



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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March 23, 2011

Fiber-Span
3434 Rt. 22 W. Suite 140
Branchburg, New Jersey 08876

Dear David Thomson,

Enclosed is the EMC Wireless test report for compliance testing of the Fiber-Span, FS42R-AWS-5 as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 Subpart L and RSS-139, Issue 2, February 2009 for Broadband Radio Service (BRS) Devices.

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 contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Fiber-Span\EMC30864G-FCC27 Rev. 1)

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Electromagnetic Compatibility Criteria Test Report

for the

**Fiber-Span
Model FS42R-AWS-5**

**Tested under
FCC Certification Rules
Title 47 of the CFR, Part 27 Subpart L
& RSS-139, Issue 2, February 2009**

MET Report: EMC30864G-FCC27 Rev. 1

March 23, 2011

Prepared For:

**Fiber-Span
3434 Rt. 22 W. Suite 140
Branchburg, New Jersey 08876**

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

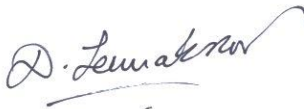
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Tested Under

**FCC Certification Rules
Title 47 of the CFR, Part 27 Subpart L
& RSS-139, Issue 2, February 2009**



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 capable of operation in accordance with the requirements of Part 27 M of the FCC Rules and Industry Canada standard RSS-139, Issue 2, February 2009 under normal use and maintenance.



Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab



Fiber-Span
FS42R-AWS-5

Electromagnetic Compatibility
Report Status
CFR Title 47 Part 15B & Part 27; ICES-003 & RSS-139

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	March 8, 2011	Initial Issue.
1	March 23, 2011	Revised to reflect correct EUT name and add FCC ID.



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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB μ A	Decibels above one microamp
dB μ V	Decibels above one microvolt
dB μ A/m	Decibels above one microamp per meter
dB μ V/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	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
μ H	microhenry
μ	microfarad
μ s	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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Fiber-Span FS42R-AWS-5, with the requirements of Part 27. 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 FS42R-AWS-5. Fiber-Span should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the FS42R-AWS-5, 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 27, in accordance with Fiber-Span, purchase order number 5861.

Reference	IC Reference	Description	Compliance
§2.1046; §27.50(d)	RSS-139; Section 6.4	RF Power Output	Compliant
§2.1047	RSS-139; Section 6.2	Modulation Characteristics	Not Applicable
§2.1049	RSS-GEN	Occupied Bandwidth	Compliant
§27.53	RSS-139; Section 6.5	Band-Edge Channel Power	Not Applicable
§2.1051; §27.53(g)	RSS-139; Section 6.5	Spurious Emissions at Antenna Terminals	Compliant
§2.1053; §27.53(g)	RSS-139; Section 6.5	Radiated Spurious Emissions	Compliant
§2.1055	RSS-139; Section 6.3	Frequency Stability over Temperature Variations	Not Applicable
FCC guidance on Amplifiers		Frequency Response	Compliant
FCC guidance on Amplifiers		Intermodulation	Compliant
N/A	RSS-GEN	Receiver Spurious Emissions	Compliant
Part 15 Subpart B §15.107(a)	ICES-003 Issue 4 February 2004	Conducted Emissions	Compliant
Part 15 Subpart B §15.109(a)	ICES-003 Issue 4 February 2004	Radiated Emissions	Compliant

Table 1. Executive Summary of EMC Compliance Testing

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Fiber-Span to perform testing on the FS42R-AWS-5, under Fiber-Span's purchase order number 5861.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Fiber-Span, FS42R-AWS-5.

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

Model(s) Tested:	FS42R-AWS-5				
Model(s) Covered:	FS42R-AWS-5				
EUT Specifications:	FCC ID: Q4VFS42R-AWS-5				
	Primary Power: 120 VAC, 60 Hz				
	Equipment Code:	TNB			
	Avg. RF Output Power:	Down Link		Up Link	
		LTE	0.859 W	LTE	0.000024 W
		UMTS	0.676 W	UMTS	0.00089 W
	EUT Frequency Range:	Down Link (MHz)		Up Link (MHz)	
LTE		2110.7-2154.3	LTE	1710.7-1754.3	
	UMTS	2112.5-2152.5	UMTS	1712.5-1752.5	
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				
Date(s):	March 23, 2011				

Table 2. EUT Summary Table

B. References

CFR 47, Part 27	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless Services
RSS-139, Issue 2, February 2009	Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz
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
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards

Table 3. Standard References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 West 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 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site).

D. Description of Test Sample

The FS42R-AWS-5(EUT) is as follows:

This module is part of the RFN system. The RFN has three (3) antenna ports. The RF from the iDEN module is split between the 3 ports as follows:

1. Antenna port 1: full power
2. Antenna port 2: full power – 6 dB
3. Antenna port 3: full power

The Fiber-Span Remote Fiber Node (RFN), model FS47R consists of a chassis mainframe with up to six (6) optional plug-in service modules. Each Service Module provides dedicated support for one of the following wireless services:

- 700 MHz commercial band
- 800/900 MHz iDEN
- 850 MHz Cellular
- 1.9GHz PCS
- 2.1GHz AWS
- GHz WiFi

A seventh module (shown in the attached block diagram) will be available for future WiMAX support.

The RFN is intended for use with associated Headend equipment, including the FTU-RF, and RIS units which provide the necessary signal feed for all wireless services via optical fiber.

The RFN and associated Headend Equipment are intended to provide, via optical fiber links, a means of extending the reach of a Wireless Service Provider's BTS to areas otherwise obscured from their signal, such as subways, underground shopping areas, etc.

The output of the RFN is common to all Service Modules, and terminates in three antenna ports. Except for signal level, all signals appear at all three ports.

Operation is bi-directional in nature, and varies somewhat, depending on the requirements of the particular technology supported by the specific plug-in Service Module.

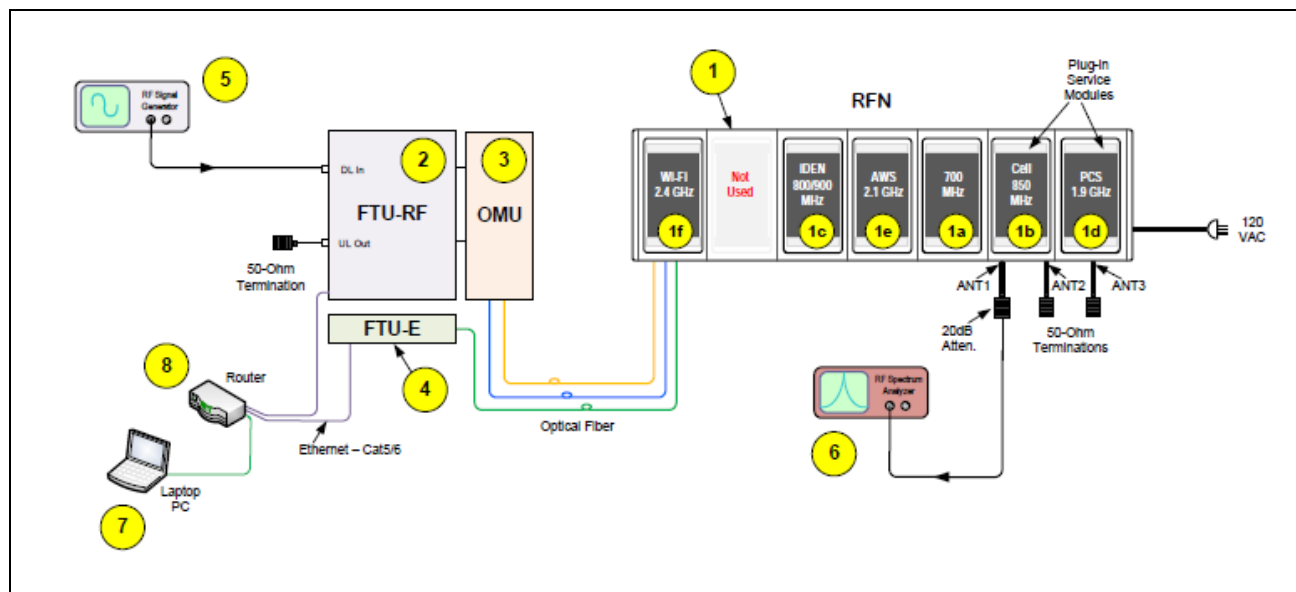


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

Ref. ID	Name / Description	Model Number	Serial Number
1e	Service Module, AWS, 5W, SBY1	FS42R - AWS - 5	2656 - 04

Table 4. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
2	FTU - RF	Fiber - Span	N/A	2656 - 20
3	OMU	Fiber - Span	N/A	2656 - 27
4	FTU - E	IMC Networks	856 - 1047	N/A
7	Laptop PC (w/CAN Tools S/W)	N/A	N/A	N/A
8	Router	N/A	N/A	N/A

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	ANT 1	RF Coaxial cable	1	1	Y	6
1	ANT 2	50 - Ohm Termination	1	N/A	Y	N/A
1	ANT 3	50 - Ohm Termination	1	N/A	Y	N/A

Table 6. Ports and Cabling Information

H. Mode of Operation

RFN is normally connected to the associated Headend Equipment – the FTU-RF and RIS units, via optical fiber.

Each optional wireless service supported operates independently, and may be removed without affecting the others installed in the mainframe option chassis.

The RFN receives an RF input signal in the downlink direction from an associated BTS (normally supplied by Wireless Service Provider). This connection is made via coaxial cable and connector at the RIS unit.

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 Fiber-Span upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

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 μ H/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 (dB μ V)		*Class B Conducted Limits (dB μ V)	
	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 found compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

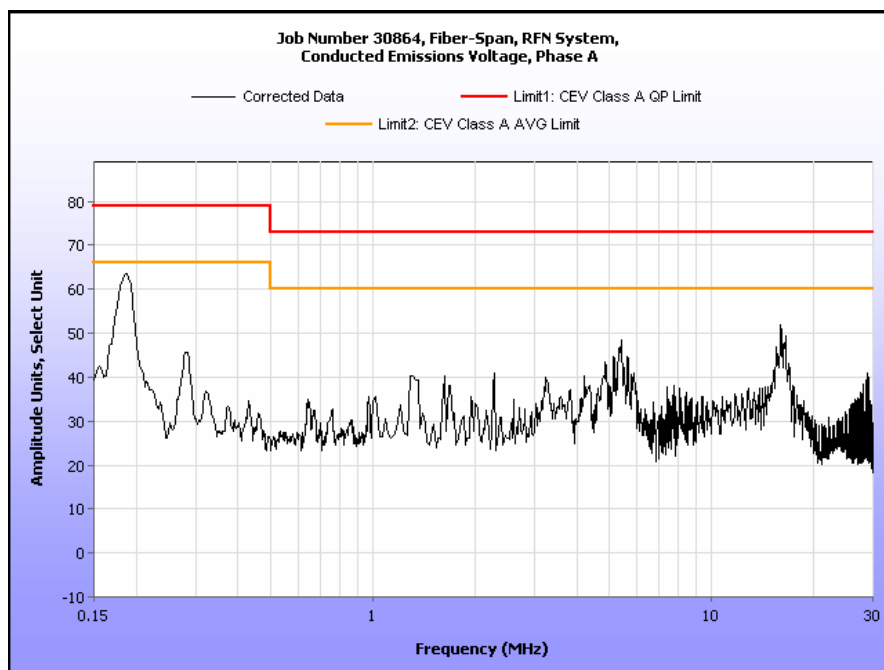
Test Engineer(s): Jeffrey Pratt

Test Date(s): 02/24/11

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.325	39.04	0	39.04	79	-39.96	35.08	0	35.08	66	-30.92
1.27	22.37	0	22.37	73	-50.63	19.83	0	19.83	60	-40.17
5.22	34.17	0.06	34.23	73	-38.77	29.51	0.06	29.57	60	-30.43
7.91	20.7	0	20.7	73	-52.3	13.56	0	13.56	60	-46.44
15.86	31.51	0	31.51	73	-41.49	18.16	0	18.16	60	-41.84
16.41	42.43	0	42.43	73	-30.57	39.17	0	39.17	60	-20.83

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

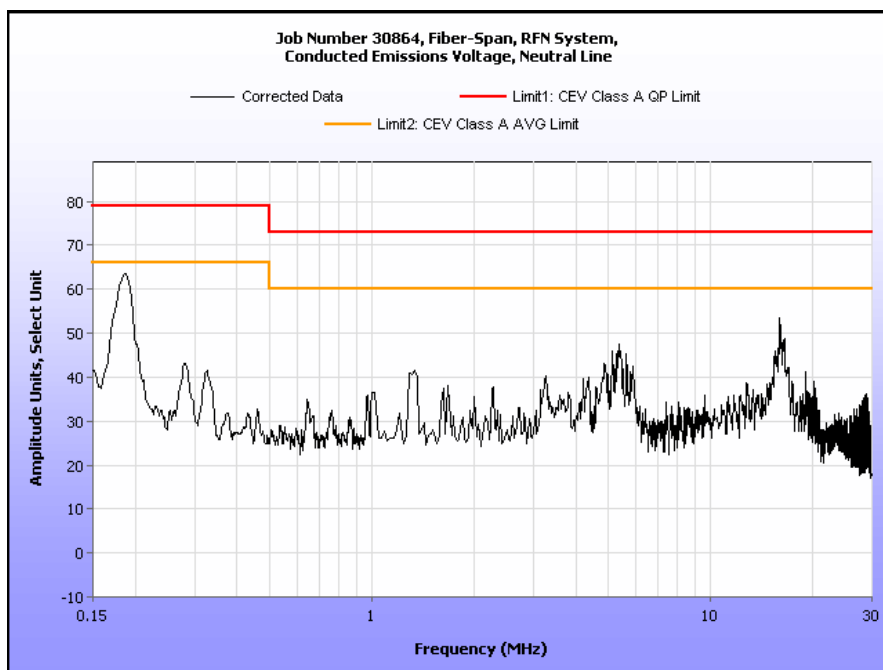


Plot 1. Conducted Emission, Phase Line Plot

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

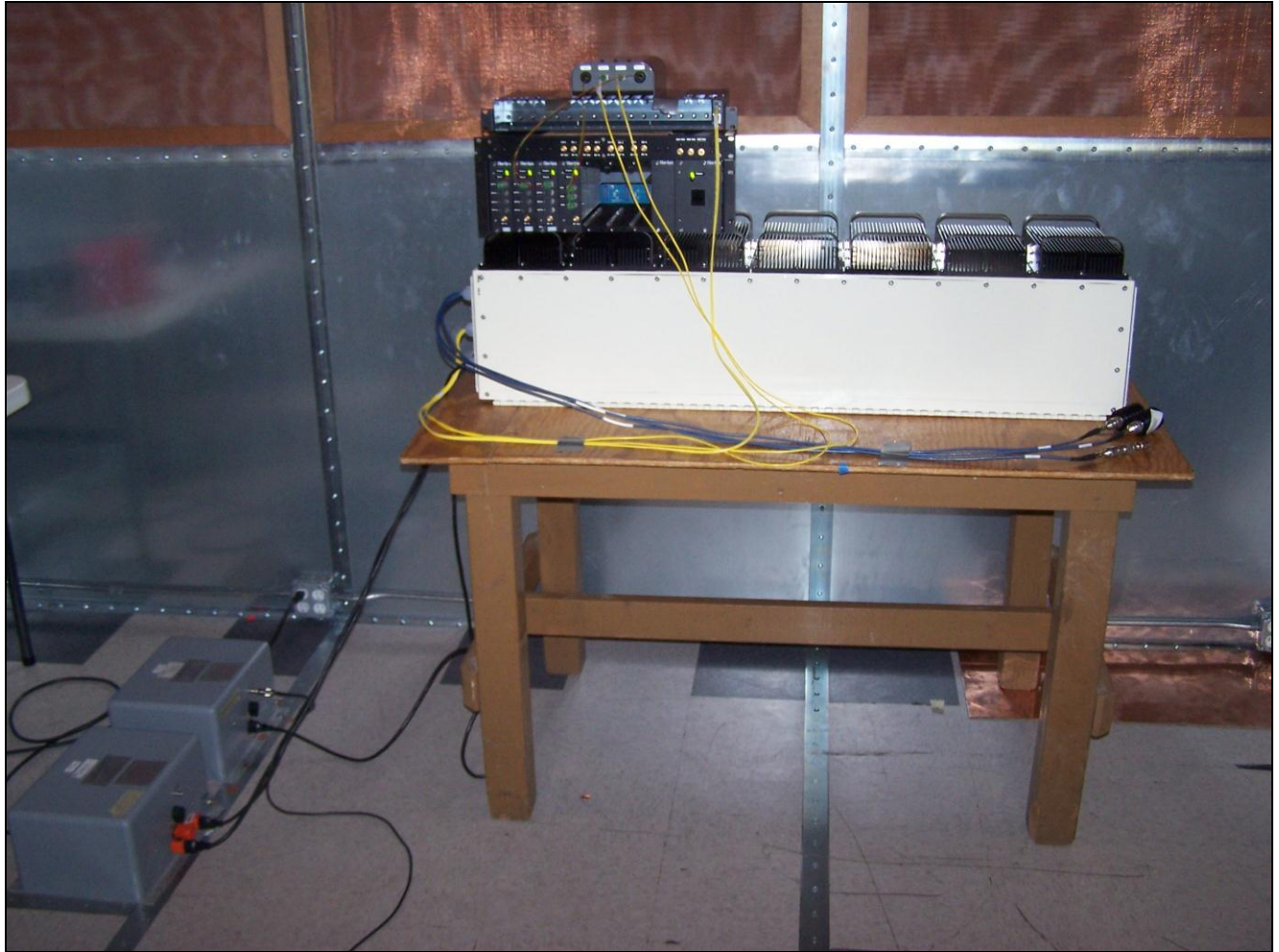
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.323	40.94	0	40.94	79	-38.06	38.59	0	38.59	66	-27.41
1.32	35.36	0	35.36	73	-37.64	32.94	0	32.94	60	-27.06
4.8	26.64	0.05	26.69	73	-46.31	20.34	0.05	20.39	60	-39.61
5.1	33.75	0.06	33.81	73	-39.19	22.88	0.06	22.94	60	-37.06
16.38	37.59	0	37.59	73	-35.41	23.8	0	23.8	60	-36.2
16.79	34.54	0	34.54	73	-38.46	21.49	0	21.49	60	-38.51

Table 9. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)



Plot 2. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup



Photograph 1. Conducted Emissions, Test Setup

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 10.

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 10.

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 10. 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 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.

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

Test Engineer(s): Dusmantha Tennakoon

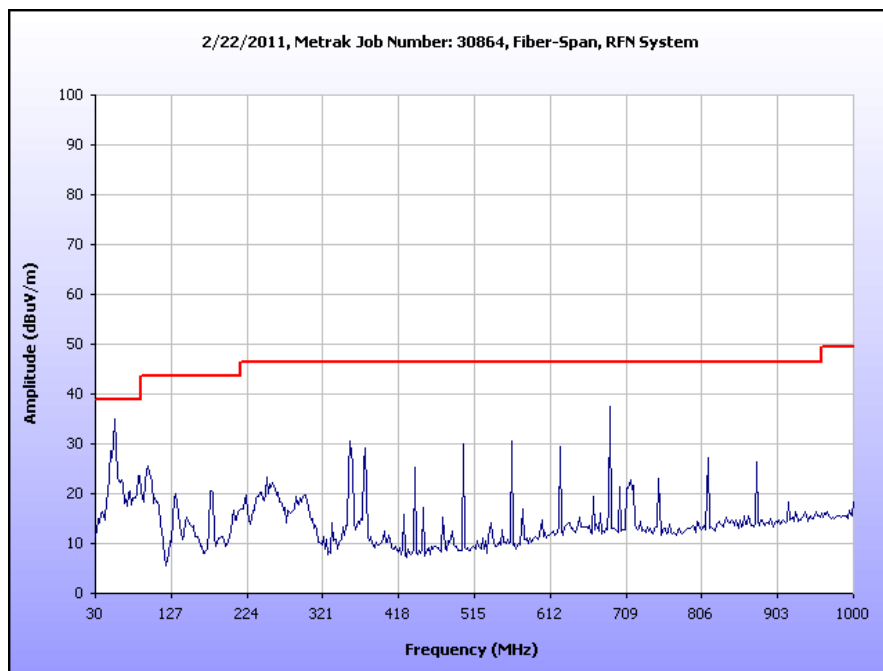
Test Date(s): 02/22/11

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)
55.713928	22	H	3.86	25.21	7.46	0.23	10.46	22.44	39.00	-16.56
55.713928	308	V	1.00	31.60	7.46	0.23	10.46	28.83	39.00	-10.17
687.51653	136	H	1.00	25.92	20.50	1.50	10.46	37.46	46.40	-8.94
687.51653	329	V	1.00	22.62	20.50	1.50	10.46	34.16	46.40	-12.24
356.37575	189	H	1.00	27.13	15.33	0.83	10.46	32.83	46.40	-13.57
356.37575	331	V	1.00	25.69	15.33	0.83	10.46	31.39	46.40	-15.01
562.51353	125	H	1.16	21.96	18.80	1.09	10.46	31.39	46.40	-15.01
562.51353	134	V	1.00	21.60	18.80	1.09	10.46	31.03	46.40	-15.37
97.96994	121	H	1.95	22.66	9.79	0.23	10.46	22.22	43.50	-21.28
97.96994	360	V	1.00	25.50	9.79	0.23	10.46	25.06	43.50	-18.44
499.98747	248	H	1.00	19.41	18.00	1.00	10.46	27.95	46.40	-18.45
499.98747	124	V	1.00	23.92	18.00	1.00	10.46	32.46	46.40	-13.94

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

Note: The EUT was tested at 3 m.



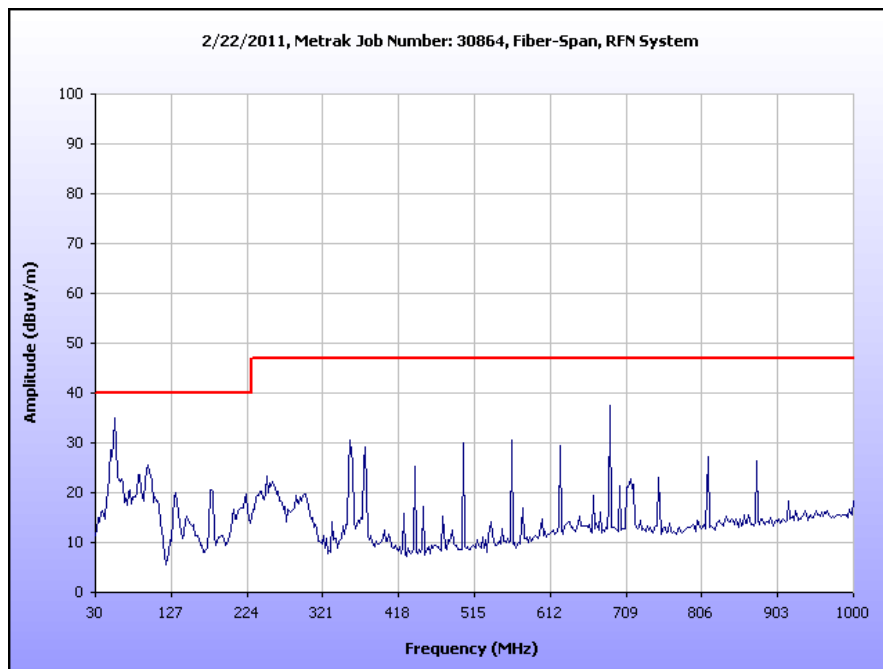
Plot 3. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits

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)
55.713928	22	H	3.86	25.21	7.46	0.23	10.46	22.44	40.00	-17.56
55.713928	308	V	1.00	31.60	7.46	0.23	10.46	28.83	40.00	-11.17
687.51653	136	H	1.00	25.92	20.50	1.50	10.46	37.46	47.00	-9.54
687.51653	329	V	1.00	22.62	20.50	1.50	10.46	34.16	47.00	-12.84
356.37575	189	H	1.00	27.13	15.33	0.83	10.46	32.83	47.00	-14.17
356.37575	331	V	1.00	25.69	15.33	0.83	10.46	31.39	47.00	-15.61
562.51353	125	H	1.16	21.96	18.80	1.09	10.46	31.39	47.00	-15.61
562.51353	134	V	1.00	21.60	18.80	1.09	10.46	31.03	47.00	-15.97
97.96994	121	H	1.95	22.66	9.79	0.23	10.46	22.22	40.00	-17.78
97.96994	360	V	1.00	25.50	9.79	0.23	10.46	25.06	40.00	-14.94
499.98747	248	H	1.00	19.41	18.00	1.00	10.46	27.95	47.00	-19.05
499.98747	124	V	1.00	23.92	18.00	1.00	10.46	32.46	47.00	-14.54

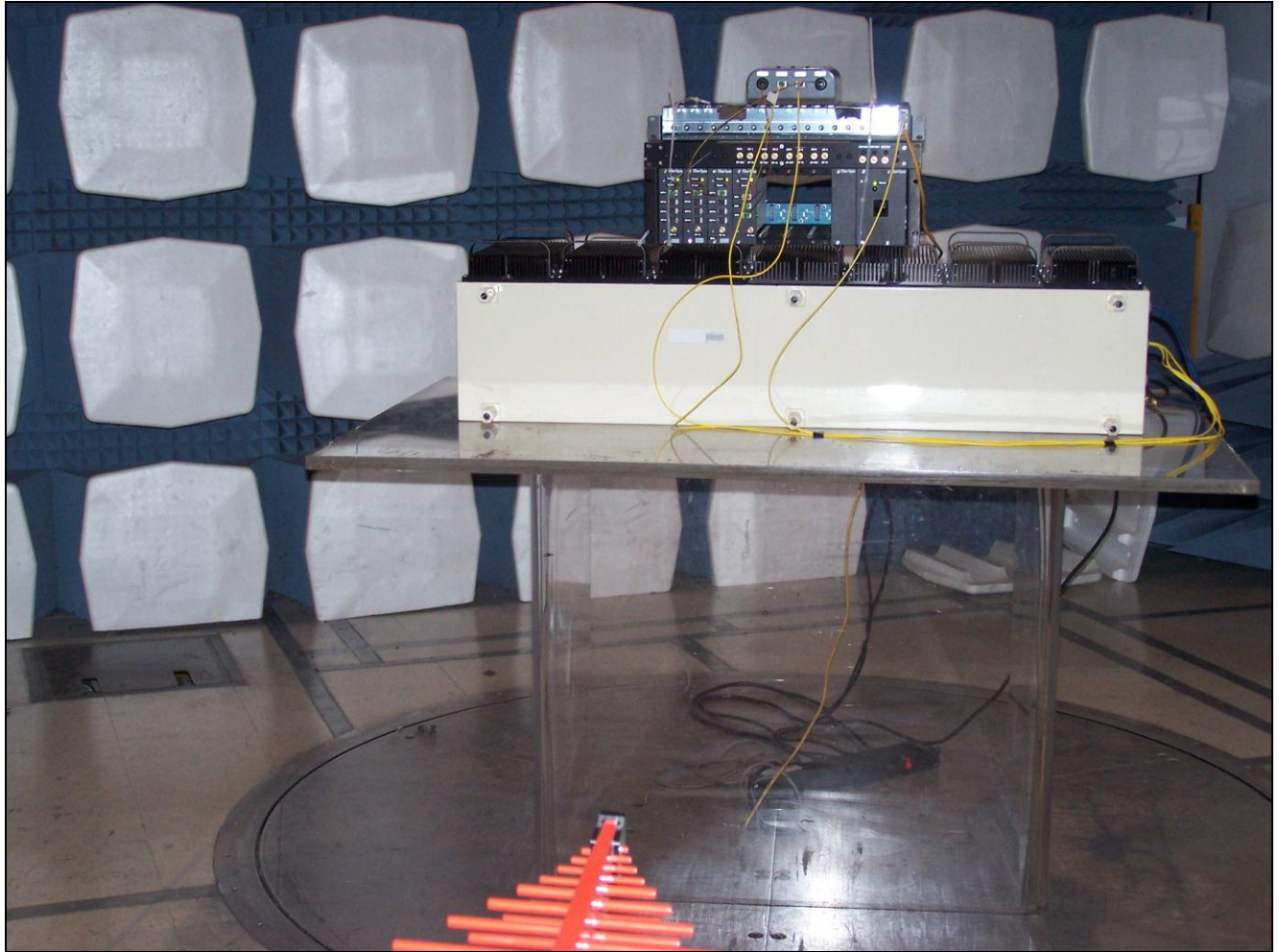
Table 12. Radiated Emissions Limits, Test Results, ICES-003 Limits

Note: The EUT was tested at 3 m.



Plot 4. Radiated Emissions, ICES-003 Limits

Radiated Emission Limits Test Setup



Photograph 2. Radiated Emission, Test Setup



IV. Electromagnetic Compatibility Criteria for Intentional Radiators



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1046 RF Power Output

Test Requirement(s): §2.1046 and §27.50(d)

The average equivalent isotropically radiated power (e.i.r.p.) for fixed, mobile and portable transmitters in the 1710-1755 MHz shall not exceed 1 watt.

Test Procedures: *RF power output measurement* was made at the RF output terminal using a spectrum analyzer for uplink and downlink.

Test Results: Equipment complies with 47CFR 2.1046 and 27.50(d).

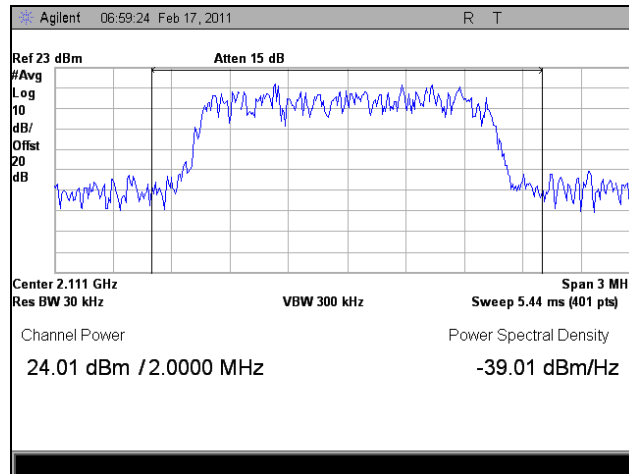
The following page show measurements of RF Power output which is recorded below. Power was measured on port 1 and then the combined power on all 3 ports was calculated. The plots below show the power on port 1.

Test Engineer(s): Dusmantha Tennakoon

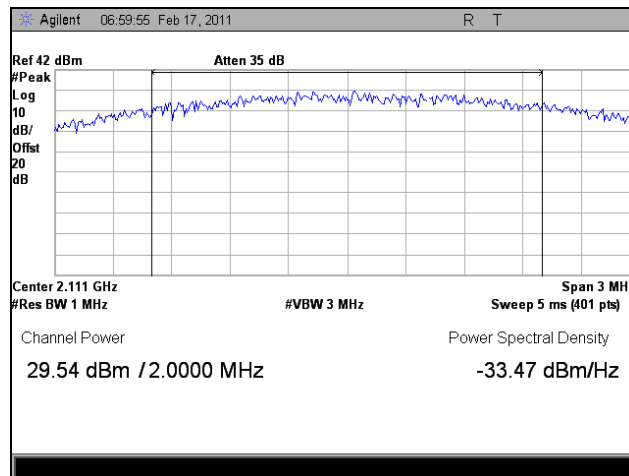
Test Date(s): 02/23/11

Band	Link	Frequency (MHz)	Power In (dBm)	Avg Power Out-Port 1 (dBm)	Peak Power Out- Port 1(dBm)	Summed Avg Power- Port 1+2+3 (dBm)	Gain (dB)
LTE	DL	2110.700	-11.26	24.01	29.54	27.53	35.3
		2132.000	-11.26	24.40	30.24	27.92	35.7
		2154.300	-11.26	25.82	30.96	29.34	37.1
	UL	1710.700	-36	-19.71	-13.41	-16.19	16.3
		1735.000	-36	-20.15	-15.26	-16.63	15.9
		1754.300	-36	-21.11	-15.88	-17.59	14.9
UMTS	DL	2112.500	-12	24.78	30.85	28.30	36.8
		2132.000	-12	24.38	30.17	27.90	36.4
		2152.500	-12	24.46	30.30	27.98	36.5
	UL	1712.500	-34	-17.56	-11.85	-14.04	16.4
		1735.000	-34	-19.55	-13.49	-16.03	14.5
		1752.500	-34	-20.22	-14.26	-16.70	13.8

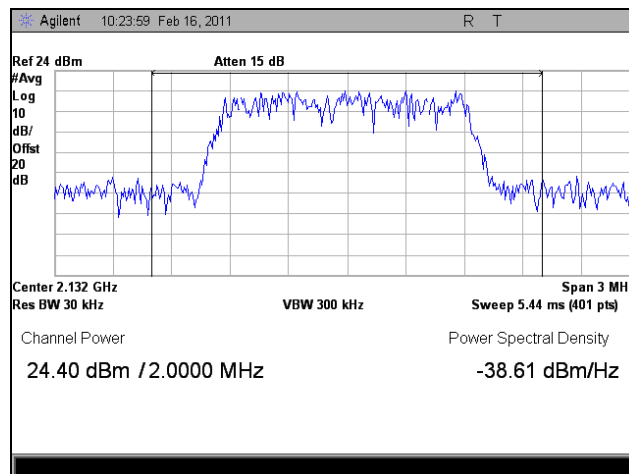
Table 13. RF Output Power, Test Results



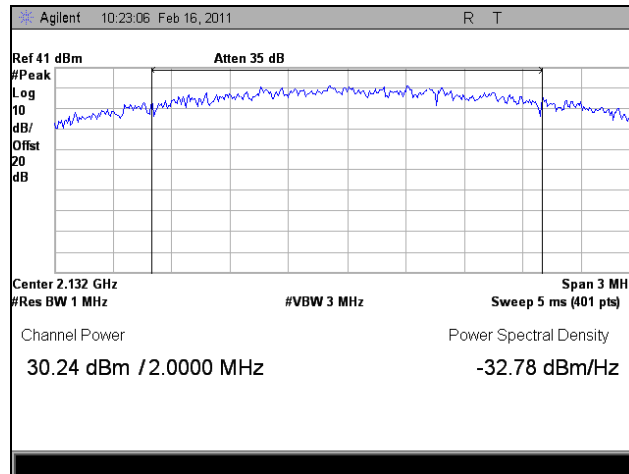
Plot 5. 2110.7 MHz, RF Output Power, Downlink, LTE, Average



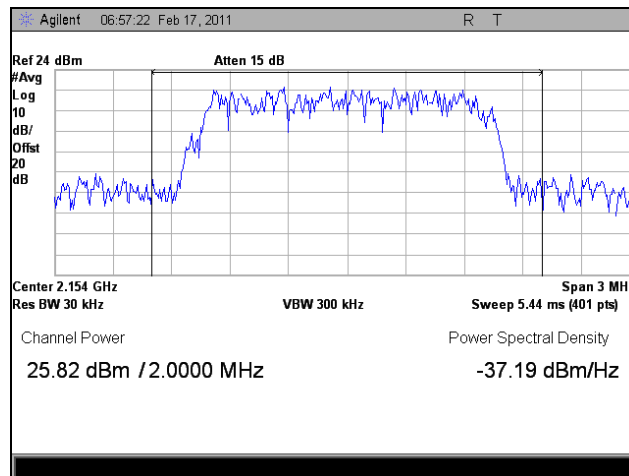
Plot 6. 2110.7 MHz, RF Output Power, Downlink, LTE, Peak



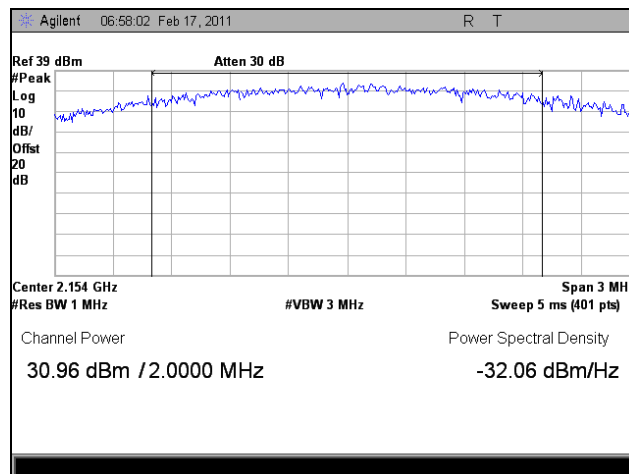
Plot 7. 2132 MHz, RF Output Power, Downlink, LTE, Average



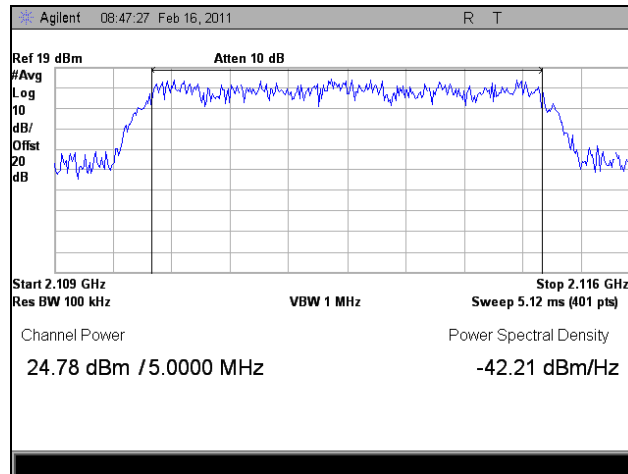
Plot 8. 2132 MHz, RF Output Power, Downlink, LTE, Peak



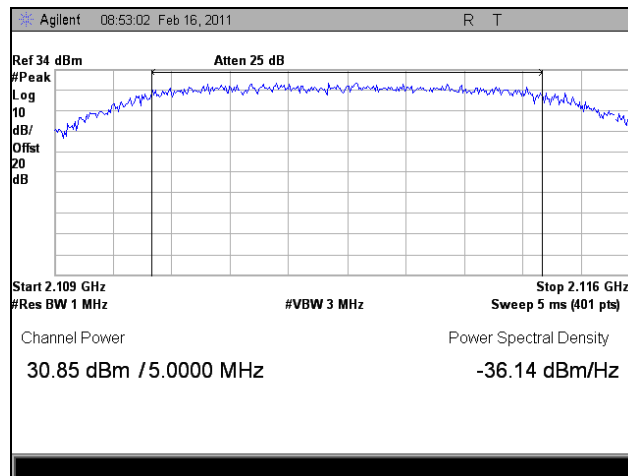
Plot 9. 2154.5 MHz, RF Output Power, Downlink, LTE, Average



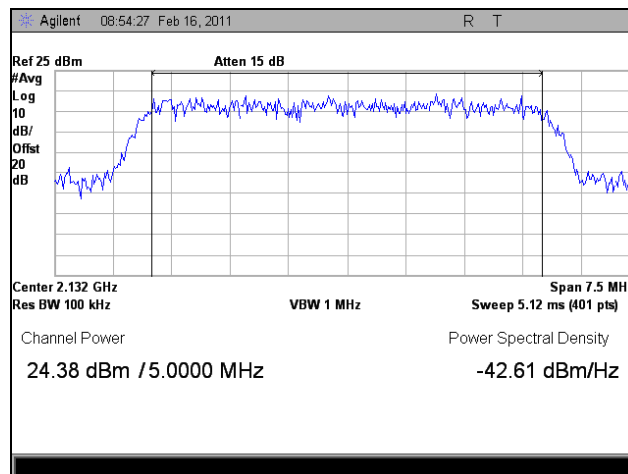
Plot 10. 2154.5 MHz, RF Output Power, Downlink, LTE, Peak



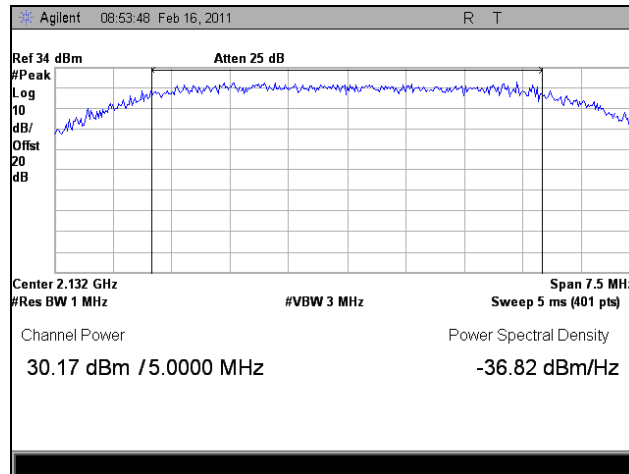
Plot 11. 2112.5 MHz, RF Output Power, Downlink, UMTS, Average



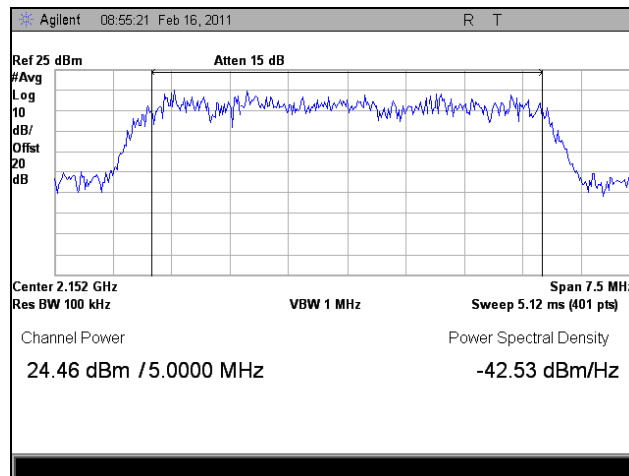
Plot 12. 2112.5 MHz, RF Output Power, Downlink, UMTS, Peak



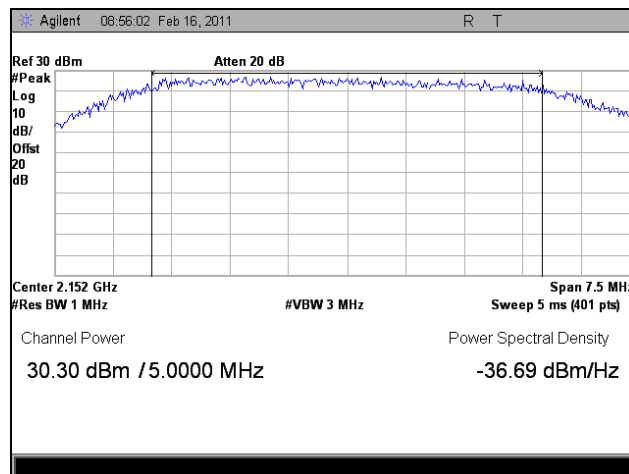
Plot 13. 2132 MHz, RF Output Power, Downlink, UMTS, Average



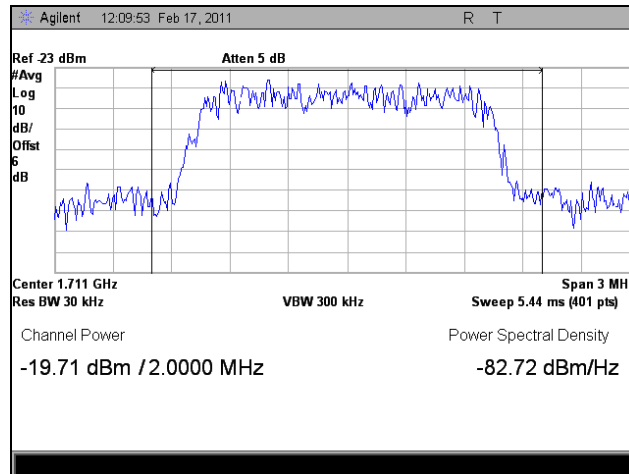
Plot 14. 2132 MHz, RF Output Power, Downlink, UMTS, Peak



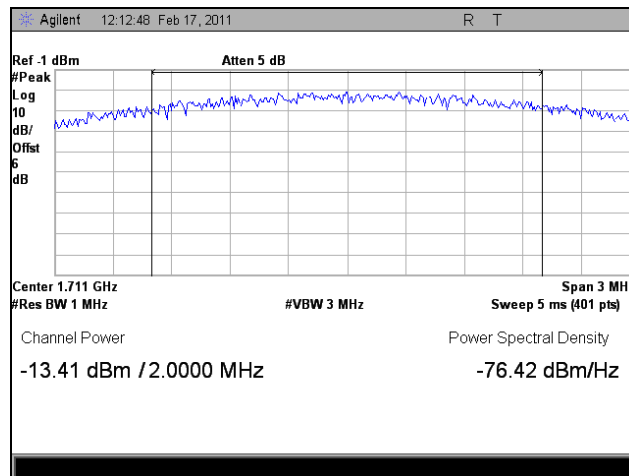
Plot 15. 2152.5 MHz, RF Output Power, Downlink, UMTS, Average



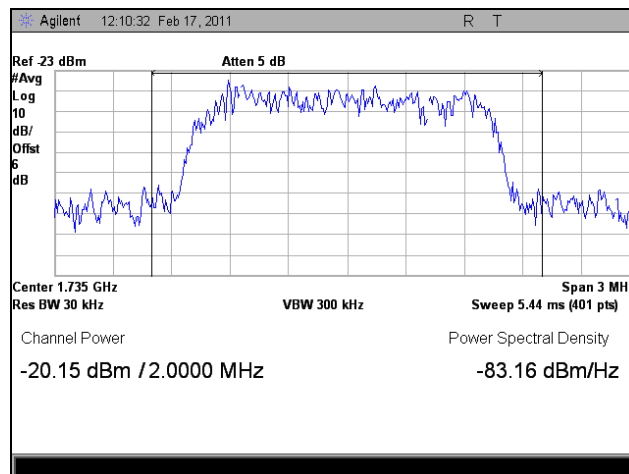
Plot 16. 2152.5 MHz, RF Output Power, Downlink, UMTS, Peak



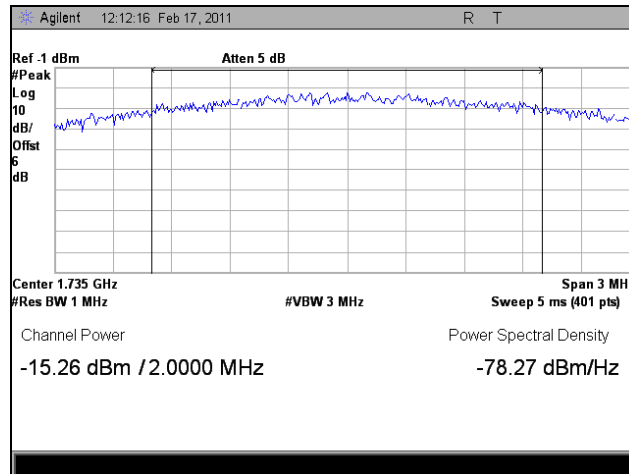
Plot 17. 1710.7 MHz, RF Output Power, Uplink, LTE, Average



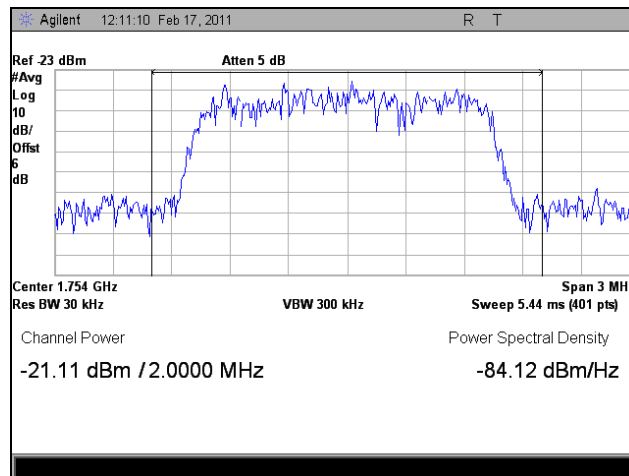
Plot 18. 1710.7 MHz, RF Output Power, Uplink, LTE, Peak



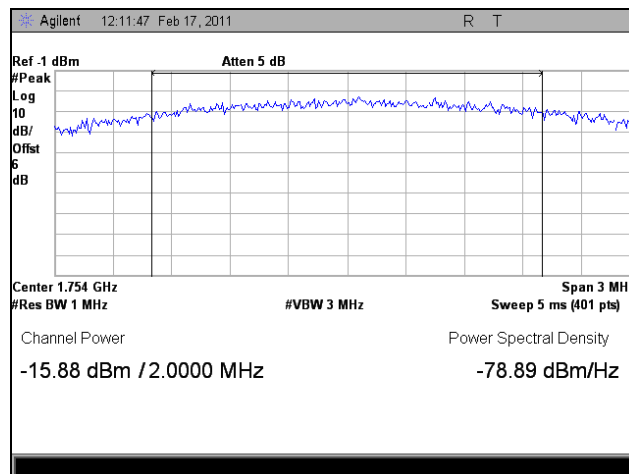
Plot 19. 1735 MHz, RF Output Power, Uplink, LTE, Average



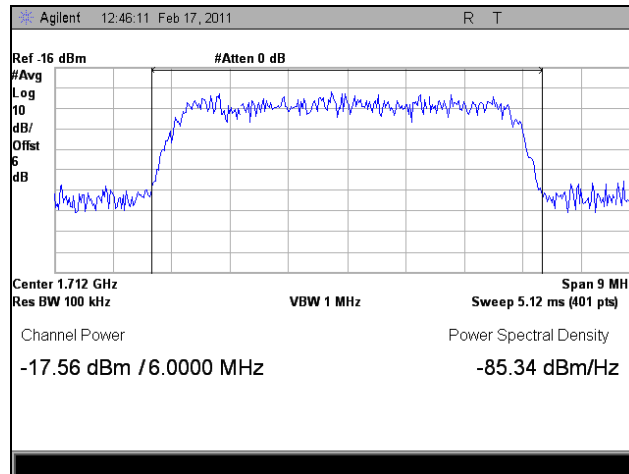
Plot 20. 1735 MHz, RF Output Power, Uplink, LTE, Peak



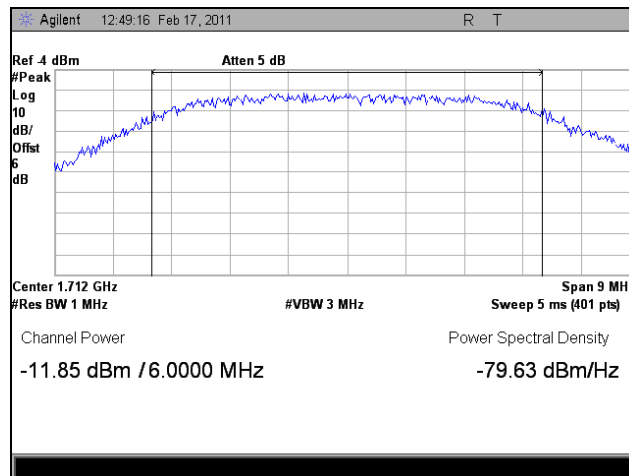
Plot 21. 1754.3 MHz, RF Output Power, Uplink, LTE, Average



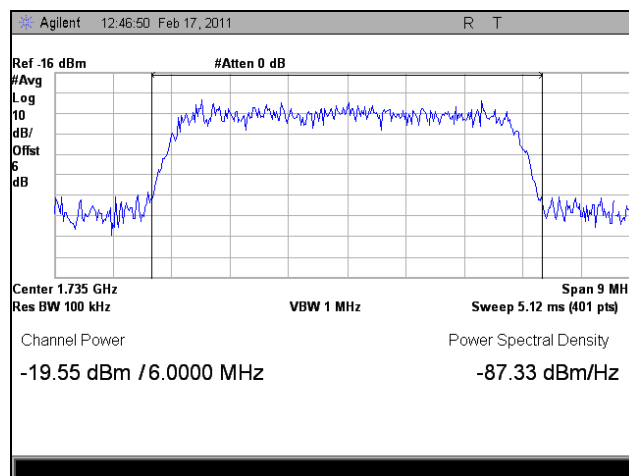
Plot 22. 1754.3 MHz, RF Output Power, Uplink, LTE, Peak



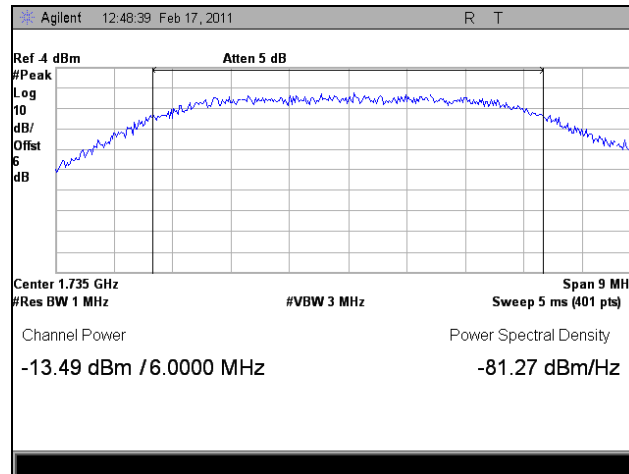
Plot 23. 1712.5 MHz, RF Output Power, Uplink, UMTS, Average



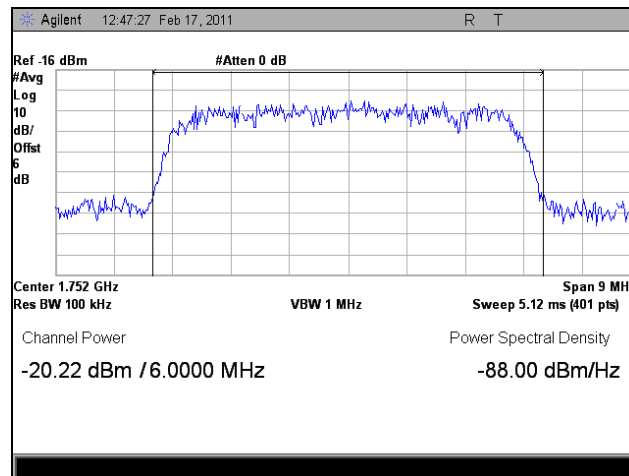
Plot 24. 1712.5 MHz, RF Output Power, Uplink, UMTS, Peak



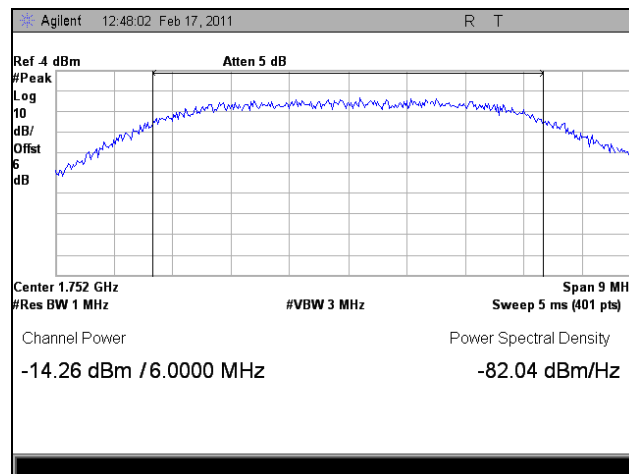
Plot 25. 1735 MHz, RF Output Power, Uplink, UMTS, Average



Plot 26. 1735 MHz, RF Output Power, Uplink, UMTS, Peak



Plot 27. 1752.5 MHz, RF Output Power, Uplink, UMTS, Average



Plot 28. 1752.5 MHz, RF Output Power, Uplink, UMTS, Peak

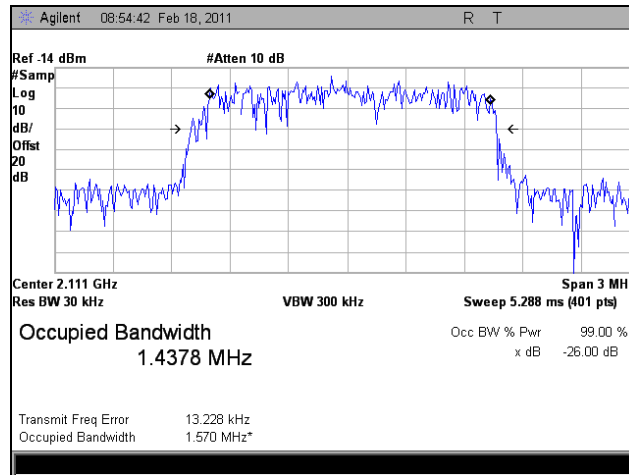


Photograph 3. RF Power, Test Setup

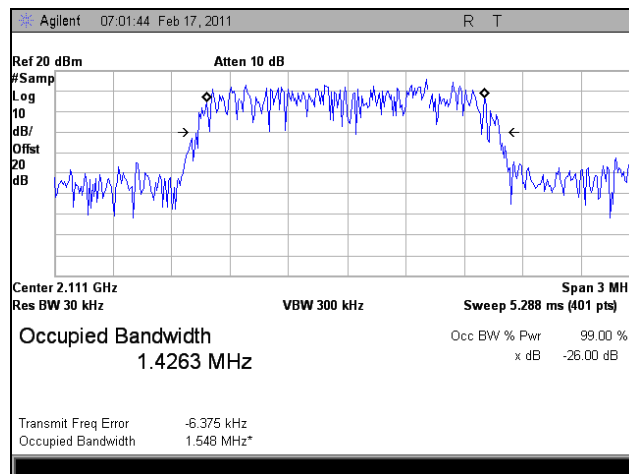


§ 2.1049 Occupied Bandwidth

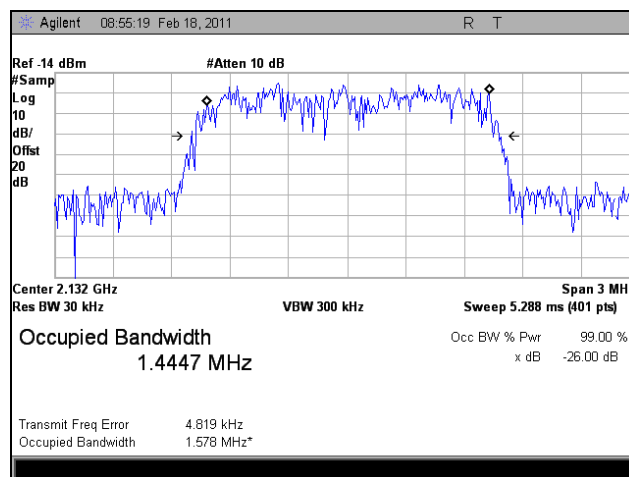
Test Requirement(s):	§ 2.1049 Measurements required: Occupied bandwidth: The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.
Test Procedures:	As required by 47 CFR 2.1049, <i>occupied bandwidth measurements</i> were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.
Test Results:	Equipment complies with Section 2.1049. The following pages show measurements of 99% and -26 dB Occupied Bandwidth plots.
Test Engineer(s):	Dusmantha Tennakoon
Test Date(s):	02/23/11



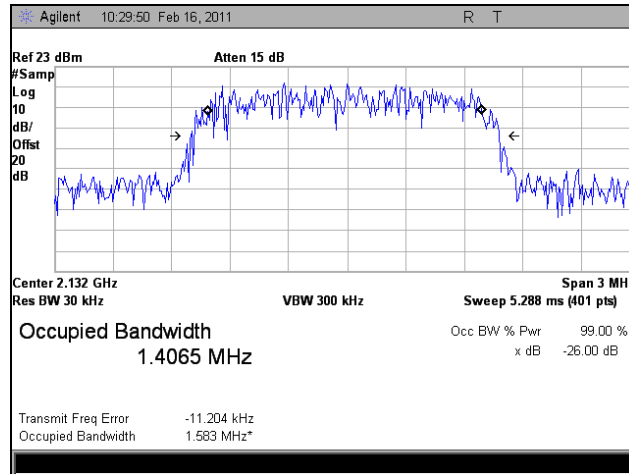
Plot 29. 2110.7 MHz, Occupied Bandwidth, Downlink, LTE, In



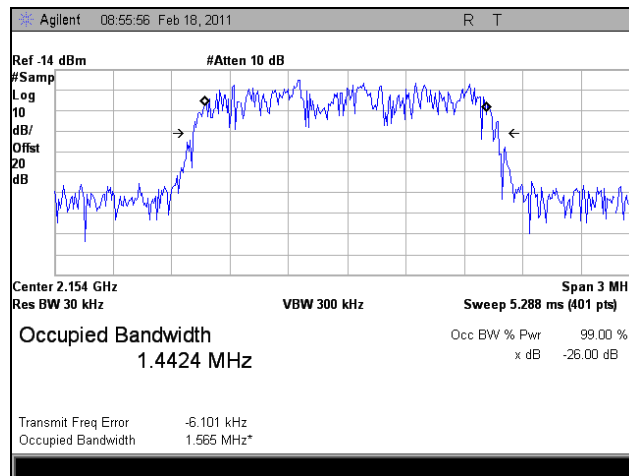
Plot 30. 2110.7 MHz, Occupied Bandwidth, Downlink, LTE, Out



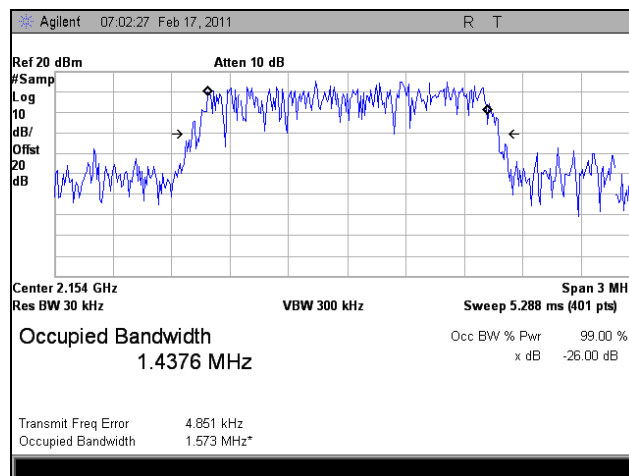
Plot 31. 2132 MHz, Occupied Bandwidth, Downlink, LTE, In



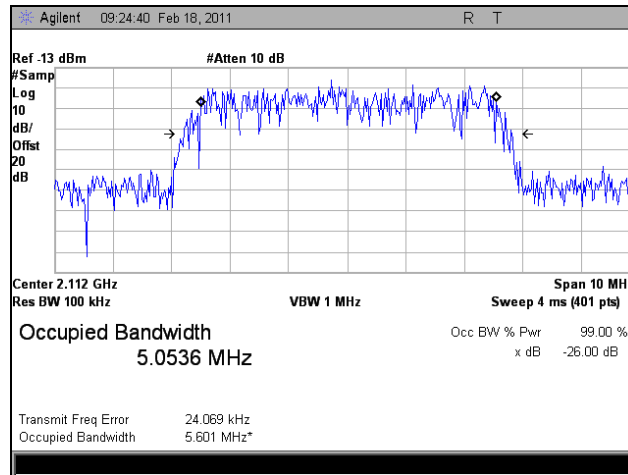
Plot 32. 2132 MHz, Occupied Bandwidth, Downlink, LTE, Out



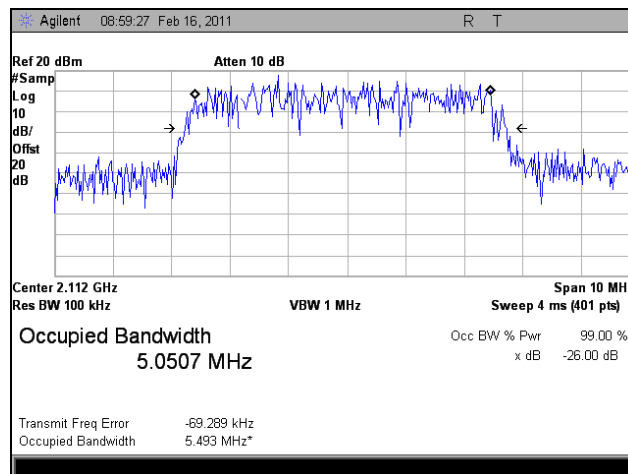
Plot 33. 2154.3 MHz, Occupied Bandwidth, Downlink, LTE, In



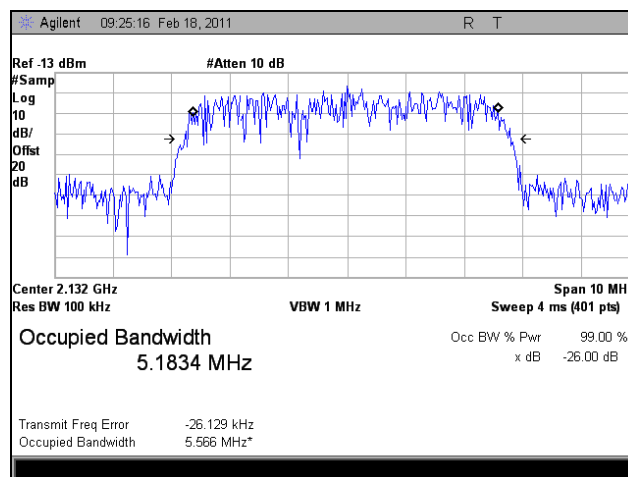
Plot 34. 3154.3 MHz, Occupied Bandwidth, Downlink, LTE, Out



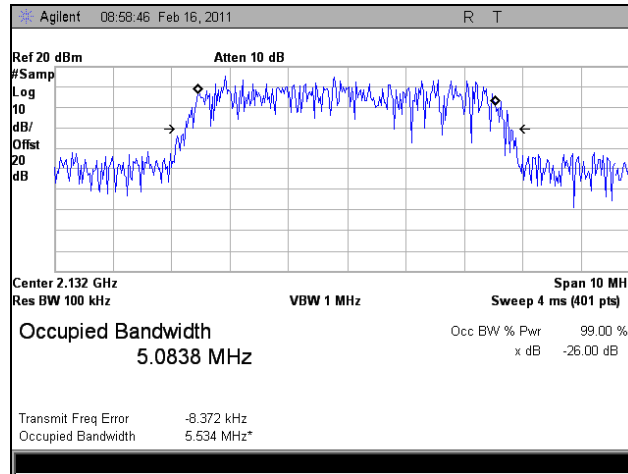
Plot 35. 2112.5 MHz, Occupied Bandwidth, Downlink, UMTS, In



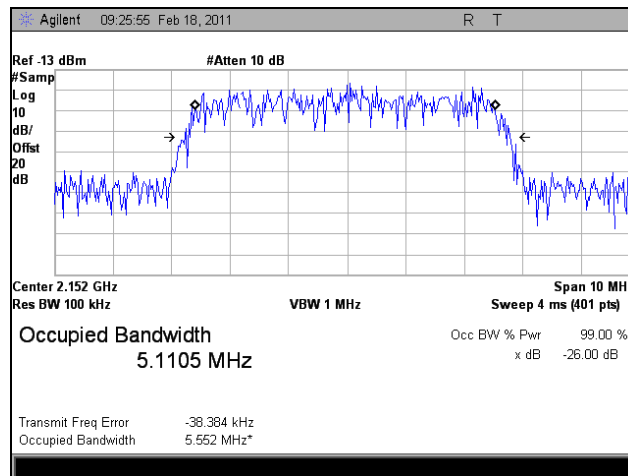
Plot 36. 2112.5 MHz, Occupied Bandwidth, Downlink, UMTS, Out



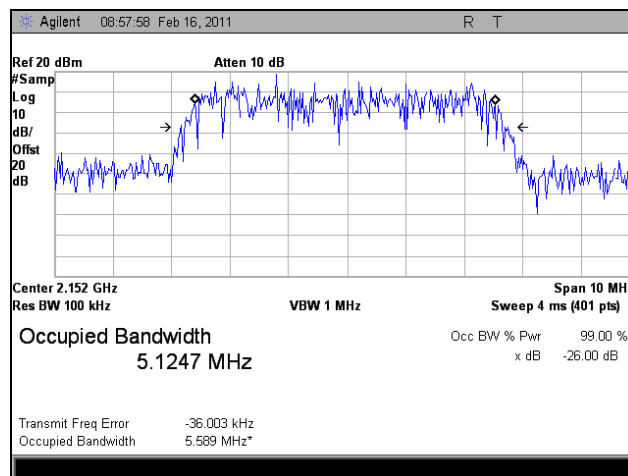
Plot 37. 2132 MHz, Occupied Bandwidth, Downlink, UMTS, In



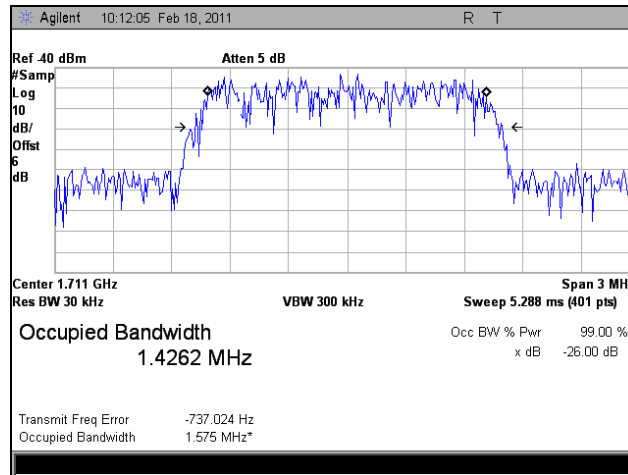
Plot 38. 2132 MHz, Occupied Bandwidth, Downlink, UMTS, Out



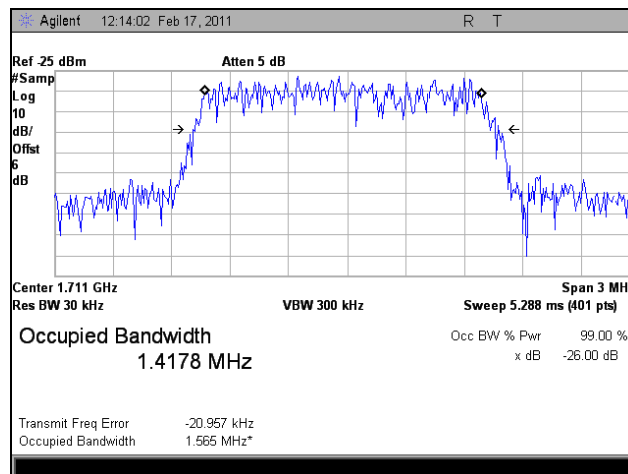
Plot 39. 2152.5 MHz, Occupied Bandwidth, Downlink, UMTS, In



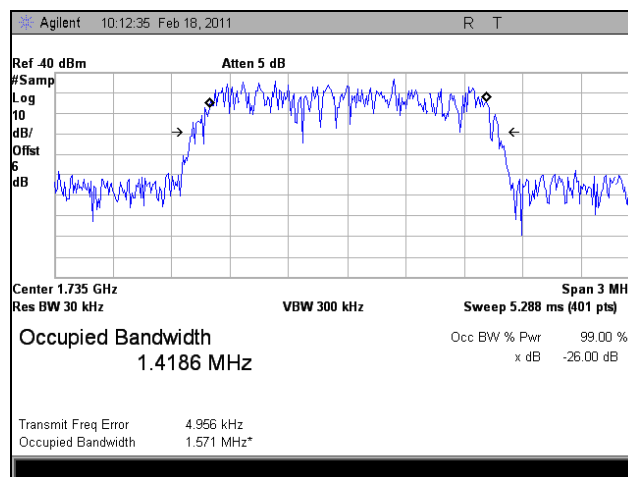
Plot 40. 2152.5 MHz, Occupied Bandwidth, Downlink, UMTS, Out



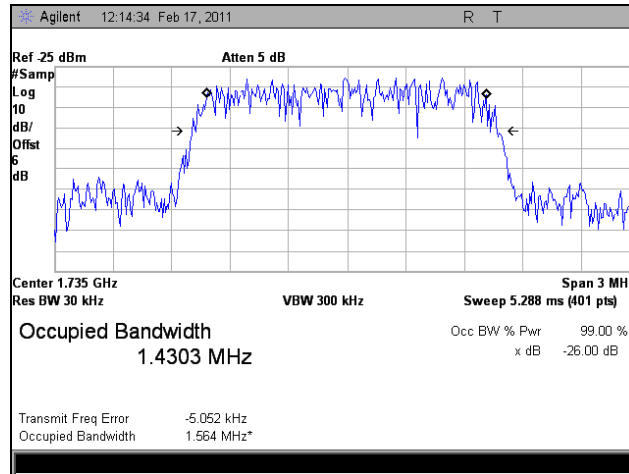
Plot 41. 1710.7 MHz, Occupied Bandwidth, Uplink, LTE, In



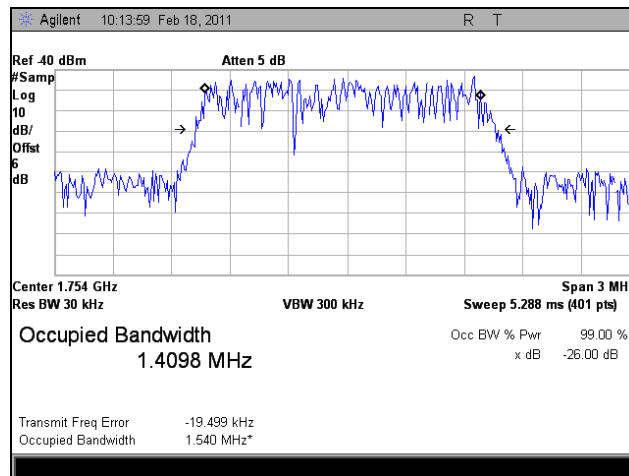
Plot 42. 1710.7 MHz, Occupied Bandwidth, Uplink, LTE, Out



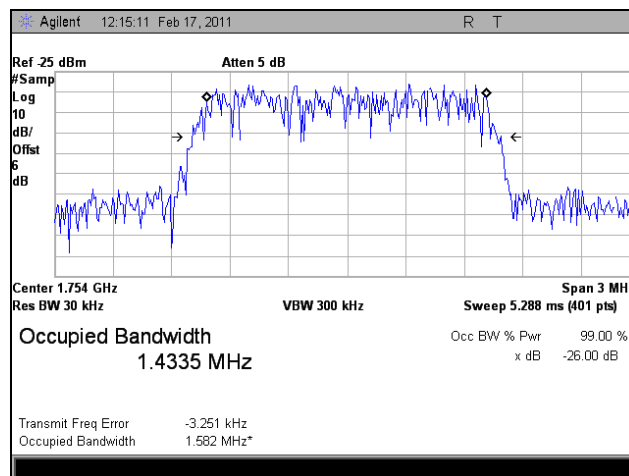
Plot 43. 1735 MHz, Occupied Bandwidth, Uplink, LTE, In



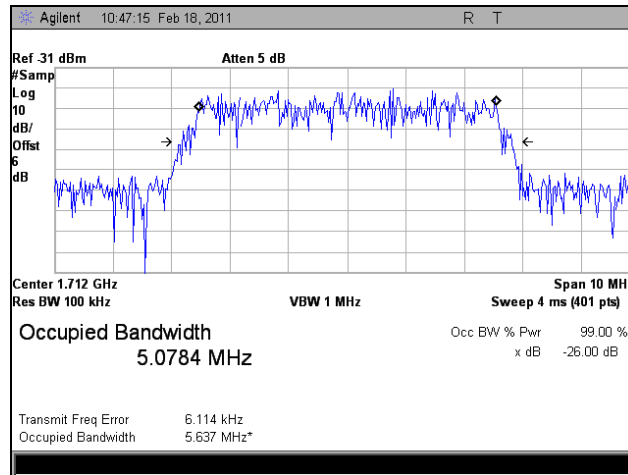
Plot 44. 1735 MHz, Occupied Bandwidth, Uplink, LTE, Out



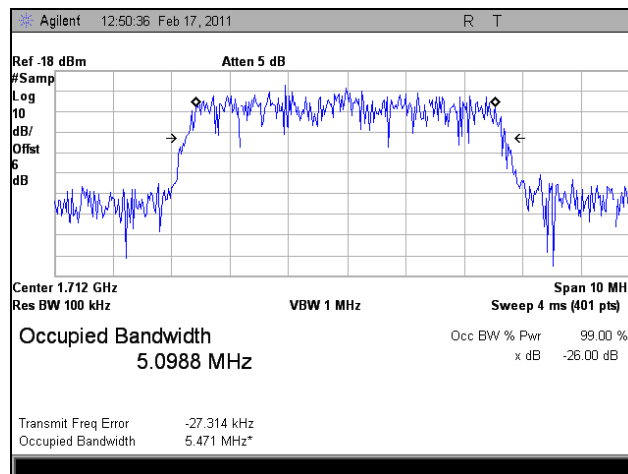
Plot 45. 1754.3 MHz, Occupied Bandwidth, Uplink, LTE, In



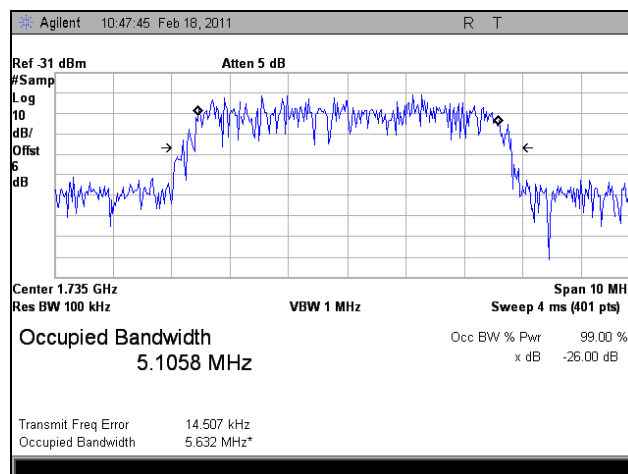
Plot 46. 1754.3 MHz, Occupied Bandwidth, Uplink, LTE, Out



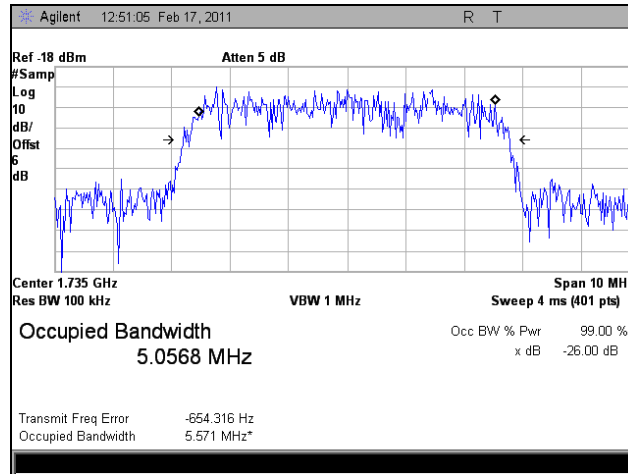
Plot 47. 1712.5 MHz, Occupied Bandwidth, Uplink, UMTS, In



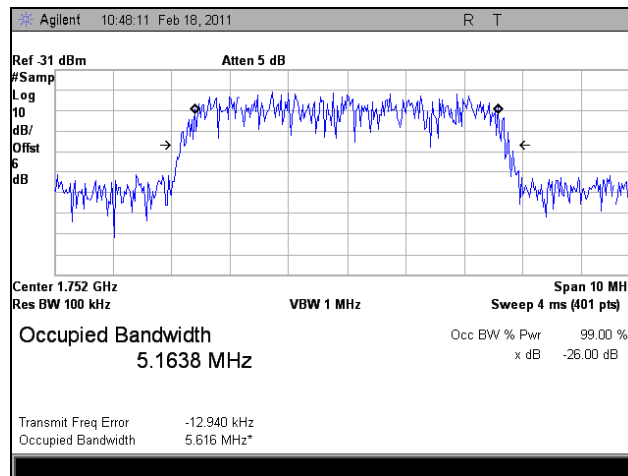
Plot 48. 1712.5 MHz, Occupied Bandwidth, Uplink, UMTS, Out



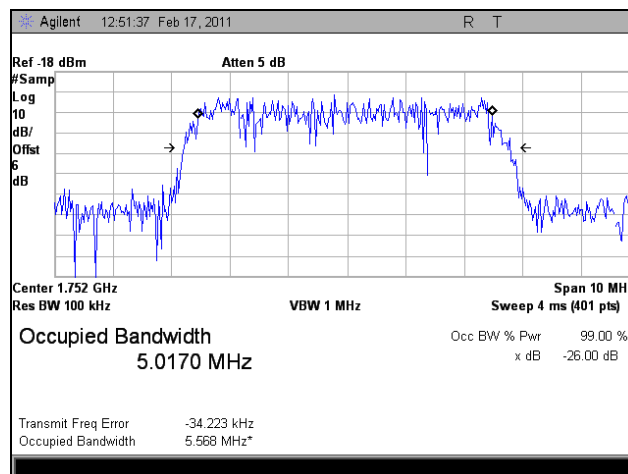
Plot 49. 1735 MHz, Occupied Bandwidth, Uplink, UMTS, In



Plot 50. 1735 MHz, Occupied Bandwidth, Uplink, UMTS, Out



Plot 51. 1752.5 MHz, Occupied Bandwidth, Uplink, UMTS, In



Plot 52. 1752.5 MHz, Occupied Bandwidth, Uplink, UMTS, Out



Photograph 4. Occupied Bandwidth, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): § 2.1053 and 27.53(g) Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emissions outside a licensee's frequency block shall be attenuated below the transmitter power P by at least $43+10\log(P)$.



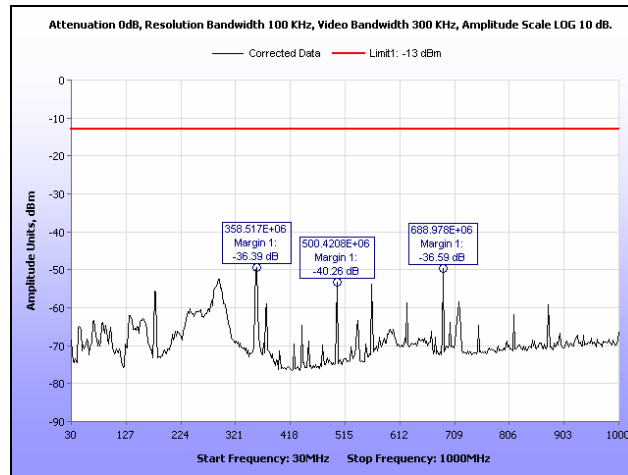
Test Procedures: As required by 47 CFR 2.1053, the *field strengths of radiated spurious emissions* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The distance between the EUT and the test antenna was 3 meters for below 1 GHz and 1m for frequencies above 1 GHz. The EUT's RF ports were connected to a dummy load. The intensities of the radiated emissions were maximized by rotating the turntable 360 degrees and varying the receive antenna from 1 to 4m. Measurements were made with the receive antenna in both horizontal and vertical polarizations.

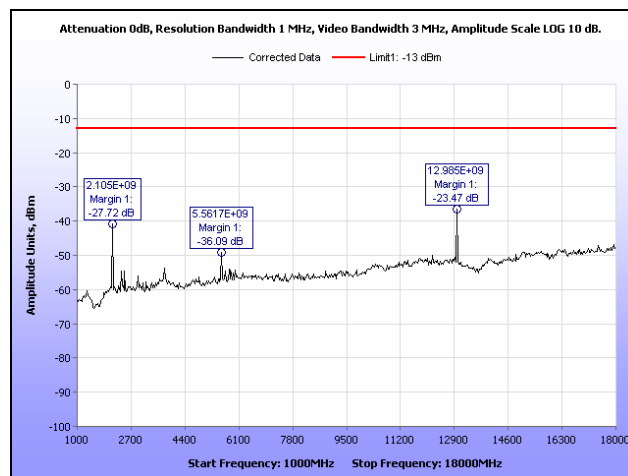
Test Results: Equipment complies with Section 2.1053. The limit for spurs is -13 dBm. Measurements revealed that no spurs came even close to this limit. Therefore, measurements using substitution method were not performed. Also, testing was performed using a CW signal. The following plots have been corrected.

Test Engineer: Dusmantha Tennakoon

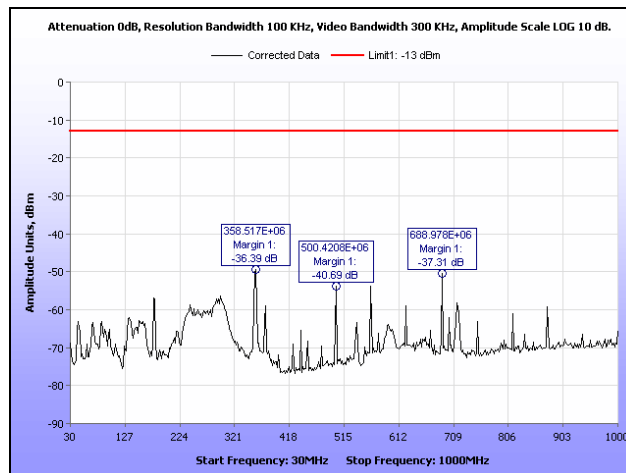
Test Date(s): 02/23/11



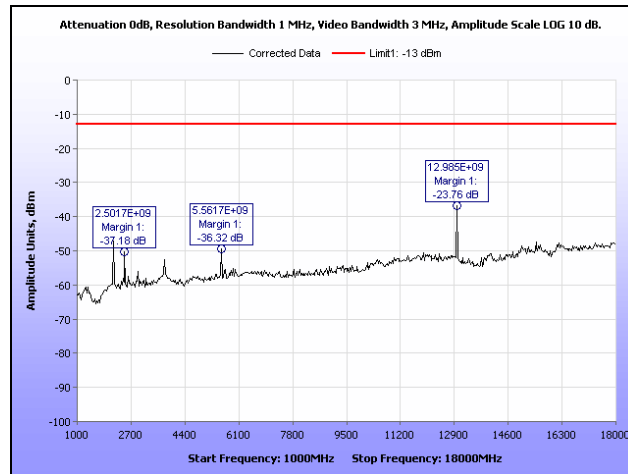
Plot 53. 2110.7 MHz, Radiated Spurious Emissions, Downlink, 30 MHz – 1 GHz



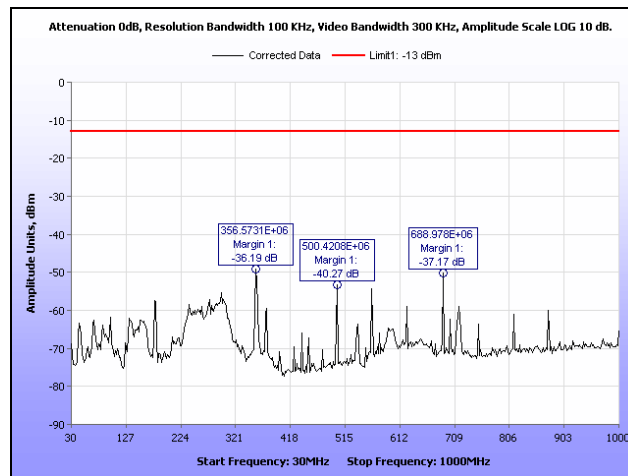
Plot 54. 2110.7 MHz, Radiated Spurious Emissions, Downlink, 1 GHz – 18 GHz



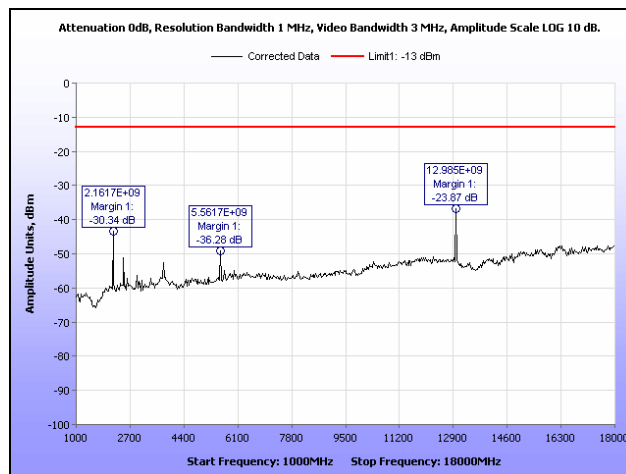
Plot 55. 2132 MHz, Radiated Spurious Emissions, Downlink, 30 MHz – 1 GHz



Plot 56. 2132 MHz, Radiated Spurious Emissions, Downlink, 1 GHz – 18 GHz

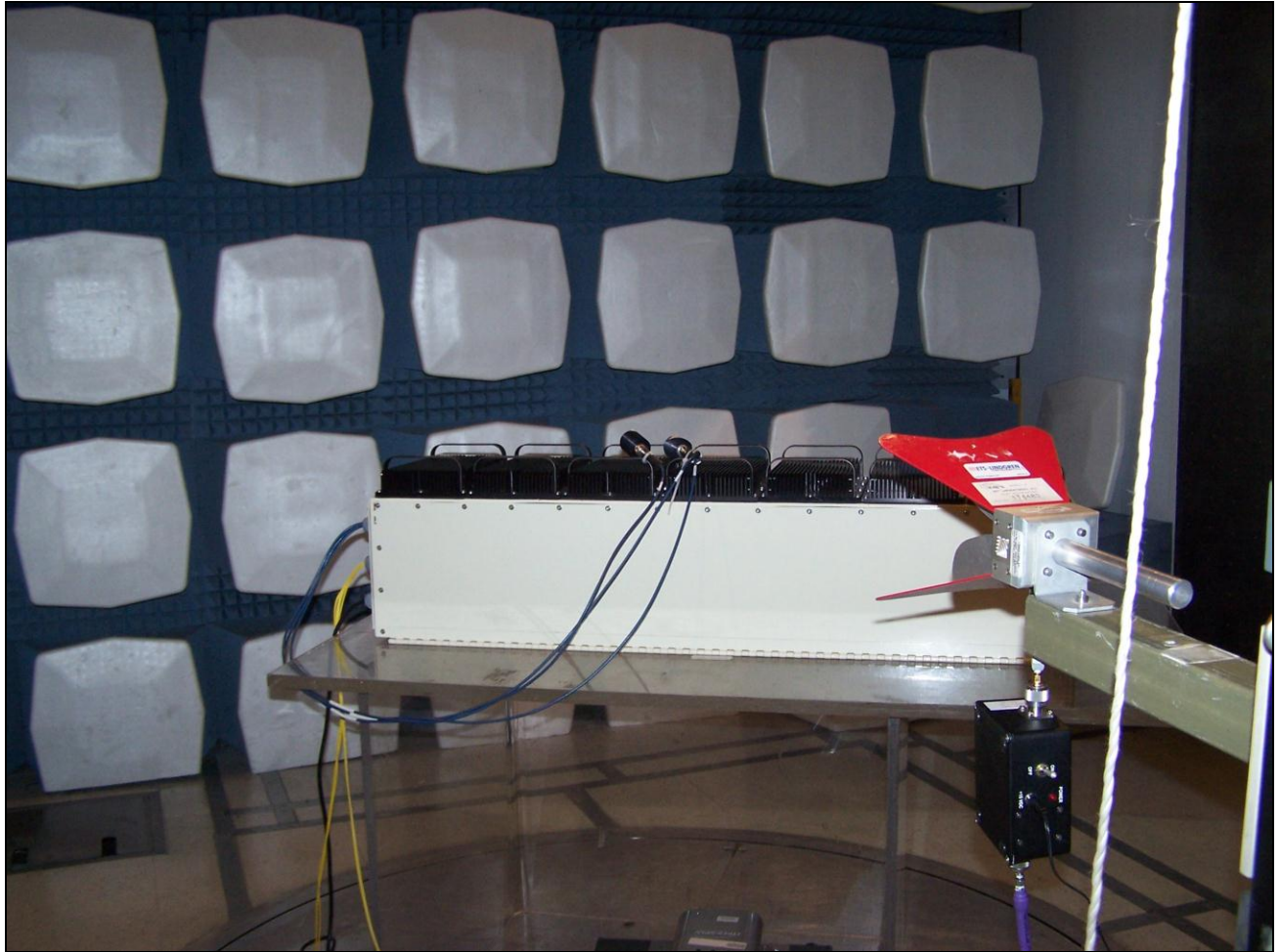


Plot 57. 2154.3 MHz, Radiated Spurious Emissions, Downlink, 30 MHz – 1 GHz



Plot 58. 2154.3 MHz, Radiated Spurious Emissions, Downlink, 1 GHz – 18 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators



Photograph 5. Radiated Emissions, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s): § 2.1051 and 27.53(g) **Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate.

For operations in the 1710-1755 MHz and 2110-2155 MHz bands, the power of any emissions outside a licensee's frequency block shall be attenuated below the transmitter power P by at least $43 + 10\log(P)$.

Test Procedures: A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the OEM. A spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. The spectrum was investigated from 30MHz to the 10th harmonic of the carrier.

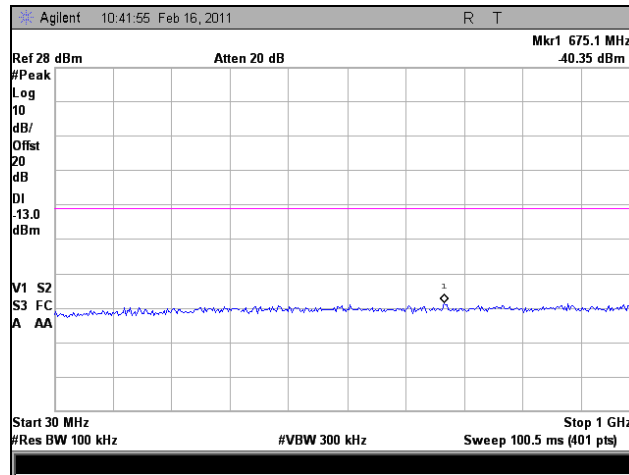
The inter-modulation requirements were performed in a similar manner as described above. The spectrum analyzer was set to 100KHz RBW and 300KHz VBW. Two modulated carriers were injected into the EUT. The in band spurious emissions were investigated. The filter response has also been measured and recorded.

Test Results: Equipment complies with Section 2.1051 and 27.53(g). The following pages show measurements of Spurious Emission plots

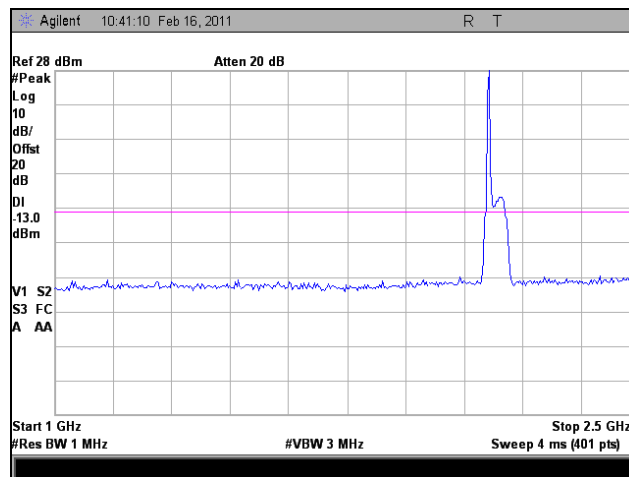
The following analysis and plots are included below to illustrate compliance with the required rule parts.

Test Engineer(s): Dusmantha Tennakoon

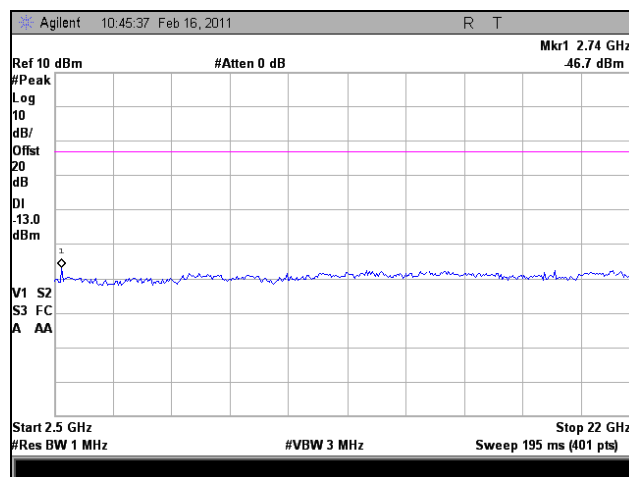
Test Date(s): 02/23/11



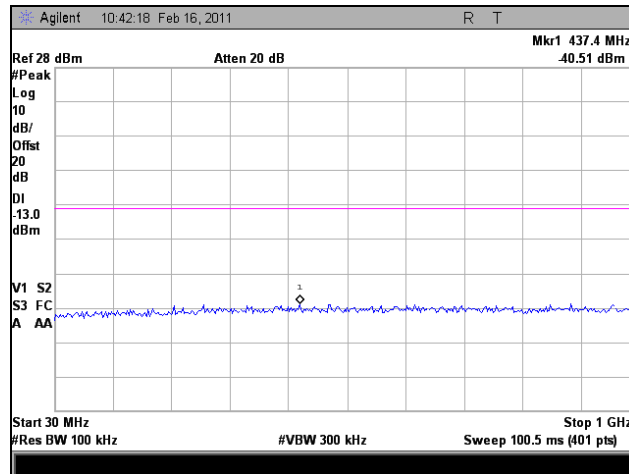
Plot 59. 2111.4 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 30 MHz – 1 GHz



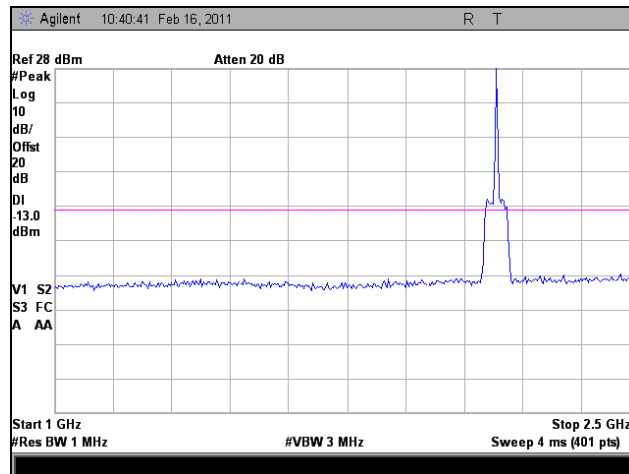
Plot 60. 2111.4 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 1 GHz – 2.5 GHz



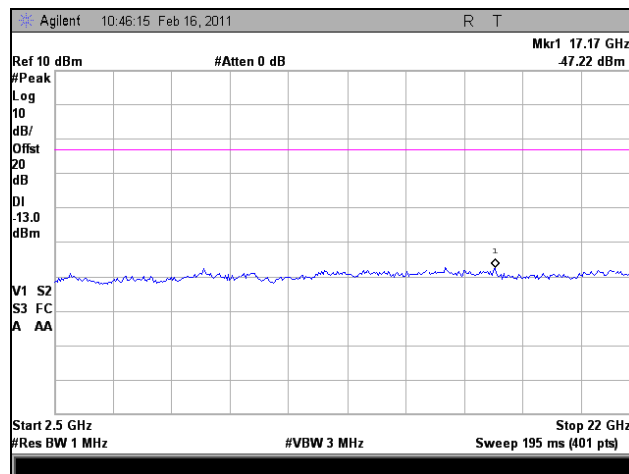
Plot 61. 2111.4 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 2.5 GHz – 22 GHz



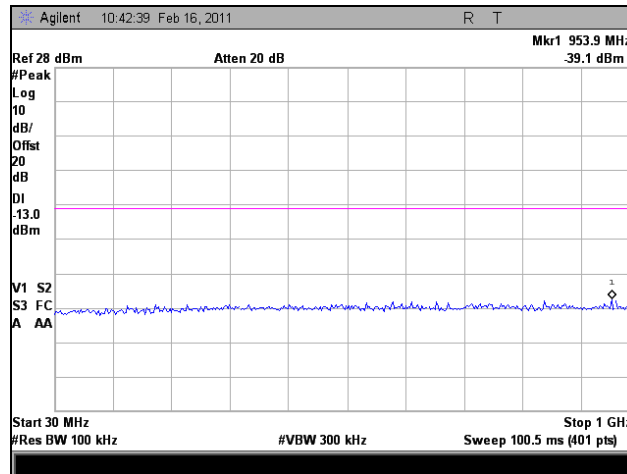
Plot 62. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 30 MHz – 1 GHz



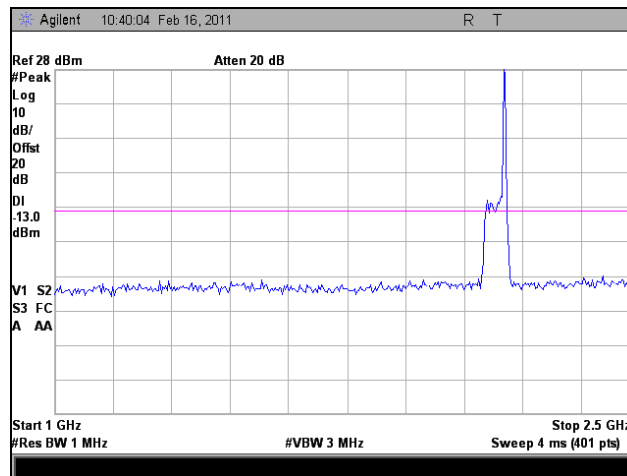
Plot 63. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 1 GHz – 2.5 GHz



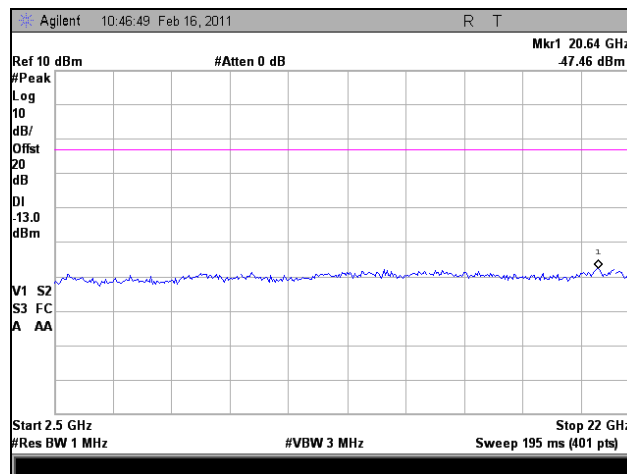
Plot 64. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 2.5 GHz – 22 GHz



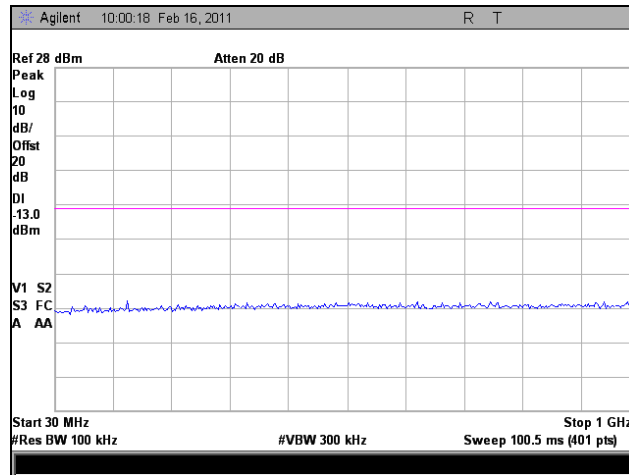
Plot 65. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 30 MHz – 1 GHz



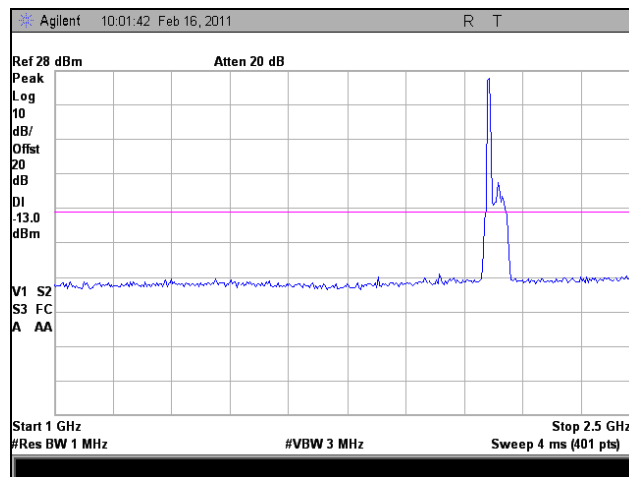
Plot 66. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 1 GHz – 2.5 GHz



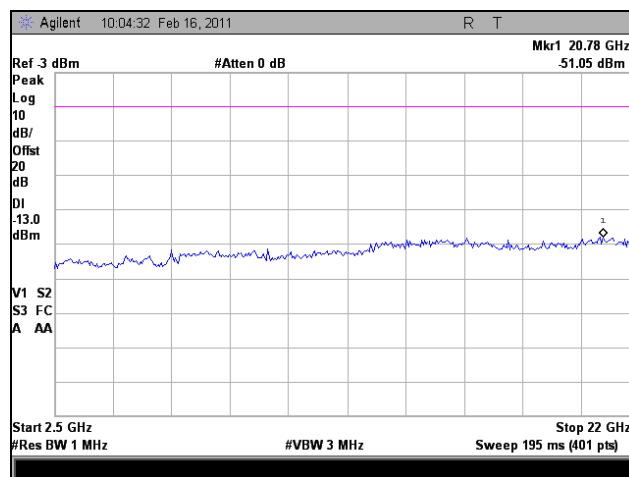
Plot 67. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, LTE, 2.5 GHz – 22 GHz



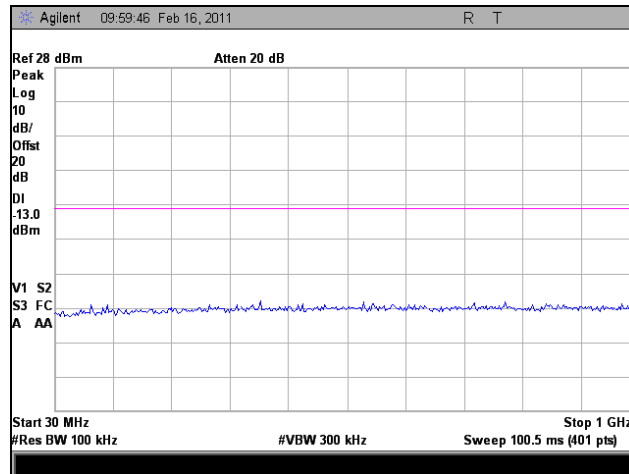
Plot 68. 2112.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 30 MHz – 1 GHz



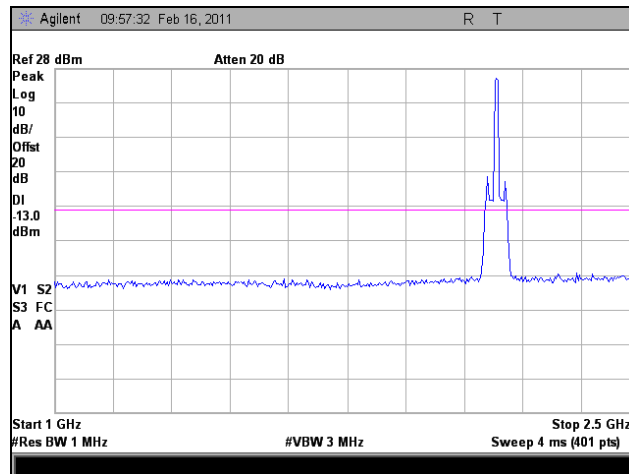
Plot 69. 2112.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 1 GHz – 2.5 GHz



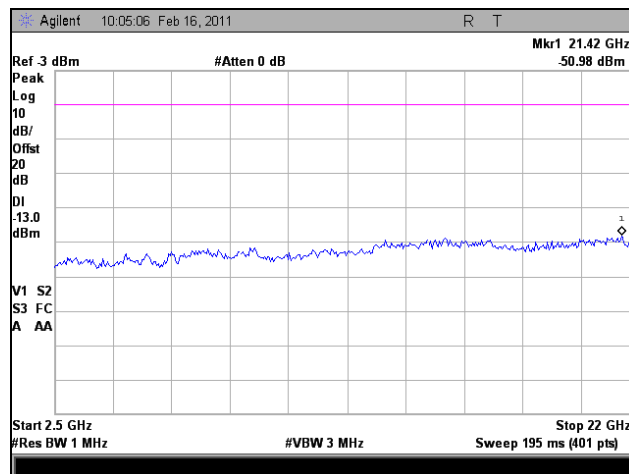
Plot 70. 2112.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 2.5 GHz – 22 GHz



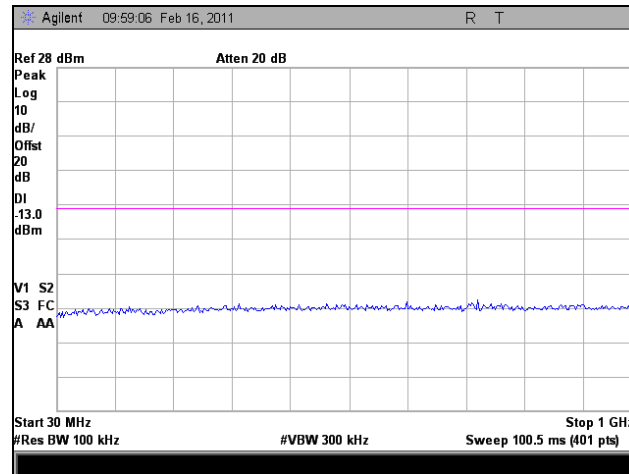
Plot 71. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 30 MHz – 1 GHz



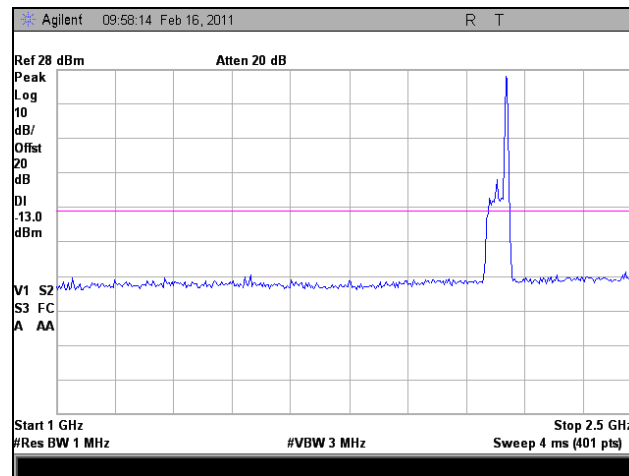
Plot 72. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 1 GHz – 2.5 GHz



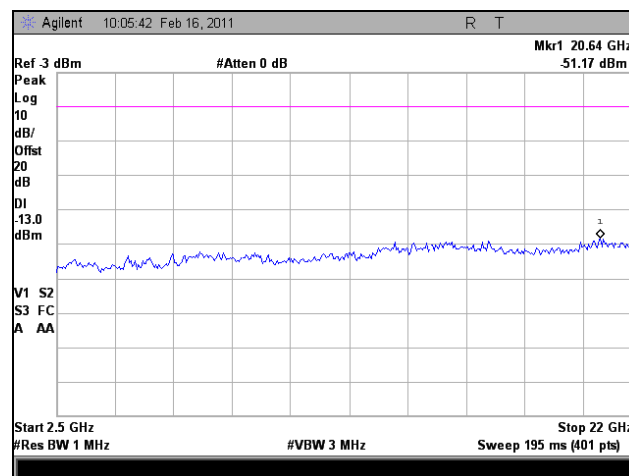
Plot 73. 2132 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 2.5 GHz – 22 GHz



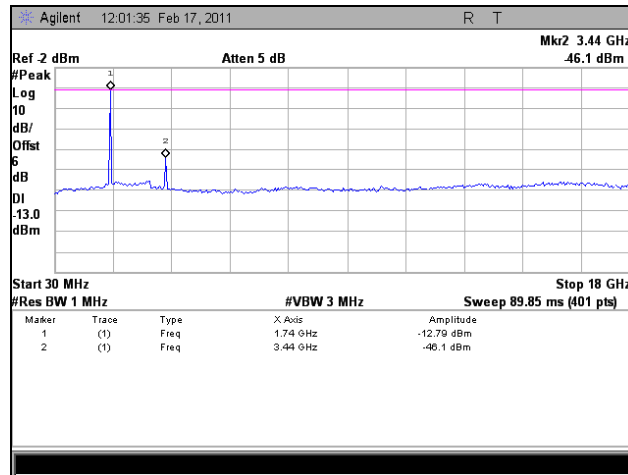
Plot 74. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 30 MHz – 1 GHz



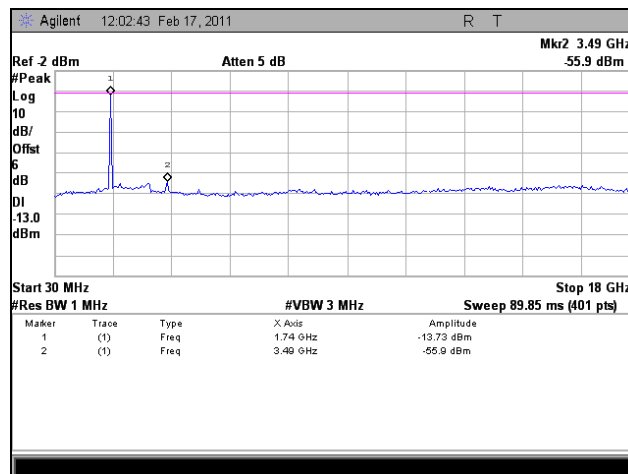
Plot 75. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 1 GHz – 2.5 GHz



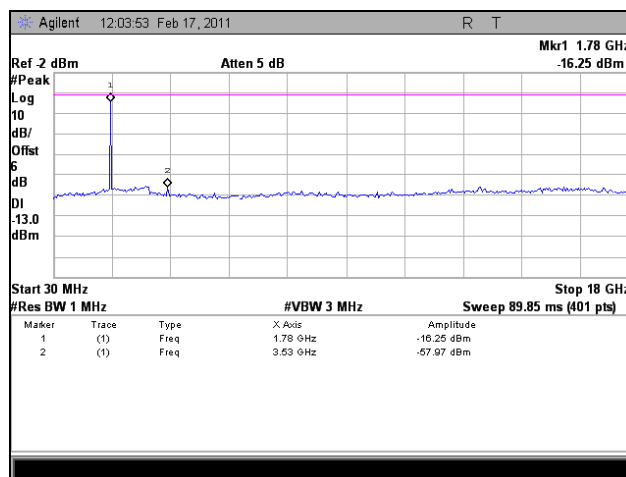
Plot 76. 2152.5 MHz, Spurious Emissions at Antenna Terminal, Downlink, UMTS, 2.5 GHz – 22 GHz



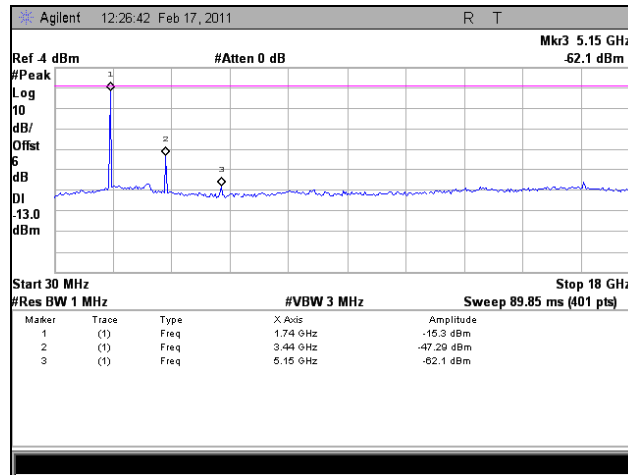
Plot 77. 1710.7 MHz, Spurious Emissions at Antenna Terminal, Uplink, LTE, 30 MHz – 18 GHz



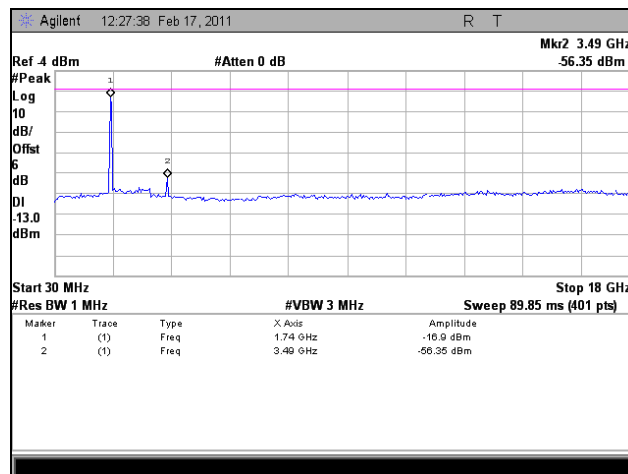
Plot 78. 1735 MHz, Spurious Emissions at Antenna Terminal, Uplink, LTE, 30 MHz – 18 GHz



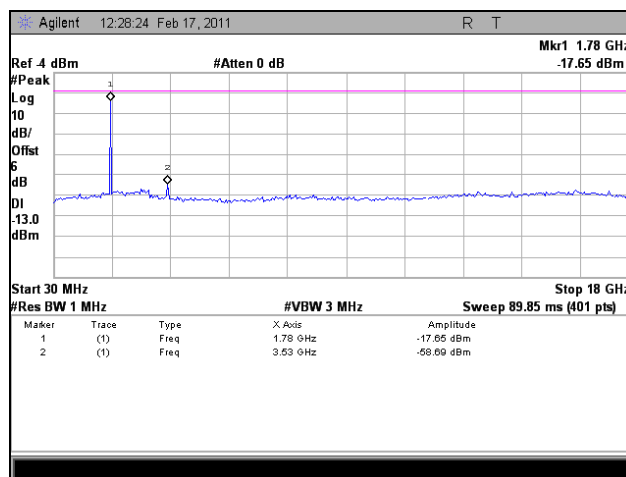
Plot 79. 1754.3 MHz, Spurious Emissions at Antenna Terminal, Uplink, LTE, 30 MHz – 18 GHz



Plot 80. 1712.5 MHz, Spurious Emissions at Antenna Terminal, Uplink, UMTS, 30 MHz – 18 GHz



Plot 81. 1735 MHz, Spurious Emissions at Antenna Terminal, Uplink, UMTS, 30 MHz – 18 GHz



Plot 82. 1752.5 MHz, Spurious Emissions at Antenna Terminal, Uplink, UMTS, 30 MHz – 18 GHz



Photograph 6. Conducted Spurious Emissions, Test Setup



Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious Emissions Requirements

Test Requirements: The following receiver spurious emission limits shall be complied with:

- (a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 14.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 14. Spurious Emission Limits for Receivers

- (b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedures: Measurements were made radiated.

Test Results: Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN. Measurements were made radiated. Highest measured receiver spurs is 47.92 dBuV/m @ 3m.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 02/24/11



Electromagnetic Compatibility Criteria for Intentional Radiators

§2.1055 Frequency Stability

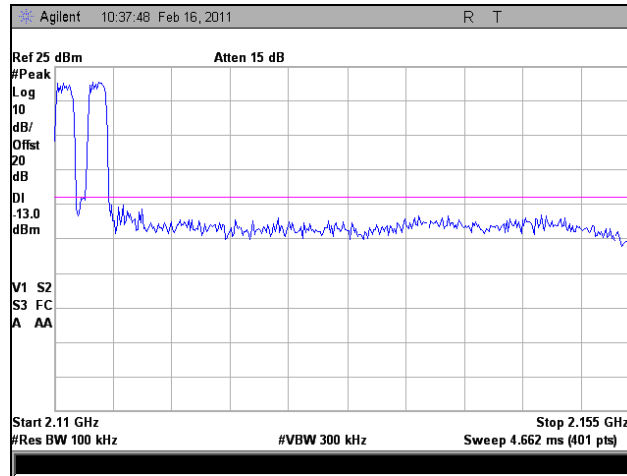
Test Requirement(s): §2.1055

Test Procedures: As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Directional Coupler through a Spectrum Analyzer and Power Meter.

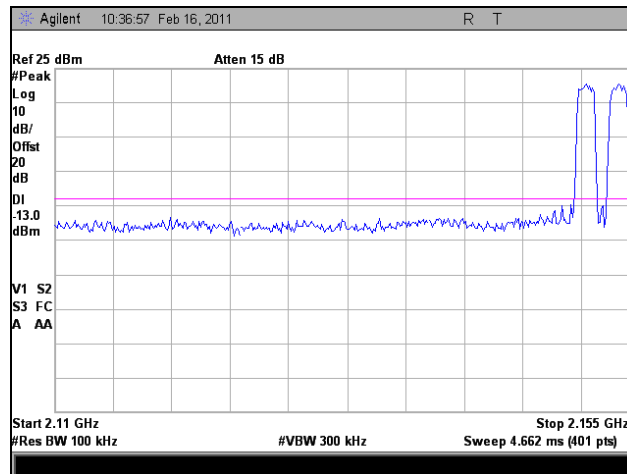
The EUT was setup in an Environmental chamber with the support equipment outside the chamber. The EUT was set to transmit on the low channel. The out of band emissions were then compared to the -13dBm limit. The same procedure was repeated on the high channel. This procedure was done at a temperature range of -30C to +50C. At the ambient temperature, in addition to the measurements at the nominal voltage, the voltage was varied to +/- 15% and measurements were taken at those voltages.

Test Results: Equipment is not applicable with Section 2.1055.

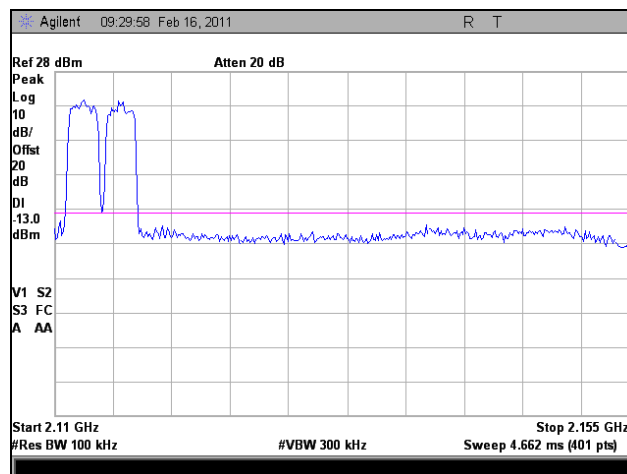
Intermodulation



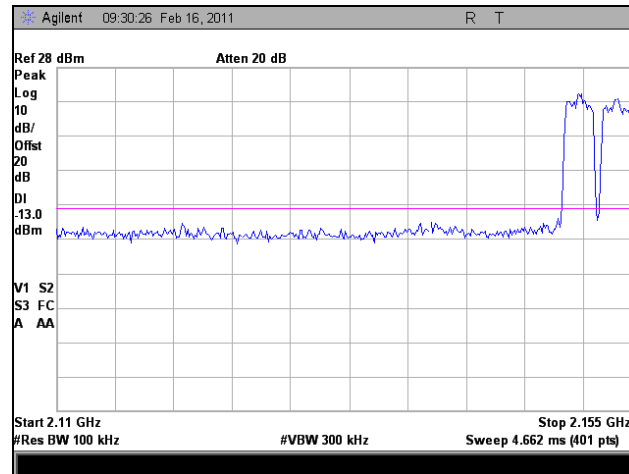
Plot 83. Intermodulation, Downlink, LTE, Low Channel



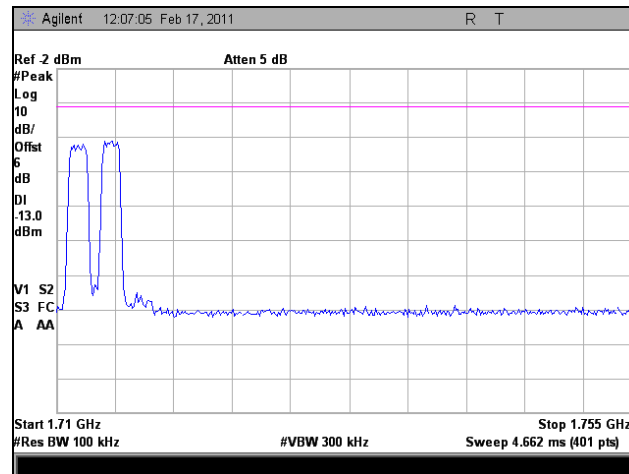
Plot 84. Intermodulation, Downlink, LTE, High Channel



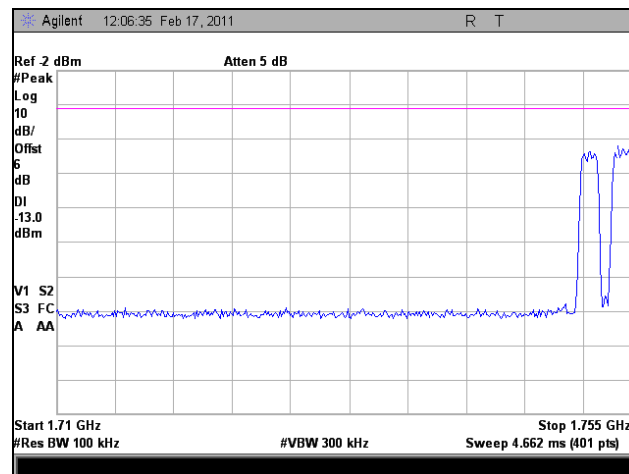
Plot 85. Intermodulation, Downlink, UMTS, Low Channel



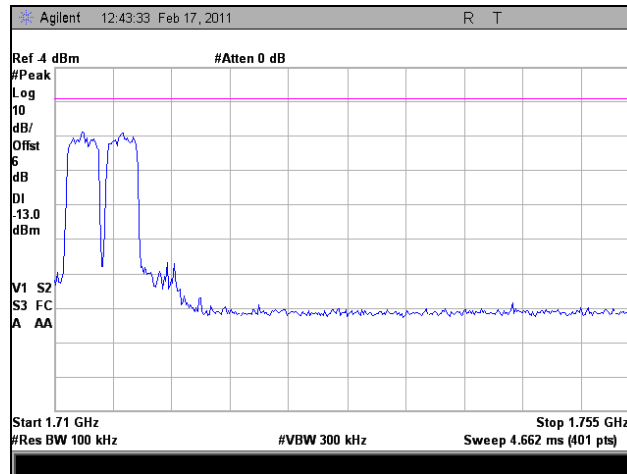
Plot 86. Intermodulation, Downlink, UMTS, High Channel



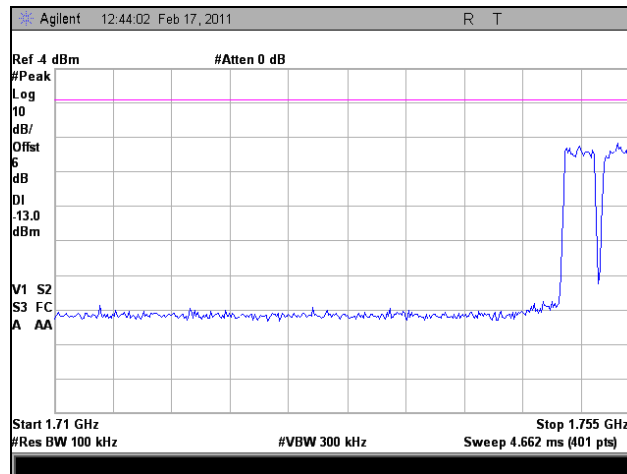
Plot 87. Intermodulation, Uplink, LTE, Low Channel



Plot 88. Intermodulation, Uplink, LTE, High Channel

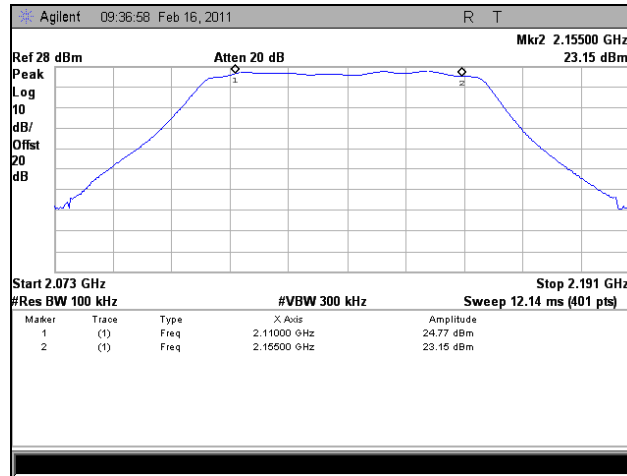


Plot 89. Intermodulation, Uplink, LTE, Low Channel

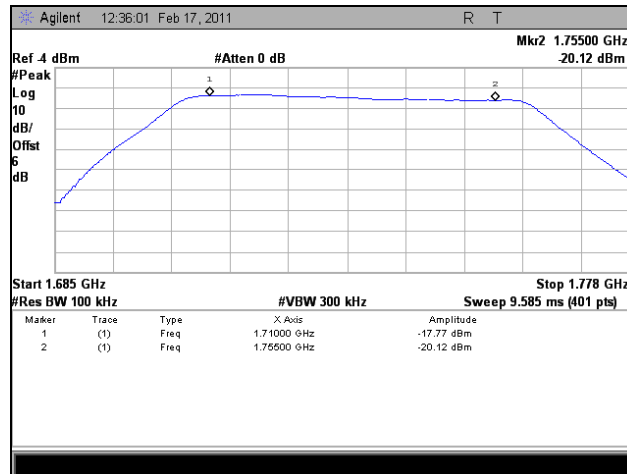


Plot 90. Intermodulation, Uplink, LTE, High Channel

Filter Response



Plot 91. Filter Response, Downlink



Plot 92. Filter Response, Uplink



Fiber-Span
FS42R-AWS-5

Electromagnetic Compatibility
Test Equipment
CFR Title 47 Part 15B & Part 27; ICES-003 & RSS-139

IV. Test Equipment



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 #	Equipment	Manufacturer	Model#	Cal Date	Cal Due
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4402B	05/10/2010	05/10/2011
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	08/23/2010	08/23/2011
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	05/25/2010	05/25/2011
1T4299	SIGNAL GENERATOR	HEWLETT PACKARD	E4432B	01/04/2011	01/04/2012
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	06/08/2010	06/08/2011
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	11/3/2010	11/3/2011
1T4354	SIGNAL GENERATOR	HEWLETT PACKARD	83752A	03/11/2010	03/11/2011
1T4592	RF FILTER KIT	VARIOUS	N/A	SEE NOTE	
1T4414	MICROWAVE PRE-AMPLIFIER	A.H. SYSTEMS	PAM-0118	SEE NOTE	

Table 15. Test Equipment List

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



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.



- (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.



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.



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.



Certification & User's Manual Information

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.



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 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.



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End of Report
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End of Report