



FCC PART 15 & 25 CERTIFICATION TEST REPORT

EQUIPMENT UNDER TEST:

S-BAND SATELLITE MODEM

MODEL NUMBER:

ICO MCAP USER EQUIPMENT

PREPARED FOR:

Hughes Network Systems
9605 Scranton Road, Suite 500
San Diego, California 92121
Mr. Dave Couchman



PREPARED BY:

Aegis Labs, Inc.
8 Rancho Circle
Lake Forest, CA 92630
www.aegislabsinc.com
(949) 454-8295



Testing Cert #: 1111.01

	REPORT BODY	APPENDICES										TOTAL PAGES
		A	B	C	D	E	F	G	H	I	J	
PAGES	13	5	3	5	6	9	6	4	4	4	3	62

The contents of this test report shall not be reproduced except in full, without the written approval of Aegis Labs, Inc. Hard copies of this document are for reference only and should not be considered the latest revision beyond the date of printing



Change History Log

Revision	Effective Date	Description of Changes
-	12/11/08	Initial Release
A1	01/13/09	Added FCC ID in section 3.0
A2	01/14/09	Updated section 2.0
A3	01/20/09	Replaced plots in Appendix D (Emissions Mask)
A4	02/04/09	Added data for new low and high channels & Updated section 2.0
A5	02/19/09	Added new high channel data (Frequency 2019.7125MHz)
A6	03/02/09	Added Appendix I & J
A7	03/31/09	Updated section 2.0
A8	04/01/09	Updated section 2.0



Approval Signatures

Test and Report by

A handwritten signature in blue ink, appearing to read "J Candelas", written over a horizontal line.

Johnny Candelas
Senior Test Engineer
Date: 02/04/09

Report Approved by

A handwritten signature in blue ink, appearing to read "Steve Kuiper", written over a horizontal line.

Steve Kuiper
Principal
Date: 02/04/09

Report Reviewed by

A handwritten signature in blue ink, appearing to read "R Candelas", written over a horizontal line.

Rick Candelas
Lab Manager
Date: 02/04/09



Table of Contents

Cover Page	1
Change History Log	2
Approval Signatures	3
Table of Contents	4
1.0 General	5
2.0 Summary of Test Results	6
3.0 Administrative Data and Test Description.....	7
4.0 Description of EUT	8
4.1 EUT Configuration.....	9
4.2 Cabling Diagram and Description	10
5.0 Test Equipment List	11
6.0 Conditions During Emissions Measurements.....	12
6.1 Radiated Emissions.....	12
6.2 Antenna Terminal Conducted Emissions.....	13
Appendix A Radiated Emissions (30 – 1000 MHz)	14
Appendix B Power Limits.....	19
Appendix C Occupied Bandwidth	22
Appendix D Emissions Mask	27
Appendix E Emissions Limitation – Spurious Emissions at Antenna Terminals.....	33
Appendix F Emissions Limitation – Field Strength of Spurious Radiation.....	42
Appendix G Frequency Tolerance	48
Appendix H Radiofrequency Radiation Exposure	52
Appendix I EIRP density conducted measurement (1559 – 1610MHz) Transmitter On	56
Appendix J EIRP density conducted measurement (1559 – 1610MHz) Transmitter Off.....	60



1.0 General

This test report is formatted to present test data in a clear and understandable manner of an EUT subjected to the tests outlined in the standard listed on the cover page of this report. . All published test results and data provided with this report were performed to specifications and or procedures approved by the client. Aegis Labs, Inc. makes no representations expressed or implied that such testing fully demonstrates efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by Aegis Labs, Inc. of the equipment tested, nor does it represent any statement whatsoever as to its merchantability or fitness of the test article or similar products for a particular purpose.

The following support documentation was available to laboratory personnel.

- **FCC 47 CFR Part 15 "Radio Frequency Devices"**
- **FCC 47 CFR Part 25 "Satellite Communications"**
- **ANSI C63.4:2003 "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"**
- **ISO17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories"**

2.0 Summary of Test Results

Table 1

FCC Section	Description	Results
15.109	Radiated Emissions Limits (30-1000 MHz)	PASSED
25.204 / 2.1046	Power Limits / RF Power Output	PASSED
2.1049	Occupied Bandwidth	PASSED
25.202(f)	Emission Masks	PASSED
25.252(b)(1)	Peak EIRP	PASSED
25.252(b)(2) & (3) / 2.1053	Emissions Limitations - Field Strength Of Spurious Radiation	PASSED
25.252(c) / 2.1051	Emissions Limitations - Spurious Emissions At Antenna Terminals	PASSED
25.202(d) / 2.1055	Frequency Tolerance (Temperature /Voltage Variation)	PASSED
25.149(c)(3) / 2.1091 / 1.1307 / 1.1310	Radiofrequency Radiation Exposure Limits	PASSED
25.216(e)	EIRP density conducted measurement (1559 – 1610MHz) Transmitter On	PASSED
25.216(i)	EIRP density conducted measurement (1559 – 1610MHz) Transmitter Off	PASSED

Statement of Compliance - We, Aegis Labs Inc. find that the S-BAND SATELLITE MODEM (Terminal and Antenna) are in compliance with the testing requirements as described under Table 1. All results are based on a test of one sample. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.



3.0 Administrative Data and Test Description

Device Tested:	Model Name: S-BAND SATELLITE MODEM Model Number(s): ICO MCAP USER EQUIPMENT Serial Number: 3500212-0001 FCC ID: K3YHNS0100	
EUT Receiving Inspection Date:	November 10, 2008	
Test Date:	November 11 – February 19, 2009	
Report Completion Date:	02/04/09	
Origin of Test Sample:	Production	
Equipment Class:	EUT tested as CLASS B device	
Responsible Party:	Hughes Network Systems 9605 Scranton Road, Suite 500 San Diego, California 92121	
Client Contact:	Mr. Dave Couchman	
Test Location(s):	Aegis Labs, Inc. 32231 Trabuco Creek Road Trabuco Canyon, CA 92678 Open Area Test Site #1 & #2	8 Rancho Circle Lake Forest, CA 92630 Chamber A1
Accreditation:	A2LA Certificate Number: 1111.01, Valid through February 28, 2010	
Security Classification:	None	
Test Deviation:	None	
Uncertainty Budget:	Proficiency Testing and Uncertainty Calculations for all tests indicated in this report have been conducted in accordance with ISO 17025: 2005 requirements Section 5.4.6, and 5.9. Uncertainty Budgets and Proficiency Test results available upon request.	
Statement of Calibration:	All accredited equipment calibrations were performed by Liberty Labs, Inc. and World Cal. with typical calibration uncertainty estimates derived from ISO Guide to the determination of uncertainties with a Coverage Factor of k=2 for 95% level of confidence.	



4.0 Description of EUT

Trade Name:	S-BAND SATELLITE MODEM
Model Number:	ICO MCAP USER EQUIPMENT
Receive Frequencies:	2180.03125 MHz (Low Channel) 2189.6875 MHz (Mid Channel) 2199.59375 MHz (High Channel)
Transmit Frequencies:	2001.43125 MHz (Low Channel) 2011.30625 MHz (Mid Channel) 2019.7125 MHz (High Channel)
Type of Transmission:	Data
Modulation Type:	Refer to manufacture's specifications or user's manual.
Transfer Rate:	Refer to manufacture's specifications or user's manual.
Antenna Type:	<u>Hughes Network Systems</u> : ICO MCAP Antenna Assembly – Custom antenna unit with PA/LNA and GPS antenna.
Antenna Gain:	3.0dBi
Antenna Amplifier Gain:	26dB
Antenna Connector:	SMA
Transmit Output Power:	Refer to Appendix B (Power Limits)
Power Supply:	12 VDC for Satellite Modem
Number of External Test Ports Exercised:	1 Transmit Antenna Port & 3 Receive Antenna Ports

NOTE 1: For a more detailed description, please refer to the manufacture's specifications or User's Manual.



4.1 EUT Configuration

The ICO MCAP USER EQUIPMENT is a satellite modem operating in the S-band and connected to a Hughes Network Systems antenna with four RF cables. The satellite modem is powered by a 12vDC vehicle supply. The antenna is powered by a DC feed from the satellite modem via the DVB/GRM port through 1 of the RF cables.

The satellite modem and Hughes Network Systems antenna were tested as a standalone device along with a host notebook computer and DC power supply.

The low, middle, and high channels were tested. The EUT was placed in continuous transmit mode by a program provided by the manufacturer.

The S-BAND SATELLITE MODEM was configured with the following components:

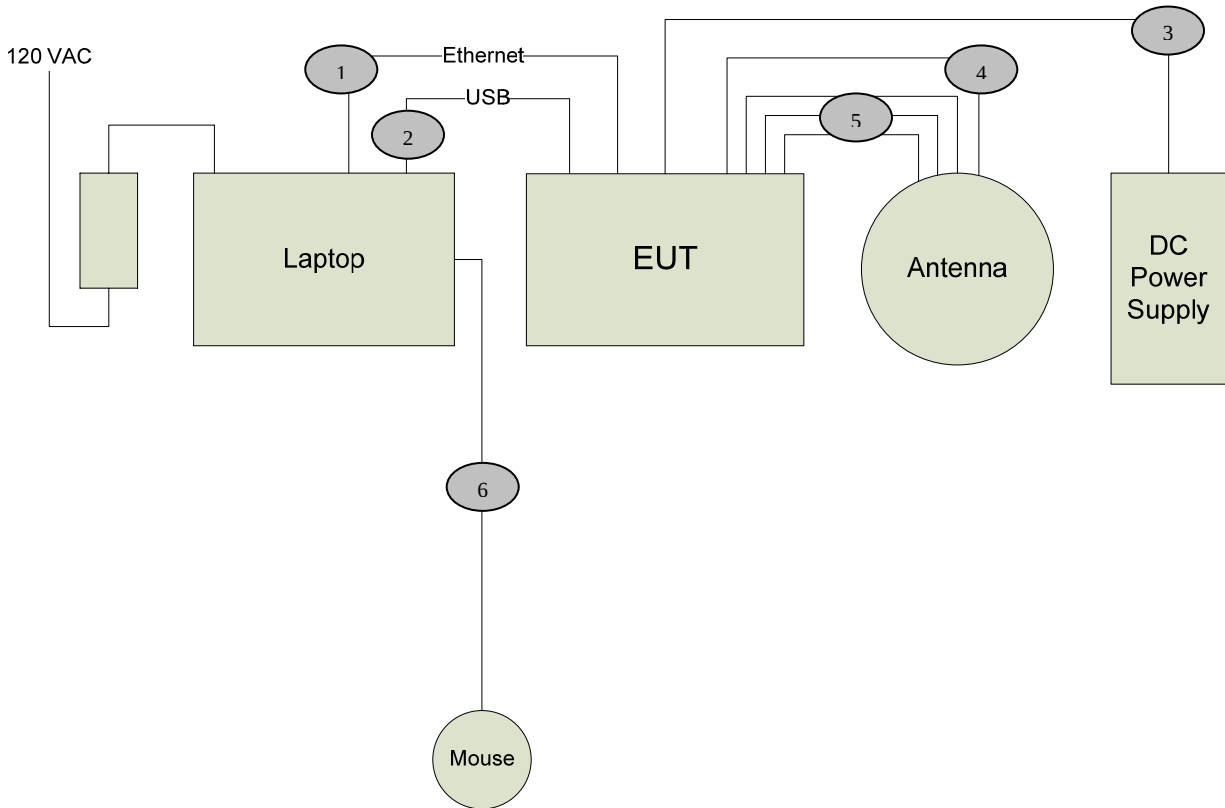
Equipment Under Test			
Equipment Name	Manufacturer	Model or Part Number	Serial Number
Satellite Modem	Hughes Network Systems	ICO MCAP USER EQUIPMENT	3500212-0001

EUT Sub-Equipment			
Equipment Name	Manufacturer	Model or Part Number	Serial Number
Antenna	Hughes Network Systems	3500215	N/A

Host Equipment			
Equipment Name	Manufacturer	Model or Part Number	Serial Number
DC Power Supply	Protek	3003B	AG4334
Notebook Computer	Toshiba	PP714U	20455807U-3
Notebook Power Supply	Toshiba	PA2450U	0649172
Mouse	Dell	M-UK	N/A

NOTE: All the power cords of the above support equipment are standard and non-shielded.

4.2 Cabling Diagram and Description



Cable Description

Cable	Length	Construction	Source Connector	Destination Connector	Bundled Length	Ferrite Attached	Note
1	1.0m	Unshielded twisted pair	EUT: Plastic RJ-45	Laptop: Plastic RJ-45	N/A	N/A	N/A
2	3.0m	Round, Braid & Foil Shielded	EUT: Metallic USB	Laptop: Metallic USB	1m	N/A	N/A
3	1.0m	Round, Braid & Foil Shielded	EUT: Hardwired	DC Power Source: Banana Ports	N/A	N/A	N/A
4	4.5m	Round, Braid & Foil Shielded	EUT: Metallic DVB/GRM Antenna Port	Antenna: SMA Antenna Port	1m	N/A	N/A
5	4.5m	Round, Braid & Foil Shielded	EUT: Metallic SMA Antenna Ports (3ea.)	Antenna: DVB Antenna Ports (3ea.)	1m	N/A	N/A
6	1.0m	Round, Braid & Foil Shielded	Laptop: Metallic USB	Mouse: Hardwired	N/A	N/A	N/A



5.0 Test Equipment List

Equipment Name	Manufacturer	Model Number	Serial Number	Calibration Due Date	Maintenance Calibration Cycle
EMI Receiver - RF Section	Hewlett Packard	8546A	3325A00137	04/26/09	1 Year
EMI Receiver - RF Filter Section	Hewlett Packard	85460A	3330A00138	04/26/09	1 Year
Antenna - Biconical	EMCO	3110B	3383	03/20/09	1 Year
Antenna - Log Periodic	EMCO	3148	47943	03/20/09	1 Year
Spectrum Analyzer	Agilent	8565EC	3946A00245	07/24/09	1 Year
PSA Spectrum Analyzer	Agilent	E4440A	MY46187354	11/28/09	1 Year
Antenna – Horn	EMCO	3115	2230	05/15/09	1 Year
Antenna – Horn	ETS	3117	00057423	03/28/09	1 Year
Preamp	Miteq	JS42-01001800-25-10P	815980	09/21/09	1 Year
Signal Generator	Agilent	E8257D	US48050182	04/23/10	2 Years
Field Strength Probe	Amplifier Research	FP4240	310921	06/04/09	2 Years
ProbeView LT	ETS / Lindgren	Version 1.0.3	NA	NA	NA
Temperature/Humidity Monitor	Dickson	TH550	7255185	04/13/09	1 Year

6.0 Conditions During Emissions Measurements

All measurements were made according to the procedures defined in or referred to by the standard listed on the cover page of this report. The measurements were made in the operating mode producing the largest emissions consistent with normal operation and connected to the minimum configuration of auxiliary devices.

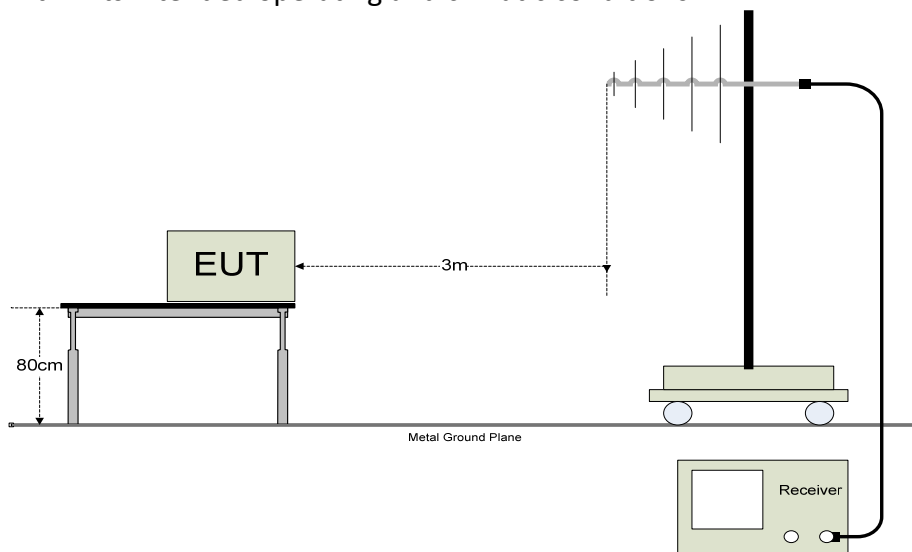
6.1 Radiated Emissions

The Open Area Test Site (OATS) was used for radiated emission testing. The receiving (Rx) antenna(s) was placed 10m from the nearest side of the EUT facing the Rx antenna. The EUT (if floor-standing) was placed directly on the flush-mounted 360 degree rotating turntable. The EUT (if table-top) was placed directly on an 80cm high non-metallic table, and the table was placed on the rotating turntable. During the initial EMI scan, all the suspect frequencies, i.e.; harmonics, broadband signals were checked with the Rx broadband antennas in both vertical and horizontal polarities. The biconical Rx, log periodic Rx, and horn Rx antennas were used from 30MHz – 299.99MHz, 300MHz – 1000MHz, and 1GHz – 18GHz respectively.

Upon completion of all harmonic and broadband measurements, the balance of any remaining frequencies was checked between 30MHz – 18GHz. Any signals appearing within 20 dB of the classification limit was measured. Each signal was maximized by first rotating the turntable at least 360 degrees and recording the azimuth in the data sheet. Lastly, the Rx antenna was raised and/or lowered to maximize the signal elevation. If the measured signal was obtained using the peak detector and that signal appeared within 3 dB of the regulatory limit line, then the same signal was re-measured using the quasi-peak detector on the EMI receiver. Both meter readings if necessary were recorded on the data sheet.

Climatic Conditions:

The EUT was tested within its intended operating and climatic conditions.

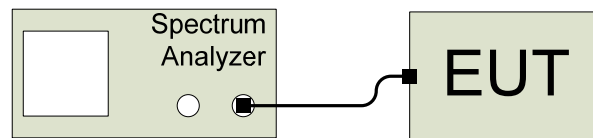


6.2 Antenna Terminal Conducted Emissions

All test equipment setups and operations during conducted emissions testing were in accordance with the reference document.

Conducted measurements were made connected to the transmitter via a suitable attenuator. The measurement was made using the normal operation of the EUT with the test modulation applied. The measurements were made with spectrum analyzer.

The measurement was repeated at the lowest, the middle, and the highest frequency of the stated frequency range. These frequencies were recorded.





APPENDIX A

Radiated Emissions (30 - 1000 MHz)



TEST DESCRIPTION:	Radiated Emissions (30 – 1000 MHz)		
CLIENT:	Hughes Network Systems	DATE:	11/11/08
EUT:	S-BAND SATELLITE MODEM	START TIME:	09:30 AM
Part NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	1:30 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	18° C	HUMIDITY:	50% RH

Results:	PASSED Horizontal and Vertical Antenna Polarizations Class B Limits
Note:	None

Radiated Emissions Sample Calculations

Corrected Meter Reading = Meter Reading + F + C - D

Where,
F = Antenna Factor
C = Cable Factor
G = Amplifier Gain
D = Distance Factor (if applicable)

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

$$\text{CML} = \text{Specification Limit} - F - C + D$$

**TEST DESCRIPTION:**

Radiated Emissions (30 – 1000 MHz) - Continued

Horizontal Open Field Maximized Data

<i>Freq. (MHz)</i>	<i>Meter Reading (dBuV)</i>	<i>Antenna Height (cm)</i>	<i>Azimuth (degrees)</i>	<i>Quasi pk or AVG (dBuV)</i>		<i>Cable Factor (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Corrected Reading (dBuV/m)</i>	<i>Limits (dBuV/m)</i>	<i>Diff (dB) +=FAIL</i>
31.44	9.23	400	180	6.54	Q	1.83	18.20	26.56	30.00	-3.44
49.89	7.45	400	45			1.99	11.54	20.98	30.00	-9.02
59.35	9.51	400	135			2.06	8.32	19.89	30.00	-10.11
130.67	10.34	400	180	5.29	Q	2.38	14.13	21.81	30.00	-8.19
149.95	7.17	400	315			2.50	15.40	25.07	30.00	-4.93
168.53	10.46	400	135	6.40	Q	2.60	15.86	24.86	30.00	-5.14
195.98	10.87	400	225	6.68	Q	2.73	17.04	26.45	30.00	-3.55
250.02	7.72	400	135			2.91	17.90	28.53	37.00	-8.47
300.01	11.66	300	315			3.12	13.90	28.68	37.00	-8.32
324.98	7.19	300	225			3.22	15.10	25.51	37.00	-11.49
349.99	8.37	300	45			3.33	15.00	26.70	37.00	-10.30
375.00	11.30	250	45			3.44	15.10	29.84	37.00	-7.16
399.99	6.68	300	180			3.55	15.10	25.33	37.00	-11.67
432.01	8.49	200	225			3.65	16.24	28.38	37.00	-8.62
499.98	7.86	200	225			3.92	18.60	30.38	37.00	-6.62
575.05	10.44	200	0	7.85	Q	4.17	19.30	31.31	37.00	-5.69

Vertical Open Field Maximized Data

<i>Freq. (MHz)</i>	<i>Meter Reading (dBuV)</i>	<i>Antenna Height (cm)</i>	<i>Azimuth (degrees)</i>	<i>Quasi pk or AVG (dBuV)</i>		<i>Cable Factor (dB)</i>	<i>Antenna Factor (dB)</i>	<i>Corrected Reading (dBuV/m)</i>	<i>Limits (dBuV/m)</i>	<i>Diff (dB) +=FAIL</i>
30.00	12.79	100	315	7.79	Q	1.81	17.90	27.50	30.00	-2.50
69.54	9.41	100	135			2.13	6.29	17.82	30.00	-12.18
130.66	14.40	100	270	9.28	Q	2.38	13.95	25.61	30.00	-4.39
149.95	9.93	100	225	5.65	Q	2.50	14.80	22.95	30.00	-7.05
168.55	10.10	100	270	6.57	Q	2.60	16.00	25.17	30.00	-4.83
195.98	11.42	100	315	7.96	Q	2.73	16.80	27.49	30.00	-2.51
300.00	13.35	100	180			3.12	14.40	30.87	37.00	-6.13
319.99	7.71	100	135			3.20	15.60	26.51	37.00	-10.49
349.96	8.30	100	180			3.33	15.50	27.13	37.00	-9.87
375.00	8.06	100	180			3.44	15.50	27.00	37.00	-10.00
400.02	8.91	100	315			3.55	15.10	27.56	37.00	-9.44
432.00	8.15	100	135			3.65	16.49	28.29	37.00	-8.71
499.98	10.04	100	225	7.48	Q	3.92	18.10	29.50	37.00	-7.50
575.05	10.86	100	45	8.26	Q	4.17	19.20	31.63	37.00	-5.37

TEST DESCRIPTION:	Radiated Emissions (30 – 1000 MHz) - Continued
--------------------------	--

FRONT VIEW



TEST DESCRIPTION:

Radiated Emissions (30 – 1000 MHz) - Continued

REAR VIEW





APPENDIX B

Power Limits



TEST DESCRIPTION:	Power Limits		
CLIENT:	Hughes Network Systems	DATE:	01/28/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	10:00 AM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	11:00 AM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	15° C	HUMIDITY:	29% RH

Channel	Frequency	Power (dBm)	Power (W)
Low	2001.43125	11.38	.0137
Mid	2011.30625	11.50	.0141
High	2019.7125	11.48	.0141

TEST DESCRIPTION:

Power Limits (Continued)

FRONT VIEW





APPENDIX C

Occupied Bandwidth

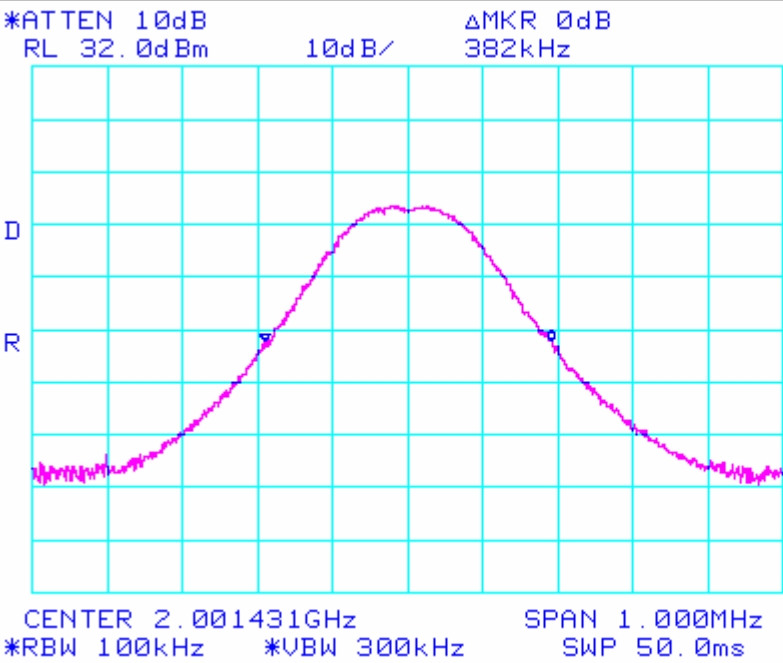


TEST DESCRIPTION:	Occupied Bandwidth		
CLIENT:	Hughes Network Systems	DATE:	01/28/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	11:15 AM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	1:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	18° C	HUMIDITY:	22% RH

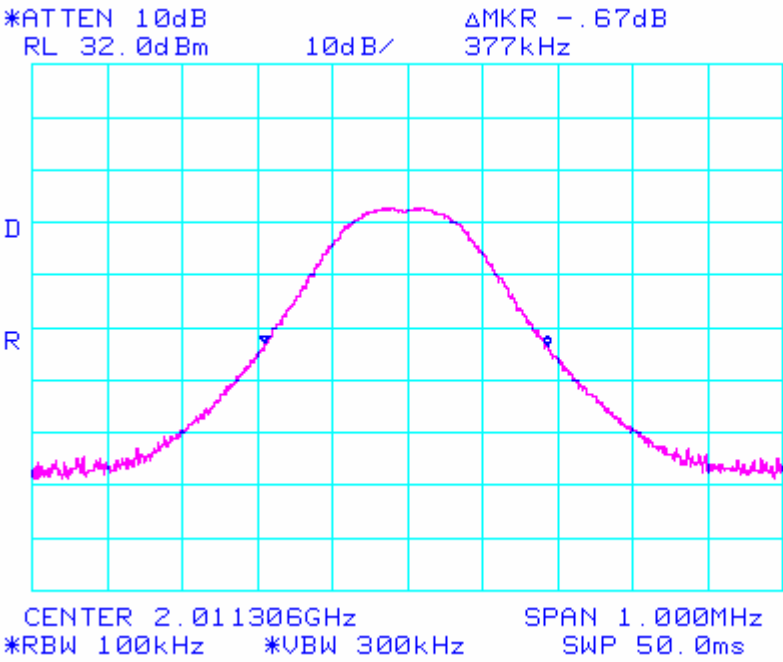


TEST DESCRIPTION:	Occupied Bandwidth (Continued)
-------------------	--------------------------------

Low Channel



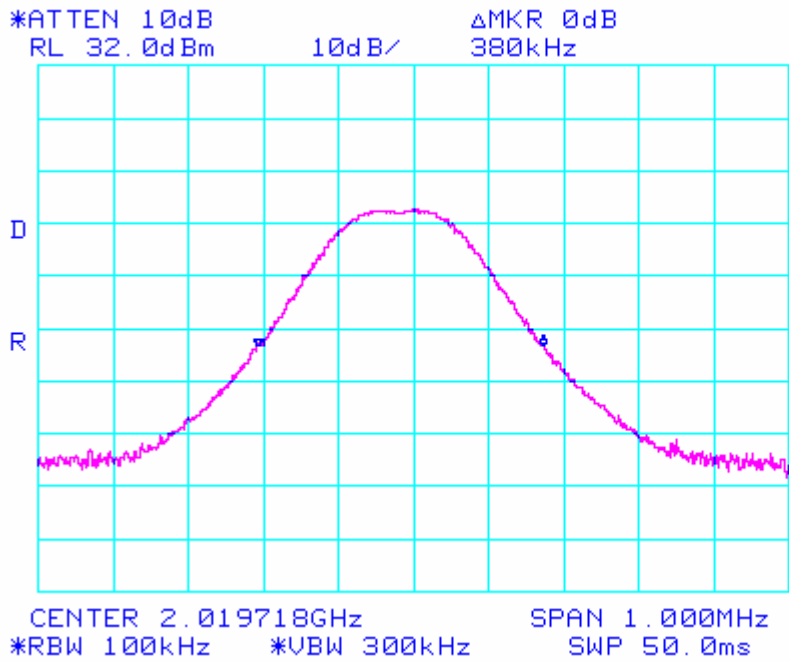
Mid Channel





TEST DESCRIPTION:	Occupied Bandwidth (Continued)
-------------------	--------------------------------

High Channel



Note: Actual center frequency is 2019.7125 MHz.

TEST DESCRIPTION:	Occupied Bandwidth (Continued)
--------------------------	--------------------------------

FRONT VIEW



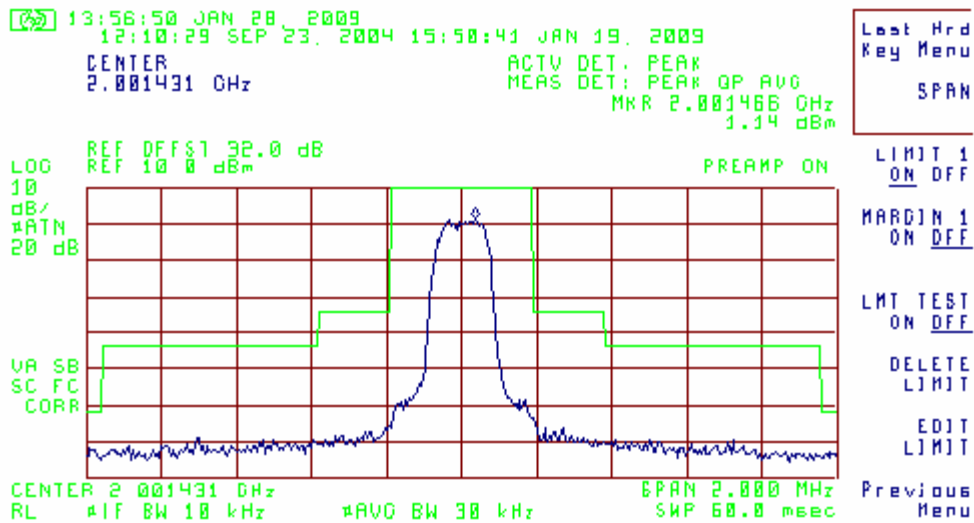


APPENDIX D

Emissions Mask



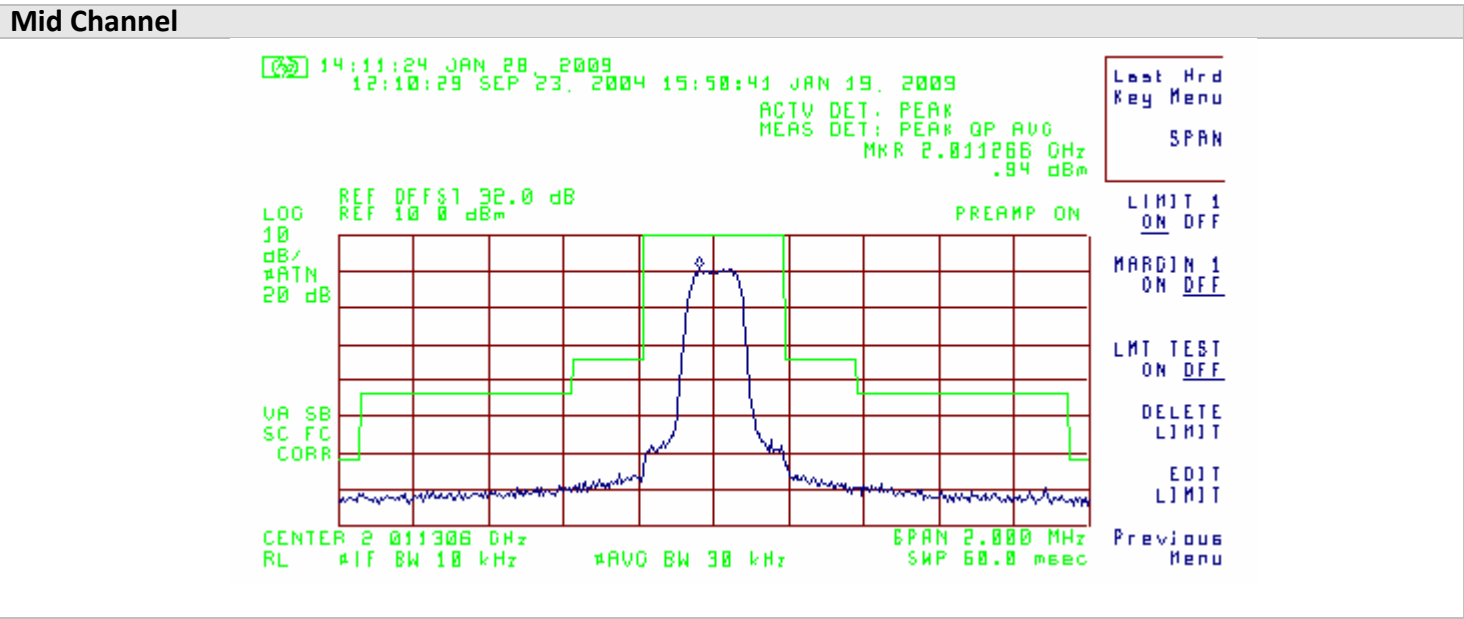
TEST DESCRIPTION:	Emissions Mask		
CLIENT:	Hughes Network Systems	DATE:	01/28/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	12:00 PM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	2:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	18° C	HUMIDITY:	22% RH





TEST DESCRIPTION:

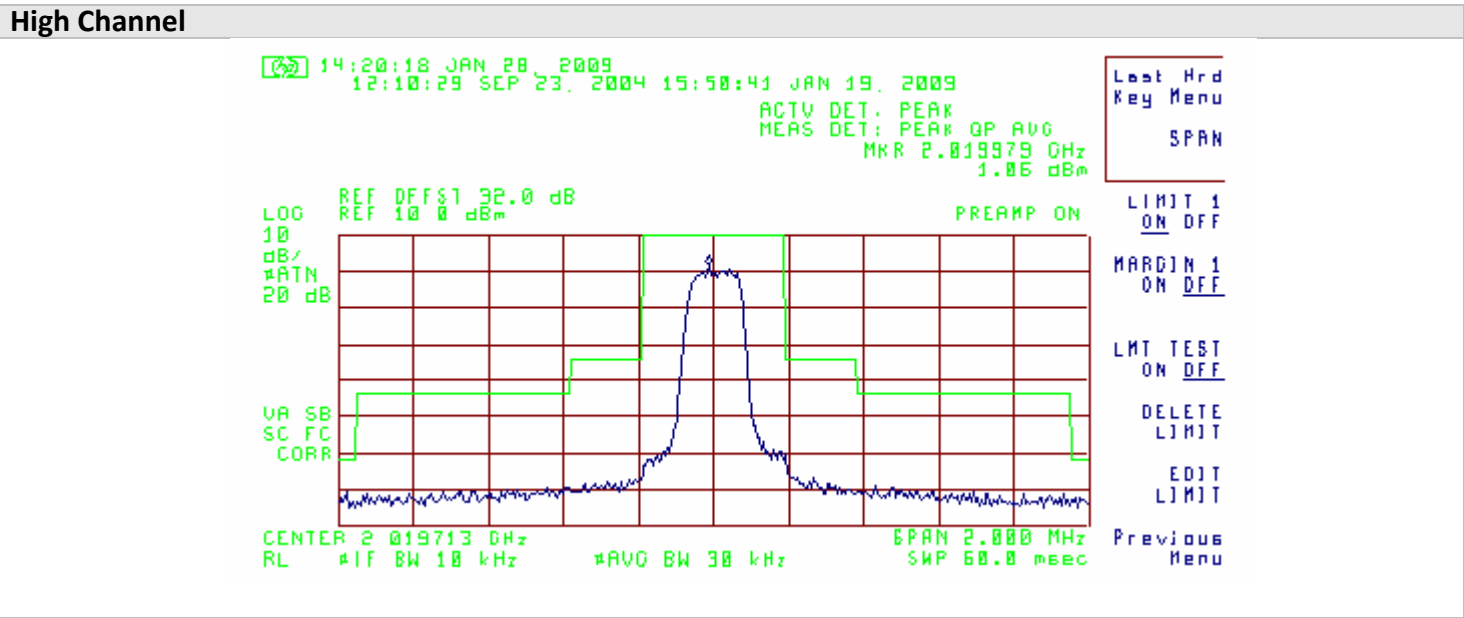
Emissions Mask (Continued)





TEST DESCRIPTION:

Emissions Mask (Continued)



TEST DESCRIPTION:	Emissions Mask (Continued)
--------------------------	----------------------------

FRONT VIEW





APPENDIX E

Emissions Limitations – Spurious Emissions at Antenna Terminals

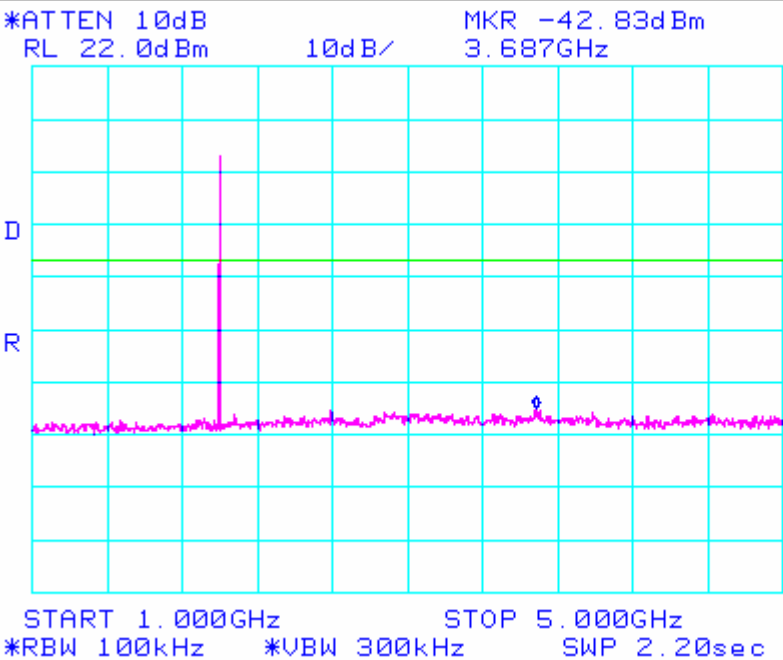
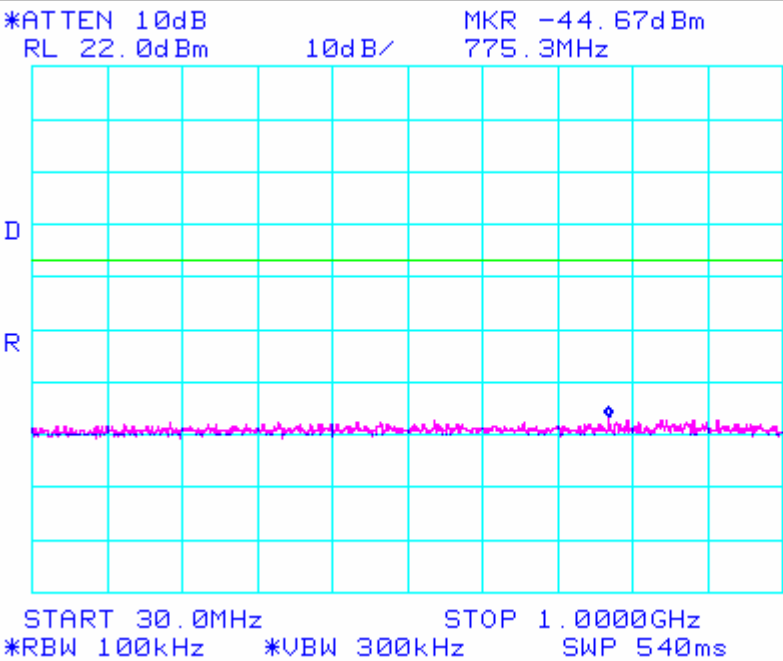


TEST DESCRIPTION:	Emissions Limitations – Spurious Emissions at Antenna Terminals		
CLIENT:	Hughes Network Systems	DATE:	01/28/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	2:00 PM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	5:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	20° C	HUMIDITY:	19% RH



TEST DESCRIPTION: Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

Low Channel





Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

*ATTEN 10dB MKR -36.50dBm
RL 22.0dBm 10dB/ 14.02GHz

D

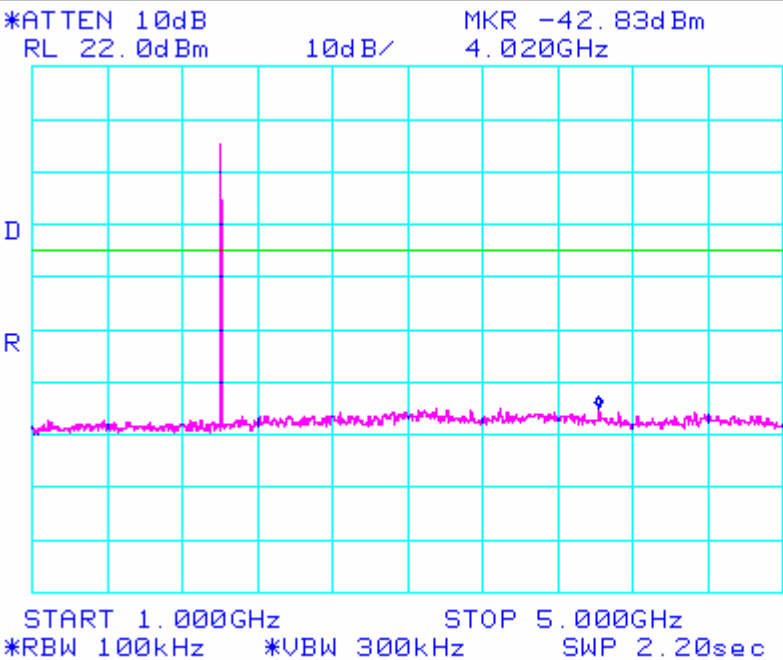
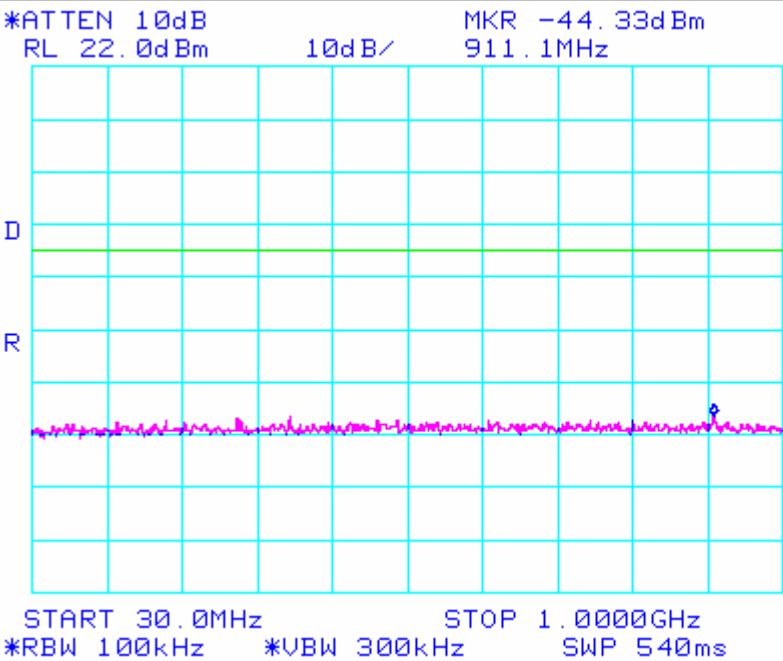
R

START 10.00GHz STOP 22.00GHz
*RBW 100kHz *VBW 300kHz SWP 6.60sec



TEST DESCRIPTION: Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

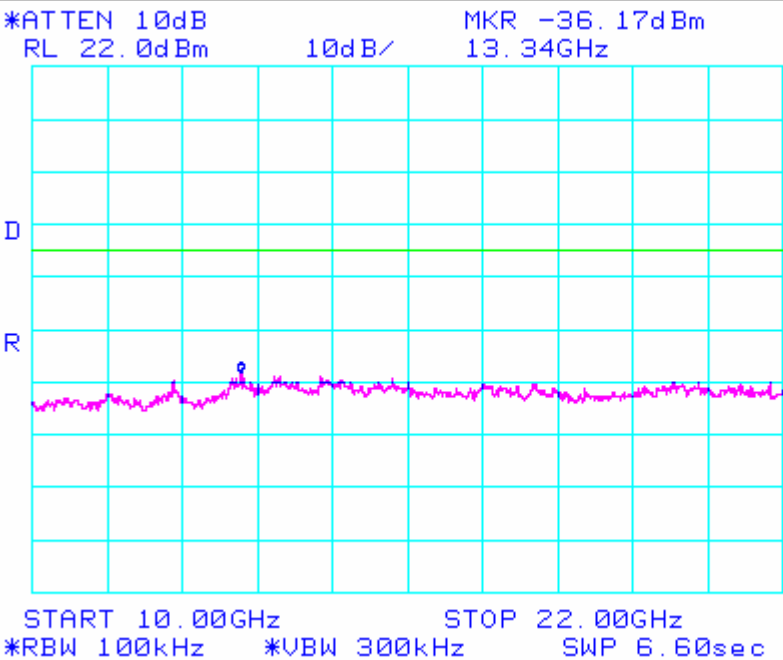
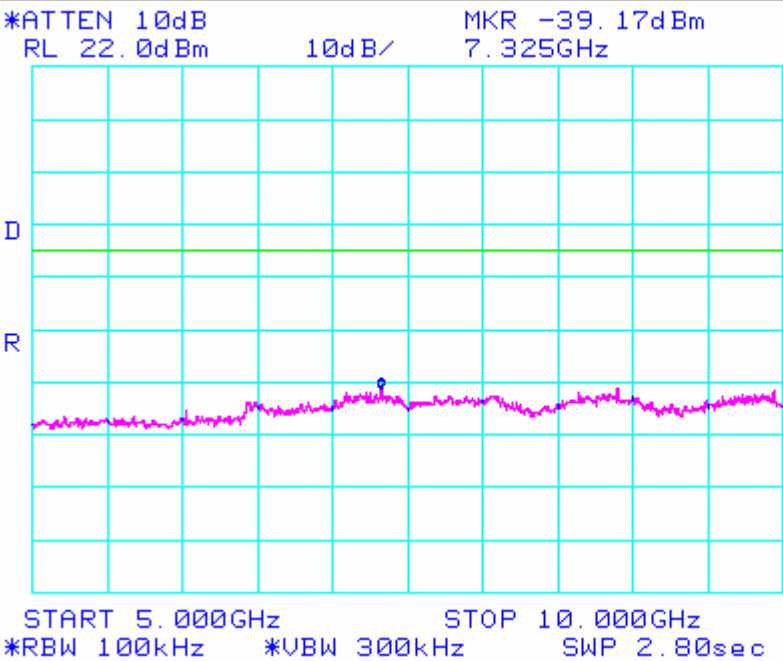
Mid Channel





TEST DESCRIPTION: Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

Mid Channel

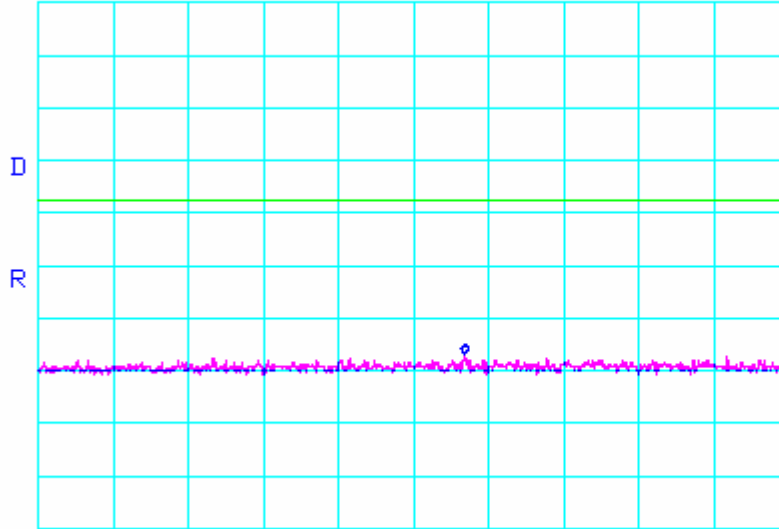


TEST DESCRIPTION:

Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

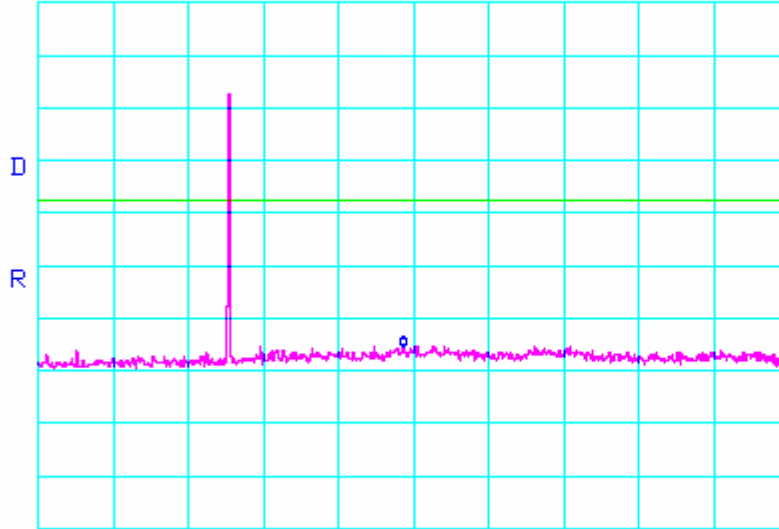
High Channel

*ATTEN 10dB
RL 22.0dBm 10dB/ MKR -44.83dBm
581.3MHz



START 30.0MHz STOP 1.0000GHz
*RBW 100kHz *VBW 300kHz SWP 540ms

*ATTEN 10dB
RL 22.0dBm 10dB/ MKR -43.50dBm
2.947GHz



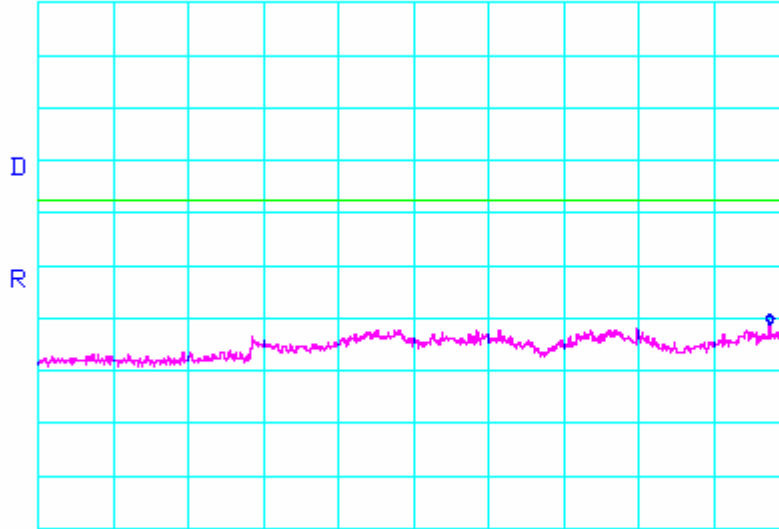
START 1.000GHz STOP 5.000GHz
*RBW 100kHz *VBW 300kHz SWP 2.20sec

TEST DESCRIPTION:

Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

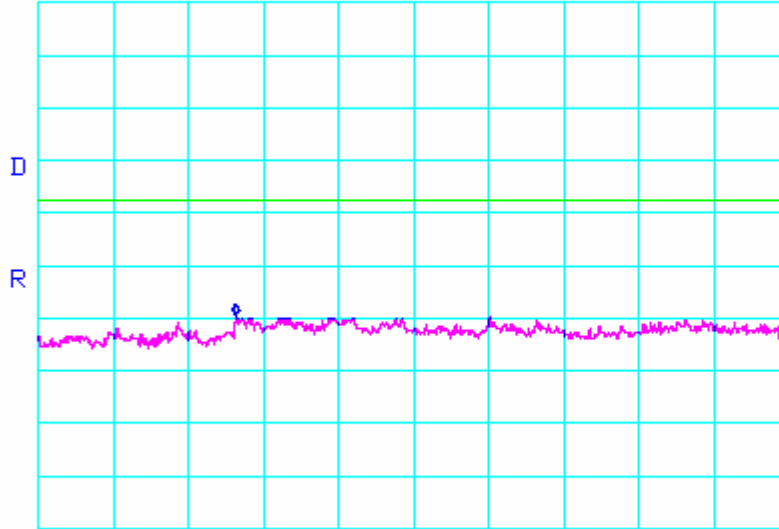
High Channel

*ATTEN 10dB MKR -39.17dBm
RL 22.0dBm 10dB/ 9.875GHz



START 5.000GHz STOP 10.000GHz
*RBW 100kHz *VBW 300kHz SWP 2.80sec

*ATTEN 10dB MKR -37.50dBm
RL 22.0dBm 10dB/ 13.16GHz



START 10.00GHz STOP 22.00GHz
*RBW 100kHz *VBW 300kHz SWP 6.60sec

TEST DESCRIPTION:

Emissions Limitations – Spurious Emissions at Antenna Terminals (Continued)

FRONT VIEW





APPENDIX F

Emissions Limitations – Field Strength of Spurious Radiation



TEST DESCRIPTION:	Emissions Limitations – Field Strength of Spurious Radiation		
CLIENT:	Hughes Network Systems	DATE:	01/29/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	11:00 AM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	5:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#2
TEMPERATURE:	27° C	HUMIDITY:	39% RH

Radiated Emissions Sample Calculations

Corrected Meter Reading = Meter Reading + F + C - D

Where,
F = Antenna Factor
C = Cable Factor
G = Amplifier Gain
D = Distance Factor (if applicable)

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

$$\text{CML} = \text{Specification Limit} - F - C + D$$



TEST DESCRIPTION: Emissions Limitations – Field Strength of Spurious Radiation (Continued)

Horizontal Maximized Radiated Data

<i>Freq. (MHz)</i>	<i>Sig Gen Reading (dBm)</i>	<i>Rx Antenna Height (cm)</i>	<i>Azimuth (Degrees)</i>	<i>CL (dB)</i>	<i>AF (dBi)</i>	<i>Radiated ERP (dBm)</i>	<i>Limits (dBm)</i>	<i>Diff (dB) +/-FAIL</i>	<i>Channel</i>	<i>Antenna Polarity</i>
4002.86	-49.40	125	135	2.64	8.80	-43.24	-13.00	-30.24	Low	H
6004.29	-34.70	100	315	3.23	10.40	-27.53	-13.00	-14.53		H
8005.73	-40.10	125	45	3.78	10.70	-33.18	-13.00	-20.18		H
10007.16	-35.20	100	225	4.25	11.80	-27.65	-13.00	-14.65		H
12008.59	-39.10	125	45	4.71	12.40	-31.41	-13.00	-18.41		H
14010.02	-42.50	125	315	5.21	11.50	-36.21	-13.00	-23.21		H
16011.45	-43.90	125	135	5.54	16.00	-33.44	-13.00	-20.44		H
4022.61	-48.60	125	225	2.64	8.90	-42.34	-13.00	-29.34	Mid	H
6033.94	-31.60	100	315	3.24	10.40	-24.44	-13.00	-11.44		H
8045.23	-39.40	100	225	3.78	10.70	-32.48	-13.00	-19.48		H
10056.53	-34.00	100	225	4.25	11.80	-26.45	-13.00	-13.45		H
12067.84	-41.30	125	225	4.71	12.40	-33.61	-13.00	-20.61		H
14079.14	-42.80	125	225	5.19	11.50	-36.49	-13.00	-23.49		H
16090.45	-43.70	125	270	5.51	16.00	-33.21	-13.00	-20.21		H
4039.43	-48.10	125	135	2.64	9.00	-41.74	-13.00	-28.74	High	H
6059.14	-30.70	100	0	3.25	10.50	-23.45	-13.00	-10.45		H
8078.85	-38.60	100	225	3.78	10.70	-31.68	-13.00	-18.68		H
10098.56	-35.20	100	225	4.26	11.80	-27.66	-13.00	-14.66		H
12118.28	-40.70	125	225	4.72	12.50	-32.92	-13.00	-19.92		H
14137.99	-42.00	125	225	5.17	11.40	-35.77	-13.00	-22.77		H
16157.70	-41.50	125	225	5.48	16.00	-30.98	-13.00	-17.98		H



TEST DESCRIPTION: Emissions Limitations – Field Strength of Spurious Radiation (Continued)

Vertical Maximized Radiated Data

<i>Freq. (MHz)</i>	<i>Sig Gen Reading (dBm)</i>	<i>Rx Antenna Height (cm)</i>	<i>Azimuth (Degrees)</i>	<i>CL (dB)</i>	<i>AF (dBi)</i>	<i>Radiated ERP (dBm)</i>	<i>Limits (dBm)</i>	<i>Diff (dB) +/-FAIL</i>	<i>Channel</i>	<i>Antenna Polarity</i>
4002.86	-53.90	100	180	2.64	9.10	-47.44	-13.00	-34.44	Low	V
6004.29	-25.40	200	180	3.23	10.50	-18.13	-13.00	-5.13		V
8005.73	-31.10	125	0	3.78	10.90	-23.98	-13.00	-10.98		V
10007.16	-32.70	125	225	4.25	11.90	-25.05	-13.00	-12.05		V
12008.59	-34.00	150	315	4.71	12.40	-26.31	-13.00	-13.31		V
14010.02	-37.20	150	225	5.21	11.40	-31.01	-13.00	-18.01		V
16011.45	-39.50	100	315	5.54	16.00	-29.04	-13.00	-16.04		V
4022.61	-52.30	100	180	2.64	9.10	-45.84	-13.00	-32.84	Mid	V
6033.94	-21.70	200	270	3.24	10.50	-14.44	-13.00	-1.44		V
8045.23	-38.50	125	45	3.78	10.90	-31.38	-13.00	-18.38		V
10056.53	-29.20	125	180	4.25	11.90	-21.55	-13.00	-8.55		V
12067.84	-32.80	125	135	4.71	12.50	-25.01	-13.00	-12.01		V
14079.14	-39.20	125	225	5.19	11.40	-32.99	-13.00	-19.99		V
16090.45	-41.50	100	225	5.51	16.00	-31.01	-13.00	-18.01		V
4039.43	-51.00	100	45	2.64	9.20	-44.44	-13.00	-31.44	High	V
6059.14	-22.80	200	180	3.25	10.60	-15.45	-13.00	-2.45		V
8078.85	-37.40	125	45	3.78	10.90	-30.28	-13.00	-17.28		V
10098.56	-29.40	125	180	4.26	11.90	-21.76	-13.00	-8.76		V
12118.28	-31.40	125	135	4.72	12.60	-23.52	-13.00	-10.52		V
14137.99	-37.60	125	225	5.17	11.30	-31.47	-13.00	-18.47		V
16157.70	-40.20	100	225	5.48	15.90	-29.78	-13.00	-16.78		V

TEST DESCRIPTION:

Emissions Limitations – Field Strength of Spurious Radiation (Continued)

FRONT VIEW



TEST DESCRIPTION:	Emissions Limitations – Field Strength of Spurious Radiation (Continued)
--------------------------	--

REAR VIEW





APPENDIX G

Frequency Tolerance



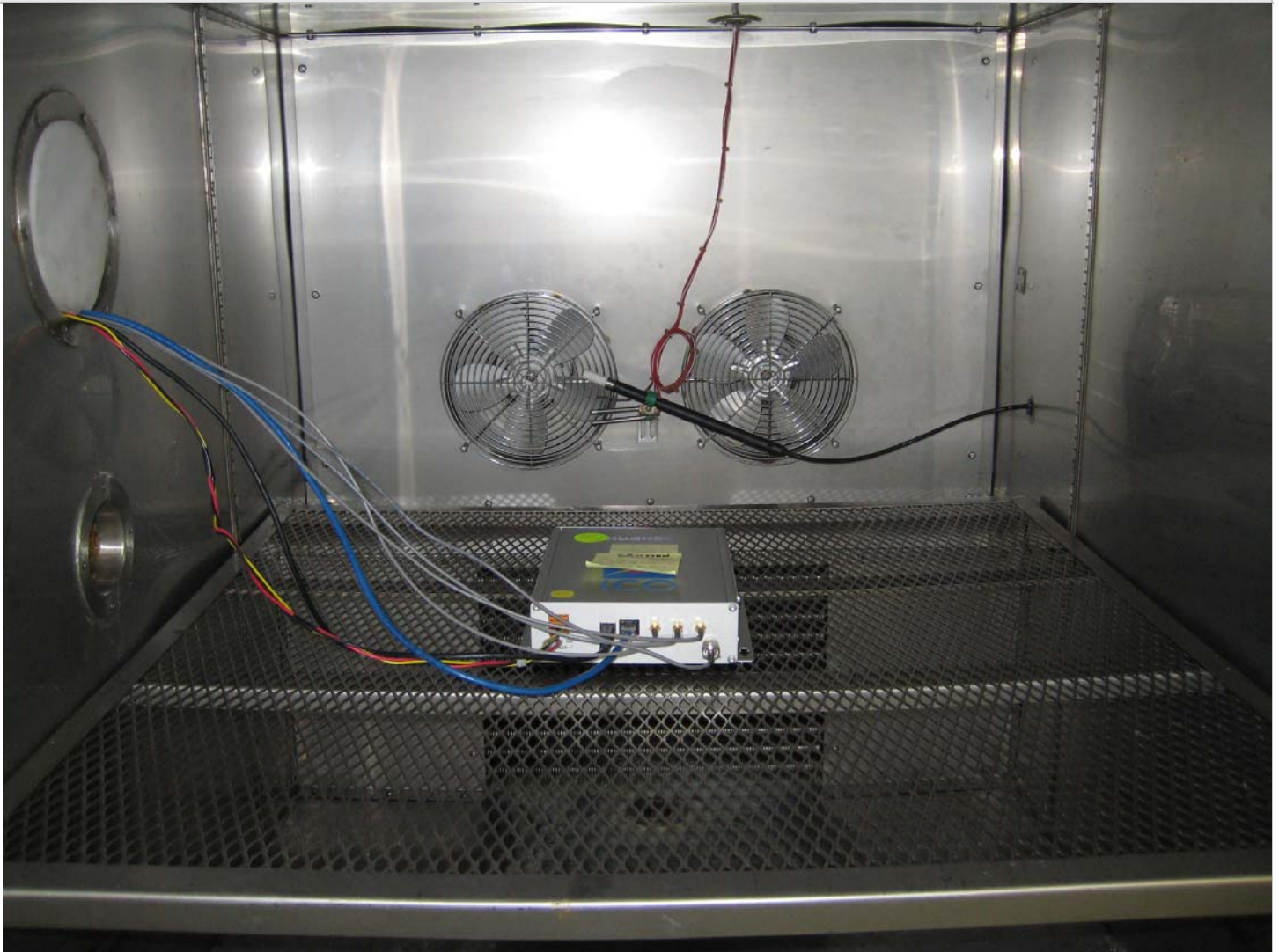
TEST DESCRIPTION:	Frequency Tolerance		
CLIENT:	Hughes Network Systems	DATE:	02/03/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	10:00 AM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	2:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	#1
TEMPERATURE:	20° C	HUMIDITY:	28% RH


TEST DESCRIPTION: Frequency Tolerance (Continued)

<i>Channel</i>	<i>Center Frequency (MHz)</i>	<i>Voltage (VDC)</i>	<i>Temperature (°C)</i>	<i>Frequency (MHz)</i>	<i>Diff (Hz)</i>	<i>Deviation (%)</i>	<i>Limit (%)</i>	<i>Comments</i>
Low	2001.43125	12		2001.42950	0.00	0.000000		Reference
Low	2001.43125	10.2		2001.43000	500.00	0.000025	0.001	
Low	2001.43125	13.8		2001.42800	-1500.00	0.000075	0.001	
Low	2001.43125		Ambient	2001.42950	0.00	0.000000		Reference
Low	2001.43125		-30	2001.43150	2000.00	0.000100	0.001	
Low	2001.43125		-20	2001.42900	-500.00	0.000025	0.001	
Low	2001.43125		-10	2001.43050	1000.00	0.000050	0.001	
Low	2001.43125		0	2001.43100	1500.00	0.000075	0.001	
Low	2001.43125		10	2001.43250	3000.00	0.000150	0.001	
Low	2001.43125		20	2001.43150	2000.00	0.000100	0.001	
Low	2001.43125		30	2001.43300	3500.00	0.000175	0.001	
Low	2001.43125		40	2001.43200	2500.00	0.000125	0.001	
Low	2001.43125		50	2001.43150	2000.00	0.000100	0.001	
Mid	2011.30625	12		2011.30300	0.00	0.000000		Reference
Mid	2011.30625	10.2		2011.30100	-2000.00	0.000099	0.001	
Mid	2011.30625	13.8		2011.30400	1000.00	0.000050	0.001	
Mid	2011.30625		Ambient	2011.30300	0.00	0.000000		Reference
Mid	2011.30625		-30	2011.30800	5000.00	0.000249	0.001	
Mid	2011.30625		-20	2011.30600	3000.00	0.000149	0.001	
Mid	2011.30625		-10	2011.30900	6000.00	0.000298	0.001	
Mid	2011.30625		0	2011.30500	2000.00	0.000099	0.001	
Mid	2011.30625		10	2011.30800	5000.00	0.000249	0.001	
Mid	2011.30625		20	2011.30600	3000.00	0.000149	0.001	
Mid	2011.30625		30	2011.30700	4000.00	0.000199	0.001	
Mid	2011.30625		40	2011.30500	2000.00	0.000099	0.001	
Mid	2011.30625		50	2011.30400	1000.00	0.000050	0.001	
High	2019.7125	12		2019.71300	0.00	0.000000		Reference
High	2019.7125	10.2		2019.71450	1500.00	0.000074	0.001	
High	2019.7125	13.8		2019.71550	2500.00	0.000124	0.001	
High	2019.7125		Ambient	2019.71300	0.00	0.000000		Reference
High	2019.7125		-30	2019.71150	-1500.00	0.000074	0.001	
High	2019.7125		-20	2019.71200	-1000.00	0.000050	0.001	
High	2019.7125		-10	2019.71350	500.00	0.000025	0.001	
High	2019.7125		0	2019.71500	2000.00	0.000099	0.001	
High	2019.7125		10	2019.71600	3000.00	0.000149	0.001	
High	2019.7125		20	2019.71700	4000.00	0.000198	0.001	
High	2019.7125		30	2019.71950	6500.00	0.000322	0.001	
High	2019.7125		40	2019.71650	3500.00	0.000173	0.001	
High	2019.7125		50	2019.71400	1000.00	0.000050	0.001	

TEST DESCRIPTION:	Frequency Tolerance (Continued)
--------------------------	---------------------------------

FRONT VIEW





APPENDIX H

Radiofrequency Radiation Exposure



TEST DESCRIPTION:	Radiofrequency Radiation Exposure		
CLIENT:	Hughes Network Systems	DATE:	02/04/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	10:00 AM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	11:30 AM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	1
TEMPERATURE:	21° C	HUMIDITY:	20% RH

<i>Channel</i>	<i>Center Frequency (MHz)</i>	<i>Modulation</i>	<i>20cm Meas (mW/cm²)</i>	<i>Meas at Radome (mW/cm²)</i>	<i>Limit (mW/cm²)</i>
Low	2001.43125	CW	0.055	0.629	1.00
Mid	2011.30625	CW	0.060	0.637	1.00
High	2019.7125	CW	0.064	0.643	1.00

TEST DESCRIPTION:

Radiofrequency Radiation Exposure (Continued)

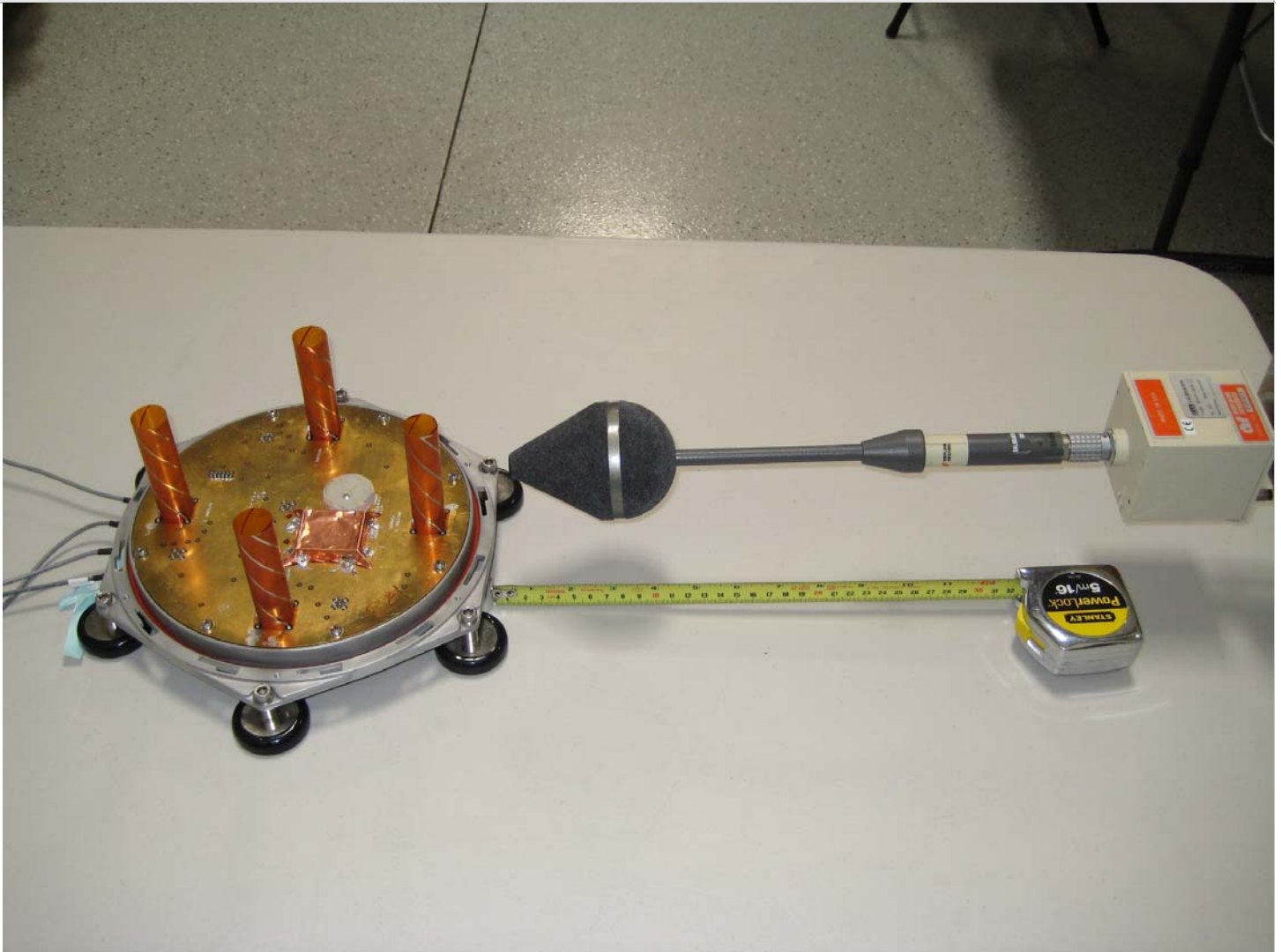
20 cm from Radome



TEST DESCRIPTION:

Radiofrequency Radiation Exposure (Continued)

0 cm from Radome





APPENDIX I

EIRP density conducted measurement (1559 – 1610MHz) Transmitter On

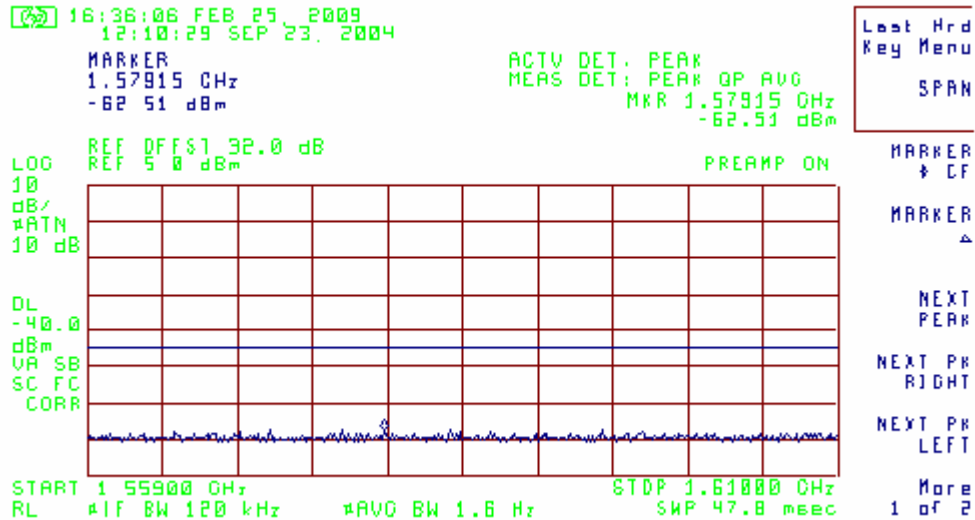
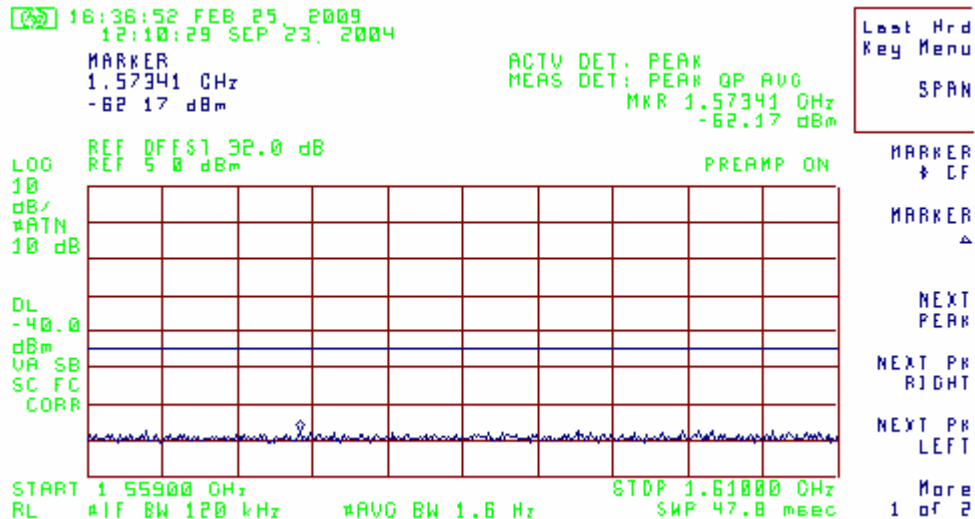


TEST DESCRIPTION:	EIRP density conducted measurement (1559 – 1610MHz) Transmitter On		
CLIENT:	Hughes Network Systems	DATE:	02/25/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	2:00 PM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	5:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	1
TEMPERATURE:	23° C	HUMIDITY:	37% RH

<i>Channel</i>	<i>Center Frequency (MHz)</i>	<i>Reading (dBm)</i>	<i>Limit (dBm/MHz)</i>
Low	2001.43125	-62.51	-40.00
Mid	2011.30625	-62.17	-40.00
High	2019.7125	-62.40	-40.00

**TEST DESCRIPTION:**

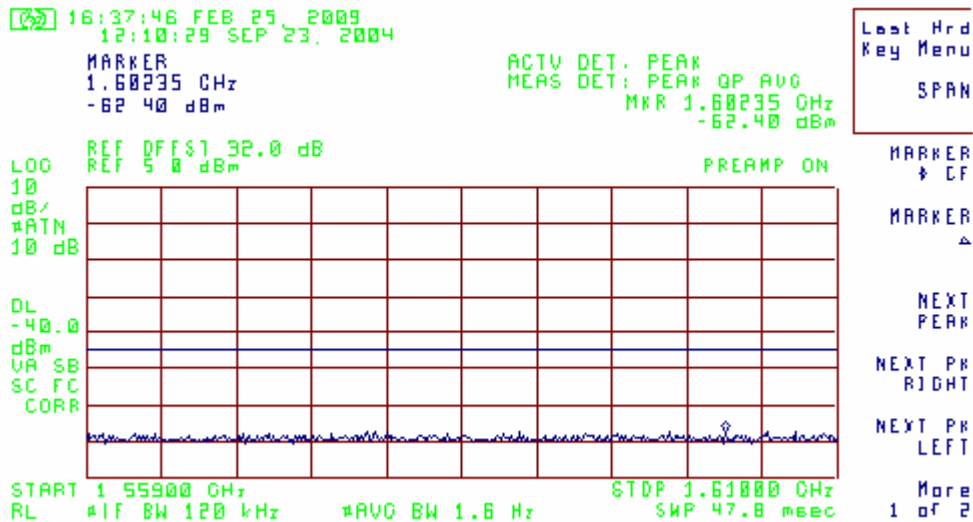
EIRP density conducted measurement (1559 – 1610MHz)
Transmitter On

Low Channel**Mid Channel**



TEST DESCRIPTION:	EIRP density conducted measurement (1559 – 1610MHz) Transmitter On
-------------------	---

High Channel





APPENDIX J

EIRP density conducted measurement (1559 – 1610MHz) Transmitter Off



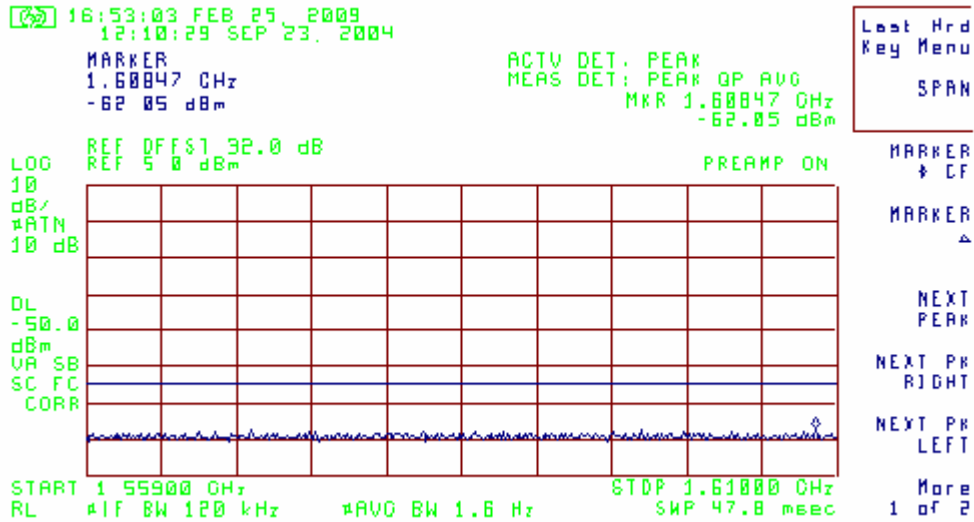
TEST DESCRIPTION:	EIRP density conducted measurement (1559 – 1610MHz) Transmitter Off		
CLIENT:	Hughes Network Systems	DATE:	02/25/09
EUT:	S-BAND SATELLITE MODEM	START TIME:	2:00 PM
PART NUMBER:	ICO MCAP USER EQUIPMENT	END TIME:	5:00 PM
SERIAL NUMBER:	3500212-0001	TEST ENGINEER:	JC
PROJECT NUMBER:	HUGNT-080301	SITE:	1
TEMPERATURE:	23° C	HUMIDITY:	37% RH

<i>Channel</i>	<i>Center Frequency (MHz)</i>	<i>Reading (dBm)</i>	<i>Limit (dBm/MHz)</i>
Stand By	N/A	-62.05	-50.00



TEST DESCRIPTION:	EIRP density conducted measurement (1559 – 1610MHz) Transmitter On
-------------------	---

Stand By



END OF DOCUMENT