



MET Laboratories, Inc.

Safety Certification - EMI - Telecom Environmental Simulation

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July 31, 2014

Digital Receiver Technology, Inc.
12409 Milestone Center Dr.
Germantown, MD 20876

Dear Steve Hudson,

Enclosed is the EMC Wireless test report for compliance testing of the Digital Receiver Technology, Inc., DRT9957B - Amplifier as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 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: (Digital Receiver Technology, Inc.\EMC39286A-FCC27 Rev. 2)

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Electromagnetic Compatibility Criteria Test Report

for the

**Digital Receiver Technology, Inc.
Model DRT9957B - Amplifier**

**Tested under
FCC Certification Rules
Title 47 of the CFR, Part 27**

MET Report: EMC39286A-FCC27 Rev. 2

July 31, 2014

Prepared For:

**Digital Receiver Technology, Inc.
12409 Milestone Center Dr.
Germantown, MD 20876**

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



Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Cover Page
CFR Title 47 Part 27

Electromagnetic Compatibility Criteria Test Report

for the

**Digital Receiver Technology, Inc.
Model DRT9957B – Amplifier**

Tested Under

**FCC Certification Rules
Title 47 of the CFR, Part 27**

Benjamin Taylor
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 Part 27 of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab



Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Report Status
CFR Title 47 Part 27

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	January 23, 2014	Initial Issue.
1	February 3, 2014	Revised to correct equipment code.



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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
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBμA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
DC	Direct Current
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
μH	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



MET®

Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Executive Summary
CFR Title 47 Part 27

I. Executive Summary



A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Digital Receiver Technology, Inc. DRT9957B - Amplifier, 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 DRT9957B - Amplifier. Digital Receiver Technology, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the DRT9957B - Amplifier, 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 Digital Receiver Technology, Inc., purchase order number 053066.

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(h)	RSS-139; Section 6.5	Spurious Emissions at Antenna Terminals	Compliant
§2.1053; §27.53(h)	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

Table 1. Executive Summary of EMC Compliance Testing

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Digital Receiver Technology, Inc. to perform testing on the DRT9957B - Amplifier, under Digital Receiver Technology, Inc.'s purchase order number 053066.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Digital Receiver Technology, Inc., DRT9957B - Amplifier.

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

Model(s) Tested	DRT9957B - Amplifier	
Model(s) Covered:	DRT9957B - Amplifier	
EUT Specifications:	FCC ID: XLM9957B1	
	Primary Power: 120 VAC, 60 Hz	
	Equipment Code:	AMP
	Avg. RF Output Power:	Single Channel, high power mode: 43.35dBm Multi Channel, low power mode: 25.88dBm
	EUT Frequency Range:	2111-2164MHz
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:	Benjamin Taylor	
Date(s):	July 31, 2014	

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
ISO/IEC 17025:2005	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 DRT9957B - Amplifier, Equipment Under Test (EUT), is an RF power amplifier used with DRT base stations operating in the cellular, PCS, AWS, and TDMA 850MHz bands.

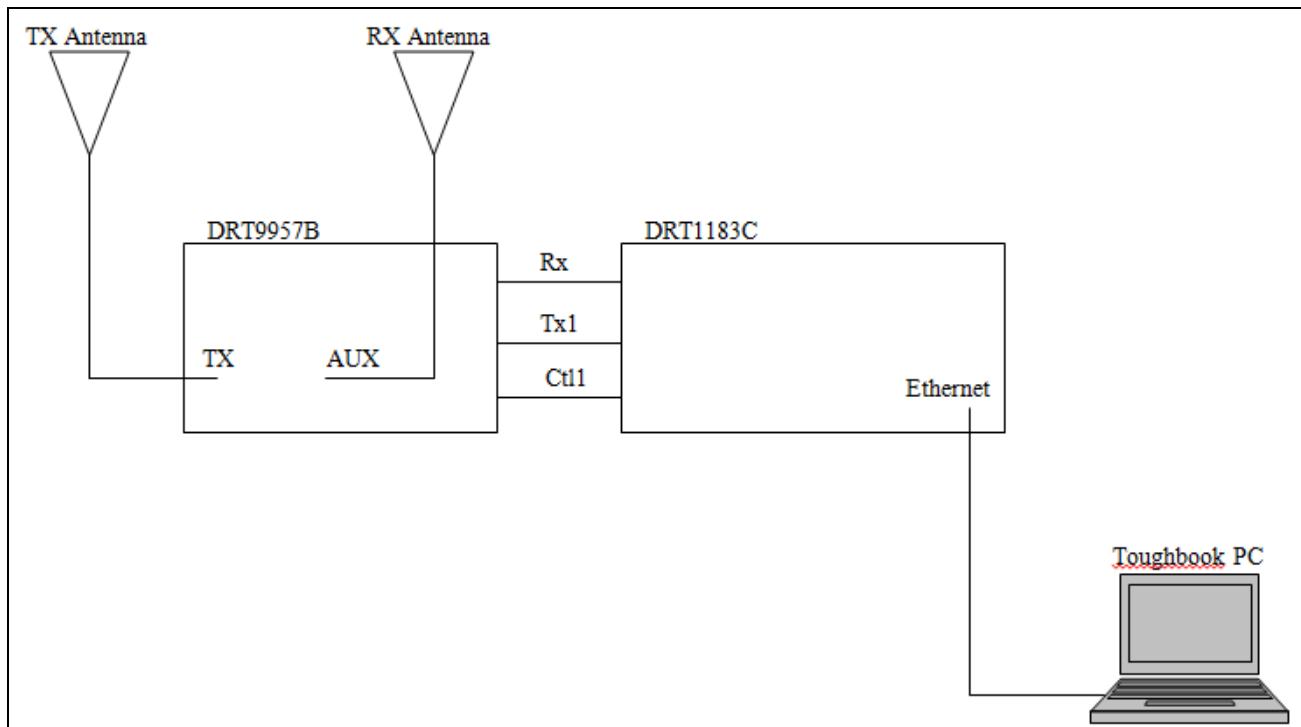


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

Name / Description	Model Number	Part Number	Serial Number
TacTRAM	DRT9957B	--	--

Table 4. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
--	Base Station	DRT	DRT1183C	--
--	Toughbook PC	Panasonic	CF-19	CF-19KDRAX6M

Table 5. Support Equipment

G. Mode of Operation

Operates as an RF power amplifier for DRT mobile base stations in GSM, CDMA, and WCDMA in the Cellular PCS, and AWS bands, and TDMA in the 850MHz band.

H. 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.

I. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Digital Receiver Technology, Inc. upon completion of testing.



Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Intentional Radiators
CFR Title 47 Part 27

III. 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)

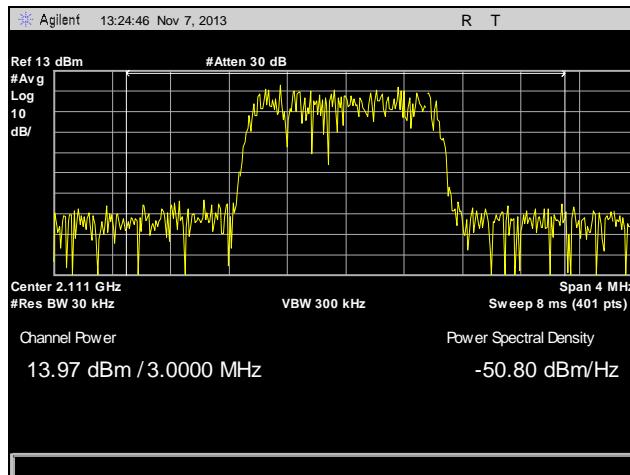
- (2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:
- (3) A licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with all Government and non-Government satellite entities in the 2025-2110 MHz band. Operations with power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must be coordinated in advance with the following licensees authorized to operate within 120 kilometers (75 miles) of the base or fixed station operating in this band: all Broadband Radio Service (BRS) licensees authorized under Part 27 in the 2155-2160 MHz band and all advanced wireless services (AWS) licensees authorized to operate on adjacent frequency blocks in the 2110-2155 MHz band.

Test Procedures: *RF power output measurement* was made at the RF output terminal using a spectrum analyzer, with suitable attenuation where appropriate.

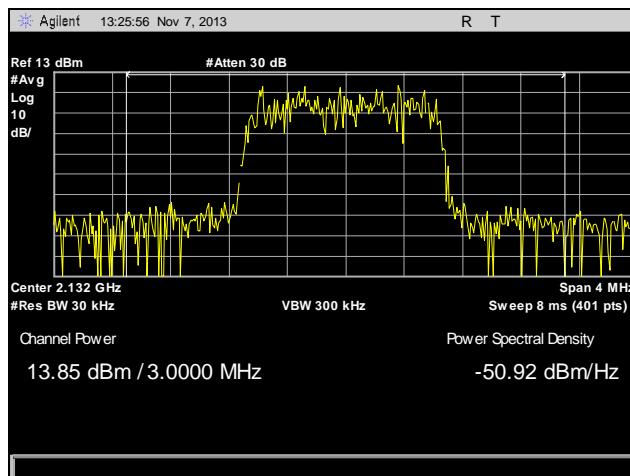
Test Results: Equipment complies with 47CFR 2.1046 and 27.50(d).

Test Engineer(s): Benjamin Taylor

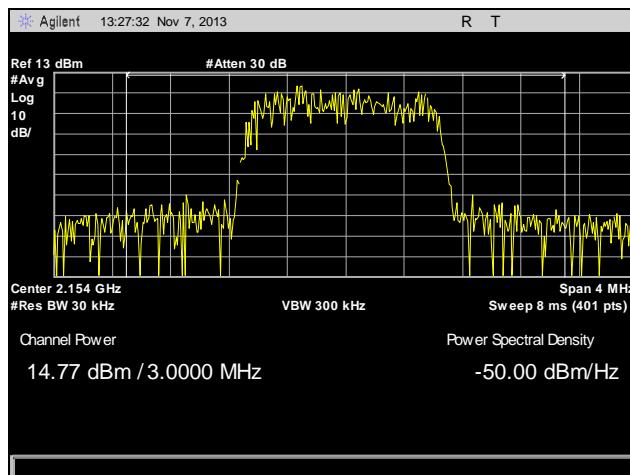
Test Date(s): 11/24/13



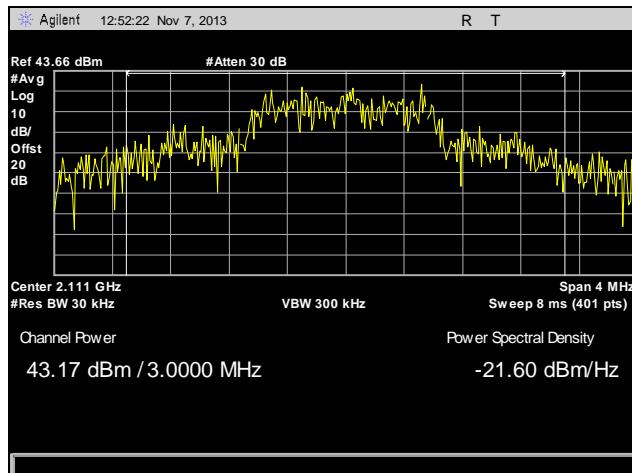
Plot 1. RF Output Power, Single Channel Operation – High Power, in CDMA, Low Channel



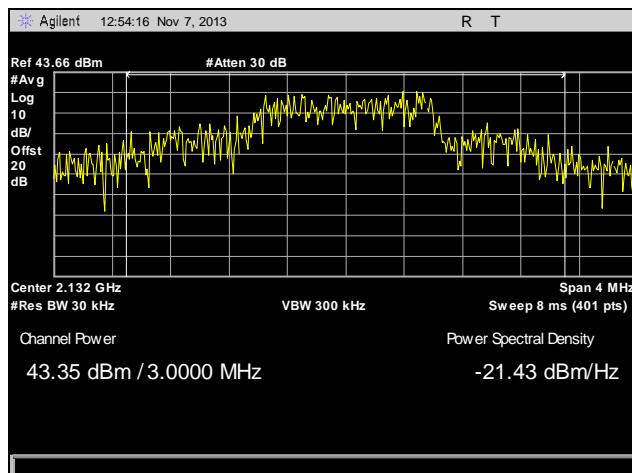
Plot 2. RF Output Power, Single Channel Operation – High Power, in CDMA, Mid Channel



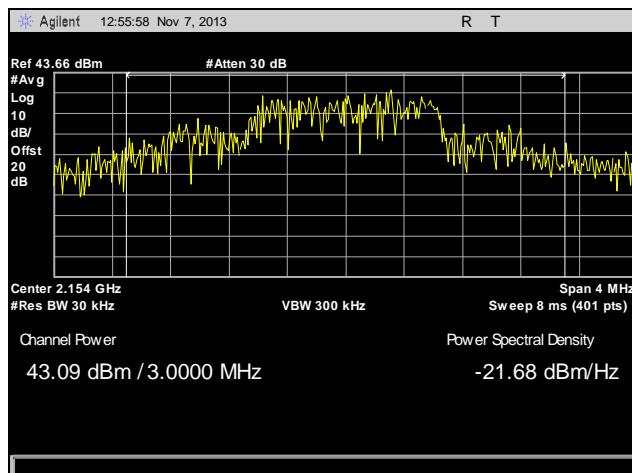
Plot 3. RF Output Power, Single Channel Operation – High Power, in CDMA, High Channel



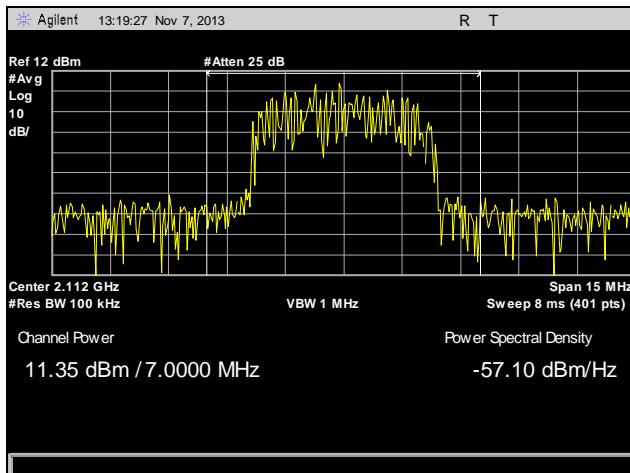
Plot 4. RF Output Power, Single Channel Operation – High Power, out CDMA, Low Channel



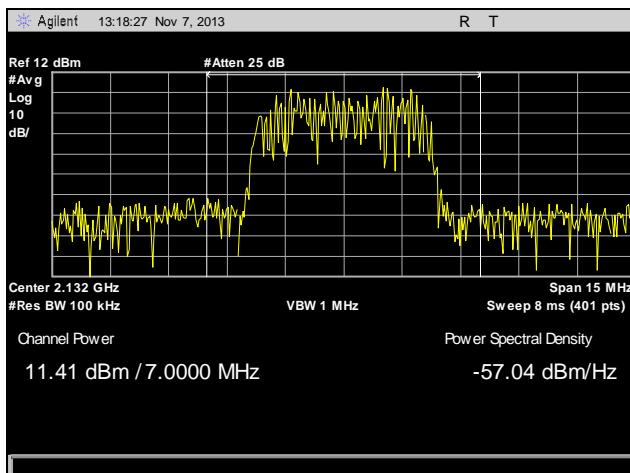
Plot 5. RF Output Power, Single Channel Operation – High Power, out CDMA, Mid Channel



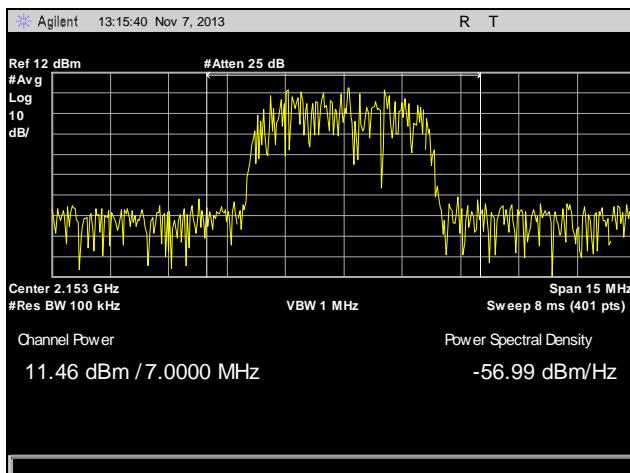
Plot 6. RF Output Power, Single Channel Operation – High Power, out CDMA, High Channel



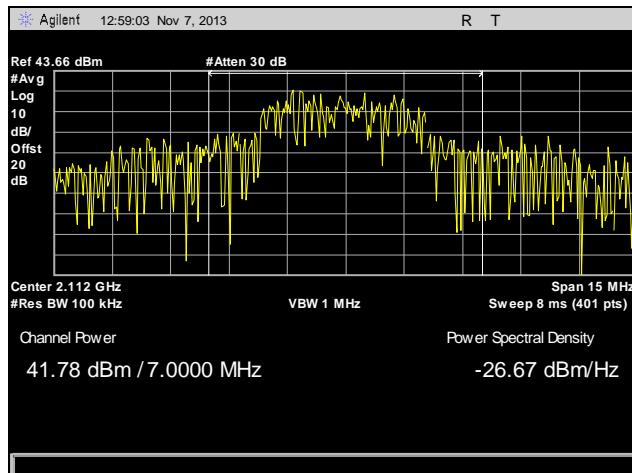
Plot 7. RF Output Power, in WCDMA, Low Channel



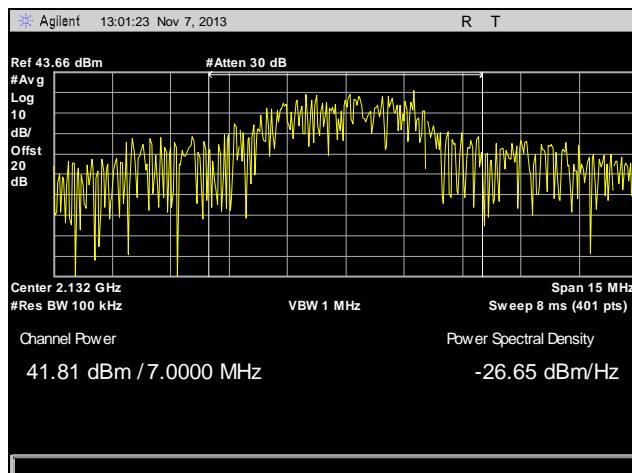
Plot 8. RF Output Power, Single Channel Operation – High Power, in WCDMA, Mid Channel



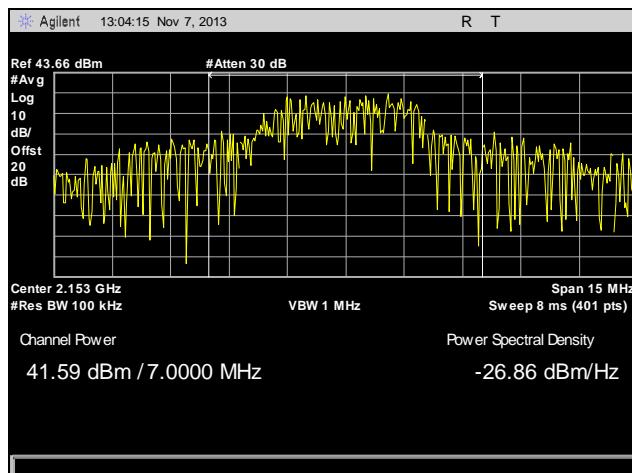
Plot 9. RF Output Power, Single Channel Operation – High Power, in WCDMA, High Channel



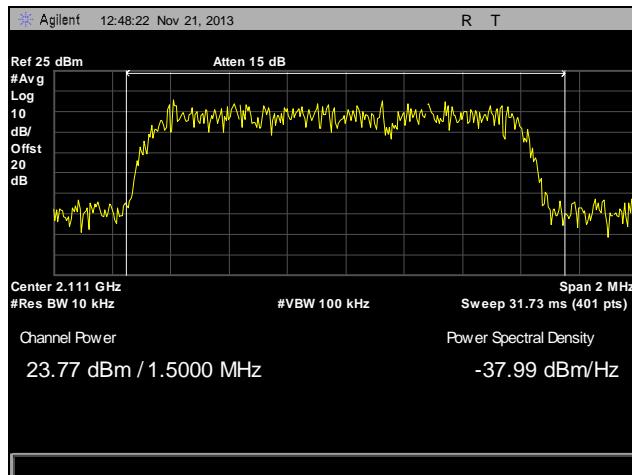
Plot 10. RF Output Power, Single Channel Operation – High Power, out WCDMA, Low Channel



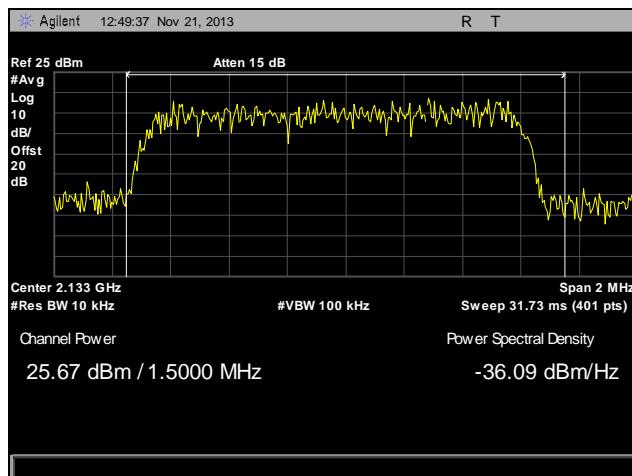
Plot 11. RF Output Power, Single Channel Operation – High Power, out WCDMA, Mid Channel



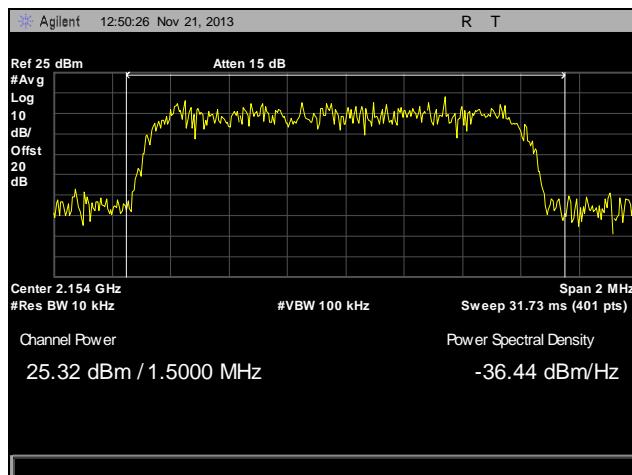
Plot 12. RF Output Power, Single Channel Operation – High Power, out WCDMA, High Channel



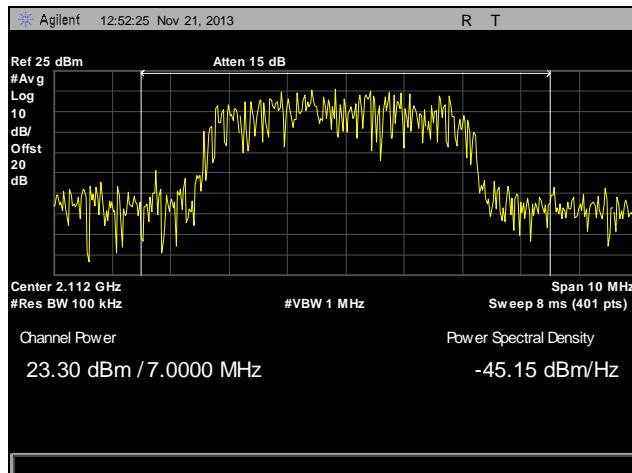
Plot 13. RF Output Power, Multi-Channel Operation – Lower Power, CDMA, Low Channel



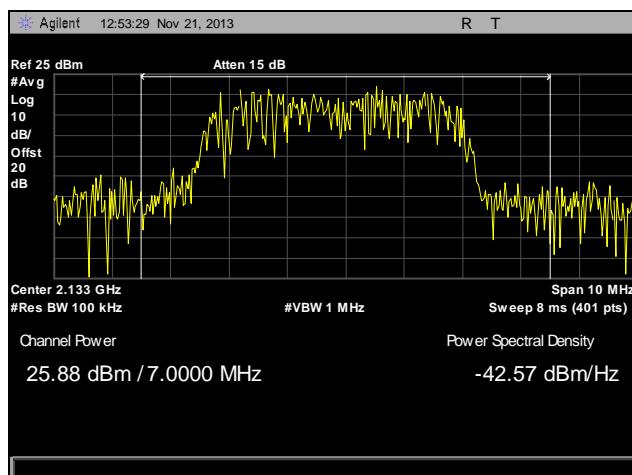
Plot 14. RF Output Power, Multi-Channel Operation – Lower Power, CDMA, Mid Channel



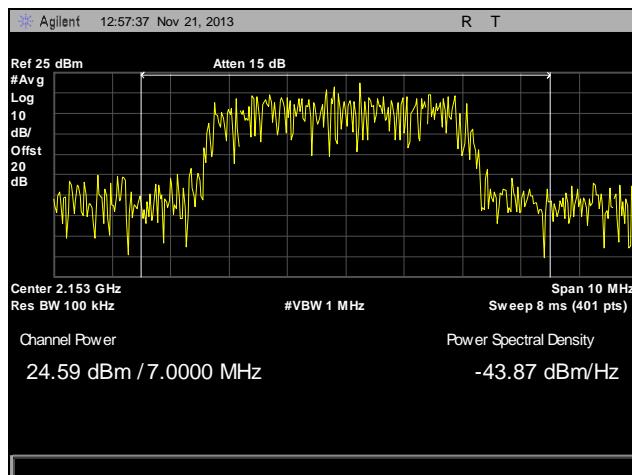
Plot 15. RF Output Power, Multi-Channel Operation – Lower Power, CDMA, High Channel



Plot 16. RF Output Power, Multi-Channel Operation – Lower Power, WCDMA, Low Channel



Plot 17. RF Output Power, Multi-Channel Operation – Lower Power, WCDMA, Mid Channel



Plot 18. RF Output Power, Multi-Channel Operation – Lower Power, WCDMA, High Channel



§ 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, occupied bandwidth measurements were made with a Spectrum Analyzer connected to the RF output of the amplifier, as well as the input to the amplifier.

The modulation characteristics of the base station were measured first at a maximum RF level prescribed by the OEM. The base station was then connected to the input of the amplifier and was operated at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

Test Results:

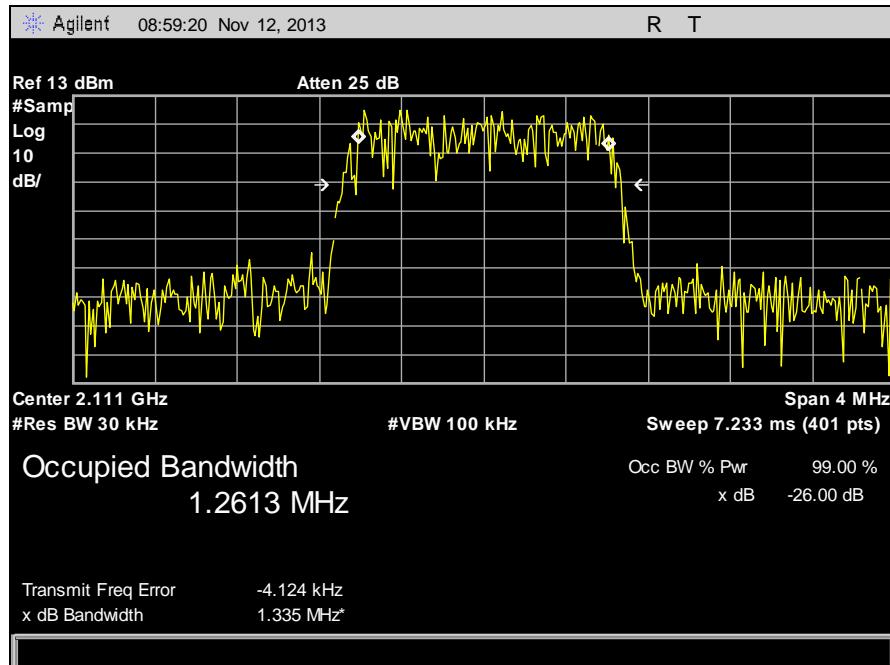
Equipment complies with Section 2.1049. The following pages show measurements of 99% and -26 dB Occupied Bandwidth plots.

Test Engineer(s):

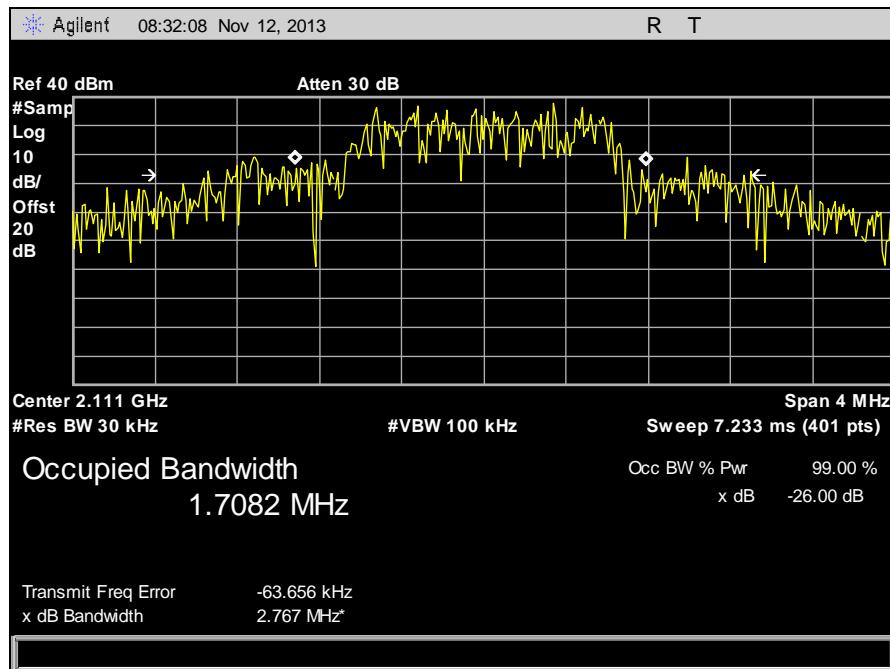
Benjamin Taylor

Test Date(s):

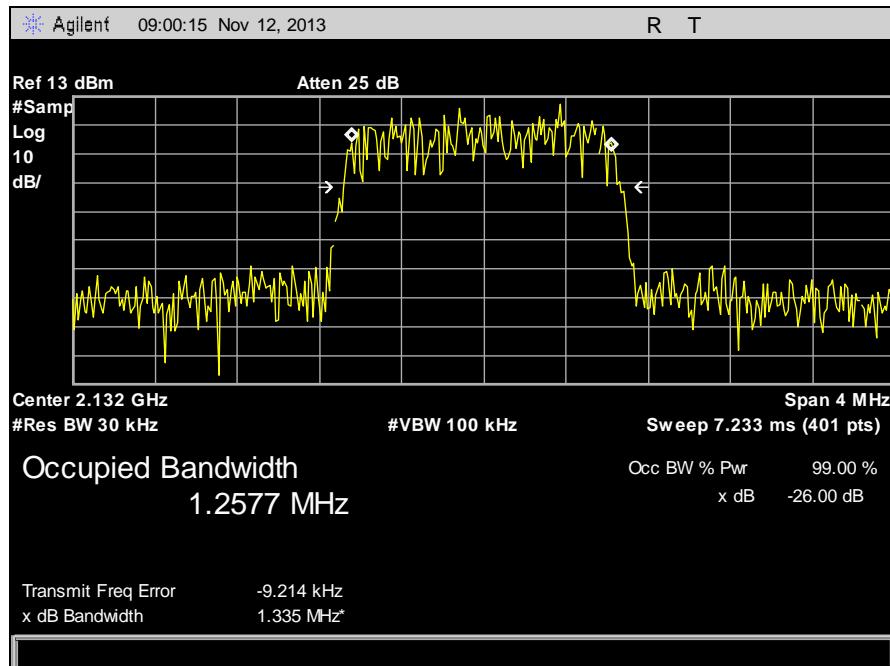
11/24/13



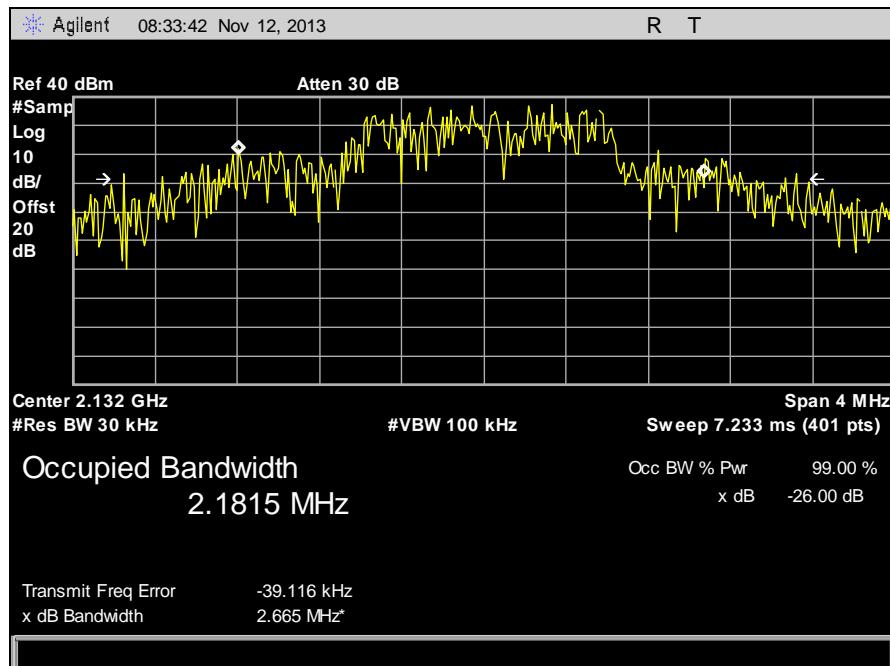
Plot 19. Occupied Bandwidth, 2111.25 MHz, CDMA, Input



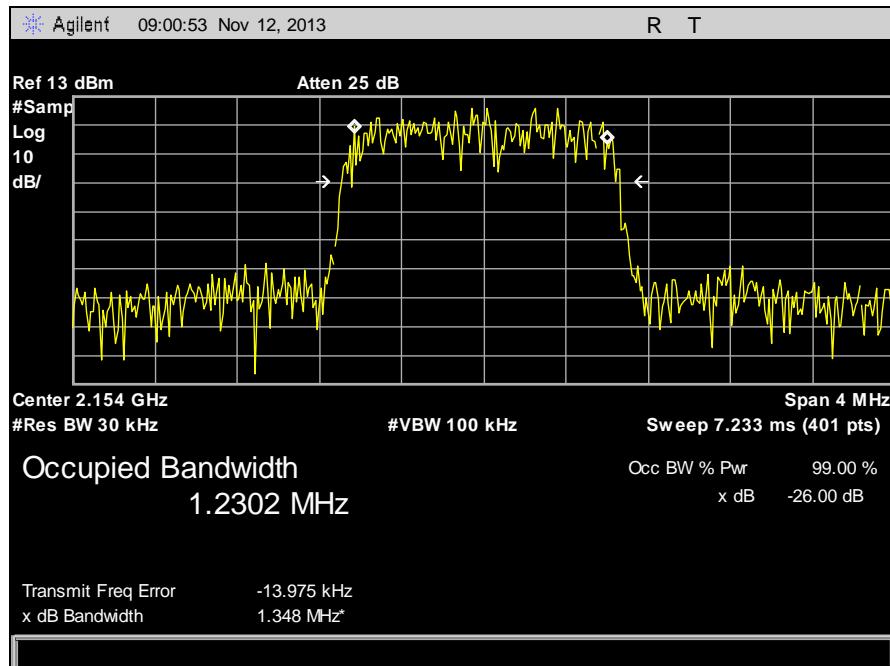
Plot 20. Occupied Bandwidth, 2111.25 MHz, CDMA, Output



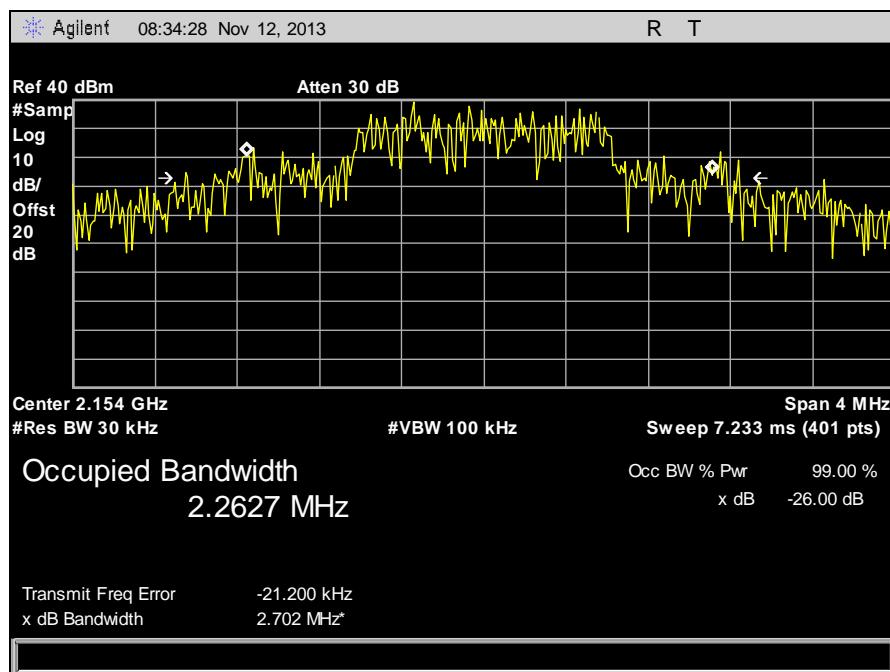
Plot 21. Occupied Bandwidth, 2132.5 MHz, CDMA, Input



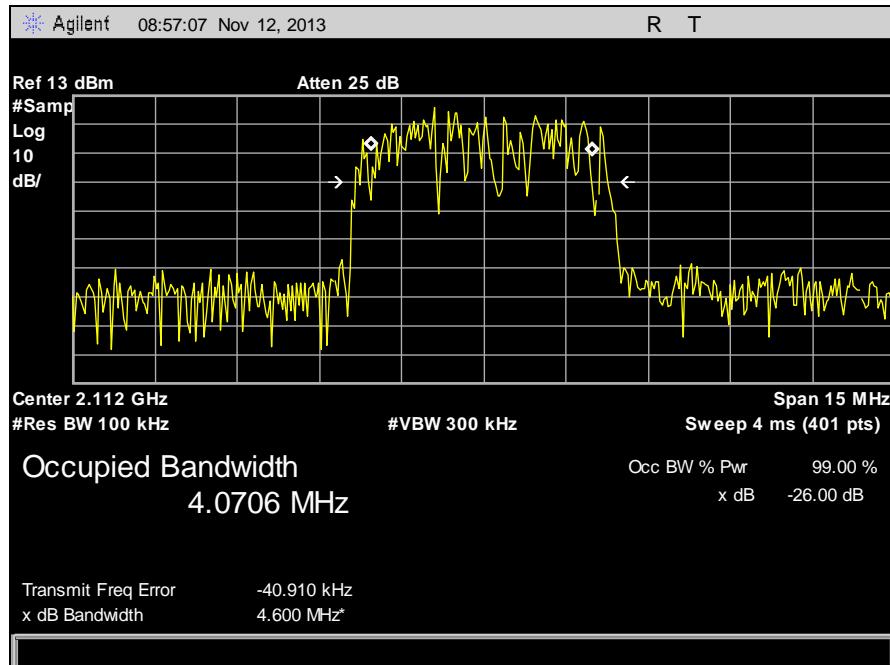
Plot 22. Occupied Bandwidth, 2132.5 MHz, CDMA, Output



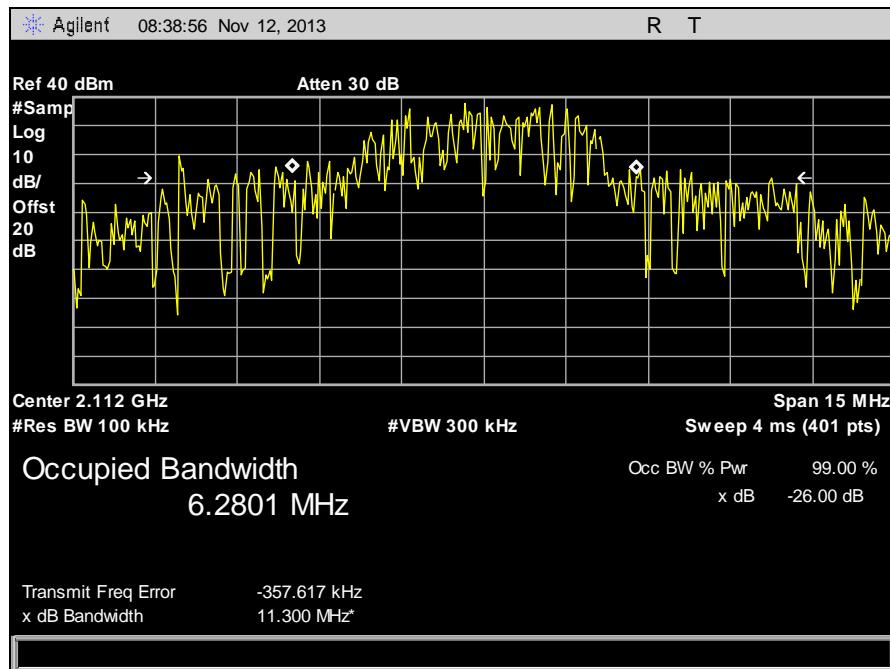
Plot 23. Occupied Bandwidth, 2153.75 MHz, CDMA, Input



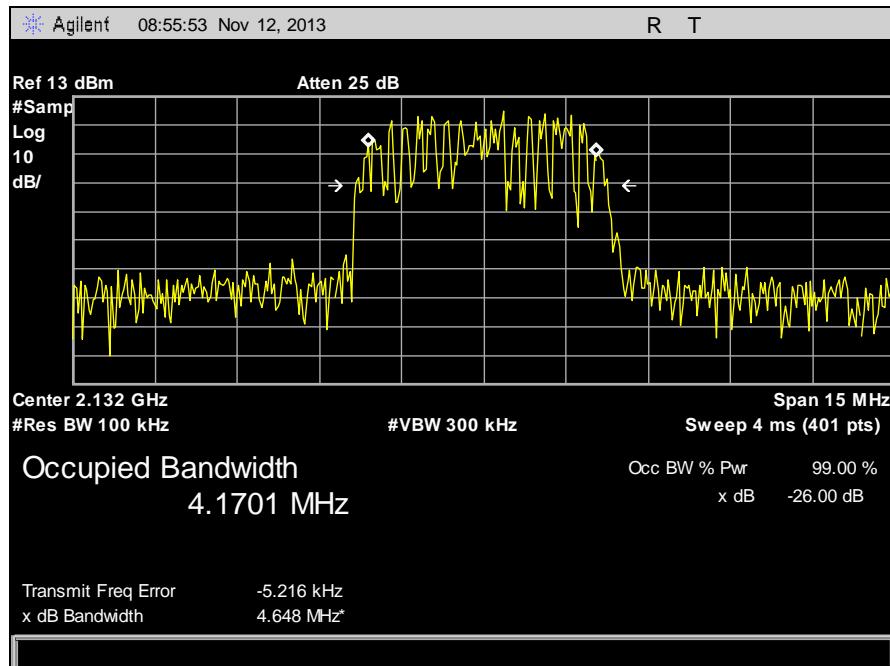
Plot 24. Occupied Bandwidth, 2153.75 MHz, CDMA, Output



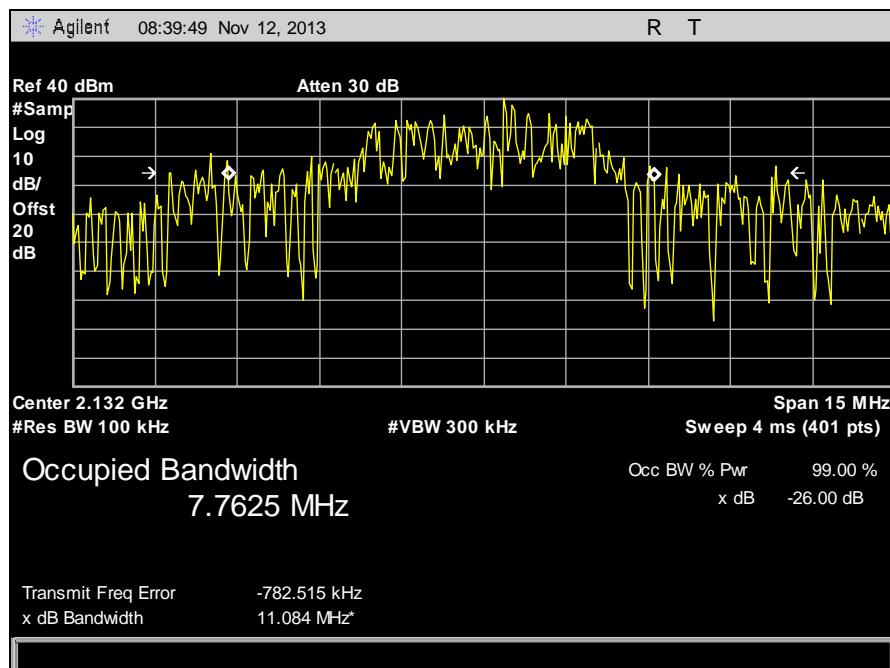
Plot 25. Occupied Bandwidth, 2111.4 MHz, WCDMA, Input



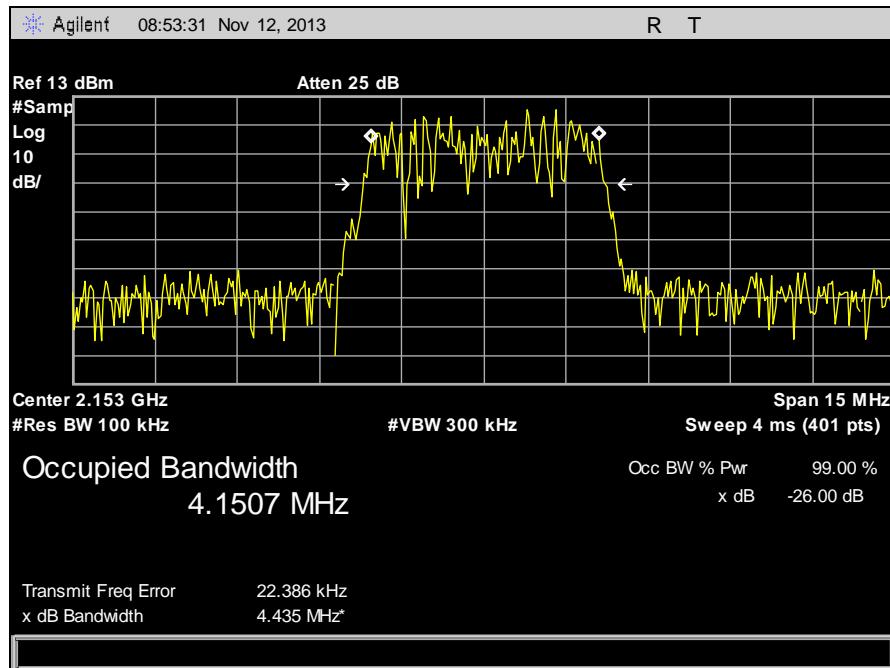
Plot 26. Occupied Bandwidth, 2111.4 MHz, WCDMA, Output



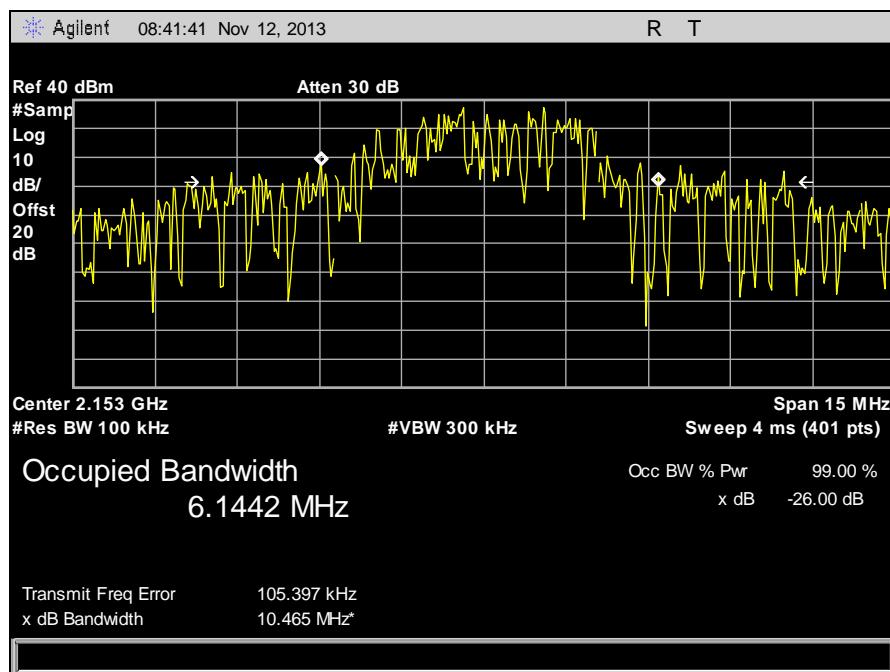
Plot 27. Occupied Bandwidth, 2132.4 MHz, WCDMA, Input



Plot 28. Occupied Bandwidth, 2132.4 MHz, WCDMA, Output



Plot 29. Occupied Bandwidth, 2152.6 MHz, WCDMA, Input



Plot 30. Occupied Bandwidth, 2152.6 MHz, WCDMA, Output



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): § 2.1053 and 27.53(h) 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 $43+10\log(P)$.



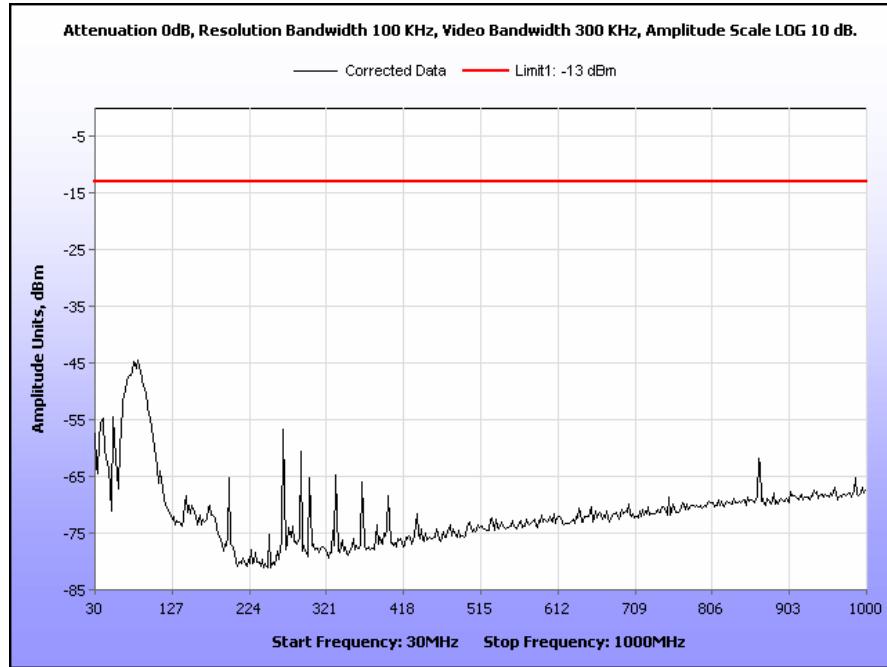
Test Procedures: As required by 47 CFR 2.1053, the *field strengths of radiated spurious emissions* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

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.

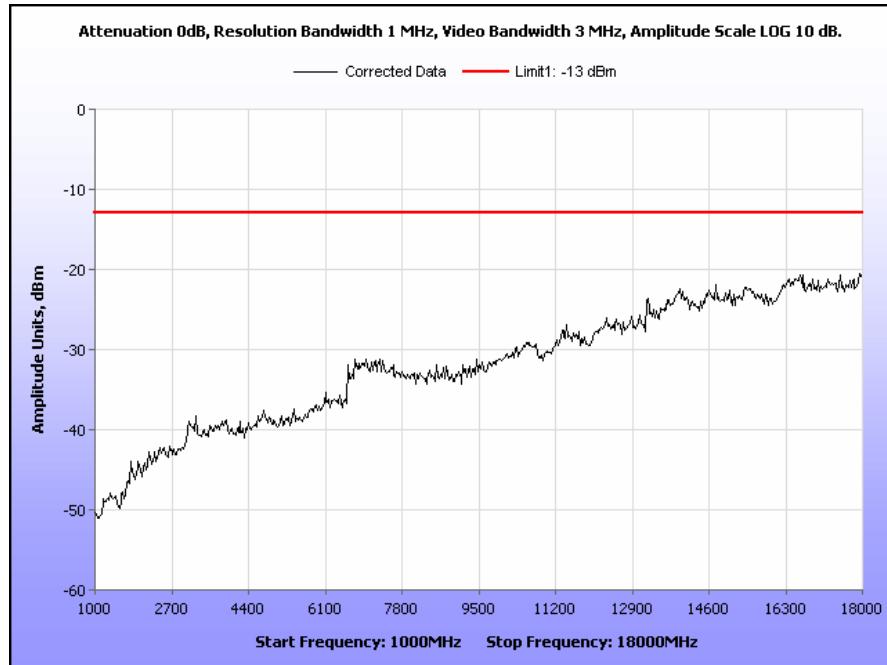
Test Results: Equipment complies with Section 2.1053. The limit for spurs is -13 dBm. Measurements revealed that no spurs came even close to this limit. Therefore, measurements using substitution method were not performed. Also, testing was performed using a CW signal. The following plots have been corrected.

Test Engineer: Benjamin Taylor

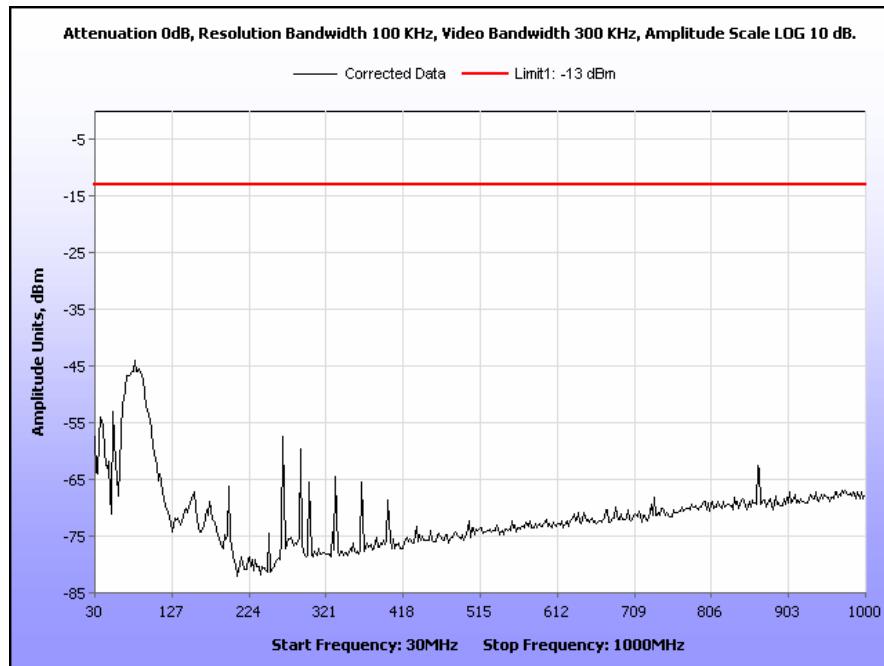
Test Date(s): 11/25/13



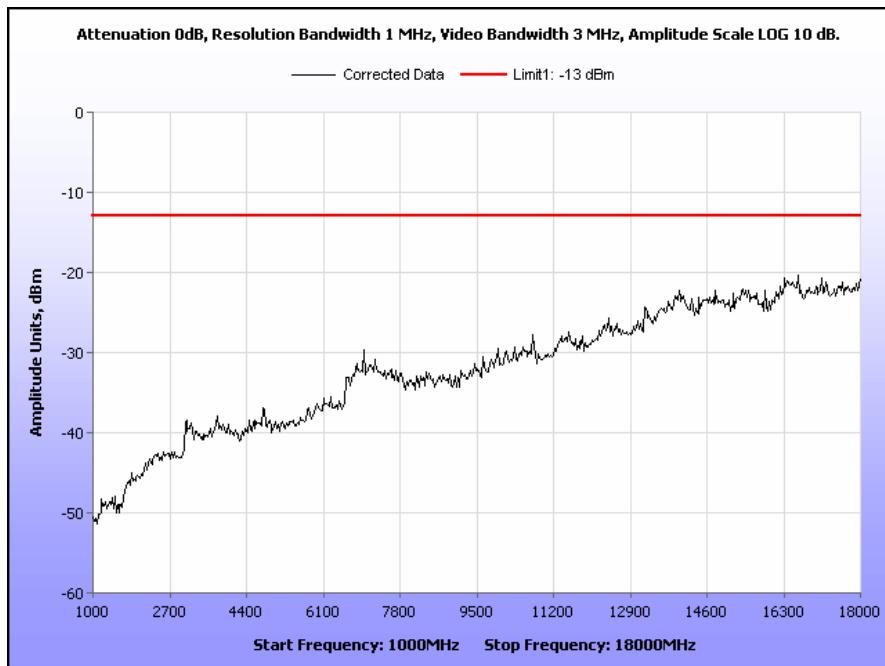
Plot 31. Radiated Spurious Emissions, CDMA, 2111.25 MHz, 30 MHz – 1 GHz



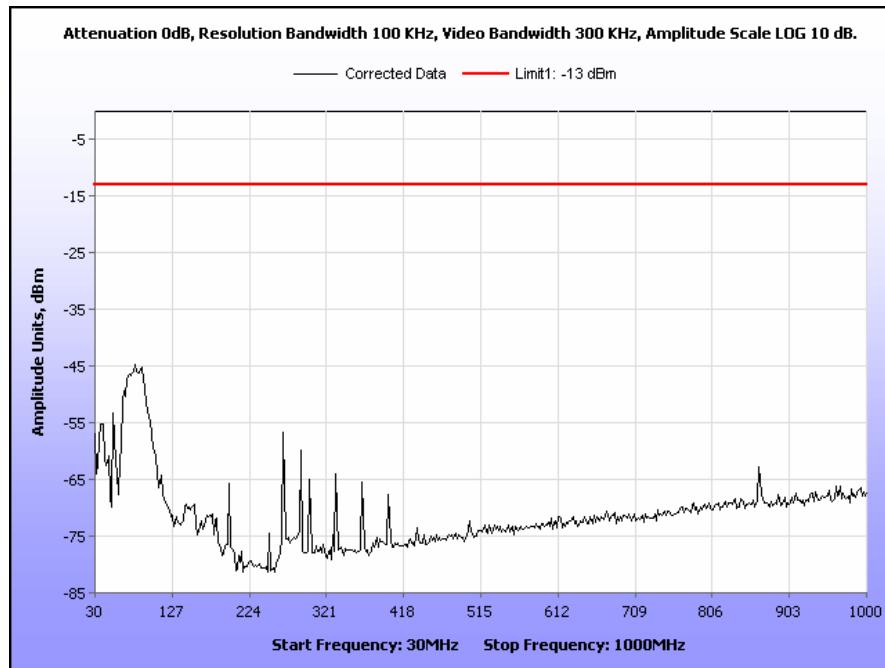
Plot 32. Radiated Spurious Emissions, CDMA, 2111.25 MHz, 1 GHz – 18 GHz



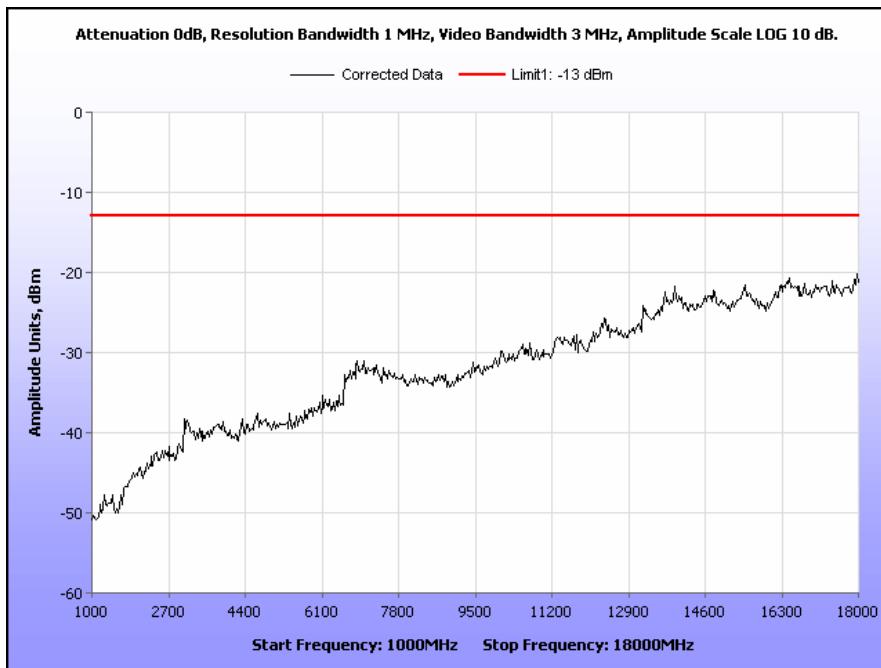
Plot 33. Radiated Spurious Emissions, CDMA, 2132.5 MHz, 30 MHz – 1 GHz



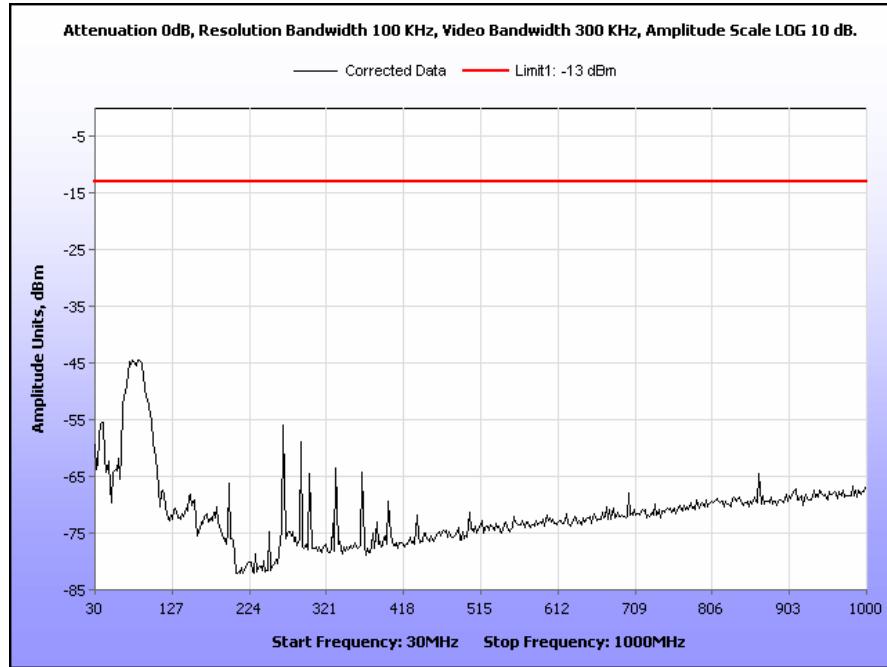
Plot 34. Radiated Spurious Emissions, CDMA, 2132.5 MHz, 1 GHz – 18 GHz



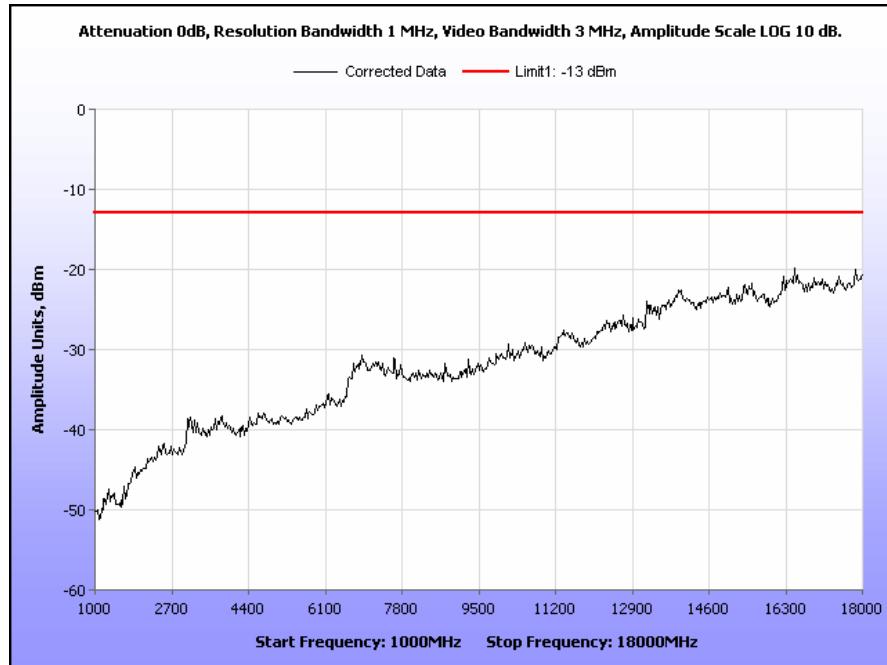
Plot 35. Radiated Spurious Emissions, CDMA, 2153.75 MHz, 30 MHz – 1 GHz



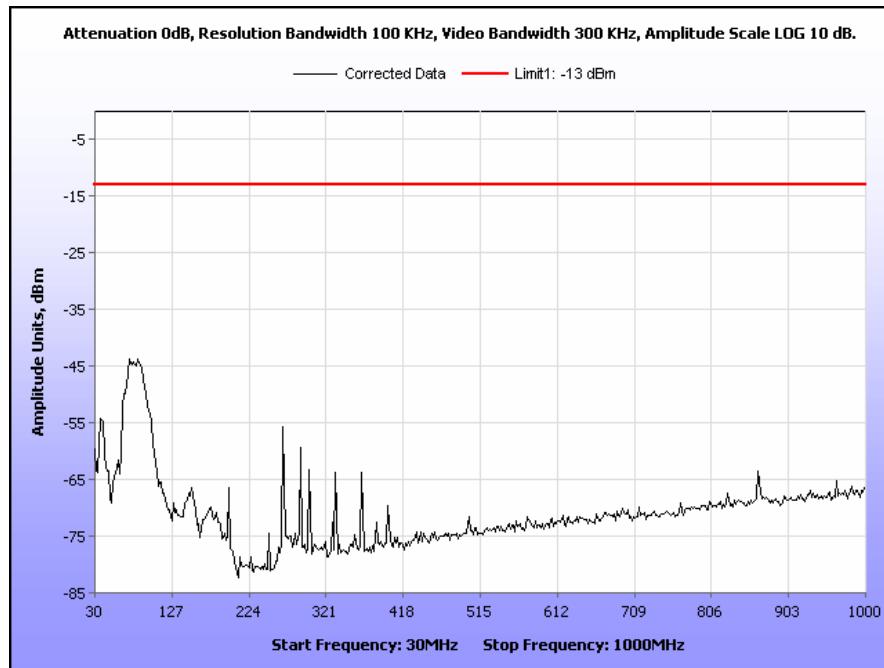
Plot 36. Radiated Spurious Emissions, CDMA, 2153.75 MHz, 1 GHz – 18 GHz



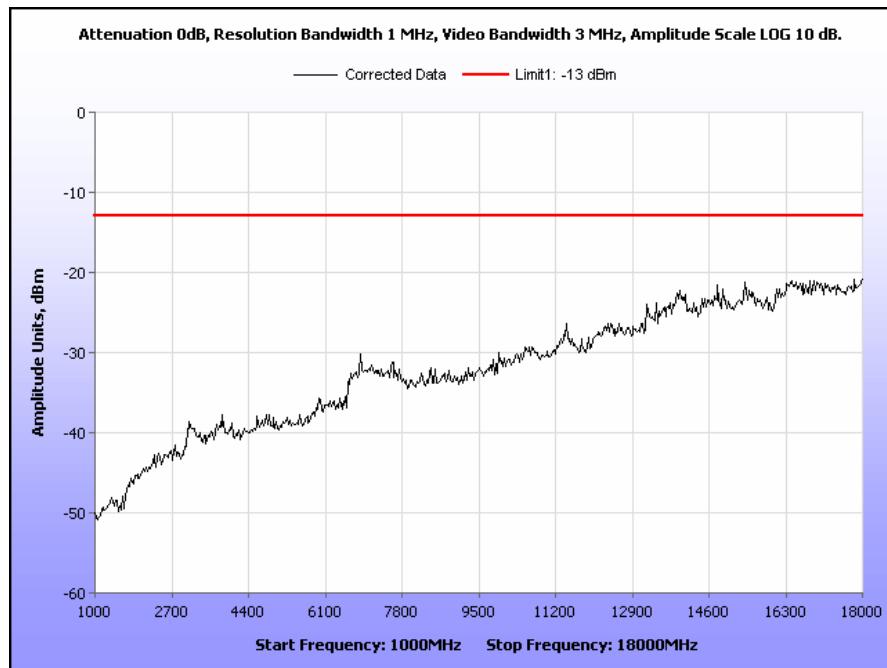
Plot 37. Radiated Spurious Emissions, WCDMA, Low Channel, 30 MHz – 1 GHz



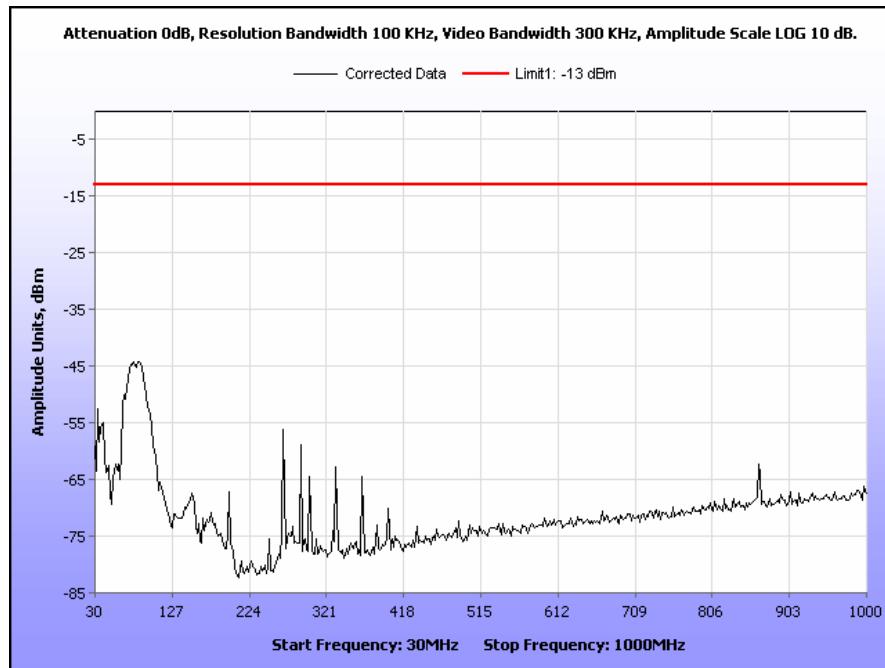
Plot 38. Radiated Spurious Emissions, WCDMA, Low Channel, 1 GHz – 18 GHz



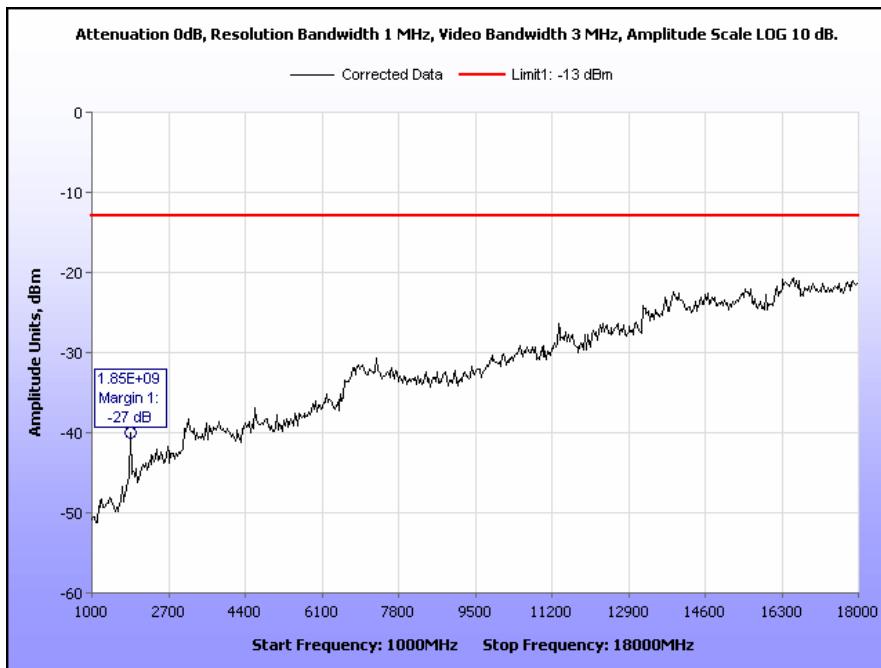
Plot 39. Radiated Spurious Emissions, WCDMA, Mid Channel, 30 MHz – 1 GHz



Plot 40. Radiated Spurious Emissions, WCDMA, Mid Channel, 1 GHz – 18 GHz



Plot 41. Radiated Spurious Emissions, WCDMA, High Channel, 30 MHz – 1 GHz



Plot 42. Radiated Spurious Emissions, WCDMA, High Channel, 1 GHz – 18 GHz



Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s): **§ 2.1051 and 27.53(h) 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 base station was connected to RF input port at a maximum level as determined by the OEM. A spectrum analyzer was connected to either the RF output port for spurious emissions measurements. 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 from the base station. The in band spurious emissions were investigated.

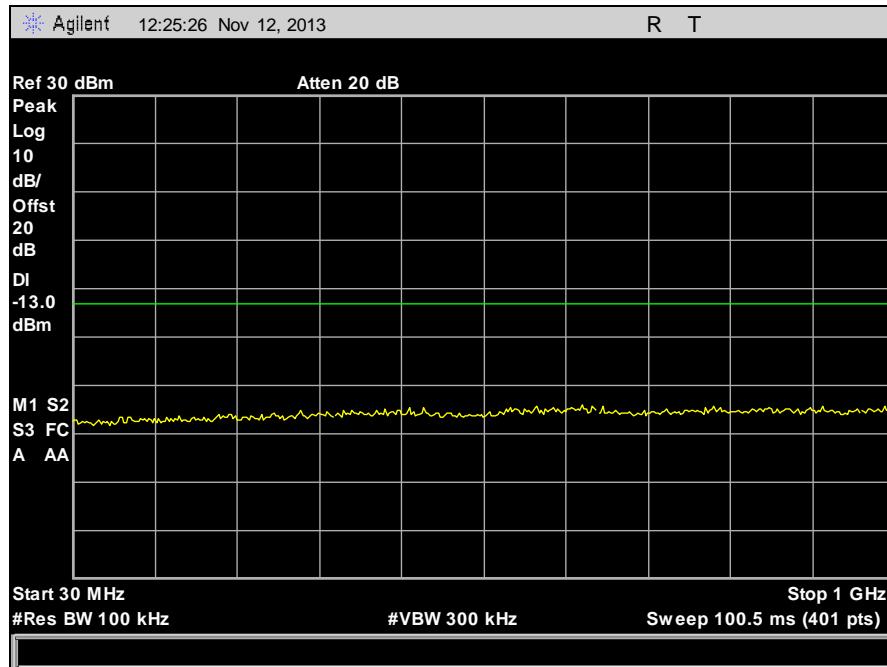
The filter response has also be measured and recorded.

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

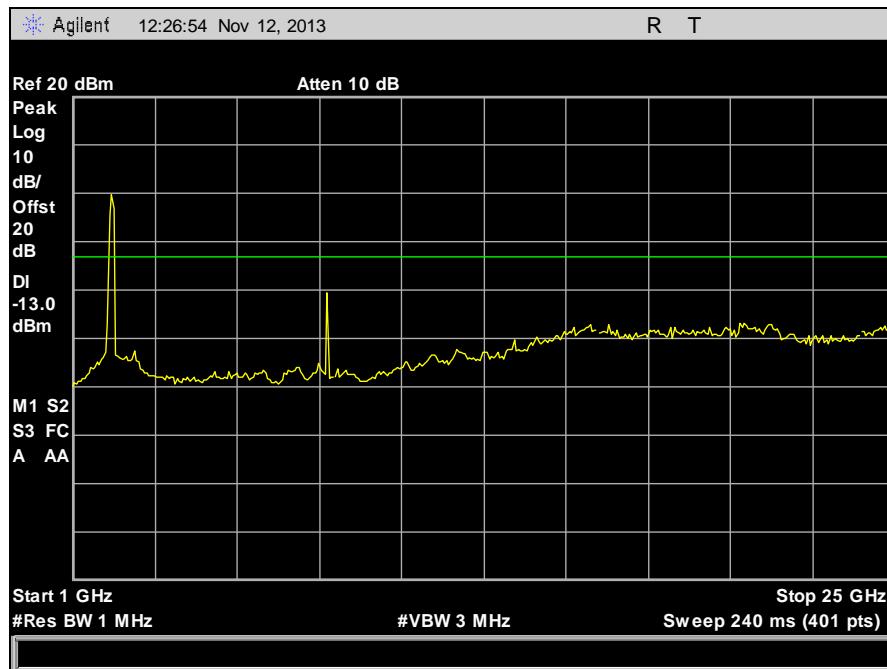
The following analysis and plots are included below to illustrate compliance with the required rule parts.

Test Engineer(s): Benjamin Taylor

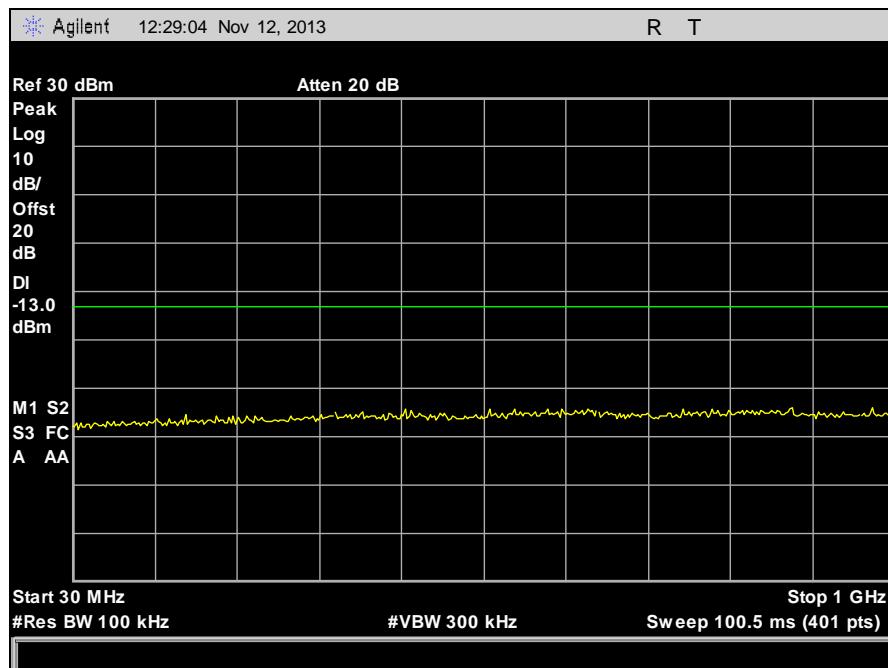
Test Date(s): 11/25/13



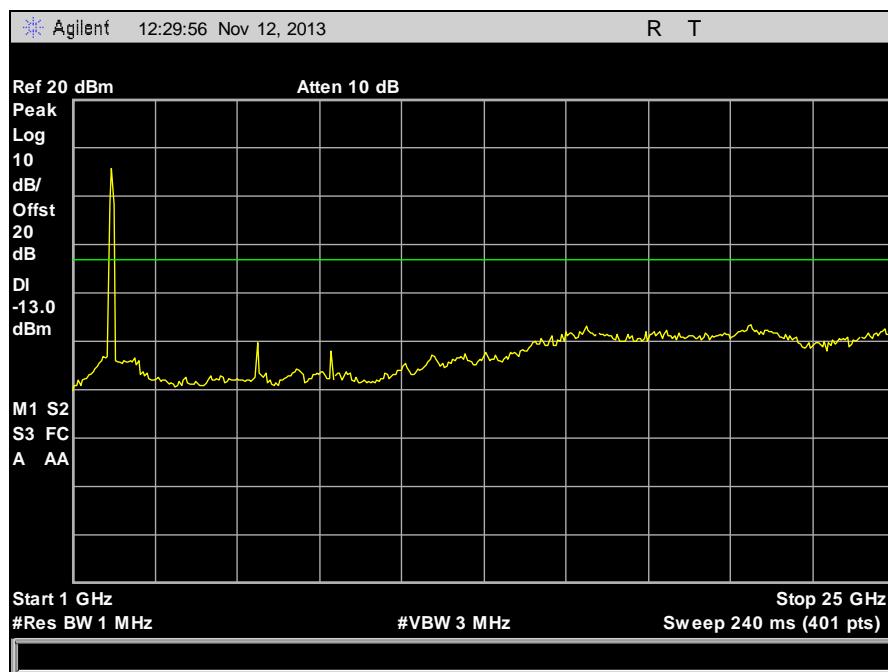
Plot 43. Conducted Spurious Emissions, CDMA, 2111.25 MHz, 30 MHz – 1 GHz



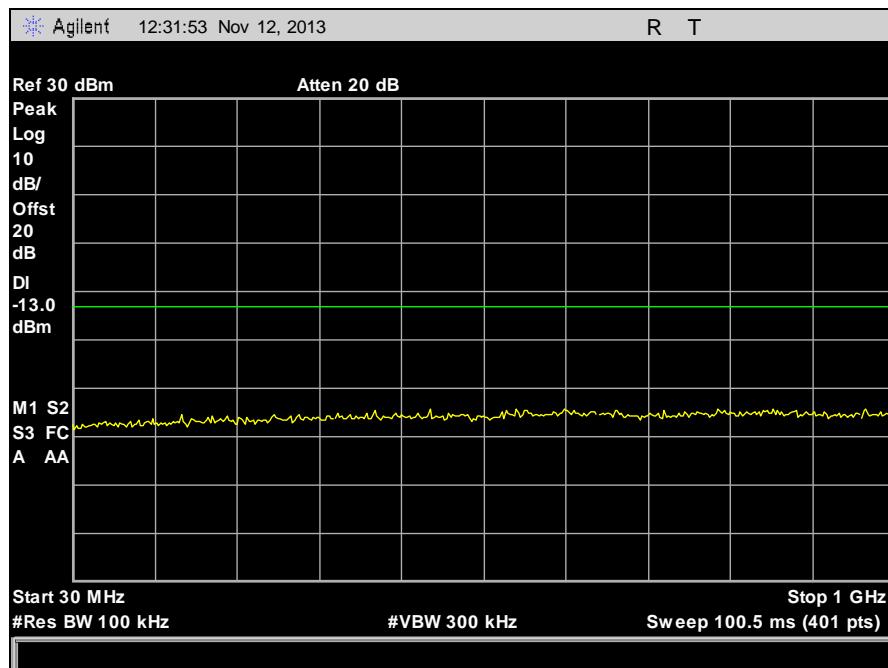
Plot 44. Conducted Spurious Emissions, CDMA, 2111.25 MHz, 1 GHz – 25 GHz



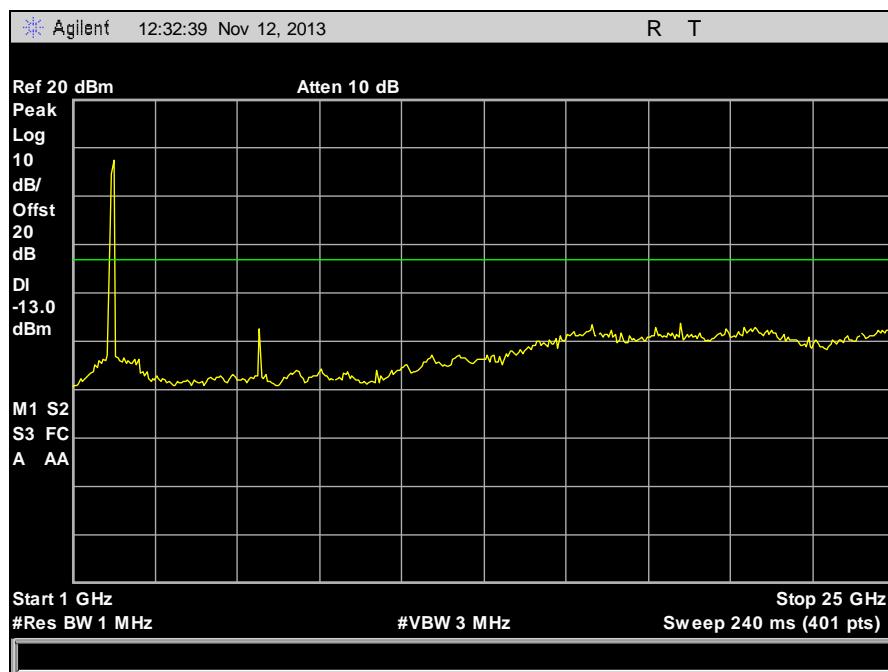
Plot 45. Conducted Spurious Emissions, CDMA, 2132.5 MHz, 30 MHz – 1 GHz



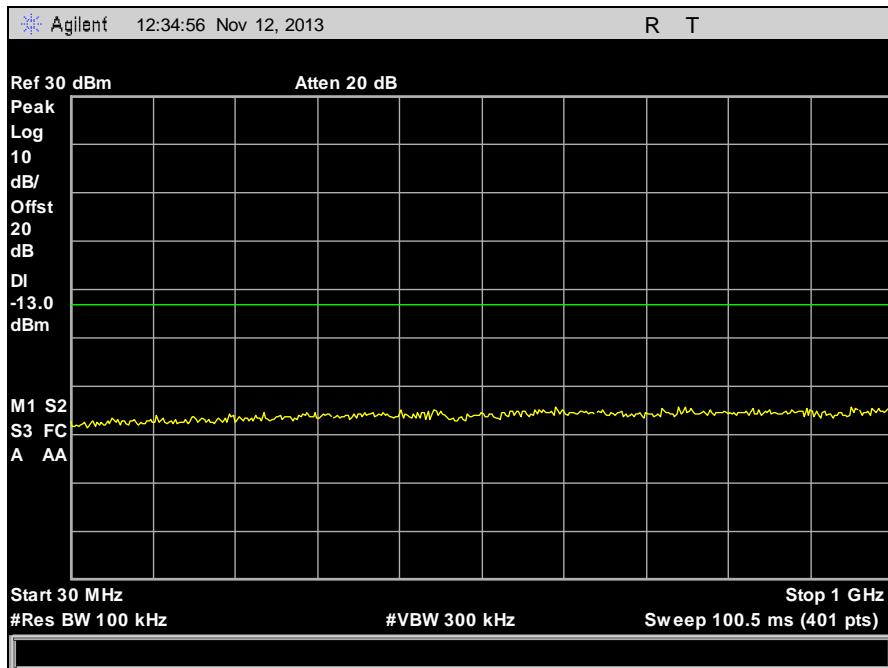
Plot 46. Conducted Spurious Emissions, CDMA, 2132.5 MHz, 1 GHz – 25 GHz



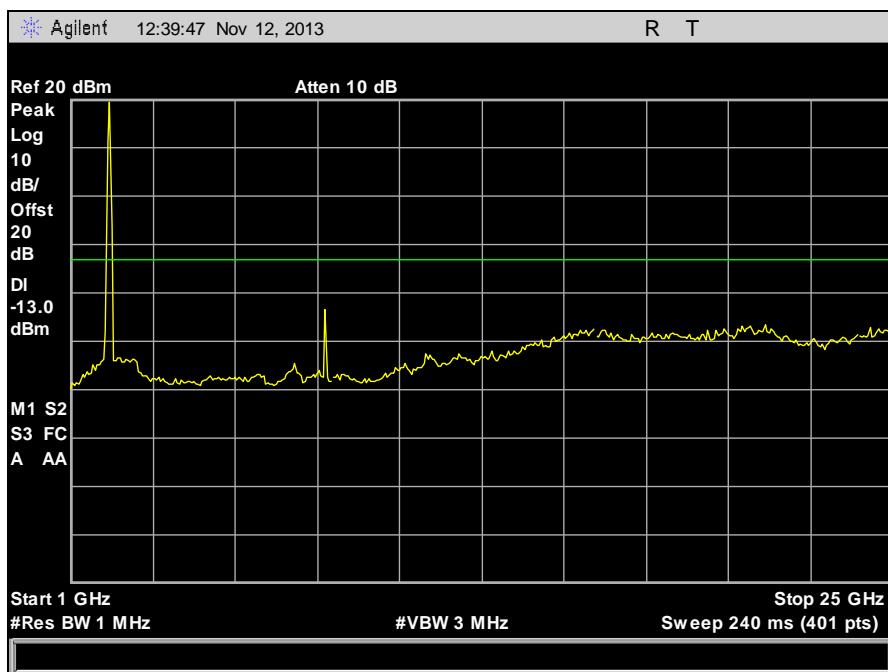
Plot 47. Conducted Spurious Emissions, CDMA, 2153.75 MHz, 30 MHz – 1 GHz



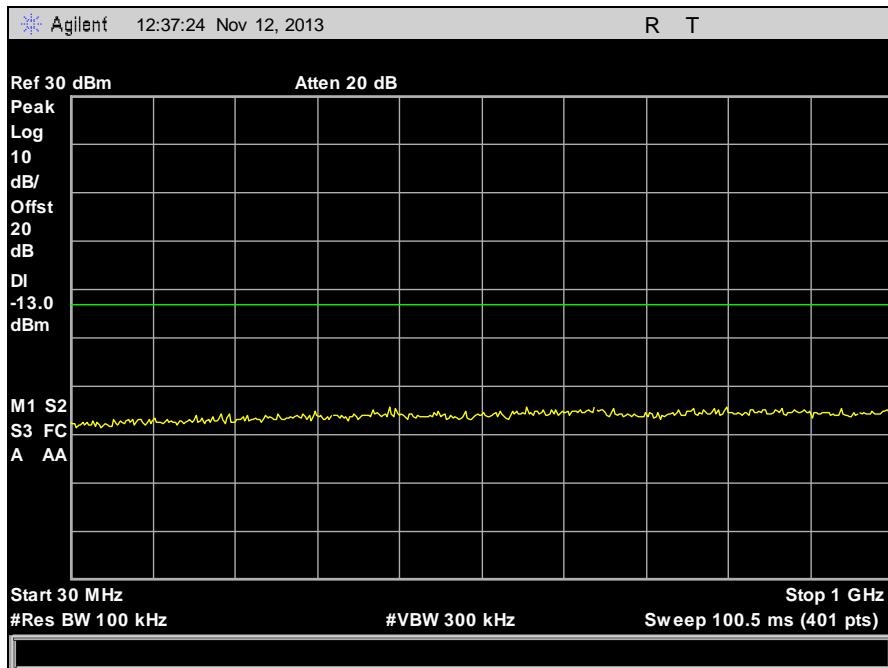
Plot 48. Conducted Spurious Emissions, CDMA, 2153.75 MHz, 1 GHz – 25 GHz



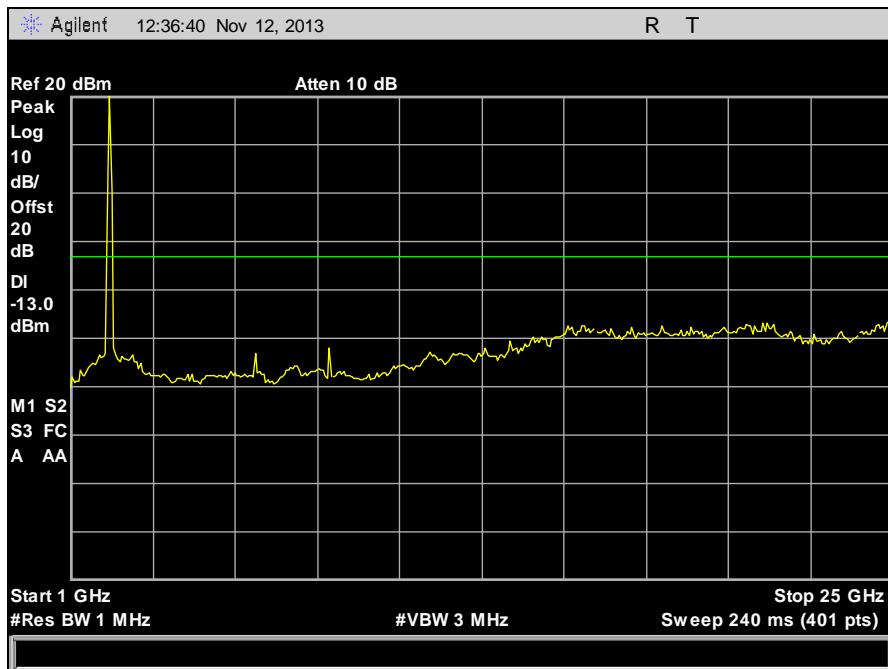
Plot 49. Conducted Spurious Emissions, WCDMA, 2112.4 MHz, 30 MHz – 1 GHz



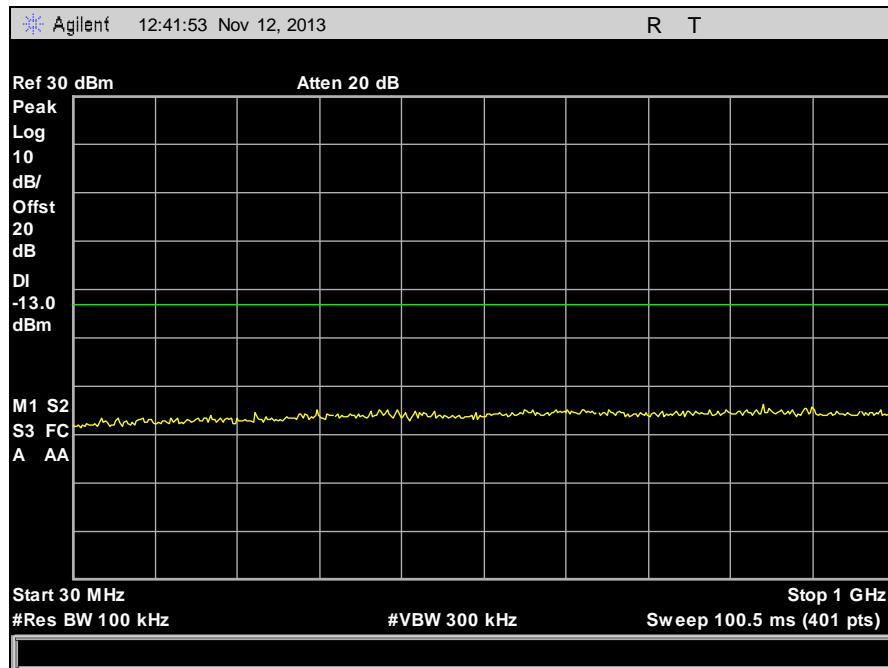
Plot 50. Conducted Spurious Emissions, WCDMA, 2112.4 MHz, 1 GHz – 25 GHz



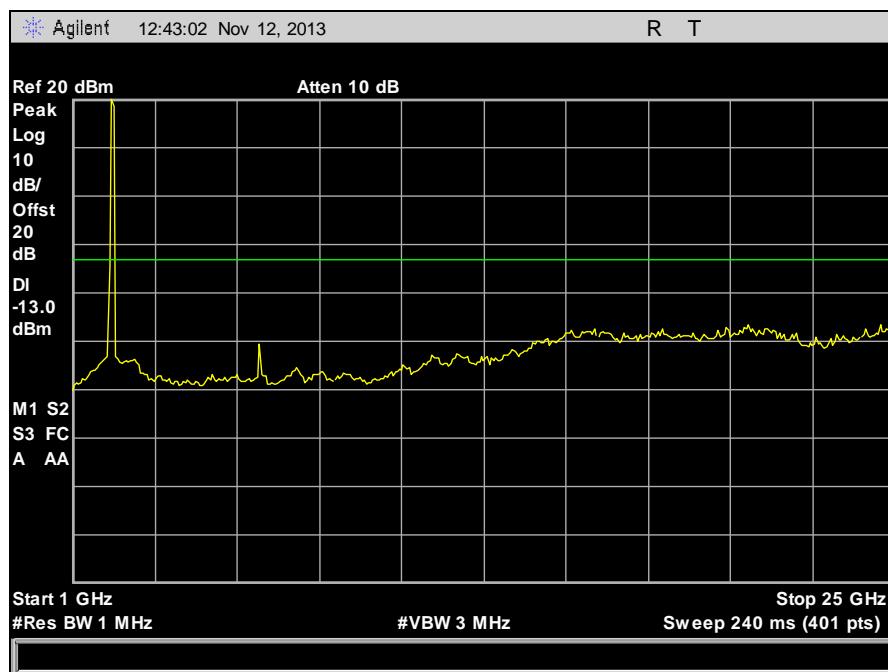
Plot 51. Conducted Spurious Emissions, WCDMA, 2132.4 MHz, 30 MHz – 1 GHz



Plot 52. Conducted Spurious Emissions, WCDMA, 2132.4 MHz, 1 GHz – 25 GHz



Plot 53. Conducted Spurious Emissions, WCDMA, 2152.6 MHz, 30 MHz – 1 GHz

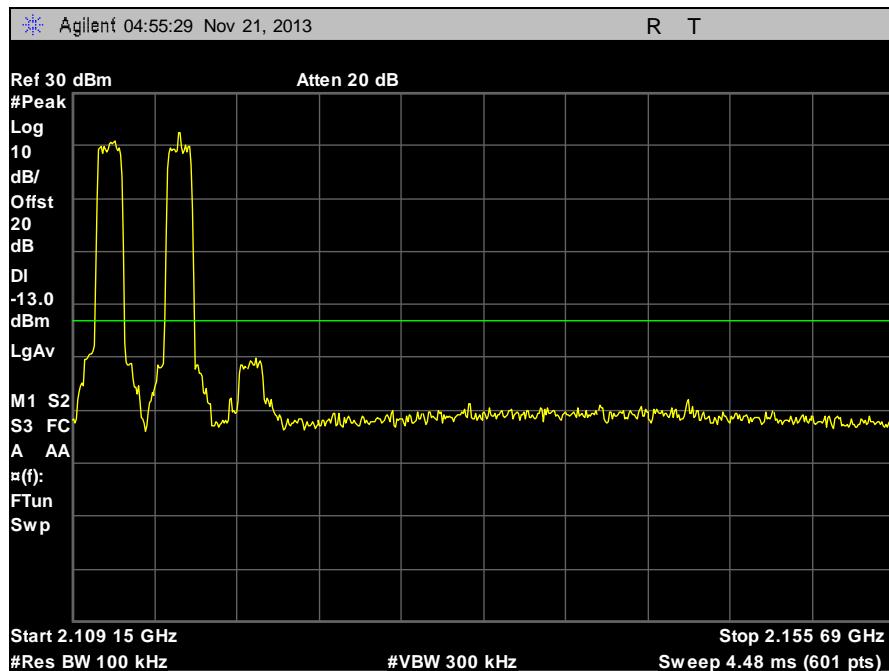


Plot 54. Conducted Spurious Emissions, WCDMA, 2152.6 MHz, 1 GHz – 25 GHz

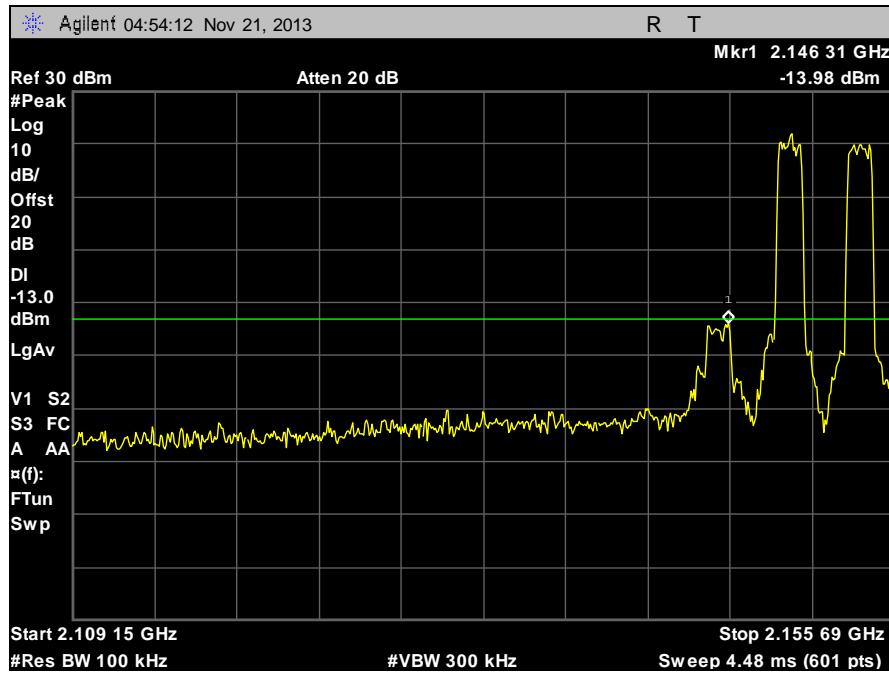
Electromagnetic Compatibility Criteria for Intentional Radiators

Intermodulation

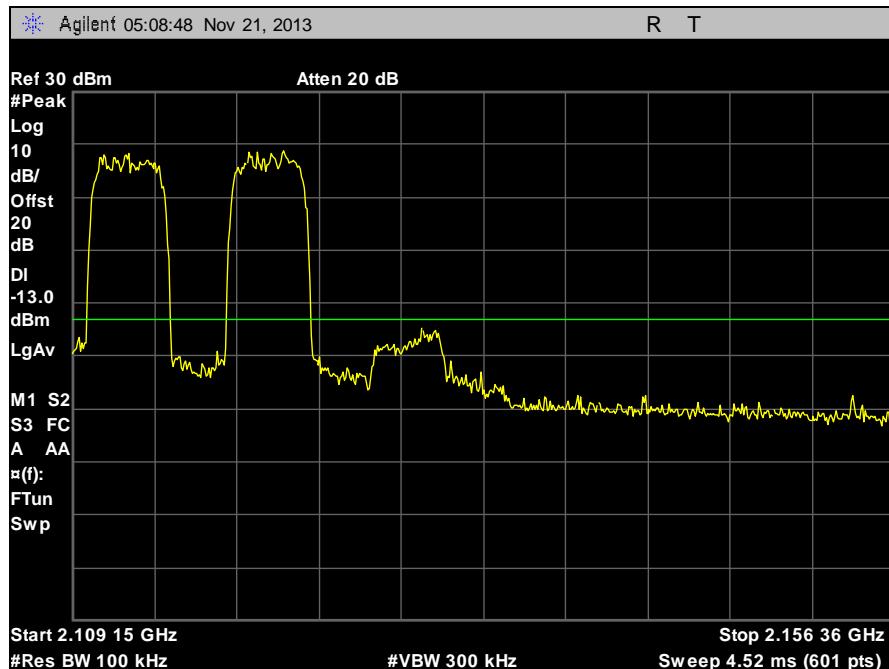
- Test Requirement(s):** Intermodulation – Test all modulation types [TDMA, CDMA, and FM (covers GSM and F1D)]
- CW signal rather than typical signal is acceptable (for FM).
 - At maximum drive level, for each modulation: one test with three tones, or two tests (High-, low-band edge) with two tones
 - Limit usually is -13 dBm conducted.
 - Not needed for Single Channel systems
 - Combination of modulation types not needed.
- Test Procedures:** The two tone test method was used. A signal generator was used to drive the input of the EUT. The EUT was evaluated at the high and low band edge.
- Test Results:** The EUT complies with the requirements of this section.
- Test Engineer(s):** Len Knight
- Test Date(s):** 11/24/13



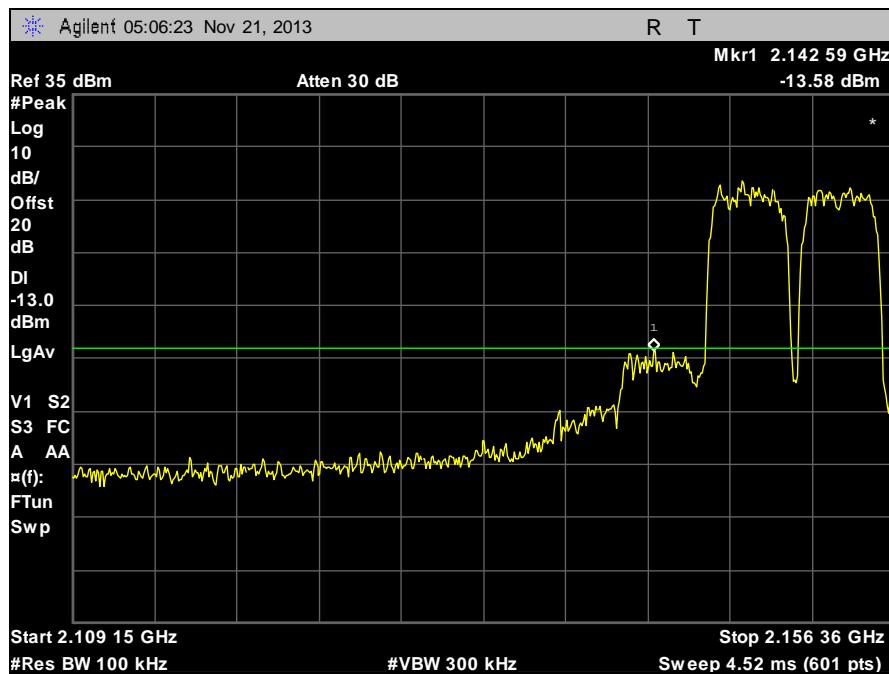
Plot 55. Intermodulation, CDMA, Low Channels



Plot 56. Intermodulation, CDMA, High Channels



Plot 57. Intermodulation, WCDMA, Low Channels



Plot 58. Intermodulation, WCDMA, High Channels



Electromagnetic Compatibility Criteria for Intentional Radiators

Filter Response

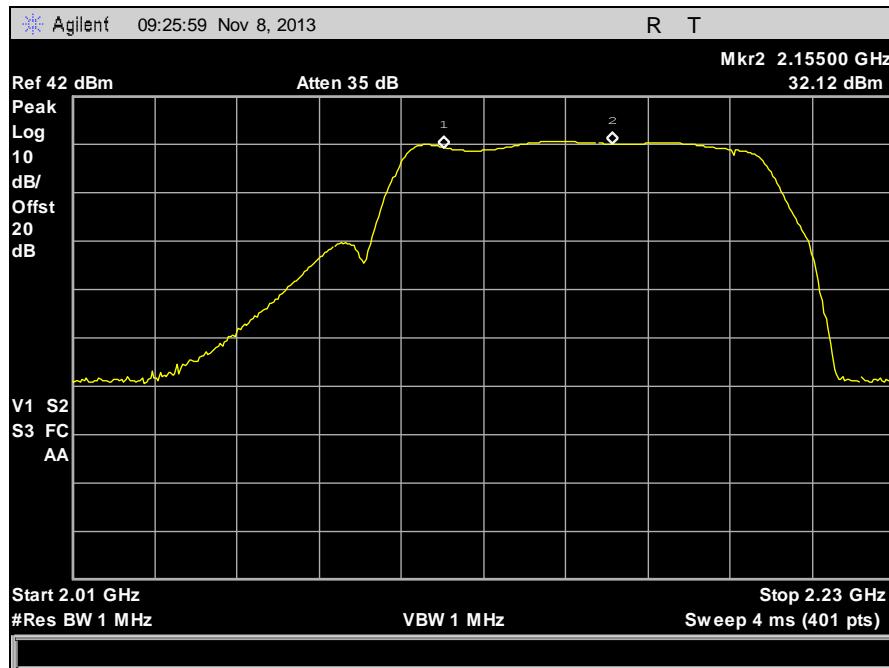
Test Requirement(s): Test for rejection of out-of-band signals

Test Procedures: A signal generator was used to drive the input of the EUT. The signal generator was swept across the band of interest. Filter frequency response plots were taken.

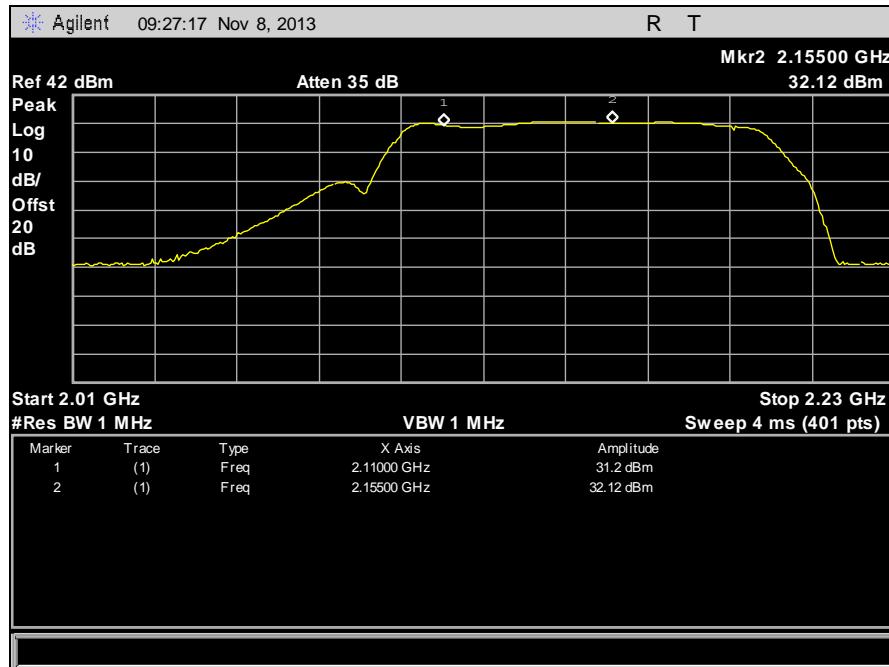
Test Results: The EUT complies with the requirements of this section.

Test Engineer: Len Knight

Test Results: 11/08/13



Plot 59. Filter Response



Plot 60. Filter Response with Marker Table



Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Test Equipment
CFR Title 47 Part 27

IV. Test Equipment



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
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	07/30/2013	01/30/2015
1T4300	SEMI-ANECHOIC CHAMBER # 1 (NSA)	EMC TEST SYSTEMS	NONE	07/24/2012	07/24/2015
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	07/16/2012	07/16/2014
1T4299	SIGNAL GENERATOR	HP	E4432B	11/13/2013	05/13/2015
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	08/06/2012	02/06/2014
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	01/08/2013	07/08/2014
1T4354	SIGNAL GENERATOR	HEWLETT PACKARD	83752A	10/28/2013	04/28/2015
1T4592	RF FILTER KIT	VARIOUS	N/A	NOT REQUIRED	
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4149	HIGH-FREQUENCY ANECHOIC CHAMBER	RAY-PROOF	81	NOT REQUIRED	
1T4548	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	1251P	SEE NOTE	
2T1083	TEMPHUMIDITY CHAMBER/ CONTROLLER/ RECORDER/ TRANSMITTER	THERMOTRON/ THERMOTRON/ HONEYWELL/ VAIASALA	SE-1000-3-3/ 7800/ DR4500/ HMM30C	05/25/2013	05/25/2014
1T4377	TRUE RMS MULTIMETER	FLUKE	189	07/25/2013	01/25/2015

Table 6. Test Equipment List

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



Digital Receiver Technology, Inc.
DRT9957B - Amplifier

Electromagnetic Compatibility
Certification & User's Manual Information
CFR Title 47 Part 27

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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