



# Compliance Testing, LLC

Previously Flom Test Lab

RF, EMC and Safety Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.ComplianceTesting.com>

[info@ComplianceTesting.com](mailto:info@ComplianceTesting.com)

**Date:** January 18, 2011

**Applicant:** EMS Technologies Canada, Ltd  
400 Maple Grove Rd  
Ottawa, ON K2V 1B8  
Canada

**Attention of:** Ron Halka - Director, Business Process Improvement & Quality  
Ph: (613) 591-9064 Ext. 3244  
Fax: (613) 591-9107  
E-mail: [halka.r@emsaviation.com](mailto:halka.r@emsaviation.com)

**Equipment:** Aspire HDU-200 Inmarsat High Speed Satcom Transceiver

**FCC ID:** K6KHSD-XI

**FCC Rules:** Part 87

Enclosed please find your copy of the Engineering Test Report for which you are subject to the restrictions as listed on the attached summary.

This report may not be reproduced, except in full, without written permission from Compliance Testing, LLC. Please retain a copy of this report for your archival purposes.

Once a Telecommunication Certification Body (TCB) issues a Grant the Federal Communication Commission (FCC) has 30 days to review the application and request added information. It is your decision whether or not to market the equipment subject to a possible recall before the end of the 30 days.

If your equipment is still retained by us, it will be returned to you 30 days after approval is achieved.

Our invoice for services has been directed to your Accounts Payable Department.

For any additional information please contact us.

Sincerely,

Compliance Testing



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## Test Report

for

**FCC ID:** K6KHSD-XI

**Model:** HDU-200

to

**Federal Communications Commission**

Rule Part(s) 87

Date of report: January 18, 2011

**On the Behalf of the Applicant:** EMS Technologies Canada, Ltd

**At the Request of:** EMS Technologies Canada, Ltd  
400 Maple Grove Rd  
Ottawa, ON K2V 1B8  
Canada

**Attention of:** Ron Halka - Director, Business Process Improvement & Quality  
Ph: (613) 591-9064 Ext. 3244  
Fax: (613) 591-9107  
E-mail: [halka.r@emsaviation.com](mailto:halka.r@emsaviation.com)

By  
Compliance Testing, LLC  
3356 N. San Marcos Place, Suite 107  
Chandler, Arizona 85225-7176  
(866) 311-3268 phone, (480) 926-3598 fax



### Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	January 18, 2011	J. Erhard	Original Document



**The Applicant has been cautioned as to the following:**

**15.21 Information to the User**

The user's manual or instruction manual for an intentional 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.

**15.27(a) Special Accessories**

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.879 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.



## Testimonial and Statement of Certification

### This is to Certify:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data is true and correct.

A handwritten signature in black ink, appearing to read "John Erhard".

John Erhard, Engineering Manager

Certifying Engineer:



## Table of Contents

Rule	Description	Page
2.1033(c)(14)	Rule Summary	2
	Standard Test Conditions and Engineering Practices	3
2.1033(c)	General Information Required	4
	Test Results Summary	6
2.1051, 87.139(i)(1)	Conducted Spurious Emissions	7
2.1053,	Field Strength of Spurious Radiation	16
	Test Equipment Utilized	19
	Appendix	20



Sub-part

2.1033(c)(14):

## Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts: 87.



## Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI/C63.4-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 87% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

### A2LA

“A2LA has accredited Compliance Testing LLC, in Chandler, AZ for technical competence in the field of Electrical testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO 17025:2005 ‘General Requirements for the Competence of Testing and Calibration Laboratories’ and any additional program requirements in the identified field of testing.”

Please refer to [www.a2la.org](http://www.a2la.org) for current scope of accreditation.

Certificate number: 2152.01



TESTING CERT# 2152.01

FCC OATS Reg. #933597

IC Reg. # 2044A-1





### List of General Information Required for Certification

In Accordance with FCC Rules and Regulations,  
Volume II, Part 2 and to Part 87

Sub-part 2.1033 (c)(1):

**Name and Address of Applicant:** EMS Technologies Canada, Ltd  
400 Maple Grove Rd  
Ottawa, ON K2V 1B8  
Canada

**Manufacturer:** EMS Technologies Canada, Ltd  
400 Maple Grove Rd  
Ottawa, ON K2V 1B8  
Canada

(c)(2): **FCC ID:** K6KHSD-XI

**Model Number:** HDU-200

(c)(3): **Instruction Manual(s):**

Please see attached exhibits

(c)(4): **Type of Emission:** BPSK, QPSK, QAM

(c)(5): **Frequency Range, MHz:** 1626.5 – 1660.5

(c)(6): **Power Rating, Watts:** 0.2  
\_\_\_\_\_ Switchable                        X   Variable                      \_\_\_\_\_ N/A

(c)(7): **Maximum Allowable Power, Watts:** 60

**DUT Results:** Passes   X   Fails \_\_\_\_\_



Subpart 2.1033 (continued)

(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A =	60 mA
Collector Voltage, Vdc =	3.8
Supply Voltage, Vdc =	3.8

(c)(9): **Tune-Up Procedure:**

Please see attached exhibits

(c)(10): **Circuit Diagram/Circuit Description:**

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please see attached exhibits

(c)(11): **Label Information:**

Please see attached exhibits

(c)(12): **Photographs:**

Please see attached exhibits

(c)(13): **Digital Modulation Description:**

Attached Exhibits  
 N/A

(c)(14): **Test and Measurement Data:**

Follows



### Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1051, 87.139(i)(1)	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1053	Field Strength of Spurious Radiation	Pass	

**Name of Test:** Conducted Spurious Emissions  
**Specification:** 2.1051, 87.139(i)(1)  
**Test Equipment Utilized:** i00331

**Engineer:** J. Erhard  
**Test Date:** 2/11/2011

### Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. The RBW was set according to the requirements of 87139 (i)(1). The power was corrected for the measurement RBW bandwidth. The dBc limit, the DLNA rejection, and corrected power were summed together to determine the necessary dBm value of the EUT to provide a system rejection greater than the FCC limit. This necessary value was compared to the measured value to ensure compliance to the specification, which is expressed as the margin. A negative value indicates a passing result.

### Test Setup



### BPSK 1626.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	22.13	23.38	-37.62	-58.5	-20.88
1026.5 to 1525	-135	0.004	94	22.13	23.38	-17.62	-58.5	-40.88
1525 to 1559	-203	0.004	120	22.13	23.38	-59.62	-77.03	-17.41
1559 to 1585	-155	1	94	22.32	22.32	-38.68	-51.88	-13.20
1585 to 1605	-143	1	71	22.32	22.32	-49.68	-51.4	-1.72
1605 to 1610	-117	1	51	22.32	22.32	-43.68	-48.73	-5.05
1610 to 1610.6	-95	1	48	22.32	22.32	-24.68	-49.7	-25.02
1610.6 to 1613.8	-49	1	33	22.32	22.32	6.32	-48.04	-54.36
1613.8 to 1614	-95	1	32	22.32	22.32	-40.68	-47.38	-6.70
1614 to 1620	-70	0.004	3.5	22.13	23.38	-43.12	-58.55	-15.43
1620 to 1624.5	-70	0.004	1	22.13	23.38	-45.62	-58.36	-12.74
1624.5 to 1625.5	-70	0.004	1	22.13	23.38	-45.62	-55.16	-9.54
1625.5 to 1626.5	-70	0.004	1	22.13	23.38	-45.62	-55.09	-9.47
1626.5 to 1660	-70	0.004	0.1	22.13	23.38	-46.52	-54.62	-8.10
1660 to 1670	-19.5	0.02	1	22.24	20.48	1.98	-62.85	-64.83
1670 to 1735	-60	0.004	18.5	22.13	23.38	-18.12	-72.96	-54.84
1735 to 1865	-105	0.004	50	22.13	23.38	-31.62	-73.7	-42.08
1865 to 2260.5	-105	0.004	60	22.13	23.38	-21.62	-73.7	-52.08
2260.5 to 3250	-105	0.004	60	22.13	23.38	-21.62	-70.75	-49.13
3250 to 3330	-105	0.004	70	22.13	23.38	-11.62	-27.13	-15.51
3330 to 4000	-105	0.004	50	22.13	23.38	-31.62	-76.29	-44.67
4000 to 12000	-105	0.004	65	22.13	23.38	-16.62	-27.79	-11.17
12000 to 18000	-70	0.004	50	22.13	23.38	3.38	-71.32	-74.70



## BPSK 1643.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	21.9	23.15	-37.85	-57.97	-20.12
1026.5 to 1525	-135	0.004	94	21.9	23.15	-17.85	-57.97	-40.12
1525 to 1559	-203	0.004	120	21.9	23.15	-59.85	-78.43	-18.58
1559 to 1585	-155	1	94	22.03	22.03	-38.97	-52.81	-13.84
1585 to 1605	-143	1	71	22.03	22.03	-49.97	-52.29	-2.32
1605 to 1610	-117	1	51	22.03	22.03	-43.97	-51.54	-7.57
1610 to 1610.6	-95	1	48	22.03	22.03	-24.97	-50.27	-25.30
1610.6 to 1613.8	-49	1	33	22.03	22.03	6.03	-49.05	-55.08
1613.8 to 1614	-95	1	32	22.03	22.03	-40.97	-48.78	-7.81
1614 to 1620	-70	0.004	3.5	21.9	23.15	-43.35	-62.18	-18.83
1620 to 1624.5	-70	0.004	1	21.9	23.15	-45.85	-69.57	-23.72
1624.5 to 1625.5	-70	0.004	1	21.9	23.15	-45.85	-71.69	-25.84
1625.5 to 1626.5	-70	0.004	1	21.9	23.15	-45.85	-66.57	-20.72
1626.5 to 1660	-70	0.004	0.1	21.9	23.15	-46.75	-54.25	-7.50
1660 to 1670	-19.5	0.02	1	21.97	20.21	1.71	-62.04	-63.75
1670 to 1735	-60	0.004	18.5	21.9	23.15	-18.35	-64.02	-45.67
1735 to 1865	-105	0.004	50	21.9	23.15	-31.85	-72.21	-40.36
1865 to 2260.5	-105	0.004	60	21.9	23.15	-21.85	-72.21	-50.36
2260.5 to 3250	-105	0.004	60	21.9	23.15	-21.85	-71.31	-49.46
3250 to 3330	-105	0.004	70	21.9	23.15	-11.85	-18.05	-6.20
3330 to 4000	-105	0.004	50	21.9	23.15	-31.85	-76.41	-44.56
4000 to 12000	-105	0.004	65	21.9	23.15	-16.85	-29.23	-12.38
12000 to 18000	-70	0.004	50	21.9	23.15	3.15	-77.71	-80.86



## BPSK 1660.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	22.1	23.35	-37.65	-59.41	-21.76
1026.5 to 1525	-135	0.004	94	22.1	23.35	-17.65	-59.41	-41.76
1525 to 1559	-203	0.004	120	22.1	23.35	-59.65	-77.82	-18.17
1559 to 1585	-155	1	94	22.12	22.12	-38.88	-51.56	-12.68
1585 to 1605	-143	1	71	22.12	22.12	-49.88	-52.07	-2.19
1605 to 1610	-117	1	51	22.12	22.12	-43.88	-50.4	-6.52
1610 to 1610.6	-95	1	48	22.12	22.12	-24.88	-48.56	-23.68
1610.6 to 1613.8	-49	1	33	22.12	22.12	6.12	-49.63	-55.75
1613.8 to 1614	-95	1	32	22.12	22.12	-40.88	-48.47	-7.59
1614 to 1620	-70	0.004	3.5	22.1	23.35	-43.15	-64.47	-21.32
1620 to 1624.5	-70	0.004	1	22.1	23.35	-45.65	-67.44	-21.79
1624.5 to 1625.5	-70	0.004	1	22.1	23.35	-45.65	-69.62	-23.97
1625.5 to 1626.5	-70	0.004	1	22.1	23.35	-45.65	-64.92	-19.27
1626.5 to 1660	-70	0.004	0.1	22.1	23.35	-46.55	-54.1	-7.55
1660 to 1670	-19.5	0.02	1	22.1	20.34	1.84	-44.15	-45.99
1670 to 1735	-60	0.004	18.5	22.1	23.35	-18.15	-68.27	-50.12
1735 to 1865	-105	0.004	50	22.1	23.35	-31.65	-73.61	-41.96
1865 to 2260.5	-105	0.004	60	22.1	23.35	-21.65	-73.61	-51.96
2260.5 to 3250	-105	0.004	60	22.1	23.35	-21.65	-73.26	-51.61
3250 to 3330	-105	0.004	70	22.1	23.35	-11.65	-28.88	-17.23
3330 to 4000	-105	0.004	50	22.1	23.35	-31.65	-76.09	-44.44
4000 to 12000	-105	0.004	65	22.1	23.35	-16.65	-27.8	-11.15
12000 to 18000	-70	0.004	50	22.1	23.35	3.35	-71.93	-75.28

**QPSK 1626.5 MHz Conducted Spurious Emissions**

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	12.5	13.75	-47.25	-58.39	-11.14
1026.5 to 1525	-135	0.004	94	12.5	13.75	-27.25	-58.39	-31.14
1525 to 1559	-203	0.004	120	12.5	13.75	-69.25	-75.99	-6.74
1559 to 1585	-155	1	94	23.01	23.01	-37.99	-51.51	-13.52
1585 to 1605	-143	1	71	23.01	23.01	-48.99	-50.10	-1.11
1605 to 1610	-117	1	51	23.01	23.01	-42.99	-50.08	-7.09
1610 to 1610.6	-95	1	48	23.01	23.01	-23.99	-49.11	-25.12
1610.6 to 1613.8	-49	1	33	23.01	23.01	7.01	-46.49	-53.50
1613.8 to 1614	-95	1	32	23.01	23.01	-39.99	-46.88	-6.89
1614 to 1620	-70	0.004	3.5	12.5	13.75	-52.75	-64.67	-11.92
1620 to 1624.5	-70	0.004	1	12.5	13.75	-55.25	-58.43	-3.18
1624.5 to 1625.5	-70	0.004	1	12.5	13.75	-55.25	-56.29	-1.04
1625.5 to 1626.5	-70	0.004	1	12.5	13.75	-55.25	-55.83	-0.58
1626.5 to 1660	-70	0.004	0.1	12.5	13.75	-56.15	-56.22	-0.07
1660 to 1670	-19.5	0.02	1	19.19	17.43	-1.07	-62.30	-61.23
1670 to 1735	-60	0.004	18.5	12.5	13.75	-27.75	-75.79	-48.04
1735 to 1865	-105	0.004	50	12.5	13.75	-41.25	-73.13	-31.88
1865 to 2260.5	-105	0.004	60	12.5	13.75	-31.25	-73.13	-41.88
2260.5 to 3250	-105	0.004	60	12.5	13.75	-31.25	-72.13	-40.88
3250 to 3330	-105	0.004	70	12.5	13.75	-21.25	-40.38	-19.13
3330 to 4000	-105	0.004	50	12.5	13.75	-41.25	-76.26	-35.01
4000 to 12000	-105	0.004	65	12.5	13.75	-26.25	-40.68	-14.43
12000 to 18000	-70	0.004	50	12.5	13.75	-6.25	-70.96	-64.71

**QPSK 1643.5 MHz Conducted Spurious Emissions**

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	12.54	13.79	-47.21	-60.44	-13.23
1026.5 to 1525	-135	0.004	94	12.54	13.79	-27.21	-60.44	-33.23
1525 to 1559	-203	0.004	120	12.54	13.79	-69.21	-77.91	-8.70
1559 to 1585	-155	1	94	23.01	23.01	-37.99	-50.97	-12.98
1585 to 1605	-143	1	71	23.01	23.01	-48.99	-51.2	-2.21
1605 to 1610	-117	1	51	23.01	23.01	-42.99	-51.08	-8.09
1610 to 1610.6	-95	1	48	23.01	23.01	-23.99	-50.68	-26.69
1610.6 to 1613.8	-49	1	33	23.01	23.01	7.01	-50.23	-57.24
1613.8 to 1614	-95	1	32	23.01	23.01	-39.99	-49.07	-9.08
1614 to 1620	-70	0.004	3.5	12.54	13.79	-52.71	-66.77	-14.06
1620 to 1624.5	-70	0.004	1	12.54	13.79	-55.21	-72.43	-17.22
1624.5 to 1625.5	-70	0.004	1	12.54	13.79	-55.21	-77.95	-22.74
1625.5 to 1626.5	-70	0.004	1	12.54	13.79	-55.21	-69	-13.79
1626.5 to 1660	-70	0.004	0.1	12.54	13.79	-56.11	-56.12	-0.01
1660 to 1670	-19.5	0.02	1	-19.14	-20.90	-39.40	-63.86	-24.46
1670 to 1735	-60	0.004	18.5	12.54	13.79	-27.71	-66	-38.29
1735 to 1865	-105	0.004	50	12.54	13.79	-41.21	-70.74	-29.53
1865 to 2260.5	-105	0.004	60	12.54	13.79	-31.21	-70.74	-39.53
2260.5 to 3250	-105	0.004	60	12.54	13.79	-31.21	-70.71	-39.50
3250 to 3330	-105	0.004	70	12.54	13.79	-21.21	-43.78	-22.57
3330 to 4000	-105	0.004	50	12.54	13.79	-41.21	-77	-35.79
4000 to 12000	-105	0.004	65	12.54	13.79	-26.21	-43.92	-17.71
12000 to 18000	-70	0.004	50	12.54	13.79	-6.21	-70.15	-63.94





## QPSK 1660.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	13.36	14.61	-46.39	-60.89	-14.50
1026.5 to 1525	-135	0.004	94	13.36	14.61	-26.39	-60.89	-34.50
1525 to 1559	-203	0.004	120	13.36	14.61	-68.39	-78.08	-9.69
1559 to 1585	-155	1	94	23.01	23.01	-37.99	-52.75	-14.76
1585 to 1605	-143	1	71	23.01	23.01	-48.99	-51.99	-3.00
1605 to 1610	-117	1	51	23.01	23.01	-42.99	-50.7	-7.71
1610 to 1610.6	-95	1	48	23.01	23.01	-23.99	-50.44	-26.45
1610.6 to 1613.8	-49	1	33	23.01	23.01	7.01	-49.75	-56.76
1613.8 to 1614	-95	1	32	23.01	23.01	-39.99	-48.57	-8.58
1614 to 1620	-70	0.004	3.5	13.36	14.61	-51.89	-72.67	-20.78
1620 to 1624.5	-70	0.004	1	13.36	14.61	-54.39	-72.64	-18.25
1624.5 to 1625.5	-70	0.004	1	13.36	14.61	-54.39	-73.19	-18.80
1625.5 to 1626.5	-70	0.004	1	13.36	14.61	-54.39	-69.79	-15.40
1626.5 to 1660	-70	0.004	0.1	13.36	14.61	-55.29	-57.57	-2.28
1660 to 1670	-19.5	0.02	1	19.32	17.56	-0.94	-46.49	-45.55
1670 to 1735	-60	0.004	18.5	13.36	14.61	-26.89	-72.19	-45.30
1735 to 1865	-105	0.004	50	13.36	14.61	-40.39	-71.39	-31.00
1865 to 2260.5	-105	0.004	60	13.36	14.61	-30.39	-71.39	-41.00
2260.5 to 3250	-105	0.004	60	13.36	14.61	-30.39	-70.17	-39.78
3250 to 3330	-105	0.004	70	13.36	14.61	-20.39	-41.89	-21.50
3330 to 4000	-105	0.004	50	13.36	14.61	-40.39	-77.36	-36.97
4000 to 12000	-105	0.004	65	13.36	14.61	-25.39	-41.01	-15.62
12000 to 18000	-70	0.004	50	13.36	14.61	-5.39	-71.57	-66.18



## QAM 1626.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	10.98	12.23	-48.77	-58.07	-9.30
1026.5 to 1525	-135	0.004	94	10.98	12.23	-28.77	-58.07	-29.30
1525 to 1559	-203	0.004	120	10.98	12.23	-70.77	-76.99	-6.22
1559 to 1585	-155	1	94	22.98	22.98	-38.02	-50.72	-12.70
1585 to 1605	-143	1	71	22.98	22.98	-49.02	-50.92	-1.90
1605 to 1610	-117	1	51	22.98	22.98	-43.02	-48.36	-5.34
1610 to 1610.6	-95	1	48	22.98	22.98	-24.02	-49.59	-25.57
1610.6 to 1613.8	-49	1	33	22.98	22.98	6.98	-48.30	-55.28
1613.8 to 1614	-95	1	32	22.98	22.98	-40.02	-48.20	-8.18
1614 to 1620	-70	0.004	3.5	10.98	12.23	-54.27	-68.42	-14.15
1620 to 1624.5	-70	0.004	1	10.98	12.23	-56.77	-61.39	-4.62
1624.5 to 1625.5	-70	0.004	1	10.98	12.23	-56.77	-58.86	-2.09
1625.5 to 1626.5	-70	0.004	1	10.98	12.23	-56.77	-57.17	-0.40
1626.5 to 1660	-70	0.004	0.1	10.98	12.23	-57.67	-58.48	-0.81
1660 to 1670	-19.5	0.02	1	18.85	17.09	-1.41	-64.37	-62.96
1670 to 1735	-60	0.004	18.5	10.98	12.23	-29.27	-74.21	-44.94
1735 to 1865	-105	0.004	50	10.98	12.23	-42.77	-73.14	-30.37
1865 to 2260.5	-105	0.004	60	10.98	12.23	-32.77	-73.14	-40.37
2260.5 to 3250	-105	0.004	60	10.98	12.23	-32.77	-70.59	-37.82
3250 to 3330	-105	0.004	70	10.98	12.23	-22.77	-44.95	-22.18
3330 to 4000	-105	0.004	50	10.98	12.23	-42.77	-76.24	-33.47
4000 to 12000	-105	0.004	65	10.98	12.23	-27.77	-46.14	-18.37
12000 to 18000	-70	0.004	50	10.98	12.23	-7.77	-70.89	-63.12



## QAM 1643.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	10.26	11.51	-49.49	-58.67	-9.18
1026.5 to 1525	-135	0.004	94	10.26	11.51	-29.49	-58.67	-29.18
1525 to 1559	-203	0.004	120	10.26	11.51	-71.49	-76.78	-5.29
1559 to 1585	-155	1	94	22.98	22.98	-38.02	-50.95	-12.93
1585 to 1605	-143	1	71	22.98	22.98	-49.02	-51.17	-2.15
1605 to 1610	-117	1	51	22.98	22.98	-43.02	-49.39	-6.37
1610 to 1610.6	-95	1	48	22.98	22.98	-24.02	-49.64	-25.62
1610.6 to 1613.8	-49	1	33	22.98	22.98	6.98	-49.49	-56.47
1613.8 to 1614	-95	1	32	22.98	22.98	-40.02	-48.74	-8.72
1614 to 1620	-70	0.004	3.5	10.26	11.51	-54.99	-66.09	-11.10
1620 to 1624.5	-70	0.004	1	10.26	11.51	-57.49	-71.59	-14.10
1624.5 to 1625.5	-70	0.004	1	10.26	11.51	-57.49	-72.14	-14.65
1625.5 to 1626.5	-70	0.004	1	10.26	11.51	-57.49	-70.96	-13.47
1626.5 to 1660	-70	0.004	0.1	10.26	11.51	-58.39	-58.48	-0.09
1660 to 1670	-19.5	0.02	1	18.3	16.54	-1.96	-63.12	-61.16
1670 to 1735	-60	0.004	18.5	10.26	11.51	-29.99	-67.75	-37.76
1735 to 1865	-105	0.004	50	10.26	11.51	-43.49	-71.14	-27.65
1865 to 2260.5	-105	0.004	60	10.26	11.51	-33.49	-71.14	-37.65
2260.5 to 3250	-105	0.004	60	10.26	11.51	-33.49	-70.89	-37.40
3250 to 3330	-105	0.004	70	10.26	11.51	-23.49	-44.33	-20.84
3330 to 4000	-105	0.004	50	10.26	11.51	-43.49	-75.76	-32.27
4000 to 12000	-105	0.004	65	10.26	11.51	-28.49	-48.53	-20.04
12000 to 18000	-70	0.004	50	10.26	11.51	-8.49	-70.67	-62.18



## QAM 1660.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	IPLD Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1026.5	-135	0.004	74	10.64	11.89	-49.11	-59.5	-10.39
1026.5 to 1525	-135	0.004	94	10.64	11.89	-29.11	-59.5	-30.39
1525 to 1559	-203	0.004	120	10.64	11.89	-71.11	-76.05	-4.94
1559 to 1585	-155	1	94	22.98	22.98	-38.02	-51.22	-13.20
1585 to 1605	-143	1	71	22.98	22.98	-49.02	-50.68	-1.66
1605 to 1610	-117	1	51	22.98	22.98	-43.02	-50.1	-7.08
1610 to 1610.6	-95	1	48	22.98	22.98	-24.02	-49.78	-25.76
1610.6 to 1613.8	-49	1	33	22.98	22.98	6.98	-48.34	-55.32
1613.8 to 1614	-95	1	32	22.98	22.98	-40.02	-49.28	-9.26
1614 to 1620	-70	0.004	3.5	10.64	11.89	-54.61	-73.03	-18.42
1620 to 1624.5	-70	0.004	1	10.64	11.89	-57.11	-71.56	-14.45
1624.5 to 1625.5	-70	0.004	1	10.64	11.89	-57.11	-72.46	-15.35
1625.5 to 1626.5	-70	0.004	1	10.64	11.89	-57.11	-70.77	-13.66
1626.5 to 1660	-70	0.004	0.1	10.64	11.89	-58.01	-60.42	-2.41
1660 to 1670	-19.5	0.02	1	18.68	16.92	-1.58	-47.65	-46.07
1670 to 1735	-60	0.004	18.5	10.64	11.89	-29.61	-72.36	-42.75
1735 to 1865	-105	0.004	50	10.64	11.89	-43.11	-72.32	-29.21
1865 to 2260.5	-105	0.004	60	10.64	11.89	-33.11	-72.32	-39.21
2260.5 to 3250	-105	0.004	60	10.64	11.89	-33.11	-70.34	-37.23
3250 to 3330	-105	0.004	70	10.64	11.89	-23.11	-30.71	-7.60
3330 to 4000	-105	0.004	50	10.64	11.89	-43.11	-75.6	-32.49
4000 to 12000	-105	0.004	65	10.64	11.89	-28.11	-41.01	-12.90
12000 to 18000	-70	0.004	50	10.64	11.89	-8.11	-69.43	-61.32



**Name of Test:** Field Strength of Spurious Radiation  
**Specification:** 2.1053  
**Test Equipment Utilized:** i00103, i00379

**Engineer:** J. Erhard  
**Test Date:** 1/17/2011

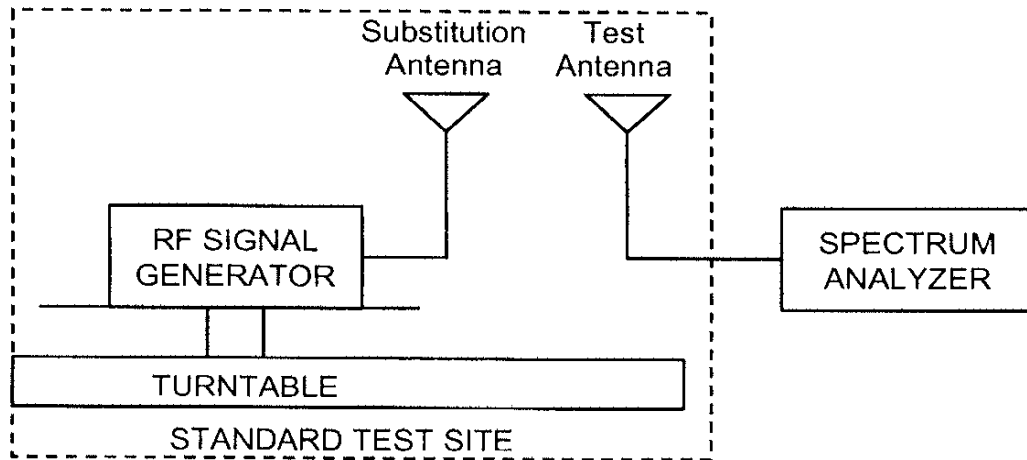
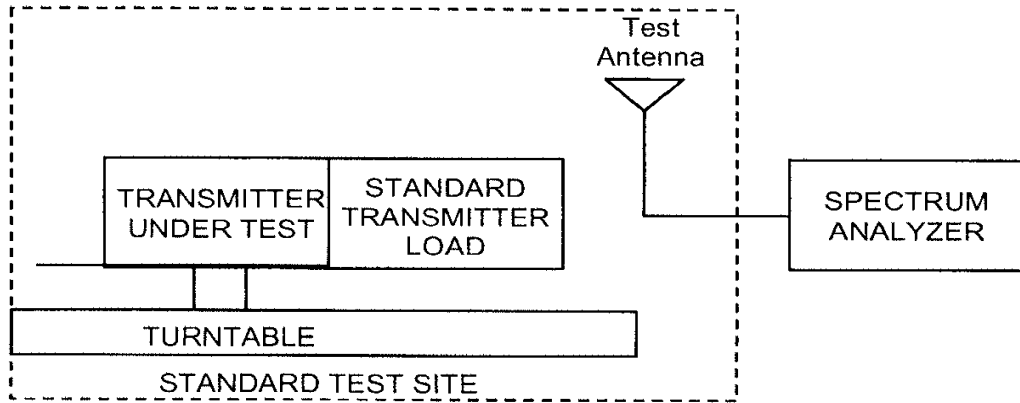
### Test Procedure

- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth 100 kHz (<1 GHz), 1 MHz (> 1GHz).
  - 2) Video Bandwidth  $\geq 3$  times Resolution Bandwidth, or 30 kHz
  - 3) Sweep Speed  $\leq 2000$  Hz/second
  - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load that is placed on the turntable. The RF cable to this load should be of minimum length.
- D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to  $\pm$  the test bandwidth (see section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.
- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in step B).
- I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
- M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB =  $10\log_{10}(\text{TX power in watts}/0.001)$  – the levels in step I)

*NOTE: It is permissible that other antennas provided can be referenced to a dipole.*

### Test Setup





**1626.5 MHz Radiated Spurious Emissions**

<b>Emission Frequency (MHz)</b>	<b>Measured Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Result</b>
3253.0	-43.03	-13	Pass
4879.5	-39.97	-13	Pass
6506.0	-38.11	-13	Pass

**1643.5 MHz Radiated Spurious Emissions**

<b>Emission Frequency (MHz)</b>	<b>Measured Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Result</b>
3287.0	-42.13	-13	Pass
4930.5	-39.13	-13	Pass
6574.0	-38.57	-13	Pass

**1660.5 MHz Radiated Spurious Emissions**

<b>Emission Frequency (MHz)</b>	<b>Measured Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Result</b>
3321.0	-43.45	-13	Pass
4981.5	-40.55	-13	Pass
6642.0	-38.07	-13	Pass

No other emissions were detected.



### Test Equipment Utilized

#### Compliance Testing

Asset#	Manufacturer	Model	Description	Last Calibration	Calibration Due
i00103	EMCO	3115	Horn Antenna	11/25/2010	11/25/2012
i00331	Agilent	E4407B	Spectrum Analyzer	12/20/2010	12/20/2011
i00379	Agilent	E7405A	Spectrum Analyzer	11/22/2010	11/22/2011

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.





Appendix

IPLD Specifications

<b>Freq (MHz)</b>	<b>IPLD Rejection (dB)</b>
.010 to 1026.5	74
1026.5 to 1525	94
1525 to 1559	120
1559 to 1585	94
1585 to 1605	71
1605 to 1610	51
1610 to 1610.6	48
1610.6 to 1613.8	33
1613.8 to 1614	32
1614 to 1620	3.5
1620 to 1624.5	1
1624.5 to 1625.5	1
1625.5 to 1626.5	1
1626.5 to 1660	0.1
1660 to 1670	1
1670 to 1735	18.5
1735 to 1865	50
1865 to 2260.5	60
2260.5 to 3250	60
3250 to 3330	70
3330 to 4000	50
4000 to 12000	65
12000 to 18000	50

END OF TEST REPORT