



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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Test Report

Prepared for: EMS Technologies

Model: 1252-A-3520-02

Description: HSD-400i

FCC ID: K6KHSD-440

To

FCC Part 87

Date of Issue: March 12, 2014

On the behalf of the applicant:

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John Erhard
Project Test Engineer

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All results contained herein relate only to the sample tested



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	March 12, 2014	John Erhard	Original Document
2.0	May 7, 2014	Amanda Reed	Updated Model Description



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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009)

The tests results contained within this test report all fall within our scope of accreditation, unless noted in the table below

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A



Standard Test Conditions Engineering Practices

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

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Subpart 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.

EUT Description

Model: 1252-A-3520-02

Description: HSD-400i

Firmware: N/A

Software: N/A

Additional Information: The EUT is an aircraft satellite communication system.

EUT Operation during Tests

The EUT was in a normal operating condition with test software allowing for manual operation.



Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1046, 87.131	Carrier Output Power (Conducted)	Pass	
2.1051, 87.139(i)(1)	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1053	Field Strength of Spurious Radiation	N/A	This C2PC is not affected by these changes
2.1049, 87.139(i)(3)	Emission Masks (Occupied Bandwidth)	Pass	See FCC waiver for allowable variance
2.1047	Audio Low Pass Filter (Voice Input)	N/A	The EUT does not contain an audio input
2.1047	Audio Frequency Response	N/A	The EUT does not contain an audio input
2.1047	Modulation Limiting	N/A	The EUT does not contain an audio input
2.1055, 87.133(a)	Frequency Stability (Temperature Variation)	N/A	This C2PC is not affected by these changes
2.1055, 87.133(a)	Frequency Stability (Voltage Variation)	N/A	This C2PC is not affected by these changes



Carrier Output Power (Conducted)

Name of Test: Carrier Output Power (Conducted)

Engineer: John Erhard

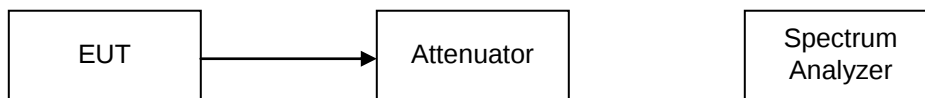
Test Equipment Utilized: 5833, 5228

Test Date: 2/18/2013

Test Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer through a power attenuator. with the RBW set to 1 MHz and the VBW set to 3 X RBW which set the RBW greater than the transmit signal ensuring there was no signal suppression while measuring a modulated signal. The peak readings were taken for each modulation type and the result was then compared to the limit.

Test Setup



QPSK Transmitter Peak Output Power

Tuned Frequency (MHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
1626.5	47.4	54.9	60	Pass
1643.5	47.4	54.9	60	Pass
1660.5	47.2	52.5	60	Pass

16 QAM Transmitter Peak Output Power

Tuned Frequency (MHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
1626.5	47.2	52.5	60	Pass
1643.5	47.7	58.9	60	Pass
1660.5	47.3	53.7	60	Pass

32 QAM Transmitter Peak Output Power

Tuned Frequency (MHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
1626.5	47.5	56.2	60	Pass
1643.5	47.5	56.2	60	Pass
1660.5	47.1	51.3	60	Pass

64 QAM Transmitter Peak Output Power

Tuned Frequency (MHz)	Measured Power (dBm)	Measured Power (W)	Limit (W)	Result
1626.5	47.3	53.7	60	Pass
1643.5	47.5	56.2	60	Pass
1660.5	47.4	54.9	60	Pass



Conducted Spurious Emissions

Name of Test:

Conducted Spurious Emissions

Engineer: John Erhard

Test Equipment Utilized:

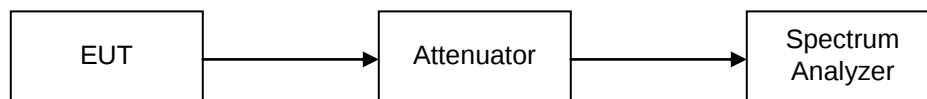
5833, 5228

Test Date: 2/18/2013

Test Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer through a power attenuator. 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



QPSK 1626.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	34.23	35.48	-19.52	-49.77	-30.25
1525 to 1559	-203	0.004	120	34.23	35.48	-47.52	-48.27	-0.75
1559 to 1585	-155	1	111	47.4	47.4	3.40	-17.53	-20.93
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-16.70	-16.10
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-17.87	-10.27
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.20	-8.60
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-15.70	-5.70
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.03	-8.43
1614 to 1620	-70	0.004	30	34.23	35.48	-4.52	-40.20	-35.68
1620 to 1624.5	-70	0.004	20	34.23	35.48	-14.52	-38.03	-23.51
1624.5 to 1625.5	-70	0.004	10	34.23	35.48	-24.52	-35.03	-10.51
1625.5 to 1626.5	-70	0.004	1.3	34.23	35.48	-33.22	-34.37	-1.15
1626.5 to 1660	-70	0.004	0.8	34.23	35.48	-33.72	-34.70	-0.98
1660 to 1670	-19.5	0.02	0.8	43.23	41.47	-18.7	-32.03	-13.33
1670 to 1735	-60	0.004	0.8	34.23	35.48	-23.72	-46.38	-22.66
1735 to 1865	-105	0.004	50	34.23	35.48	-19.52	-46.03	-26.51
1865 to 3250	-105	0.004	20	34.23	35.48	-49.52	-56.03	-6.51
3250 to 3330	-105	0.004	50	34.23	35.48	-19.52	-46.60	-27.08
3330 to 4000	-105	0.004	40	34.23	35.48	-29.52	-46.43	-16.91
4000 to 12000	-105	0.004	50	34.23	35.48	-19.52	-45.27	-25.75
12000 to 18000	-70	0.004	15	34.23	35.48	-19.52	-84.00	-64.48



QPSK 1643.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.07	36.32	-18.68	-47.77	-29.09
1525 to 1559	-203	0.004	120	35.07	36.32	-46.68	-48.1	-1.42
1559 to 1585	-155	1	111	47.4	47.4	3.40	-18.27	-21.67
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-16.77	-16.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.6	-9.00
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.77	-6.77
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-15.77	-8.17
1614 to 1620	-70	0.004	30	35.07	36.32	-3.68	-41.93	-38.25
1620 to 1624.5	-70	0.004	20	35.07	36.32	-13.68	-44.6	-30.92
1624.5 to 1625.5	-70	0.004	10	35.07	36.32	-23.68	-43.93	-20.25
1625.5 to 1626.5	-70	0.004	1.3	35.07	36.32	-32.38	-44.1	-11.72
1626.5 to 1660	-70	0.004	0.8	35.07	36.32	-32.88	-33.77	-0.89
1660 to 1670	-19.5	0.02	0.8	44.07	42.31	-18.7	-34.77	-16.07
1670 to 1735	-60	0.004	0.8	35.07	36.32	-22.88	-40.1	-17.22
1735 to 1865	-105	0.004	50	35.07	36.32	-18.68	-47.27	-28.59
1865 to 3250	-105	0.004	20	35.07	36.32	-48.68	-51.27	-2.59
3250 to 3330	-105	0.004	50	35.07	36.32	-18.68	-47.1	-28.42
3330 to 4000	-105	0.004	40	35.07	36.32	-28.68	-46.27	-17.59
4000 to 12000	-105	0.004	50	35.07	36.32	-18.68	-45.1	-26.42
12000 to 18000	-70	0.004	15	35.07	36.32	-18.68	-40.93	-22.25



QPSK 1660.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.23	36.48	-18.52	-48.77	-30.25
1525 to 1559	-203	0.004	120	35.23	36.48	-46.52	-50.1	-3.58
1559 to 1585	-155	1	111	47.4	47.4	3.40	-18.77	-22.17
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-17.77	-17.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.77	-9.17
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.1	-8.50
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.93	-6.93
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1614 to 1620	-70	0.004	30	35.23	36.48	-3.52	-45.93	-42.41
1620 to 1624.5	-70	0.004	20	35.23	36.48	-13.52	-45.27	-31.75
1624.5 to 1625.5	-70	0.004	10	35.23	36.48	-23.52	-45.27	-21.75
1625.5 to 1626.5	-70	0.004	1.3	35.23	36.48	-32.22	-44.6	-12.38
1626.5 to 1660	-70	0.004	0.8	35.23	36.48	-32.72	-35.27	-2.55
1660 to 1670	-19.5	0.02	0.8	43.4	41.64	-18.7	-23.77	-5.07
1670 to 1735	-60	0.004	0.8	35.23	36.48	-22.72	-42.6	-19.88
1735 to 1865	-105	0.004	50	35.23	36.48	-18.52	-47.27	-28.75
1865 to 3250	-105	0.004	20	35.23	36.48	-48.52	-52.77	-4.25
3250 to 3330	-105	0.004	50	35.23	36.48	-18.52	-43.77	-25.25
3330 to 4000	-105	0.004	40	35.23	36.48	-28.52	-47.43	-18.91
4000 to 12000	-105	0.004	50	35.23	36.48	-18.52	-45.1	-26.58
12000 to 18000	-70	0.004	15	35.23	36.48	-18.52	-41.27	-22.75



QAM 1626.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	34.23	35.48	-19.52	-49.77	-30.25
1525 to 1559	-203	0.004	120	34.23	35.48	-47.52	-48.27	-0.75
1559 to 1585	-155	1	111	47.4	47.4	3.40	-17.53	-20.93
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-16.70	-16.10
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-17.87	-10.27
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.20	-8.60
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-15.70	-5.7
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.03	-8.43
1614 to 1620	-70	0.004	30	34.23	35.48	-4.52	-40.20	-35.68
1620 to 1624.5	-70	0.004	20	34.23	35.48	-14.52	-38.03	-23.51
1624.5 to 1625.5	-70	0.004	10	34.23	35.48	-24.52	-35.03	-10.51
1625.5 to 1626.5	-70	0.004	1.3	34.23	35.48	-33.22	-34.37	-1.15
1626.5 to 1660	-70	0.004	0.8	34.23	35.48	-33.72	-34.70	-0.98
1660 to 1670	-19.5	0.02	0.8	43.23	41.47	-18.7	-32.03	-13.23
1670 to 1735	-60	0.004	0.8	34.23	35.48	-23.72	-46.38	-22.66
1735 to 1865	-105	0.004	50	34.23	35.48	-19.52	-46.03	-26.51
1865 to 3250	-105	0.004	20	34.23	35.48	-49.52	-56.03	-6.51
3250 to 3330	-105	0.004	50	34.23	35.48	-19.52	-46.60	-27.08
3330 to 4000	-105	0.004	40	34.23	35.48	-29.52	-46.43	-16.91
4000 to 12000	-105	0.004	50	34.23	35.48	-19.52	-45.27	-25.75
12000 to 18000	-70	0.004	15	34.23	35.48	-19.52	-84.00	-64.48



QAM 1643.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.07	36.32	-18.68	-47.77	-29.09
1525 to 1559	-203	0.004	120	35.07	36.32	-46.68	-48.1	-1.42
1559 to 1585	-155	1	111	47.4	47.4	3.40	-18.27	-21.67
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-16.77	-16.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.6	-9.00
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.77	-6.77
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-15.77	-8.17
1614 to 1620	-70	0.004	30	35.07	36.32	-3.68	-41.93	-38.25
1620 to 1624.5	-70	0.004	20	35.07	36.32	-13.68	-44.6	-30.92
1624.5 to 1625.5	-70	0.004	10	35.07	36.32	-23.68	-43.93	-20.25
1625.5 to 1626.5	-70	0.004	1.3	35.07	36.32	-32.38	-44.1	-11.72
1626.5 to 1660	-70	0.004	0.8	35.07	36.32	-32.88	-33.77	-0.89
1660 to 1670	-19.5	0.02	0.8	44.07	42.31	-18.7	-34.77	-16.07
1670 to 1735	-60	0.004	0.8	35.07	36.32	-22.88	-40.1	-17.22
1735 to 1865	-105	0.004	50	35.07	36.32	-18.68	-47.27	-28.59
1865 to 3250	-105	0.004	20	35.07	36.32	-48.68	-51.27	-2.59
3250 to 3330	-105	0.004	50	35.07	36.32	-18.68	-47.1	-28.42
3330 to 4000	-105	0.004	40	35.07	36.32	-28.68	-46.27	-17.59
4000 to 12000	-105	0.004	50	35.07	36.32	-18.68	-45.1	-26.42
12000 to 18000	-70	0.004	15	35.07	36.32	-18.68	-40.93	-22.25



QAM 1660.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	F Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.23	36.48	-18.52	-48.77	-30.25
1525 to 1559	-203	0.004	120	35.23	36.48	-46.52	-50.1	-3.58
1559 to 1585	-155	1	111	47.4	47.4	3.40	-18.77	-22.17
1585 to 1605	-143	1	95	47.4	47.4	-0.60	-17.77	-17.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.77	-9.17
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.1	-8.50
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.93	-6.93
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1614 to 1620	-70	0.004	30	35.23	36.48	-3.52	-45.93	-42.41
1620 to 1624.5	-70	0.004	20	35.23	36.48	-13.52	-45.27	-31.75
1624.5 to 1625.5	-70	0.004	10	35.23	36.48	-23.52	-45.27	-21.75
1625.5 to 1626.5	-70	0.004	1.3	35.23	36.48	-32.22	-44.6	-12.38
1626.5 to 1660	-70	0.004	0.8	35.23	36.48	-32.72	-35.27	-2.55
1660 to 1670	-19.5	0.02	0.8	43.4	41.64	-18.7	-23.77	-5.07
1670 to 1735	-60	0.004	0.8	35.23	36.48	-22.72	-42.6	-19.88
1735 to 1865	-105	0.004	50	35.23	36.48	-18.52	-47.27	-28.75
1865 to 3250	-105	0.004	20	35.23	36.48	-48.52	-52.77	-4.25
3250 to 3330	-105	0.004	50	35.23	36.48	-18.52	-43.77	-25.25
3330 to 4000	-105	0.004	40	35.23	36.48	-28.52	-47.43	-18.91
4000 to 12000	-105	0.004	50	35.23	36.48	-18.52	-45.1	-26.58
12000 to 18000	-70	0.004	15	35.23	36.48	-18.52	-41.27	-22.75



QPSK 1626.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	34.23	35.48	-19.52	-49.77	-30.25
1525 to 1559	-203	0.004	120	34.23	35.48	-47.52	-48.27	-0.75
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-17.53	-9.93
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-16.70	-9.10
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-17.87	-10.27
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.20	-8.60
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-15.70	-5.70
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.03	-8.43
1614 to 1620	-70	0.004	2.3	34.23	35.48	-32.22	-40.20	-7.98
1620 to 1626.5	-70	0.004	2.3	34.23	35.48	-32.22	-34.37	-2.15
1626.5 to 1660	-70	0.004	0.8	34.23	35.48	-33.72	-34.70	-0.98
1660 to 1670	-19.5	0.02	0.8	43.23	41.47	-18.7	-32.03	-13.33
1670 to 1735	-60	0.004	0.8	34.23	35.48	-23.72	-46.38	-22.66
1735 to 12000	-105	0.004	50	34.23	35.48	-19.52	-45.27	-25.75
12000 to 18000	-70	0.004	15	34.23	35.48	-19.52	-84.00	-64.48

QPSK 1643.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.07	36.32	-18.68	-47.77	-29.09
1525 to 1559	-203	0.004	120	35.07	36.32	-46.68	-48.10	-1.42
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-18.27	-10.67
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-16.77	-9.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.60	-9.00
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.77	-6.77
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-15.77	-8.17
1614 to 1620	-70	0.004	2.3	35.07	36.32	-31.38	-41.93	-10.55
1620 to 1626.5	-70	0.004	2.3	35.07	36.32	-31.38	-43.93	-12.55
1626.5 to 1660	-70	0.004	0.8	35.07	36.32	-32.88	-33.77	-0.89
1660 to 1670	-19.5	0.02	0.8	44.07	42.31	-18.7	-34.77	-19.07
1670 to 1735	-60	0.004	0.8	35.07	36.32	-22.88	-40.10	-17.22
1735 to 12000	-105	0.004	50	35.07	36.32	-18.68	-45.10	-26.42
12000 to 18000	-70	0.004	15	35.07	36.32	-18.68	-40.93	-22.25



QPSK 1660.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	35.23	36.48	-18.52	-48.77	-30.25
1525 to 1559	-203	0.004	120	35.23	36.48	-46.52	-50.10	-3.58
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-18.77	-11.17
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-17.77	-10.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-16.77	-9.17
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-16.10	-8.50
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-16.93	-6.93
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-16.43	-8.83
1614 to 1620	-70	0.004	2.3	35.23	36.48	-31.22	-45.93	-14.71
1620 to 1626.5	-70	0.004	2.3	35.23	36.48	-31.22	-44.60	-13.38
1626.5 to 1660	-70	0.004	0.8	35.23	36.48	-32.72	-35.27	-2.55
1660 to 1670	-19.5	0.02	0.8	43.4	41.64	-18.7	-23.77	-5.07
1670 to 1735	-60	0.004	0.8	35.23	36.48	-22.72	-42.60	-19.88
1735 to 12000	-105	0.004	50	35.23	36.48	-18.52	-43.77	-25.25
12000 to 18000	-70	0.004	15	35.23	36.48	-18.52	-41.27	-22.75

QAM 1626.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	34.23	35.48	-19.52	-49.93	-30.41
1525 to 1559	-203	0.004	120	34.23	35.48	-47.52	-48.27	-0.75
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-21.93	-14.33
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-19.27	-11.67
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-18.60	-11.00
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-18.77	-11.17
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-17.93	-7.93
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-18.10	-10.50
1614 to 1620	-70	0.004	2.3	34.23	35.48	-32.22	-43.43	-11.21
1620 to 1626.5	-70	0.004	2.3	34.23	35.48	-32.22	-33.93	-1.71
1626.5 to 1660	-70	0.004	0.8	34.23	35.48	-33.72	-35.60	-1.88
1660 to 1670	-19.5	0.02	0.8	44.73	42.97	-18.7	-33.93	-15.23
1670 to 1735	-60	0.004	0.8	34.23	35.48	-23.72	-45.43	-21.71
1735 to 12000	-105	0.004	50	34.23	35.48	-19.52	-42.60	-23.08
12000 to 18000	-70	0.004	15	34.23	35.48	-19.52	-43.10	-23.58



QAM 1643.5 MHz Conducted Spurious Emissions

Frequency (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	33.23	34.48	-20.52	-50.10	-29.58
1525 to 1559	-203	0.004	120	33.23	34.48	-48.52	-50.60	-2.08
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-21.93	-14.33
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-19.10	-11.50
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-18.60	-11.00
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-18.10	-10.50
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-18.77	-8.77
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-18.10	-10.50
1614 to 1620	-70	0.004	2.3	33.23	34.48	-33.22	-40.60	-7.38
1620 to 1626.5	-70	0.004	2.3	33.23	34.48	-33.22	-44.77	-11.55
1626.5 to 1660	-70	0.004	0.8	33.23	34.48	-34.72	-35.10	-0.38
1660 to 1670	-19.5	0.02	0.8	44.07	42.31	-18.7	-33.43	-14.73
1670 to 1735	-60	0.004	0.8	33.23	34.48	-24.72	-42.10	-17.38
1735 to 12000	-105	0.004	50	33.23	34.48	-20.52	-41.43	-20.91
12000 to 18000	-70	0.004	15	33.23	34.48	-20.52	-52.10	-31.58

QAM 1660.5 MHz Conducted Spurious Emissions

Freq (MHz)	Limit (dBc)	RBW (MHz)	Modified A Type DLNA Rejection (dB)	Measured Power (dBm)	Corrected Power (dBm)	Necessary Level (dBm)	Measured Level (dBm)	Margin (dB)
.010 to 1525	-135	0.004	80	34.4	35.65	-19.35	-50.60	-31.25
1525 to 1559	-203	0.004	120	34.4	35.65	-47.35	-49.77	-2.42
1559 to 1585	-155	1	100	47.4	47.4	-7.60	-20.93	-13.33
1585 to 1605	-143	1	88	47.4	47.4	-7.60	-19.77	-12.17
1605 to 1610	-117	1	62	47.4	47.4	-7.60	-18.77	-11.17
1610 to 1610.6	-95	1	40	47.4	47.4	-7.60	-18.10	-10.50
1610.6 to 1613.8	-50	1	40	47.4	47.4	-10.0	-18.10	-8.10
1613.8 to 1614	-95	1	40	47.4	47.4	-7.60	-17.60	-10.00
1614 to 1620	-70	0.004	2.3	34.4	35.65	-32.05	-46.27	-14.22
1620 to 1626.5	-70	0.004	2.3	34.4	35.65	-32.05	-42.35	-10.30
1626.5 to 1660	-70	0.004	0.8	34.4	35.65	-33.55	-35.43	-1.88
1660 to 1670	-19.5	0.02	0.8	43.07	41.31	-18.7	-25.93	-7.23
1670 to 1735	-60	0.004	0.8	34.4	35.65	-23.55	-42.92	-19.37
1735 to 12000	-105	0.004	50	34.4	35.65	-19.35	-41.10	-21.75
12000 to 18000	-70	0.004	15	34.4	35.65	-19.35	-51.27	-31.92



Emission Masks (Occupied Bandwidth)

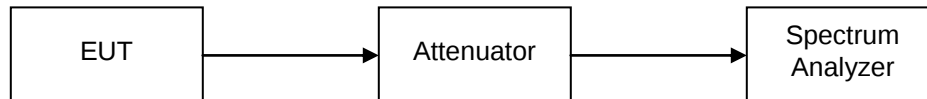
Name of Test: Emission Masks (Occupied Bandwidth)
Test Equipment Utilized: 5833, 5228

Engineer: John Erhard
Test Date: 2/18/2013

Test Procedure

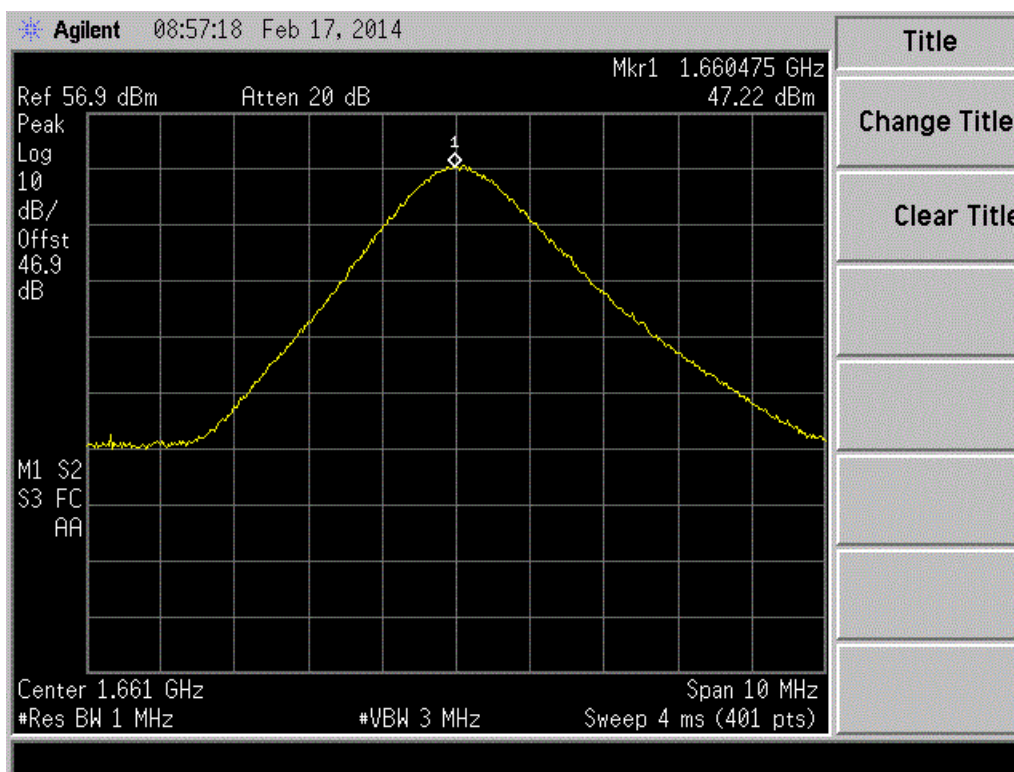
The EUT was connected directly to a spectrum analyzer through a power attenuator to verify that the EUT meets the required emissions mask. A reference level plot is provided to verify that the peak power was established prior to testing the mask. The transmitter is digital modulation therefore no data input is required to measure the emission mask. The RBW was set as close as possible to 1% of the occupied bandwidth to ensure accurate readings.

Test Setup

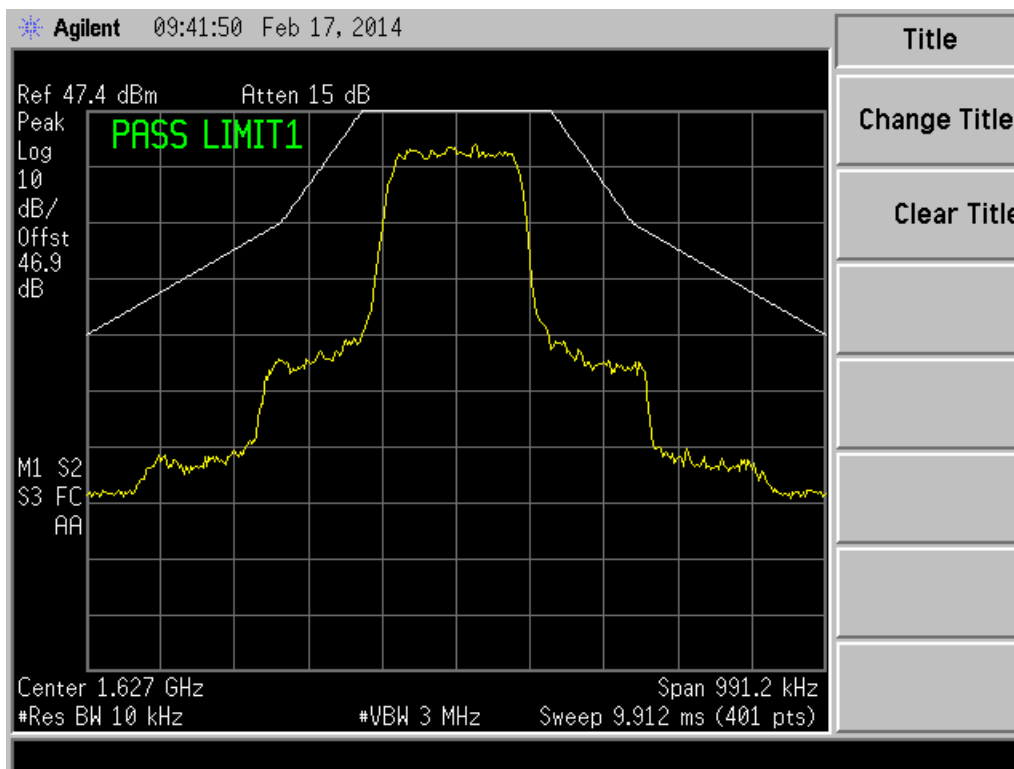




1660.5 MHz Reference

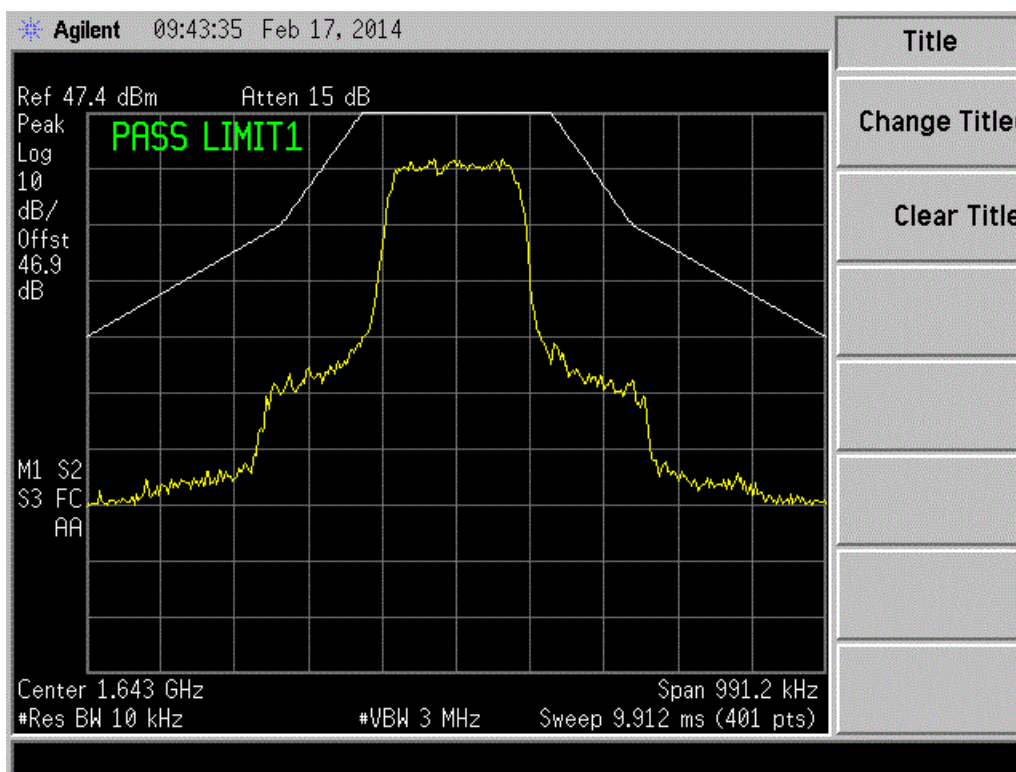


1626.5 MHz 200KG7W

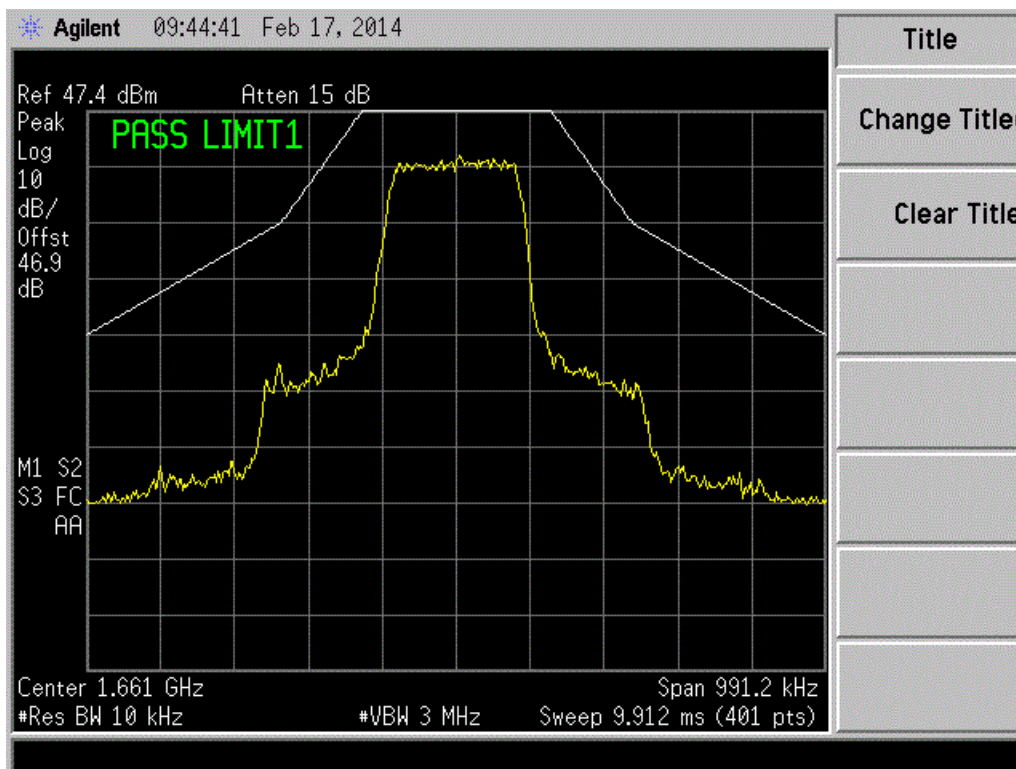




1643.5 MHz 200KG7W



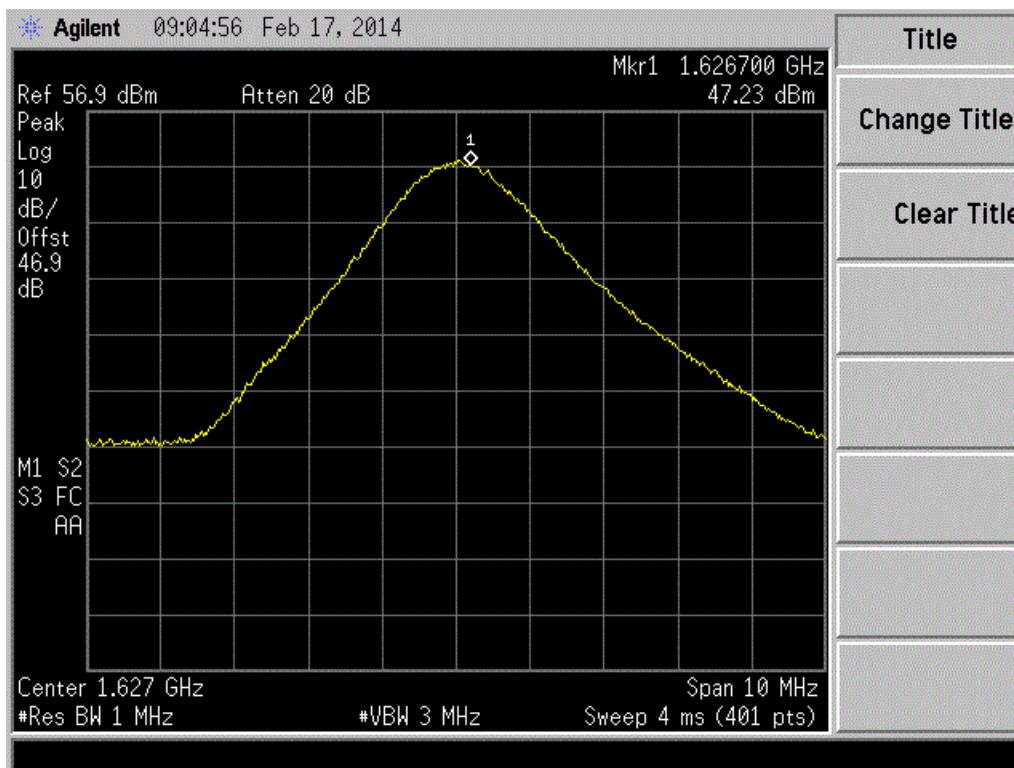
1660.5 MHz 200KG7W



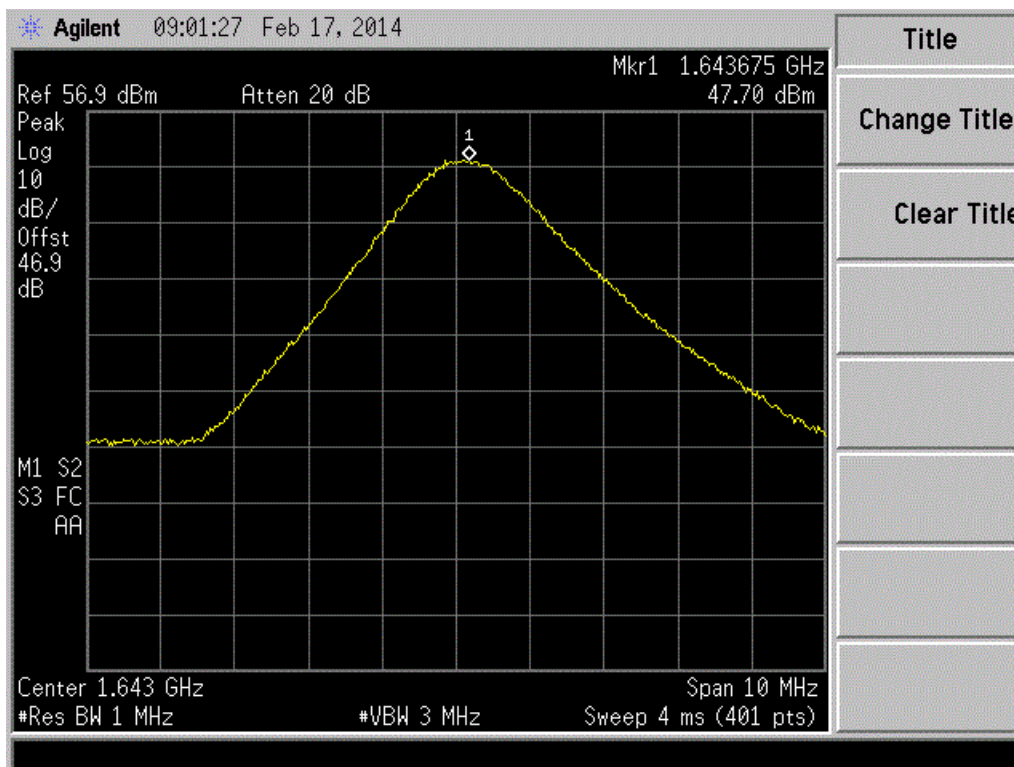


16 QAM Emissions Mask

1626.5 MHz Reference

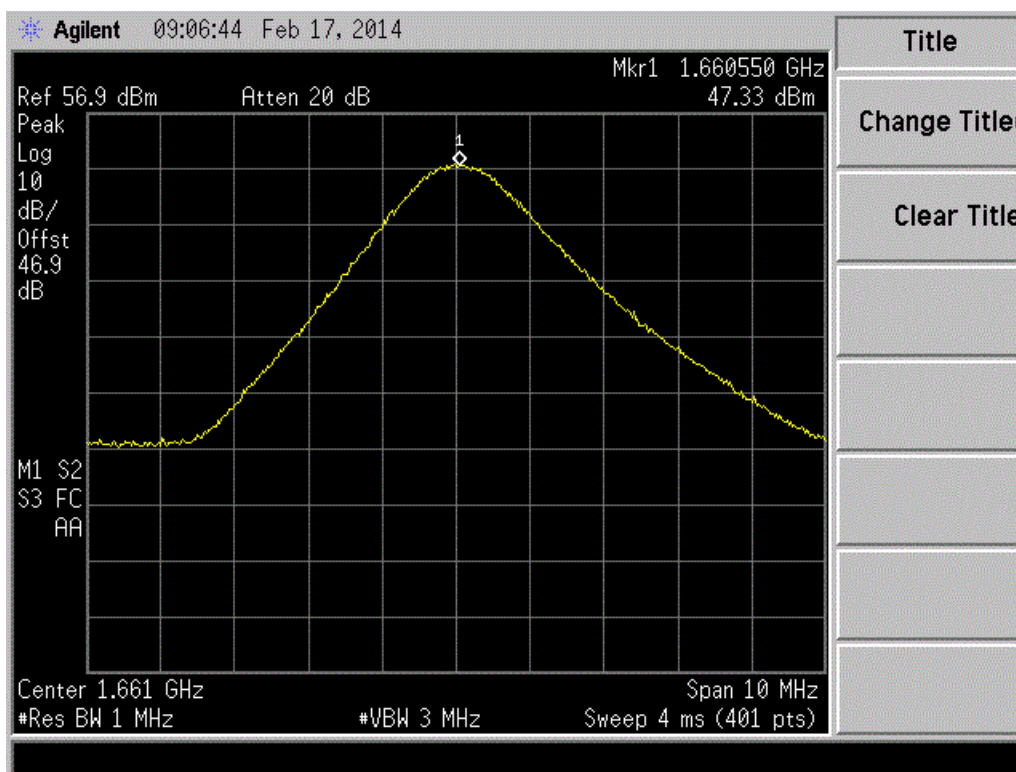


1643.5 MHz Reference

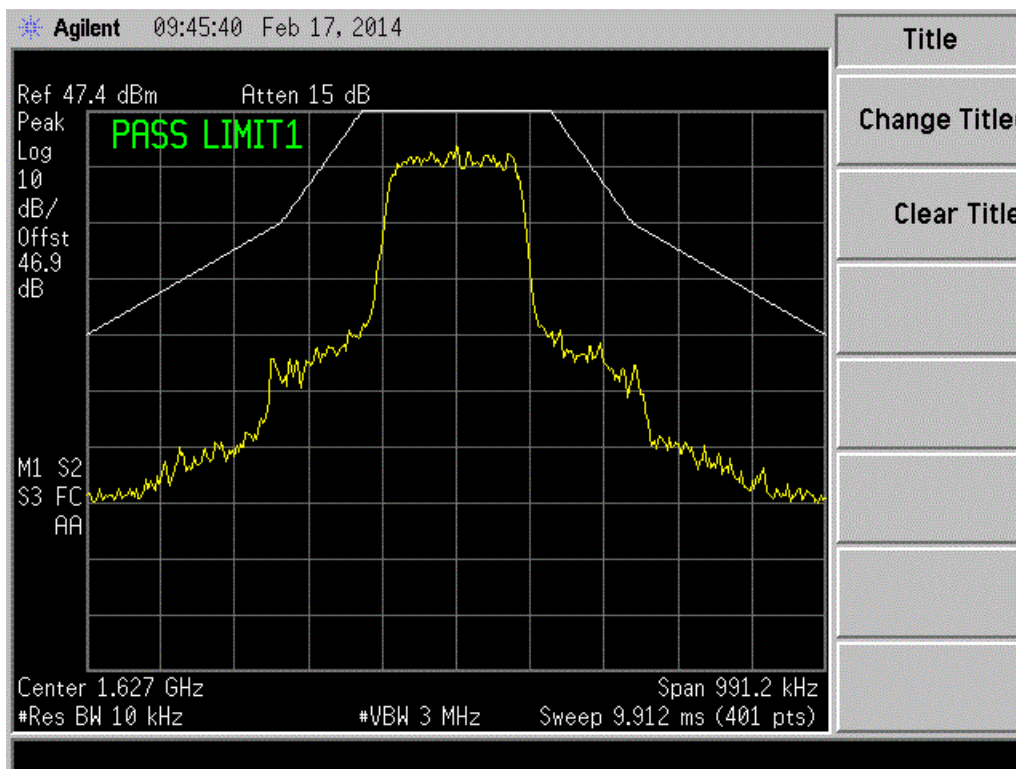




1660.5 MHz Reference

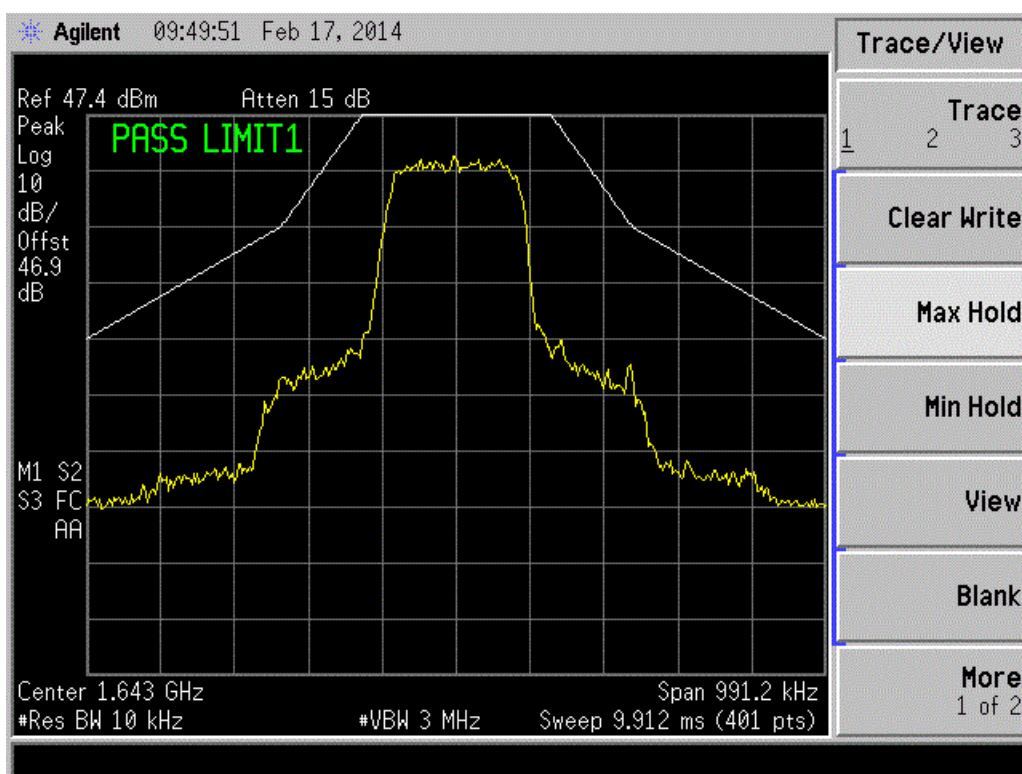


1626.5 MHz 200KD7W

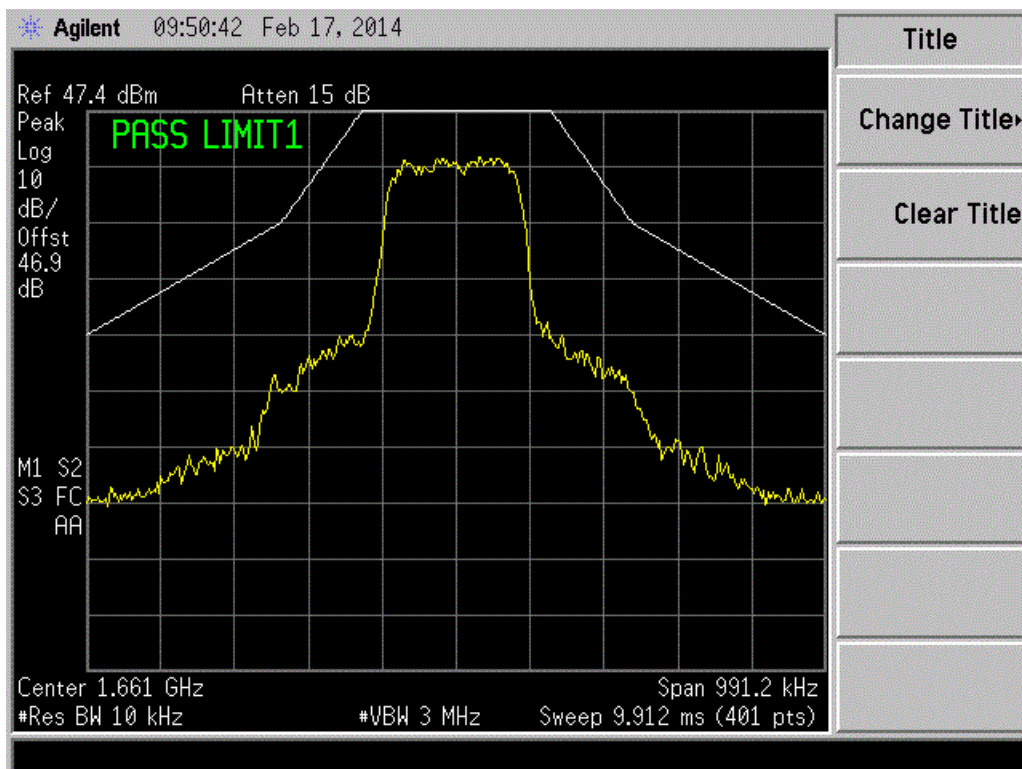




1643.5 MHz 200KD7W



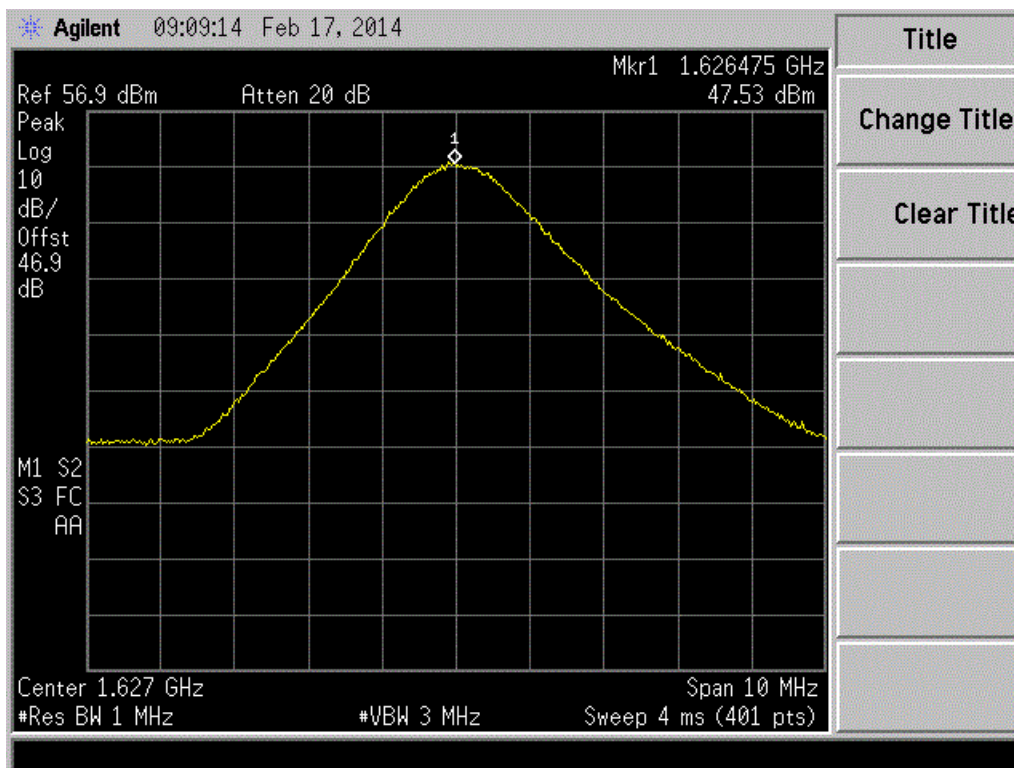
1660.5 MHz 200KD7W



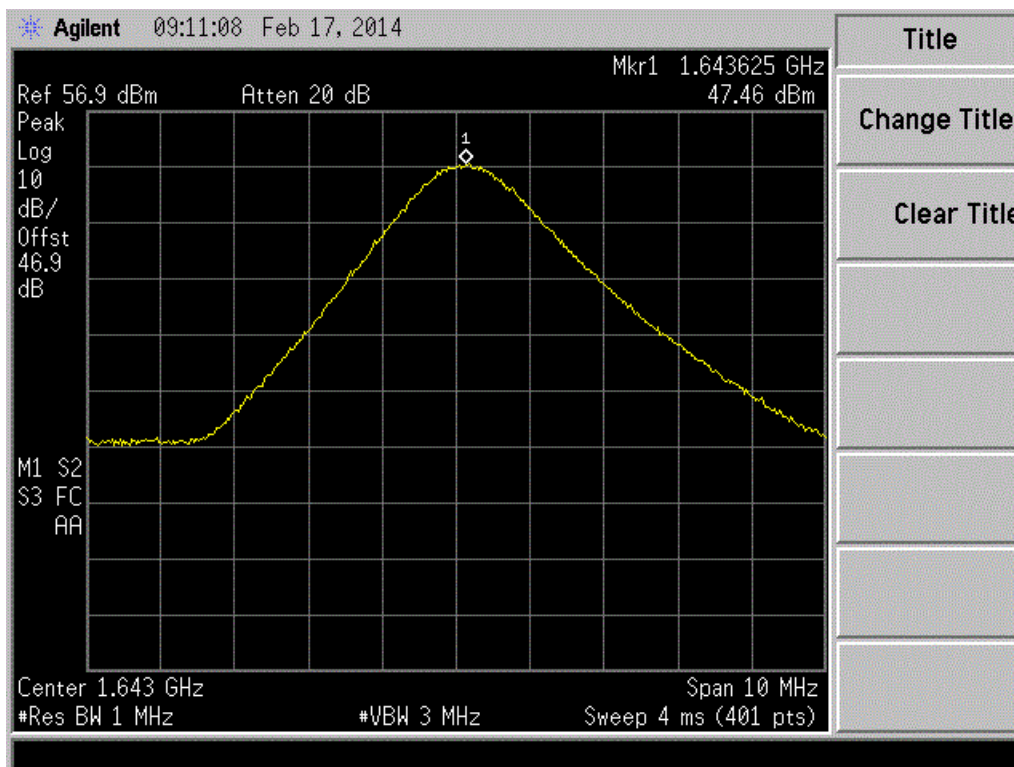


32 QAM Emissions Mask

1626.5 MHz Reference



1643.5 MHz Reference



Agilent 09:13:09 Feb 17, 2014

Ref 56.9 dBm Atten 20 dB Mkr1 1.660575 GHz 47.16 dBm

Peak Log 10 dB/ Offst 46.9 dB

M1 S2
S3 FC
AA

Center 1.661 GHz Span 10 MHz
#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)

Agilent 09:51:31 Feb 17, 2014

Ref 47.4 dBm Atten 15 dB

Peak Log

10 dB/

Offst 46.9 dB

PASS LIMIT1

M1 S2

S3 FC

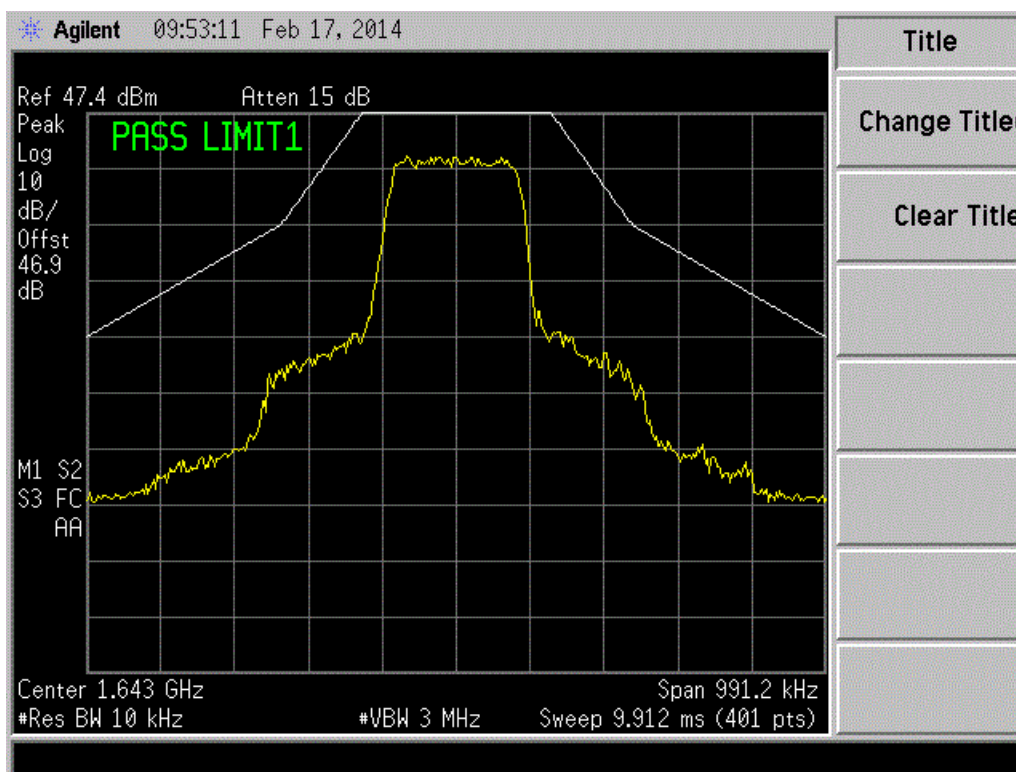
AA

Center 1.627 GHz Span 991.2 kHz

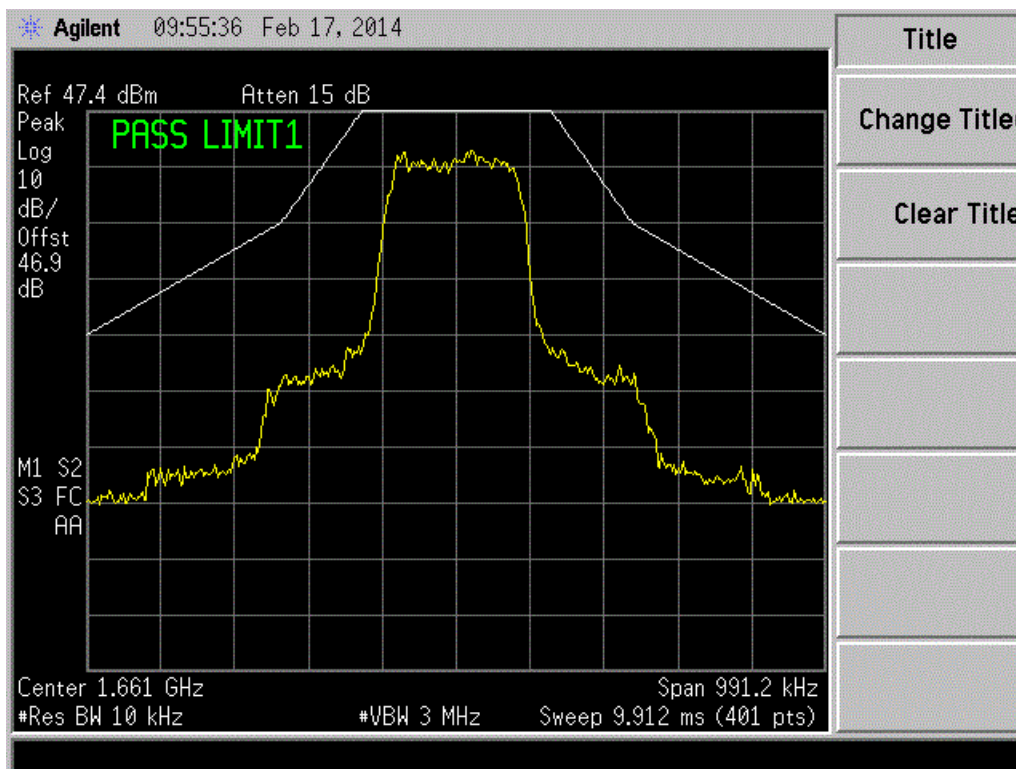
#Res BW 10 kHz #VBW 3 MHz Sweep 9.912 ms (401 pts)



1643.5 MHz 200KD7W



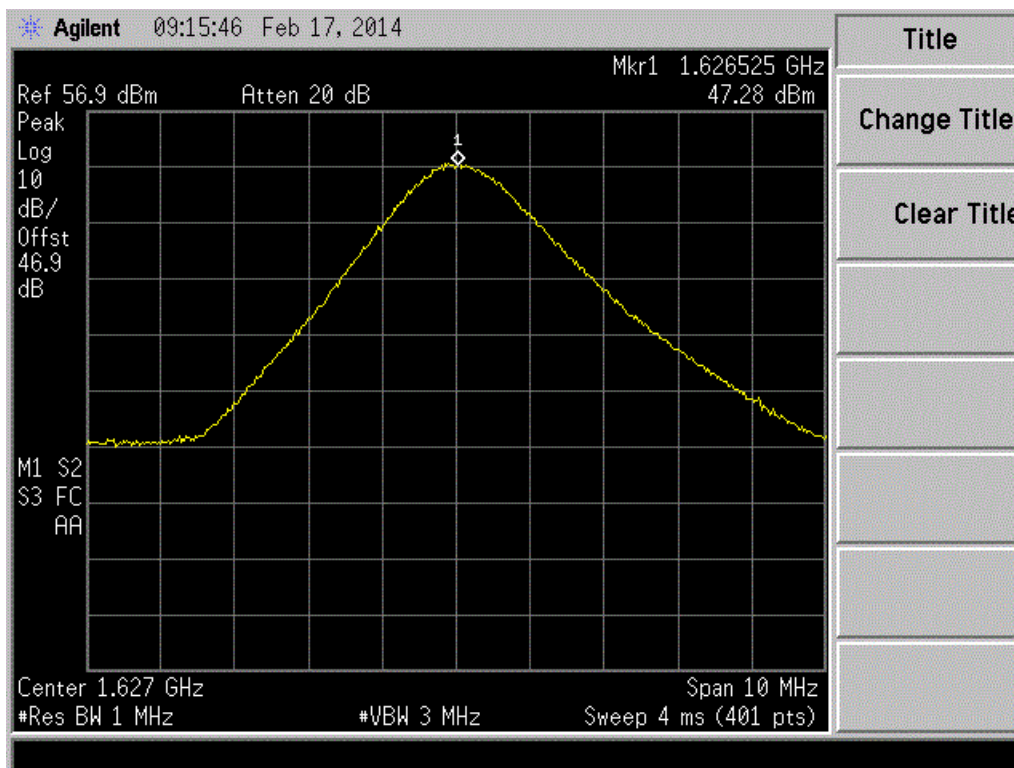
1660.5 MHz 200KD7W



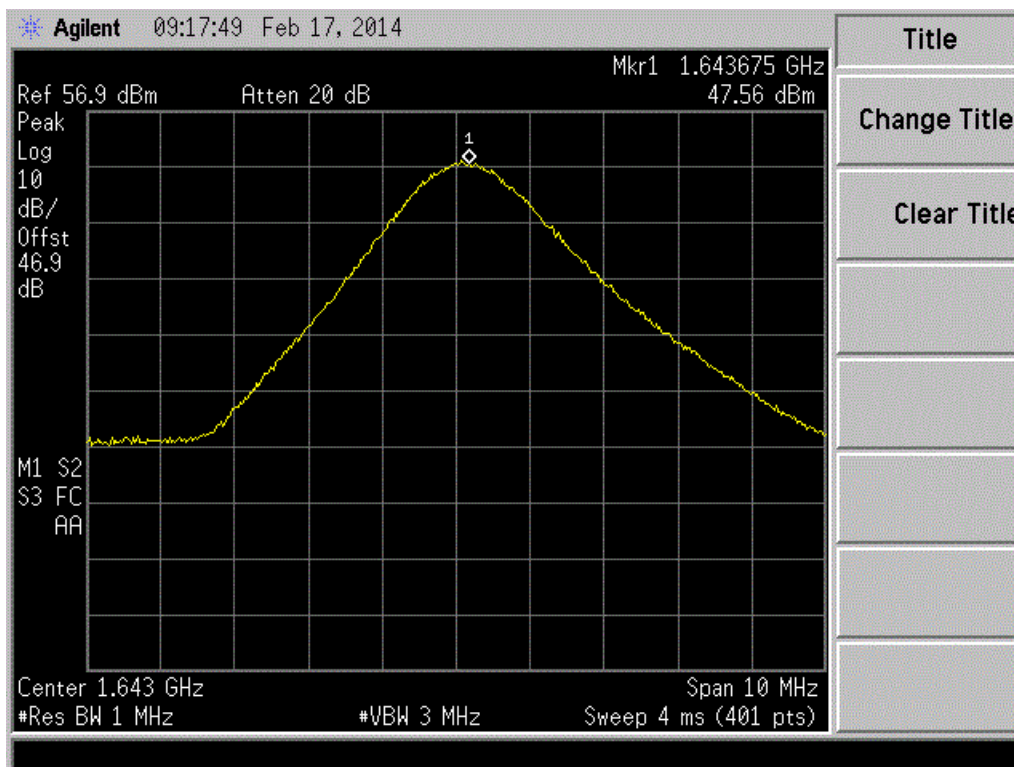


64 QAM Emissions Mask

1626.5 MHz Reference

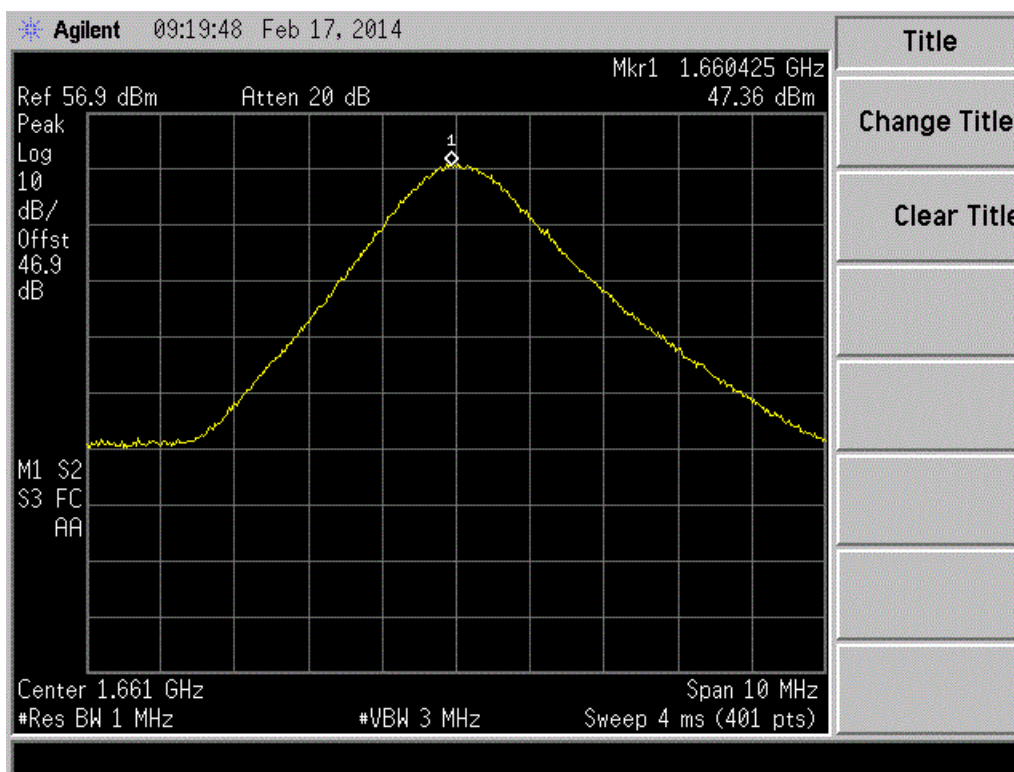


1643.5 MHz Reference

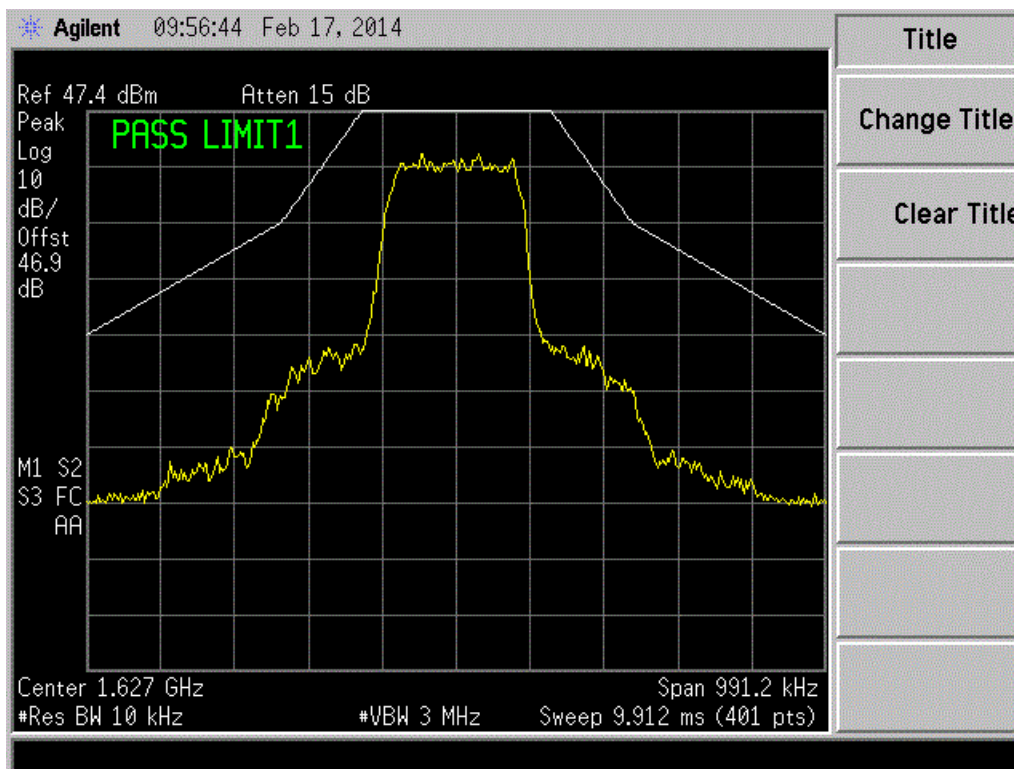




1660.5 MHz Reference

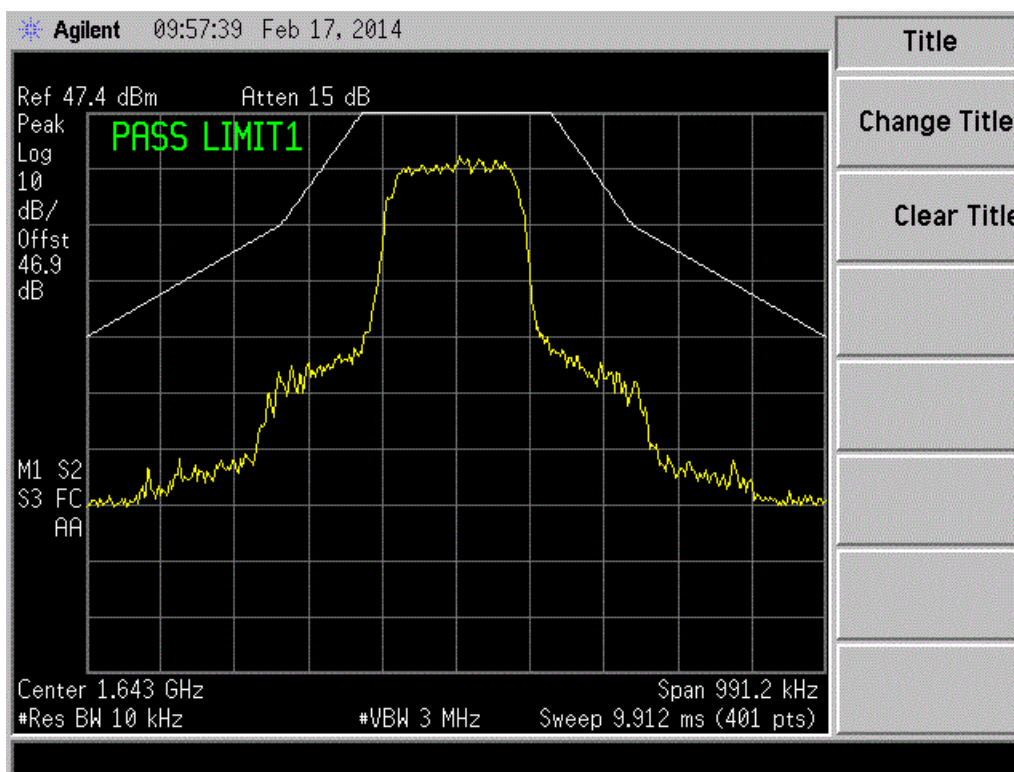


1626.5 MHz 200KD7W

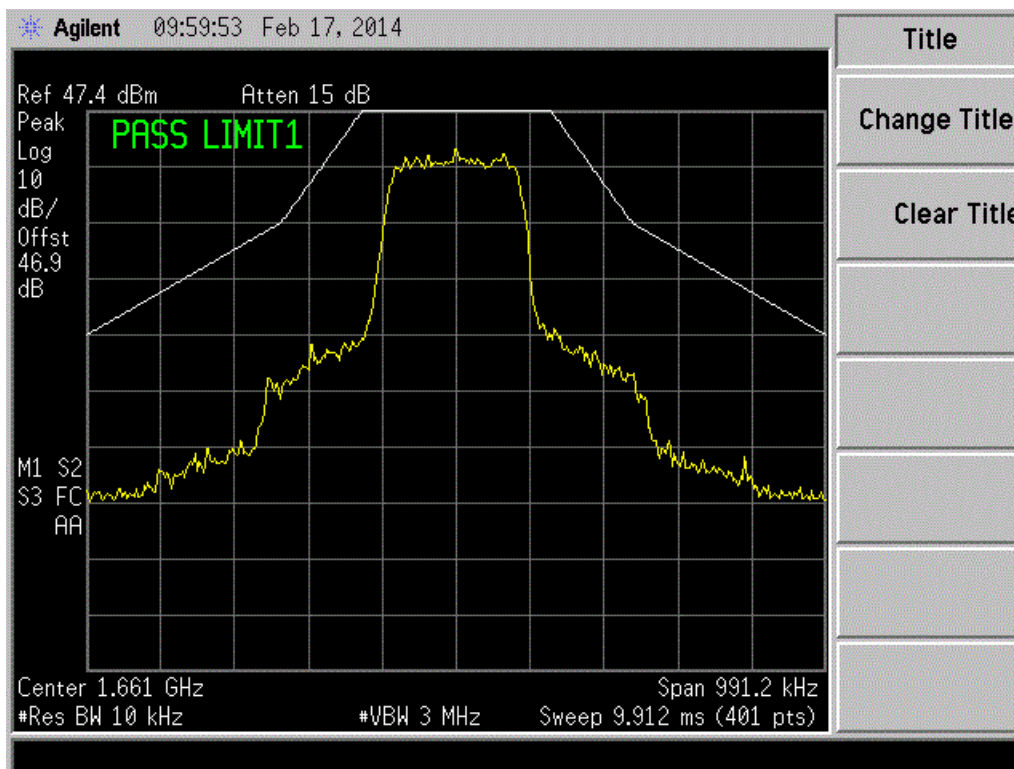




1643.5 MHz 200KD7W



1660.5 MHz 200KD7W





Necessary Bandwidth Calculations

QPSK

Modulation = 110KG7W		
Signal States (S)	=	4
Data Rate (D)	=	168
Constant Factor (K)	=	0.665
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

Modulation = 200KG7W		
Signal States (S)	=	4
Data Rate (D)	=	336
Constant Factor (K)	=	0.595
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

16 QAM

Modulation = 110KD7W		
Signal States (S)	=	16
Data Rate (D)	=	336
Constant Factor (K)	=	0.655
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

Modulation = 200KD7W		
Signal States (S)	=	16
Data Rate (D)	=	672
Constant Factor (K)	=	0.595
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

32 QAM

Modulation = 100KD7W		
Signal States (S)	=	32
Data Rate (D)	=	420
Constant Factor (K)	=	0.655
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

Modulation = 200KD7W		
Signal States (S)	=	32
Data Rate (D)	=	840
Constant Factor (K)	=	0.66
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$



64 QAM

Modulation = 100KD7W		
Signal States (S)	=	64
Data Rate (D)	=	504
Constant Factor (K)	=	0.655
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$

Modulation = 200KD7W		
Signal States (S)	=	64
Data Rate (D)	=	1008
Constant Factor (K)	=	0.595
Necessary Bandwidth (B_N), kHz	=	$2 \cdot D \cdot K / \text{LOG}_2(S)$



Test Equipment Utilized

EMS

Asset#	Manufacturer	Model	Description	Last Calibration	Calibration Due
5228	Agilent	4403B	Spectrum analyzer	2/14/2013	3/14/2014
5833	Agilent	8563EC	Spectrum analyzer	10/23/2013	11/23/2014

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.

END OF TEST REPORT