



Nemko USA, Inc.
Phone (858) 755-5525 Fax (858) 452-1810
11696 Sorrento Valley Rd., Suite F
San Diego, CA 92121-1024

Test Report: 2007 127363 FCC (Supplemental)

Applicant: Broadcast Microwave Services
12367 Crosthwaite Circle Dock 10
Poway, CA 92064
(858) 391-3050 x147
(858) 391-3049 - fax

Equipment Under Test: Model: 5W Linear Power Amplifier Model: BPA-5CC-7

FCC ID: CNVHCII-5-7

In Accordance With: FCC PART 2 and FCC PART 74 Subpart F

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road
San Diego, CA 92121-1024

Date: May 5, 2008

Total Number of Pages: 22

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DOCUMENT HISTORY

REVISION	DATE	COMMENTS	
-	May 5, 2008	Prepared By:	F.S.Custodio
-	May 5, 2008	Initial Release:	Alan Laudani

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4: 2003 "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on May 2, 2008. Testing was performed on the unit described in this report on May 2, 2008 to May 6, 2008.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), NVLAP or any other government agency.

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CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories. As a result, the FCC has placed Nemko USA Inc. on its list of EMC laboratories approved to perform Declaration of Conformity (DOC) procedure testing.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4: 2003 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 18)." digital devices. The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.



Alan Laudani, RF/EMC Test Specialist

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Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted as supplemental testing to the original report (2007 129154 FCC) in compliance with KDB 634817 requirements for filing. The EUT was tested using a transmit frequency of 2067.7MHz, 64QAM modulation and 8MHz bandwidth mode. All tests performed were done for the purpose of demonstrating compliance with FCC PART 2 and FCC PART 74 Subpart F.

The EUT is generally used in ENG/OB vehicle model or any digital microwave application. The EUT was exercised by utilizing a Carry-Coder II (CCII) portable COFDM transmitter with SN 271 and model number 8014129500.

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	2.1046/74.636	PASS
Occupied Bandwidth	2.1049/74.637(g)	PASS
Spurious Emissions at Antenna Terminals	2.1051/74.637	PASS
Field Strength of Spurious Emissions	2.1053/74.637	PASS

Test Conditions:

Indoor Temperature: 23.88 °C
 Humidity: 39.0 %

Outdoor Temperature: 12.9 °C
 Humidity: 96.0 %

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Section 2. General Equipment Specification

Manufacturer: Broadcast Microwave Services

Part No.: 8014079070

Model No.: BPA-5CC-7 (5W Linear Power Amplifier)

Serial No.: Engineering sample

FCC ID: CNVHCII-5-7

Emission Designators:
6M00W7D
7M00W7D
8M00W7D

Rated Power: 5W

Test Voltage: 28VDC to EUT

Frequency Range: 2025 MHz to 2110 MHz (Part 74)

Date Received In Laboratory: May 2, 2008

Nemko Identification No.: 7363-2

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Section 3. RF Power Output

Para. No.: 2.1046(c)

Test Performed By: F. S. Custodio	Date of Test: 05-05-2008
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Minimum Standard: Sec 74 Subpart F--Television Broadcast Auxiliary Stations

Sec. 74.636 Power limitations.

(a) On any authorized frequency, transmitter peak output power and the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired and shall not exceed the values listed in the following table. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified in the following table. In cases of harmful interference, the Commission may, after notice and opportunity for hearing, order a change in the effective radiated power of this station. The table follows:

Frequency Band (MHz)	Maximum allowable transmitter power	Maximum allowable EIRP ²	
		Fixed (dBW)	Mobile (dBW)
2,025 to 2,110	12.0	+45	+35
2,450 to 2,483.5	12.0	+45	+35
6,425 to 6,525	12.0		+35
6,875 to 7,125	12.0	+55	+35
12,700 to 13,250	1.5	+55	+35
17,700 to 18,600		+55	
18,600 to 18,800 ¹		+35	
18,800 to 19,700		+55	

¹ The power delivered to the antenna is limited to -3 dBW.

² Stations licensed based on an application filed before April 16, 2003, for EIRP values exceeding those specified above, may continue to operate indefinitely in accordance with the terms of their current authorizations, subject to periodic renewal.

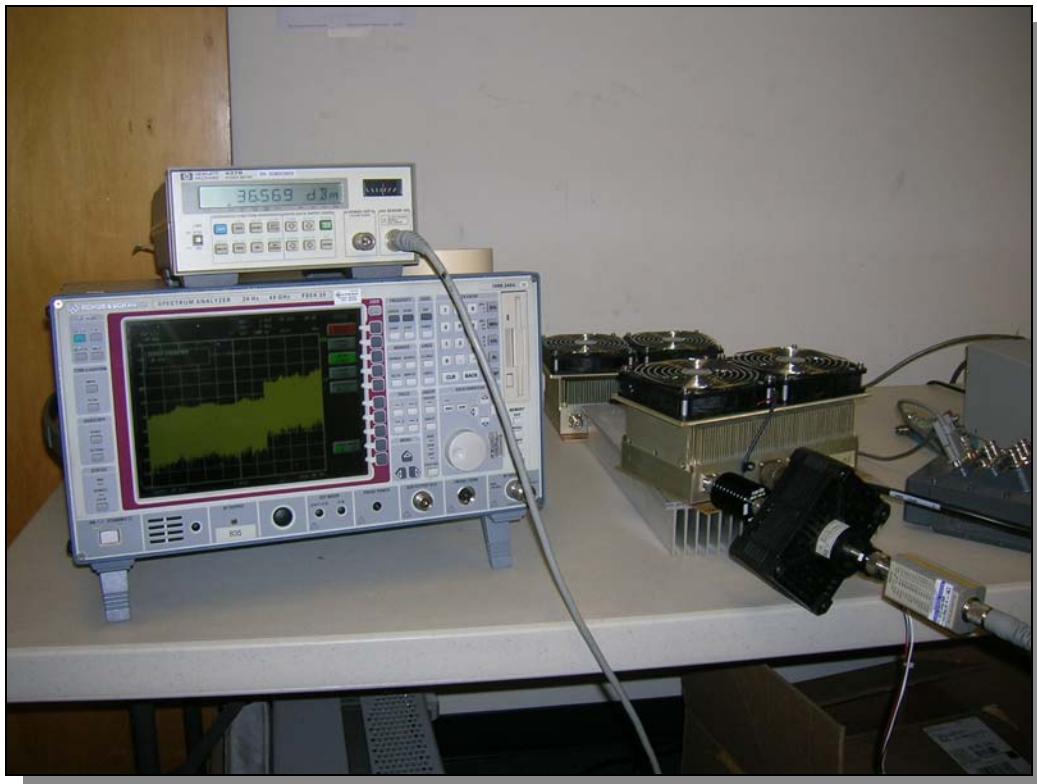
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Test Results: EUT complies – See attached plots

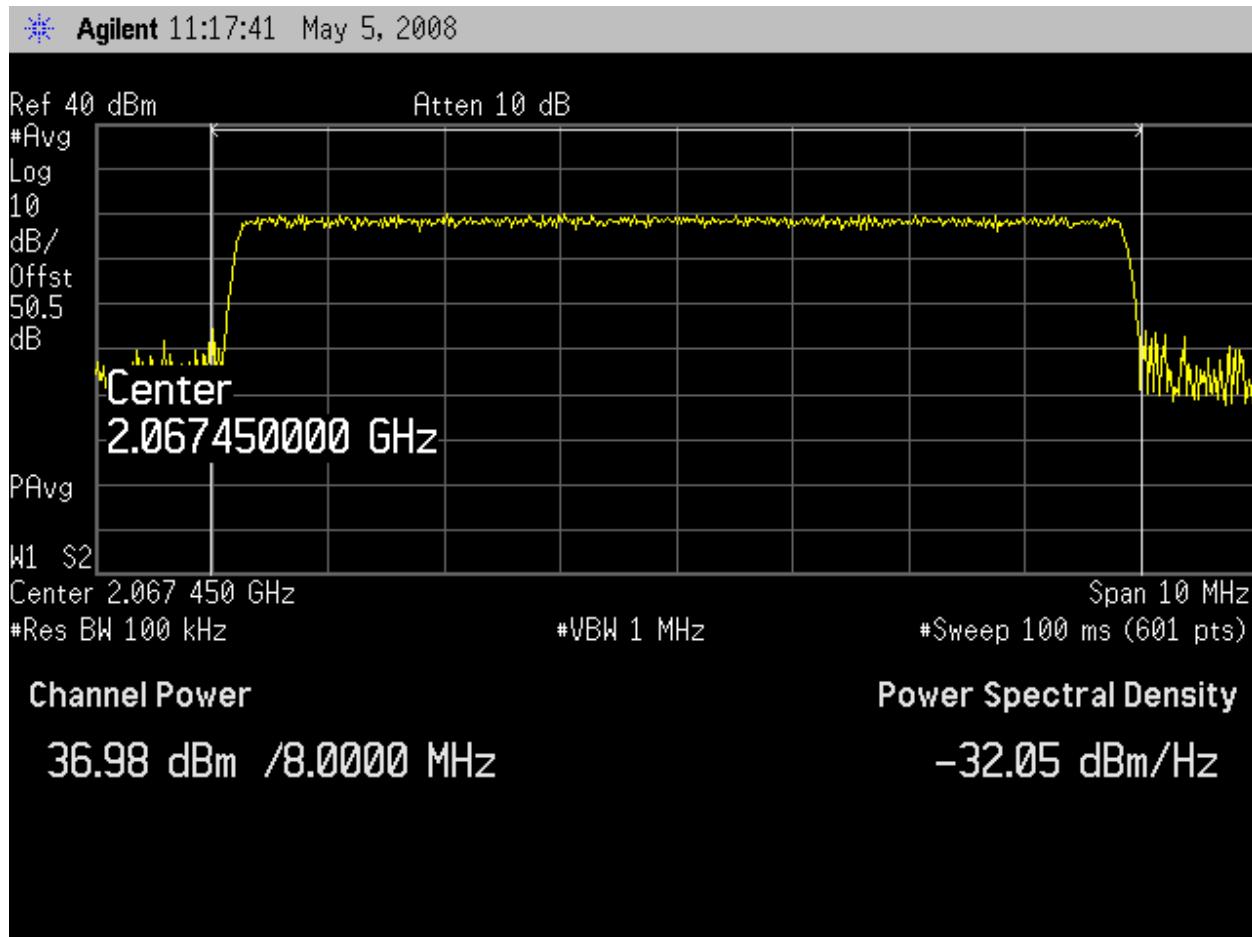
Test Conditions:

A Carry-Coder II (CCII) portable COFDM transmitter with SN 271 and model number 8014129500 was connected to the EUT during this test. Measured using internal source via ASI (Asynchronous Serial Interface) option. Signal bandwidth is set to 8MHz and modulation to 64QAM.. External attenuators and cable used were verified at 50.5dB at test frequency. Average measurements was made using the Spectrum Analyzer's Channel Power Measurement feature using RBW of 100kHz and VBW of 1MHz. Measurement bandwidth is set to signal bandwidth.

A supplemental power measurement using averaging power meter with thermocouple sensor was also made. Reading at the test frequency is: **36.569dBm**. Offset set to 30dBm to compensate for the external attenuator. Further testing will be based from this measurement.



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Average Measurement (64QAM 8MHz 2067.5MHz)
36.98 dBm = 4.98 Watts

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Section 4. Occupied Bandwidth

Para. No.: 2.1049

Test Performed By: Ferdinand Custodio	Date of Test: 05-05-2008
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Minimum Standard: Part 74.637 (g)
Occupied/Authorized bandwidth.

(g) The maximum bandwidth which will be authorized per frequency assignment is set out in the table which follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that less bandwidth would be sufficient to support an applicant's intended communications.

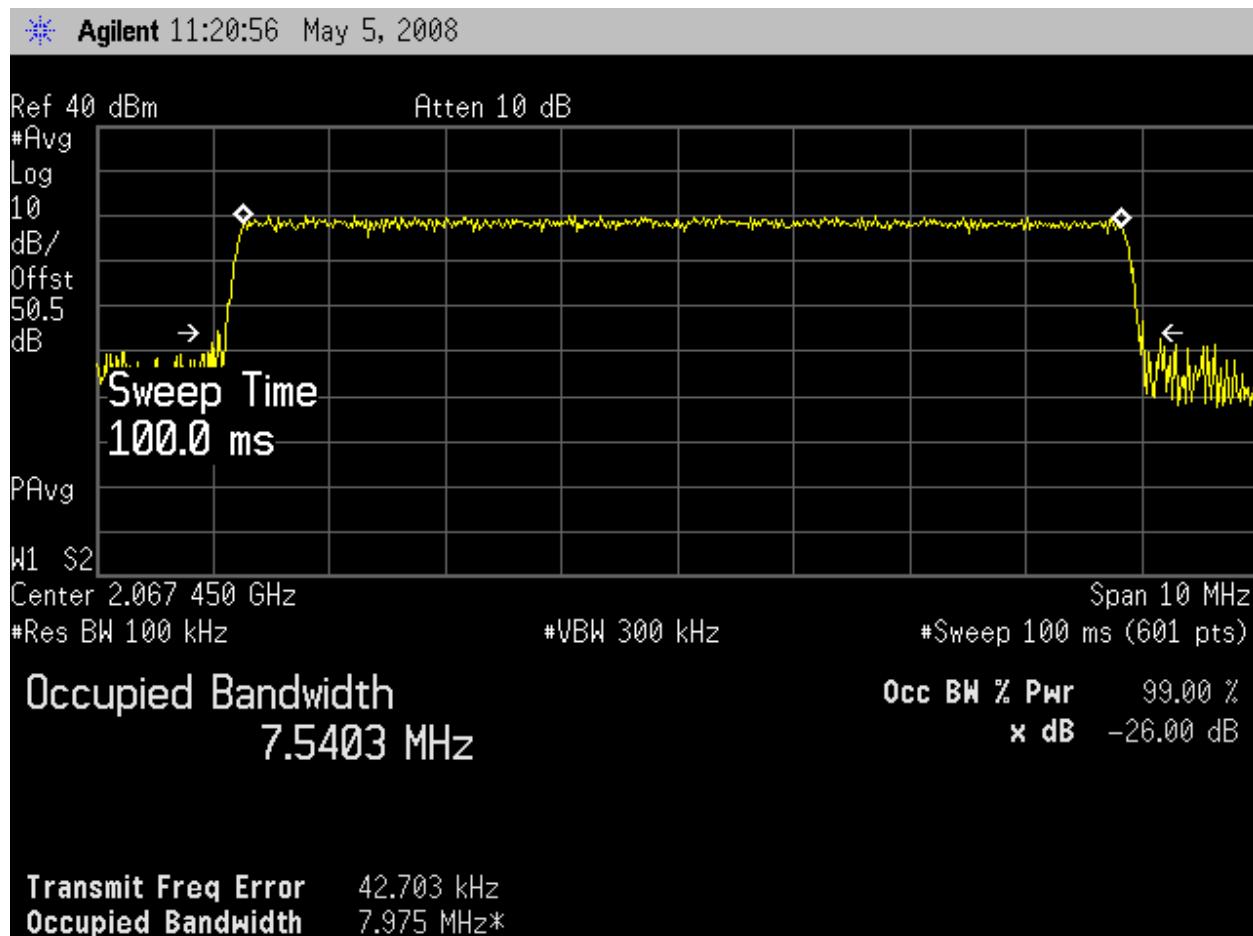
Frequency Band (MHz)	Maximum authorized bandwidth (MHz)
1,990 to 2,110	18
6,425 to 6,525	25
6,875 to 7,125	25
12,700 to 13,250	25
17,700 to 19,700	80

Test Results: EUT Complies. Conductive emission plots captured on the Spectrum Analyzer thru a 50.5 dB attenuator/cable.

Test Data: See attached plots. The EUT was tested with an RF Bandwidth of 8MHz (Digital COFDM) at 2067.5MHz. The EUT was investigated using 64QAM modulation.

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64QAM 8MHz Bandwidth



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Section 5. Spurious Emissions At Antenna Terminals

Para. No.: 2.1051

Test Performed By: Ferdinand Custodio	Date of Test: 05-05-2008
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Minimum Standard: Part 74.637 Emissions and emission limitations

(a) *The mean power of emissions shall be attenuated below the mean transmitter power (P_{MEAN}) in accordance with the following schedule:*

(1) *When using frequency modulation:*

(i) *On any frequency removed from the assigned (center) frequency by more than 50% up to and including 100% of the authorized bandwidth: At least 25 dB in any 100 kHz reference bandwidth (B_{REF});*

(ii) *On any frequency removed from the assigned (center) frequency by more than 100% up to and including 250% of the authorized bandwidth: At least 35 dB in any 100 kHz reference bandwidth;*

(iii) *On any frequency removed from the assigned (center) frequency by more than 250% of the authorized bandwidth: At least $43 + 10 \log_{10} (P_{MEAN} \text{ in watts})$ dB, or 80 dB, whichever is the lesser attenuation, in any 100 kHz reference bandwidth.*

(2) *When using transmissions employing digital modulation techniques:*

(i) *For operating frequencies below 15 GHz, in any 4 kHz reference bandwidth (B_{REF}), the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:*

$$A = 35 + 0.8 (G - 50) + 10 \log_{10} B.$$

(Attenuation greater than 80 decibels is not required.)

Where:

A = Attenuation (in decibels) below the mean output power level.

G = Percent removed from the carrier frequency.

B = Authorized bandwidth in megahertz.

(c) *For purposes of compliance with the emission limitation requirements of this section:*

(3) *For demonstrating compliance with the attenuation requirements for frequency modulation and digital modulation in paragraph (a) of this section, the resolution bandwidth (B_{RES}) of the measuring equipment used for measurements removed from the center frequency by more than 250 percent of the authorized bandwidth shall be 100 kHz for operating frequencies below 1 GHz, and 1 MHz for operating frequencies above 1 GHz. The resolution bandwidth for*

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freqencies removed from the center frequency by less than 250 percent of the authorized bandwidth shall be the reference bandwidth (B_{REF}) specified in the individual emission limitations, but may be reduced to not less than one percent of the authorized bandwidth (B), adjusted upward to the nearest greater resolution bandwidth available on the measuring equipment. In all cases, if B_{RES} and B_{REF} are not equal, then the attenuation requirement must be increased (or decreased) as determined by a factor of $10 \log_{10} [(B_{REF} \text{ in megahertz})/(B_{RES} \text{ in megahertz})]$ decibels, where a positive factor indicates an increase in the attenuation requirement and a negative factor indicates a decrease in the attenuation requirement.

Test Results:

EUT Complies. Conductive emission plots captured on the Spectrum Analyzer thru a 50.5 dB attenuator.. Emissions were investigated from 30 MHz to 26 GHz .

Test Data:

See attached Plots.

EUT setup is similar to Section 3: RF Power Output measurements.

RF setting using internal source via ASI (Asynchronous Serial Interface) option. Signal bandwidth is set to 8MHz. External attenuators and cable used were verified at 50.52dB at test frequency.

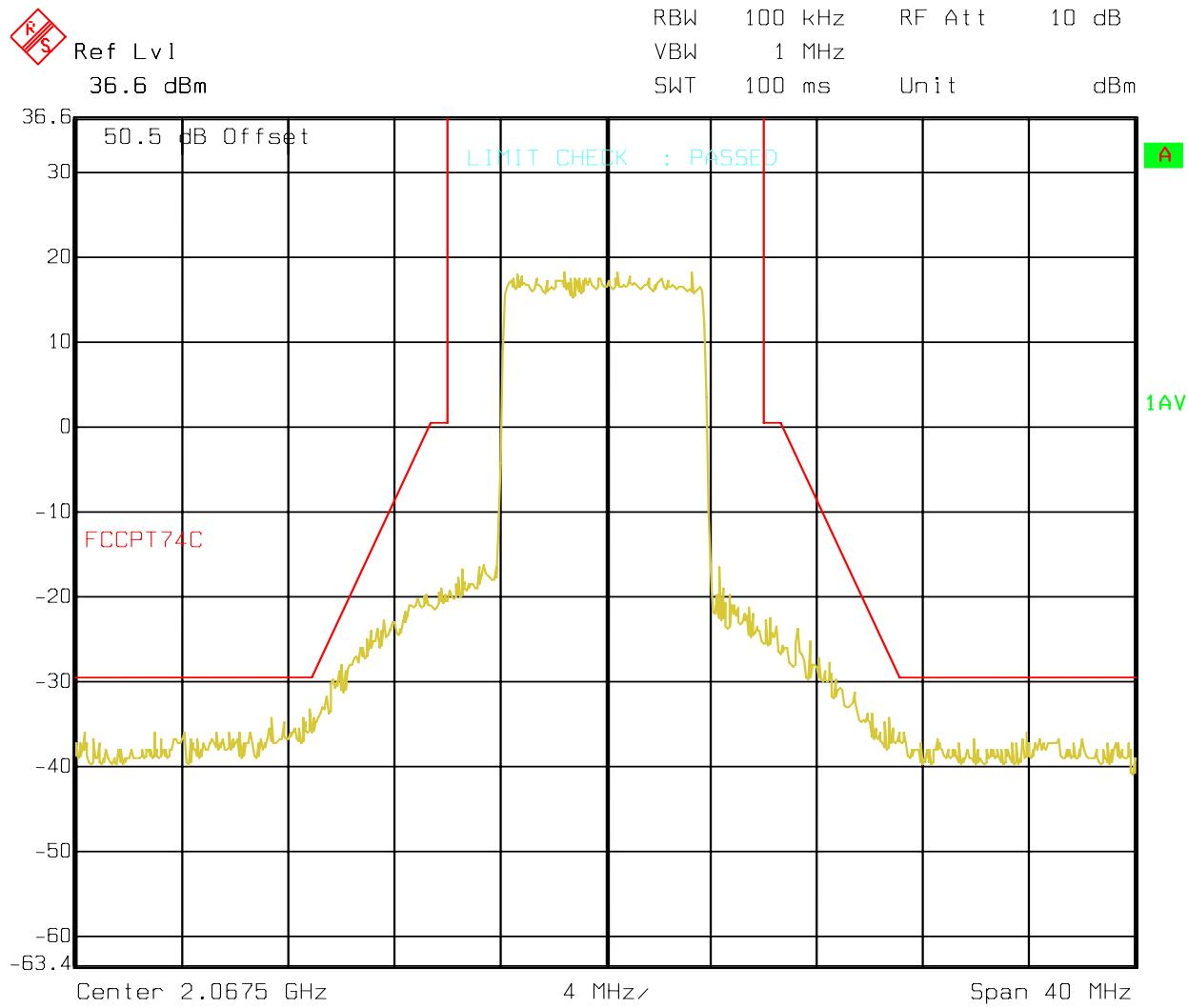
The reference level used is the Mean Output Power (Average) measured under RF Power Output Test which is 36.6dBm. A compliance factor of $10 \log (B_{ref}/B_{res})$ was used for using 100kHz RBW to calculate the mask:

$$\begin{aligned}
 A &= 35 + 0.8(G-50) + 10\log 12 + 10\log(4/100) \\
 &= 80 + (-13.98) \\
 &= 66 \text{ db attenuation @100kHz RBW}
 \end{aligned}$$

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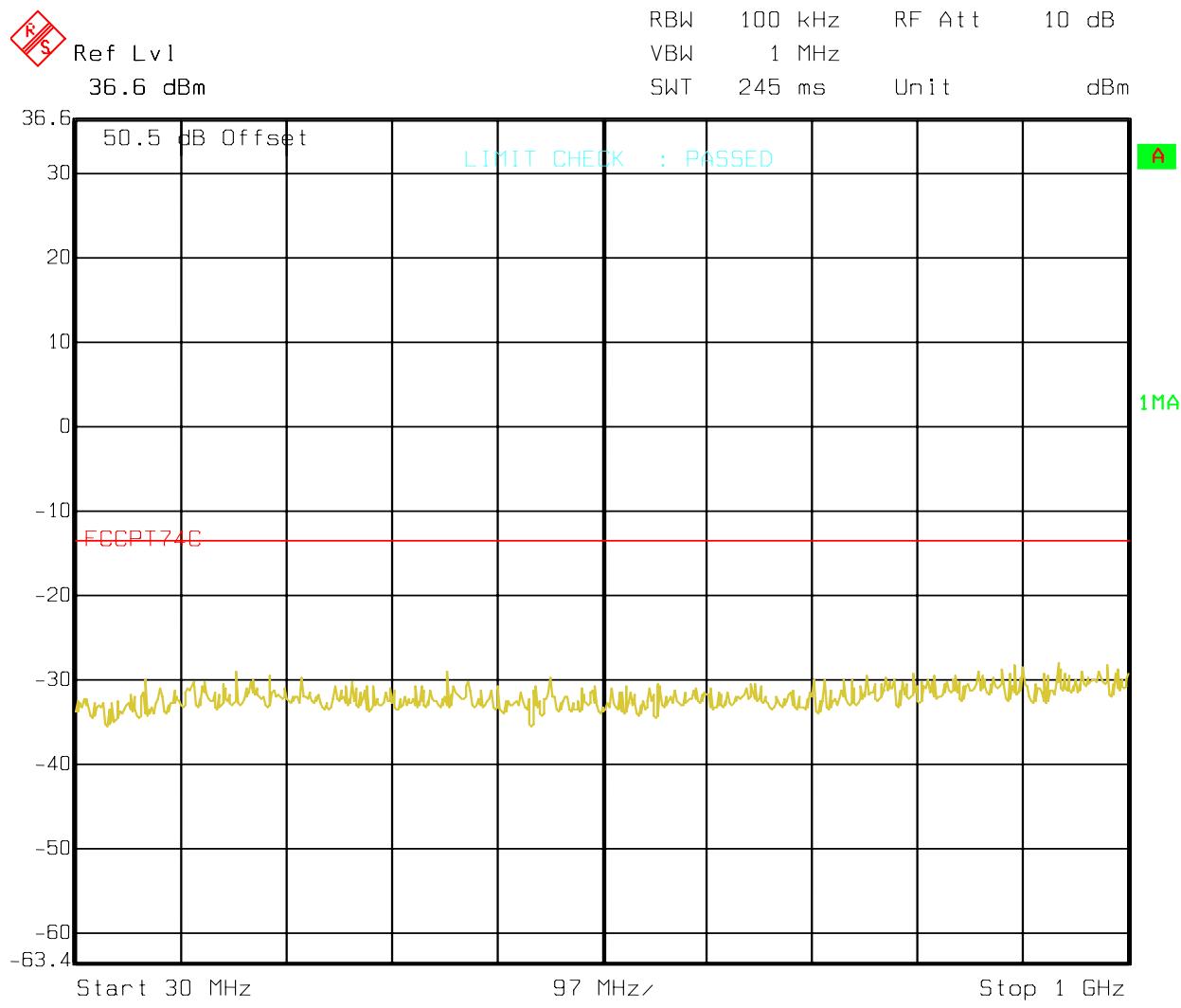
Emission Mask Endpoints Part 74.637(C)(3):

BW = 12 MHz, REF LVL = Mean Output Power

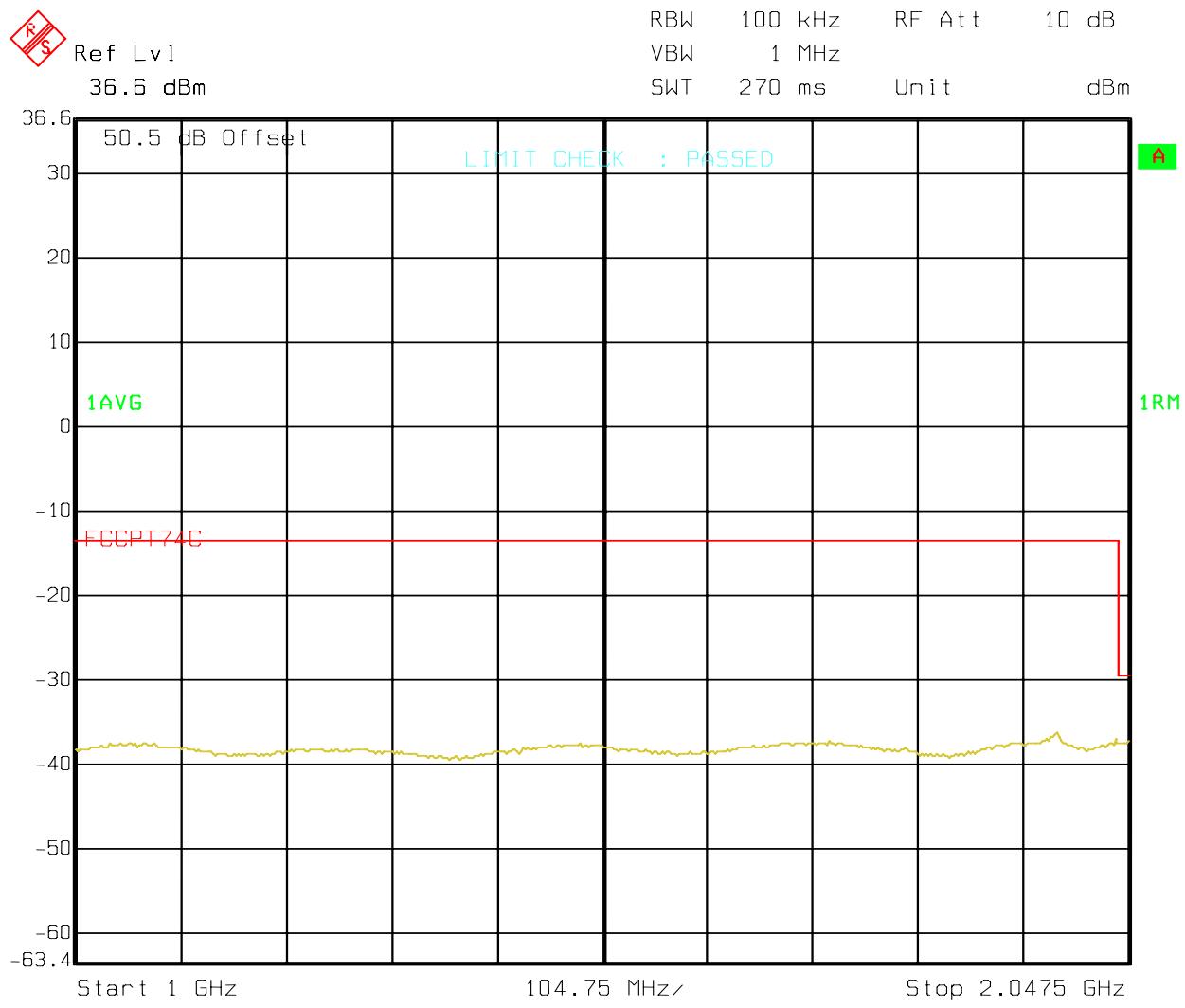
2067.5MHz 64QAM

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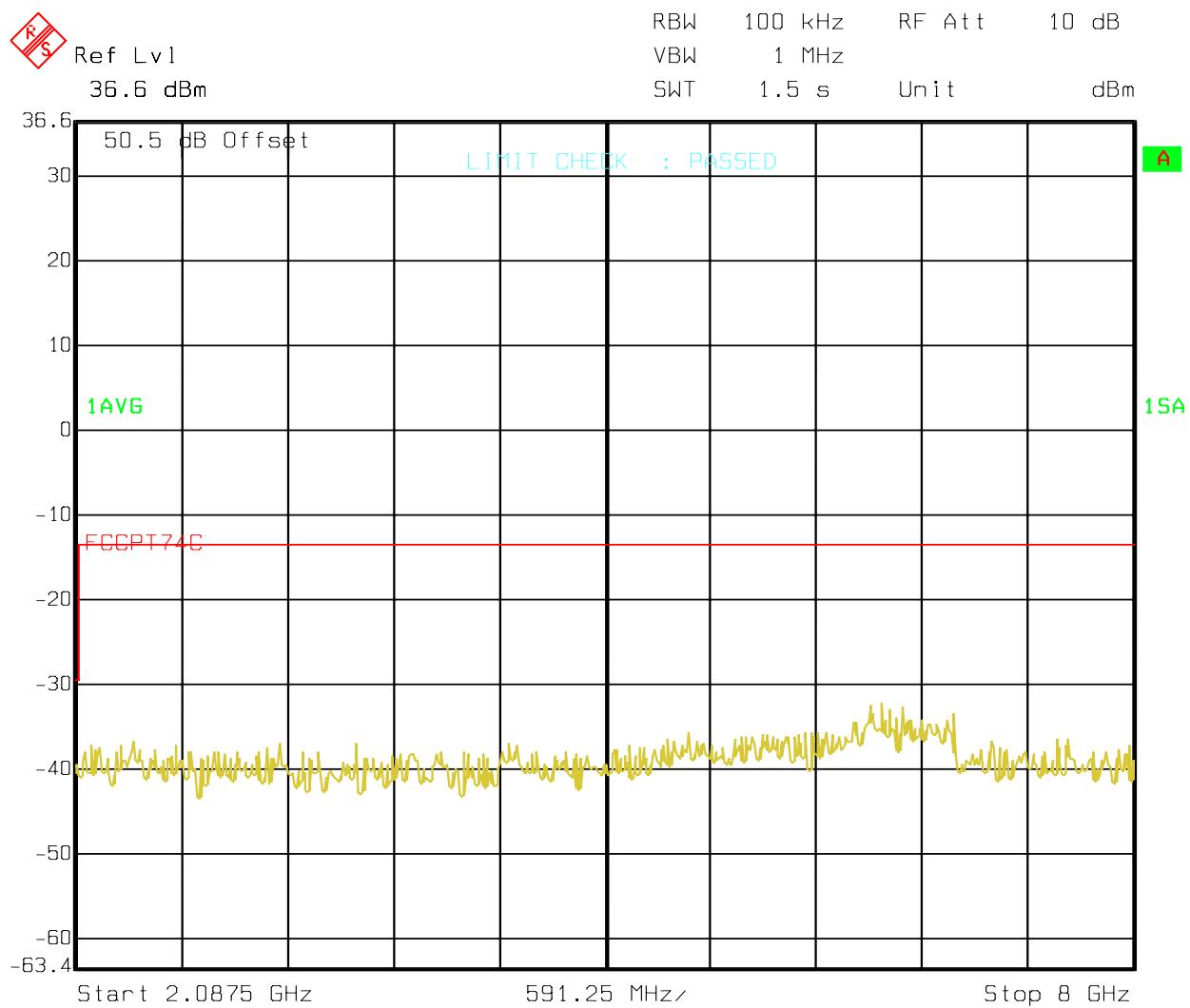
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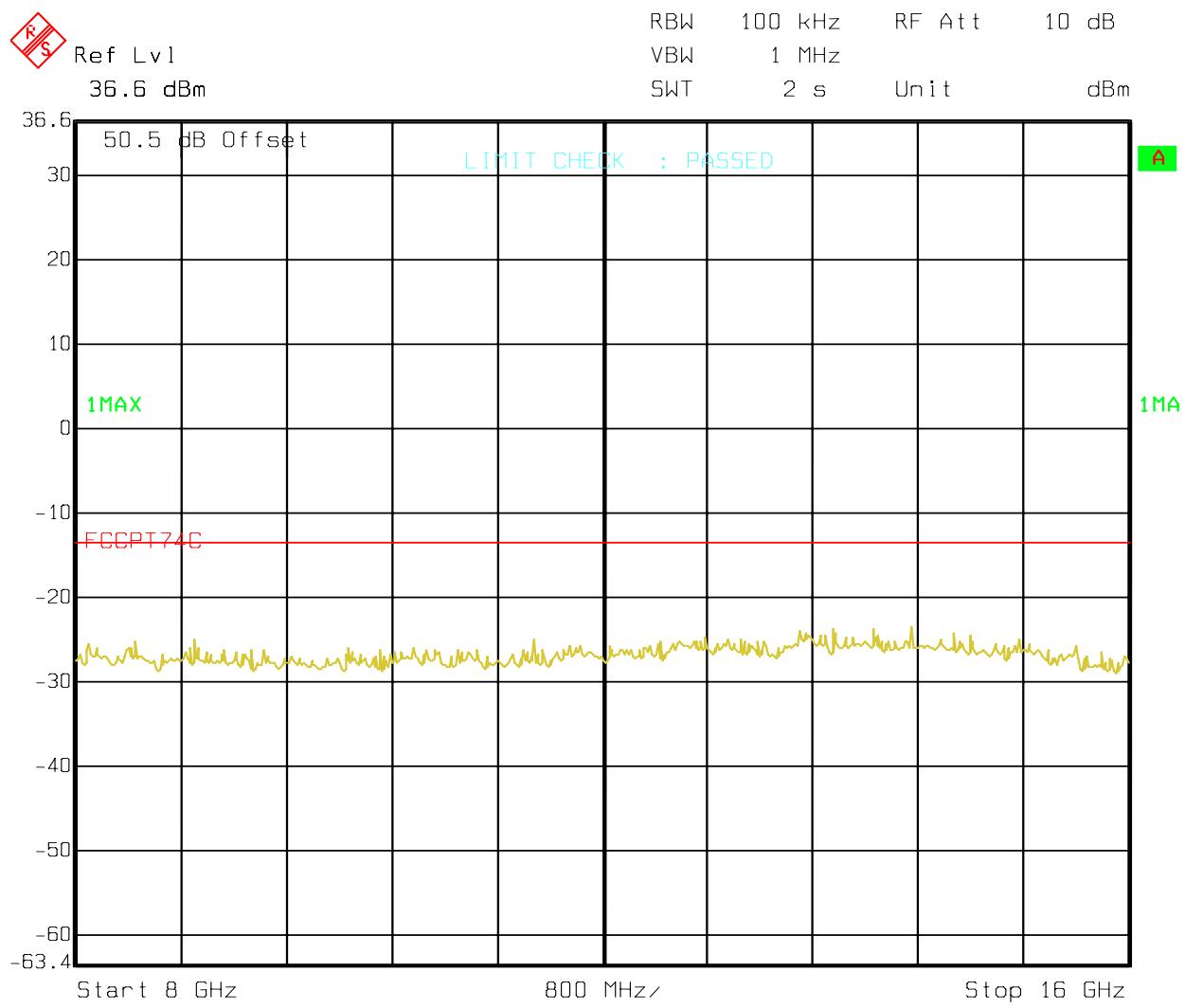
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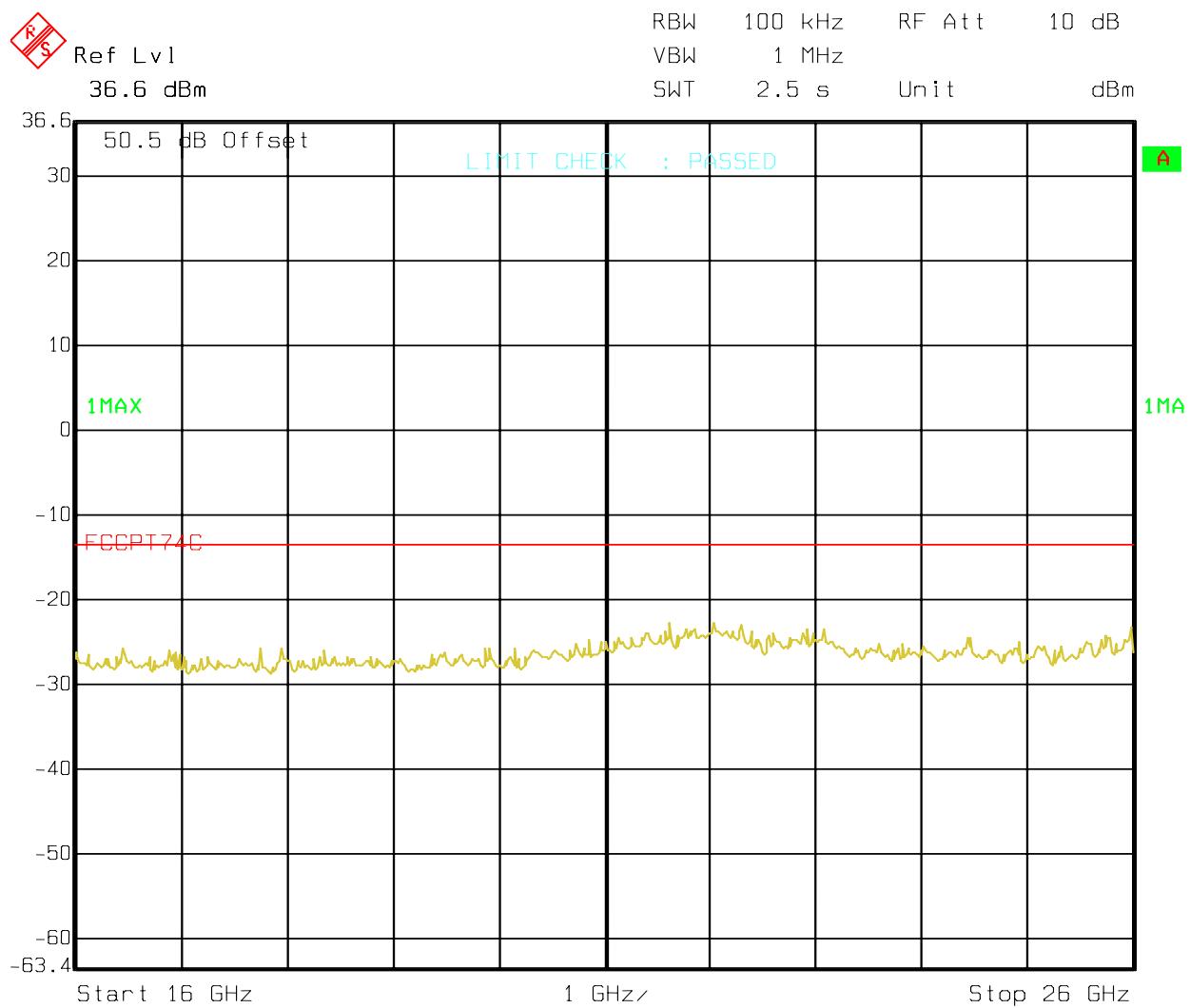
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Section 6. Field Strength of Spurious

Para. No.: 2.1053

Test Performed By: Ferdinand Custodio	Date of Test: 05-06-2008
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Minimum Standard: Part 74.637

Test Results: EUT Complies. Emissions were searched from 30 MHz to 26 GHz with the antenna port terminated into a 50 ohm load. No spurious emissions level within 20dB of the limit was observed. All emissions measured were proved by substitution method.

Test Data: See attached tables.

Quasi-peak measurements with a RBW =120KHz and VBW = 1MHz below 1GHz.

Measured Frequency (MHz)	Antenna Polarization (H/V)	Meter Reading (dBuV)
30.4	V	69.5
37.0	V	81.3
40.4	V	75.9
47.8	V	78.7
51.7	H	79.8

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Results—Substitution Method

Target Frequency	Target Level (dBuV/m)	Antenna Gain (dipole)	Cable Loss	Signal Generator (dBm)	Total (EIRP) dBm	Specs (dBm)	Margin (dBm)
30.4	69.5	0	1	-43.23	-44.23	-13	-31.23
37.0	81.3	0	1	-32.44	-33.44	-13	-20.44
40.4	75.9	0	1	-38.25	-39.25	-13	-26.25
47.8	78.7	0	1	-33.36	-34.36	-13	-21.36
51.7	79.8	0	1	-33.81	-34.81	-13	-21.81

Location: South 3 meters OATS, T = 12.9°C, 96% R.H.

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Section 7. Test Equipment List

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
114	Antenna, Bicon	EMCO	3104	2997	10-Jan-08	10-Jan-09
110	Antenna, LPA	Electrometrics	LPA-25	1217	10-Jan-08	10-Jan-09
529	Antenna, DRWG	EMCO	3115	2505	27-Aug-07	27-Aug-08
897	Spectrum Analyzer	Rohde & Schwarz	FSP7	837620/009	14-Sep-07	14-Sep-08
765	Antenna Set, Dipole	EMCO	3121C	1214	11-Jul-07	11-Jul-08
836	Signal Generator	Agilent	E8254A	US41140229	04-Dec-07	04-Dec-08
Rental	Attenuator	Agilent	08498-60001	3318A07155	02-May-08	02-Jun-08
Rental	RF Power Sensor	Agilent	8482B	3318A07155	02-May-08	02-Jun-08
911	Spectrum Analyzer	Agilent	E4440A	US41421266	18-Mar-08	18-Mar-09
Rental	RF/Microwave Power Metr	Agilent	437B-002	3038A03603	02-May-08	02-Jun-08
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	20-Jun-07	20-Jun-08
SOATS	South Outside Area Test Site			RN 90579		