MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
3162 BELICK STREET ● SANTA CLARA, CA 95054-2401 ● PHONE (408) 748-3585 ● FAX (510) 489-6372

January 25, 2012

Digital Receiver Technology, Inc.
20250 Century Blvd., Suite 500
Germantown, MD 20874

Dear Steve Hudson,

Enclosed is the EMC Wireless test report for compliance testing of the Digital Receiver Technology, Inc., DRT1183C (Base Station) as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 22 Subpart H for Cellular Devices and FCC Part 24 Subpart E for Broadband PCS 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.\EMC31505B-FCC22_24 Rev. 1)

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Electromagnetic Compatibility Criteria
Test Report

for the

Digital Receiver Technology, Inc.
Model DRT1183C (Base Station)

Tested under
FCC Certification Rules
Title 47 of the CFR,
Part 22 Subpart H for Cellular Devices
&
Part 24 Subpart E for Broadband PCS Devices

MET Report: EMC31505B-FCC22_24 Rev. 1

January 25, 2012

Prepared For:

Digital Receiver Technology, Inc.
20250 Century Blvd., Suite 500
Germantown, MD 20874

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

Electromagnetic Compatibility Criteria
Test Report

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Tested Under
FCC Certification Rules
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Part 22 Subpart H for Cellular Devices
&
Part 24 Subpart E for Broadband PCS Devices

Len Knight, 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 22 Subpart H and Part 15 Subpart B of the FCC Rules under normal use and maintenance.

Shawn McMillen, Manager
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	September 21, 2011	Initial Issue
1	January 25, 2012	Revised to reflect customer corrections.

Table of Contents

List of Tables

List of Terms and Abbreviations

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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Digital Receiver Technology, Inc..DRT1183C (Base Station), with the requirements of Part 22 Subpart H and Part 24 Subpart E. 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 DRT1183C (Base Station). 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 DRT1183C (Base Station), 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 22 Subpart H and Part 24 Subpart E, in accordance with Digital Receiver Technology, Inc., purchase order number 045620.

Reference	Description	Compliance
Part 22 Subpart H §2.1046; §22.913 Part 24 Subpart E §2.1046; §24.232	RF Power Output	Compliant
§2.1047	Modulation Characteristics	Not Applicable
§2.1049	Occupied Bandwidth	Compliant
§2.1051; §22.917, §24.238	Conducted Spurious Emissions at Antenna Terminals	Compliant
§2.1053; §22.917, §24.238	Radiated Spurious Emissions from the Cabinet	Compliant
§2.1055; §22.355, §24.135	Frequency Stability	Compliant

Table 1. Executive Summary of EMC ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Digital Receiver Technology, Inc.. to perform testing on the DRT1183C (Base Station), under Digital Receiver Technology, Inc.'s purchase order number 045620.

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., DRT1183C (Base Station).

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

Model(s) Tested:	DRT1183C (Base Station)		
Model(s) Covered:	DRT1183C (Base Station)		
EUT Specifications:	FCC ID: XLM1183C		
	Type of Modulations:	GMSK and QPSK	
	Equipment Code:	PCB	
	RF Power Output	21.80 dBm	21.94 dBm
	EUT Frequency Ranges:	869 – 894	1930 - 1990
Analysis:	The results obtained relate only to the item(s) tested.		
Environmental Test Conditions:	Temperature: 15-35º C		
	Relative Humidity: 30-60%		
	Barometric Pressure: 860-1060 mbar		
Evaluated by:	Len Knight		
Date(s):	January 25, 2012		

B. References

CFR 47, Part 22, Subpart H	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 22: Rules and Regulations for Cellular Devices.
CFR 47, Part 24, Subpart E	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 24: Rules and Regulations for Personal Communications Services
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

C. Test Site

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

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

D. Description of Test Sample

DRT1183C is a mobile cellular, PCS, and TDMA base station.

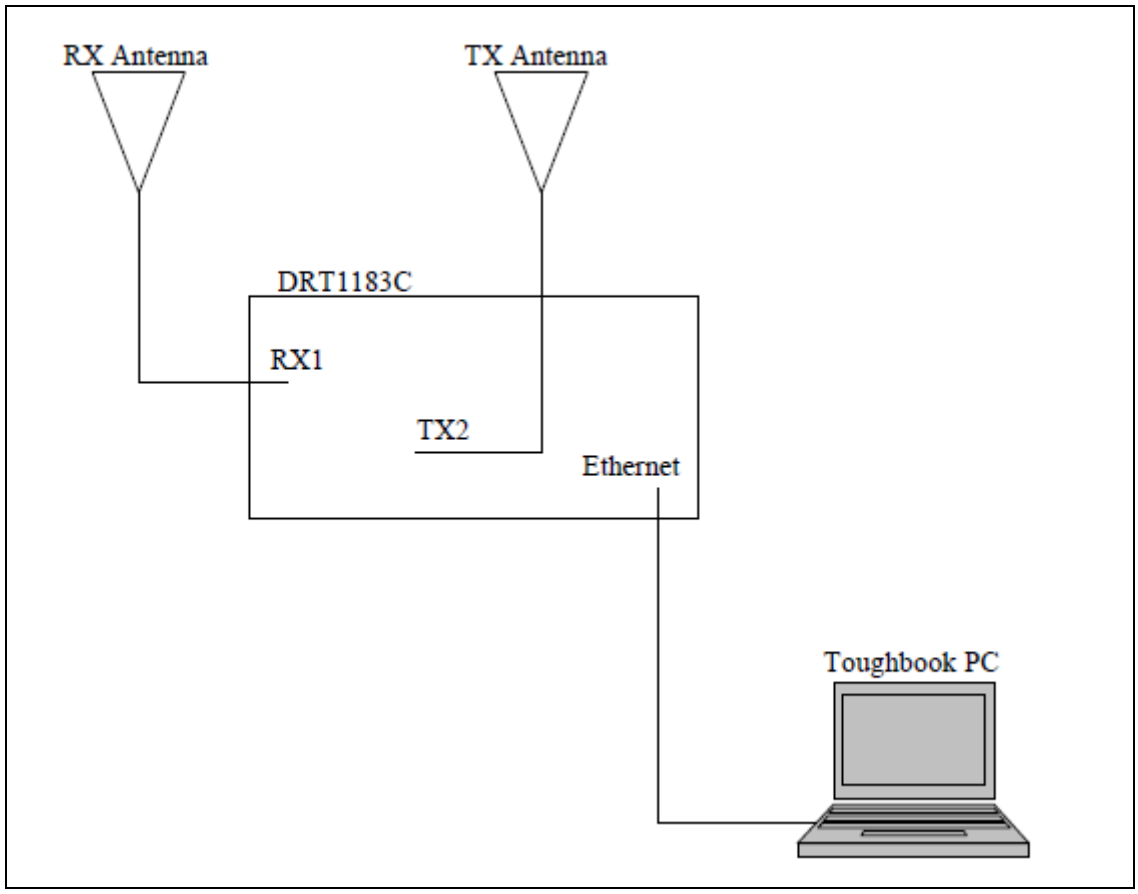


Figure 1. Block Diagram of Equipment Configuration

E. Equipment Configuration

The DRT1183C was configured with 4 RFT Digital Tuners, 4 WPM Processors, 1 REF Reference Generator, and 1 CTL Computer Control.

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
CF-19	Toughbook PC	Panasonic	CF-19	CF-19KDRAX6M

Table 2. Support Equipment

G. Ports and Cabling Information

Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
RX1	Receive antenna	1	5	Y	
TX2	Transmit antenna	1	5	Y	
ETHERNET1	LAN connection to PC	1	5	Y	

Table 3. Ports and Cabling Information

H. Mode of Operation

Operates as a mobile base station in GSM and CDMA in the Cellular and PCS bands and TDMA in the 800MHz band.

I. Method of Monitoring EUT Operation

Ran control software on a connected PC.

J. 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.

K. 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.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1046 RF Power Output

Test Requirements: **§ 2.1046 Measurements required: RF power output:**

§ 2.1046 (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8).The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§ 2.1046 (b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 22.913 Power and antenna height limits.

§ 22.913(a): The Effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

§ 24.232 Power and antenna height limits.

§ 24.232 (b): Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Test Procedures: As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. The spectrum analyzer was set to its default settings – RBW, VBW, Sweep Time, etc. – except that the detector was set to an average detector. The "Channel Power" measurement feature of the spectrum analyzer was used to determine the input and output power across the Occupied Bandwidth. Measurements were made with both a Peak and Average detector.

Test Results: The EUT complies with the requirements of this section. The EUT conducted power does not exceed limit at the carrier frequency.

Test Engineer(s): Len Knight

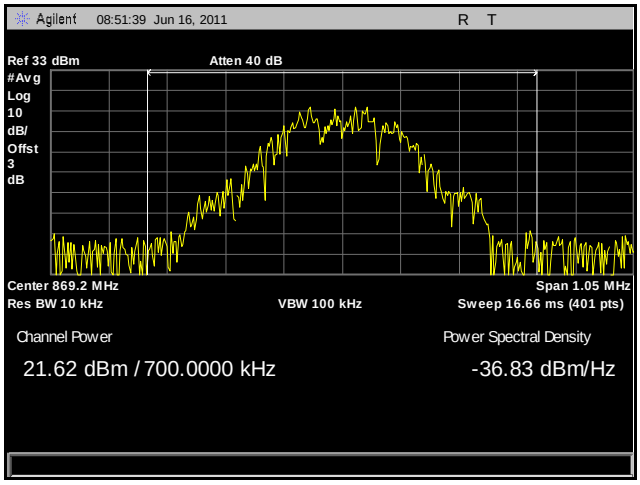
Test Date(s): 06/16/11

GSM Modulation – Part 22		
Channel	**Frequency (MHz)**	**Conducted Power (dBm)**
Low	869.2	21.62
Mid	881.6	21.80
High	893.8	21.64
CDMA Modulation – Part 22		
Channel	**Frequency (MHz)**	**Conducted Power (dBm)**
Low	869.7	13.79
Mid	881.52	13.81
High	893.31	13.83

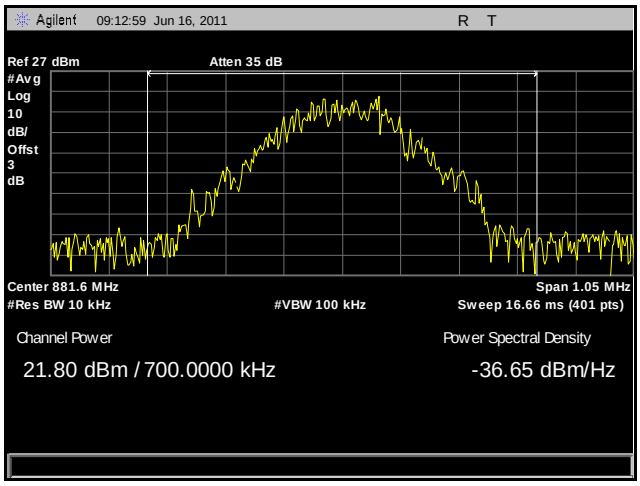
Table 4. RF Power Output, Test Results, Part 22

GSM Modulation – Part 24		
Channel	**Frequency (MHz)**	**Conducted Power (dBm)**
Low	1930.2	21.47
Mid	1960	21.94
High	1989.8	21.33
CDMA Modulation – Part 24		
Channel	**Frequency (MHz)**	**Conducted Power (dBm)**
Low	1931.25	13.98
Mid	1960	13.92
High	1988.75	13.86

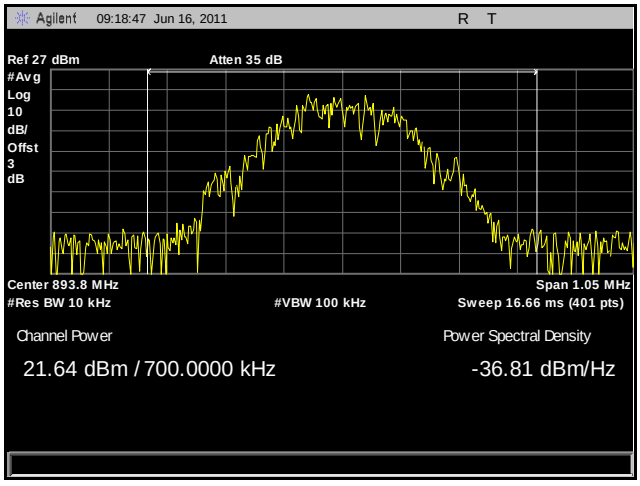
Table 5. RF Power Output, Test Results, Part 24



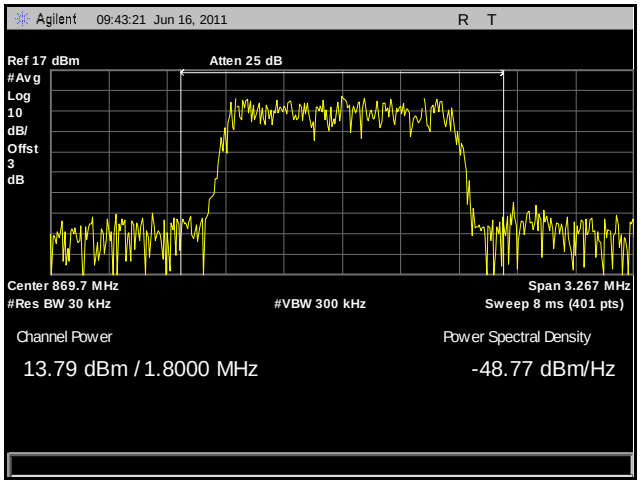
Plot 1. RF Power, Low Channel, GSM, Part 22



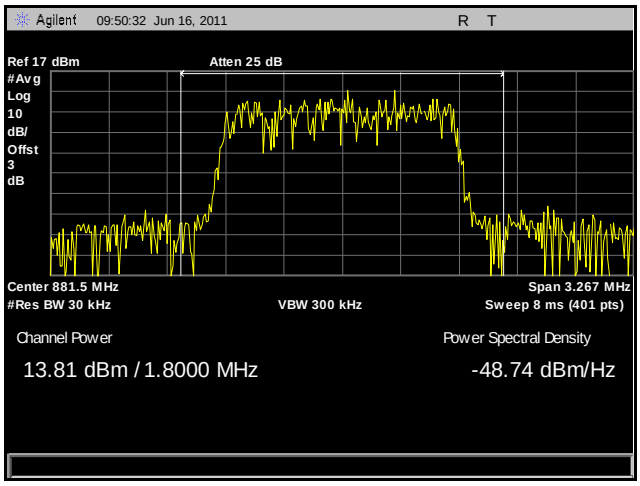
Plot 2. RF Power, Mid Channel, GSM, Part 22



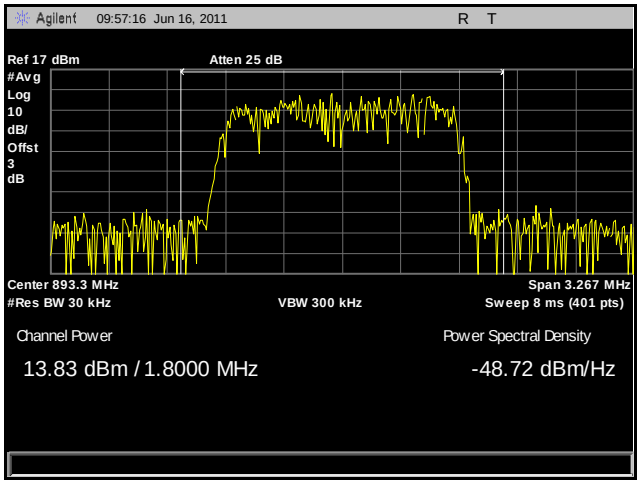
Plot 3. RF Power, High Channel, GSM, Part 22



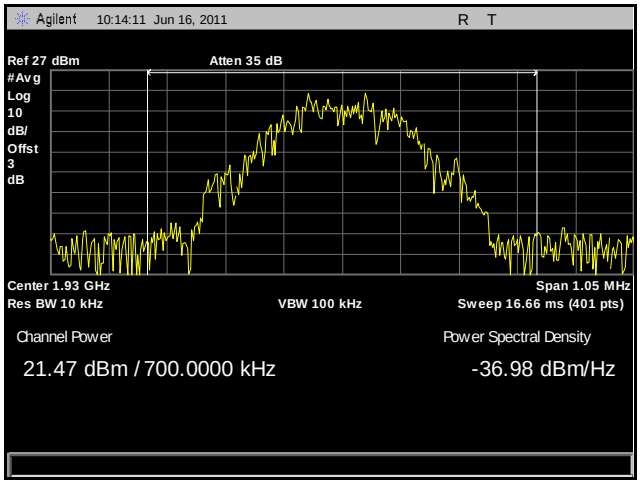
Plot 4. RF Power, Low Channel, CDMA, Part 22



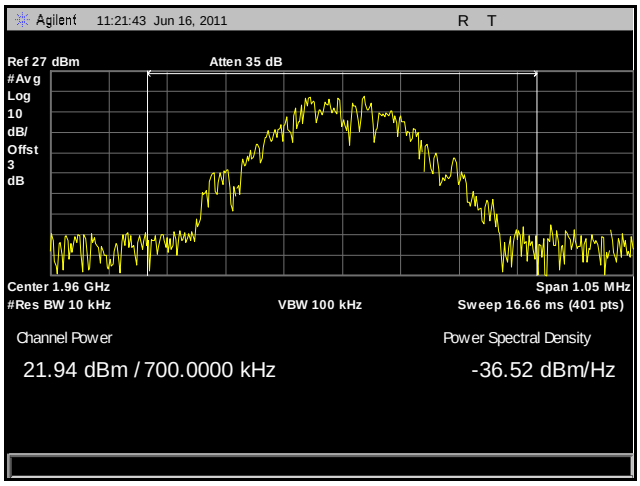
Plot 5. RF Power, Mid Channel, CDMA, Part 22



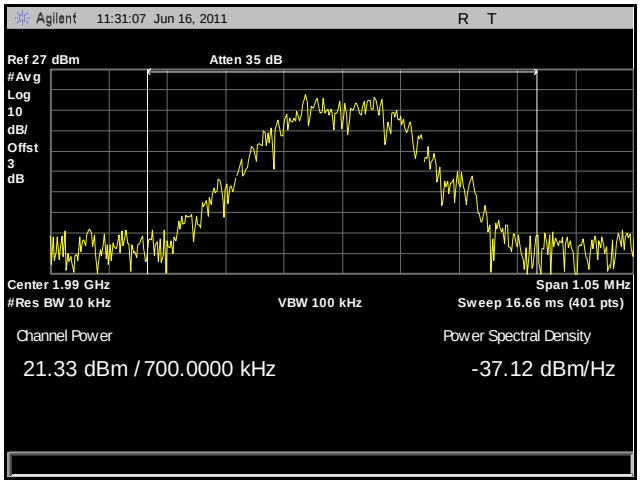
Plot 6. RF Power, High Channel, CDMA, Part 22



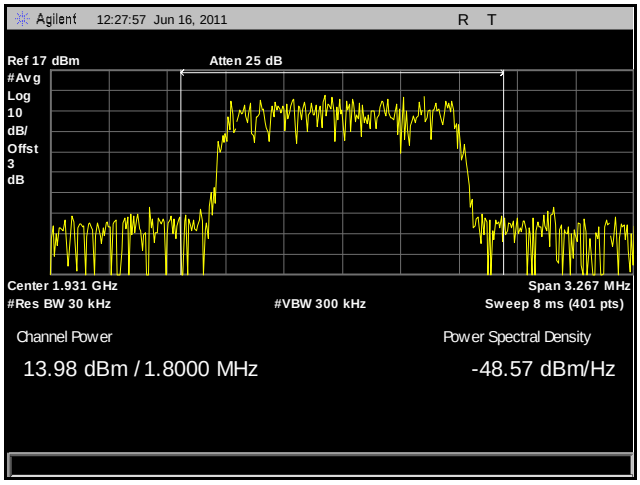
Plot 7. RF Power, Low Channel, GSM, Part 24



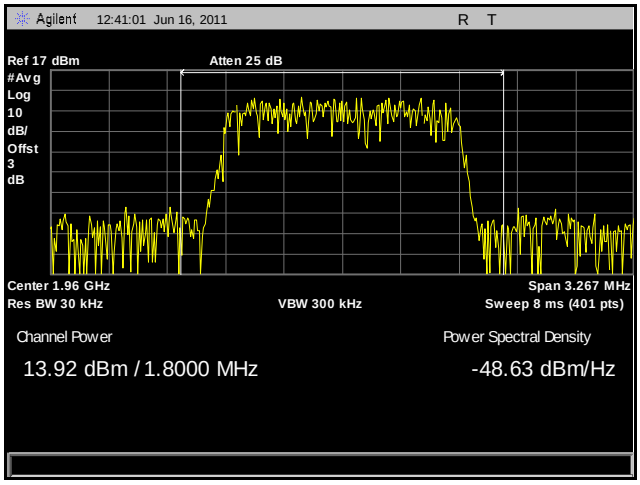
Plot 8. RF Power, Mid Channel, GSM, Part 24



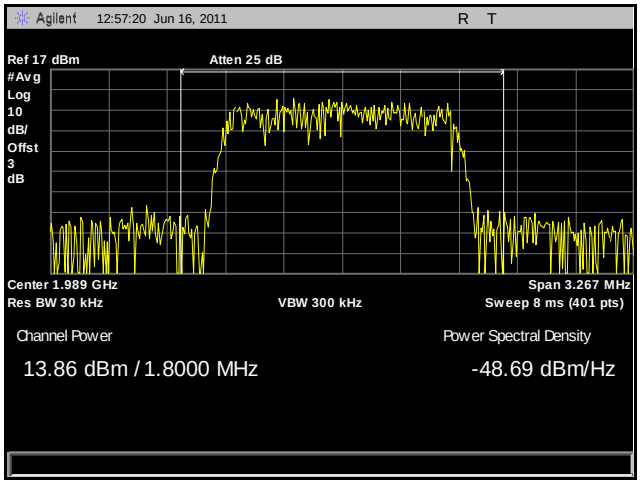
Plot 9. RF Power, High Channel, GSM, Part 24



Plot 10. RF Power, Low Channel, CDMA, Part 24



Plot 11. RF Power, Mid Channel, CDMA, Part 24



Plot 12. RF Power, High Channel, CDMA, Part 24

§ 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 port.

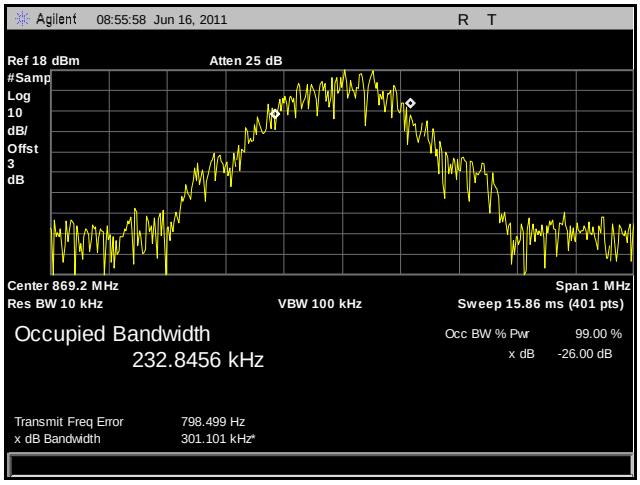
Test Results: The EUT complies with the requirements of this section.

Test Engineer(s): Len Knight

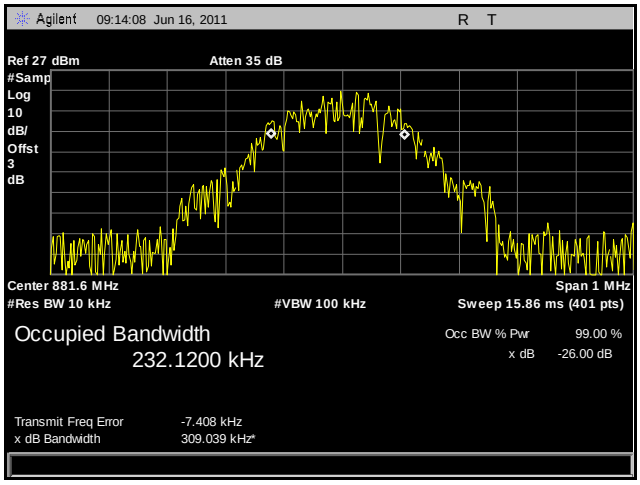
Test Date(s): 06/17/11

GSM Modulation – Part 22		
Channel	**Frequency (MHz)**	**Occupied Bandwidth (kHz)**
Low	869.2	301.101
Mid	881.6	309.04
High	893.8	306.026
CDMA Modulation – Part 22		
Channel	**Frequency (MHz)**	**Occupied Bandwidth (MHz)**
Low	869.7	1.361
Mid	881.52	1.347
High	893.31	1.356
GSM Modulation – Part 24		
Channel	**Frequency (MHz)**	**Occupied Bandwidth (kHz)**
Low	1930.2	319.785
Mid	1960	319.45
High	1989.8	308.249
CDMA Modulation – Part 24		
Channel	**Frequency (MHz)**	**Occupied Bandwidth (MHz)**
Low	1931.25	1.358
Mid	1960	1.375
High	1988.75	1.340

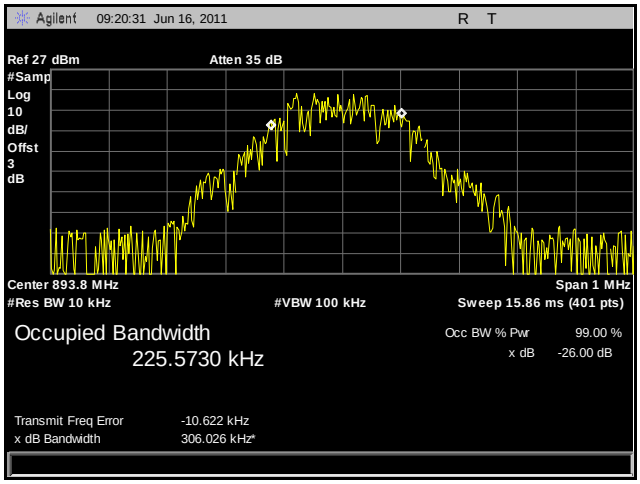
Table 6. Occupied Bandwidth, Test Results



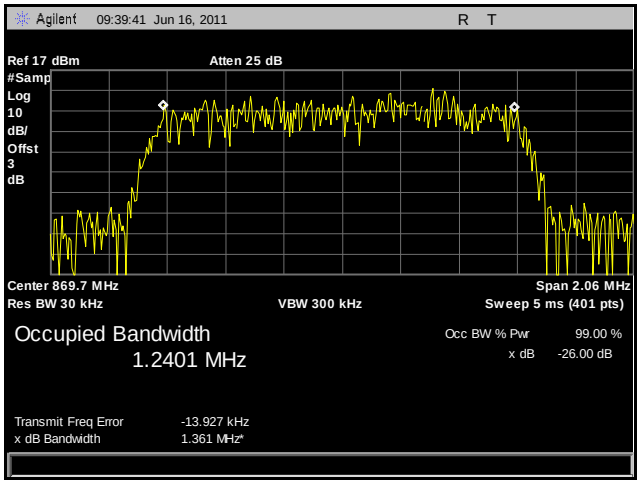
Plot 13. Occupied Bandwidth, Low Channel, GSM, Part 22



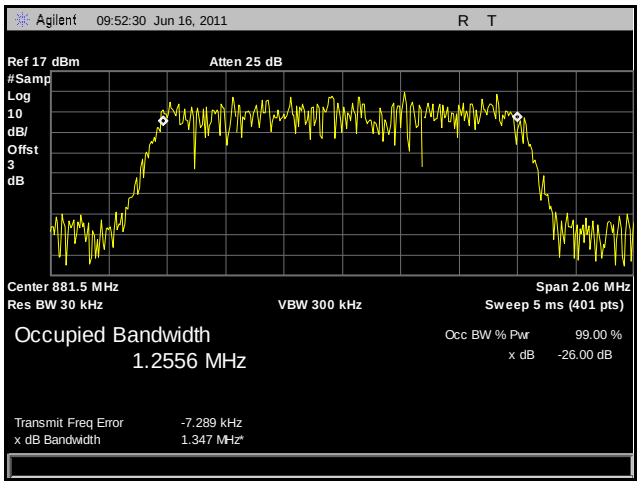
Plot 14. Occupied Bandwidth, Mid Channel, GSM, Part 22



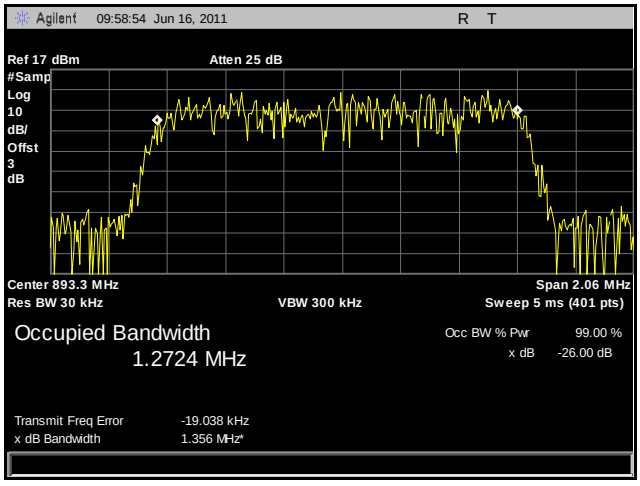
Plot 15. Occupied Bandwidth, High Channel, GSM, Part 22



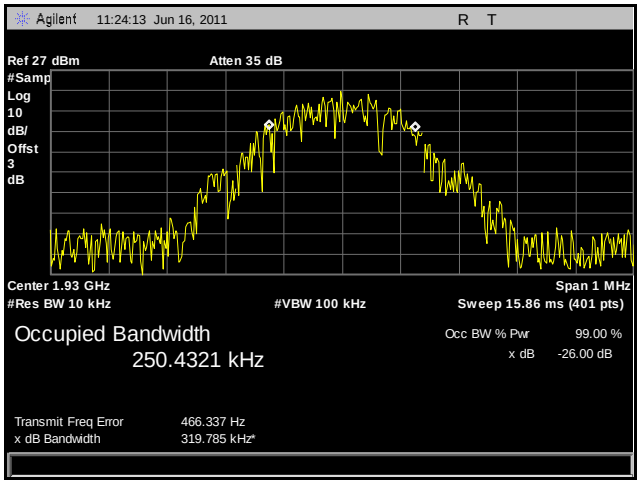
Plot 16. Occupied Bandwidth, Low Channel, CDMA, Part 22



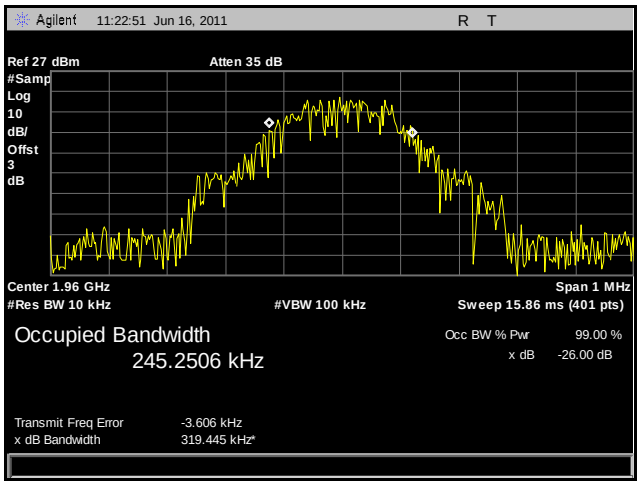
Plot 17. Occupied Bandwidth, Mid Channel, CDMA, Part 22



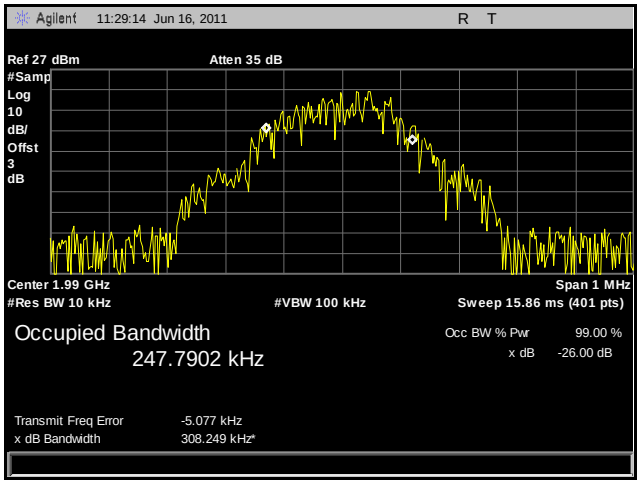
Plot 18. Occupied Bandwidth, High Channel, CDMA, Part 22



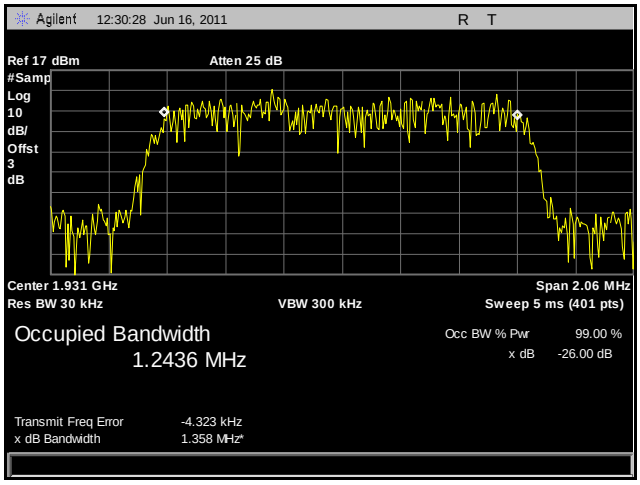
Plot 19. Occupied Bandwidth, Low Channel, GSM, Part 24



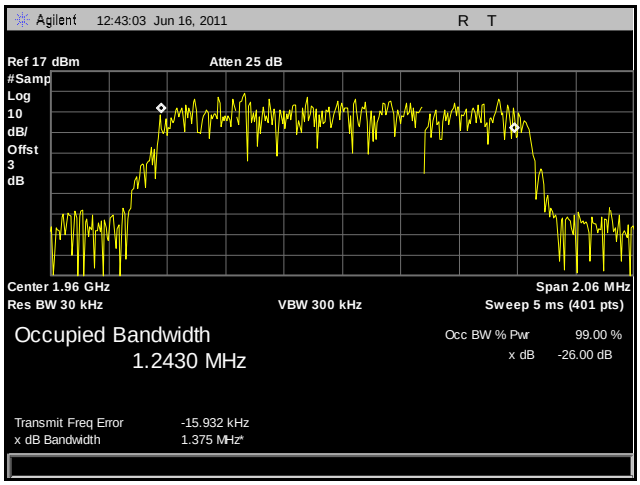
Plot 20. Occupied Bandwidth, Mid Channel, GSM, Part 24



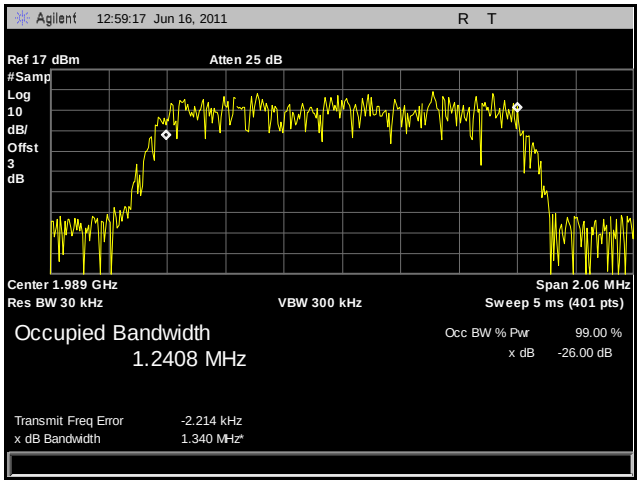
Plot 21. Occupied Bandwidth, High Channel, GSM, Part 24



Plot 22. Occupied Bandwidth, Low Channel, CDMA, Part 24



Plot 23. Occupied Bandwidth, Mid Channel, CDMA, Part 24



Plot 24. Occupied Bandwidth, High Channel, CDMA, Part 24

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): **§ 2.1053 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.

§ 22.917 Emission limitations Cellular equipment: The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P).

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

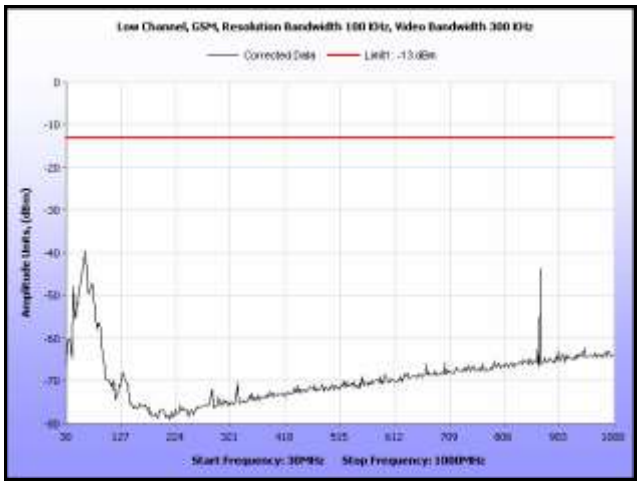
Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360^0 and the receiving antenna scanned from 1-4m in order to capture the maximum emission. The plots are corrected for cable loss, antenna correction factor, and distance correction. The field strength was mathematically corrected to an E.I.R.P. Harmonic emissions up to the 10^{th} or 40GHz, which ever was the lesser, were investigated.

The spectrum analyzer was set to 1MHz RBW and 3MHz VBW above 1 GHz and 100 kHz RBW and 300 kHz VBW below 1 GHz. The spectrum was investigated from 30MHz to the 10^{th} harmonic of the carrier.

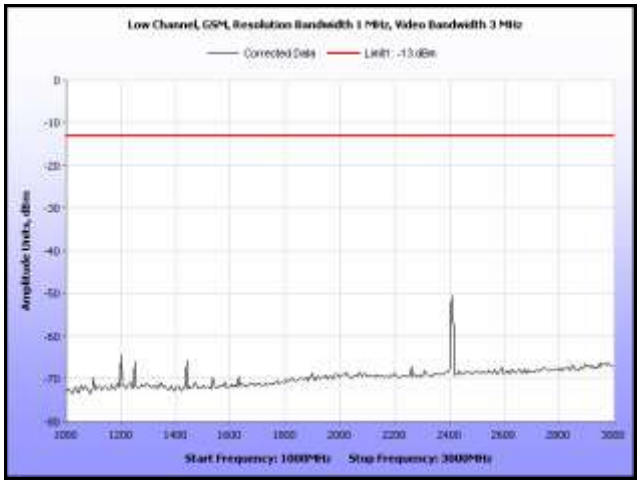
Test Results: The EUT complies with the requirements of this section.

Test Engineer: Len Knight

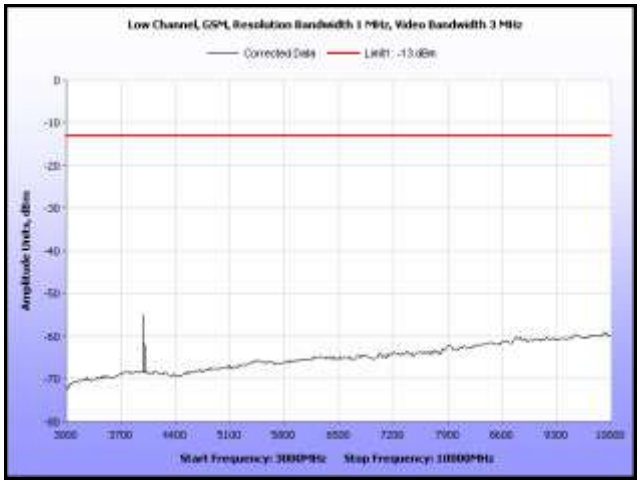
Test Date(s): 06/22/11 – 06/24/11



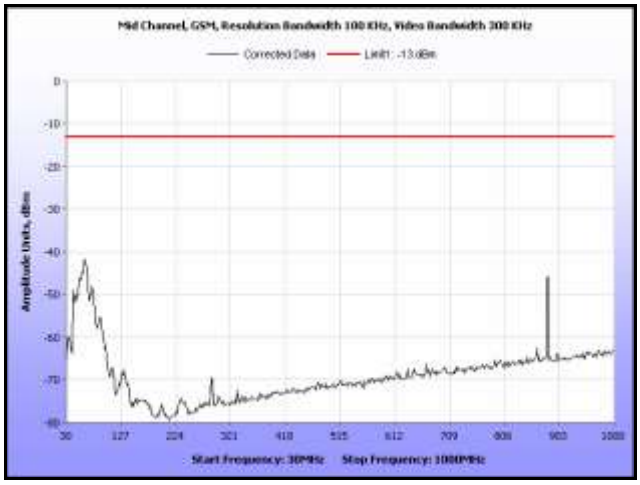
Plot 25. Radiated Spurious Emissions, Low Channel, GSM, Part 22, 30 MHz – 1 GHz



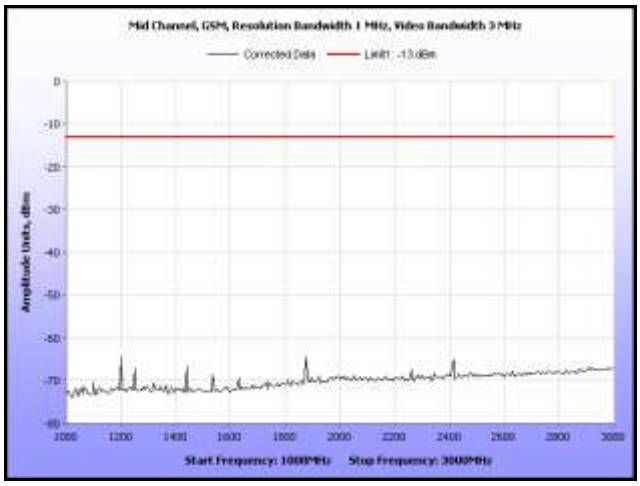
Plot 26. Radiated Spurious Emissions, Low Channel, GSM, Part 22, 1 GHz – 3 GHz



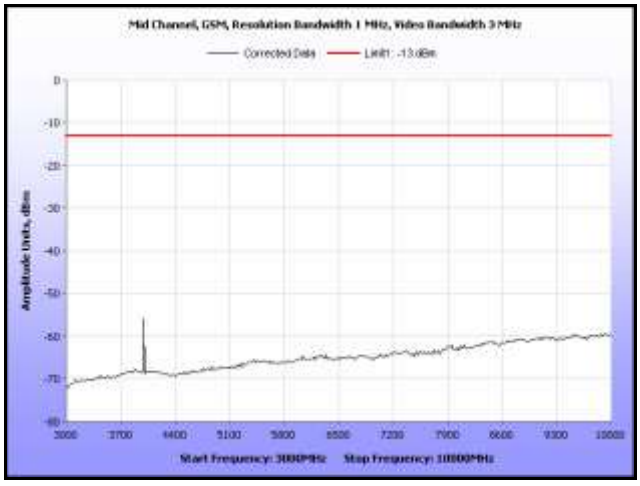
Plot 27. Radiated Spurious Emissions, Low Channel, GSM, Part 22, 3 GHz – 10 GHz



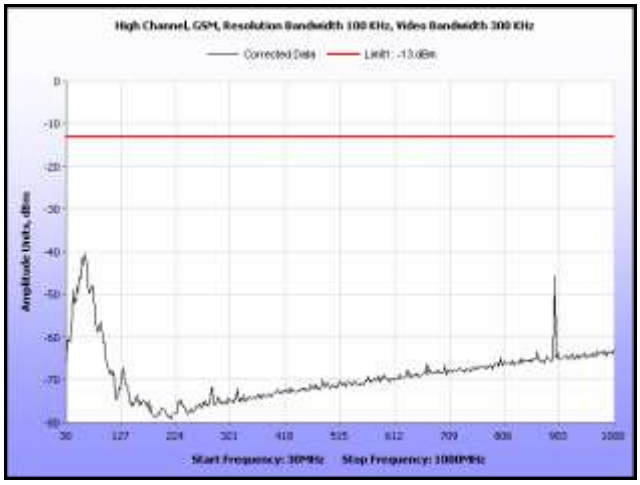
Plot 28. Radiated Spurious Emissions, Mid Channel, GSM, Part 22, 30 MHz – 1 GHz



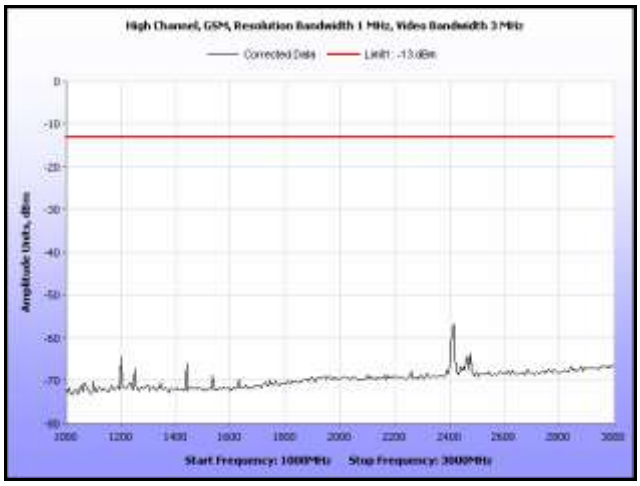
Plot 29. Radiated Spurious Emissions, Mid Channel, GSM, Part 22, 1 GHz – 3 GHz



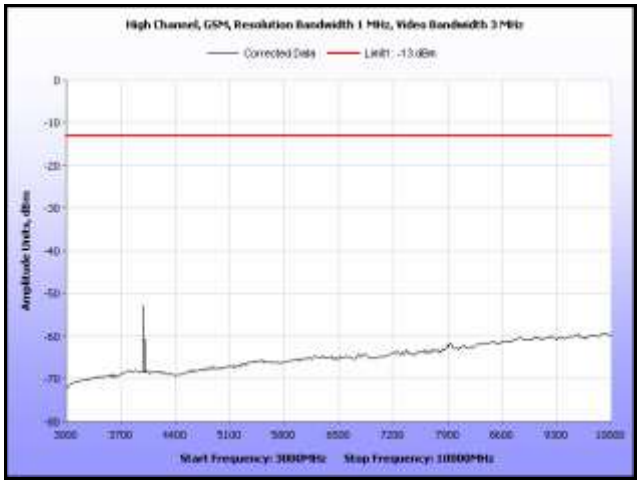
Plot 30. Radiated Spurious Emissions, Mid Channel, GSM, Part 22, 3 GHz – 10 GHz



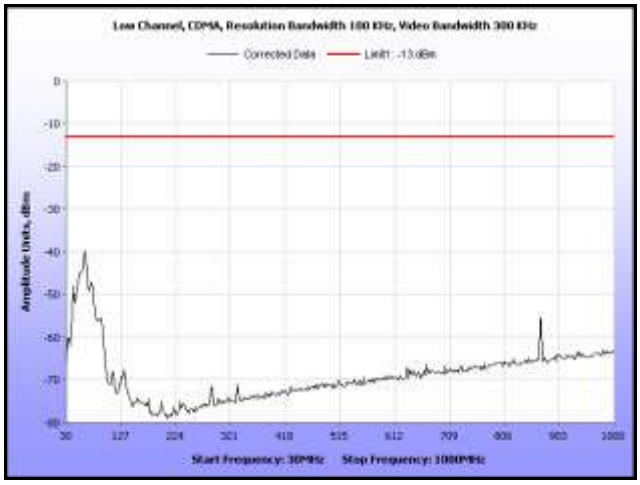
Plot 31. Radiated Spurious Emissions, High Channel, GSM, Part 22, 30 MHz – 1 GHz



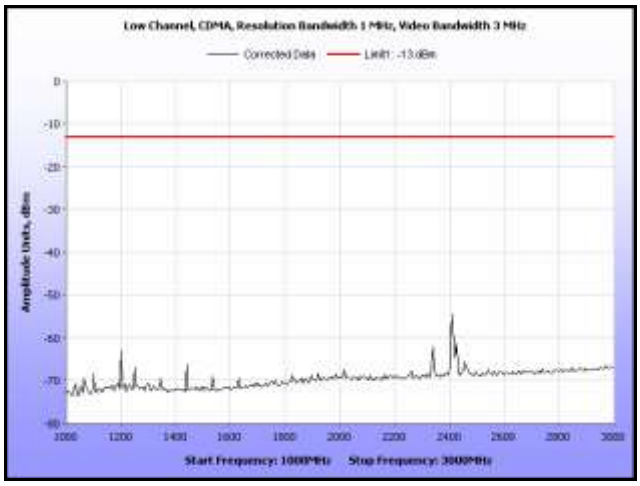
Plot 32. Radiated Spurious Emissions, High Channel, GSM, Part 22, 1 GHz – 3 GHz



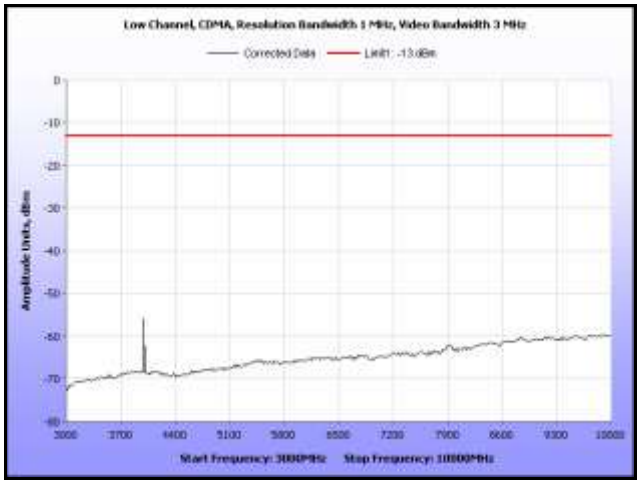
Plot 33. Radiated Spurious Emissions, High Channel, GSM, Part 22, 3 GHz – 10 GHz



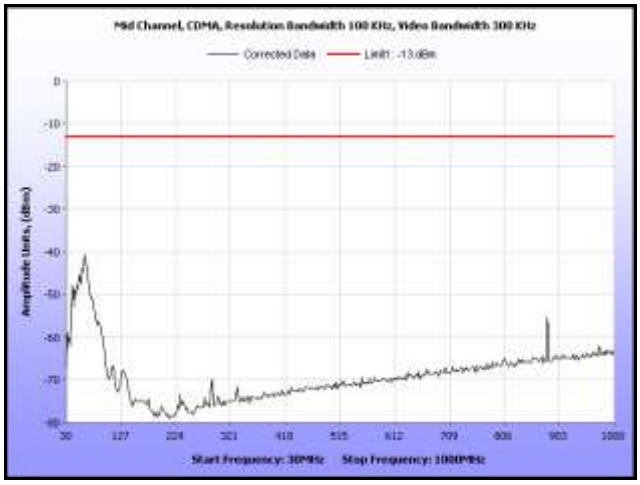
Plot 34. Radiated Spurious Emissions, Low Channel, CDMA, Part 22, 30 MHz – 1 GHz



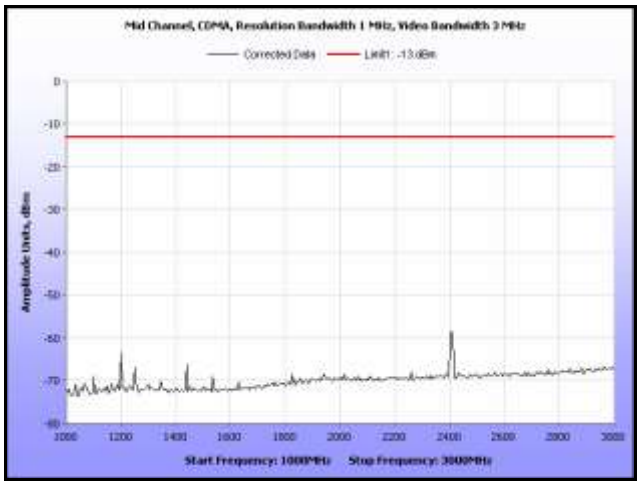
Plot 35. Radiated Spurious Emissions, Low Channel, CDMA, Part 22, 1 GHz – 3 GHz



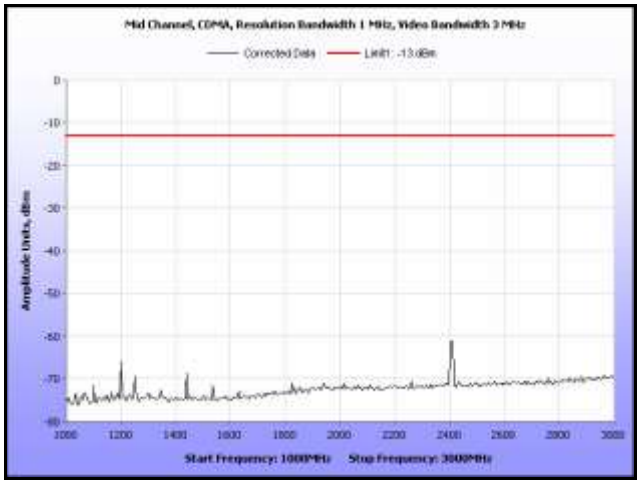
Plot 36. Radiated Spurious Emissions, Low Channel, CDMA, Part 22, 3 GHz – 10 GHz



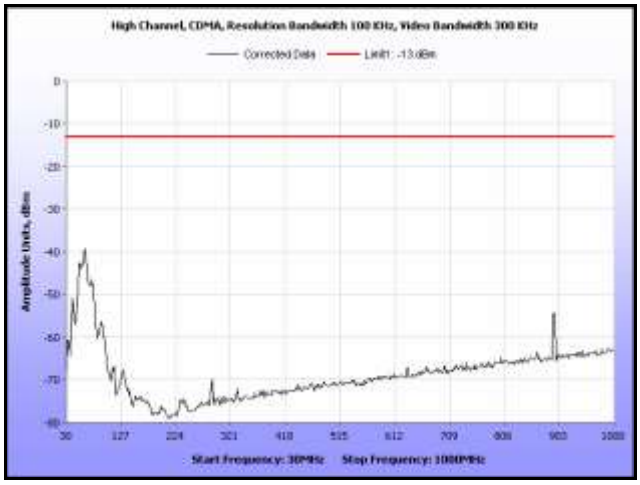
Plot 37. Radiated Spurious Emissions, Mid Channel, CDMA, Part 22, 30 MHz – 1 GHz



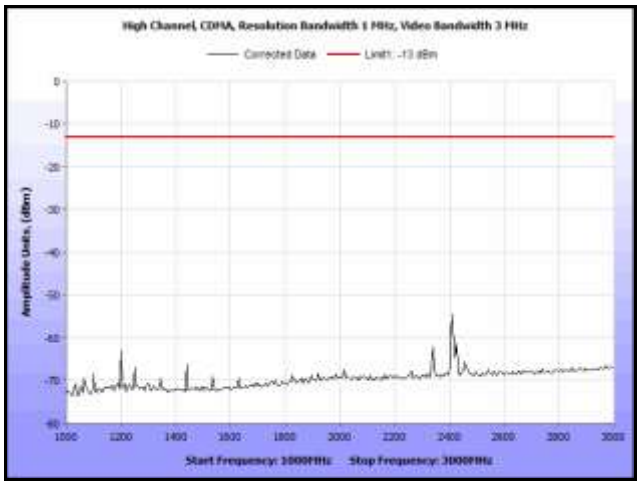
Plot 38. Radiated Spurious Emissions, Mid Channel, CDMA, Part 22, 1 GHz – 3 GHz



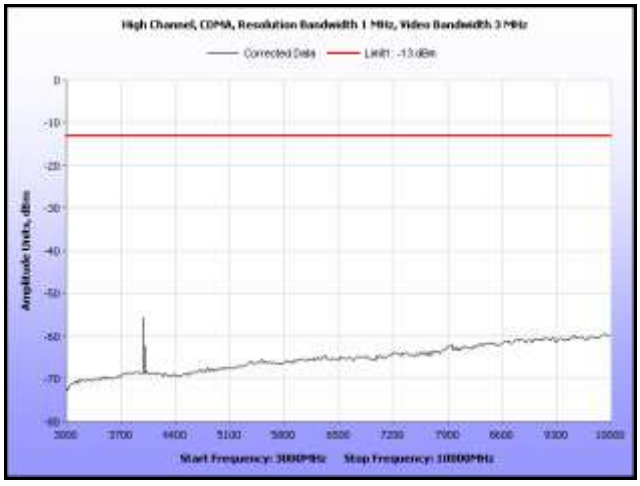
Plot 39. Radiated Spurious Emissions, Mid Channel, CDMA, Part 22, 3 GHz – 10 GHz



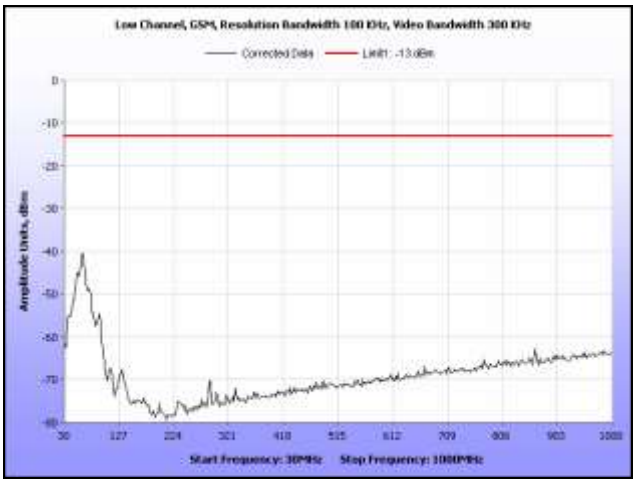
Plot 40. Radiated Spurious Emissions, High Channel, CDMA, Part 22, 30 MHz – 1 GHz



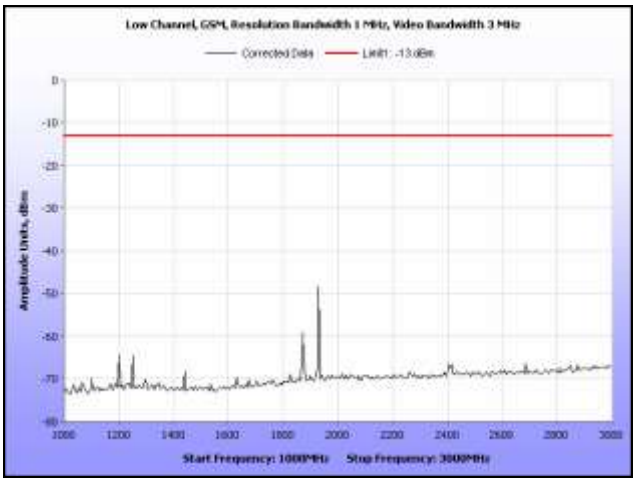
Plot 41. Radiated Spurious Emissions, High Channel, CDMA, Part 22, 1 GHz – 3 GHz



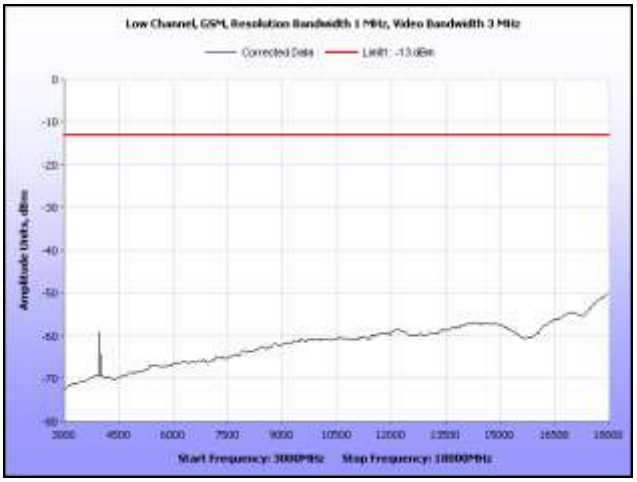
Plot 42. Radiated Spurious Emissions, High Channel, CDMA, Part 22, 3 GHz – 10 GHz



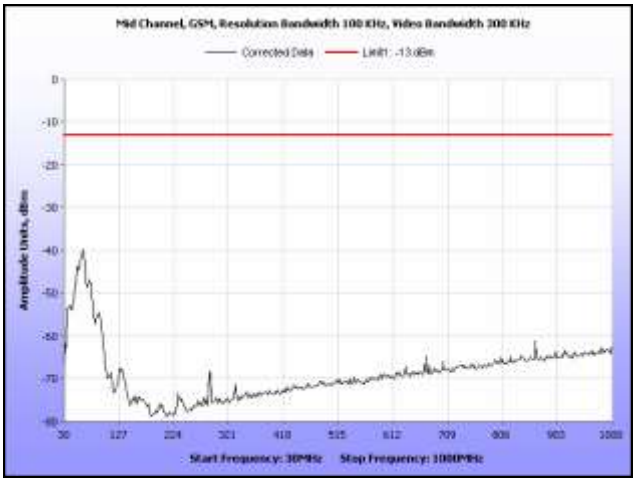
Plot 43. Radiated Spurious Emissions, Low Channel, GSM, Part 24, 30 MHz – 1 GHz



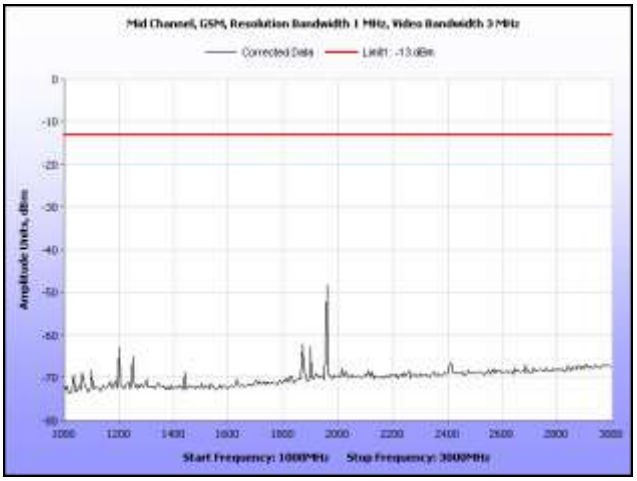
Plot 44. Radiated Spurious Emissions, Low Channel, GSM, Part 24, 1 GHz – 3 GHz



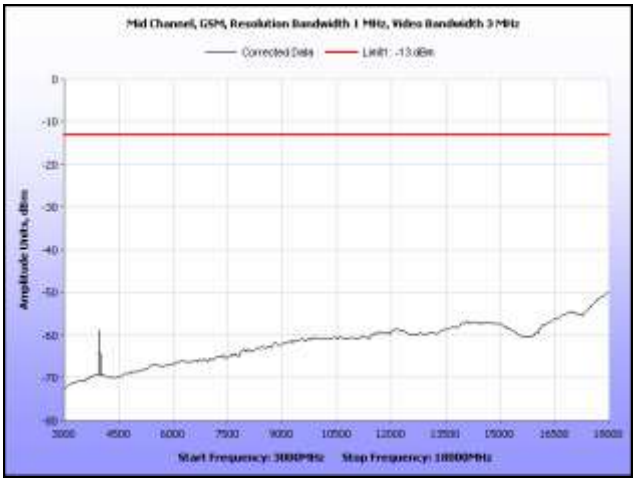
Plot 45. Radiated Spurious Emissions, Low Channel, GSM, Part 24, 3 GHz – 18 GHz



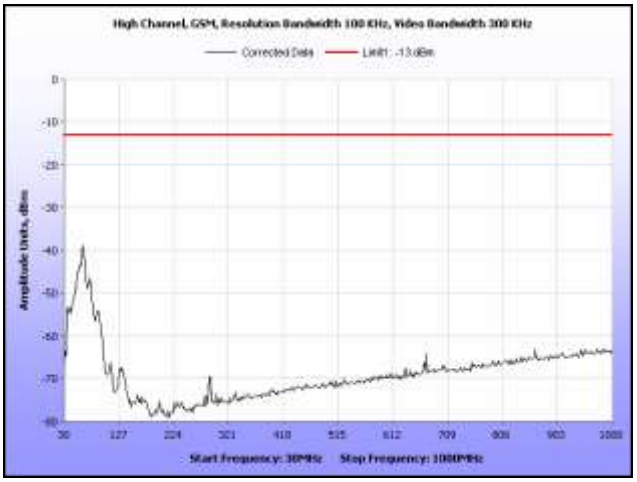
Plot 46. Radiated Spurious Emissions, Mid Channel, GSM, Part 24, 30 MHz – 1 GHz



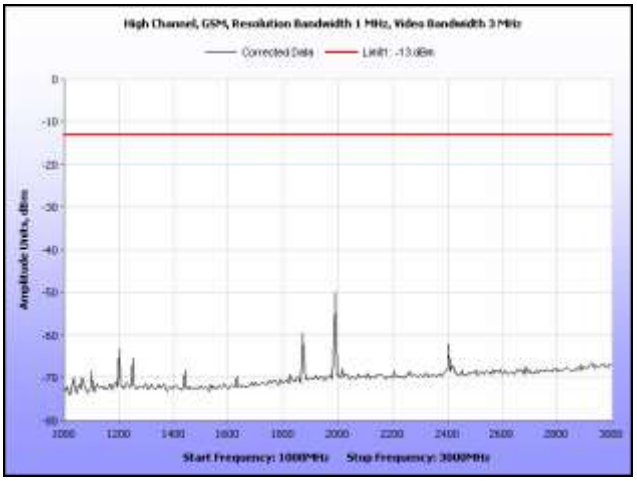
Plot 47. Radiated Spurious Emissions, Mid Channel, GSM, Part 24, 1 GHz – 3 GHz



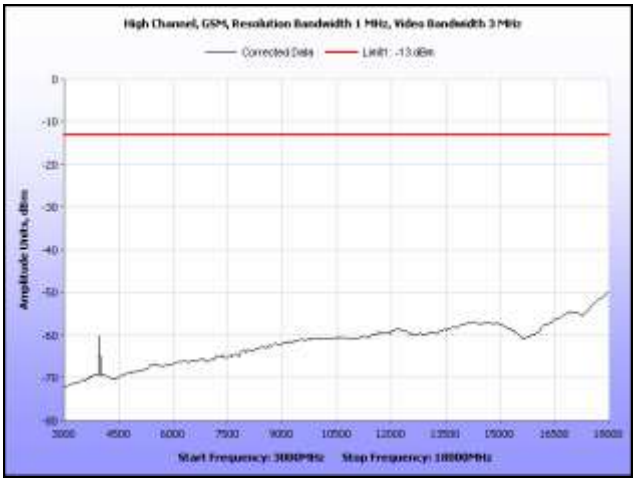
Plot 48. Radiated Spurious Emissions, Mid Channel, GSM, Part 24, 3 GHz – 18 GHz



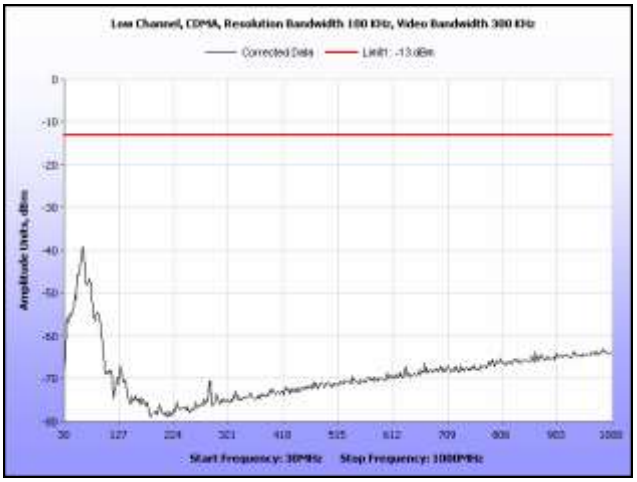
Plot 49. Radiated Spurious Emissions, High Channel, GSM, Part 24, 30 MHz – 1 GHz



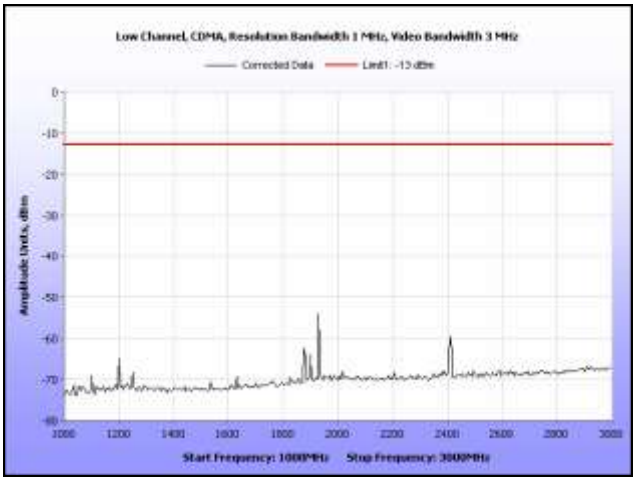
Plot 50. Radiated Spurious Emissions, High Channel, GSM, Part 24, 1 GHz – 3 GHz



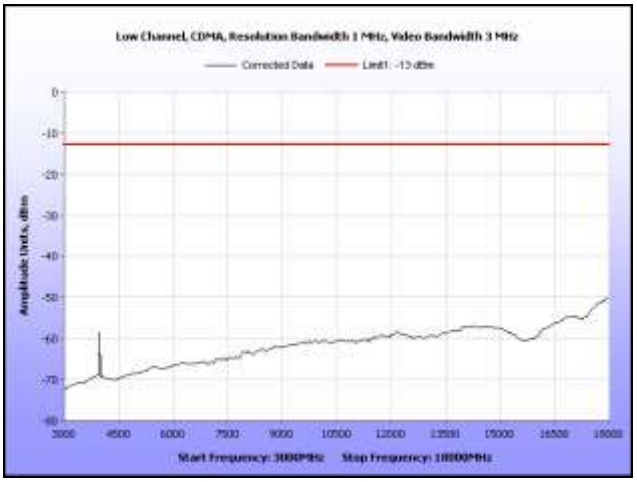
Plot 51. Radiated Spurious Emissions, High Channel, GSM, Part 24, 3 GHz – 18 GHz



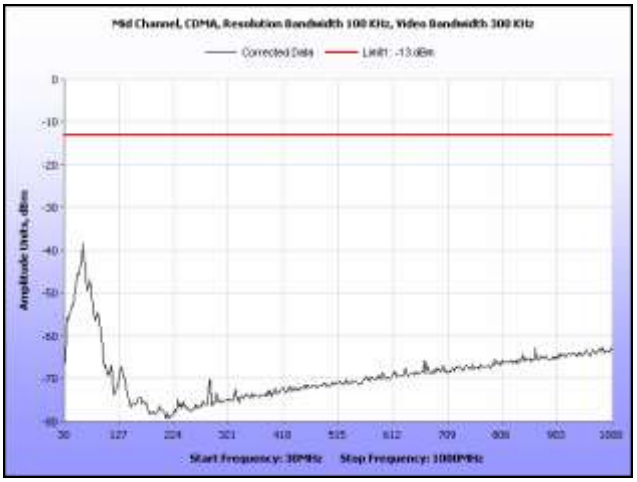
Plot 52. Radiated Spurious Emissions, Low Channel, CDMA, Part 24, 30 MHz – 1 GHz



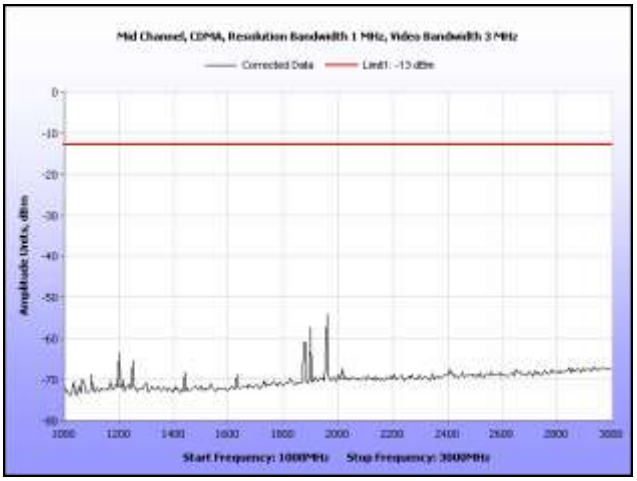
Plot 53. Radiated Spurious Emissions, Low Channel, CDMA, Part 24, 1 GHz – 3 GHz



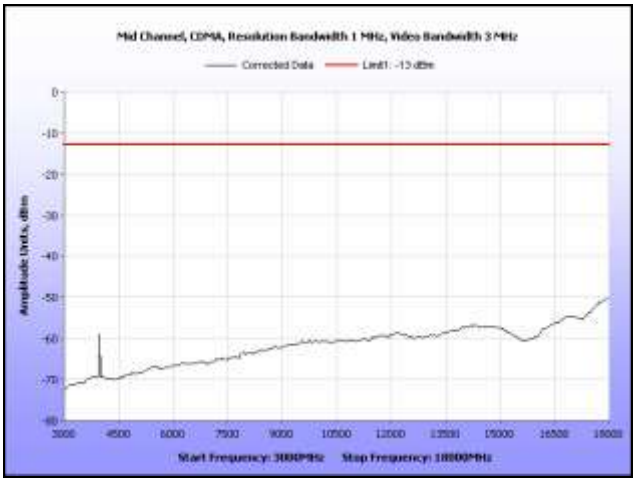
Plot 54. Radiated Spurious Emissions, Low Channel, CDMA, Part 24, 3 GHz – 18 GHz



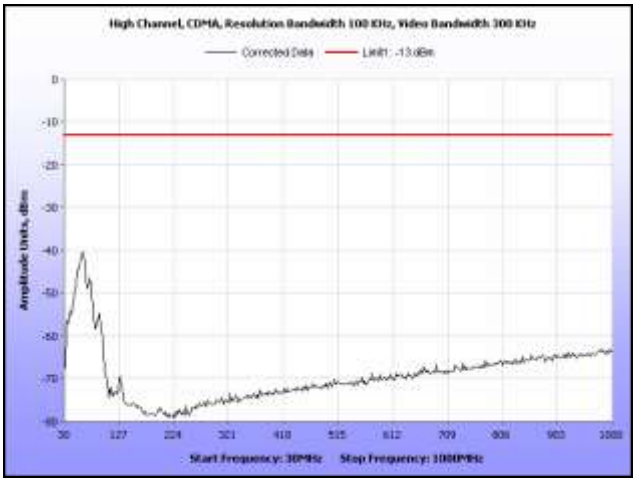
Plot 55. Radiated Spurious Emissions, Mid Channel, CDMA, Part 24, 30 MHz – 1 GHz



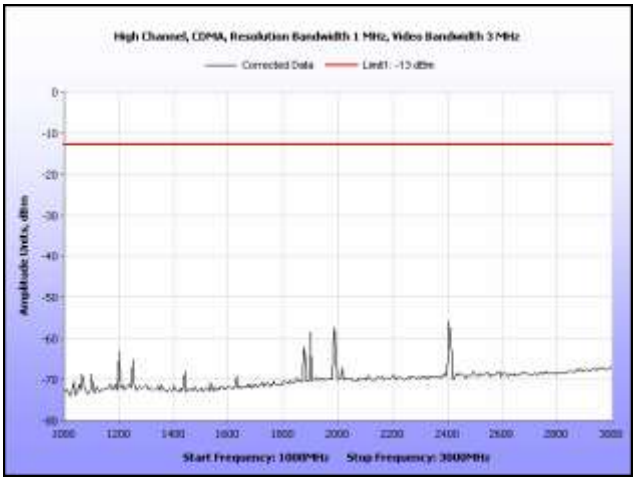
Plot 56. Radiated Spurious Emissions, Mid Channel, CDMA, Part 24, 1 GHz – 3 GHz



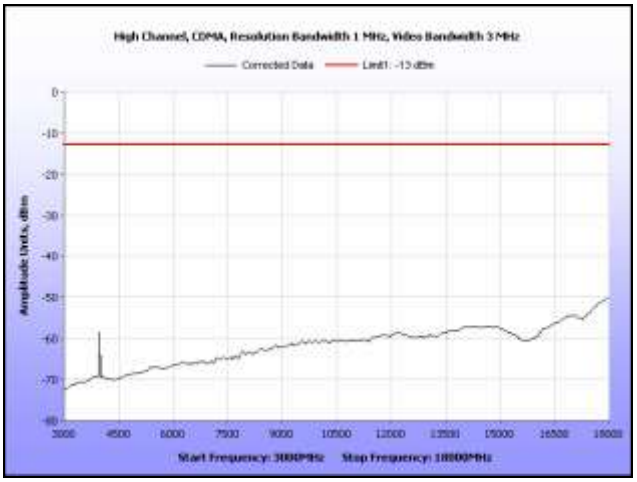
Plot 57. Radiated Spurious Emissions, Mid Channel, CDMA, Part 24, 3 GHz – 18 GHz



Plot 58. Radiated Spurious Emissions, High Channel, CDMA, Part 24, 30 MHz – 1 GHz



Plot 59. Radiated Spurious Emissions, High Channel, CDMA, Part 24, 1 GHz – 3 GHz



Plot 60. Radiated Spurious Emissions, High Channel, CDMA, Part 24, 3 GHz – 18 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s):

§ 2.1051 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. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 22.917 The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

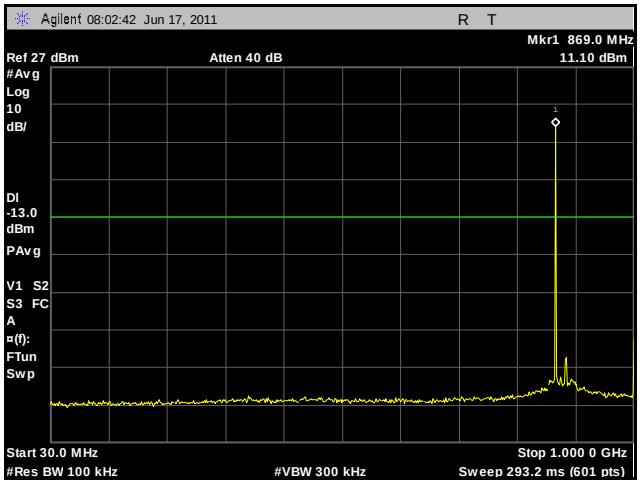
§ 22.917 (b) *Measurement procedure*. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy approved the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§24.238 Emission limitations for Broadband PCS equipment: The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

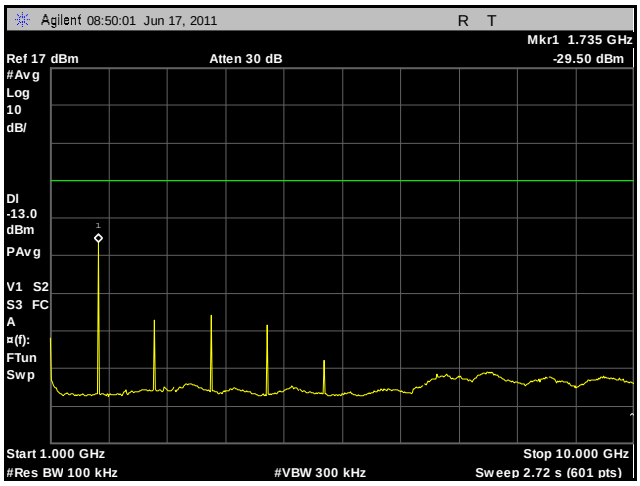
§ 24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§ 24.238 (b) *Measurement procedure*. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

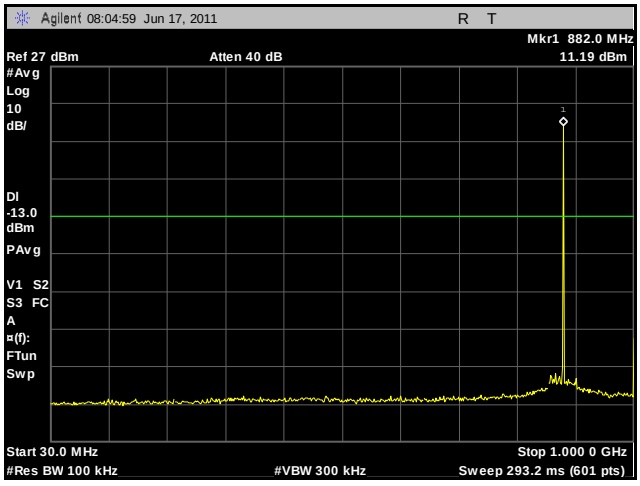
Test Procedures:	The EUT's RF Output Power port was connected to a spectrum analyzer through an attenuator. The EUT was set to transmit at the low, mid, and high channels of both modulations in both the Cellular and the PCS bands. Measurements were taken with an average detector up to the 10th harmonic of the carrier.
Test Results:	The EUT complies with the requirements of this section. There were no detectable spurious emissions for this EUT.
Test Engineer(s):	Len Knight
Test Date(s):	06/17/11



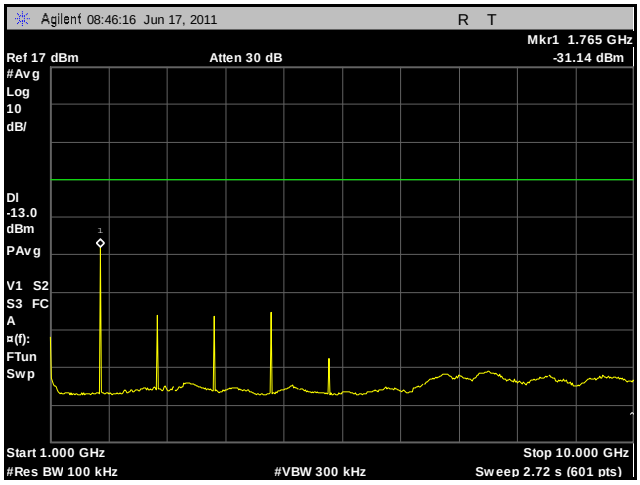
Plot 61. Conducted Spurious Emissions, Low Channel, GSM, Part 22, 30 MHz – 1 GHz



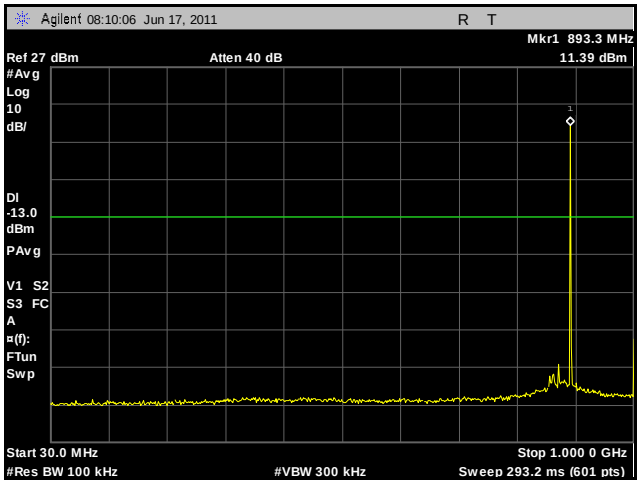
Plot 62. Conducted Spurious Emissions, Low Channel, GSM, Part 22, 1 GHz – 10 GHz



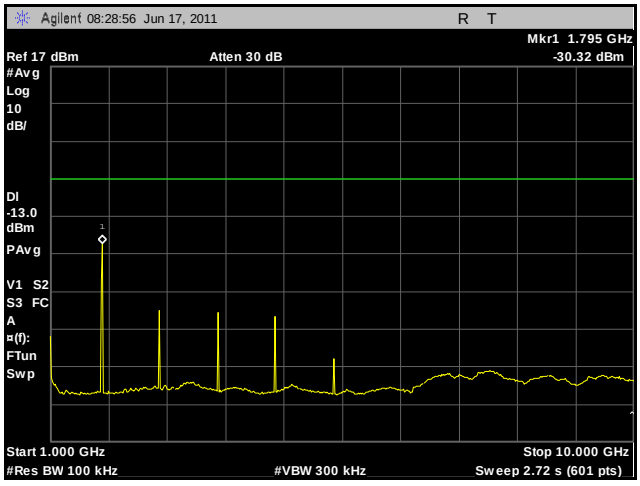
Plot 63. Conducted Spurious Emissions, Mid Channel, GSM, Part 22, 30 MHz – 1 GHz



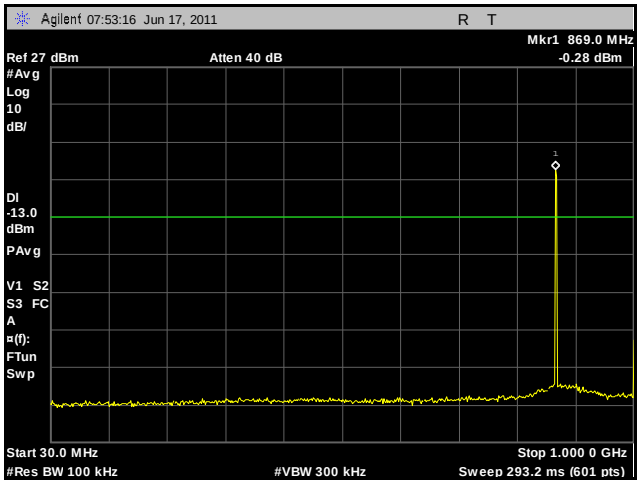
Plot 64. Conducted Spurious Emissions, Mid Channel, GSM, Part 22, 1 GHz – 10 GHz



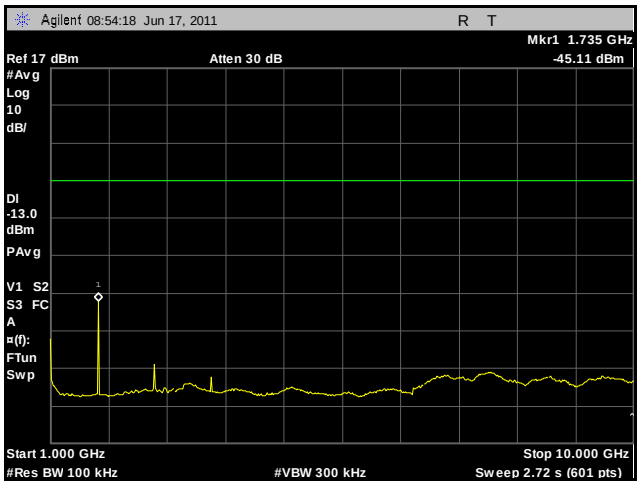
Plot 65. Conducted Spurious Emissions, High Channel, GSM, Part 22, 30 MHz – 1 GHz



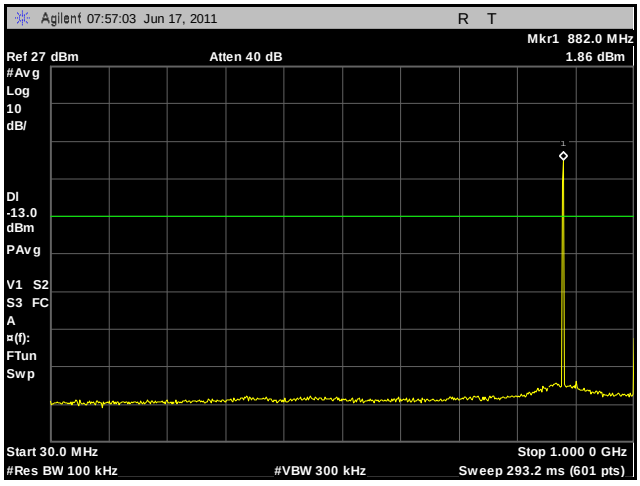
Plot 66. Conducted Spurious Emissions, High Channel, GSM, Part 22, 1 GHz – 10 GHz



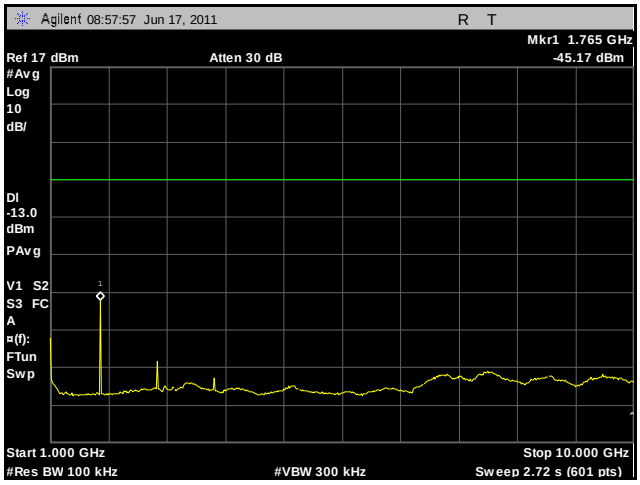
Plot 67. Conducted Spurious Emissions, Low Channel, CDMA, Part 22, 30 MHz – 1 GHz



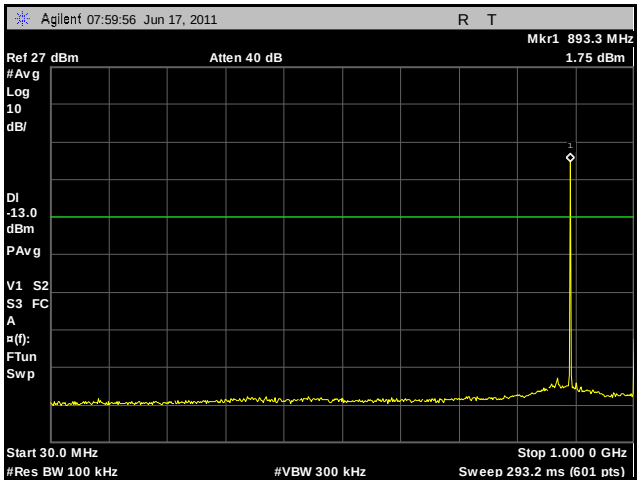
Plot 68. Conducted Spurious Emissions, Low Channel, CDMA, Part 22, 1 GHz – 10 GHz



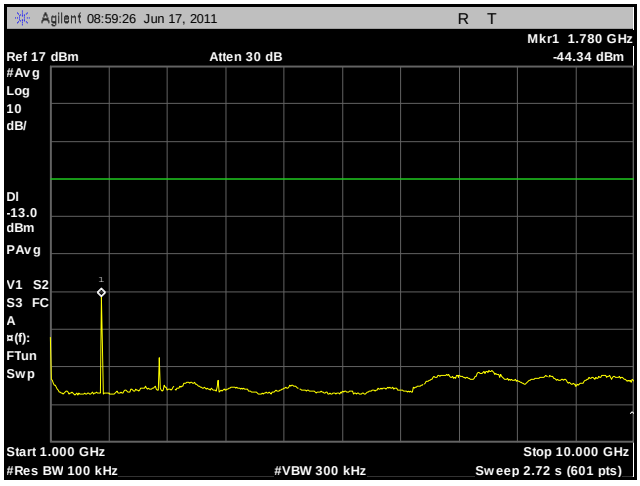
Plot 69. Conducted Spurious Emissions, Mid Channel, CDMA, Part 22, 30 MHz – 1 GHz



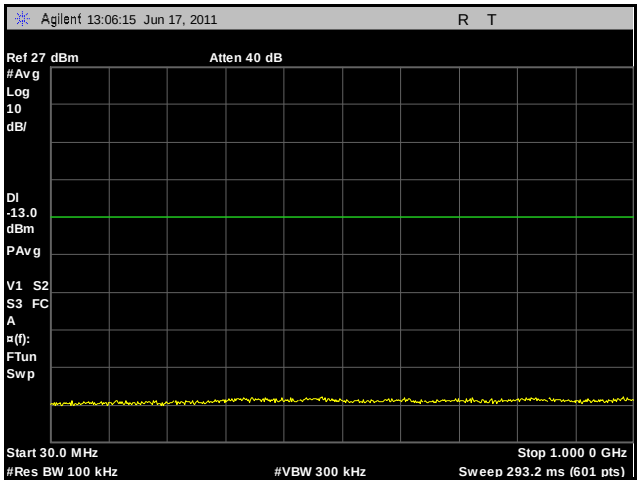
Plot 70. Conducted Spurious Emissions, Mid Channel, CDMA, Part 22, 1 GHz – 10 GHz



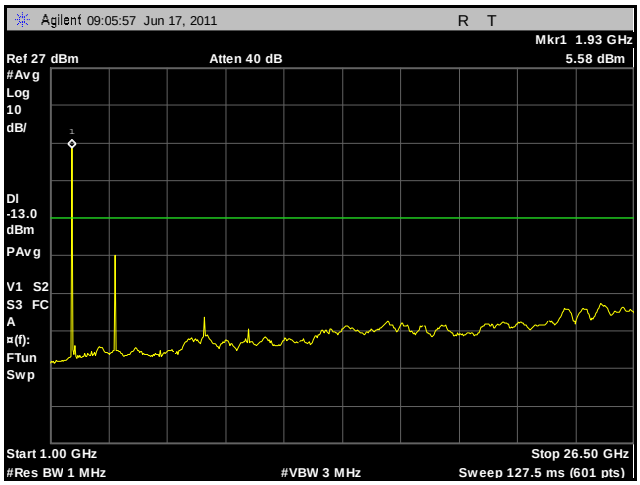
Plot 71. Conducted Spurious Emissions, High Channel, CDMA, Part 22, 30 MHz – 1 GHz



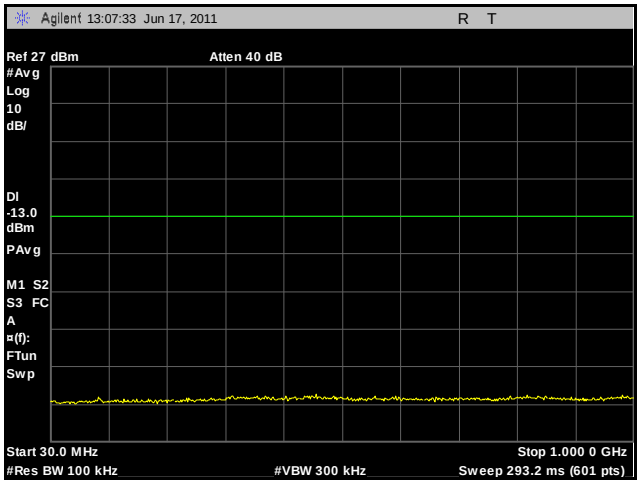
Plot 72. Conducted Spurious Emissions, High Channel, CDMA, Part 22, 1 GHz – 10 GHz



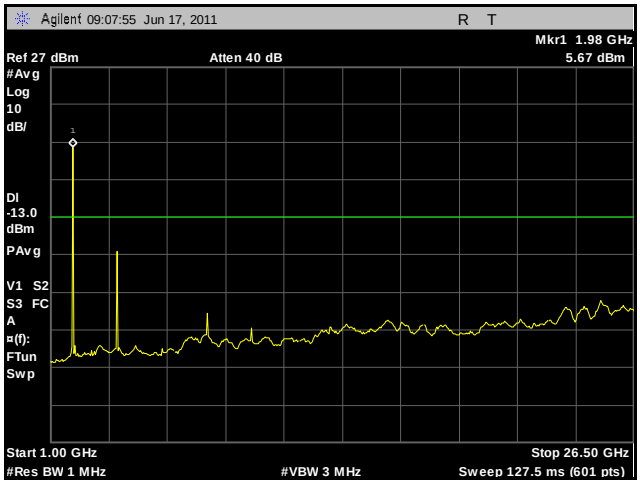
Plot 73. Conducted Spurious Emissions, Low Channel, GSM, Part 24, 30 MHz – 1 GHz



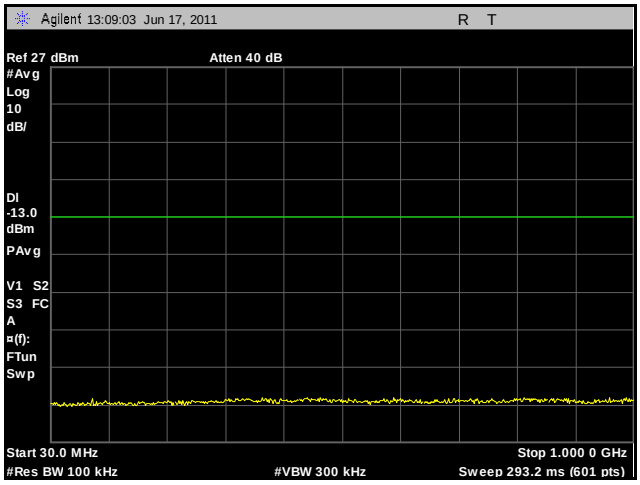
Plot 74. Conducted Spurious Emissions, Low Channel, GSM, Part 24, 1 GHz – 26.5 GHz



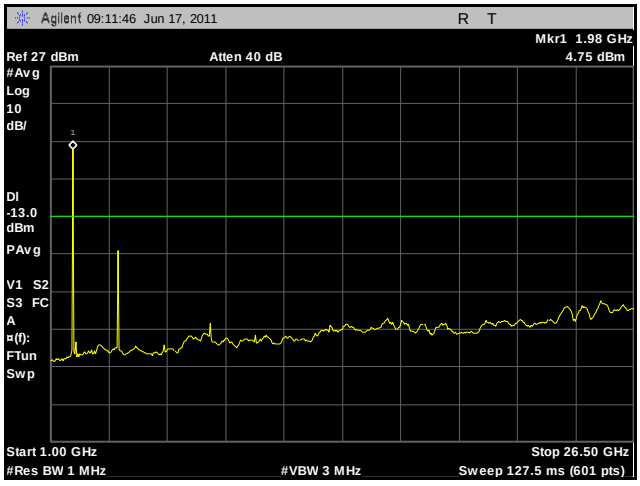
Plot 75. Conducted Spurious Emissions, Mid Channel, GSM, Part 24, 30 MHz – 1 GHz



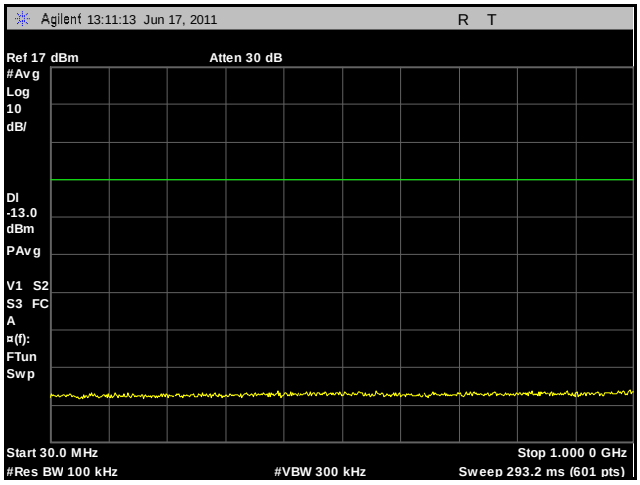
Plot 76. Conducted Spurious Emissions, Mid Channel, GSM, Part 24, 1 GHz – 26.5 GHz



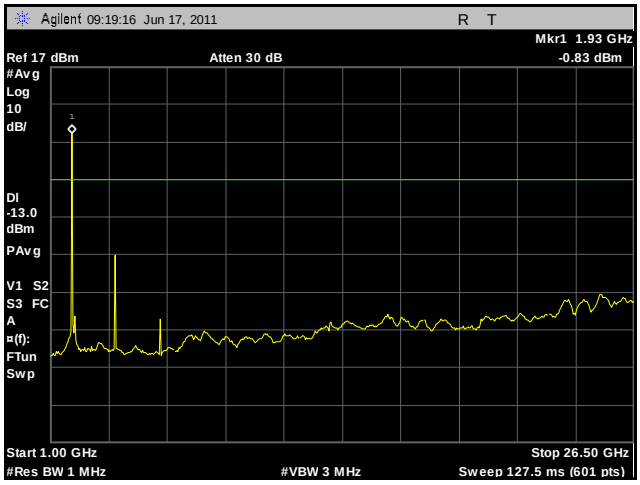
Plot 77. Conducted Spurious Emissions, High Channel, GSM, Part 24, 30 MHz – 1 GHz



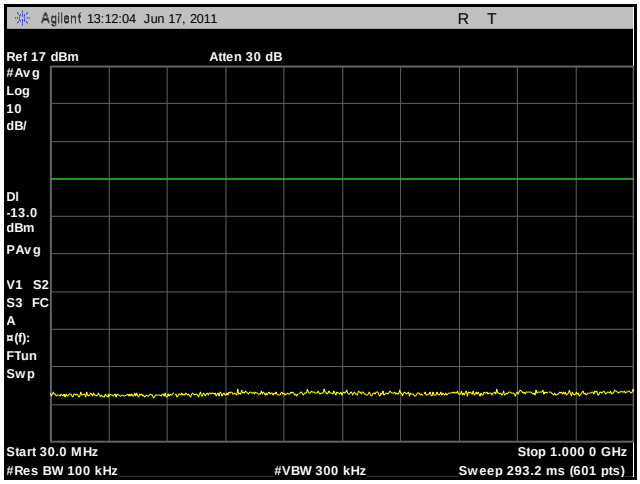
Plot 78. Conducted Spurious Emissions, High Channel, GSM, Part 24, 1 GHz – 26.5 GHz



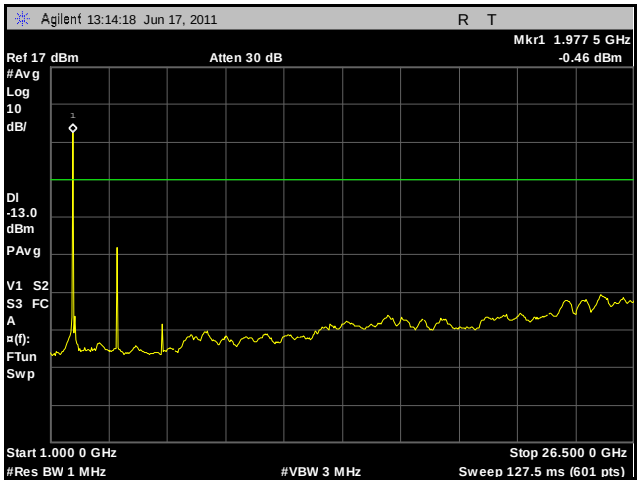
Plot 79. Conducted Spurious Emissions, Low Channel, CDMA, Part 24, 30 MHz – 1 GHz



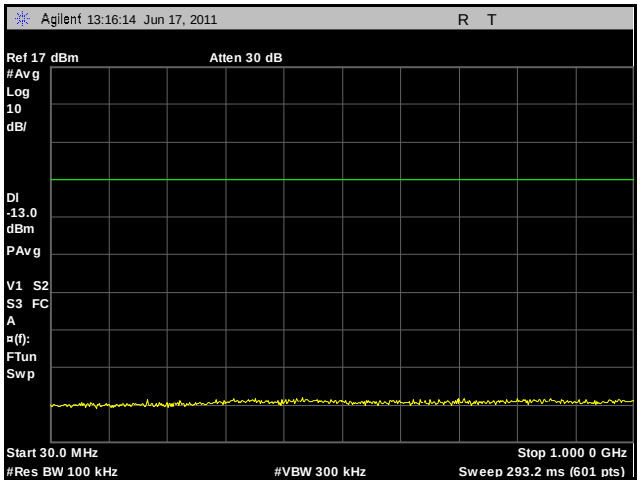
Plot 80. Conducted Spurious Emissions, Low Channel, CDMA, Part 24, 1 GHz – 26.5 GHz



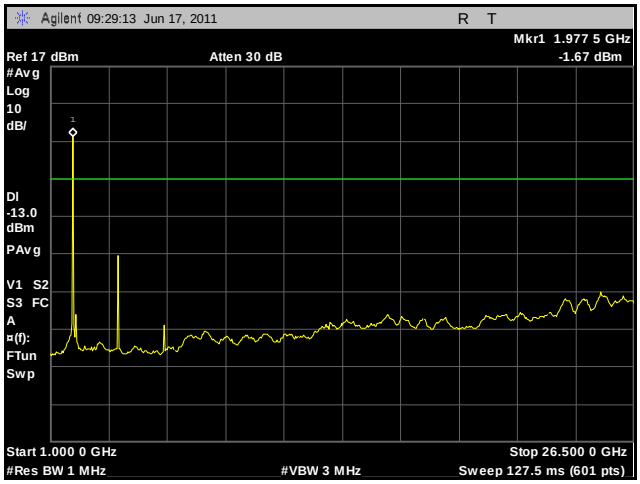
Plot 81. Conducted Spurious Emissions, Mid Channel, CDMA, Part 24, 30 MHz – 1 GHz



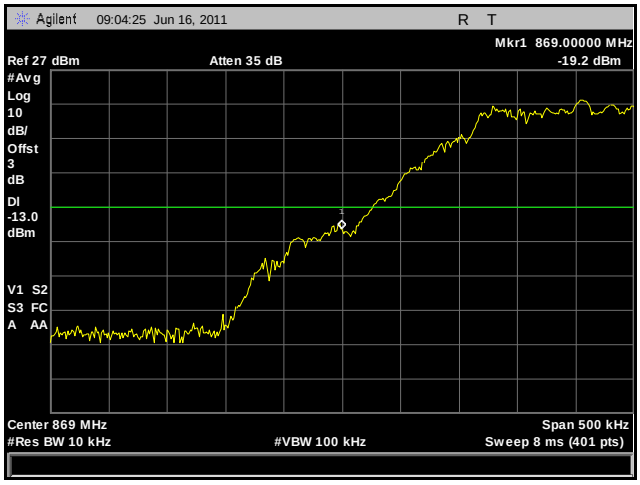
Plot 82. Conducted Spurious Emissions, Mid Channel, CDMA, Part 24, 1 GHz – 26.5 GHz



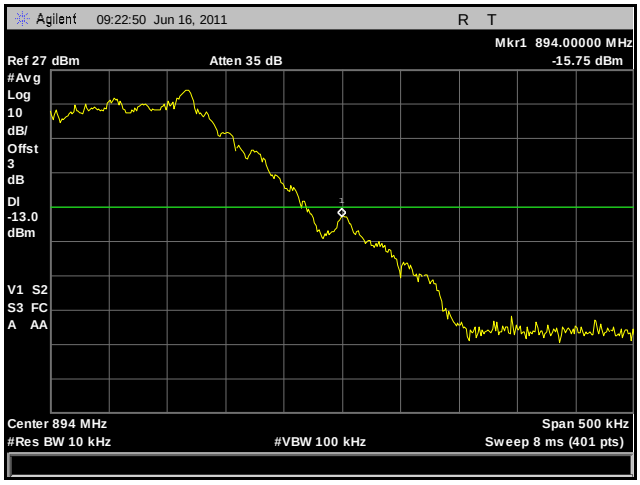
Plot 83. Conducted Spurious Emissions, High Channel, CDMA, Part 24, 30 MHz – 1 GHz



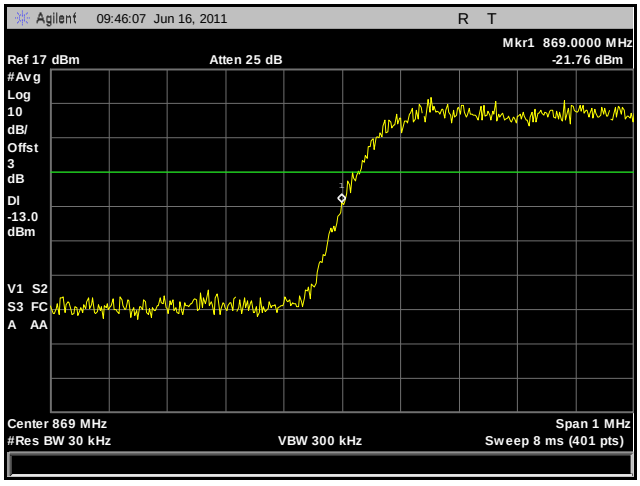
Plot 84. Conducted Spurious Emissions, High Channel, CDMA, Part 24, 1 GHz – 26.5 GHz



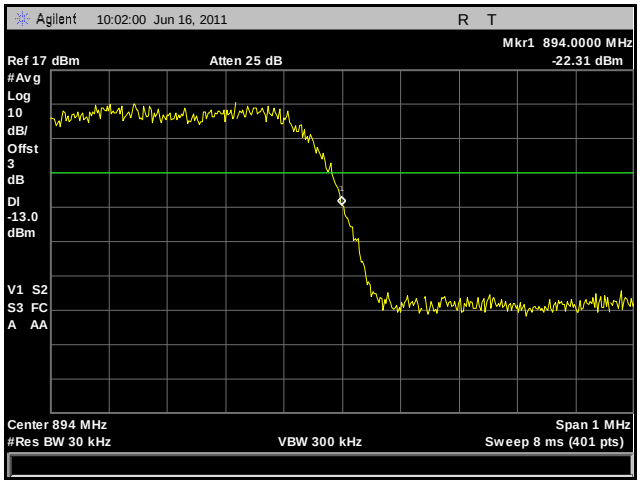
Plot 85. Conducted Band Edge, Low Channel, GSM, Part 22



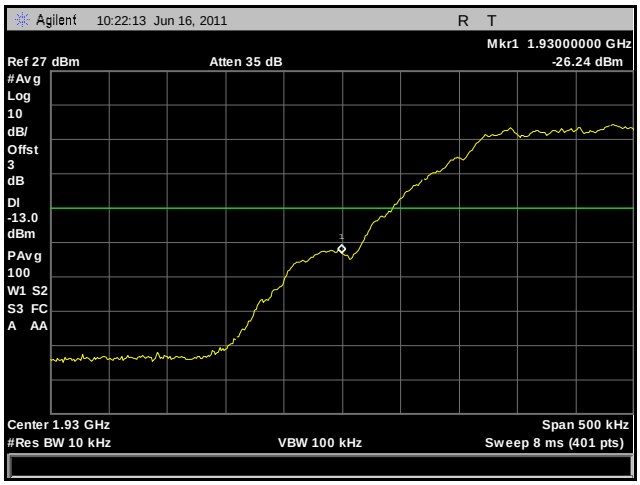
Plot 86. Conducted Band Edge, High Channel, GSM, Part 22



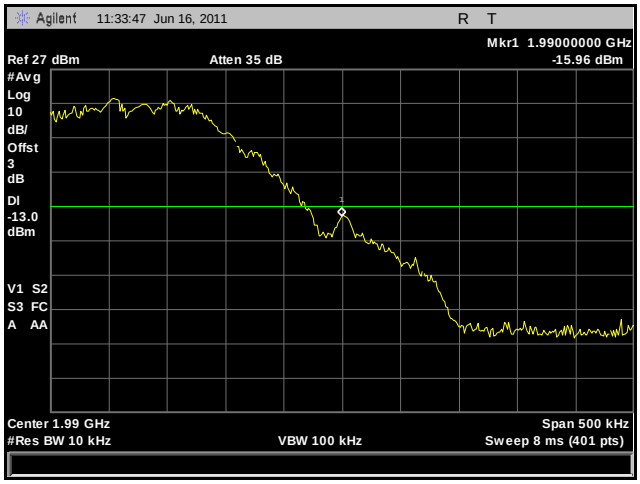
Plot 87. Conducted Band Edge, Low Channel, CDMA, Part 22



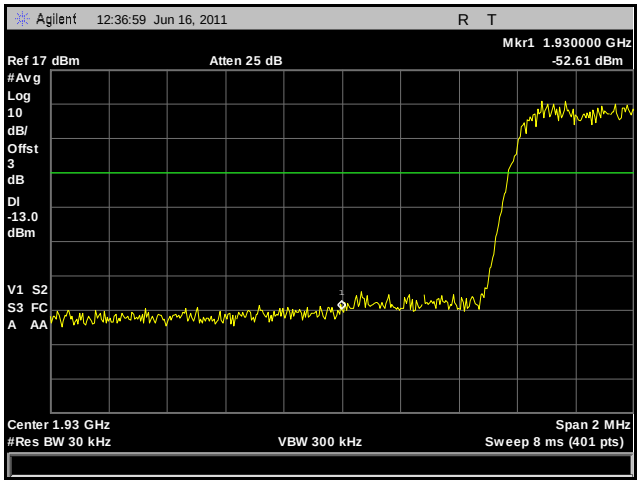
Plot 88. Conducted Band Edge, High Channel, CDMA, Part 22



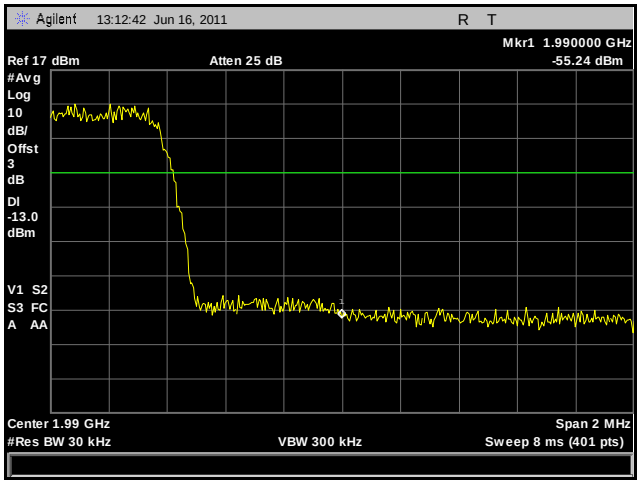
Plot 89. Conducted Band Edge, Low Channel, GSM, Part 24



Plot 90. Conducted Band Edge, High Channel, GSM, Part 24



Plot 91. Conducted Band Edge, Low Channel, CDMA, Part 24



Plot 92. Conducted Band Edge, High Channel, CDMA, Part 24

Electromagnetic Compatibility Criteria for Intentional Radiators

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 direct connect to a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber with the support equipment on the outside. The EUT was set to transmitter at its mid channel using a CW carrier. The frequency drift was investigated for every 10°C increment until the unit was stabilized. Measurements were made using the frequency counter function of the spectrum analyzer.

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

Test Results: Equipment is compliant with Section 2.1055, 22.863, and 24.235.

Test Engineer(s): Len Knight

Test Date(s): 06/27/11

Temperature (deg C)	Frequency (MHz)	Drift (ppm)
-30	881.600021	0.007
-20	881.600032	0.019
-10	881.600031	0.018
0	881.600028	0.015
10	881.600025	0.011
20	881.600015	ref
30	881.600021	0.007
40	881.600020	0.006
50	881.600018	0.003

Voltage (VAC)	Frequency (MHz)	Drift (ppm)
120	881.600025	ref
102	881.600024	-0.001
138	881.600025	0.000

Table 7. Frequency Stability, Test Results, Part 22

Temperature (deg C)	Frequency (MHz)	Drift (ppm)
-30	1960.000079	0.020
-20	1960.000073	0.017
-10	1960.000071	0.016
0	1960.000062	0.012
10	1960.000054	0.008
20	1960.000039	ref
30	1960.000048	0.005
40	1960.000044	0.003
50	1960.000040	0.001

Voltage (VAC)	Frequency (MHz)	Drift (ppm)
120	1960.000054	ref
102	1960.000055	0.001
138	1960.000055	0.001

Table 8. Frequency Stability, Test Results, Part 24

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 Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	09/27/2010	09/27/2011
1T2511	ANTENNA; HORN	EMCO	3115	08/31/2010	08/31/2011
1T4710	SIGNAL GENERATOR	HEWLETT PACKARD	8648D	03/30/2011	03/30/2012
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	08/23/2010	08/23/2013
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	06/14/2011	06/14/2012
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4297	TRANSFORMER; ISOLATION	SOLAR ELECTRONICS	6220-4	SEE NOTE	
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	11/03/2010	11/03/2011
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4402B	05/31/2011	05/31/2012

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

End of Report

