WASHINGTON LABORATORIES, LTD.
7560 Lindbergh Drive • Gaithersburg, Maryland 20879 • (301) 417-0220 • Fax (301) 417-9069 • (800) 839-1649
website: http://www.wll.com • e-mail: info@wll.com

FCC CLASS II PERMISSIVE CHANGE TEST REPORT

for

Hughes Network Systems
11717 Exploration Lane
Germantown, MD 20876

FCC ID: K3Y-IRD-1

July 14, 1998

WLL PROJECT #: 4544B

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STATEMENT OF QUALIFICATIONS

for

Steven Koster

Washington Laboratories, Ltd.

I have eighteen years of electronics experience, the last seven years being directly involved in EMI testing. I am qualified to perform EMC testing to the methods described in this test report. The measurements taken within this report are accurate within my ability to perform the tests and within the tolerance of the measuring instrumentation.

By: _____
Steven Koster
Compliance Engineer

Date: July 14, 1998

HUGHES
NETWORK SYSTEMS
A HUGHES ELECTRONICS COMPANY

Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

LETTER OF AGENCY

This letter is to serve notice that Washington Laboratories, Ltd is hereby authorized to act on our behalf in connection with the Application for Equipment Authorization attached herewith.

We certify that we are not subject to denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.
Further, no party, as defined in 47 CFR 1.2002(b) to the application is subject to denial of federal benefits, that includes FCC benefits.

Signed,

Huy Nguyen
Compliance Engineer

11717 Exploration Lane, Germantown, MD 20876
Tel: (301) 428-5500 TWX: 710-828-0541
FAX: (301) 428-1868/2830

FCC CLASS II PERMISSIVE CHANGE TEST REPORT

for

FCC ID: K3Y-IRD-1

1.0 Introduction

This report has been prepared on behalf of Hughes Network Systems to support the attached Class II Permissive Change. The test and application are submitted for a TV Interface Device under Part 15 of the FCC Rules and Regulations. The Equipment Under Test was the DSS-FSS (DSS2).

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements are performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The results of this test report relate only to the item tested. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government.

1.1 Summary

The Hughes Network Systems' DSS-FSS (DSS2) complies with the limits for a Class B digital device.

2.0 Description of Change

The Hughes Network Systems' DSS-FSS (DSS2) is a TV Interface device that also contains a satellite receiver and Class B digital device. The unit is the same as the Hughes Network Systems' DSS, except for the circuitry that was added to support the new FSS service. The DSS and FSS are both satellite audio\video services, they are just sent from different satellite orbital positions. Switches external to the TV unit are required since, with the DSS-FSS unit, the ODU (satellite dish) contains either 2 or 4 LNB's for receiving from the different satellite positions. See the diagrams below.

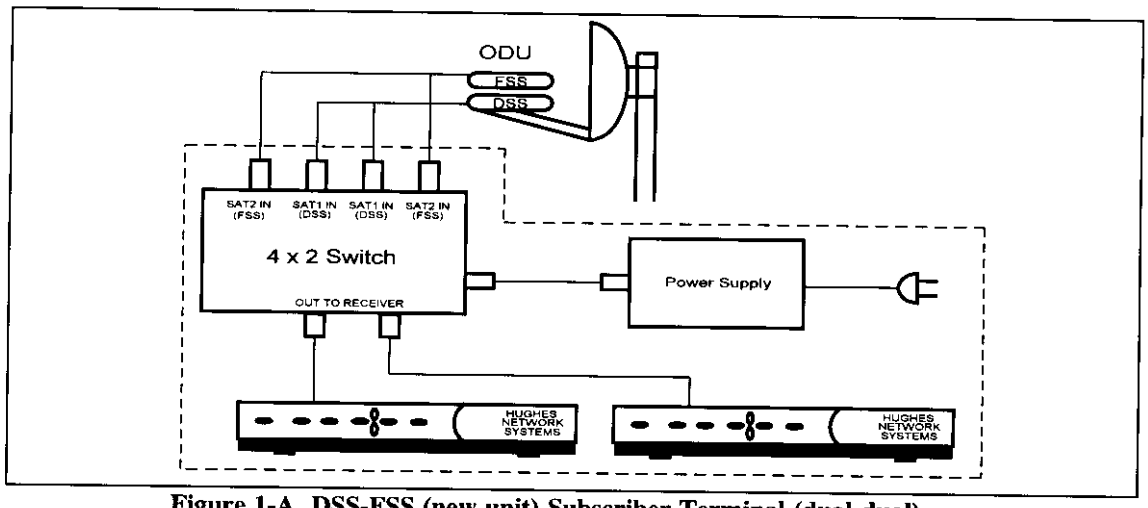

Figure 1-A DSS-FSS (new unit) Subscriber Terminal (dual-dual)

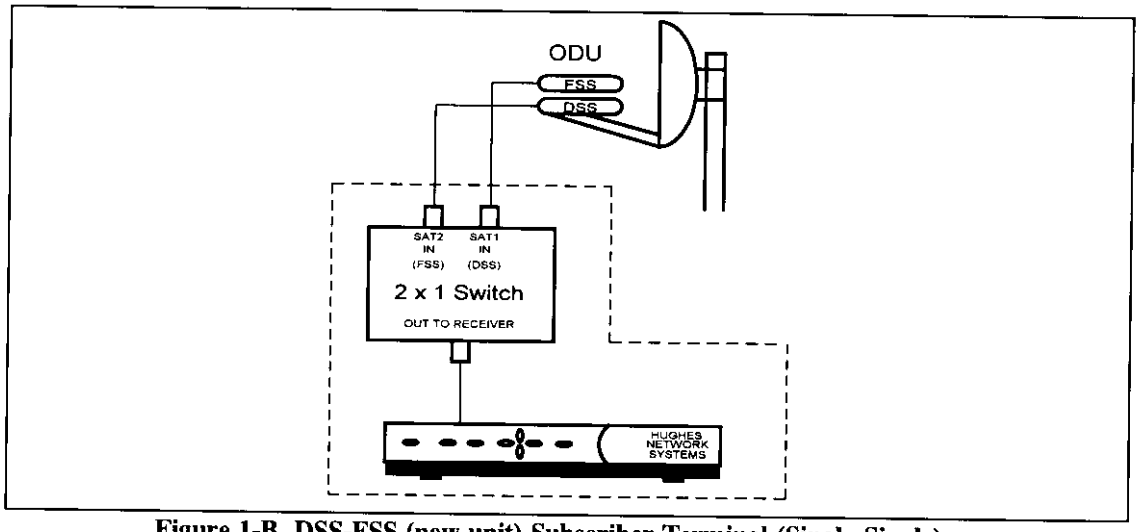

Figure 1-B DSS-FSS (new unit) Subscriber Terminal (Single-Single)

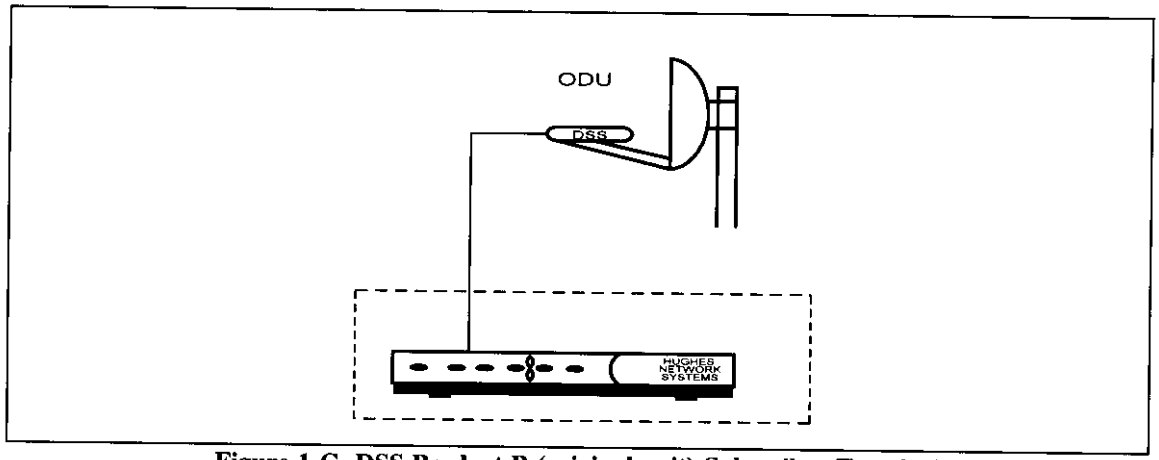

Figure 1-C DSS Product B (original unit) Subscriber Terminal

The following changes were made to the DSS product to convert it into a DSS-FSS (DSS2) unit:

- A 22 kHz continuous control signal (640 mVp-p) circuitry was added into the current DSS product (to become DSS-FSS or DSS2 product) along with the 13 Vdc/18 Vdc control voltage to select polarization (right/vertical or left/horizontal) and service (DSS or FSS) via the IFL to ODU (satellite dish). The absence of the 22 kHz signal from the unit will indicate a request for the DSS service, its presence will indicate a request for the FSS service. LNB polarization selection is accomplished using 13 VDC (RHCP/Vert.) or 18 VDC (LHCP/Hor.).

- The source of the 22 kHz control signal is from the existing 11 MHz clock (CMOS output) on the current DSS product.

- This 22 kHz continuous control signal circuitry consists of a frequency divider (GAL 22V10B), a filter and a DC block circuitry with 650 mVp-p nominal output voltage.

- An 4 x 2 or 2 x 1 switch is added to the outside of the TV interface device. The external switch is added between the ODU (satellite dish) and the DSS unit in order to switch between DSS and FSS (see above diagrams). The 4 x 2 switch contains and external, desktop power supply. The 2 x 1 switch does not have a power supply.

Since the TV interface device circuitry was not changed, only emissions testing was performed to confirm the continued compliance of the other circuitry in the unit. According to Rich Fabina at the FCC laboratory, these changes can be made to the unit as a Class II Permissive Change (see fax in Exhibit 3).

Other changes have been made to the unit since the original certification. These changes were tested and Class I Permissive Change reports are on file at Hughes Network Systems. The nature of the changes and the required testing\reporting was confirmed with the FCC at the time of any change to the unit.

3.0 Test Configuration

To complete the minimum test configuration required by the FCC, the satellite input port was connected to the 4 x 2 switch and the switch was loaded with 2 dual LNA's. The unit's antenna input port was connected to a small TV antenna, the TV port, S-video port, and three RCA type audio and video ports were all connected to a television. The 4 x 2 switch data is representative of both the 2 x 1 and 4 x 2 switches.

3.1 Testing Algorithm

The unit was programmed to receive audio/video satellite signals and display them on the TV monitor. Worst case emissions are recorded in the data tables.

3.2 Conducted Emissions Testing

The EUT and peripherals were placed on an 80 cm high 1 x 1.5 m non-conductive table. Power to the unit was provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 450 kHz to 30 MHz was measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

Conducted emissions data is supplied in Table 1 of this report.

Table 1

FCC Class B Conducted Emissions Data - Site 2

CLIENT:	Hughes Network Systems
FCC ID:	K3Y-IRD-1
DATE:	5/7/98
BY:	Steve Koster
JOB #:	4544B
CONFIGURATION:	DSS-FSS (DSS2) TV Device

LINE 1 - NEUTRAL

FREQ MHz	VOLTAGE (PEAK) dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
2.40	35.8	61.7	250	-12.2
2.87	37.5	75.0	250	-10.5
3.02	36.7	68.4	250	-11.3
5.77	33.3	46.2	250	-14.7
13.25	33.1	45.2	250	-14.9
25.21	31.2	36.3	250	-16.8

LINE 2 - PHASE

FREQ MHz	VOLTAGE (PEAK) dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
2.40	32.5	42.2	250	-15.5
2.87	35.4	58.9	250	-12.6
3.05	37.1	71.6	250	-10.9
5.36	31.6	38.0	250	-16.4
6.42	31.2	36.3	250	-16.8
7.75	30.1	32.0	250	-17.9

Table 1

FCC Class B Conducted Emissions Data - Site 2

CLIENT: Hughes Network Systems
FCC ID: K3Y-IRD-1
DATE: 5/7/98
BY: Steve Koster
JOB #: 4544B
CONFIGURATION: 4 x 2 Switch

LINE 1 - NEUTRAL

FREQ MHz	VOLTAGE (PEAK) dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
0.51	37.2	72.4	250	-10.8
2.43	35.7	61.0	250	-12.3
12.95	42.2	128.8	250	-5.8
13.33	42.8	138.4	250	-5.1
15.79	39.9	98.9	250	-8.1
24.56	37.3	73.3	250	-10.7

LINE 2 - PHASE

FREQ MHz	VOLTAGE (PEAK) dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
1.72	34.6	53.7	250	-13.4
2.43	35.4	58.9	250	-12.6
13.10	44.5	167.9	250	-3.5
13.81	39.9	98.9	250	-8.1
15.79	43.0	141.3	250	-5.0
23.36	35.2	57.5	250	-12.8

3.3 Radiated Emissions Testing

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3 meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. A Biconical log periodic broadband antenna was mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preselector, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. The measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth.

Radiated emissions data is supplied in Table 2 of this report.

3.3.1 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Table 2. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Voltage:	VdBμV
Composite Antenna Factor:	AFcdB/m
Electric Field:	EdBμV/m = VdBμV + AFcdB/m
To convert to linear units:	EμV/m = antilog (EdBμV/m/20)

Table 2

FCC Class B 3M Radiated Emissions Data - Site 2

CLIENT:	Hughes Network Systems
FCC ID:	K3Y-IRD-1
DATE:	5/7/98
BY:	Steve Koster
JOB #:	4544B
CONFIGURATION:	DSS-FSS (DSS2)

FREQ MHz	POL H/V	Azimuth Degree	Ant Height m	SA LEVEL (QP) dBuV	AFc dB/m	E-FIELD dBuV/m	E-FIELD uV/m	LIMIT uV/m	MARGIN dB	
65.28	V	225.00	1.0	15.7	8.4	24.1	16.1	100.0	-15.9	BB
65.51	H	0.00	4.0	13.4	8.4	21.8	12.3	100.0	-18.2	
73.99	H	180.00	4.0	13.7	7.9	21.6	12.0	100.0	-18.4	
84.40	H	0.00	4.0	10.7	9.9	20.6	10.7	100.0	-19.4	
110.15	V	315.00	1.0	12.9	12.5	25.4	18.6	150.0	-18.1	
122.15	V	0.00	1.0	11.8	12.8	24.6	17.0	150.0	-18.9	
295.58	H	225.00	2.0	14.0	15.9	29.9	31.3	200.0	-16.1	

BB = Broadband

Table 3
System Under Test

FCC ID: K3Y-IRD-1

EUT:	Hughes Network Systems Digital Satellite System; M/N: DSS-FSS (DSS2); S/N: C2C34CC2002; FCC ID: K3Y-IRD-1
4 x 2 Switch (Part of EUT):	Hughes Network Systems Digital Satellite System; P/N: 1025550-0002-5
4 x 2 Switch (Part of EUT):	Phihong; M/N: PSA15W-180H
Television:	Sony; M/N: KV-20V50; S/N: 8123879

Table 4

Interface Cables Used

One meter bundled/shielded interface cables were used for connection to the EUT, except for the TV antenna cable which was non-shielded.

The unit was powered via a permanently attached non-shielded AC power cord.

Table 5

Measurement Equipment Used

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP 8568B

Hewlett-Packard Quasi-Peak Adapter: HP 85650A

Antenna Research Associates, Inc. Biconical Log Periodic Antenna LPB-2520A (Site 2)

Solar 50 Ω/50 μH Line Impedance Stabilization Network: 8012-50-R-24-BNC

Solar 50 Ω/50 μH Line Impedance Stabilization Network: 8028-50-TS-24-BNC

AH Systems, Inc. Portable Antenna Mast: AMS-4

AH Systems, Inc. Motorized Turntable

RG-214 semi-rigid coaxial cable

RG-223 double-shielded coaxial cable