MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372
3162 BELICK STREET • SANTA CLARA, CA 95054 • PHONE (408) 748-3585 • FAX (510) 489-6372
13301 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513

August 4, 2014

Autonet Mobile
1700 Montgomery Suite 111
San Francisco, CA 94111

Dear Doug Moeller,

Enclosed is the EMC Wireless test report for compliance testing of the Autonet Mobile, HELIO as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B for a Class B Digital Device and FCC Part 15 Subpart C for Intentional Radiators.

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: (\Autonet Mobile\EMCS42492B-FCC247)

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

Electromagnetic Compatibility Criteria
Test Report

for the

Autonet Mobile
HELIO

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B for Class B Digital Devices
&
15.247 Subpart C for Intentional Radiators

MET Report: EMCS42492B-FCC247

August 4, 2014

Prepared For:

Autonet Mobile
1700 Montgomery Suite 111
San Francisco, CA 94111

Prepared By:
MET Laboratories, Inc.
3162 Belick St.
Santa Clara, CA 95054

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria
Test Report

for the

Autonet Mobile
HELIO

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B for Class B Digital Devices
&
15.247 Subpart C for Intentional Radiators

Ajaz Khan, Project Engineer
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 capable of operation in accordance with the requirements of the FCC Rules Parts 15B, 15.247 under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

 © 2014, MET Laboratories, Inc.

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 4, 2014	Initial Issue.

 © 2014, MET Laboratories, Inc.

Table of Contents

I. Executive Summary 1
A. Purpose of Test 2
B. Executive Summary 2
II. Equipment Configuration 3
A. Overview 4
B. References 5
C. Test Site 5
D. Description of Test Sample 6
E. Equipment Configuration 7
F. Support Equipment 7
G. Ports and Cabling Information 7
H. Mode of Operation 8
I. Modifications 8
a) Modifications to EUT 8
b) Modifications to Test Standard 8
J. Disposition of EUT 8
III. Electromagnetic Compatibility Criteria for Unintentional Radiators 9
§ 15.107(a) Conducted Emissions Limits 10
§ 15.109(a) Radiated Emissions Limits 11
IV. Electromagnetic Compatibility Criteria for Intentional Radiators 17
§ 15.203 Antenna Requirement 18
§ 15.207(a) Conducted Emissions Limits 19
§ 15.247(a)(1) 20 dB Occupied Bandwidth 20
§15.247(a)(1) Average Time of Occupancy (Dwell Time) 24
§15.247(a)(1) Number of RF Channels 28
§15.247(a)(1) RF Channel Separation 29
§ 15.247(b) Peak Power Output 30
§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge 35
§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge 42
§ 15.247(g)(h) Declaration Statements for FHSS 49
V. Test Equipment 50
VI. Certification & User's Manual Information 52
A. Certification Information 53
B. Label and User's Manual Information 57

 © 2014, MET Laboratories, Inc.

List of Tables

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting 2
Table 2. EUT Summary Table 4
Table 3. References 5
Table 4. Equipment Configuration 7
Table 5. Support Equipment 7
Table 6. Ports and Cabling Information 7
Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a) 10
Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b) 11
Table 9. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, Standby Sleep Mode 12
Table 9. Radiated Emissions Limits, Test Results, 1 GHz – 18 GHz, Standby Sleep Mode 13
Table 9. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, Transmitting Mode 14
Table 9. Radiated Emissions Limits, Test Results, 1 GHz – 18 GHz, Transmitting Mode 15
Table 10. Antenna List 18
Table 11. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a) 19
Table 12. Peak Power Output, Test Results, 8PSK 31
Table 13. Peak Power Output, Test Results, DPSK 31
Table 14. Peak Power Output, Test Results, GFSK 31
Table 15. Restricted Bands of Operation 35
Table 16. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a) 36
Table 17. Test Equipment List 51

List of Plots

Plot 1. Radiated Emissions, 30 MHz - 1 GHz, Standby Sleep Mode 12
Plot 1. Radiated Emissions, 1 GHz – 18 GHz, Standby Sleep Mode 13
Plot 1. Radiated Emissions, 30 MHz - 1 GHz, Transmitting Mode 14
Plot 1. Radiated Emissions, 1 GHz – 18 GHz, Transmitting Mode 15
Plot 2. 20 dB Occupied Bandwidth, Low Channel, 8 PSK 21
Plot 3. 20 dB Occupied Bandwidth, Mid Channel, 8 PSK 21
Plot 4. 20 dB Occupied Bandwidth, High Channel, 8 PSK 21
Plot 5. 20 dB Occupied Bandwidth, Low Channel, DPSK 22
Plot 6. 20 dB Occupied Bandwidth, Mid Channel, DPSK 22
Plot 7. 20 dB Occupied Bandwidth, High Channel, DPSK 22
Plot 8. 20 dB Occupied Bandwidth, Low Channel, GFSK 23
Plot 9. 20 dB Occupied Bandwidth, Mid Channel, GFSK 23
Plot 10. 20 dB Occupied Bandwidth, High Channel, GFSK 23
Plot 11. DH 1 Burst (63) 25
Plot 12. DH1 on Time 25
Plot 13. DH3 Burst (16) 26
Plot 14. DH3 on Time 26
Plot 15. DH5 Burst (12) 27
Plot 16. DH5 on Time 27
Plot 17. No. of Channels, Chart 1 (2400 – 2441 MHz) 28
Plot 18. No. of Channels, Chart 2 (2441 – 2483.5 MHz) 28
Plot 19. Channel Separation, Channel 0 and 1 (GFSK) 29
Plot 20. Channel Separation, Channel 39 and 40 (GFSK) 29
Plot 21. Channel Separation, Channel 77 and 78 (GFSK) 29
Plot 22. Peak Power Output, Low Channel, 8PSK 32
Plot 23. Peak Power Output, Mid Channel, 8PSK 32

 © 2014, MET Laboratories, Inc.

Plot 24. Peak Power Output, High Channel, 8PSK 32
Plot 25. Peak Power Output, Low Channel, DPSK 33
Plot 26. Peak Power Output, Mid Channel, DPSK 33
Plot 27. Peak Power Output, High Channel, DPSK 33
Plot 28. Peak Power Output, Low Channel, GFSK 34
Plot 29. Peak Power Output, Mid Channel, GFSK 34
Plot 30. Peak Power Output, High Channel, GFSK 34
Plot 31. Radiated Spurious Emissions, Low Channel, Average 37
Plot 32. Radiated Spurious Emissions, Low Channel, Peak 37
Plot 33. Radiated Spurious Emissions, Mid Channel, Average 37
Plot 34. Radiated Spurious Emissions, Mid Channel, Peak 38
Plot 35. Radiated Spurious Emissions, High Channel, Average 38
Plot 36. Radiated Spurious Emissions, High Channel, Peak 38
Plot 37. Radiated Restricted Band Edge, Low Channel, Average 39
Plot 38. Radiated Restricted Band Edge, Low Channel, Peak 39
Plot 39. Radiated Restricted Band Edge, High Channel, Average 40
Plot 40. Radiated Restricted Band Edge, High Channel, Peak 40
Plot 41. Conducted Spurious Emissions, 30 MHz – 3 GHz, 8PSK 43
Plot 42. Conducted Spurious Emissions, 3 GHz – 26 GHz, 8PSK 43
Plot 43. Conducted Spurious Emissions, 30 MHz – 3 GHz, DPSK 44
Plot 44. Conducted Spurious Emissions, 3 GHz – 26 GHz, DPSK 44
Plot 45. Conducted Spurious Emissions, 30 MHz – 3 GHz, GFSK 45
Plot 46. Conducted Spurious Emissions, 3 GHz – 26 GHz, GFSK 45
Plot 47. Conducted Band Edge, 8PSK, Low 46
Plot 48. Conducted Band Edge, 8PSK, High 46
Plot 49. Conducted Band Edge, DPSK, Low 47
Plot 50. Conducted Band Edge, DPSK, High 47
Plot 51. Conducted Band Edge, GFSK, Low 48
Plot 52. Conducted Band Edge, GFSK, High 48

List of Figures

Figure 1. Block Diagram of Test Configuration 6
Figure 2. Block Diagram, Occupied Bandwidth Test Setup 20
Figure 3. Peak Power Output Test Setup 30
Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup 42

List of Photographs

Photograph 1. Autonet Mobile HELIO 6
Photograph 2. Radiated Emissions, Test Setup, 30 MHz – 1 GHz 16
Photograph 3. Radiated Emission, Test Setup, 1 GHz – 18 GHz 16
Photograph 4. Radiated Spurious Emissions 30 MHz – 1 GHz, Test Setup 41
Photograph 5. Radiated Spurious Emissions 1 GHz – 18 GHz, Test Setup 41

 © 2014, MET Laboratories, Inc.

List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

 © 2014, MET Laboratories, Inc.

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Autonet Mobile HELIO, with the requirements of Part 15, §15.247. 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 HELIO. Autonet Mobile should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the HELIO, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with Autonet Mobile, purchase order number 731. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
47 CFR Part 15.107 (a)	Conducted Emission Limits for a Class B Digital Device	Not Applicable
47 CFR Part 15.109 (a)	Radiated Emission Limits for a Class B Digital Device	Compliant
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Not Applicable
Title 47 of the CFR, Part 15 §15.247(a)(1)	20 dB Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(1)	Average Time of Occupancy (Dwell Time)	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(1)	Number of RF Channels	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(1)	RF Channel Separation	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	Spurious Conducted Emissions	Compliant
Title 47 of the CFR, Part 15 §15.247(g) & (h)	Declaration Statements for FHSS	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	Maximum Permissible Exposure (MPE)	Compliant

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting

 © 2014, MET Laboratories, Inc.

II. Equipment Configuration

 © 2014, MET Laboratories, Inc.

A. Overview

MET Laboratories, Inc. was contracted by Autonet Mobile to perform testing on the HELIO, under Autonet Mobile's purchase order number 731.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Autonet Mobile, HELIO.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	HELIO	
Model(s) Covered:	HELIO	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: VOI-ANMKNN3RTR-01	
	Type of Modulations:	DSSS
	Equipment Code:	DSS
	Peak RF Output Power:	0.867 dBm
	EUT Frequency Ranges:	2402 – 2480 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Ajaz Khan	
Report Date(s):	August 4, 2014	

Table 2. EUT Summary Table

 © 2014, MET Laboratories, Inc.

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

All testing was performed at MET Laboratories, Inc., 3162 Belick St., Santa Clara, CA 95054. 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 5 meter 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.

 © 2014, MET Laboratories, Inc.

D. Description of Test Sample

The Autonet Mobile HELIO, Equipment Under Test (EUT), is as follows:

Telematics Control Unit (TCU) for cars which provides connectivity for embedded applications in the head unit or standalone applications that can be accessed from a smartphone with desktop.

Photograph 1. Autonet Mobile HELIO

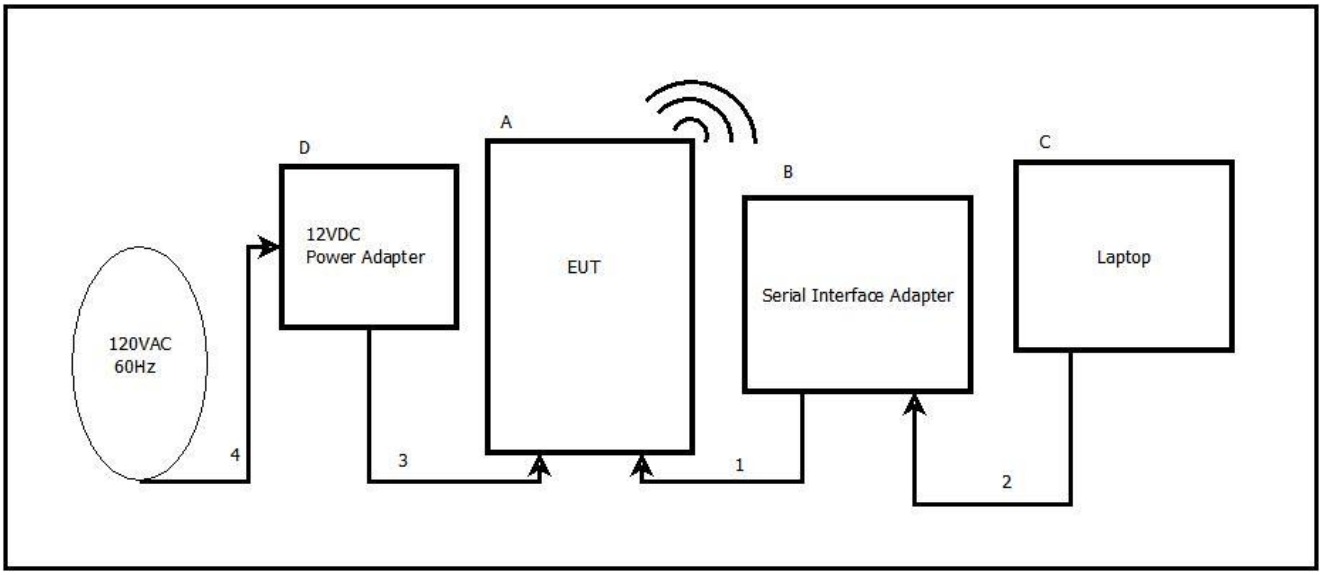


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Serial Number
A	802.11b/g and Bluetooth Access Point	HELIO	HELIO-0022

Table 4. Equipment Configuration

F. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number
B	Laptop	Dell	Latitude D500
C	Serial interface module	Autonet	SE-1
D	12VDC Power Supply	SMP Technology Inc.	SAU212

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
1	COM Port	Serial	1	.4	No	Serial Interface Module
2	Serial Interface Module	Serial	1	1.5	Yes	Serial Port on Laptop
3	12 VDC Power input	DC Power Cable	1	1.5	No	120VAC 60Hz

Table 6. Ports and Cabling Information

 © 2014, MET Laboratories, Inc.

H. Mode of Operation

Using ART & BCCMD Software.

I. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

J. Disposition of EUT

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

 © 2014, MET Laboratories, Inc.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria

§ 15.107 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 7. 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 7. 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.

15.207(a), Except as shown in paragraphs (b) and (c) of this section*, charging, AC adapters or battery eliminators 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 the Table 7, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency range (MHz)	Class A Conducted Limits (dBµV)		*Class B Conducted Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50

Note 1 — The lower limit shall apply at the transition frequencies.
Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.
* -- Limits per Subsection 15.207(a).

Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)

Test Results:

The EUT was not applicable with the Class B requirement(s) of this section. The EUT is battery powered by 12VDC from car battery.

Radiated Emission Limits

§ 15.109 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 B 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 (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 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 non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3m 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.

Test Results: The EUT was compliant with the Class B requirement(s) of this section. Measured emissions were below applicable limits.

Test Engineer(s): Cliff DePuy

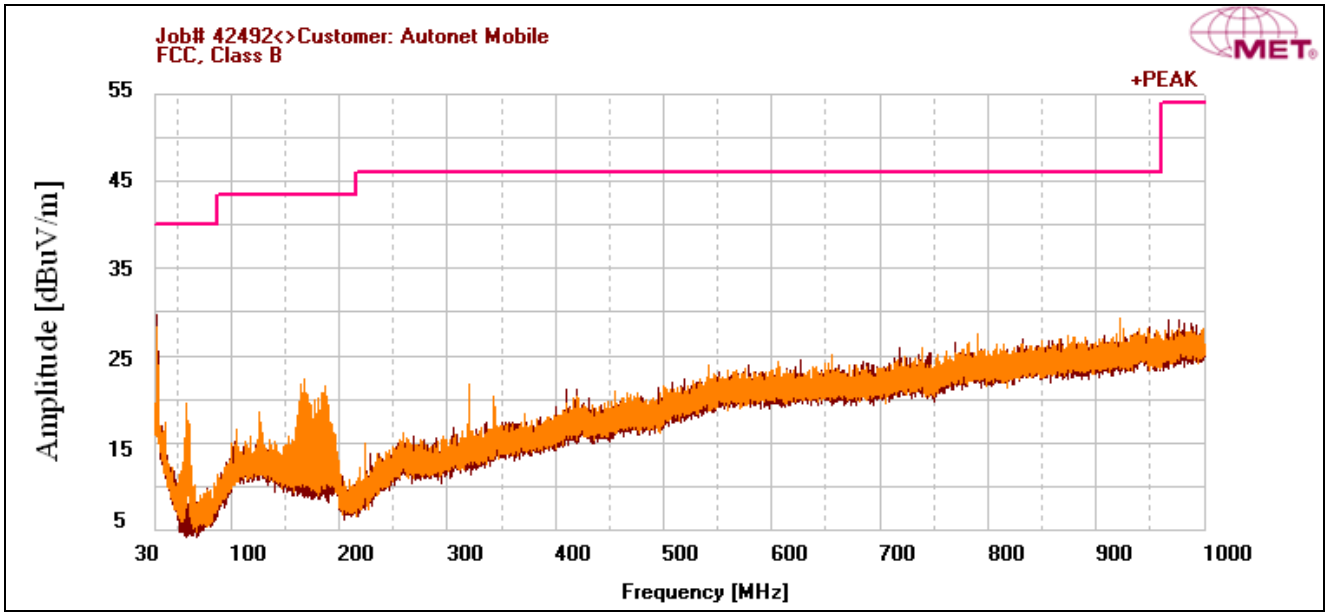
Test Date(s): 07/08/14

 © 2014, MET Laboratories, Inc.

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBµV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)
31.96	H	86	269.82	9.2	17.721	0	0.989	0	27.91	40	-12.09
31.96	V	112	100	8.5	17.721	0	0.989	0	27.21	40	-12.79
59.96	V	5	100	8.2	6.604	0	1.364	0	16.168	40	-23.832
166.58	V	235	100	7.5	10.008	0	2.301	0	19.809	43.5	-23.691
320	V	0	155	4.7	13.6	0	3.234	0	21.534	46	-24.466
903.84	V	0	100	2.7	20.506	0	5.512	0	28.718	46	-17.282

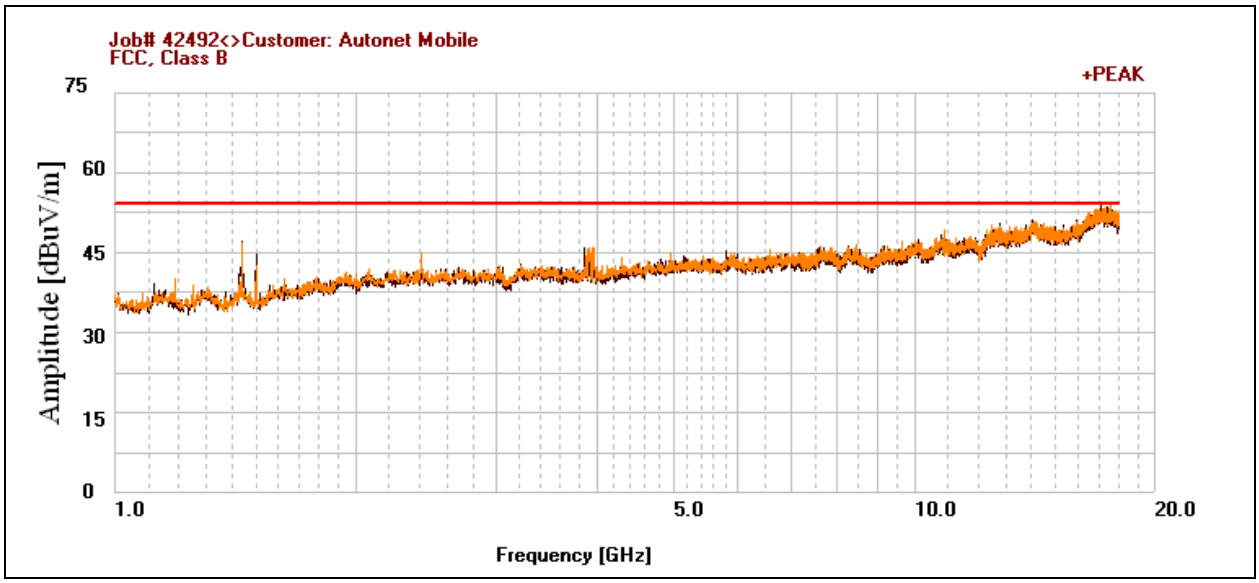
Table 9. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, Standby Sleep Mode



Plot 1. Radiated Emissions, 30 MHz - 1 GHz, Standby Sleep Mode

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBµV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)
1440	V	157	100	32.69	28.344	33.365	0	0	27.669	54	-26.331
1440	H	262	100	33.83	28.344	33.365	0	0	28.809	54	-25.191
1500	H	85	102.2	47.34	28.2	33.34	0	0	42.2	54	-11.8
3940	V	0	100	30.78	33.7	35.403	0	0	29.077	54	-24.923
17233	V	0	100	25.76	42.12	27.826	0	0	40.054	54	-13.946
16715	H	0	140.47	25.81	42.33	28.437	0	0	39.703	54	-14.297

Table 10. Radiated Emissions Limits, Test Results, 1 GHz – 18 GHz, Standby Sleep Mode

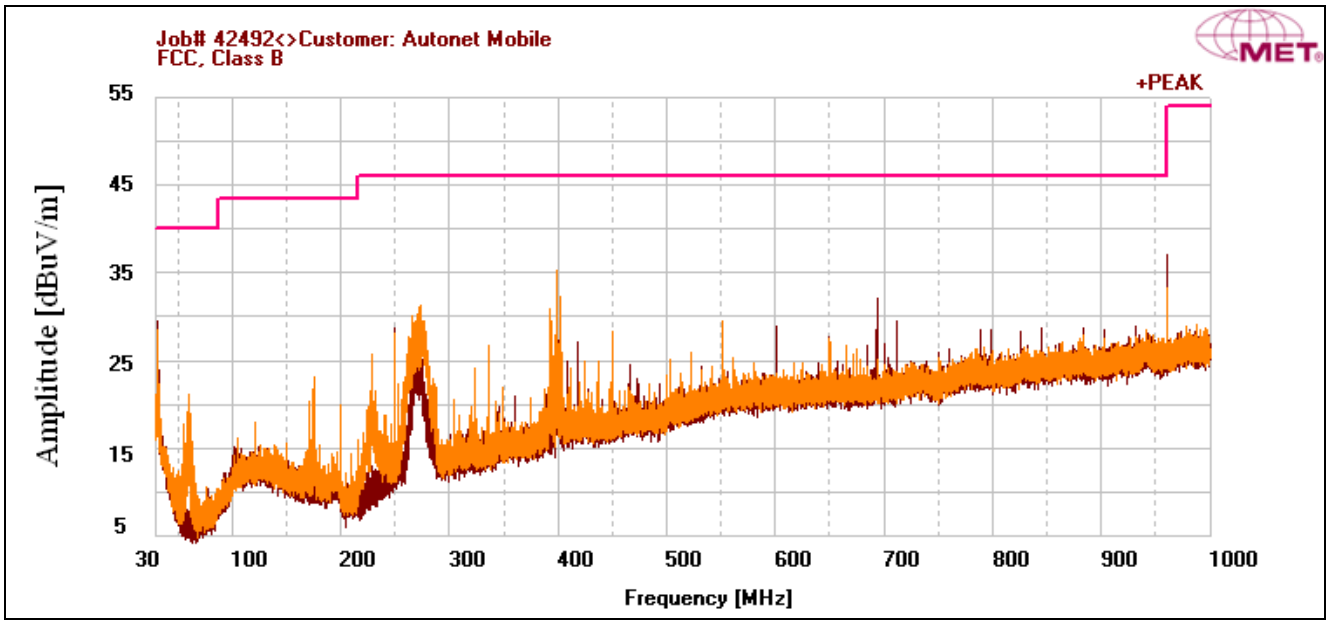


Plot 2. Radiated Emissions, 1 GHz – 18 GHz, Standby Sleep Mode

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBµV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)
32.04	H	0	241.88	12.4	17.683	0	0.99	0	31.073	40	-8.927
32.04	V	359.9	100	10.2	17.683	0	0.99	0	28.873	40	-11.127
273.96	V	65	100	13.9	12.671	0	3.009	0	29.58	46	-16.42
399	V	186	135.64	17.2	15.513	0	3.605	0	36.318	46	-9.682
401.28	V	234	100	7.2	15.622	0	3.615	0	26.437	46	-19.563
960	H	22	100	10.3	20.84	0	5.677	0	36.817	54	-17.183

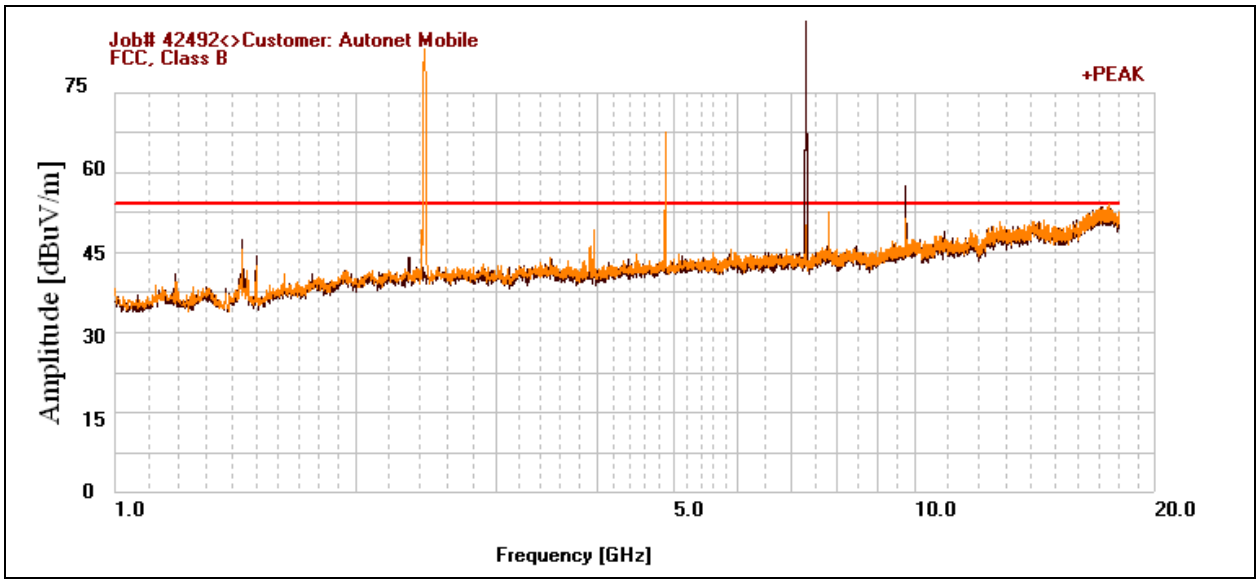
Table 11. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, Transmitting Mode



Plot 3. Radiated Emissions, 30 MHz - 1 GHz, Transmitting Mode

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBµV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)
1439	H	255	100	38.65	28.346	33.366	0	0	33.63	54	-20.37
1440	V	237	100	36.14	28.344	33.365	0	0	31.119	54	-22.881
1500	H	86	103.1	47.16	28.2	33.34	0	0	42.02	54	-11.98
7798	V	144	140.05	46.13	36.3	32.263	0	0	50.167	54	-3.833
17353	V	0	100	26.29	42.1	27.803	0	0	40.587	54	-13.413
17148	H	0	100	25.4	42.222	27.842	0	0	39.78	54	-14.22

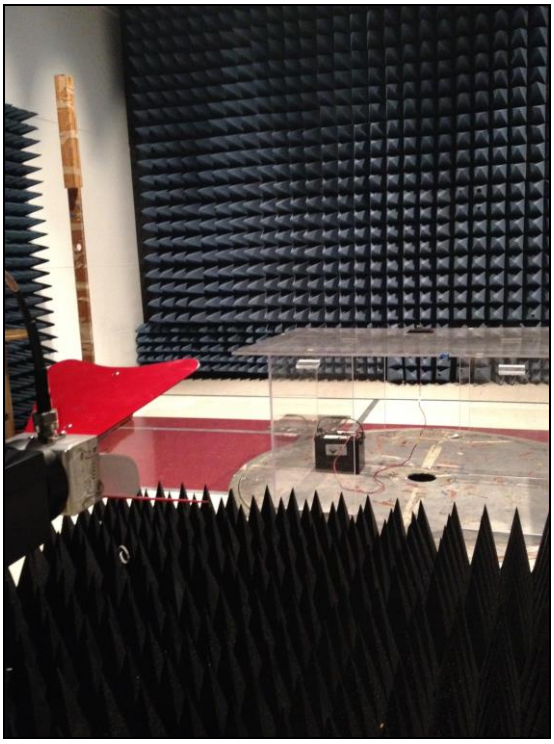
Table 12. Radiated Emissions Limits, Test Results, 1 GHz – 18 GHz, Transmitting Mode



Plot 4. Radiated Emissions, 1 GHz – 18 GHz, Transmitting Mode

Radiated Emission Limits Test Setup

Photograph 2. Radiated Emissions, Test Setup, 30 MHz – 1 GHz



Photograph 3. Radiated Emission, Test Setup, 1 GHz – 18 GHz

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203. The EUT has an integral antenna.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 11/21/11

Gain	Type	Manufacturer
1.88dBi	Ceramic Chip	Autonet

Table 13. Antenna List

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s):

§ 15.207 (a): For an intentional radiator 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 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 14. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Results:

The EUT was not applicable with this requirement. The EUT is battery powered and powered by Car Battery.

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(1) 20 dB Occupied Bandwidth

Test Requirements: **§ 15.247(a):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. For DTS, the minimum 6 dB bandwidth shall be at least 500 kHz. For frequency hopping systems, the EUT shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400 – 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure: The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth. The 20 dB bandwidth measured and recorded. For frequency separation, the channel separation has to be greater than two-thirds of the 20dB bandwidth (805 kHz). See plots 19-21 for measured channel separation.

Test Results The EUT was compliant with § 15.247 (a)(2).

Test Engineer(s): Anderson Soungpanya

Test Date(s): 11/28/11

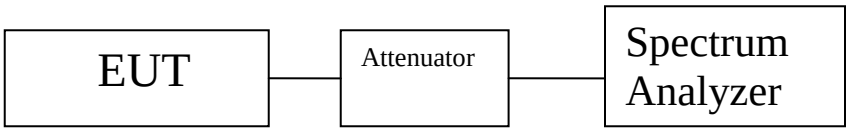
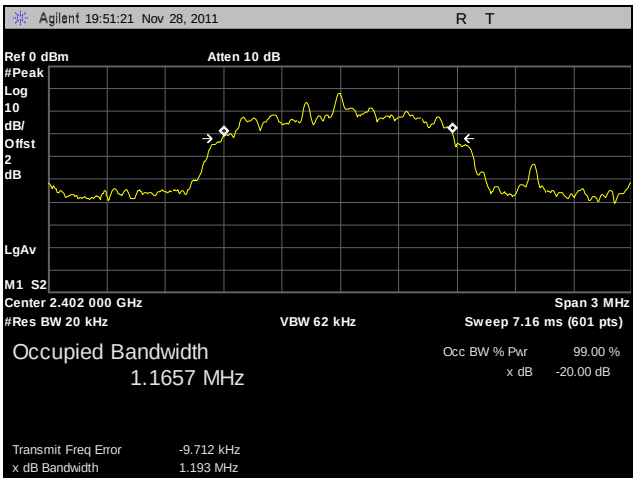


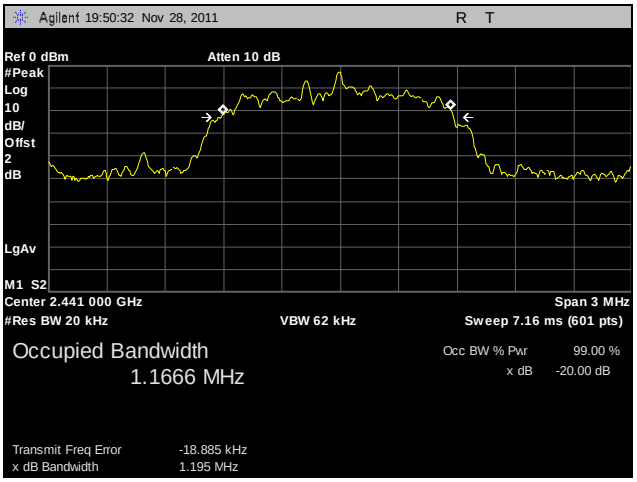
Figure 2. Block Diagram, Occupied Bandwidth Test Setup

 © 2014, MET Laboratories, Inc.

Occupied Bandwidth Test Results, 8 PSK



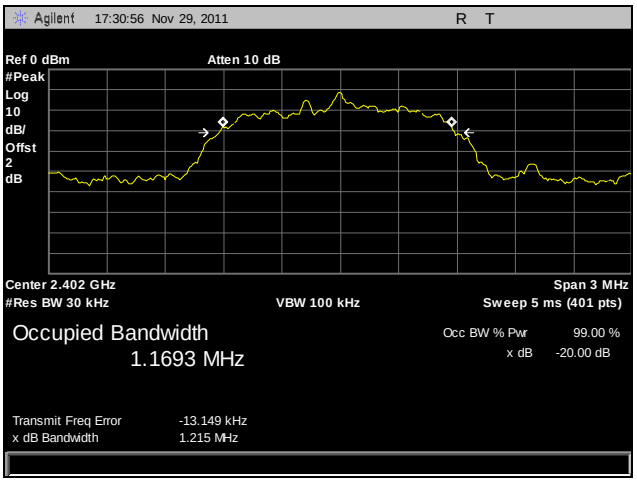
Plot 5. 20 dB Occupied Bandwidth, Low Channel, 8 PSK



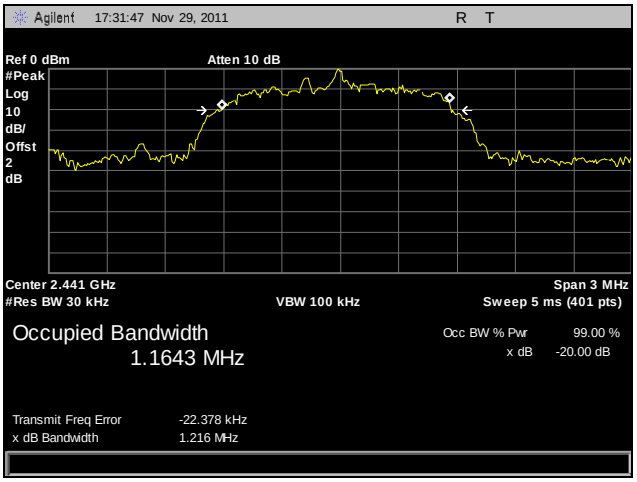
Plot 6. 20 dB Occupied Bandwidth, Mid Channel, 8 PSK

Plot 7. 20 dB Occupied Bandwidth, High Channel, 8 PSK

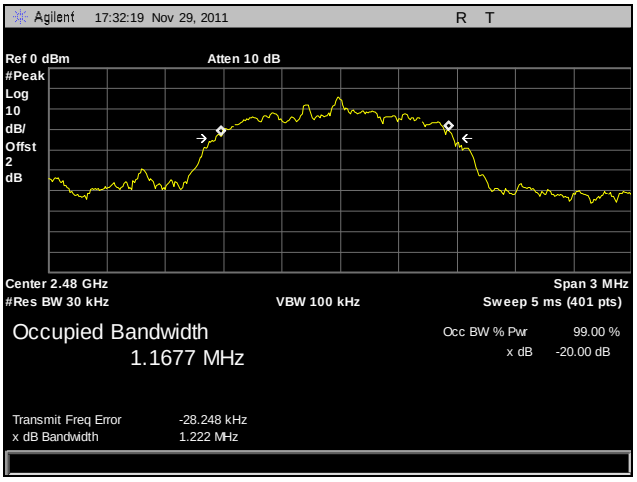
Occupied Bandwidth Test Results, DPSK



Plot 8. 20 dB Occupied Bandwidth, Low Channel, DPSK

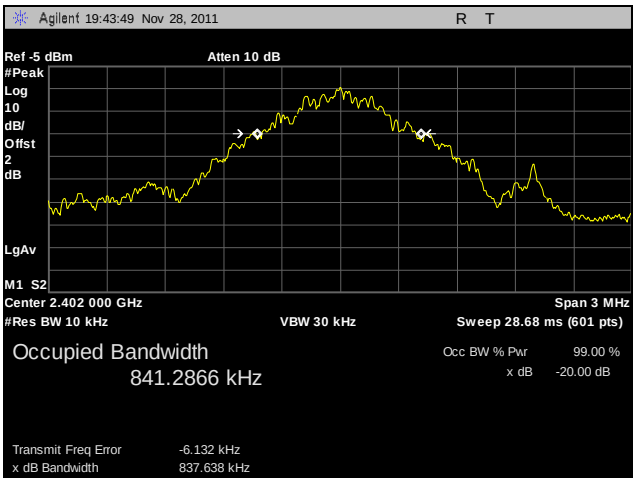


Plot 9. 20 dB Occupied Bandwidth, Mid Channel, DPSK



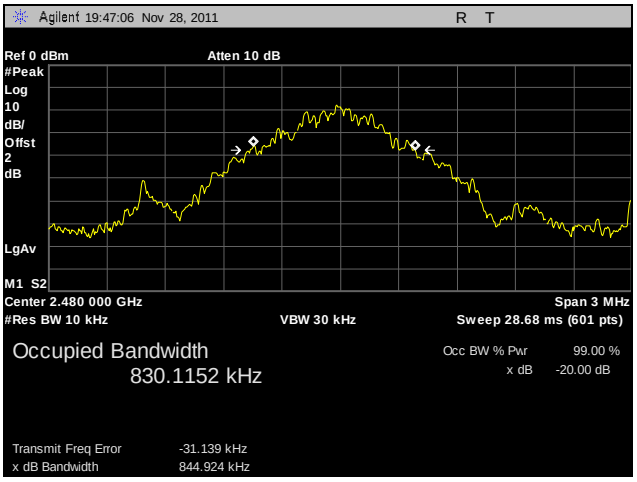
Plot 10. 20 dB Occupied Bandwidth, High Channel, DPSK

Occupied Bandwidth Test Results, GFSK



Plot 11. 20 dB Occupied Bandwidth, Low Channel, GFSK

Plot 12. 20 dB Occupied Bandwidth, Mid Channel, GFSK



Plot 13. 20 dB Occupied Bandwidth, High Channel, GFSK

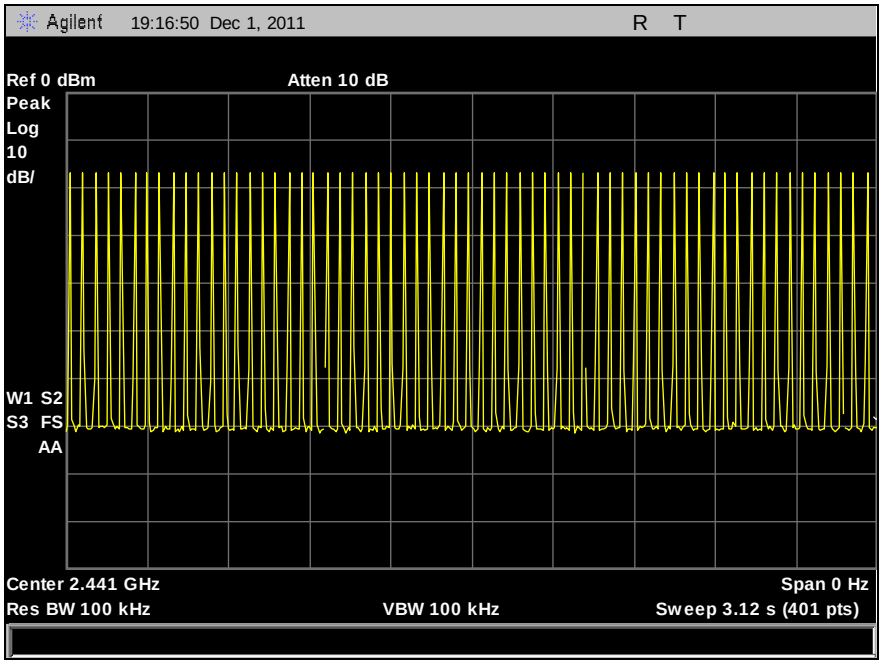
§ 15.247(a)(1) Average Time of Occupancy (Dwell Time)

Remarks: The Average time of occupancy on any channel shall not be greater than 400ms within a period of 400ms multiplied by the number of hopping channelings.

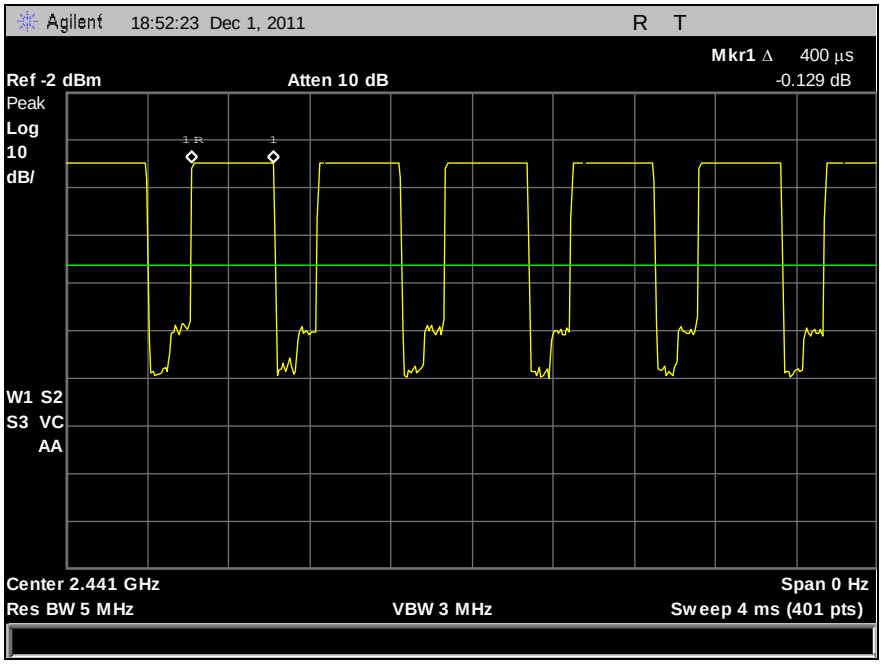
The Average time of occupancy in the specified 3.12 seconds (78*.4) is equal to number of pulses in 3.12 seconds * the pulse width.

# of Channels	Burst Duration (ms)	Number of Pulses in 3.12 seconds	Average Time of Occupancy (ms)	Limit (ms)	Margin (ms)
78	0.400	63	25.20	400	-374.800
78	1.650	16	26.40	400	-373.600
78	2.926	12	35.112	400	-364.888

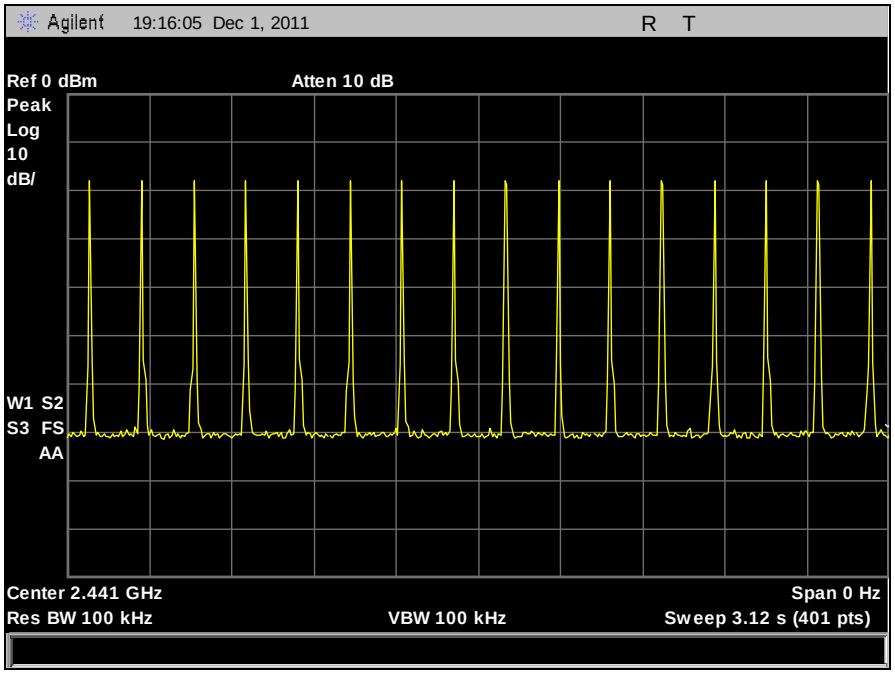
 © 2014, MET Laboratories, Inc.



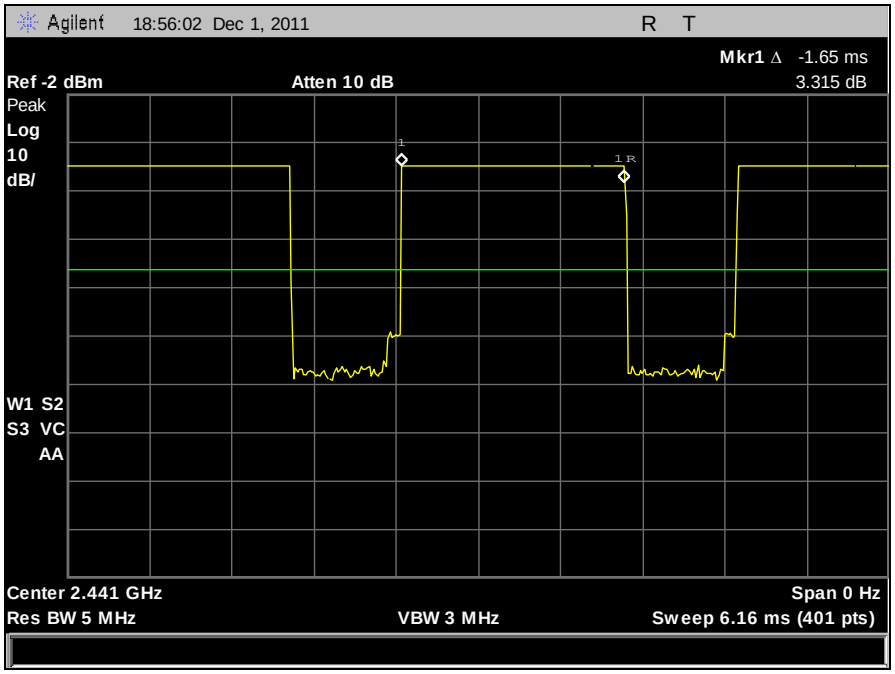
Plot 14. DH 1 Burst (63)



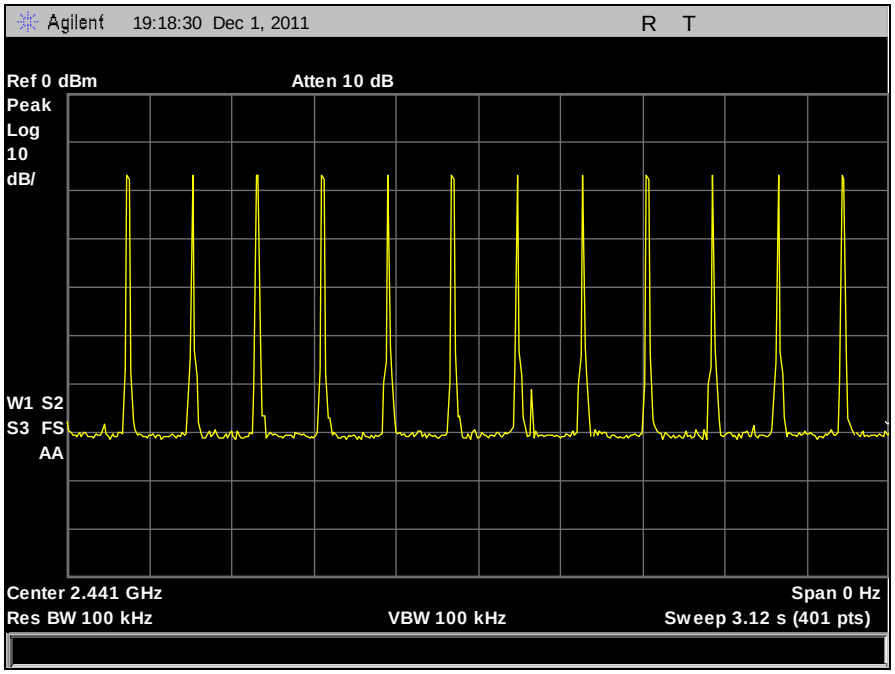
Plot 15. DH1 on Time



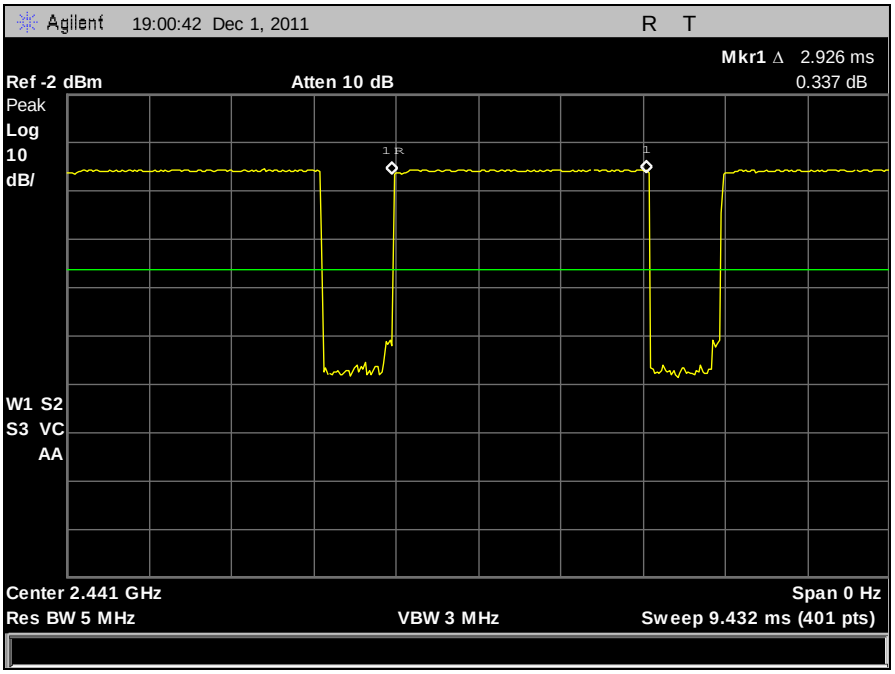
Plot 16. DH3 Burst (16)



Plot 17. DH3 on Time



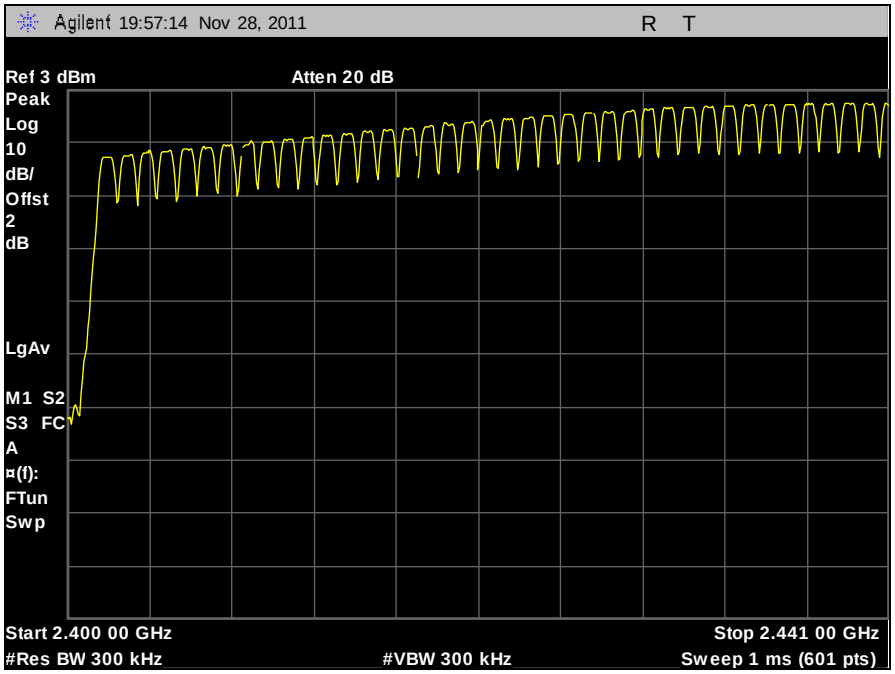
Plot 18. DH5 Burst (12)



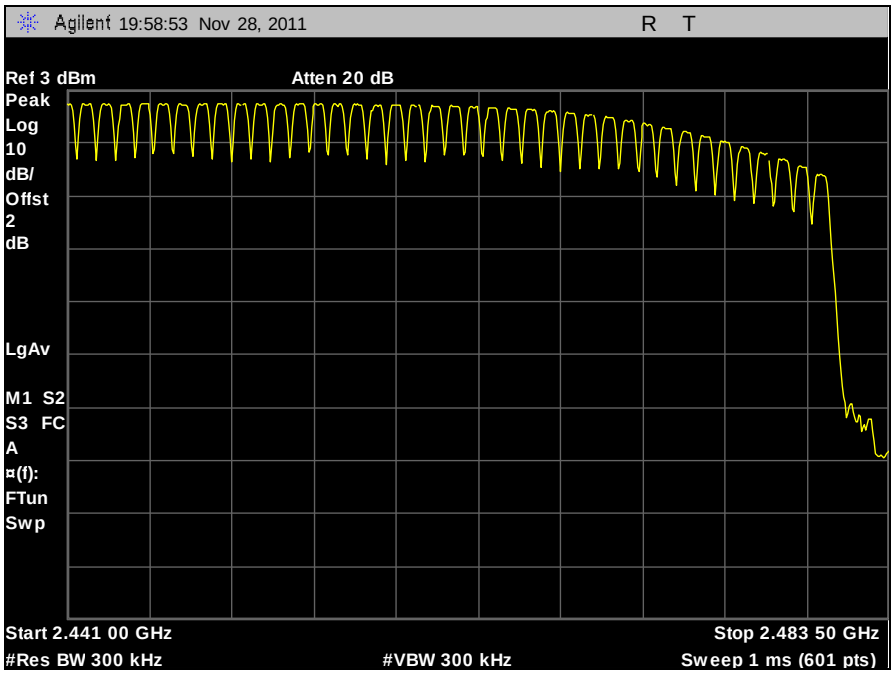
Plot 19. DH5 on Time

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(1) Number of RF Channels

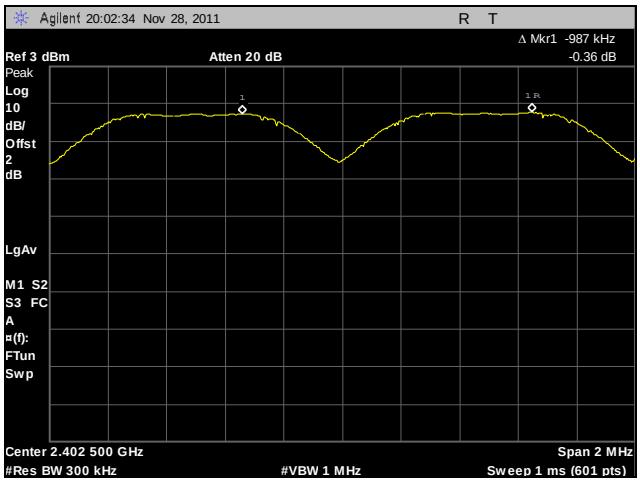


Plot 20. No. of Channels, Chart 1 (2400 – 2441 MHz)

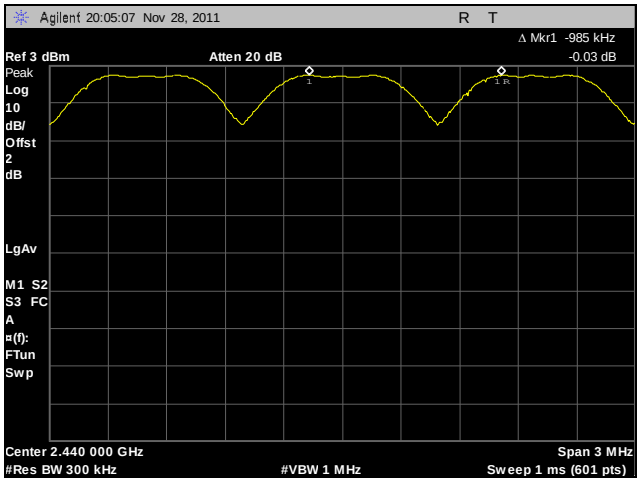


Plot 21. No. of Channels, Chart 2 (2441 – 2483.5 MHz)

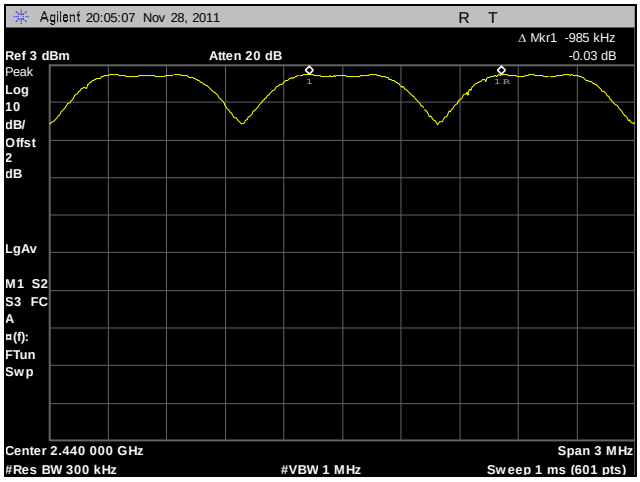
§ 15.247(a)(1) RF Channel Separation



Plot 22. Channel Separation, Channel 0 and 1 (GFSK)



Plot 23. Channel Separation, Channel 39 and 40 (GFSK)



Plot 24. Channel Separation, Channel 77 and 78 (GFSK)

© 2014, MET Laboratories, Inc.

§ 15.247(b) Peak Power Output

Test Requirements:

§15.247(b)(1): The maximum peak output power of the intentional radiator shall not exceed 0.125 Watts for frequency hopping systems operating in the 2400-2483.5 MHz band. .

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band and using a point to point application may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Test Procedure: The transmitter was connected to a calibrated spectrum analyzer. The EUT was measured at the low, mid and high channels of each band at the maximum power level.

Test Results: The EUT was compliant with the Peak Power Output limits of **§15.247(b)**.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 11/29/11

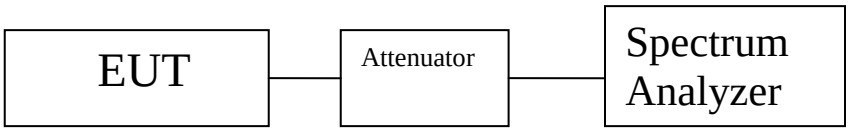


Figure 3. Peak Power Output Test Setup

Peak Power Output Test Results

Peak Conducted Output Power		
Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
Low	2402	-9.886
Mid	2441	0.144
High	2480	-12.67

Table 15. Peak Power Output, Test Results, 8PSK

Peak Conducted Output Power		
Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
Low	2402	-10.16
Mid	2441	-0.186
High	2480	-13.13

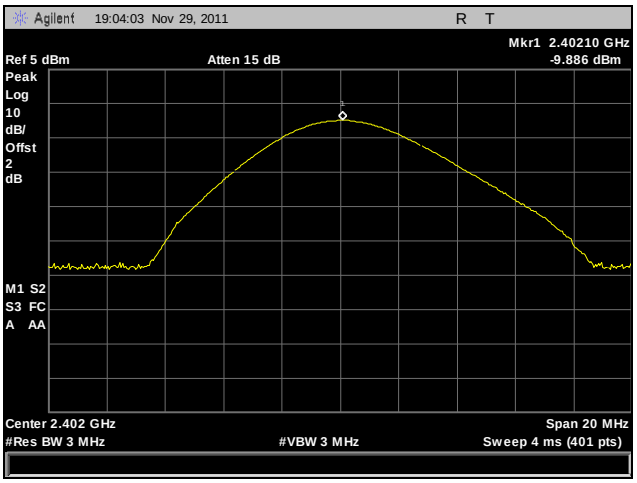
Table 16. Peak Power Output, Test Results, DPSK

Peak Conducted Output Power		
Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
Low	2402	-9.073
Mid	2441	0.867
High	2480	-11.51

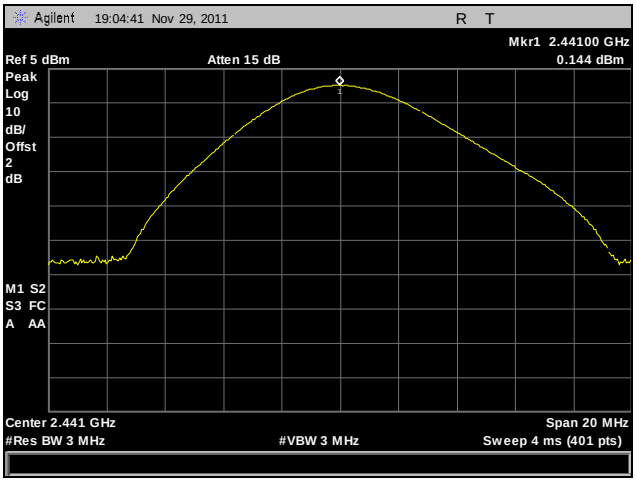
Table 17. Peak Power Output, Test Results, GFSK

 © 2014, MET Laboratories, Inc.

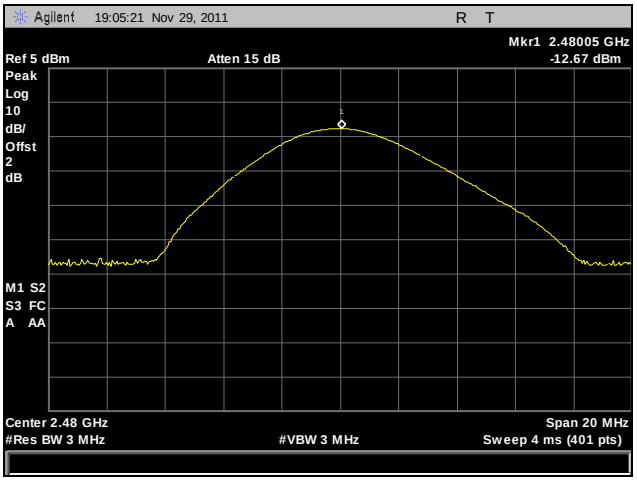
Peak Power Output Test Results, 8PSK



Plot 25. Peak Power Output, Low Channel, 8PSK

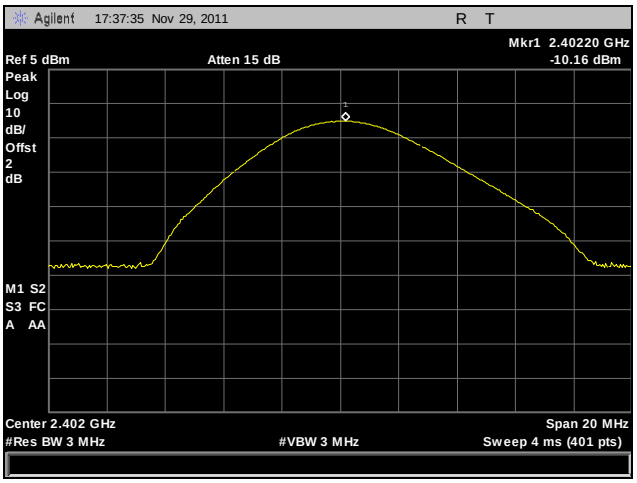


Plot 26. Peak Power Output, Mid Channel, 8PSK

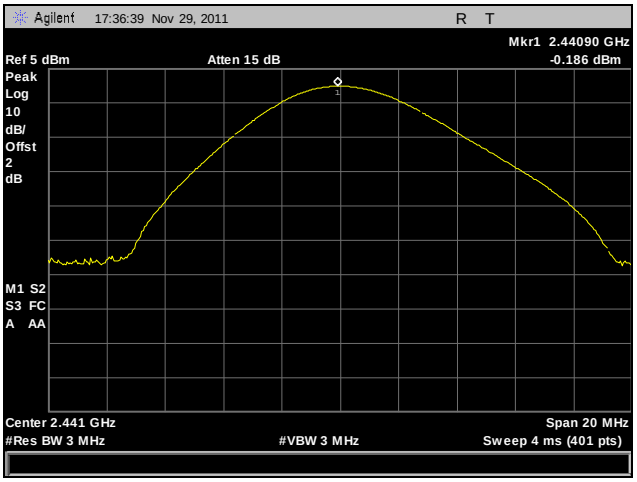


Plot 27. Peak Power Output, High Channel, 8PSK

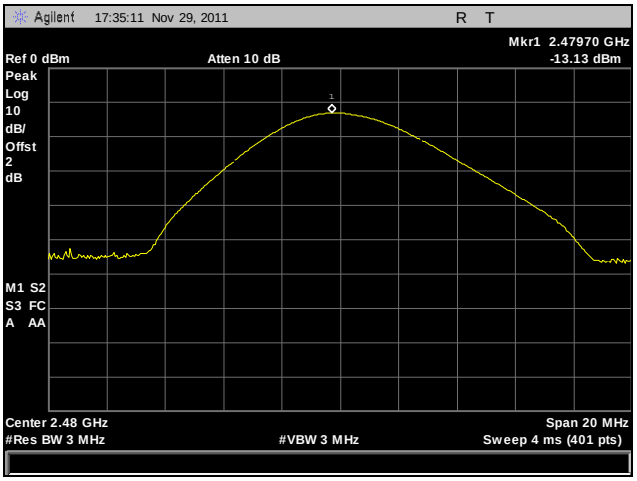
Peak Power Output Test Results, DPSK



Plot 28. Peak Power Output, Low Channel, DPSK

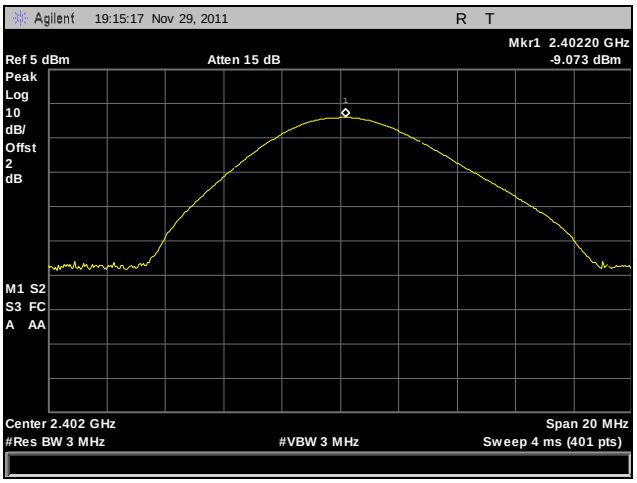


Plot 29. Peak Power Output, Mid Channel, DPSK

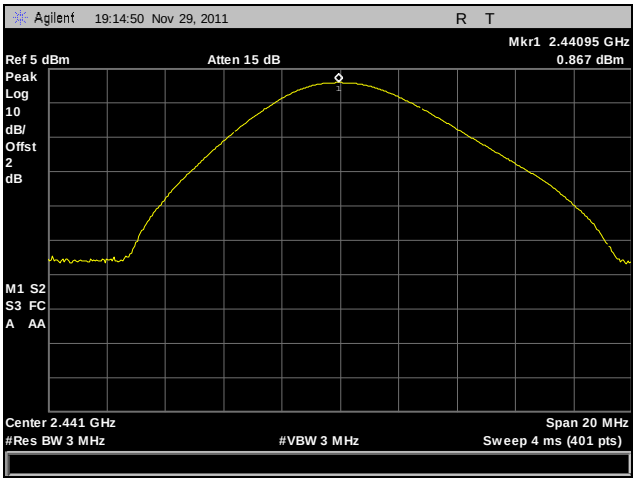


Plot 30. Peak Power Output, High Channel, DPSK

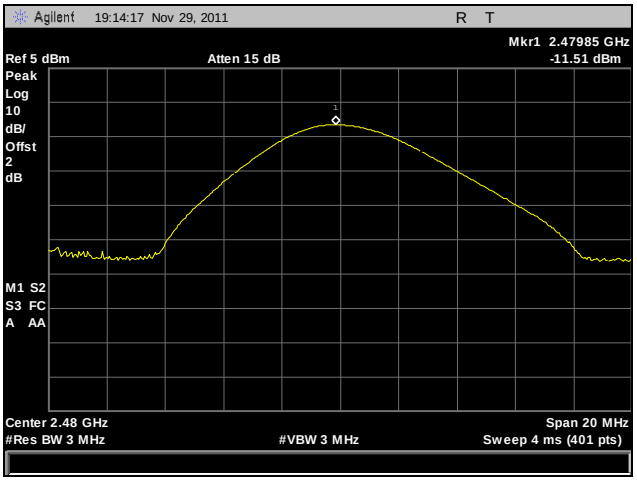
Peak Power Output Test Results, GFSK



Plot 31. Peak Power Output, Low Channel, GFSK



Plot 32. Peak Power Output, Mid Channel, GFSK



Plot 33. Peak Power Output, High Channel, GFSK

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110----------	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505----------	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905----------	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128----------	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775----------	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775----------	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218----------	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825----------	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225----------	123–138	2200–2300	14.47–14.5
8.291–8.294----------	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366----------	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675----------	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475----------	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293----------	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025----------	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725----------	322–335.4	3600–4400	([2])

Table 18. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

 © 2014, MET Laboratories, Inc.

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 19.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 19. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedure: The transmitter was set to the low, mid and high channels at the highest output power and placed on a 0.8 m high wooden table inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions. Measurement were repeated the measurement at the low and highest channels.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

In accordance with §15.35(b) the limit on the radio frequency emissions as measured using instrumentation with a peak detector function shall be 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules. Measurements were made with GFSK modulation. GFSK modulation is the highest measured power, which is considered the worst case.

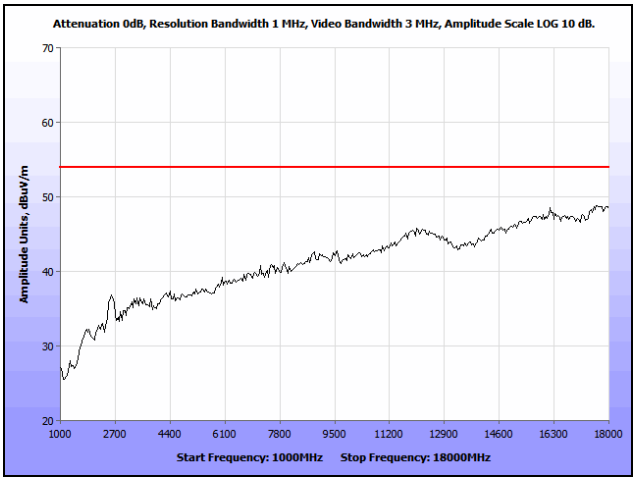
Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d)**. No Spurious Emissions were found above 18GHz.

Test Engineer(s): Anderson Soungpanya

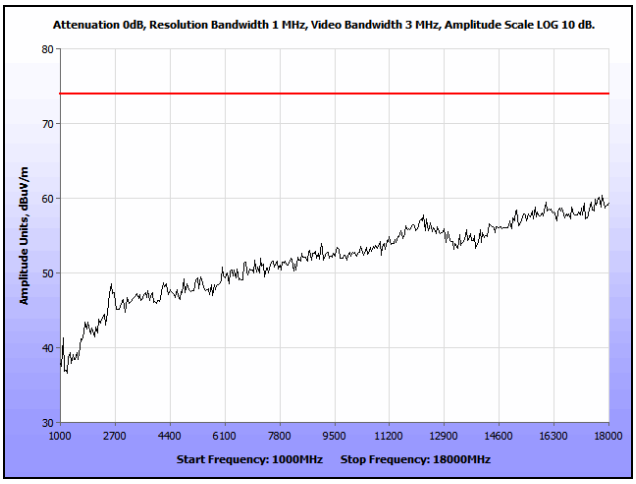
Test Date(s): 11/29/11

 © 2014, MET Laboratories, Inc.

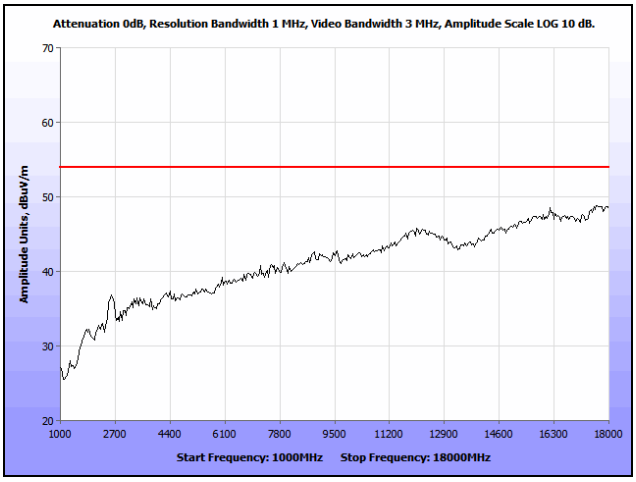
Radiated Spurious Emissions Test Results



Plot 34. Radiated Spurious Emissions, Low Channel, Average

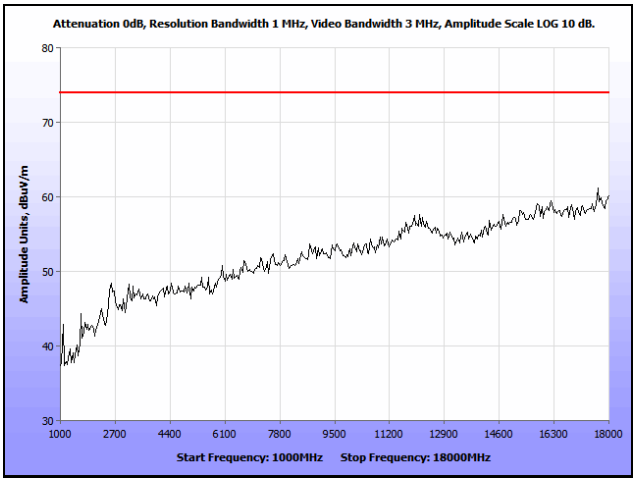


Plot 35. Radiated Spurious Emissions, Low Channel, Peak

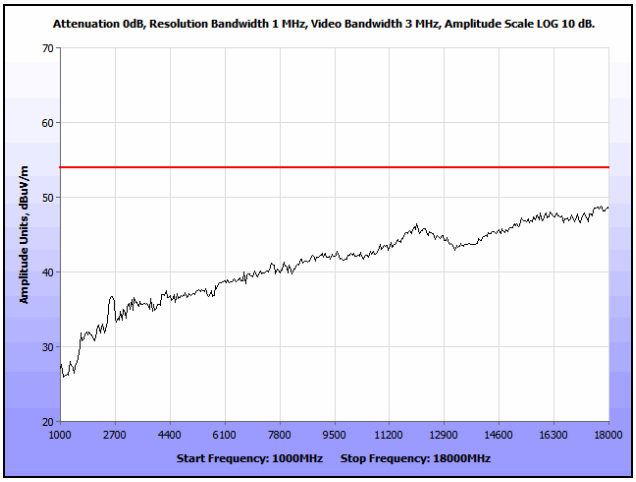


Plot 36. Radiated Spurious Emissions, Mid Channel, Average

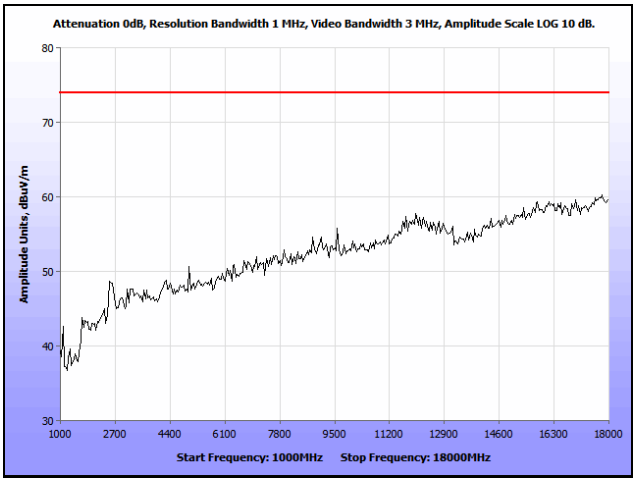
 © 2014, MET Laboratories, Inc.



Plot 37. Radiated Spurious Emissions, Mid Channel, Peak



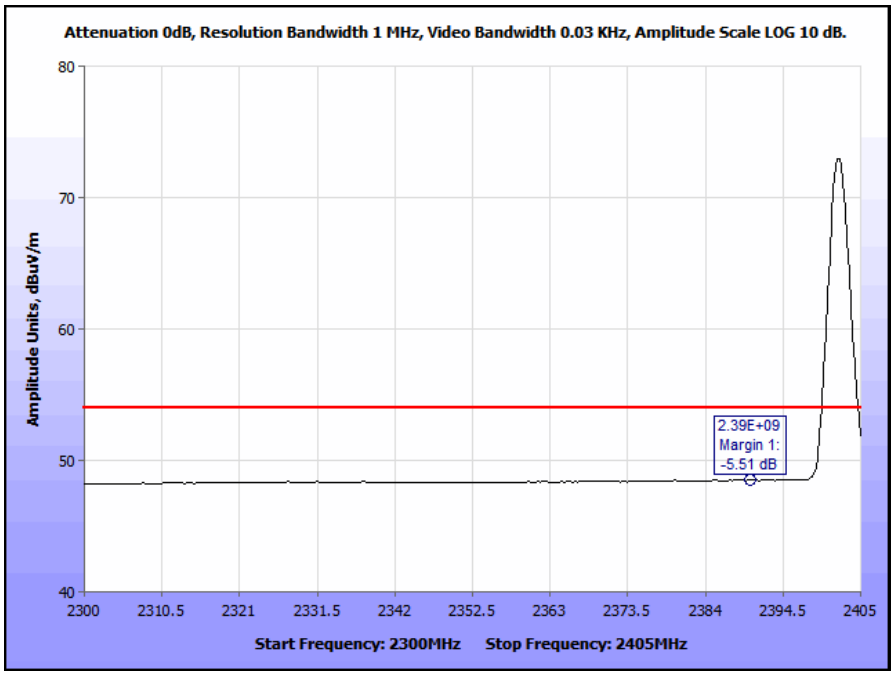
Plot 38. Radiated Spurious Emissions, High Channel, Average



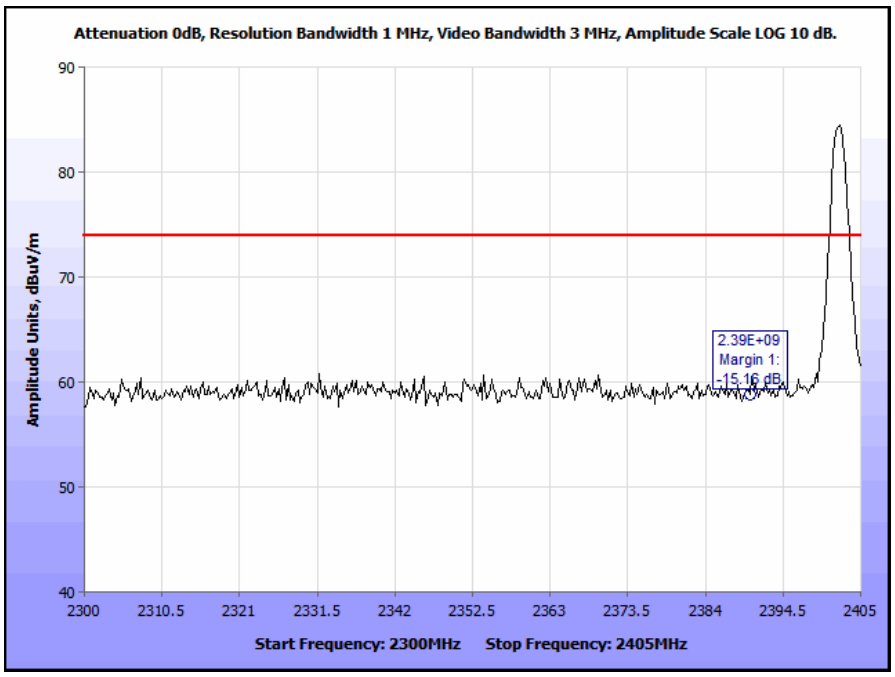
Plot 39. Radiated Spurious Emissions, High Channel, Peak

Radiated Band Edge Measurements

Test Procedures: The transmitter was turned on. Measurements were performed of the low and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance.

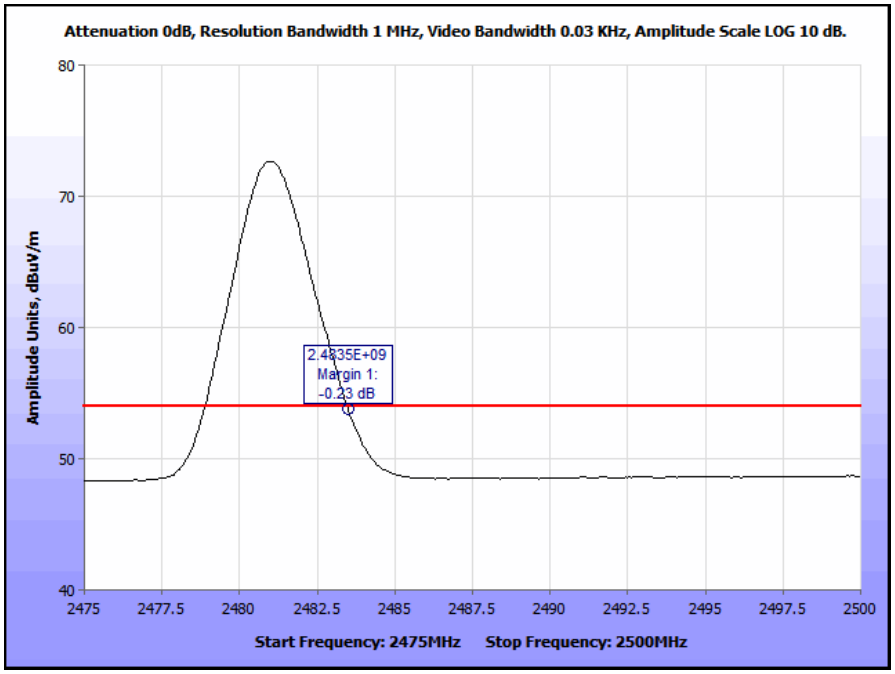


Plot 40. Radiated Restricted Band Edge, Low Channel, Average

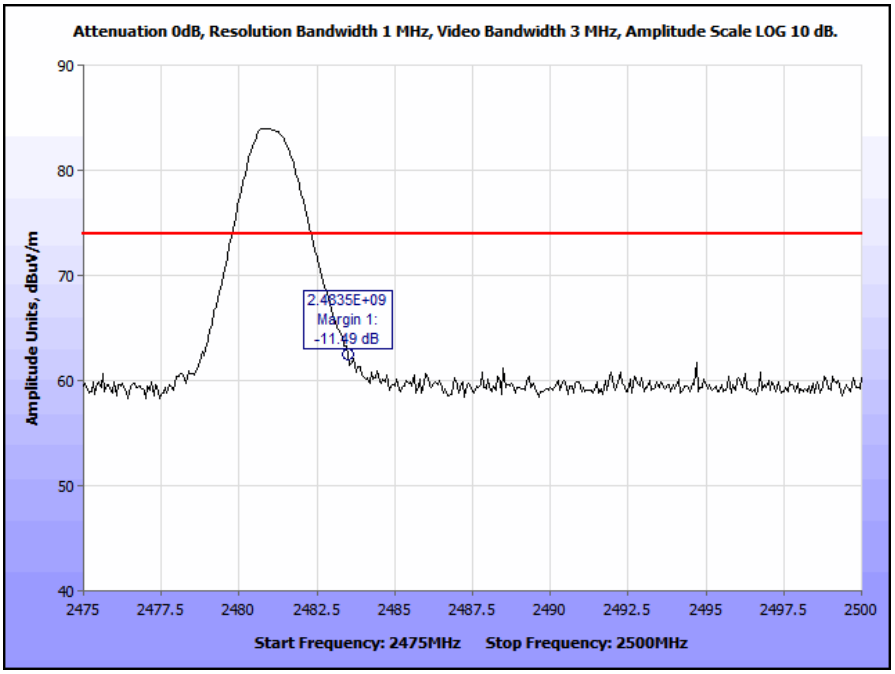


Plot 41. Radiated Restricted Band Edge, Low Channel, Peak

 © 2014, MET Laboratories, Inc.



Plot 42. Radiated Restricted Band Edge, High Channel, Average

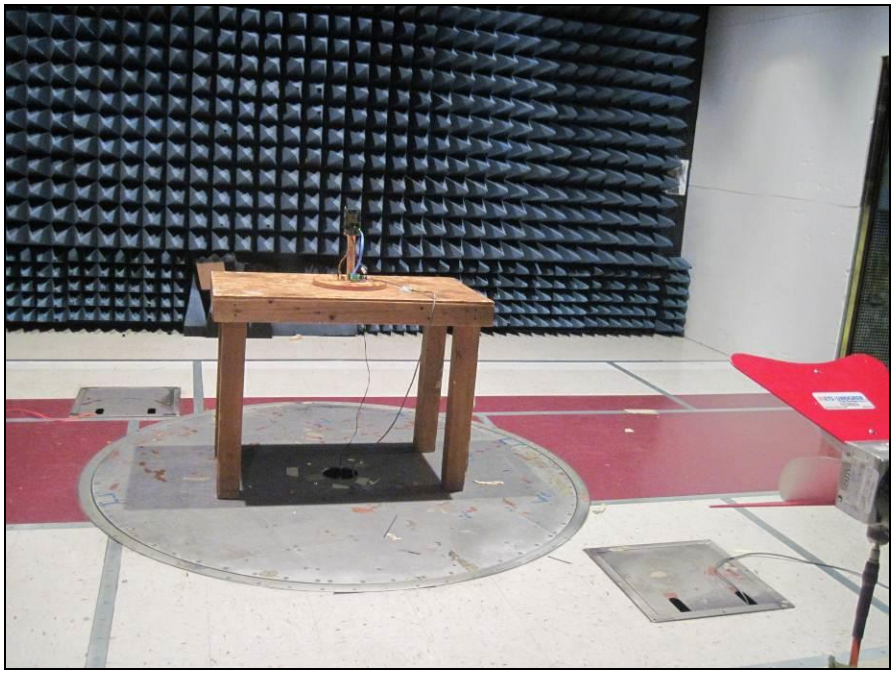


Plot 43. Radiated Restricted Band Edge, High Channel, Peak

 © 2014, MET Laboratories, Inc.

Radiated Spurious Emissions Test Setup

Photograph 4. Radiated Spurious Emissions 30 MHz – 1 GHz, Test Setup



Photograph 5. Radiated Spurious Emissions 1 GHz – 18 GHz, Test Setup

 © 2014, MET Laboratories, Inc.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 11/28/11

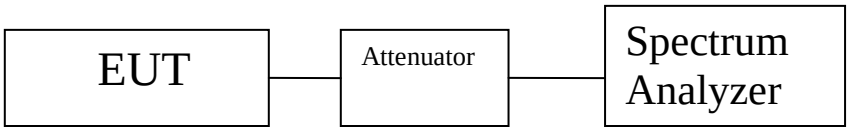
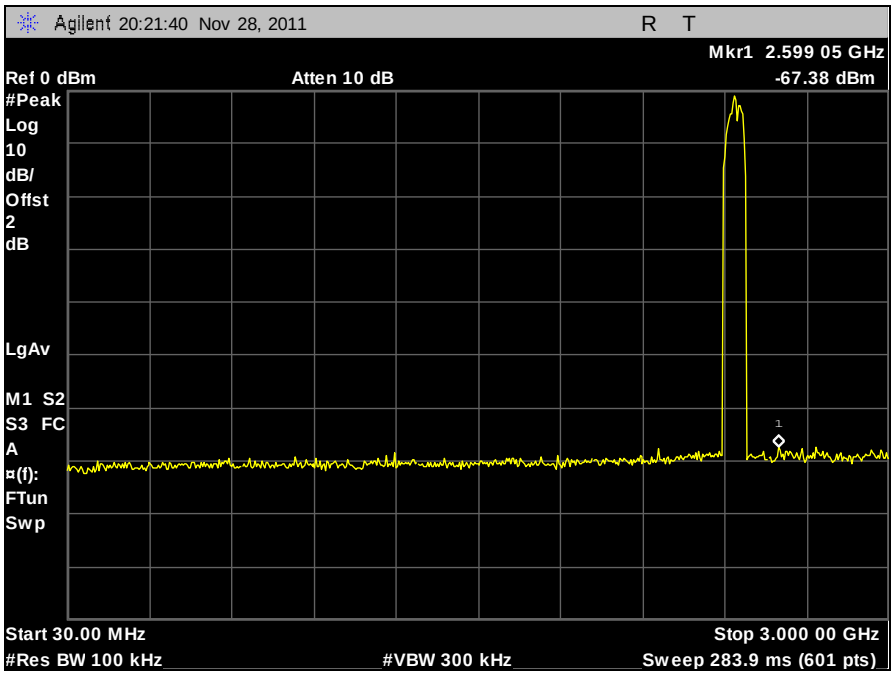


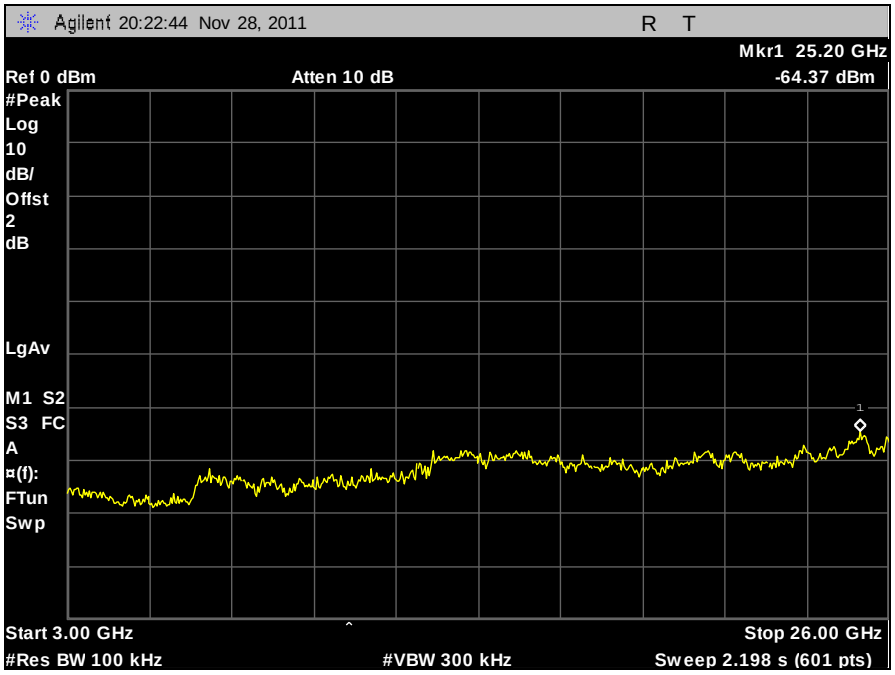
Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup

 © 2014, MET Laboratories, Inc.

Conducted Spurious Emissions Test Results, 8PSK

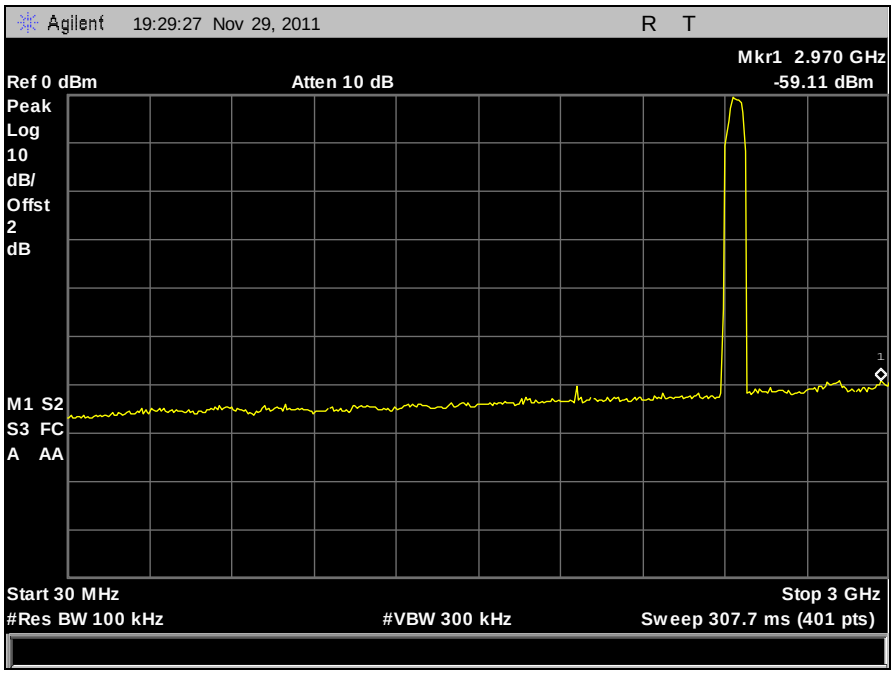


Plot 44. Conducted Spurious Emissions, 30 MHz – 3 GHz, 8PSK

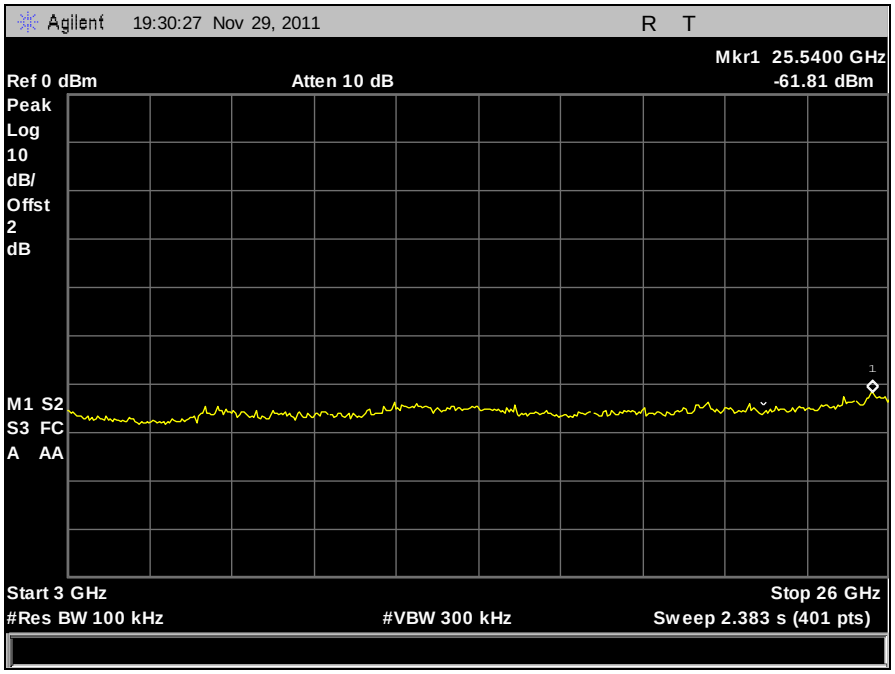


Plot 45. Conducted Spurious Emissions, 3 GHz – 26 GHz, 8PSK

Conducted Spurious Emissions Test Results, DPSK



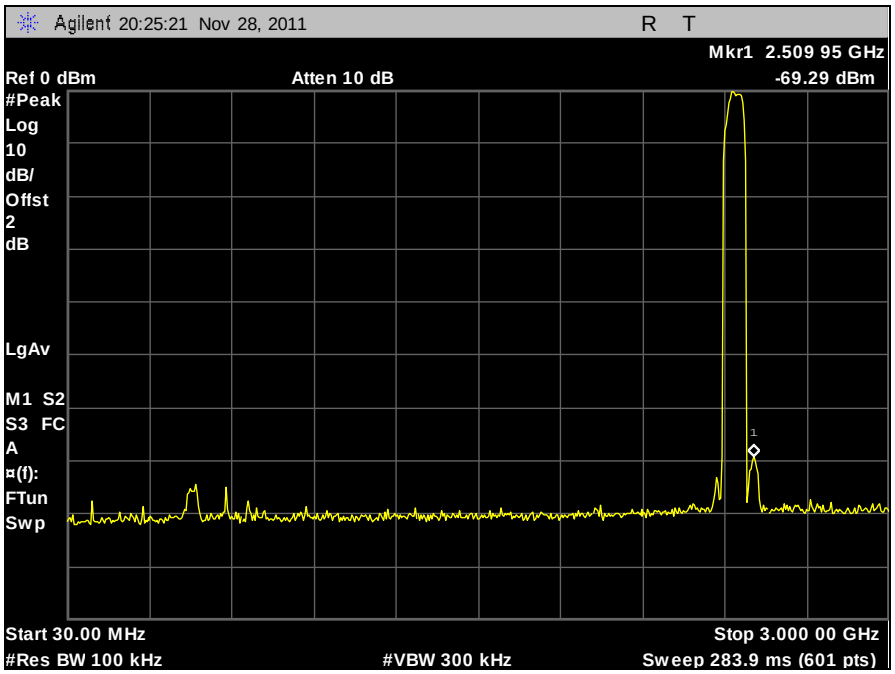
Plot 46. Conducted Spurious Emissions, 30 MHz – 3 GHz, DPSK



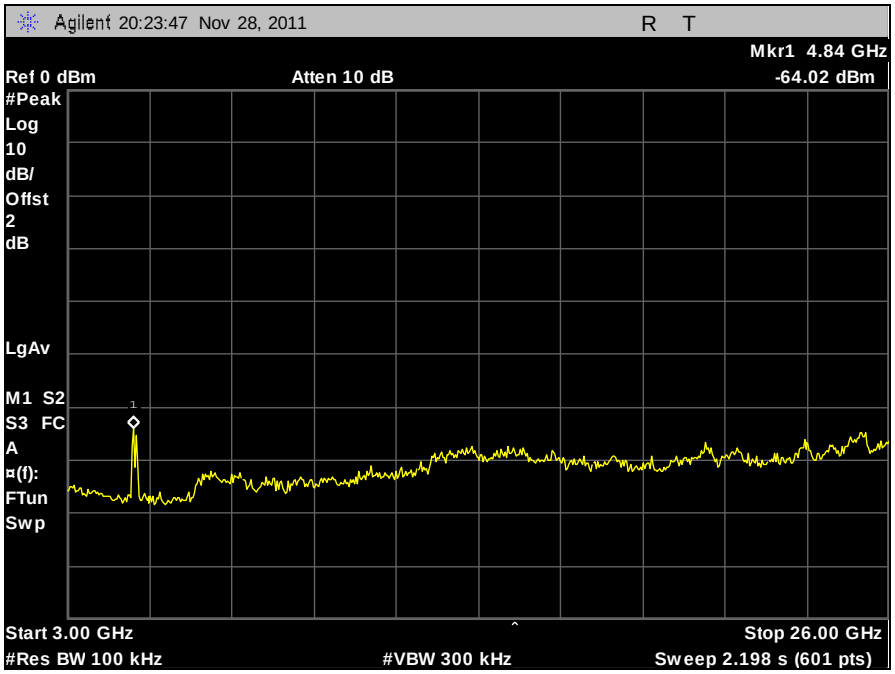
Plot 47. Conducted Spurious Emissions, 3 GHz – 26 GHz, DPSK

© 2014, MET Laboratories, Inc.

Conducted Spurious Emissions Test Results, GFSK

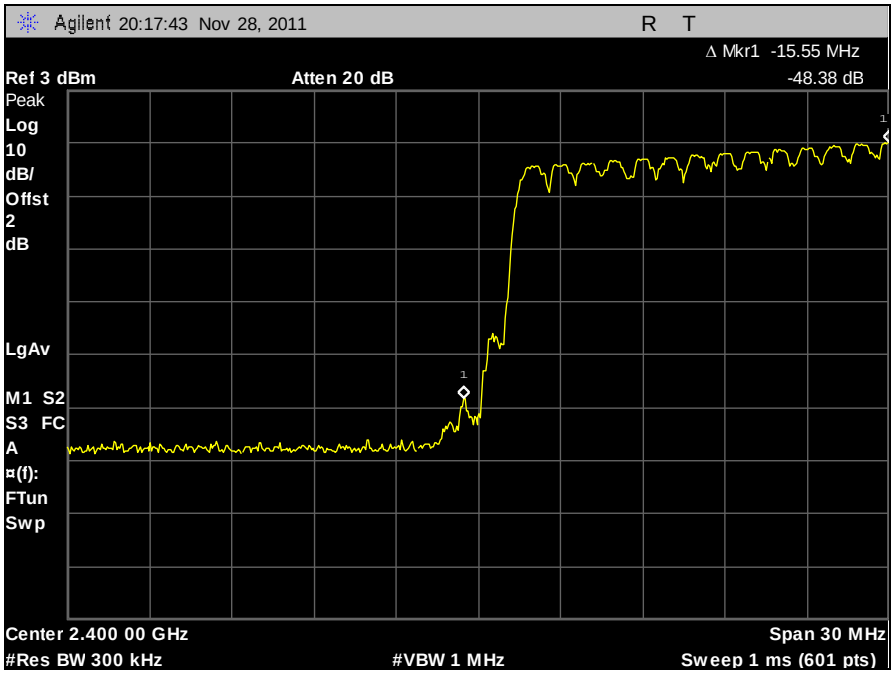


Plot 48. Conducted Spurious Emissions, 30 MHz – 3 GHz, GFSK

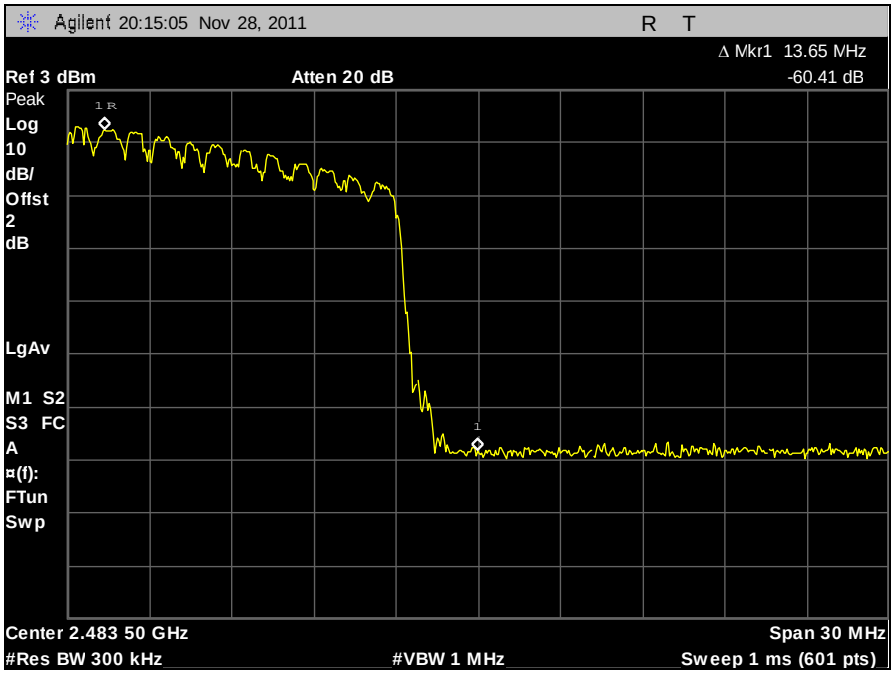


Plot 49. Conducted Spurious Emissions, 3 GHz – 26 GHz, GFSK

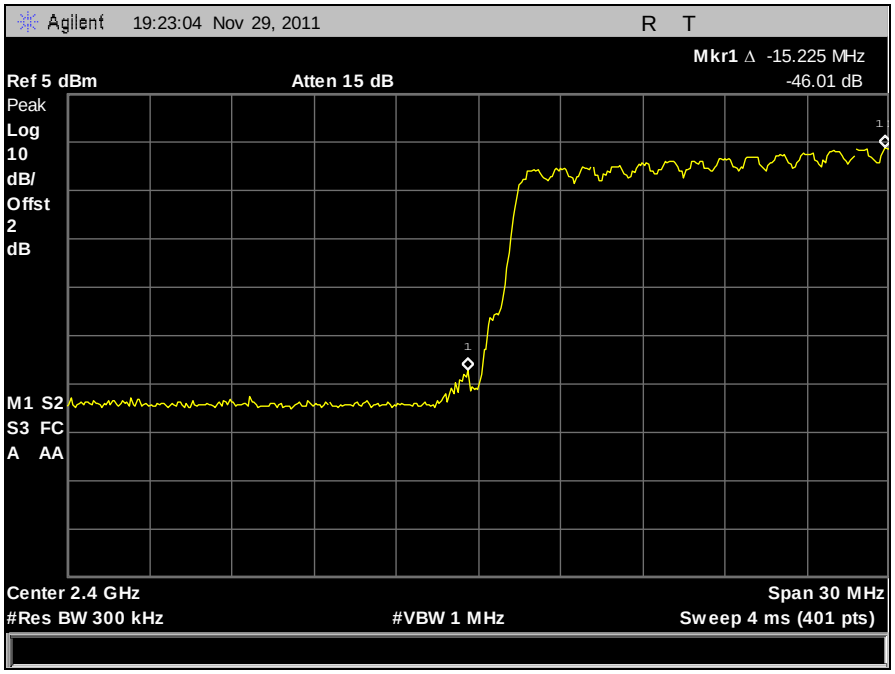
Conducted Band Edge Test Results



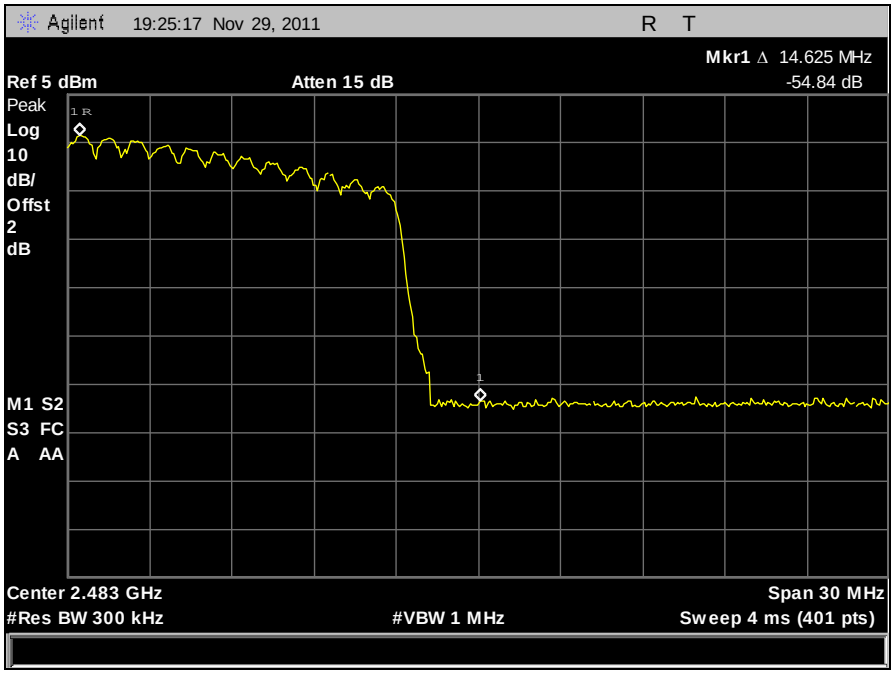
Plot 50. Conducted Band Edge, 8PSK, Low



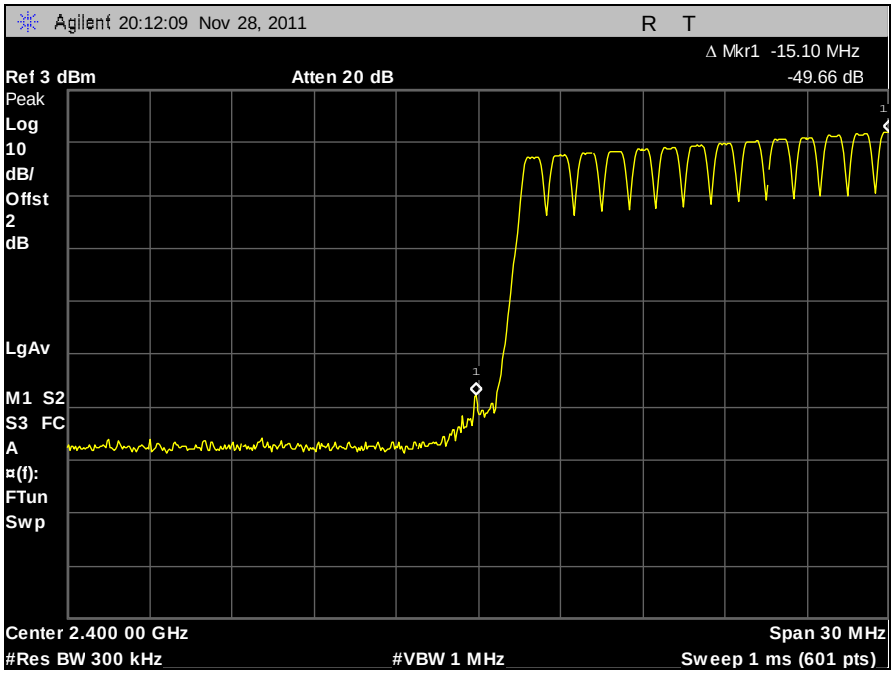
Plot 51. Conducted Band Edge, 8PSK, High



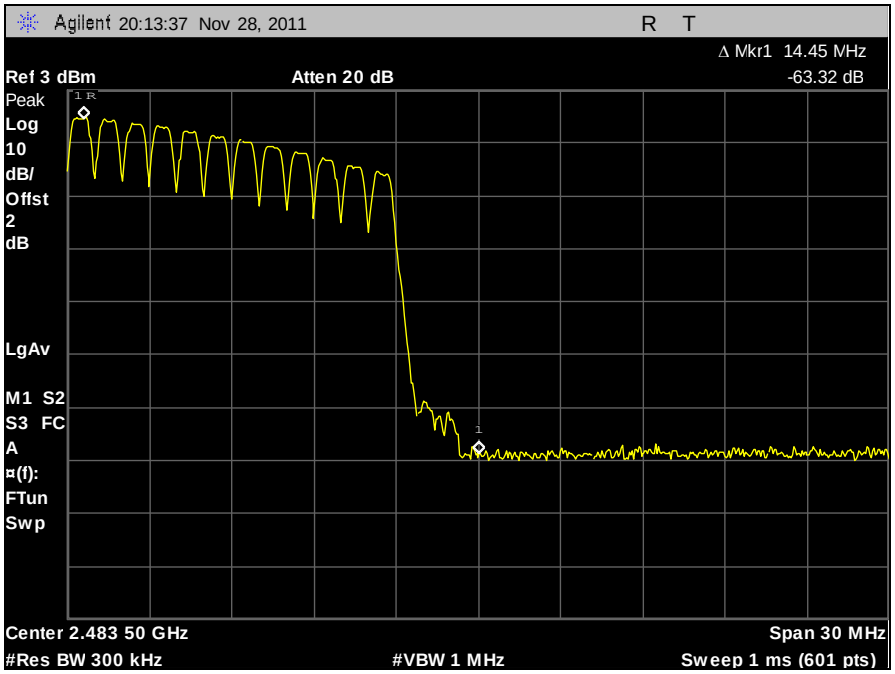
Plot 52. Conducted Band Edge, DPSK, Low



Plot 53. Conducted Band Edge, DPSK, High



Plot 54. Conducted Band Edge, GFSK, Low



Plot 55. Conducted Band Edge, GFSK, High

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(g)(h) Declaration Statements for FHSS

12/30/2011

MET Laboratories, Inc.

914 West Patapsco Ave.

Baltimore, MD 21230

RE: DECLARATION FOR modem AS-HLRTR-01 with FCC ID V0I-ANMHL0RTR-01

To Whom it May Concern:

This letter serves as an official statement that the above mentioned product is compliant with FCC Specifications 15.247h and 15.247h.

15.247 (g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

15.247 (h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Please contact me if there is any information you need.

Sincerely,

Doug Moeller
Chief Technology Officer

Autonet Mobile, Inc. 1700 Montgomery Ste. 111, San Francisco, CA 94111
Support - 1-800-977-2107 support@autonetmobile.com www.autonetmobile.com

IV. Test Equipment

 © 2014, MET Laboratories, Inc.

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2607	SPECTRUM ANALYZER	AGILENT/HP	E4407B	8/9/2011	8/9/2012
1S2691	DUAL-LINE V-LISN	TESEQ	NNB-51	3/31/2011	3/31/2012
1S2633	TRANSIENT LIMITER	FISCHER CUSTOM COMMUNICATIONS INC.	FCC-450B-2.4-N	2/18/2011	2/18/2012
1S2399	TURNTABLE CONTROLLER	SUNOL SCIENCE	SC99V	NO CALIBRATION REQUIRED	
1S2501	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	06/09/2011	06/09/2012
1S2482	5 METER CHAMBER	PANASHIELD	641431	12/17/2010	12/17/2011
1S2460	SPECTRUM ANALYZER	AGILENT	E4407B	7/12/2011	7/12/2012
1S2583	SPECTRUM ANALYZER	AGILENT/HP	E4447A	3/18/2011	3/18/2012
1S2600	BILOG ANTENNA	TESEQ	CBL6112D	4/14/2010	4/14/2013
1S2501	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU40	06/09/2011	06/09/2012
1S2198	HORN ANTENNA	EMCO	3115	9/29/2011	9/29/2012
N/A	HIGH PASS FILTER	MICRO-TRONICS	HPM13147	SEE NOTE	
1S2521	THERMO-HYGROMETER	FISHER SCIENTIFIC	11-661-7D	12/2/2009	12/2/2011
1S2523	PREAMP (1-26.5GHZ)	AGILENT	8449B	SEE NOTE	

Table 20. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

 © 2014, MET Laboratories, Inc.

V. Certification & User's Manual Information

Certification & User's Manual Information

A. 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.

 © 2014, MET Laboratories, Inc.

(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 proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

 © 2014, MET Laboratories, Inc.

Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — 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.

§ 2.907 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.

 © 2014, MET Laboratories, Inc.

Certification & User's Manual Information

§ 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.

 © 2014, MET Laboratories, Inc.

Certification & User's Manual Information

1. 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.

 © 2014, MET Laboratories, Inc.

Verification & User's Manual Information

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 A 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 A 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 commercial 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) 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.

 © 2014, MET Laboratories, Inc.

End of Report

 © 2014, MET Laboratories, Inc.