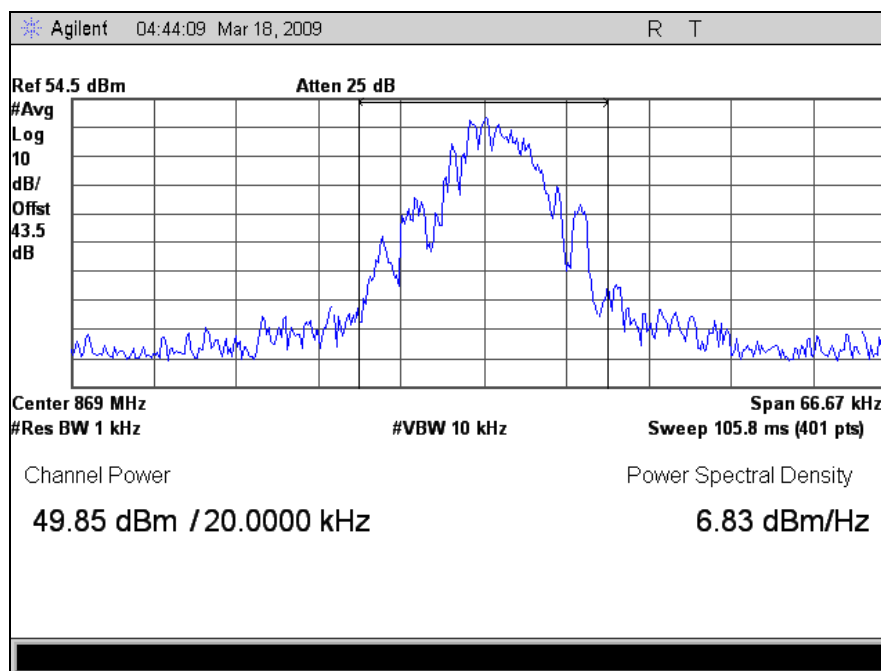
Plot 36. RF Power Output, Channel 4, HDQPSK, Peak



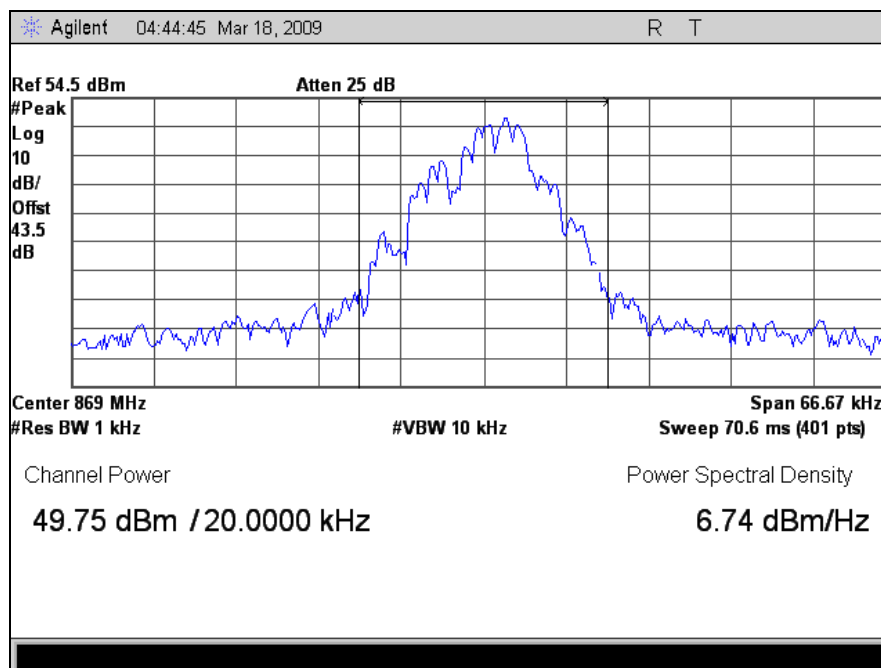
Plot 37. RF Power Output, Channel 4, CQPSK, Avg.



Plot 38. RF Power Output, Channel 4, CQPSK, Peak



Plot 39. RF Power Output, Channel 4, C4FM, Avg.



Plot 40. RF Power Output, Channel 4, C4FM, Peak



5. Electromagnetic Compatibility Occupied Bandwidth Requirements

5.1. Occupied Bandwidth (Emission Mask)

Test Requirement(s): §2.1049 and §90.210 (G and H) with FCC 04-265 (Emissions Mask G and H)

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made at the RF output terminals of the EUT.

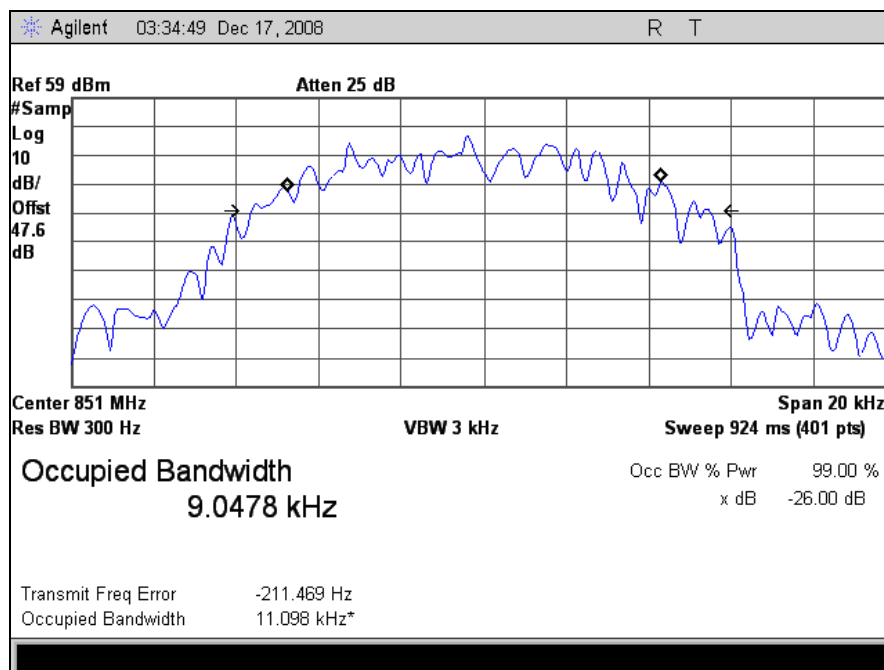
A laptop was connected to EUT to control the RF power output, m and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer. The measured highest Average Power was set relative to zero dB reference. The RBW of the Spectrum Analyzer was set to at least 1% of the channel bandwidth. The EUT power was adjusted at the maximum output power level. Measurements were carried out at the low, mid and high channels of the TX band.

Test Results: Equipment complies with Section 2.1049 and 90.210(G and H) with FCC 04-265 (Emission Mask G and H). The EUT does not exceed the Emission Masks limit.

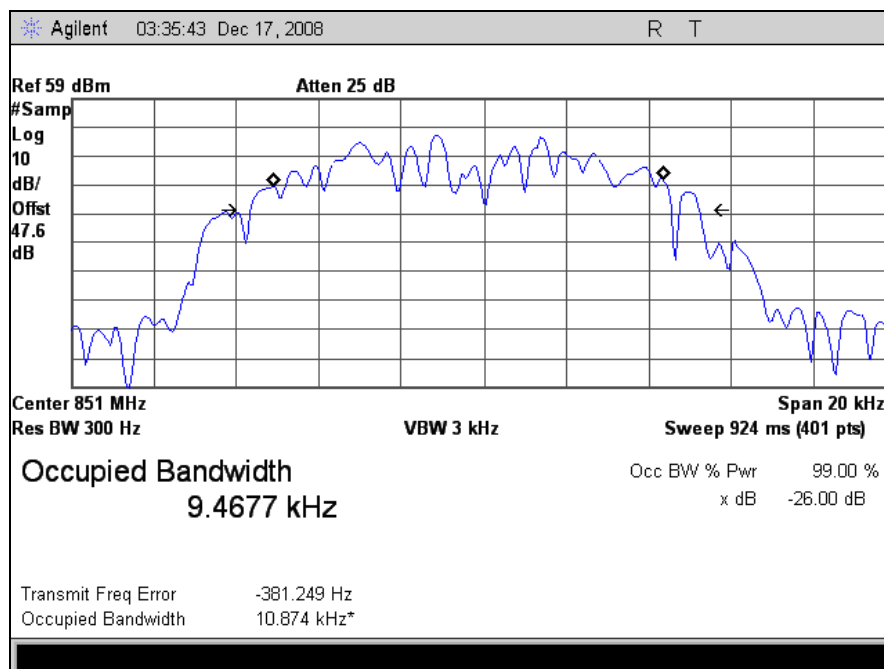
The following pages show measurements of Emission Mask plots:

Test Engineer(s): Dusmantha Tennakoon

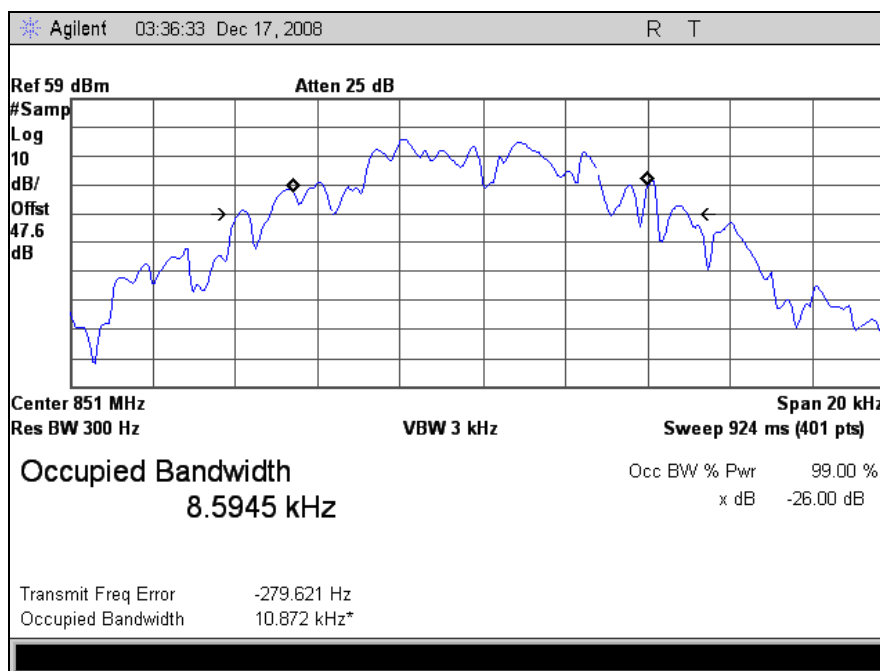
Test Date(s): 12/19/2008



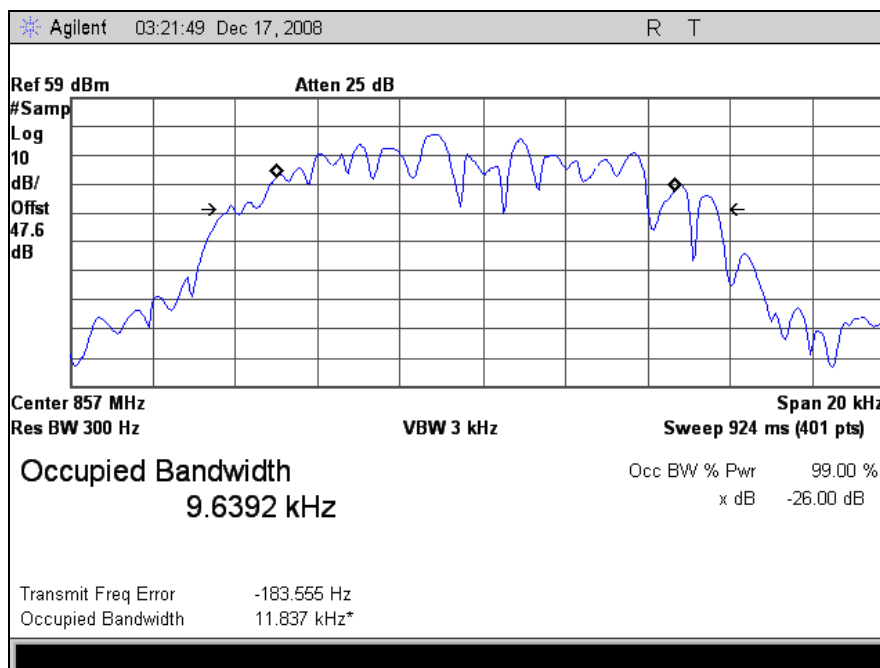
Plot 41. Occupied Bandwidth, Channel 1, HDQPSK



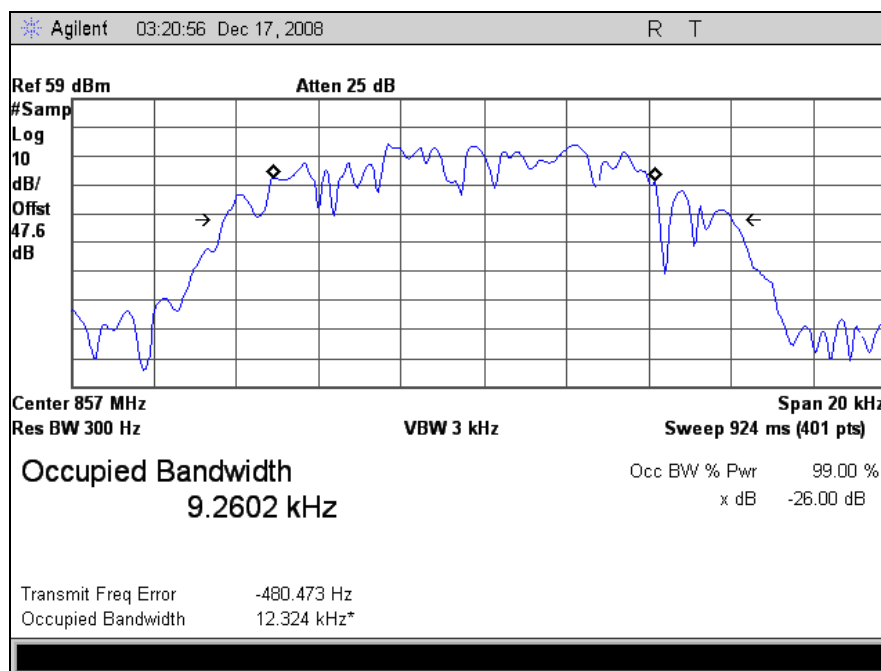
Plot 42. Occupied Bandwidth, Channel 1, CQPSK



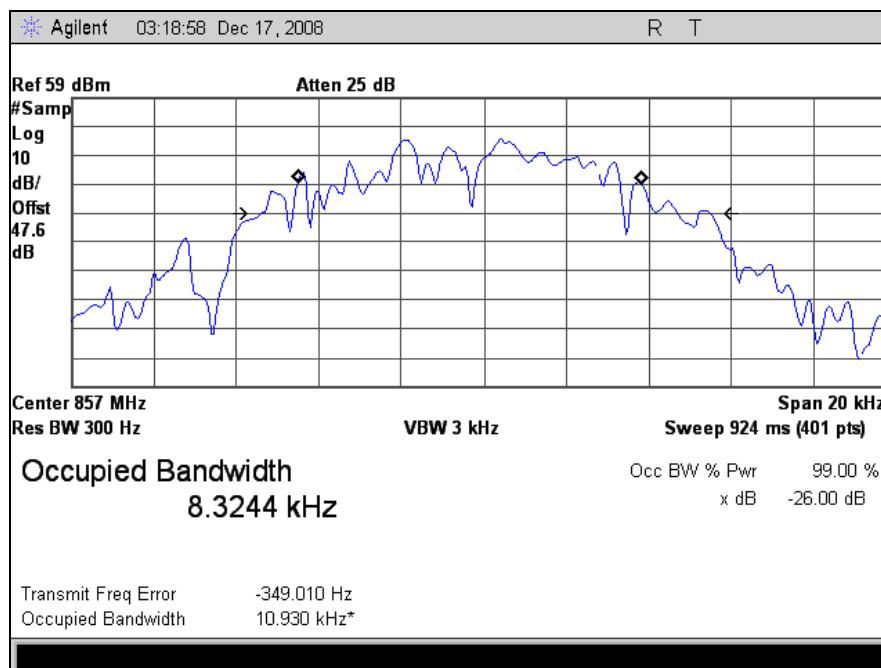
Plot 43. Occupied Bandwidth, Channel 1, C4FM



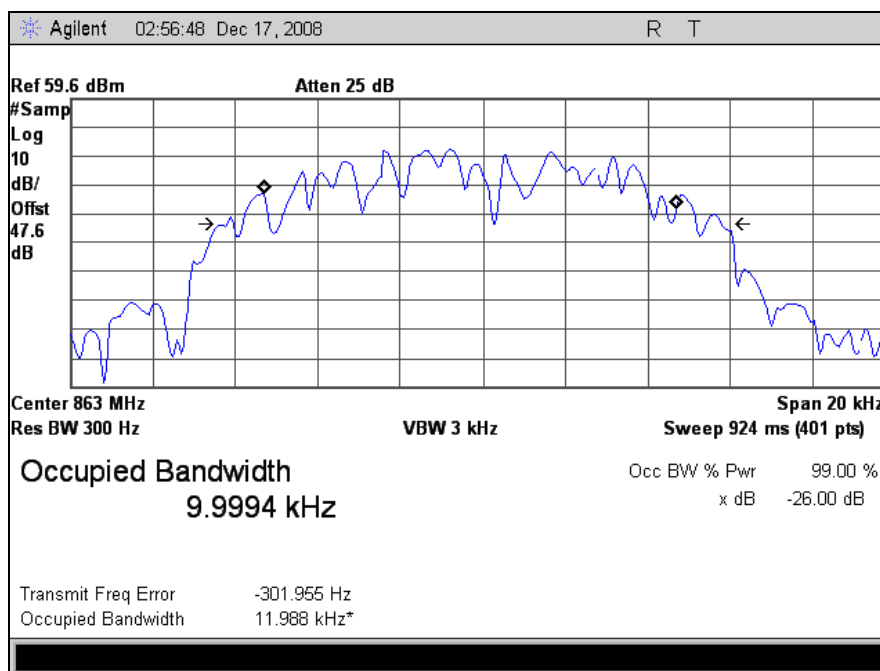
Plot 44. Occupied Bandwidth, Channel 2, HDQPSK



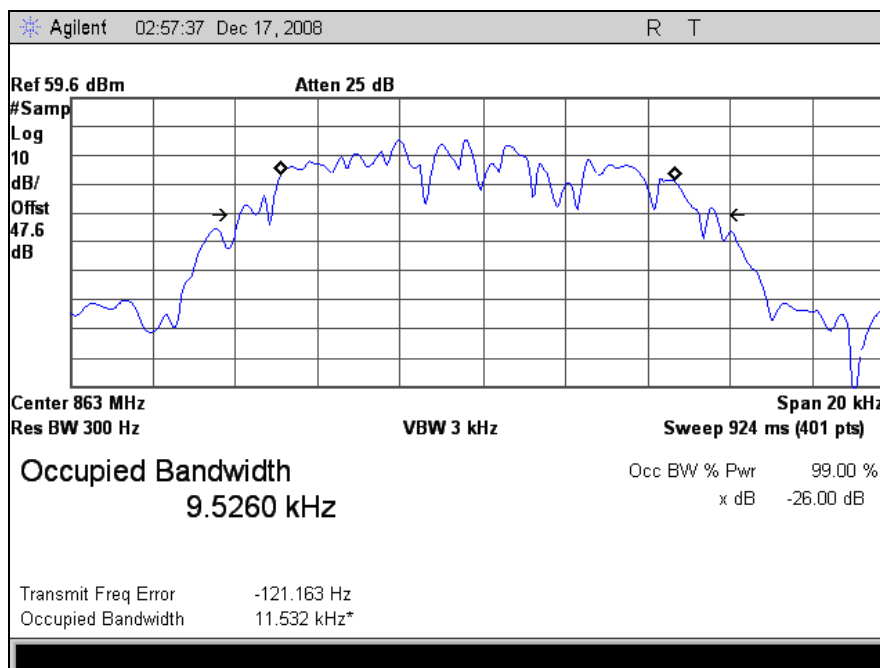
Plot 45. Occupied Bandwidth, Channel 2, CQPSK



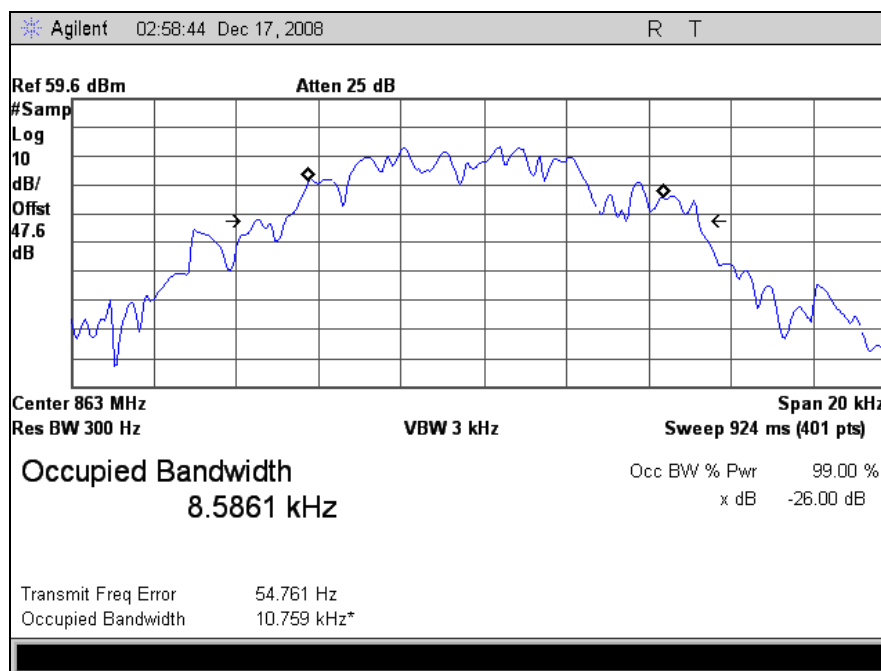
Plot 46. Occupied Bandwidth, Channel 2, C4FM



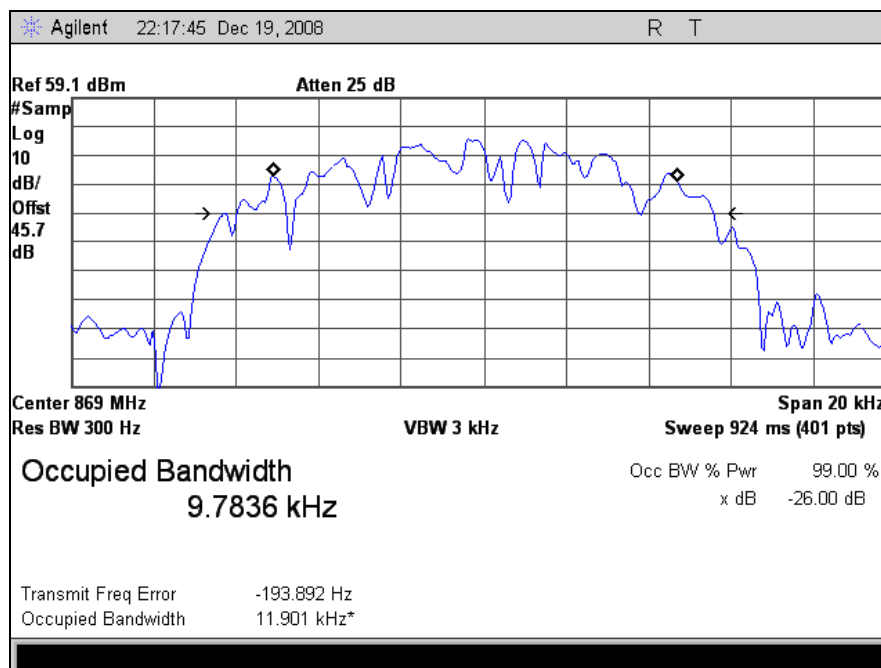
Plot 47. Occupied Bandwidth, Channel 3, HDQPSK



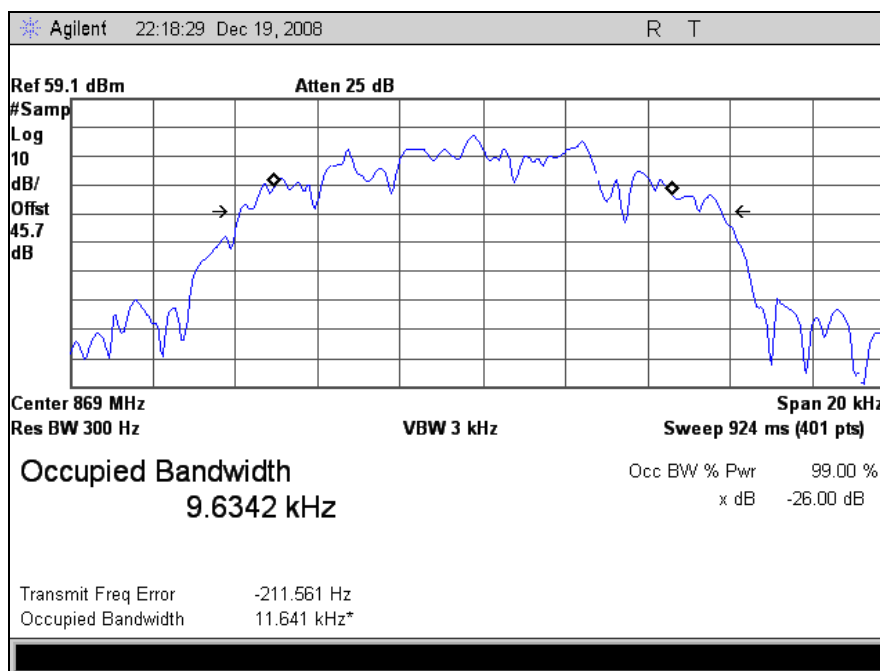
Plot 48. Occupied Bandwidth, Channel 3, CQPSK



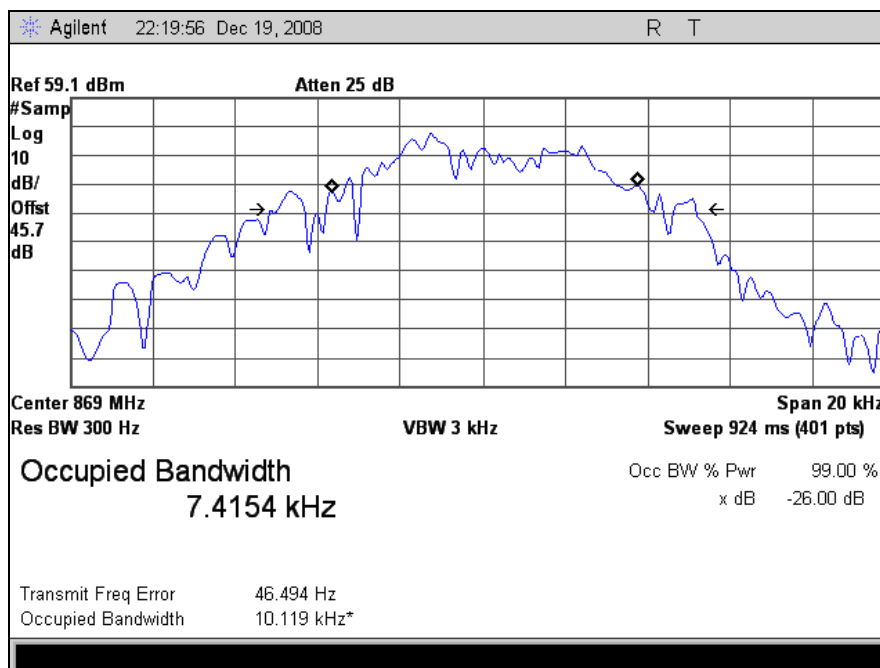
Plot 49. Occupied Bandwidth, Channel 3,C4FM



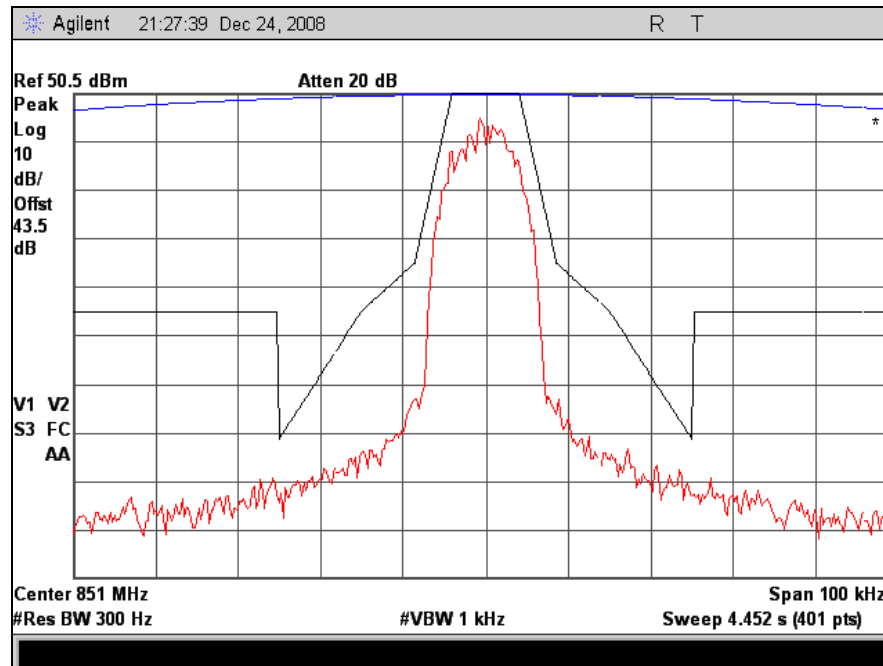
Plot 50. Occupied Bandwidth, Channel 4, HDQPSK



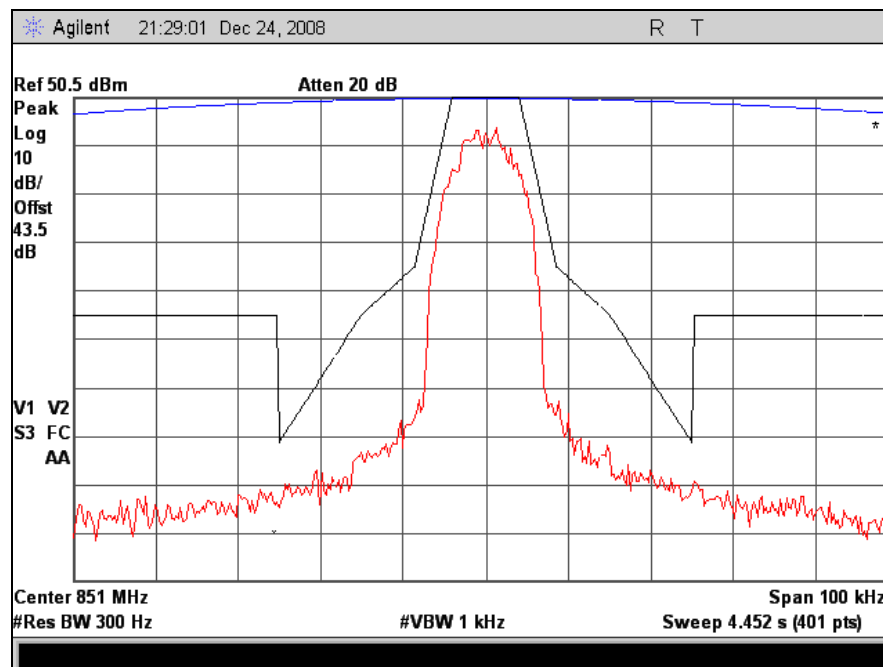
Plot 51. Occupied Bandwidth, Channel 4, CQPSK



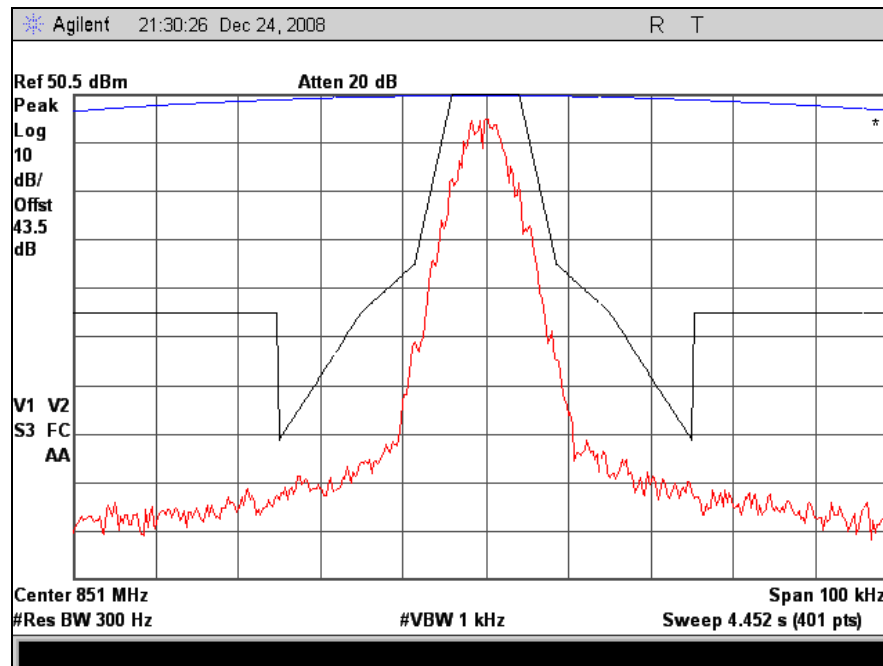
Plot 52. Occupied Bandwidth, Channel 4, C4FM



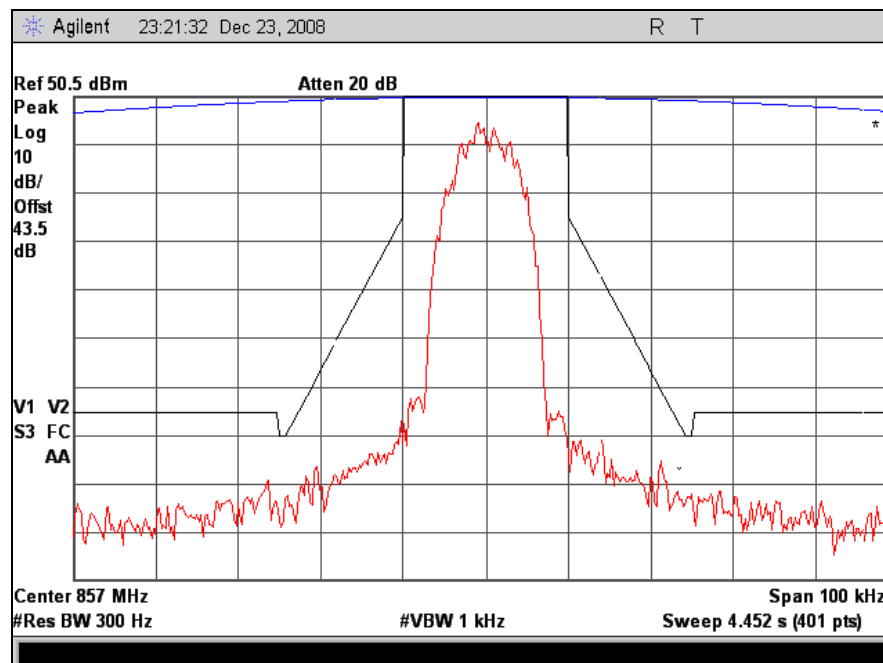
Plot 53. Emission Mask H, Channel 1, HDQPSK



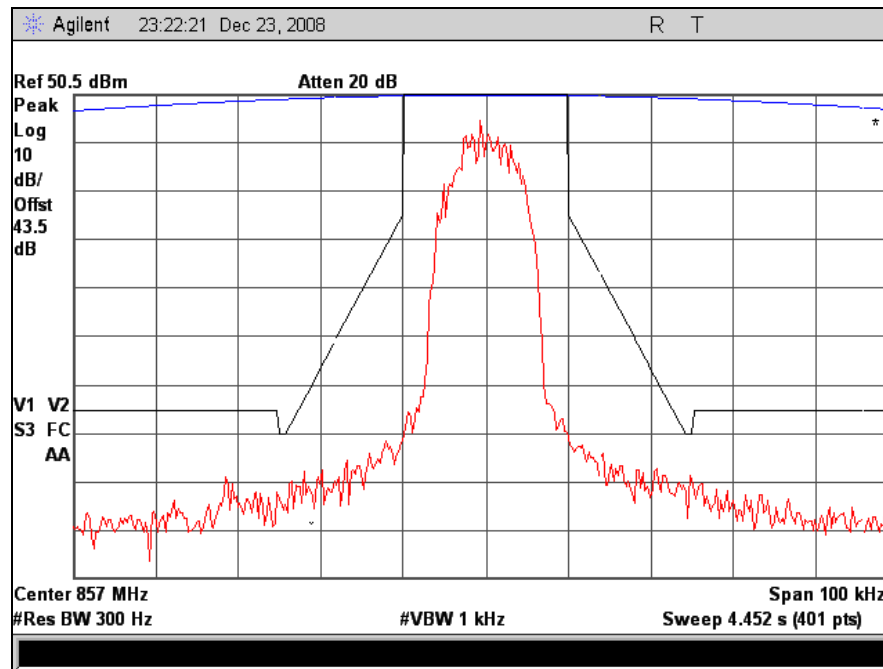
Plot 54. Emission Mask H, Channel 1, CQPSK



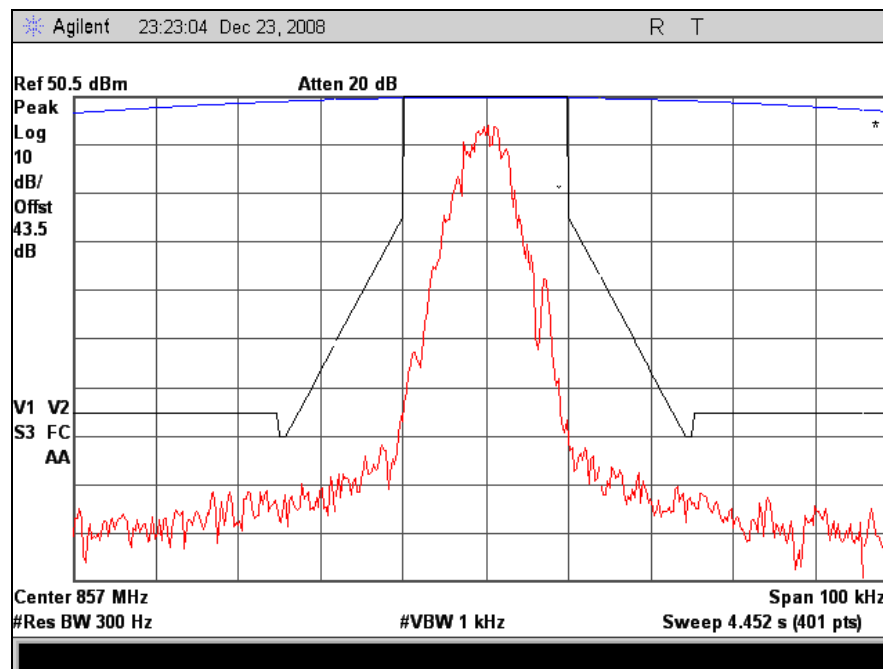
Plot 55. Emission Mask H, Channel 1,C4FM



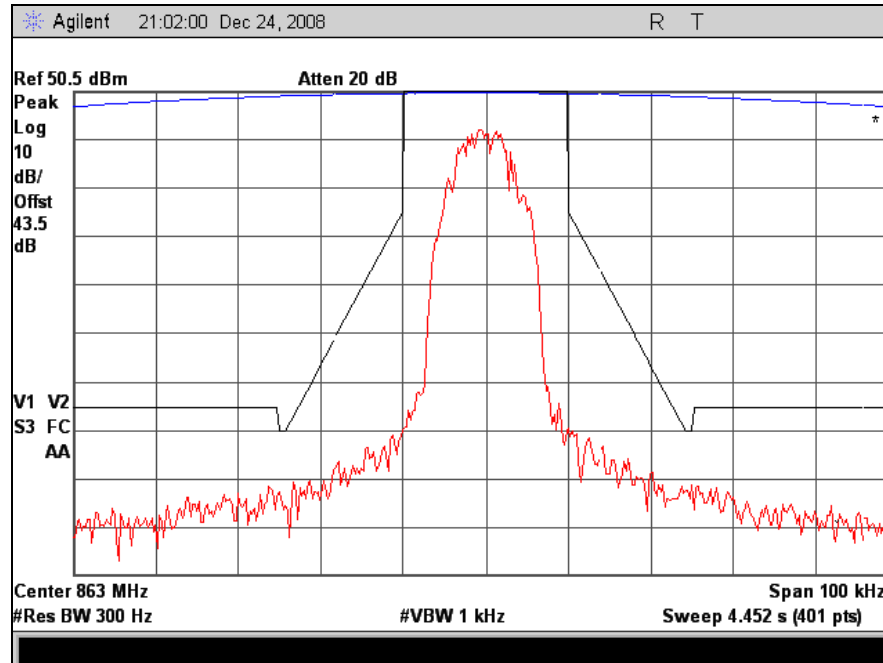
Plot 56. Emission Mask G, Channel 2, HDQPSK



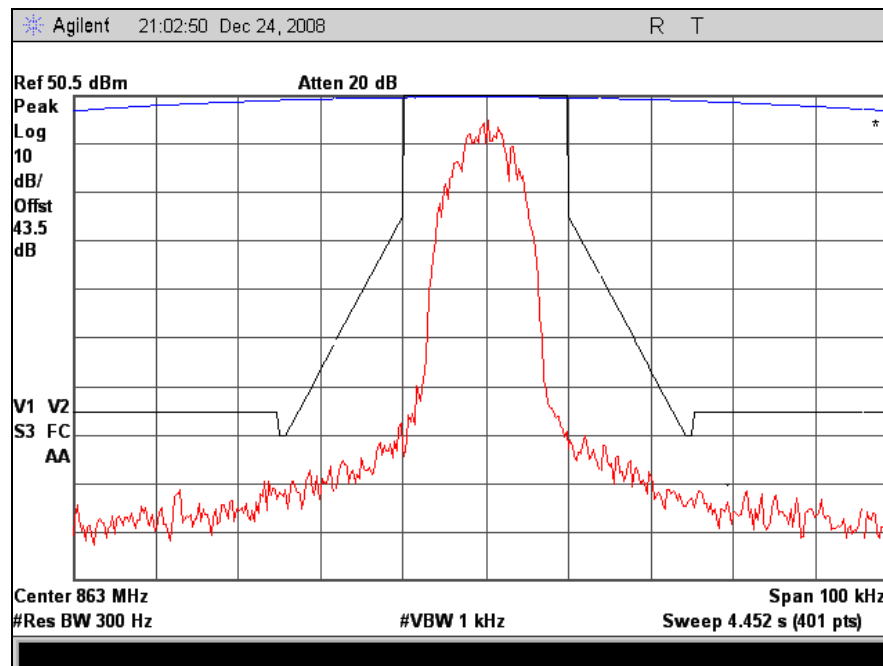
Plot 57. Emission Mask G, Channel 2, CQPSK



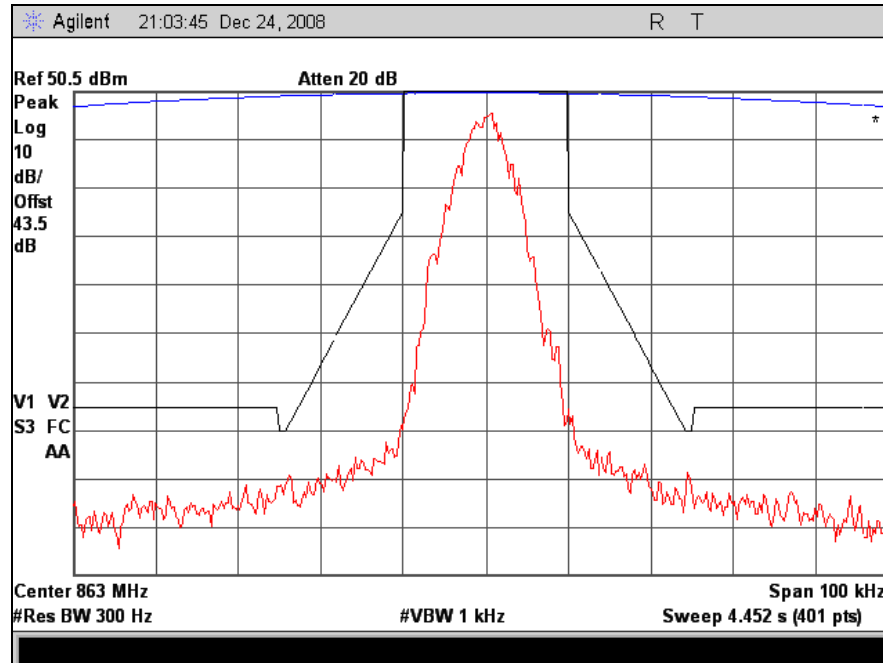
Plot 58. Emission Mask G, Channel 2, C4FM



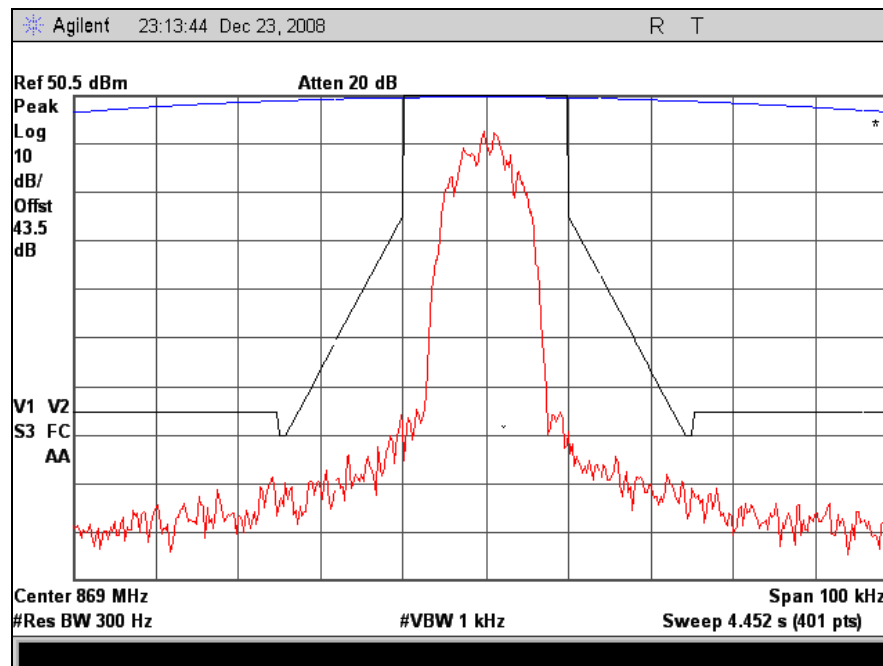
Plot 59. Emission Mask G, Channel 3, HDQPSK



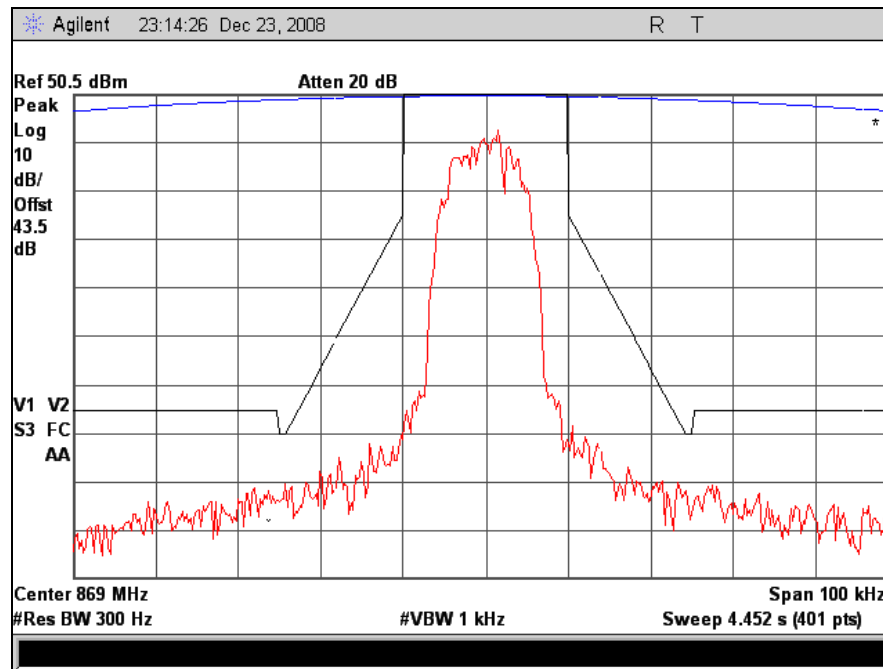
Plot 60. Emission Mask G, Channel 3, CQPSK



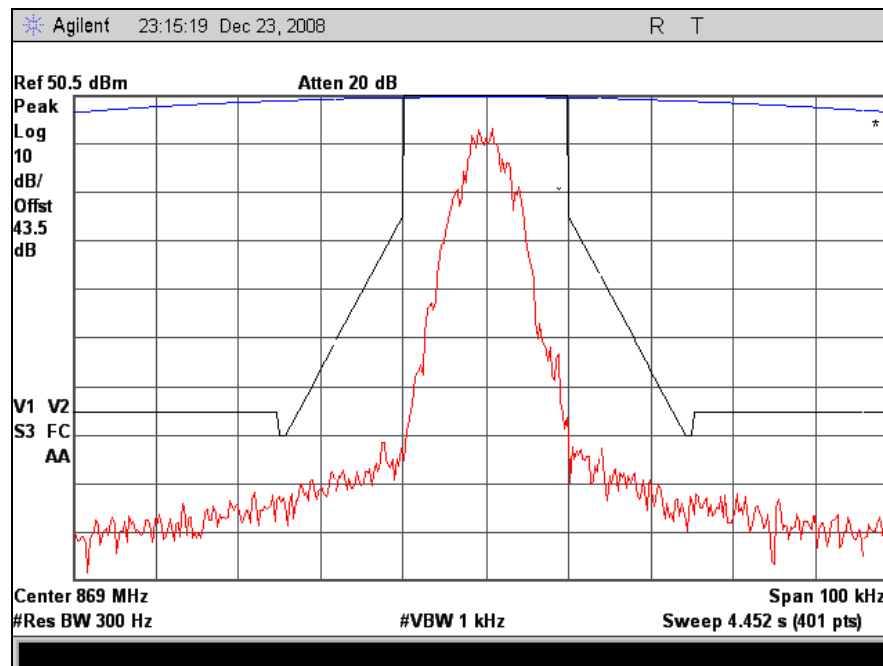
Plot 61. Emission Mask G, Channel 3,C4FM



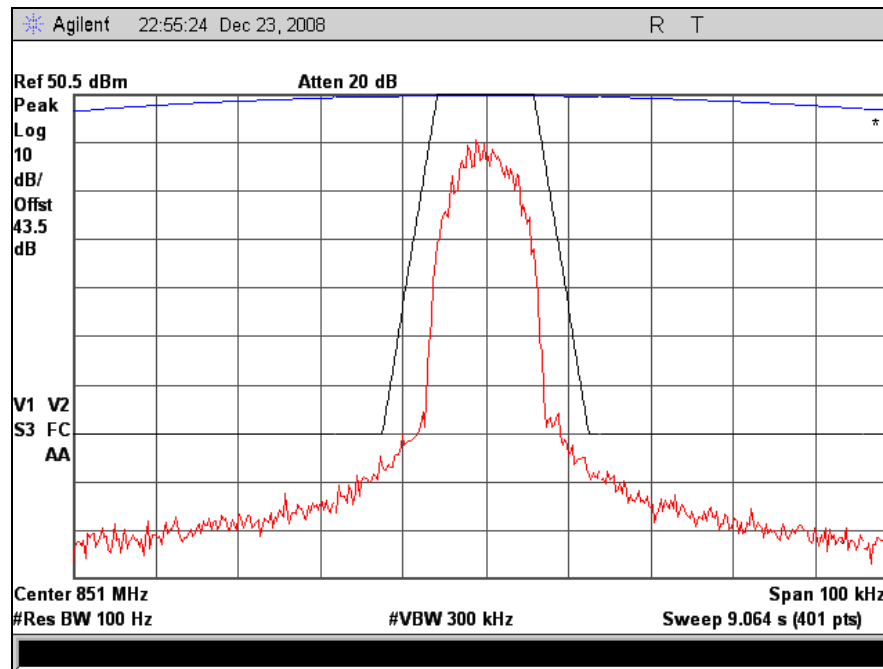
Plot 62. Emission Mask G, Channel 4, HDQPSK



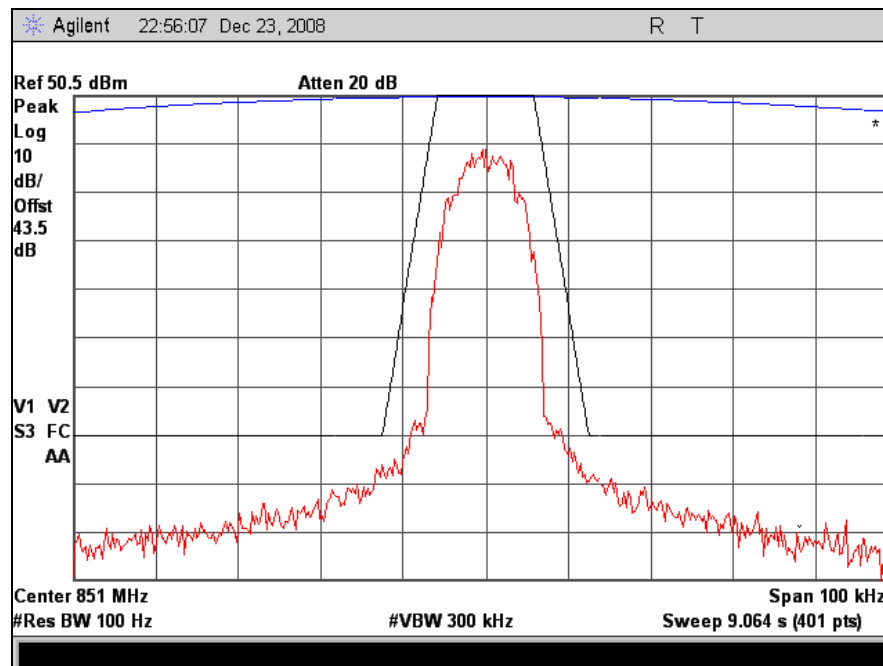
Plot 63. Emission Mask G, Channel 4, CQPSK



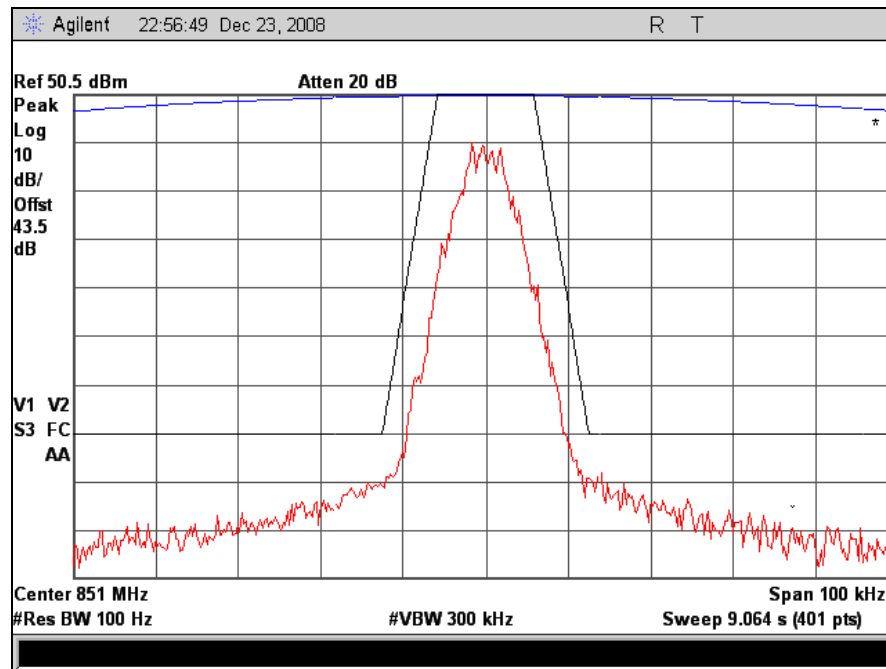
Plot 64. Emission Mask G, Channel 4, C4FM



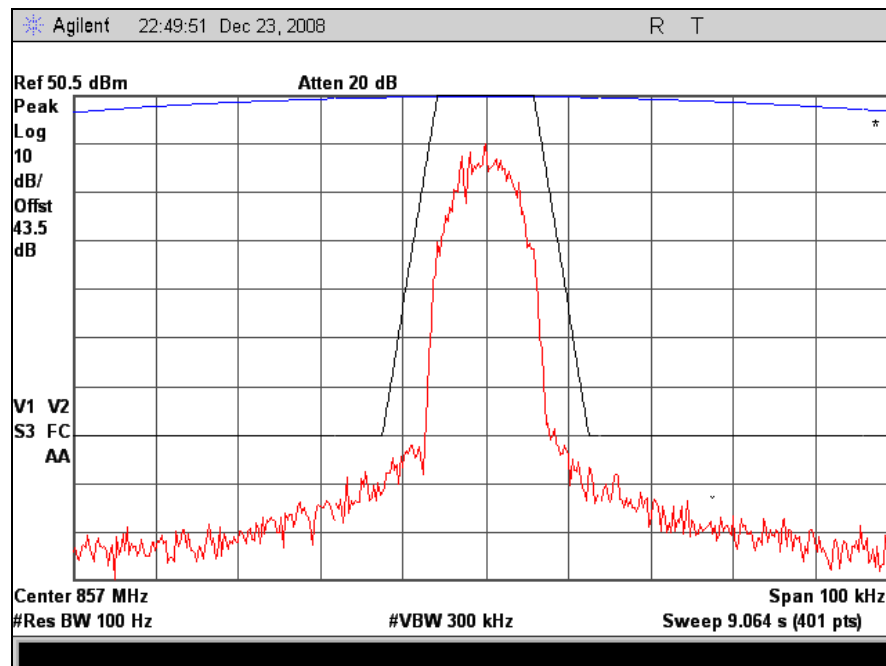
Plot 65. Emission Mask D, Channel 1, HDQPSK



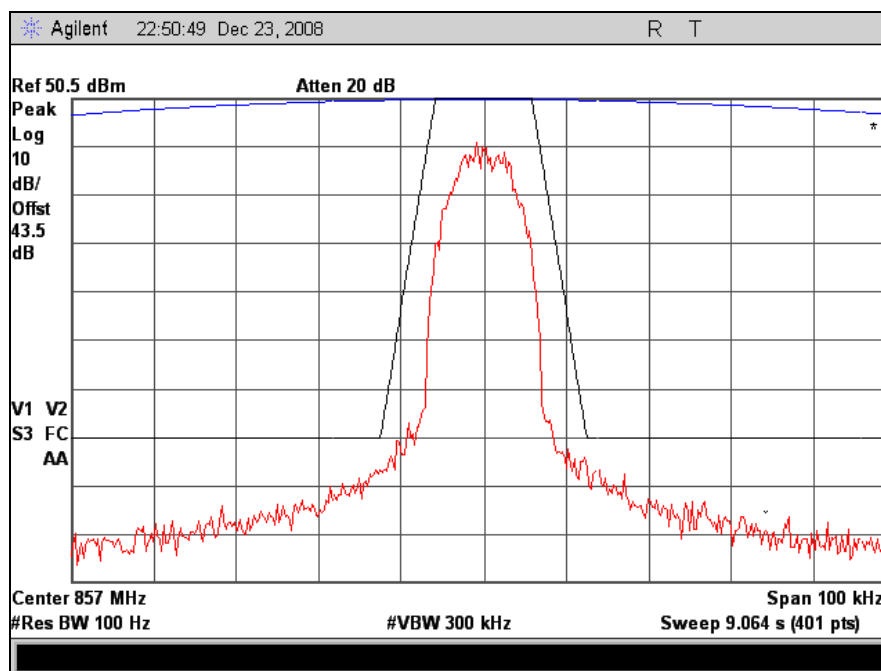
Plot 66. Emission Mask D, Channel 1, CQPSK



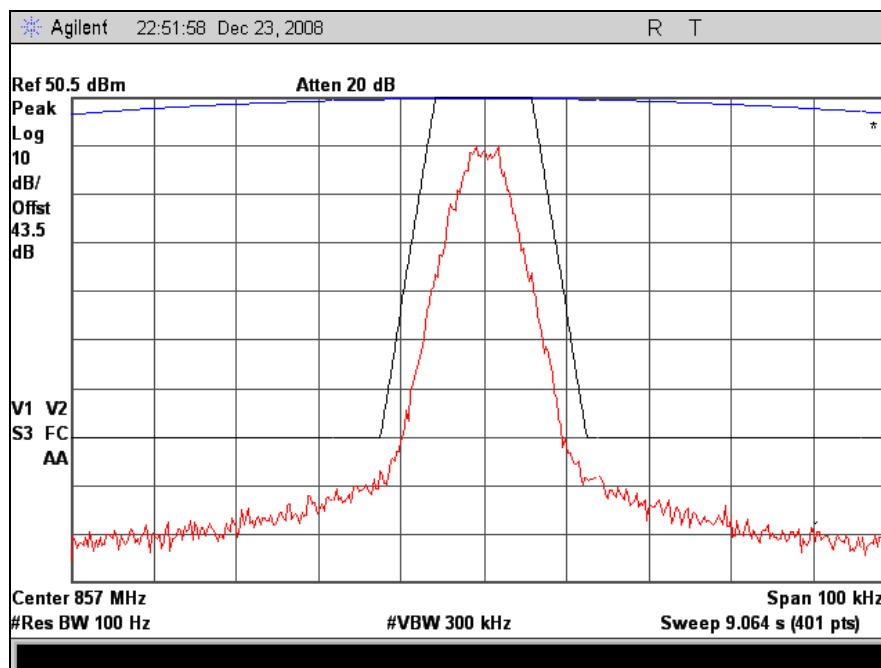
Plot 67. Emission Mask D, Channel 1, C4FM



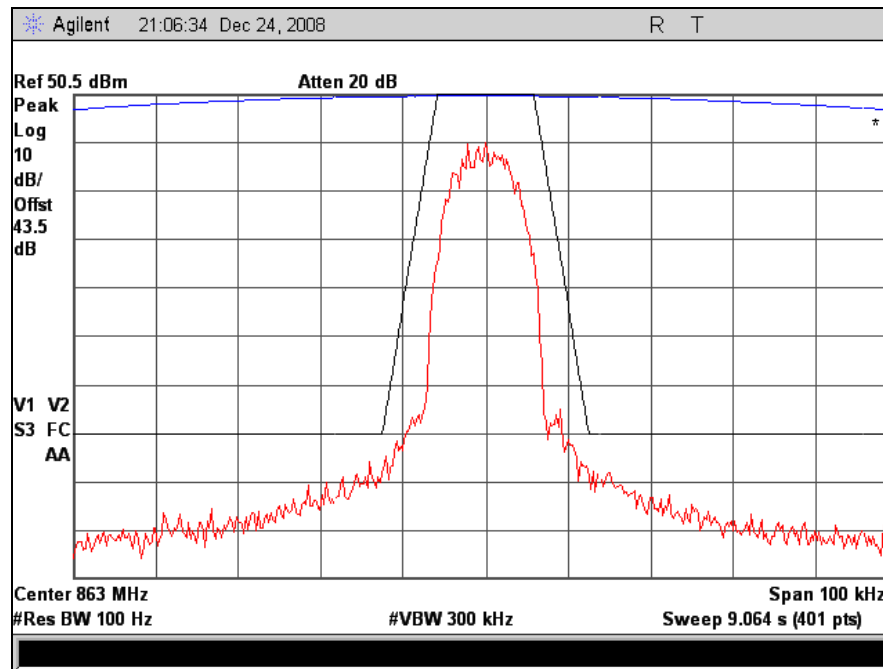
Plot 68. Emission Mask D, Channel 2, HDQPSK



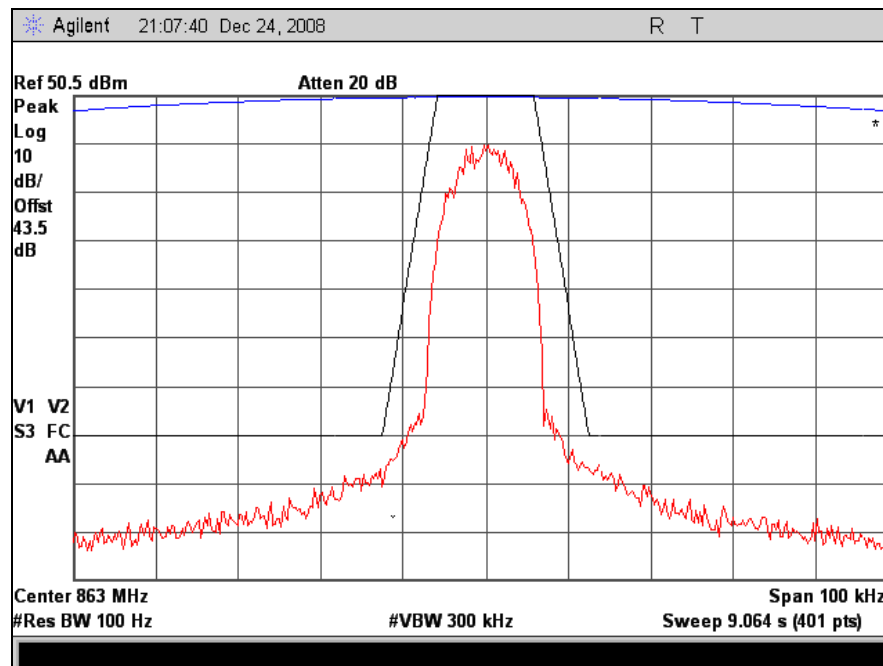
Plot 69. Emission Mask D, Channel 2, CQPSK



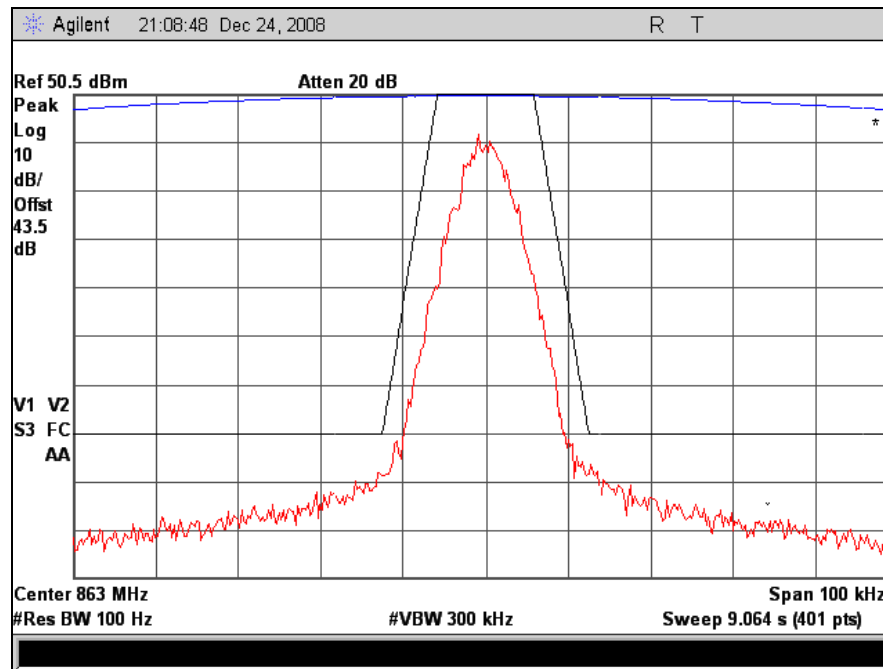
Plot 70. Emission Mask D, Channel 1, C4FM



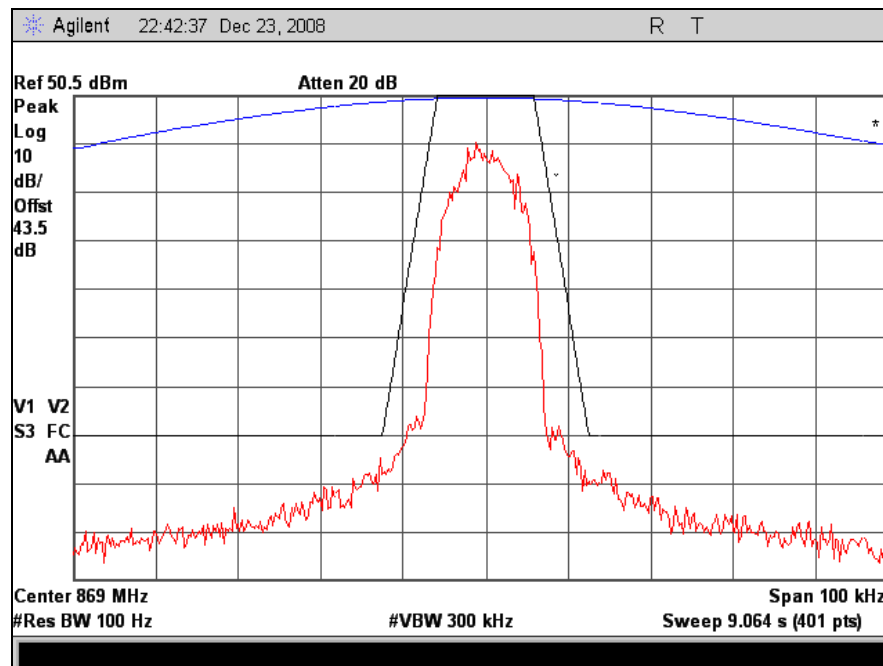
Plot 71. Emission Mask D, Channel 3, HDQPSK



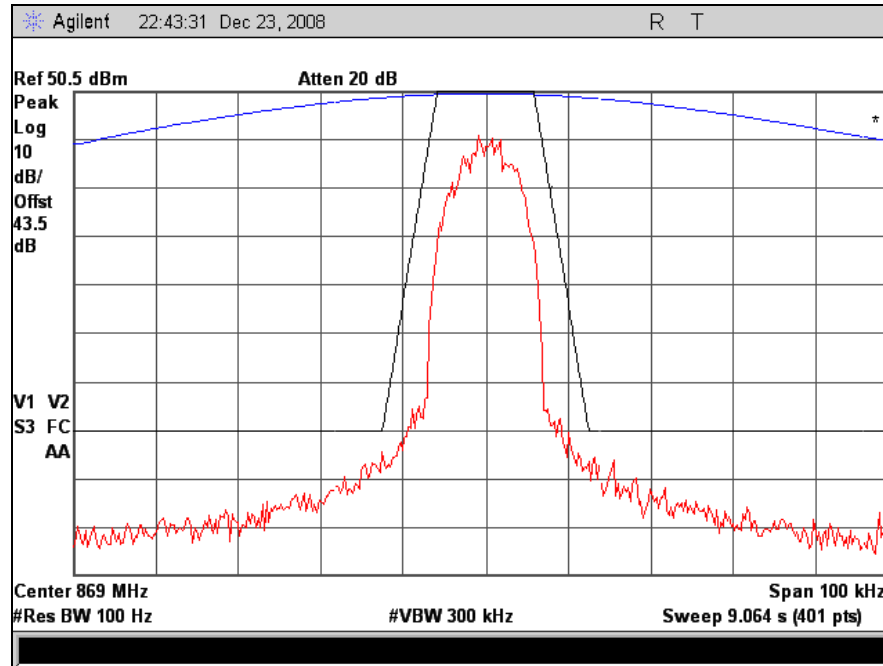
Plot 72. Emission Mask D, Channel 3, CQPSK



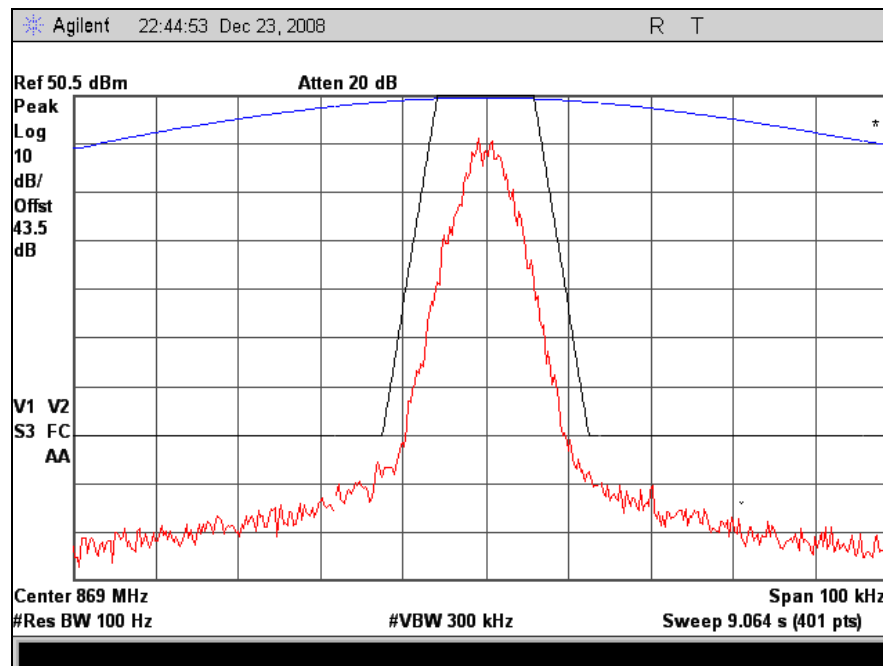
Plot 73. Emission Mask D, Channel 3, C4FM



Plot 74. Emission Mask D, Channel 4, HDQPSK



Plot 75. Emission Mask D, Channel 4, CQPSK



Plot 76. Emission Mask D, Channel 4, C4FM

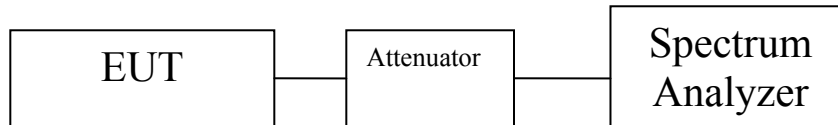


Figure 12. Occupied Bandwidth (Emission Mask) Test Setup



6. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

6.1. Spurious Emissions at Antenna Terminals

Test Requirement(s): §2.1051 and §90.210(M) with FCC 04-265

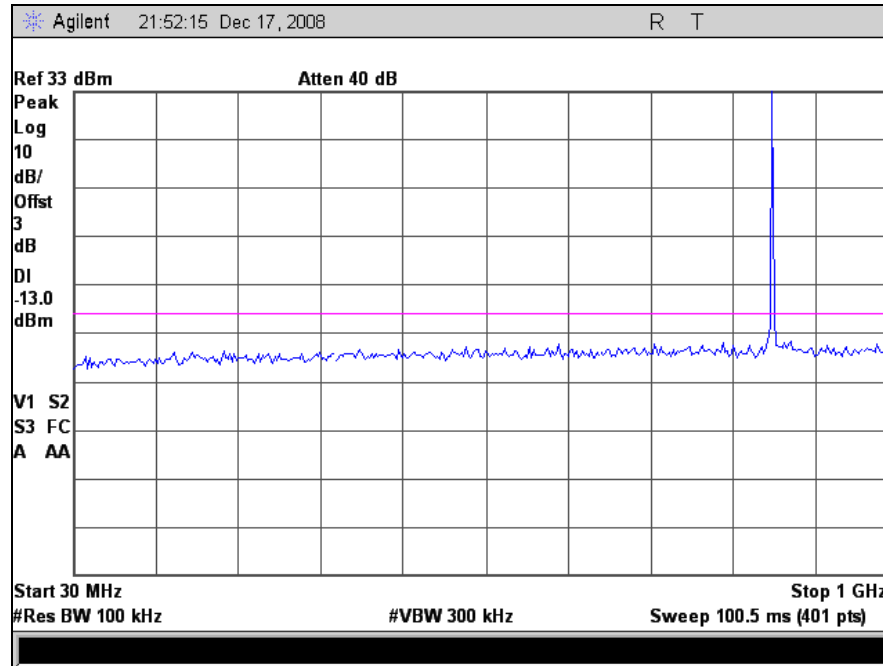
Test Procedures: As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals of the EUT.

A laptop was connected to EUT to control the RF power output, modulation, and frequency channel. The EUT was connected through an attenuator to a Spectrum Analyzer. The Spectrum Analyzer was set to sweep 30 MHz and up to 10th harmonic of the fundamental or 40GHz which ever is the lesser. Measurements were made at the low, mid and high channels.

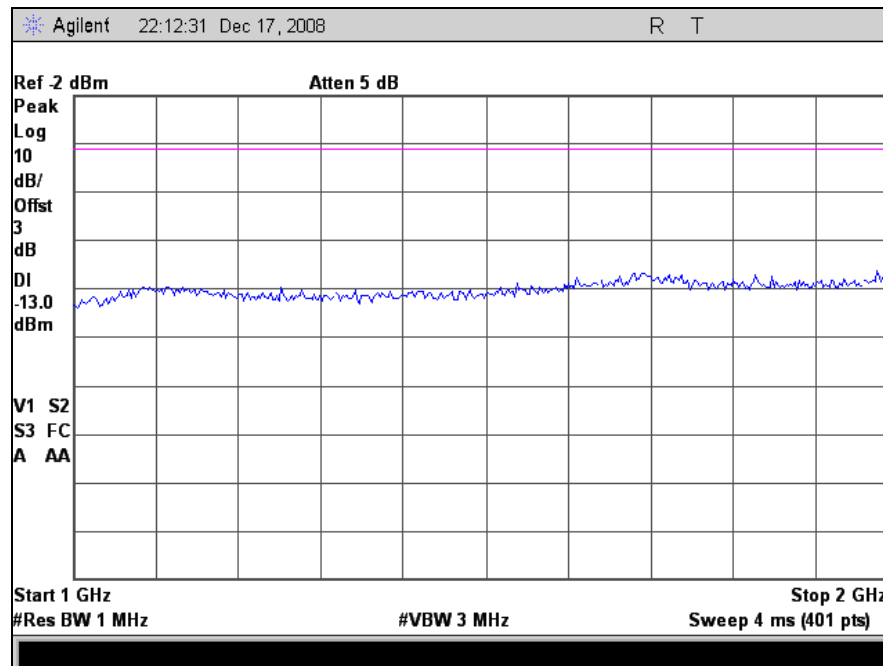
Test Results: Equipment complies with Section 2.1051 and 90.210(M) with FCC 04-265.

Test Engineer(s): Dusmantha Tennakoon

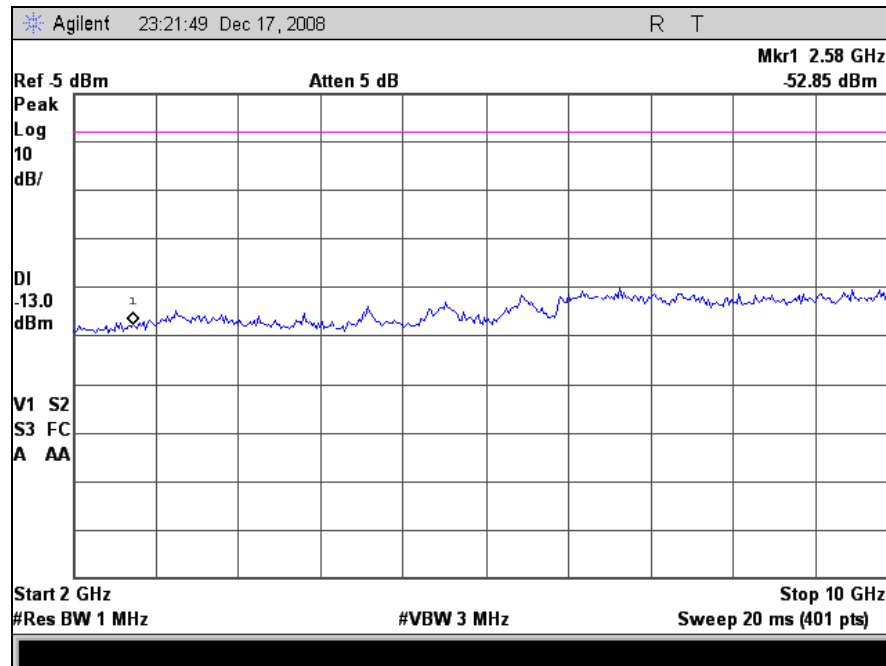
Test Date(s): 12/19/2008



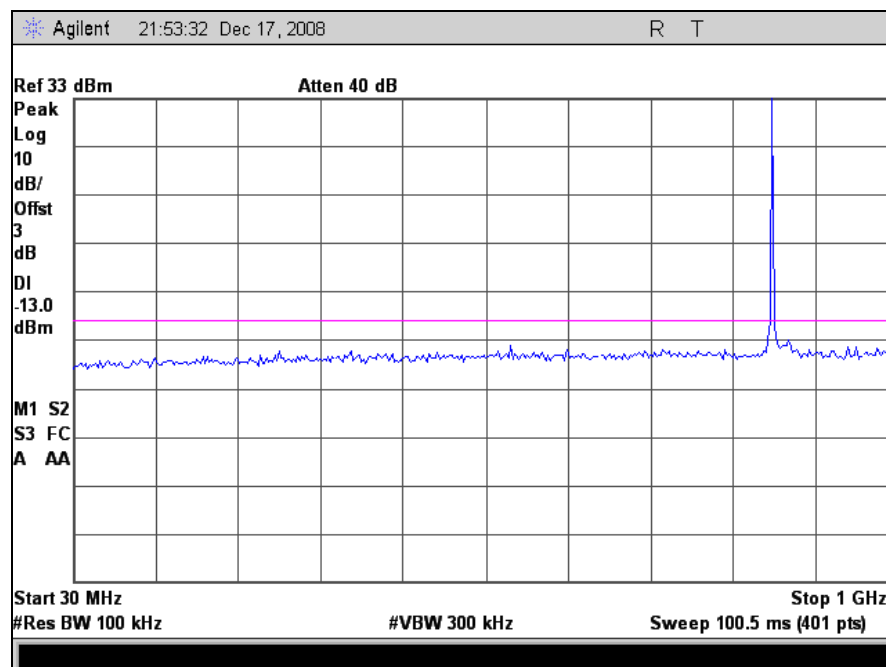
Plot 77. Conducted Spurious Emissions, Channel 1, HDQPSK, 30 MHz – 1 GHz



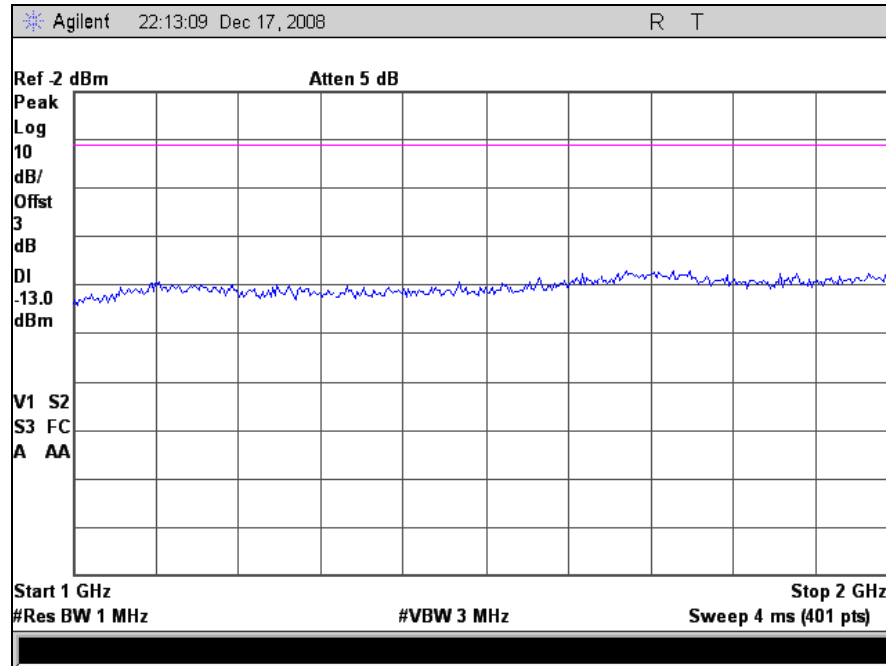
Plot 78. Conducted Spurious Emissions, Channel 1, HDQPSK, 1 GHz – 2 GHz



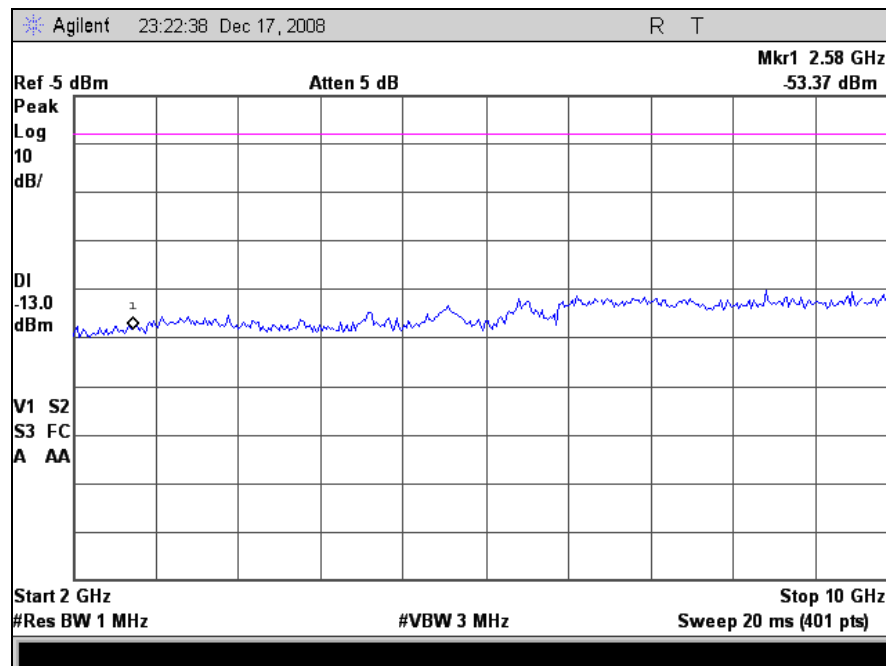
Plot 79. Conducted Spurious Emissions, Channel 1, HDQPSK, 2 GHz – 10 GHz



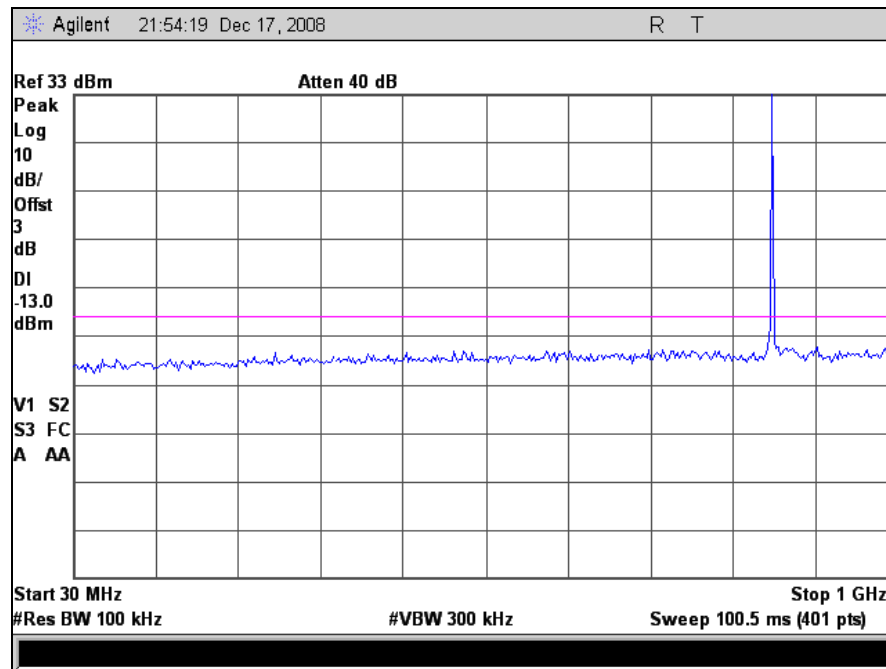
Plot 80. Conducted Spurious Emissions, Channel 1, CQPSK, 30 MHz – 1 GHz



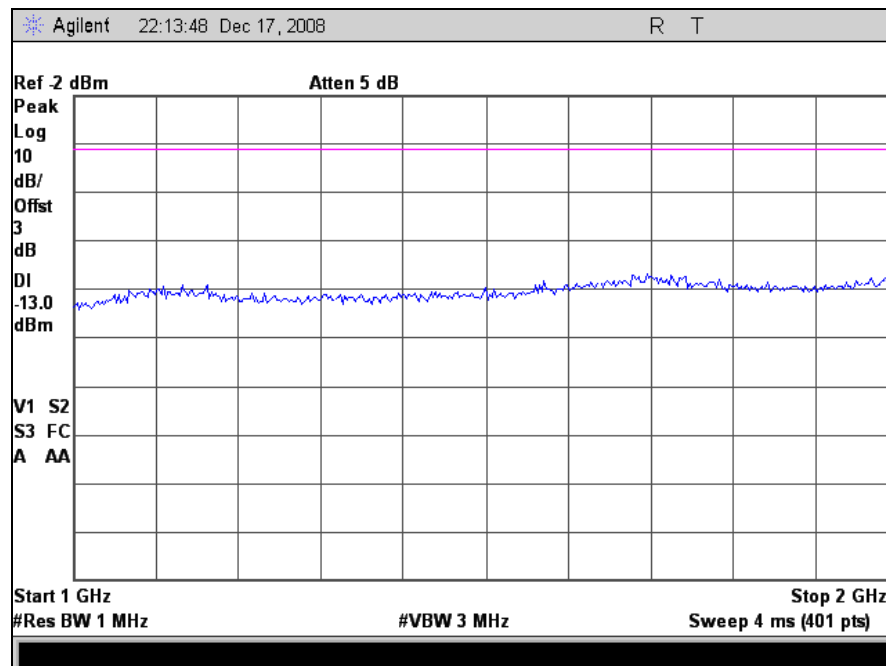
Plot 81. Conducted Spurious Emissions, Channel 1, CQPSK, 1 GHz – 2 GHz



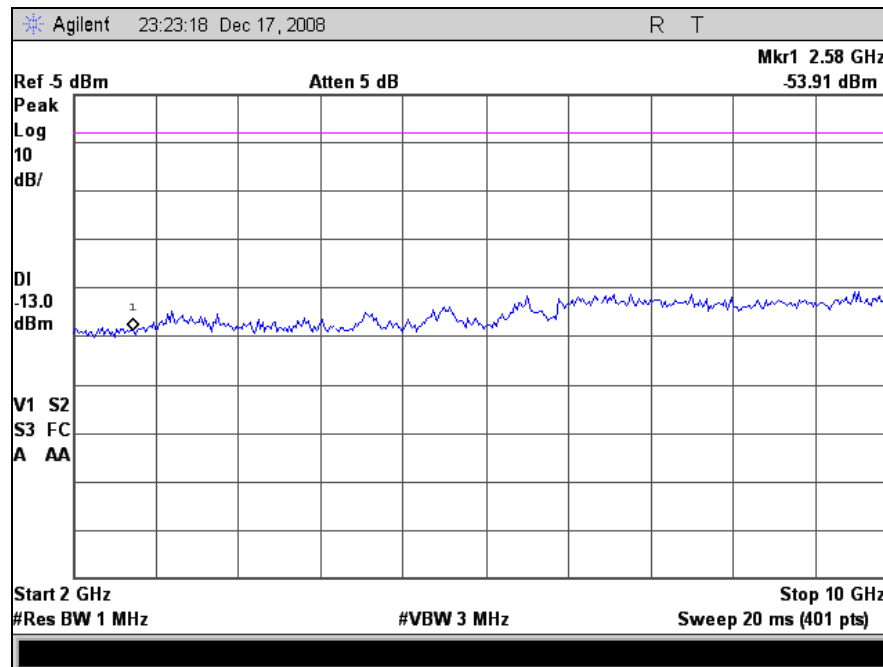
Plot 82. Conducted Spurious Emissions, Channel 1, CQPSK, 2 GHz – 10 GHz



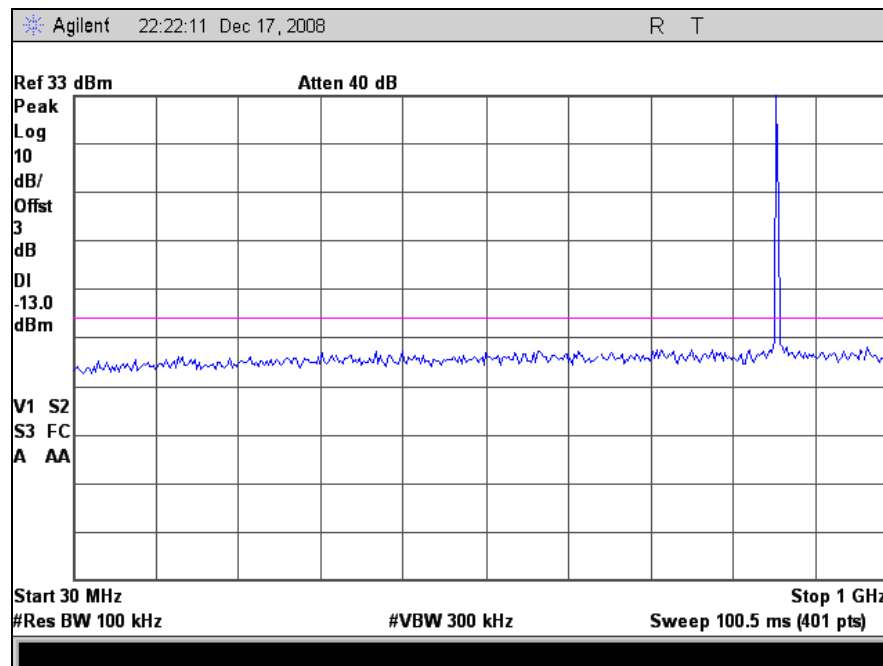
Plot 83. Conducted Spurious Emissions, Channel 1,C4FM, 30 MHz – 1 GHz



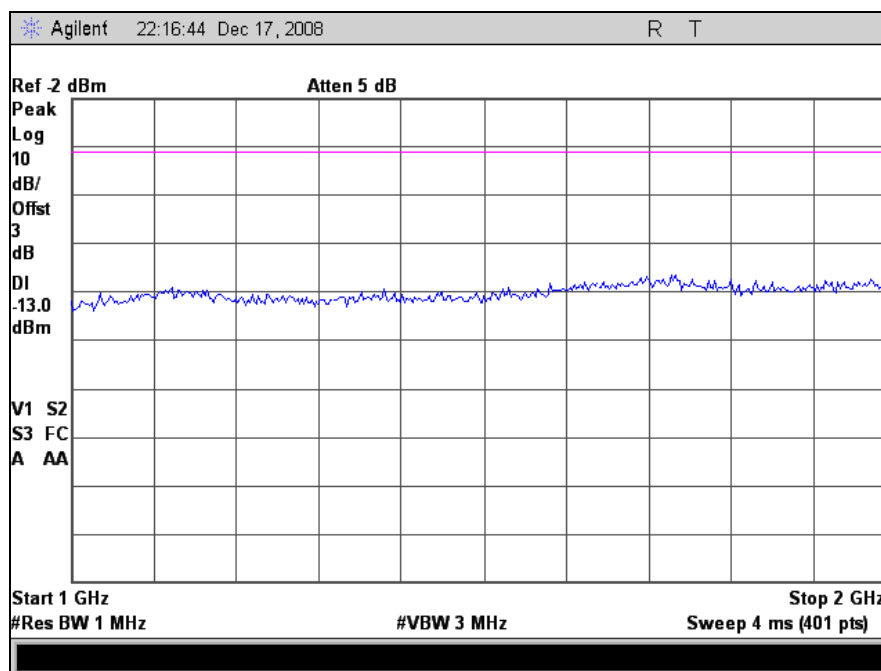
Plot 84. Conducted Spurious Emissions, Channel 1,C4FM, 1 GHz – 2 GHz



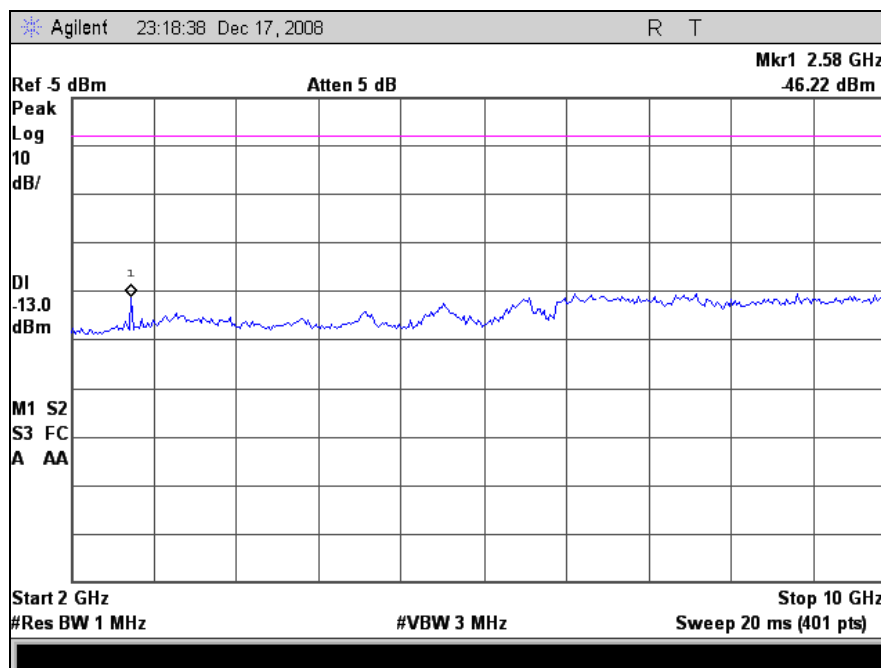
Plot 85. Conducted Spurious Emissions, Channel 1,C4FM, 2 GHz – 10 GHz



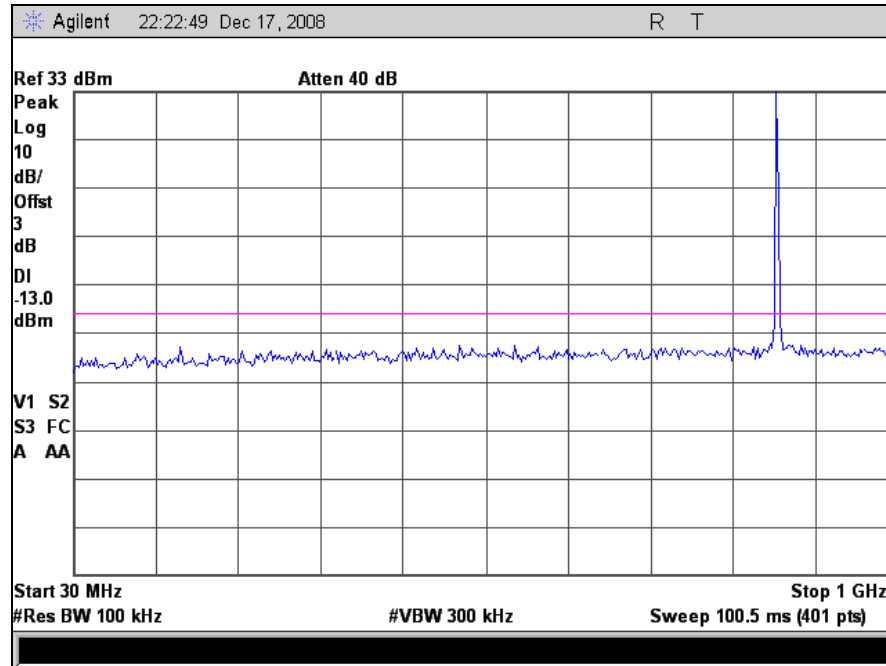
Plot 86. Conducted Spurious Emissions, Channel 2, HDQPSK, 30 MHz – 1 GHz



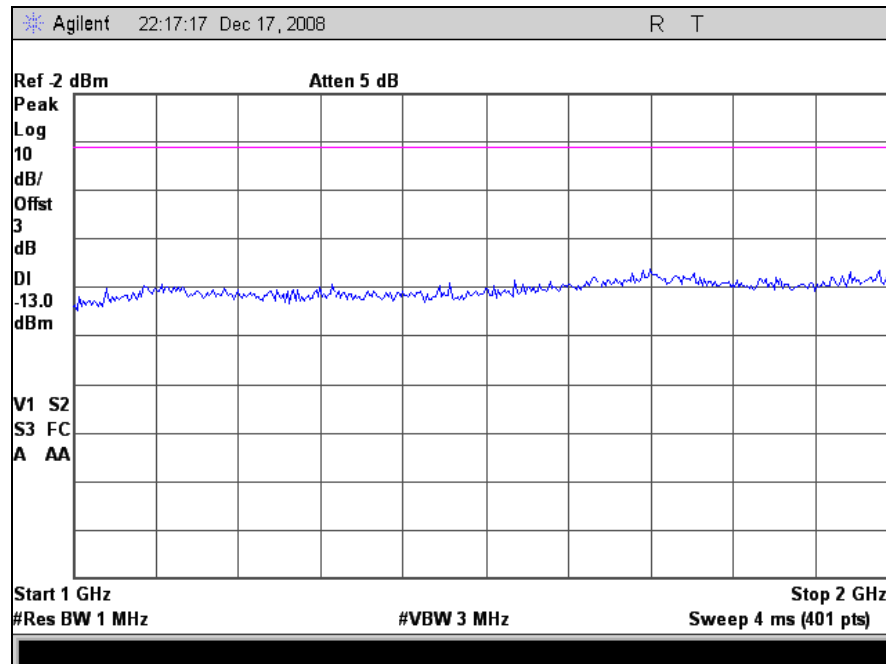
Plot 87. Conducted Spurious Emissions, Channel 2, HDQPSK, 1 GHz – 2 GHz



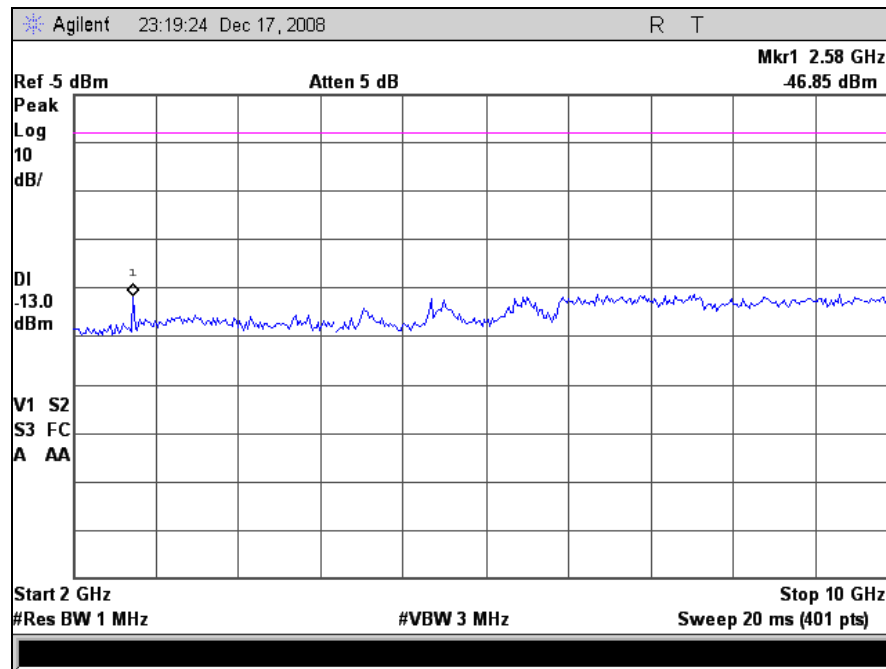
Plot 88. Conducted Spurious Emissions, Channel 2, HDQPSK, 2 GHz – 10 GHz



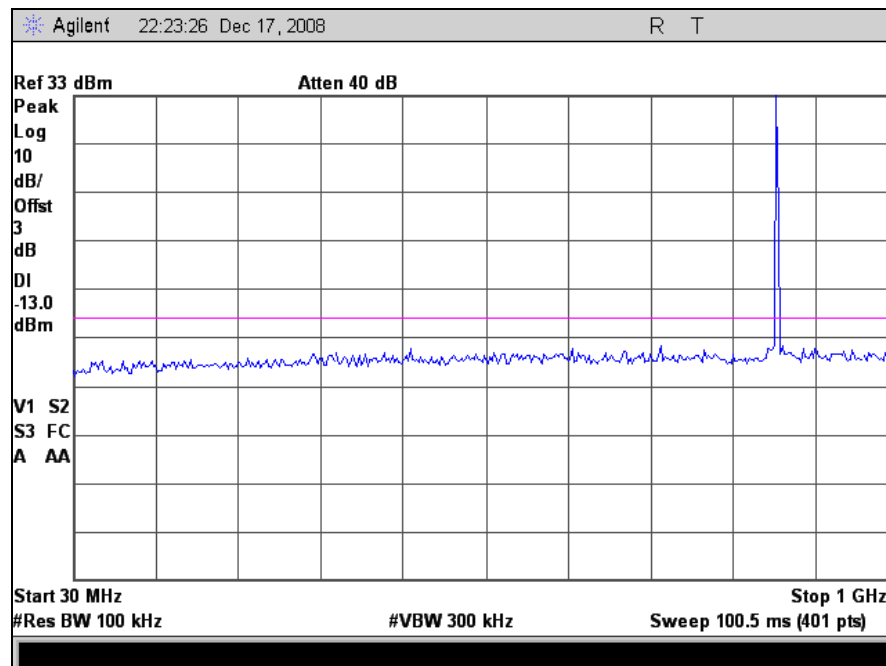
Plot 89. Conducted Spurious Emissions, Channel 2, CQPSK, 30 MHz – 1 GHz



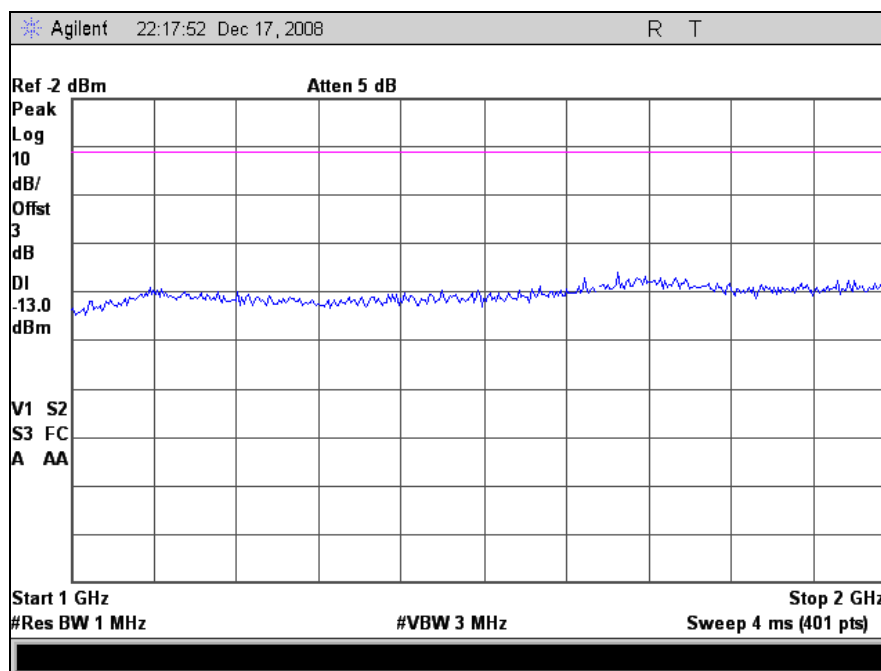
Plot 90. Conducted Spurious Emissions, Channel 2, CQPSK, 1 GHz – 2 GHz



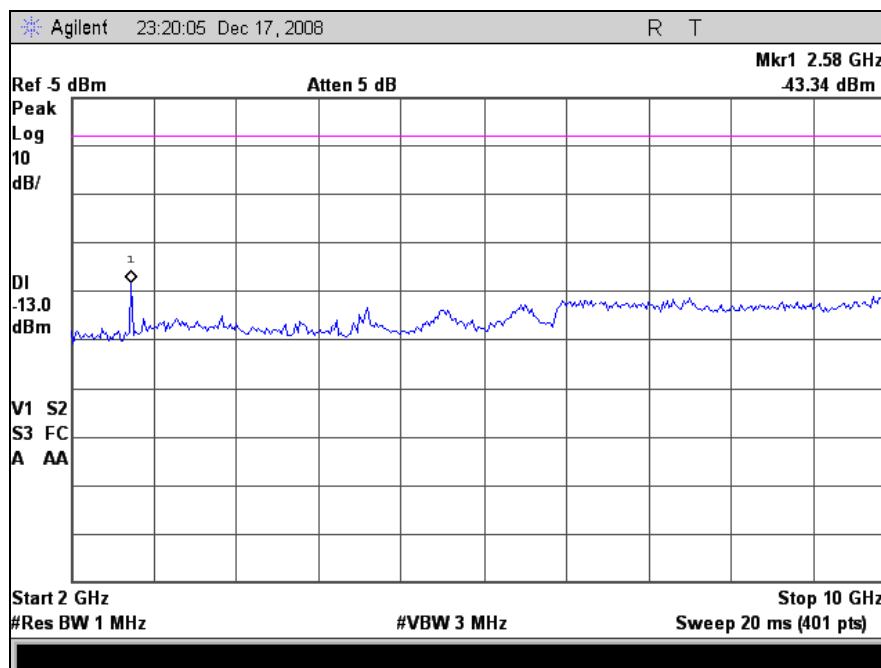
Plot 91. Conducted Spurious Emissions, Channel 2, CQPSK, 2 GHz – 10 GHz



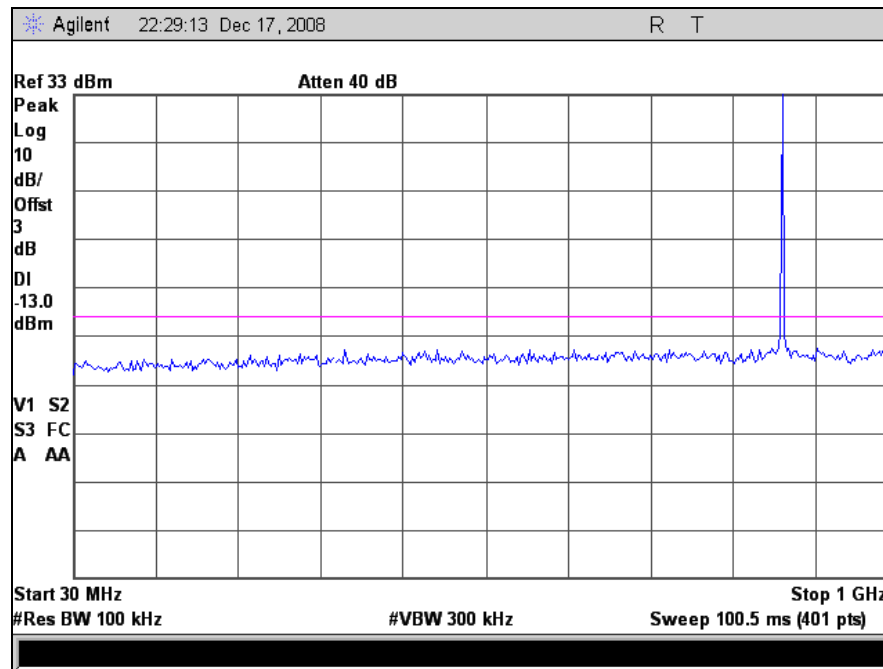
Plot 92. Conducted Spurious Emissions, Channel 2, C4FM, 30 MHz – 1 GHz



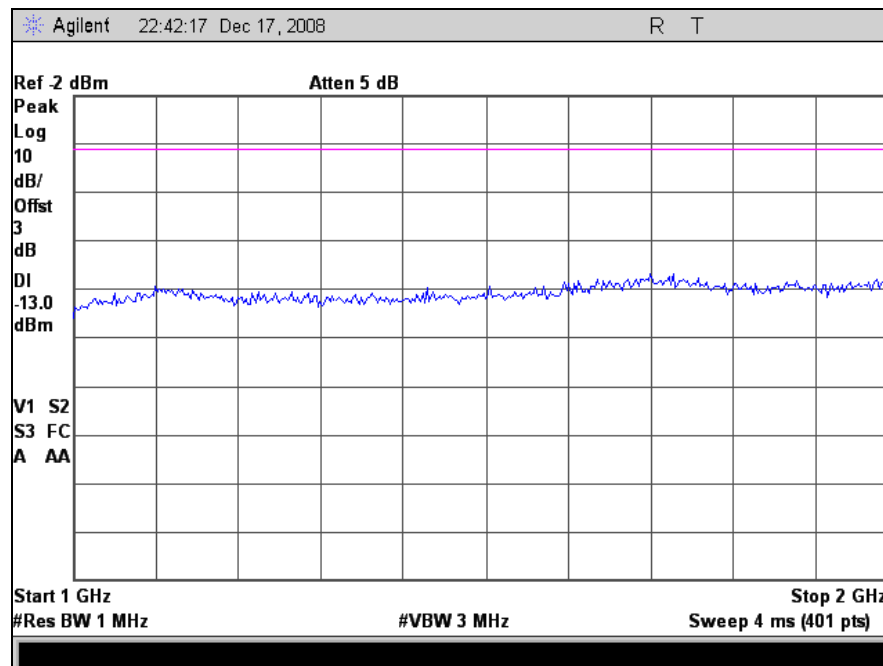
Plot 93. Conducted Spurious Emissions, Channel 2,C4FM, 1 GHz – 2 GHz



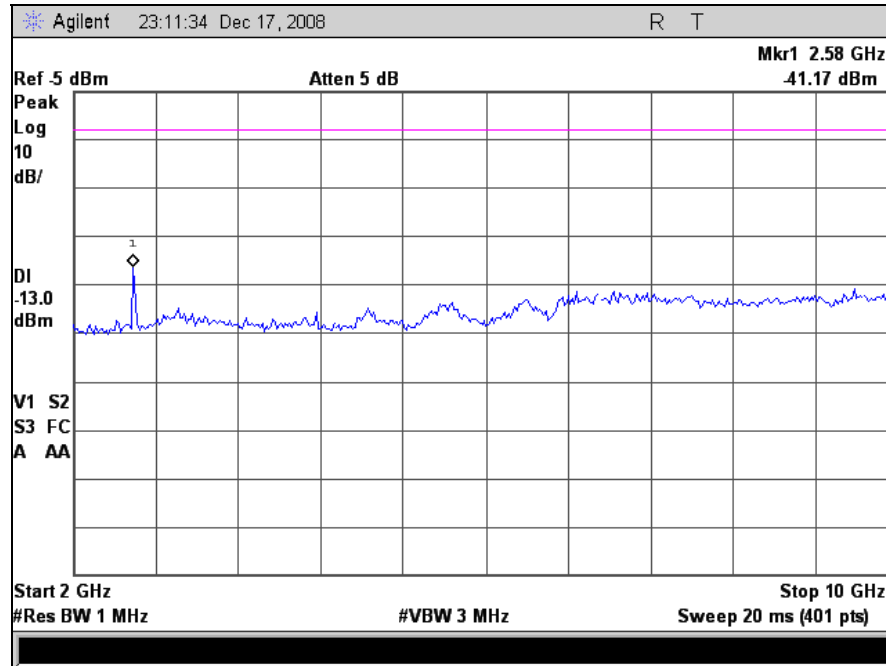
Plot 94. Conducted Spurious Emissions, Channel 2,C4FM, 2 GHz – 10 GHz



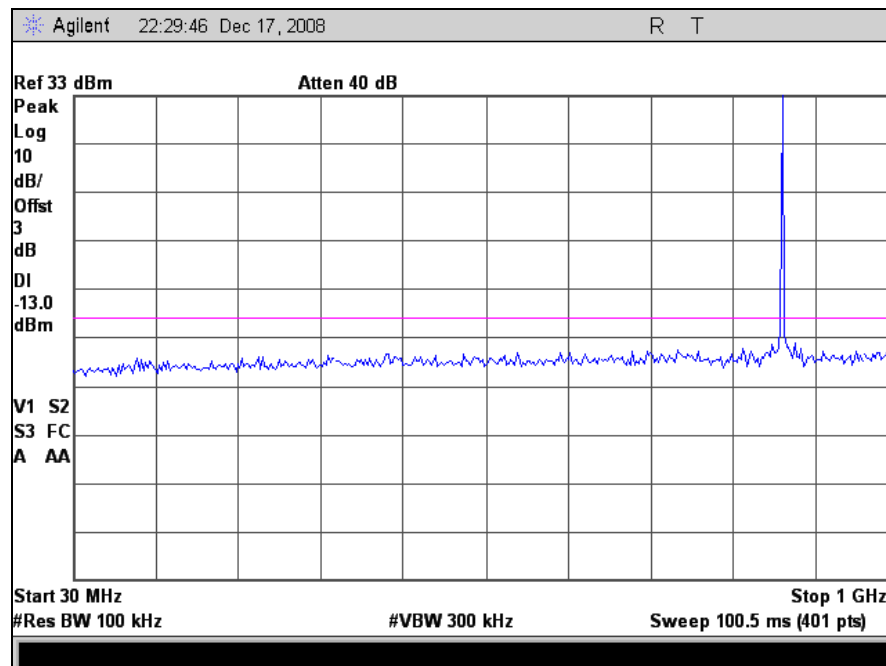
Plot 95. Conducted Spurious Emissions, Channel 3, HDQPSK, 30 MHz – 1 GHz



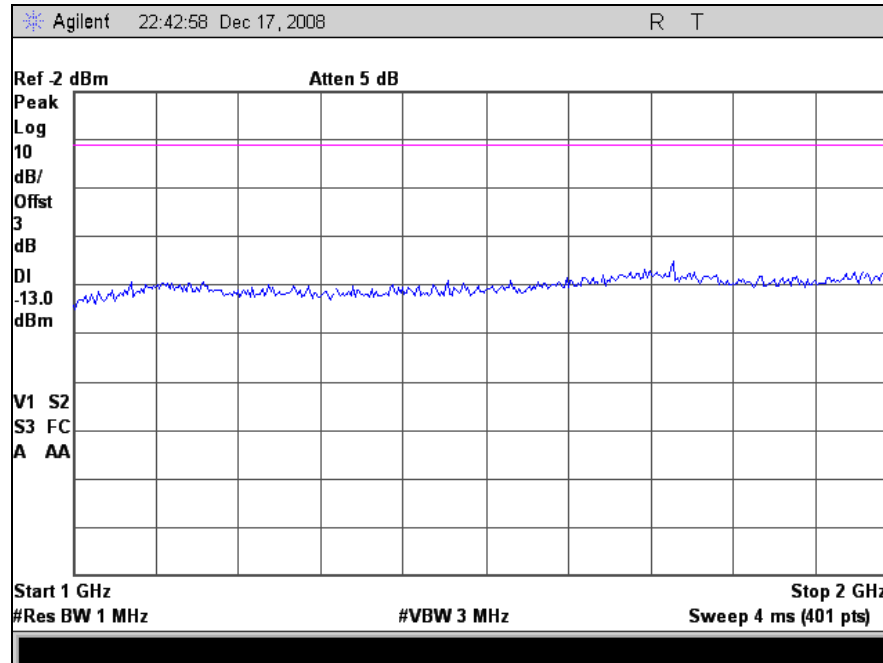
Plot 96. Conducted Spurious Emissions, Channel 3, HDQPSK, 1 GHz – 2 GHz



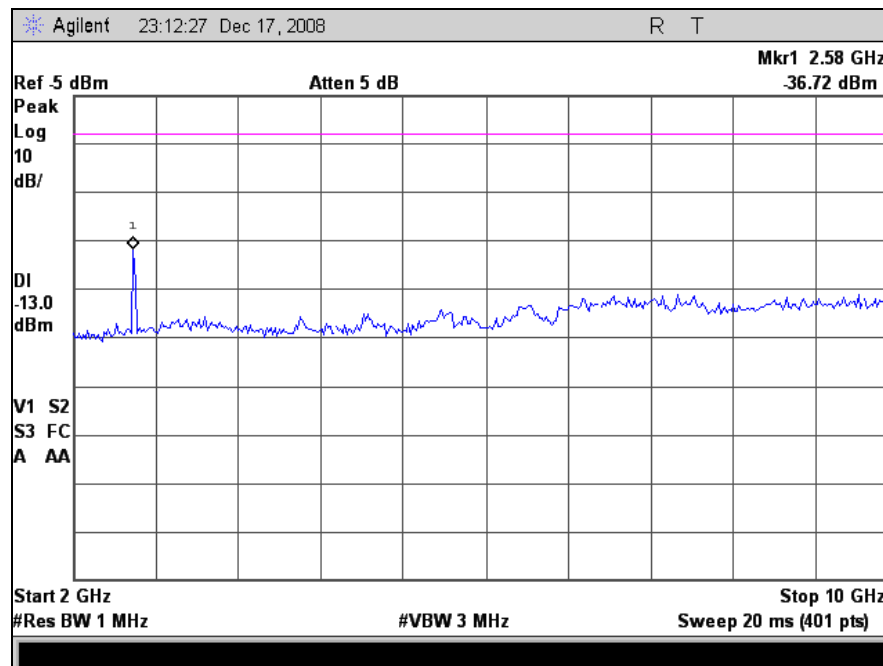
Plot 97. Conducted Spurious Emissions, Channel 3, HDQPSK, 2 GHz – 10 GHz



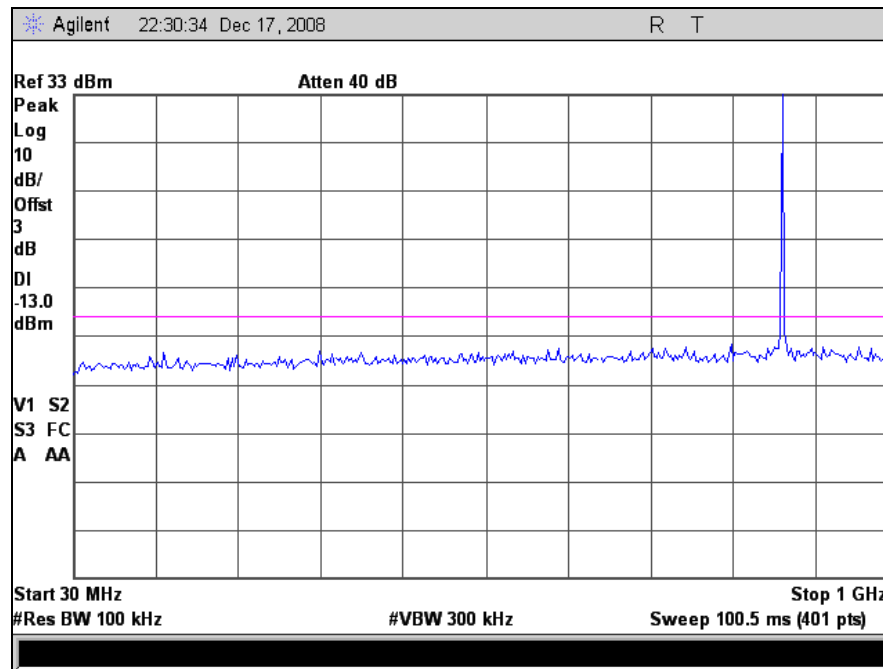
Plot 98. Conducted Spurious Emissions, Channel 3, CQPSK, 30 MHz – 1 GHz



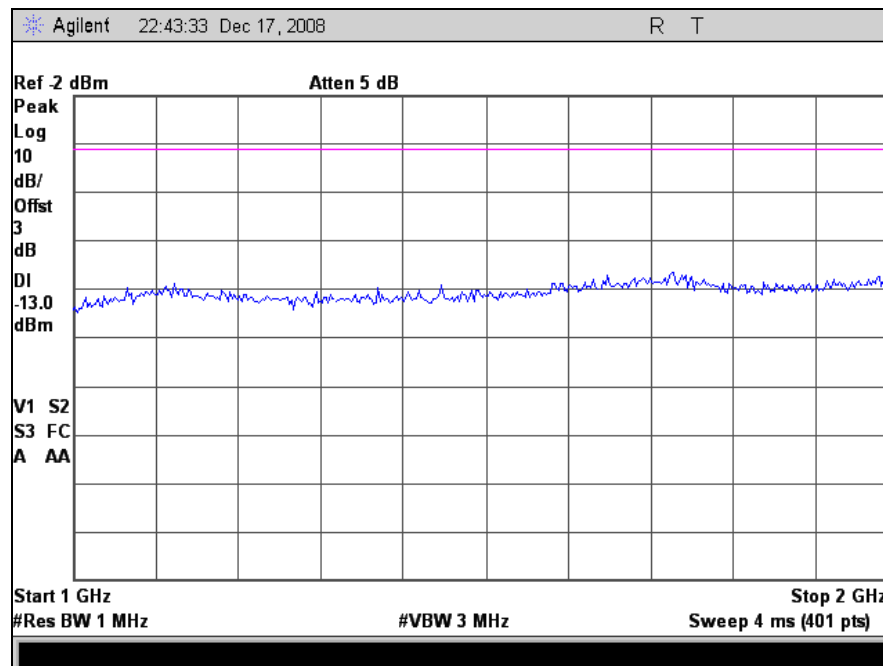
Plot 99. Conducted Spurious Emissions, Channel 3, CQPSK, 1 GHz – 2 GHz



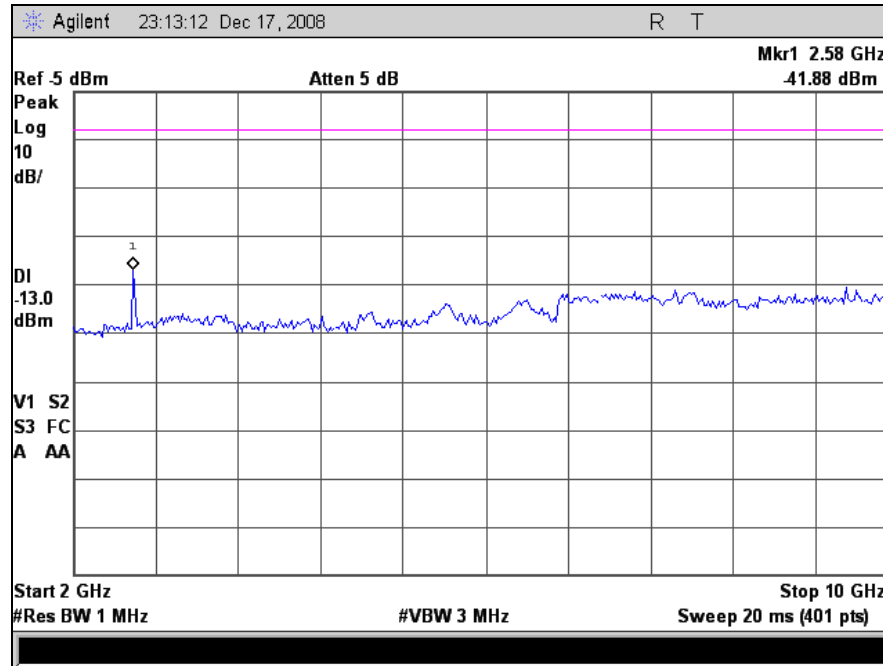
Plot 100. Conducted Spurious Emissions, Channel 3, CQPSK, 2 GHz – 10 GHz



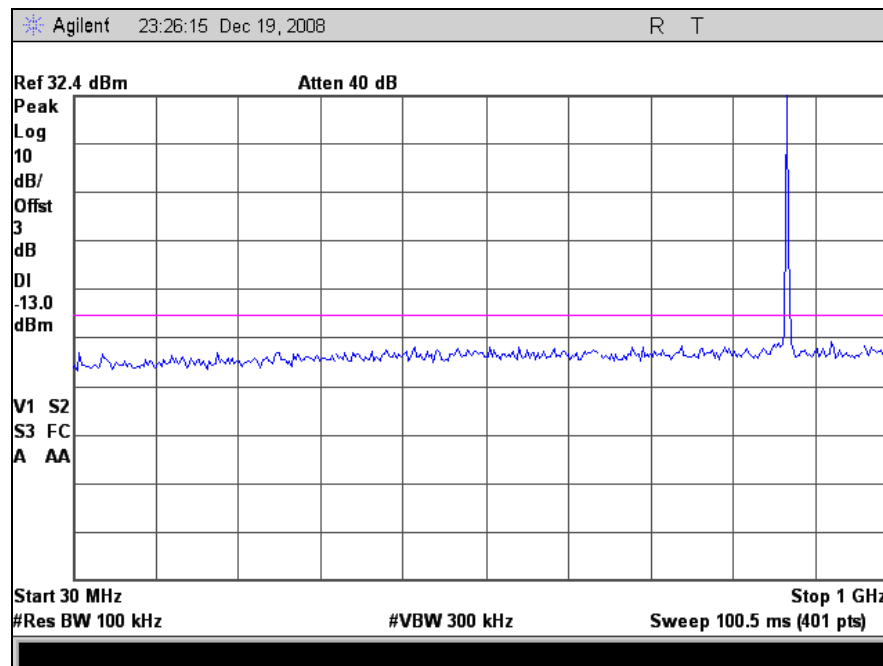
Plot 101. Conducted Spurious Emissions, Channel 3,C4FM, 30 MHz – 1 GHz



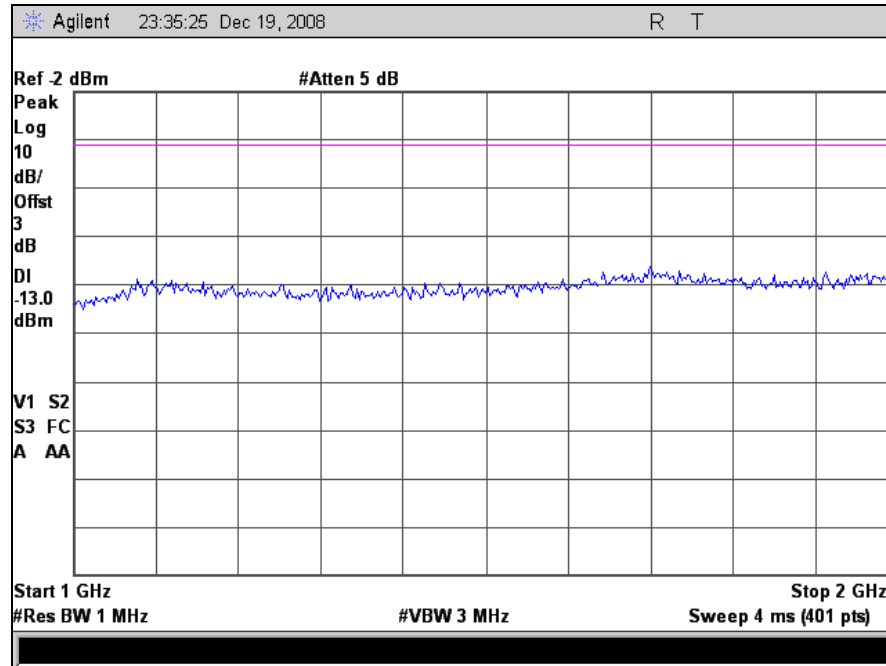
Plot 102. Conducted Spurious Emissions, Channel 3,C4FM, 1 GHz – 2 GHz



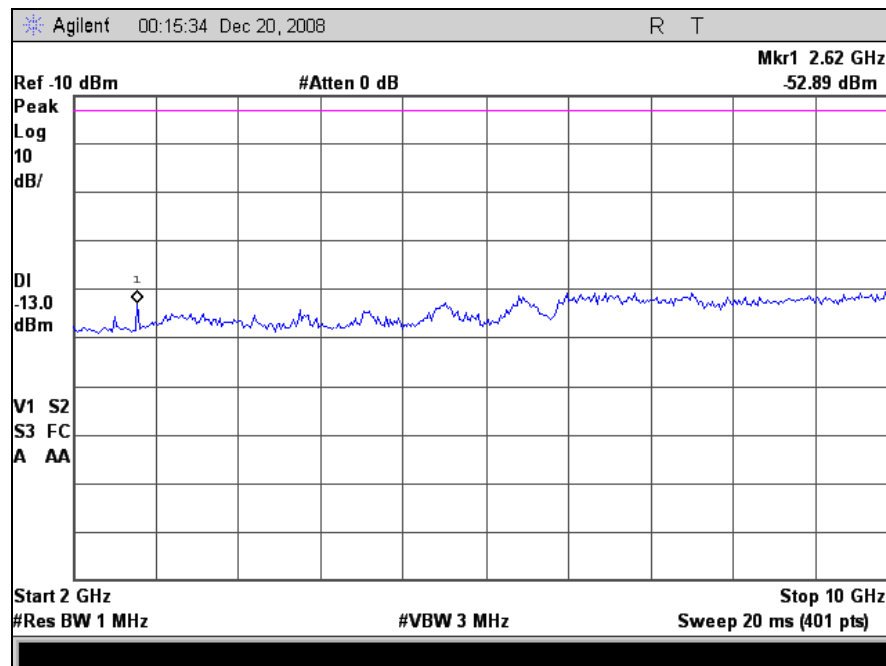
Plot 103. Conducted Spurious Emissions, Channel 3,C4FM, 2 GHz – 10 GHz



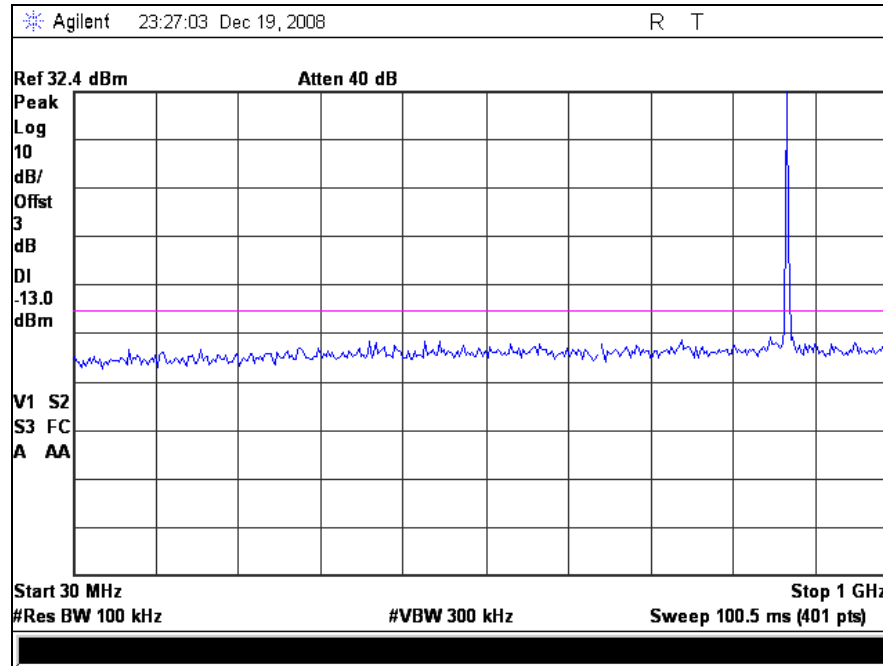
Plot 104. Conducted Spurious Emissions, Channel 4, HDQPSK, 30 MHz – 1 GHz



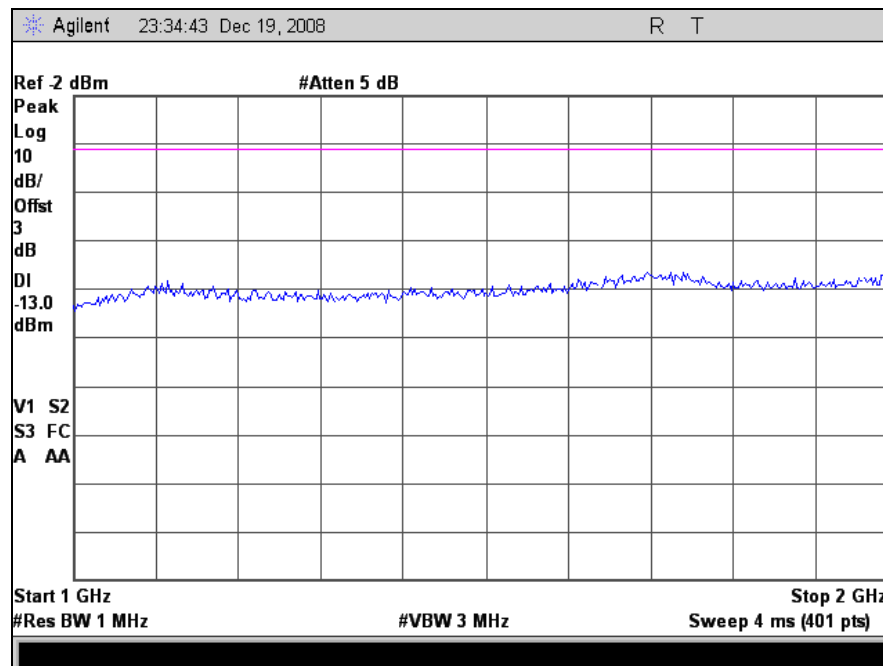
Plot 105. Conducted Spurious Emissions, Channel 4, HDQPSK, 1 GHz – 2 GHz



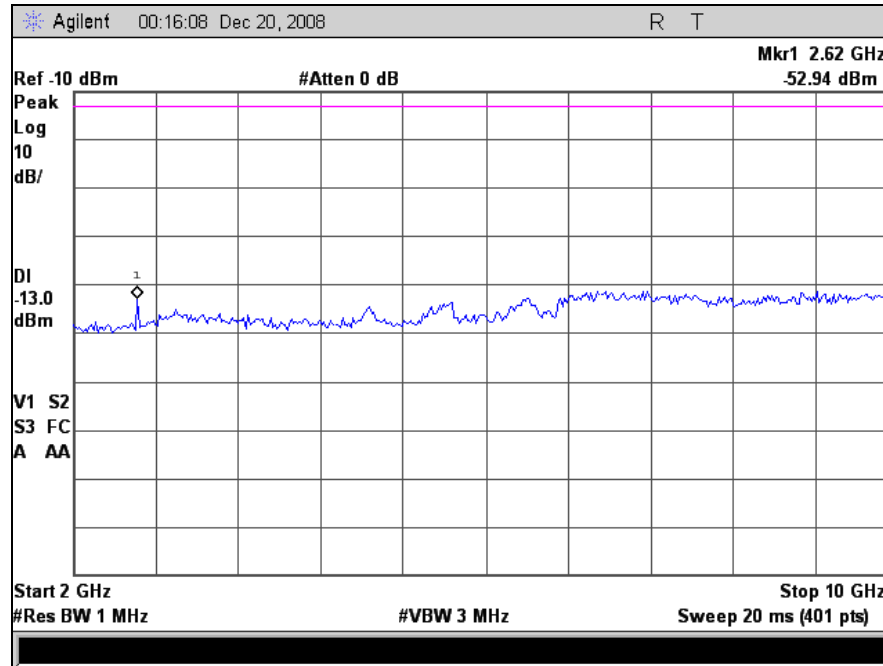
Plot 106. Conducted Spurious Emissions, Channel 4, HDQPSK, 2 GHz – 10 GHz



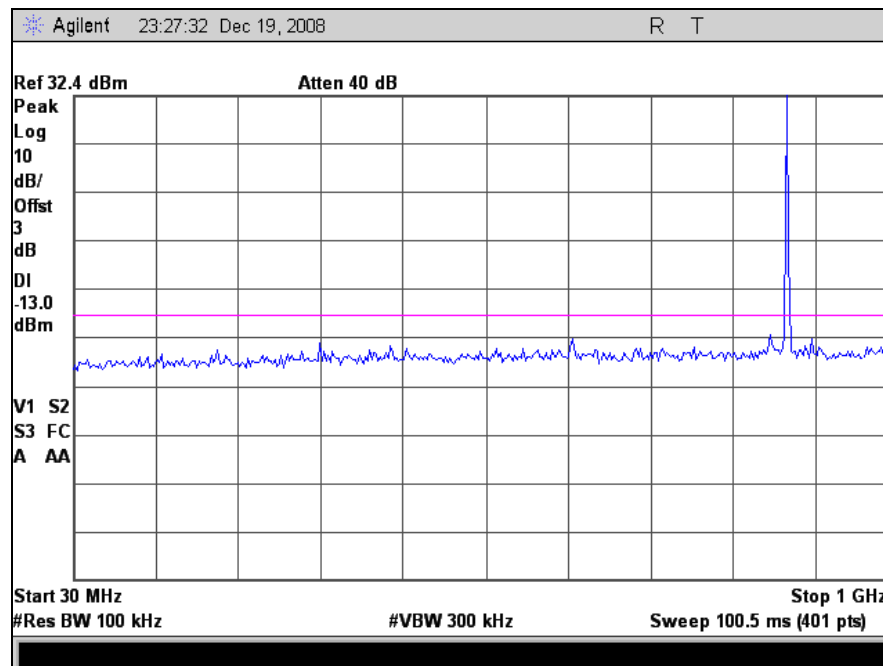
Plot 107. Conducted Spurious Emissions, Channel 4, CQPSK, 30 MHz – 1 GHz



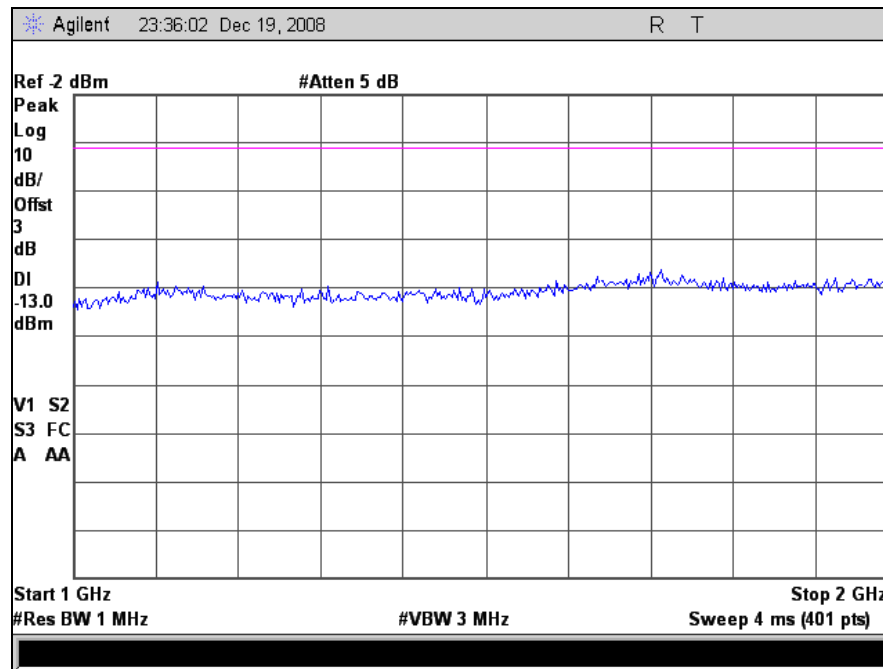
Plot 108. Conducted Spurious Emissions, Channel 4, CQPSK, 1 GHz – 2 GHz



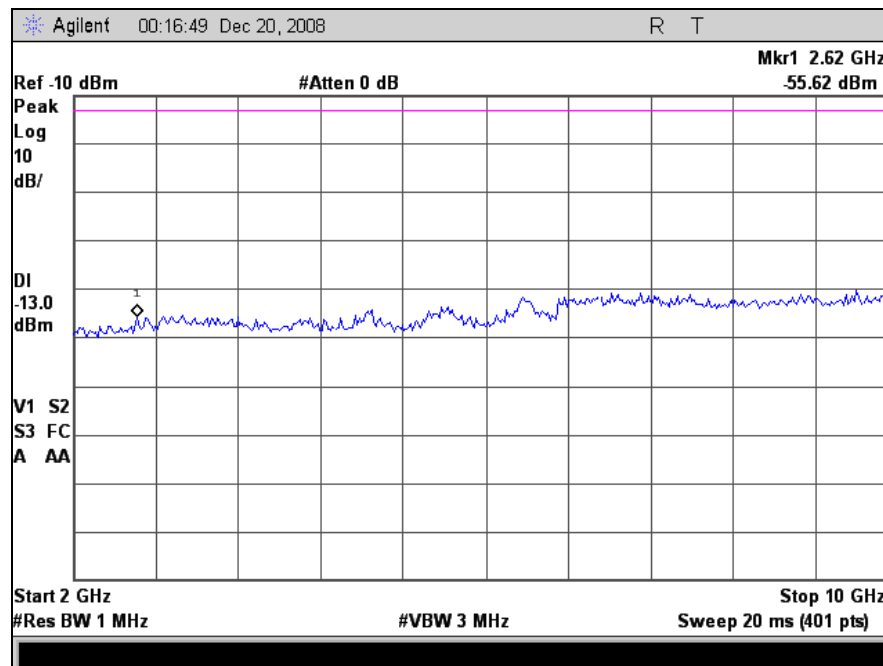
Plot 109. Conducted Spurious Emissions, Channel 4, CQPSK, 2 GHz – 10 GHz



Plot 110. Conducted Spurious Emissions, Channel 4, C4FM, 30 MHz – 1 GHz



Plot 111. Conducted Spurious Emissions, Channel 4,C4FM, 1 GHz – 2 GHz



Plot 112. Conducted Spurious Emissions, Channel 4,C4FM, 2 GHz – 10 GHz

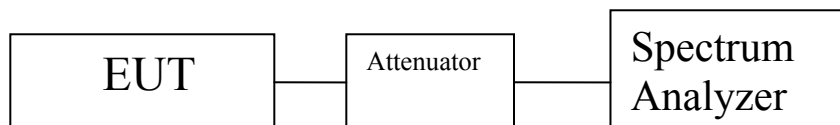


Figure 13. Spurious Emissions at Antenna Terminals Test Setup



Electromagnetic Compatibility Radiated Emissions Requirements

6.2. Radiated Spurious Emissions

Test Requirement(s): §2.1053 and §90.210

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber. The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50 ohm loads. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

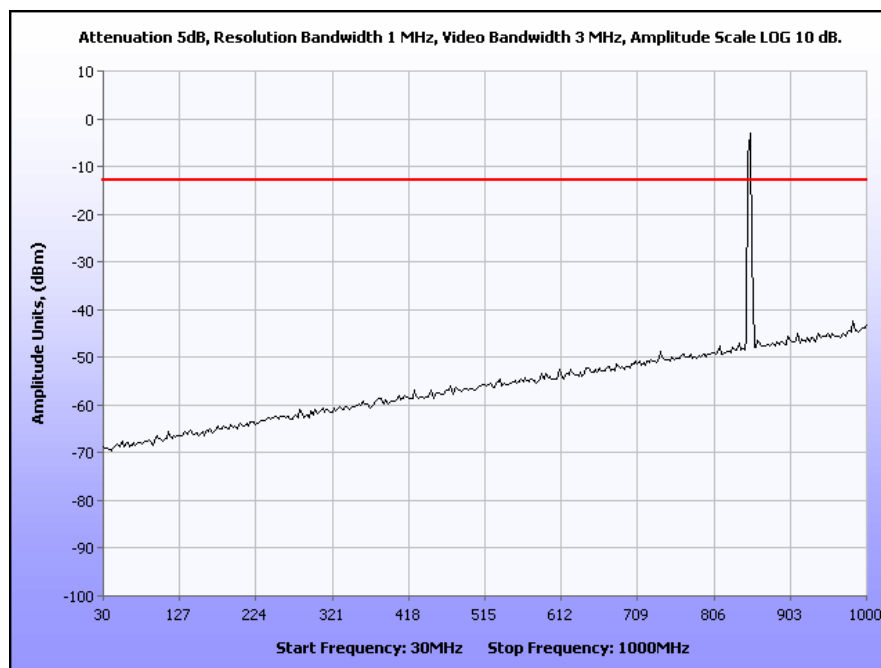
Plots were captured and corrected for antenna correction factor and cable loss. The electric field strength was converted to EIRP and graphed against a -13 dBm limit line.

Test Results: Equipment complies with Section 2.1053 and 90.210.

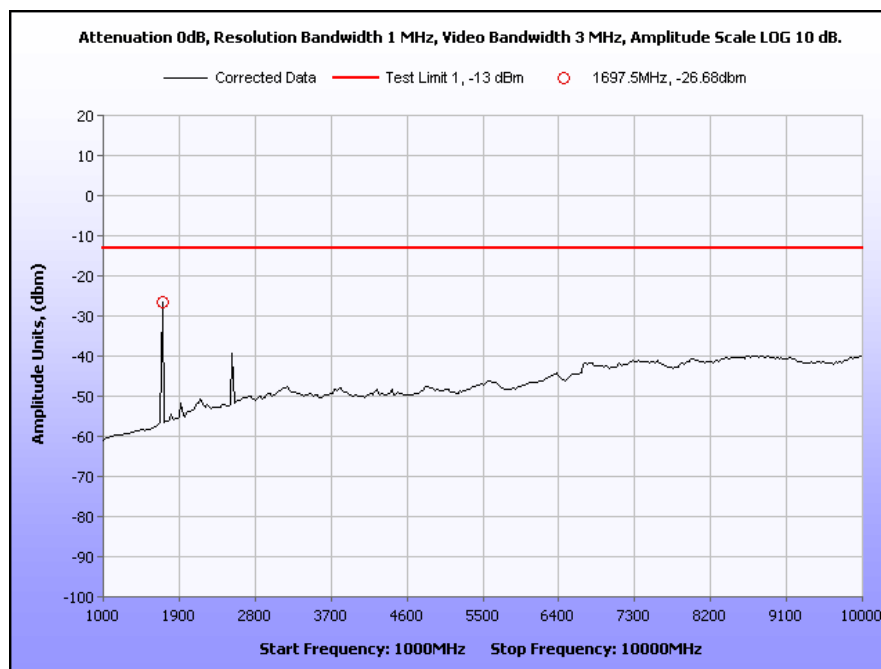
Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 12/19/2009

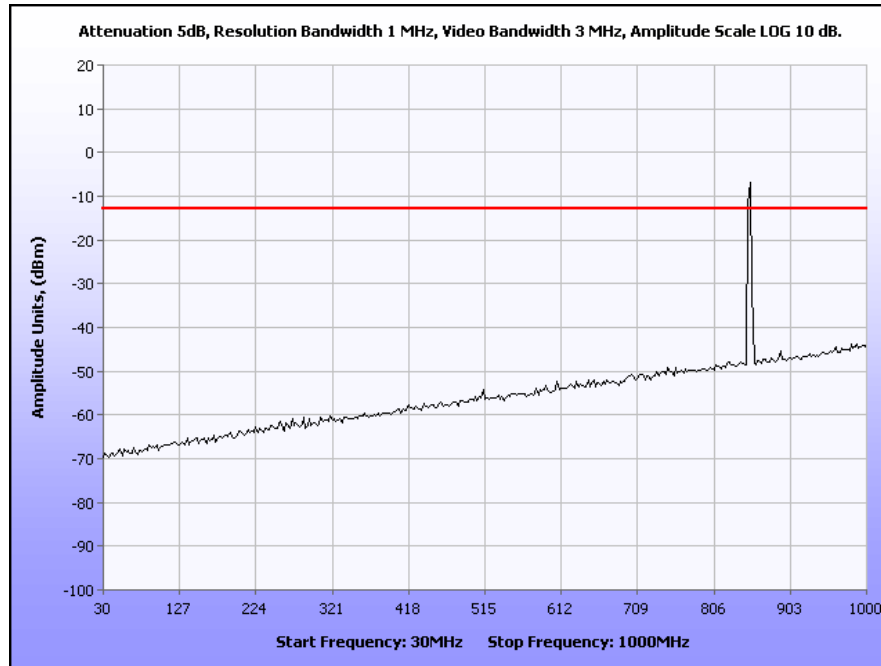
Radiated Emissions (Substitution Method) Test Results



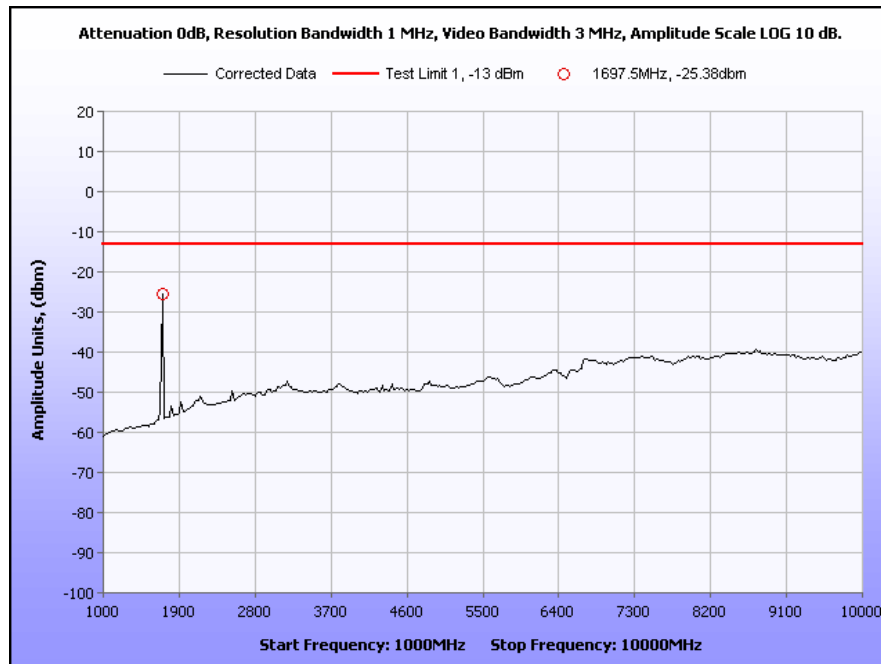
Plot 113. Radiated Spurious Emissions, Channel 1, HDQPSK, 30 MHz – 1 GHz



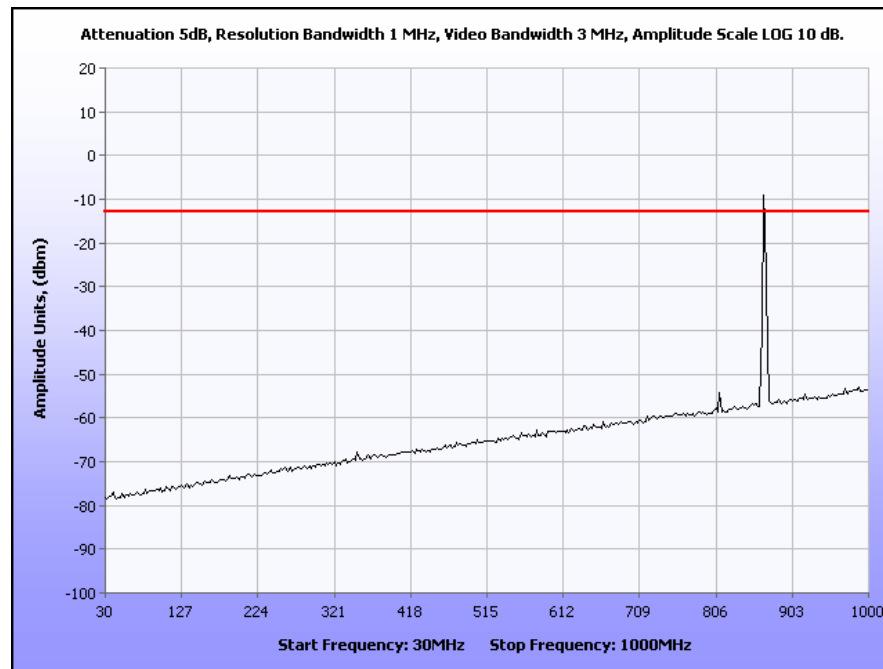
Plot 114. Radiated Spurious Emissions, Channel 1, HDQPSK, 1 GHz – 10 GHz



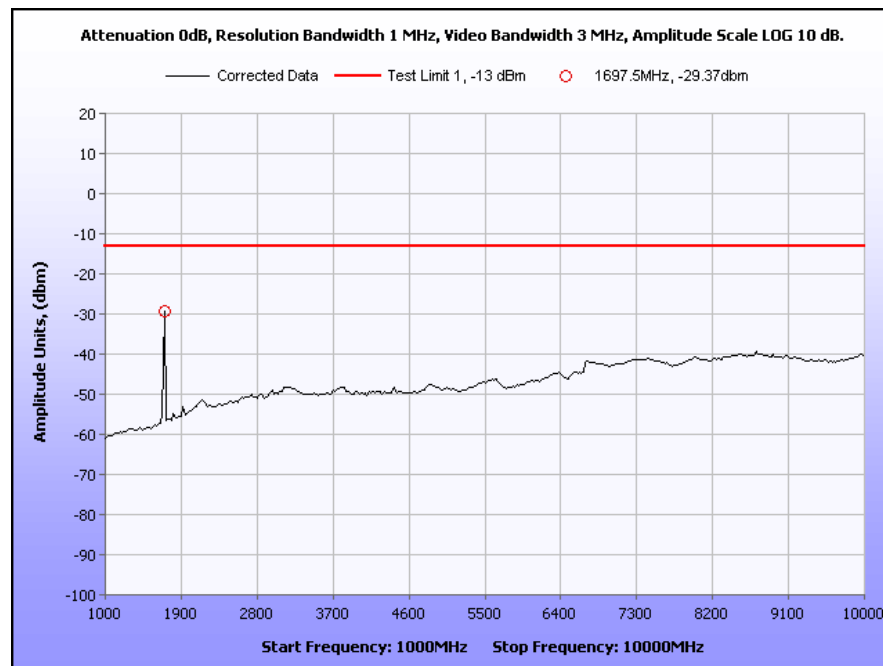
Plot 115. Radiated Spurious Emissions, Channel 1, CQPSK, 30 MHz – 1 GHz



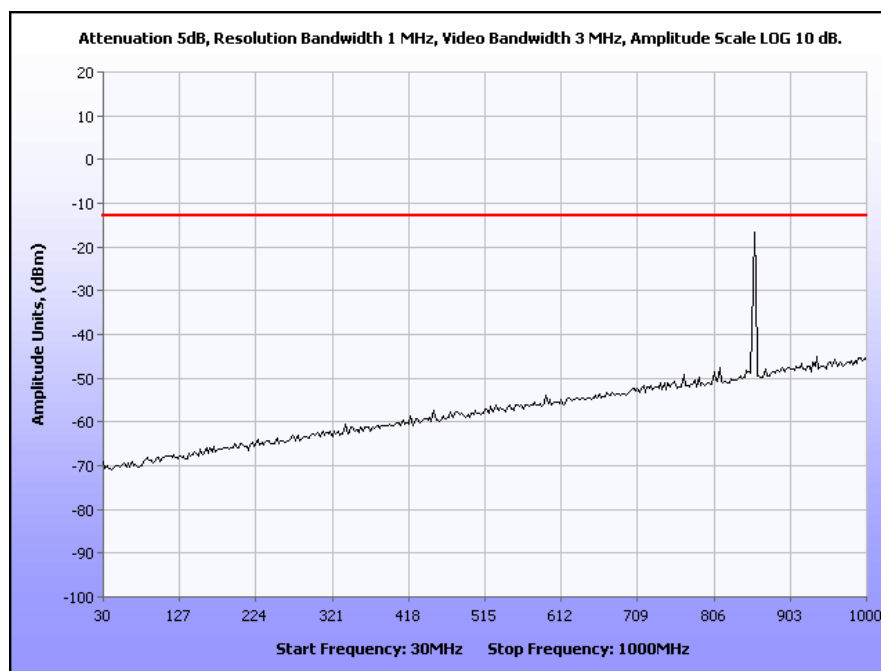
Plot 116. Radiated Spurious Emissions, Channel 1, CQPSK, 1 GHz – 10 GHz



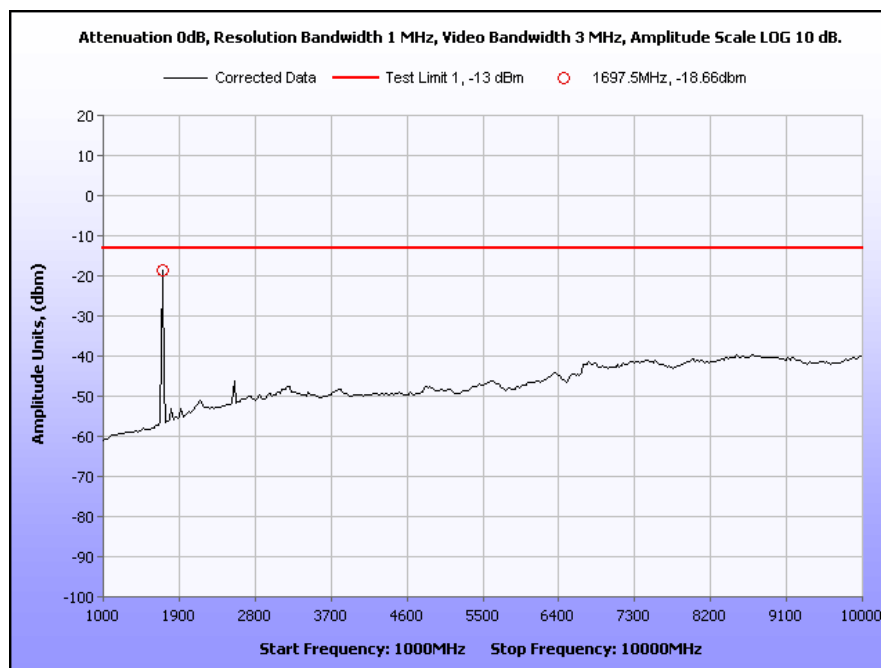
Plot 117. Radiated Spurious Emissions, Channel 1,C4FM, 30 MHz – 1 GHz



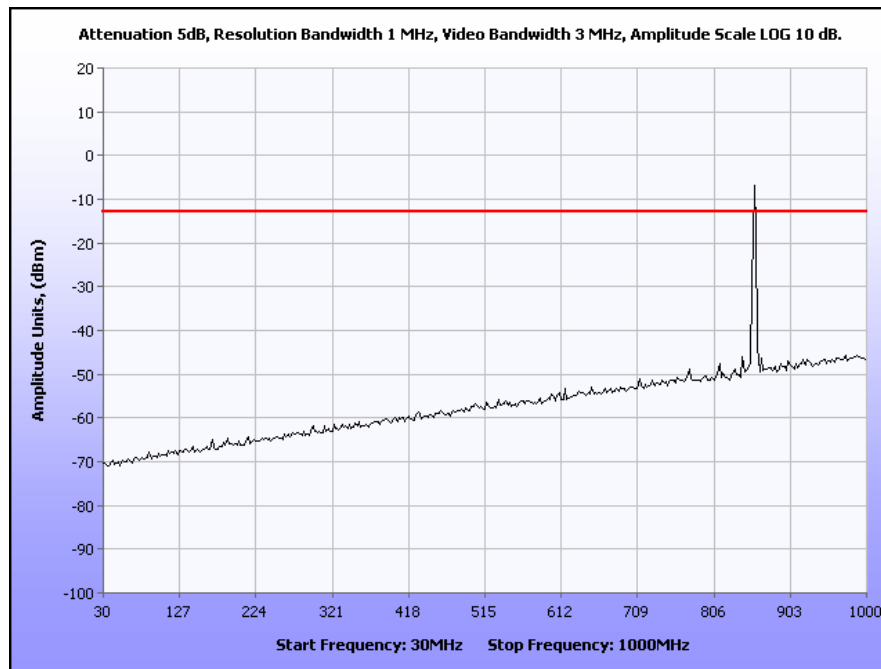
Plot 118. Radiated Spurious Emissions, Channel 1,C4FM, 1 GHz – 10 GHz



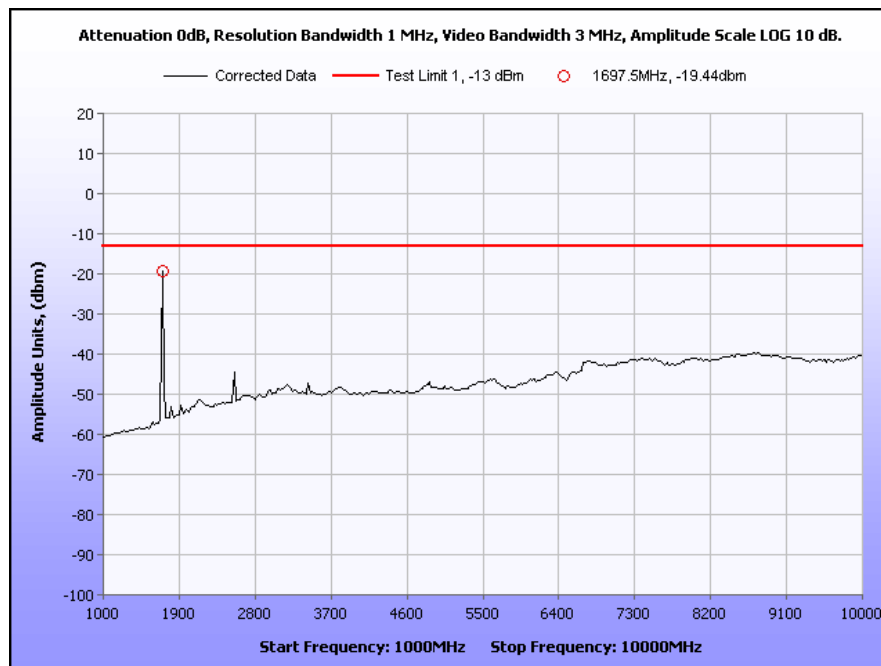
Plot 119. Radiated Spurious Emissions, Channel 2, HDQPSK, 30 MHz – 1 GHz



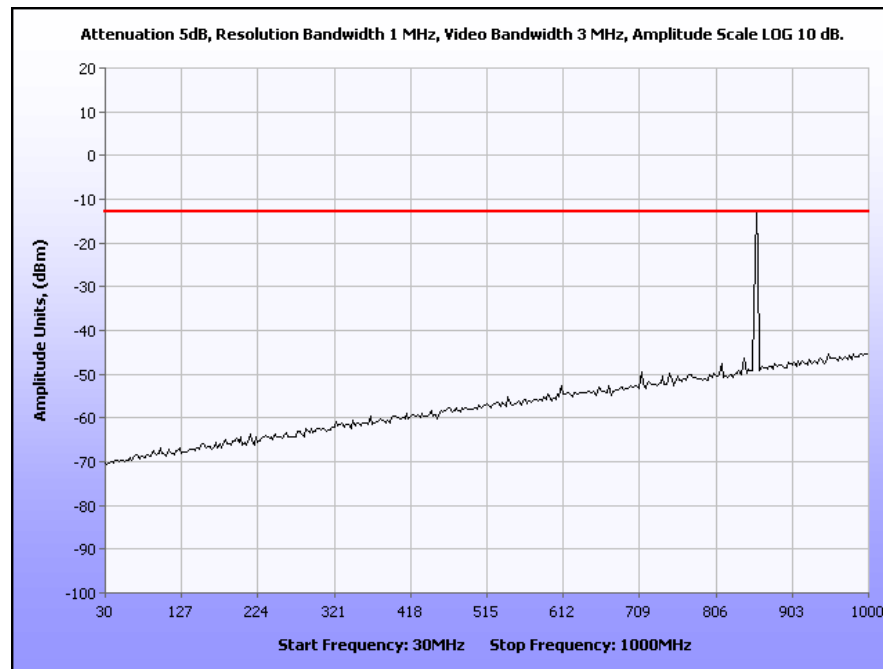
Plot 120. Radiated Spurious Emissions, Channel 2, HDQPSK, 1 GHz – 10 GHz



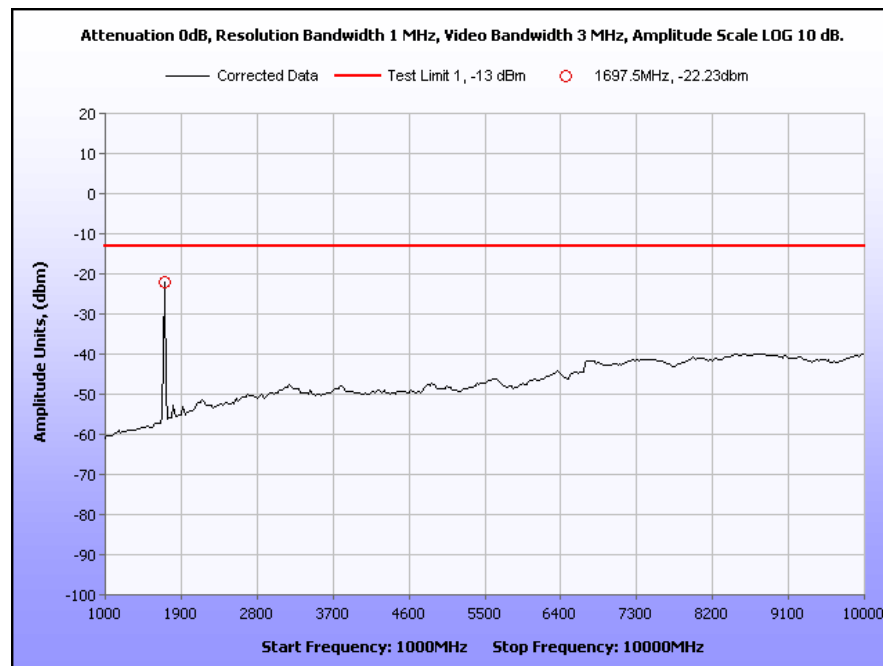
Plot 121. Radiated Spurious Emissions, Channel 2, CQPSK, 30 MHz – 1 GHz



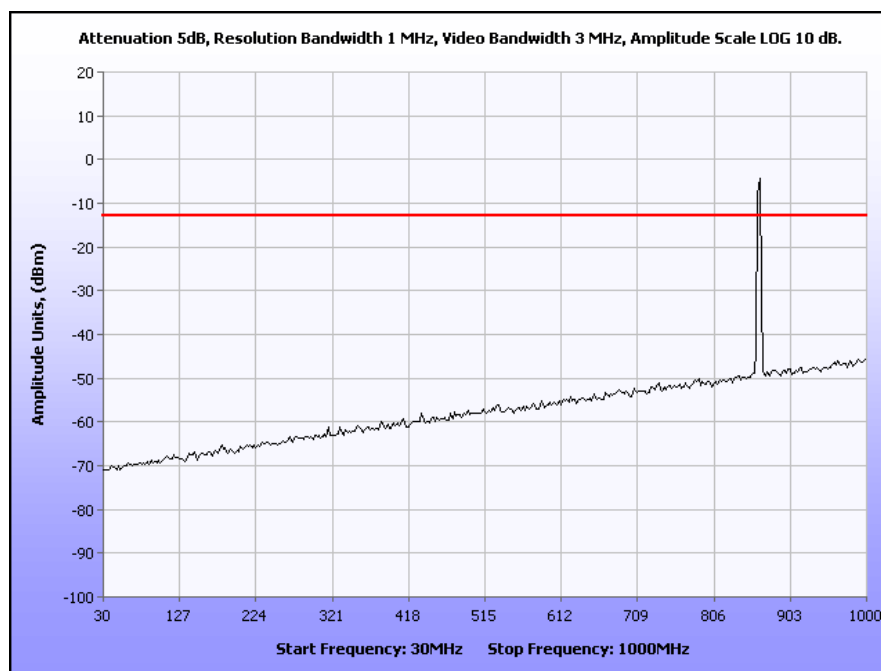
Plot 122. Radiated Spurious Emissions, Channel 2, CQPSK, 1 GHz – 10 GHz



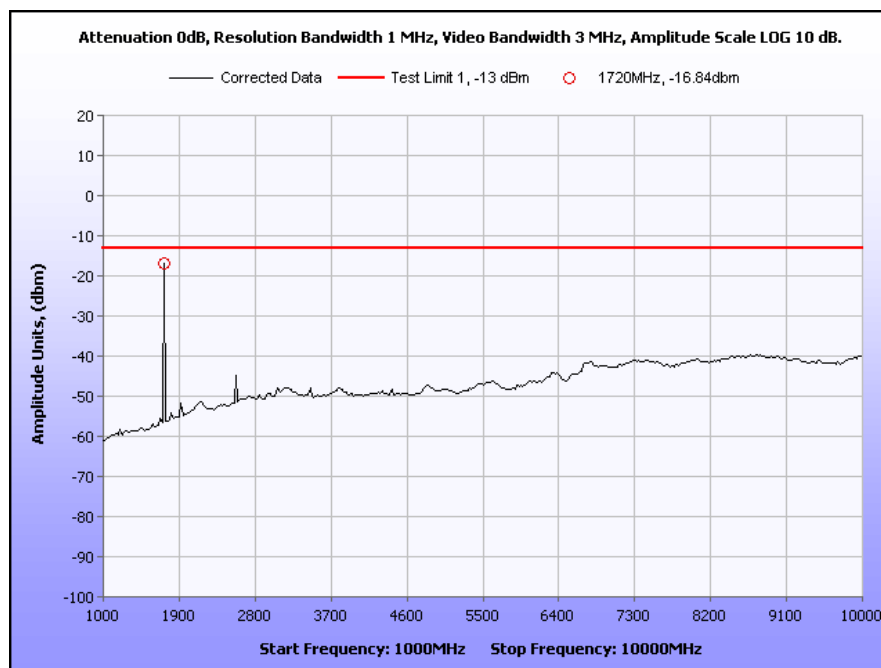
Plot 123. Radiated Spurious Emissions, Channel 2,C4FM, 30 MHz – 1 GHz



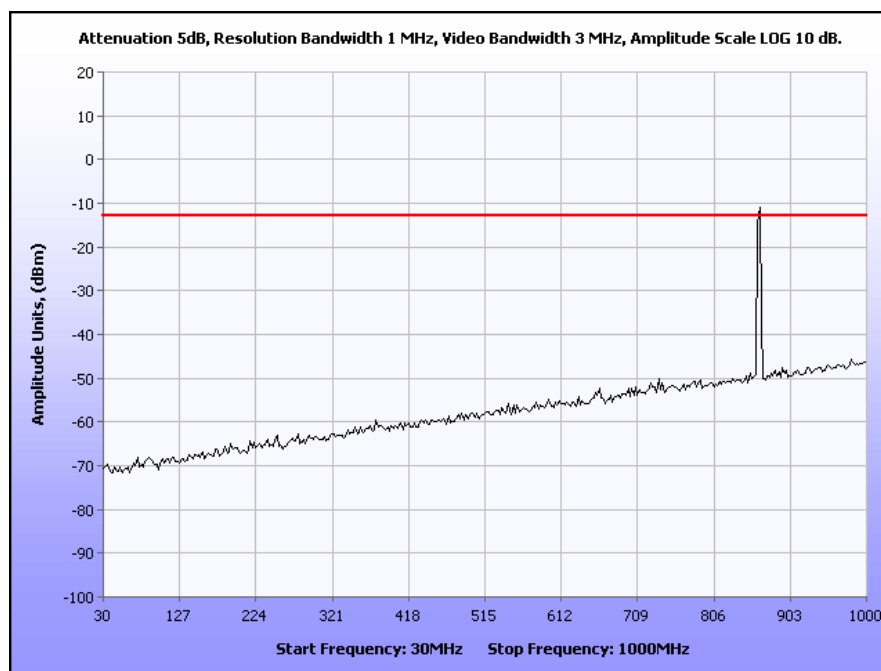
Plot 124. Radiated Spurious Emissions, Channel 2,C4FM, 1 GHz – 10 GHz



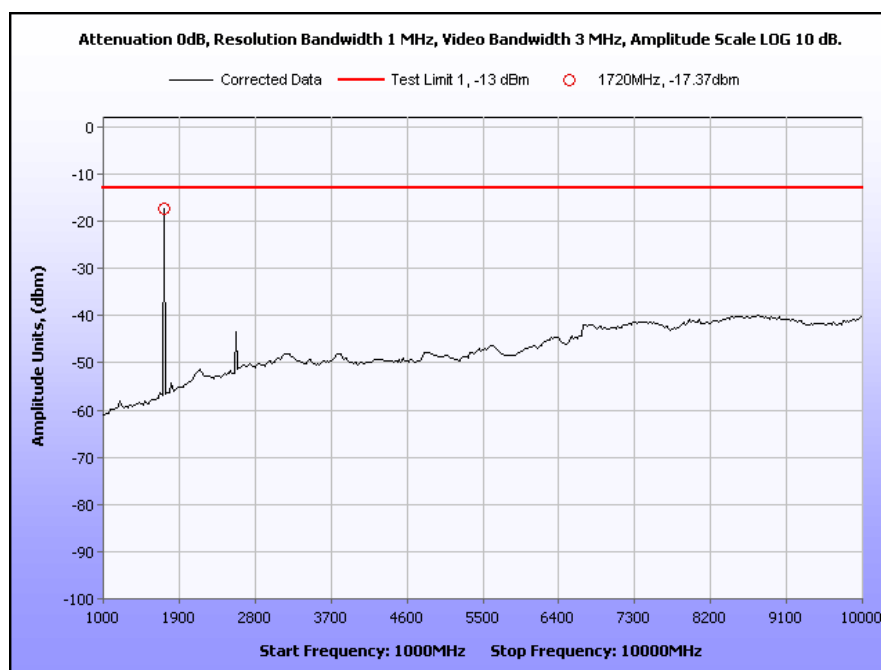
Plot 125. Radiated Spurious Emissions, Channel 3, HDQPSK, 30 MHz – 1 GHz



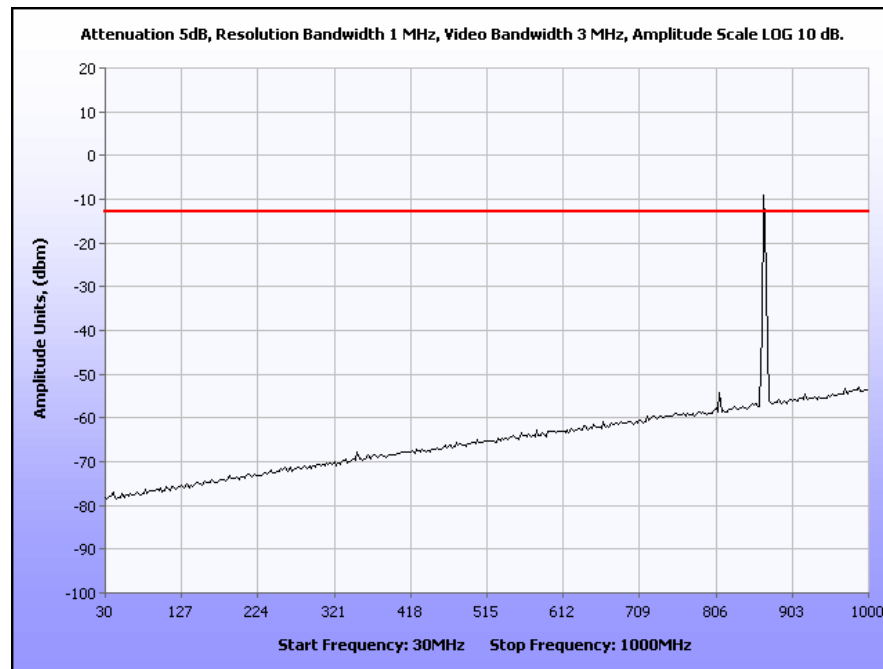
Plot 126. Radiated Spurious Emissions, Channel 3, HDQPSK, 1 GHz – 10 GHz



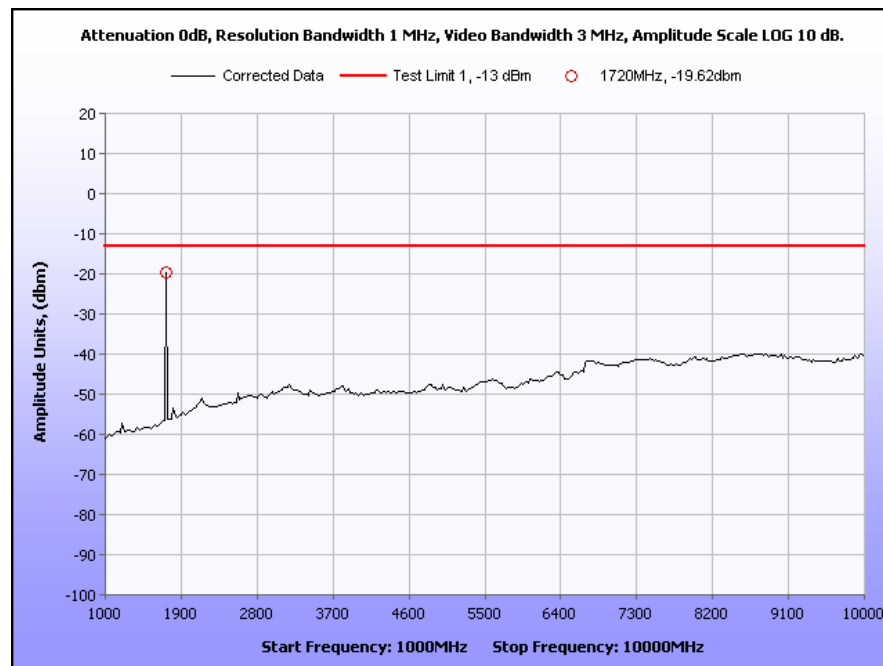
Plot 127. Radiated Spurious Emissions, Channel 3, CQPSK, 30 MHz – 1 GHz



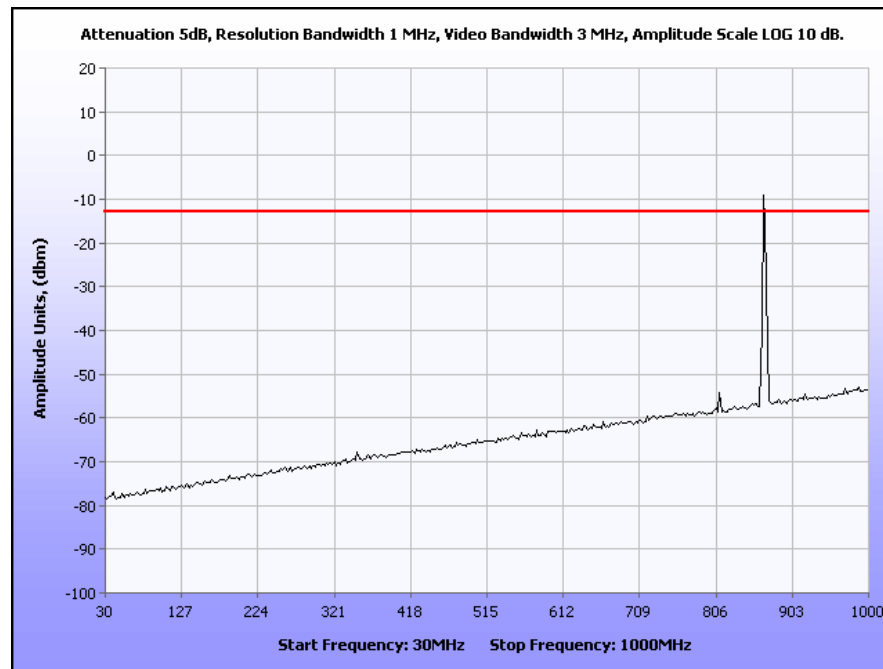
Plot 128. Radiated Spurious Emissions, Channel 3, CQPSK, 1 GHz – 10 GHz



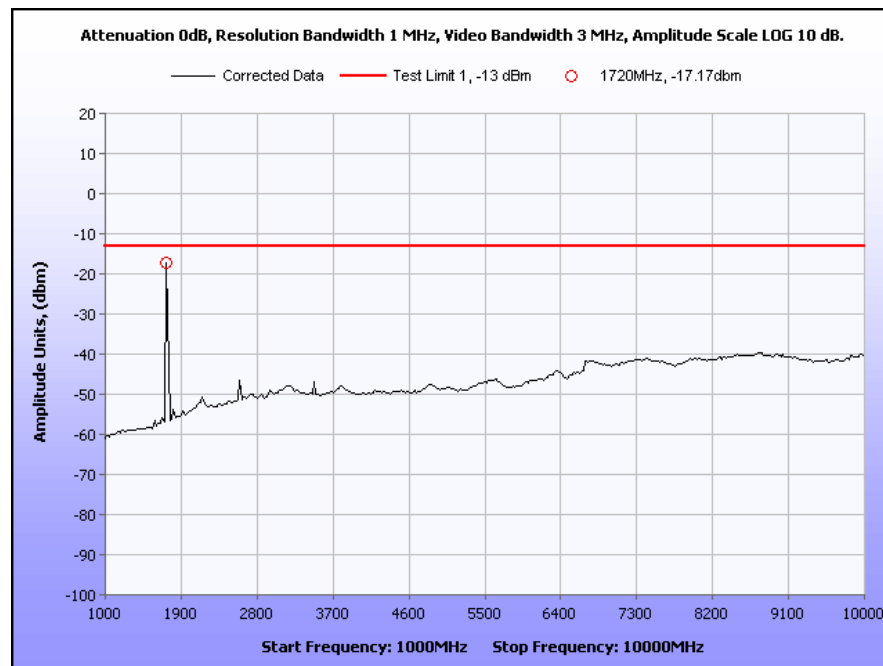
Plot 129. Radiated Spurious Emissions, Channel 3,C4FM, 30 MHz – 1 GHz



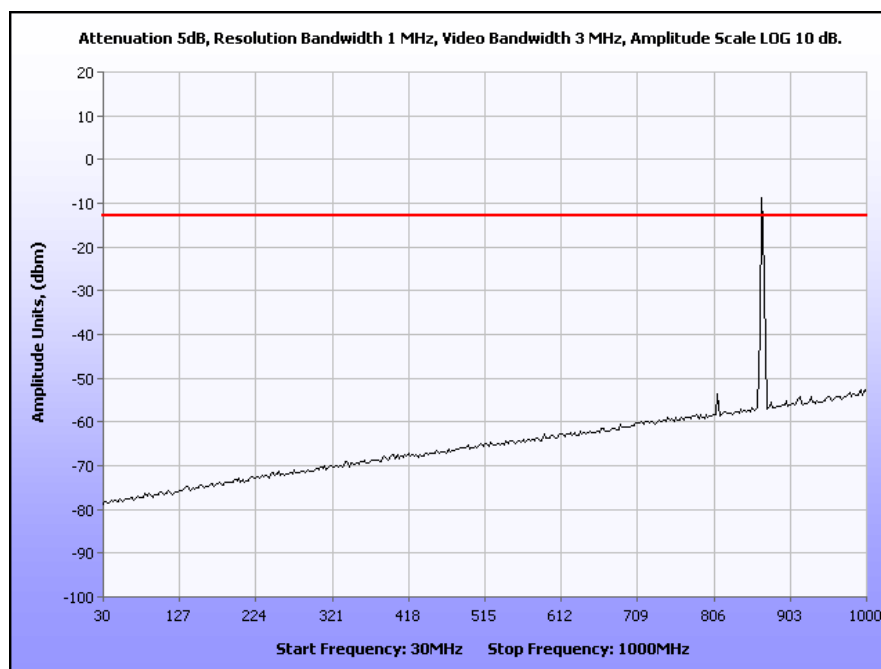
Plot 130. Radiated Spurious Emissions, Channel 3,C4FM, 1 GHz – 10 GHz



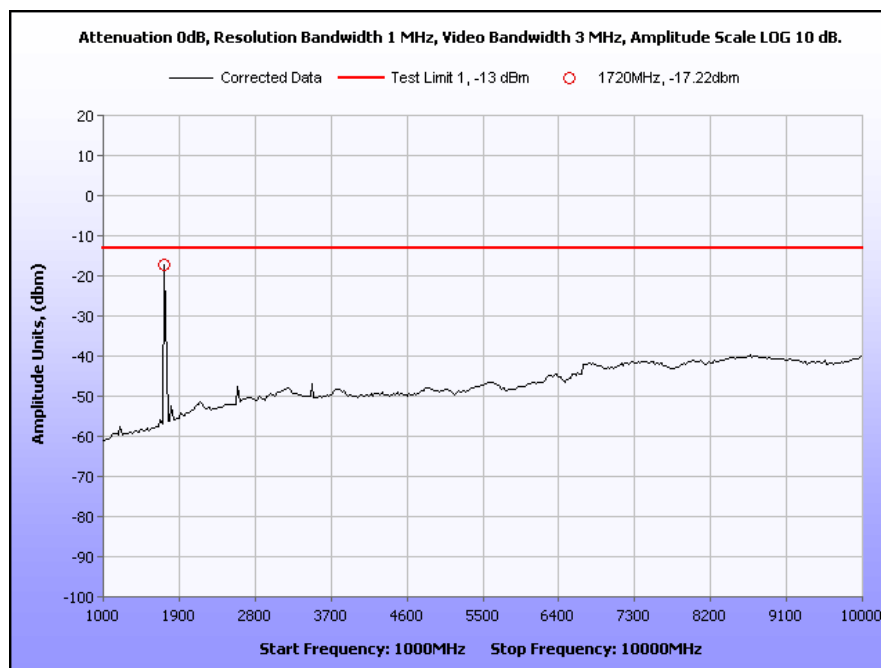
Plot 131. Radiated Spurious Emissions, Channel 4, HDQPSK, 30 MHz – 1 GHz



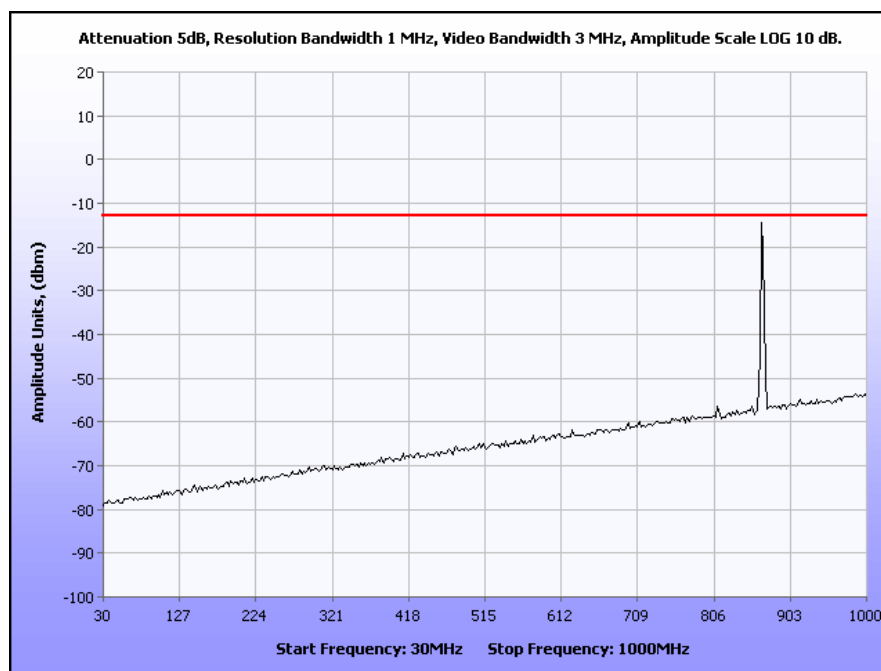
Plot 132. Radiated Spurious Emissions, Channel 4, HDQPSK, 1 GHz – 10 GHz



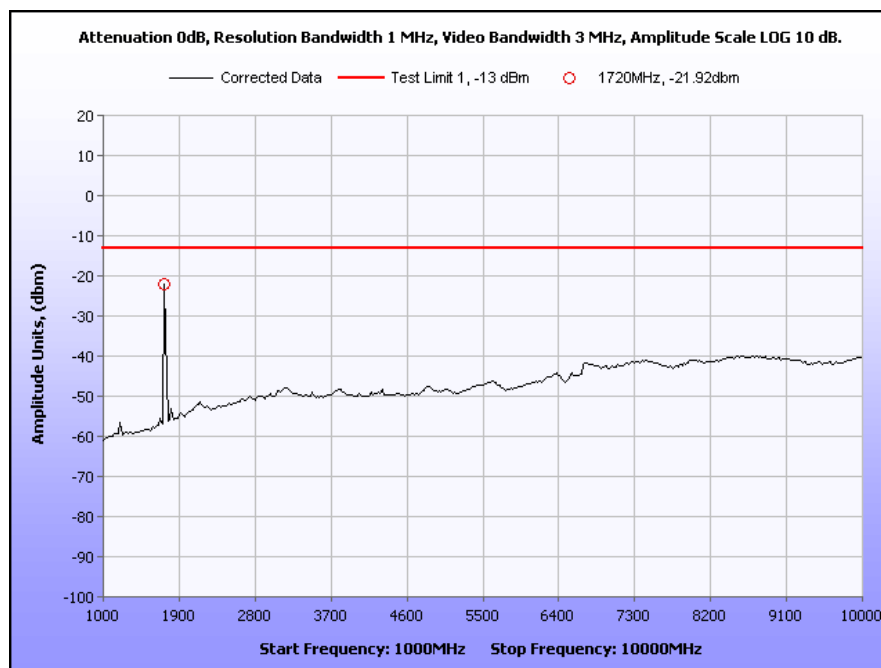
Plot 133. Radiated Spurious Emissions, Channel 4, CQPSK, 30 MHz – 1 GHz



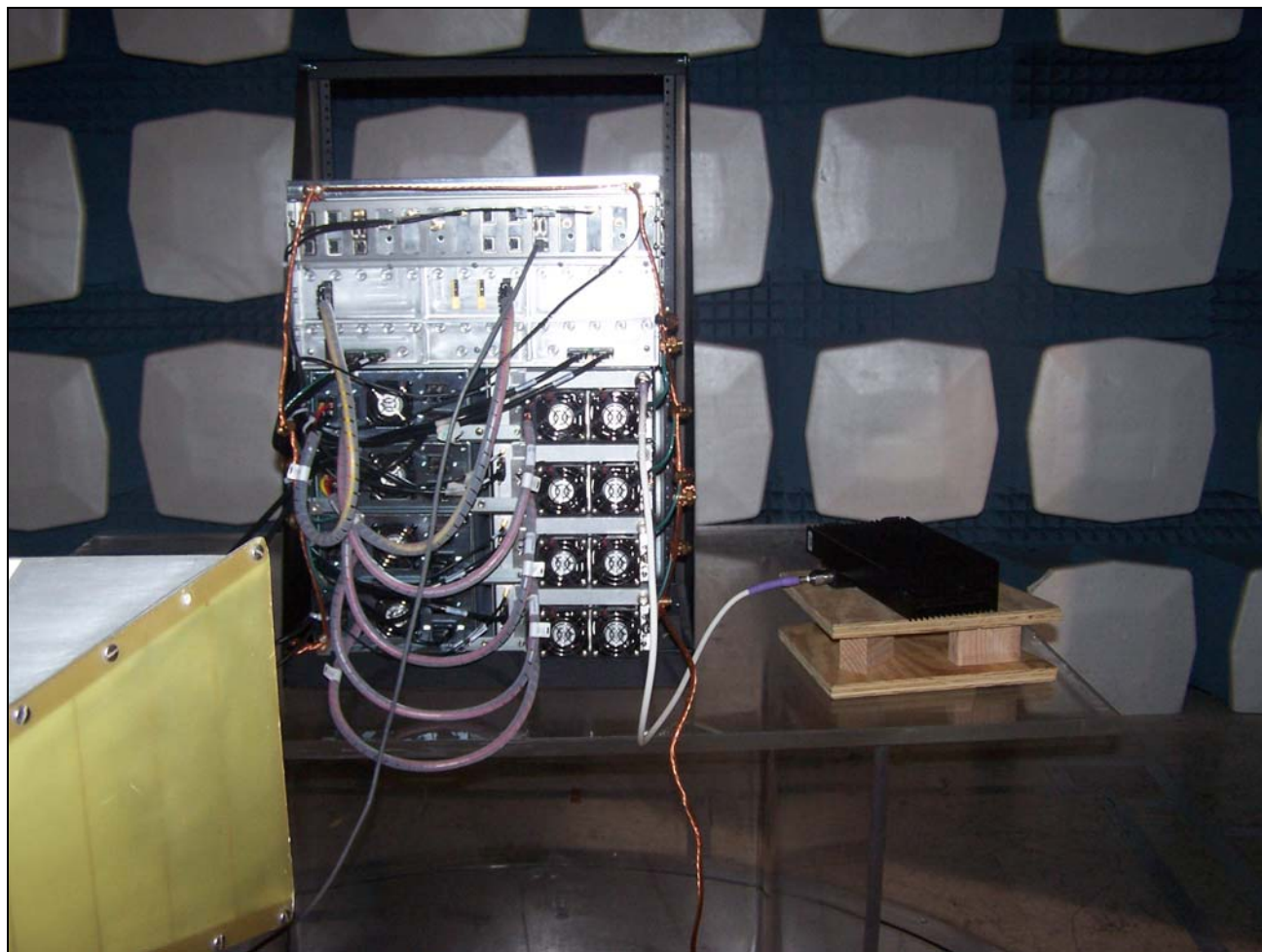
Plot 134. Radiated Spurious Emissions, Channel 4, CQPSK, 1 GHz – 10 GHz



Plot 135. Radiated Spurious Emissions, Channel 4,C4FM, 30 MHz – 1 GHz



Plot 136. Radiated Spurious Emissions, Channel 4,C4FM, 1 GHz – 10 GHz



Photograph 3. Radiated Emissions, Test Setup



7. Electromagnetic Compatibility Frequency Stability Requirements

7.1. Frequency Stability

Test Requirement(s): §2.1055 and §90.213

Test Procedures: As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals of the EUT.

The EUT was placed in an Environmental Chamber with all support equipments are outside of the chamber on a table. The EUT was set to transmitter an un-modulated carrier. The reference frequency at 20°C was observed and put on 'view' under Trace 1 of the Spectrum Analyzer. As temperature or voltage was varied, the drift in frequency was observed in Trace 2. The frequency error was measured using delta markers between Trace 1 and 2. The frequency drift was investigated for every 10°C increment until the unit was stabilized then recorded the reading in tabular format with the temperature range of -30 to 50°C.

Voltage supplied to the EUT was 120 VAC reference temperature was at 20°C. The voltage was varied by ± 15 % of nominal

Test Results: Equipment complies with Section 2.1055 and 90.213

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 12/19/2009



Frequency Stability Test Results

Reference Freq.: 861 MHz at 20°C

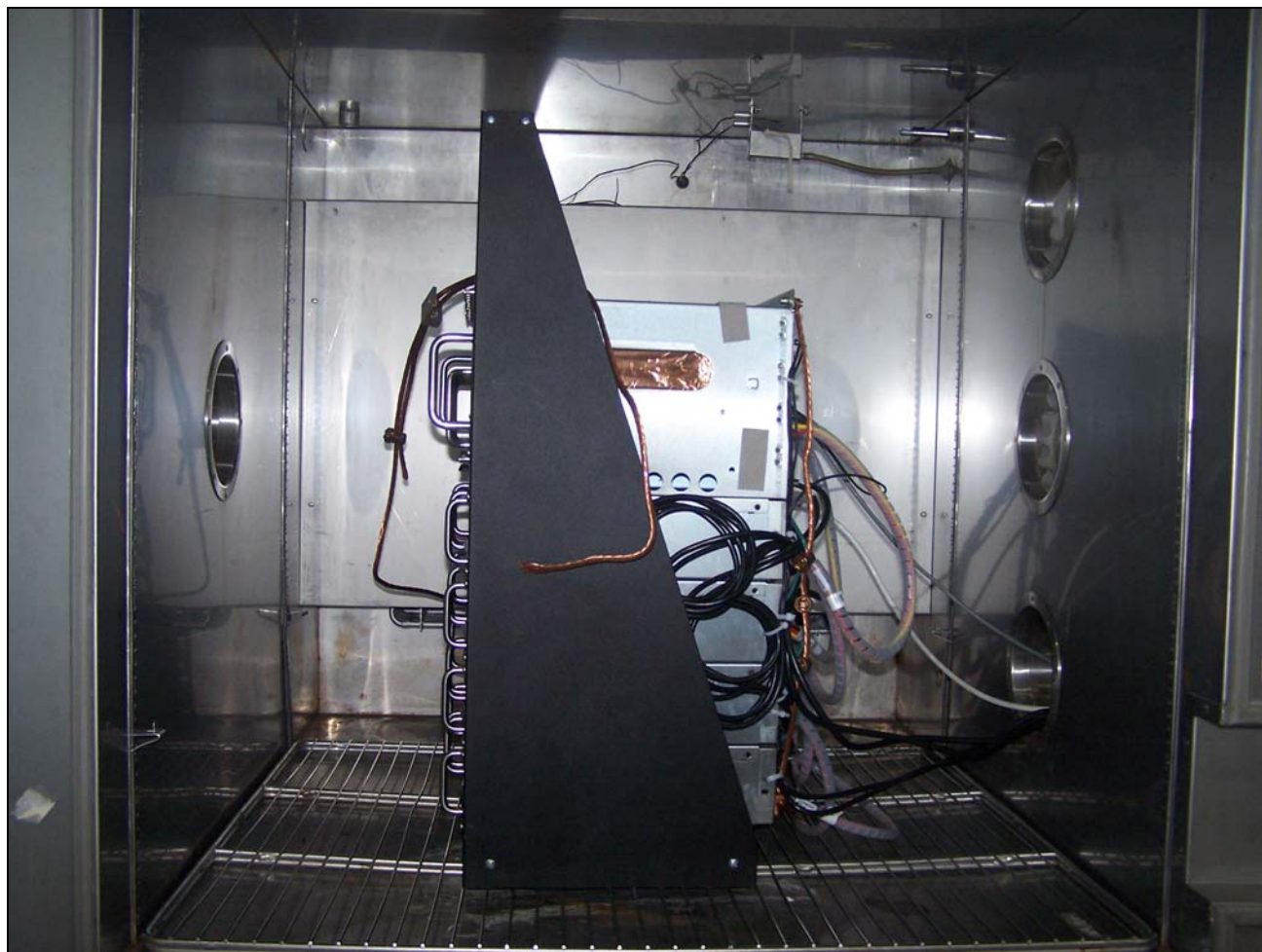
Temperature (centigrade)	Drift (ppm)
50	0.3
40	0
30	0
20	Ref
10	0
0	0
-10	0
-20	0
-30	0

Table 13. Temperature vs. Frequency Test Results

Reference Freq.: 861 MHz at 120 VAC and 20°C

Measured voltage (+/- 15% of nominal)	Drift (ppm)
102	0.3
138	0.3

Table 14. Frequency vs. Voltage Test Results



Photograph 4. Frequency Stability, Test Setup



8. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4576	ACTIVE HORN ANTENNA	COM-POWER	AHA-118	03/27/2008	03/27/2009
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	02/17/2006	5/17/2009
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	07/07/2008	07/07/2009
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	04/18/2008	04/18/2009
1T4632	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	09/25/2007	09/25/2009
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4402B	02/29/2008	03/01/2009
1T4214	SHIELD ROOM #4	UNIVERSAL SHIELD INC	N/A	01/25/2008	01/25/2009
1T4619	THERMO-HYGROMETER	CONTROL COMPANY	S6-627-9	11/07/2008	11/07/2010
1T4079	LISN; SWITCH	SOLAR	8012-50-R-24-BNC	04/22/2008	04/22/2009
1T4502	COMB GENERATOR	COM-POWER	CGC-255	09/08/2008	09/08/2009



Tyco Electronics
MASTR V 800 MHz

Electromagnetic Compatibility
Certification & User's Manual Information
CFR Title 47 Part 90; Part 15 Subpart B; RSS-119, Issue 9, June 2007 & ICES-003

Certification & User's Manual Information



9. Certification Label & User's Manual Information

9.1. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) *Compliance testing;*
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a provision that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart Y — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.*
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant, whichever is applicable.

§ 2.902 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
 - (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

9.2. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

- (3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.



§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Tyco Electronics
MASTR V 800 MHz

Electromagnetic Compatibility
End of Report
CFR Title 47 Part 90; Part 15 Subpart B; RSS-119, Issue 9, June 2007 & ICES-003

End of Report