

## MEASUREMENT AND TECHNICAL REPORT

HUGHES NETWORK SYSTEMS  
10450 Pacific Center Court  
San Diego, CA 92121

**DATE: 30 September 2002**

|                                                                                                                                                                                                     |                                                                |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------|
| <b>This Report Concerns:</b>                                                                                                                                                                        | Original Grant: X                                              | Class II Change: |
|                                                                                                                                                                                                     |                                                                |                  |
| <b>Equipment Type:</b>                                                                                                                                                                              | Hughes Model 9101 Regional BGAN Satellite IP Modem, Model 9101 |                  |
|                                                                                                                                                                                                     |                                                                |                  |
| <b>Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?</b>                                                                                                                                         | Yes:<br><b>Defer until:</b>                                    | No: X            |
|                                                                                                                                                                                                     |                                                                |                  |
| <b>Company Name agrees to notify the Commission by:</b>                                                                                                                                             | N/A                                                            |                  |
| <b>of the intended date of announcement of the product so that the grant can be issued on that date.</b>                                                                                            |                                                                |                  |
|                                                                                                                                                                                                     |                                                                |                  |
| <b>Transition Rules Request per 15.37?</b>                                                                                                                                                          | Yes:                                                           | No: X*           |
|                                                                                                                                                                                                     |                                                                |                  |
| (*) FCC Part 15, Paragraph(s) <b>15.209(a); 15.247(a); 15.247(b); 15.247(c)</b>                                                                                                                     |                                                                |                  |
| <p><b>Report Prepared by:</b></p> <p><b>TÜV AMERICA, INC</b><br/> <b>10040 Mesa Rim Road</b><br/> <b>San Diego, CA 92121-2912</b><br/> <b>Phone: 858 546 3999</b><br/> <b>Fax: 858 546 0364</b></p> |                                                                |                  |

## TABLE OF CONTENTS

|                                                                        | <b>Pages</b>   |
|------------------------------------------------------------------------|----------------|
| <b>1.0 GENERAL INFORMATION</b>                                         | <b>3 - 8</b>   |
| 1.1 Product Discription                                                | 3 - 7          |
| 1.2 Related Submittal Grant                                            | 8              |
| 1.3 Tested System Details                                              | 8              |
| 1.4 Test Methodology                                                   | 8              |
| 1.5 Test Facility                                                      | 8              |
| <b>2.0 SYSTEM TEST CONFIGURATION</b>                                   | <b>9</b>       |
| 2.1 Justification                                                      | 9              |
| 2.2 EUT Exercise Software                                              | 9              |
| 2.3 Special Accessories                                                | 9              |
| 2.4 Equipment Modifications                                            | 9              |
| 2.5 Configuration of Test System                                       | 9              |
| <b>3.0 RADIATED EMISSIONS EQUIPMENT/DATA</b>                           | <b>11 - 17</b> |
| <b>4.0 OPERATION WITHIN THE BAND OF 2400-2483.5 MHz EQUIPMENT/DATA</b> | <b>19 - 46</b> |
| <b>5.0 MAXIMUM PEAK POWER OUTPUT &lt; 1 WATT EQUIPMENT/DATA</b>        | <b>19 - 46</b> |
| <b>6.0 RADIATED SPURIOUS EMISSIONS RESTRICTED BANDS EQUIPMENT/DATA</b> | <b>19 - 46</b> |
| <b>7.0 DUTY CYCLE MEASUREMENTS EQUIPMENT/DATA</b>                      | <b>19 - 46</b> |
| <b>8.0 ATTESTATION STATEMENT</b>                                       | <b>47</b>      |

Report No. SC202038-03A

## 1.0 GENERAL INFORMATION

### 1.1 Product Description

**General Equipment Description -- NOTE: This information will be input into your test report as shown below.**

EUT Description: Satellite IP Modem

EUT Name: Hughes Model 9101 Regional BGAN Satellite IP Modem

Model No.: 9101 Serial No.: --

Product Options: --

Configurations to be tested: --

#### Power Requirements

*Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)*

Voltage: 100-240 VAC 47-63Hz (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): -- Current (Amps/phase(nominal)): --

Other: --

#### Other Special Requirements

--

#### Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

--

#### EUT Power Cable

☐ Permanent OR ☒ Removable Length (in meters): 2

☐ Shielded OR ☐ Unshielded

☐ Not Applicable

| EUT Interface Ports and Cables |                                     |                                     |     |                                     |                          |                 |             |                        |                          |                    |                                                              |
|--------------------------------|-------------------------------------|-------------------------------------|-----|-------------------------------------|--------------------------|-----------------|-------------|------------------------|--------------------------|--------------------|--------------------------------------------------------------|
| Interface                      |                                     |                                     |     | Shielding                           |                          |                 |             |                        |                          |                    |                                                              |
| Type                           | Analog                              | Digital                             | Qty | Yes                                 | No                       | Type            | Termination | Connector Type         | Port Termination         | Length (in meters) | Removable Permanent                                          |
| <b>EXAMPLE:</b>                |                                     |                                     |     |                                     |                          |                 |             |                        |                          |                    |                                                              |
| RS232                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | 2   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Foil over braid | Coaxial     | Metallized 9-pin D-Sub | Characteristic Impedance | 6                  | <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Ethernet                       | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | 1   | <input type="checkbox"/>            | <input type="checkbox"/> | --              | --          | RJ45                   | Characteristic Impedance | --                 | <input type="checkbox"/> <input checked="" type="checkbox"/> |
| USB                            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | 1   | <input type="checkbox"/>            | <input type="checkbox"/> | --              | --          | USB                    | Characteristic Impedance | --                 | <input type="checkbox"/> <input checked="" type="checkbox"/> |
| GEM Antenna Port               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | 1   | <input type="checkbox"/>            | <input type="checkbox"/> | --              | --          | SMA Mini               | 50 Ohm                   | --                 | <input type="checkbox"/> <input checked="" type="checkbox"/> |

#### EUT Software.

Revision Level: --

Description: --

**EUT Operating Modes to be Tested** -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.

Consult with your TÜV Product Service Representative if additional assistance is required.

1. Continuous transmission mode

**EUT System Components** -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

| Description      | Model #      | Serial # | FCC ID # |
|------------------|--------------|----------|----------|
| AC/DC Power Jack | 3003612-0001 | --       | --       |
| Ethernet Cable   | 3003692-0001 | --       | --       |
| USB Cable        | 3003027-0003 | --       | --       |
| Battery          | 3003082-0001 | --       | --       |

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

| Description | Model # | Serial # | FCC ID # |
|-------------|---------|----------|----------|
|-------------|---------|----------|----------|

--

#### Oscillator Frequencies

| Frequency      | Derived Frequency | Component # / Location | Description of Use     |
|----------------|-------------------|------------------------|------------------------|
| 32.768KHz      | --                | Y8/PWB                 | Strong ARM RTC         |
| 3.6864MHz      | --                | Y9/PWB                 | Strong ARM Main Clock  |
| 20MHz          | --                | Y10/PWB                | DSP Main Clock         |
| 13MHz          | 376MHz            | Y6/PWB                 | System Reference Clock |
| 485-505MHz     | 492MHz            | Y14/PWB                | Tx LO Reference Clock  |
| 1136-1414.5MHz | 1337-1370MHz      | Y4/PWB                 | Rx LO Reference Clock  |
| 28MHz          | --                | U25/PWB                | ASIC Reference Clock   |
| 16.367MHz      | --                | Y3/PWB                 | GPS Reference Clock    |
| 30.768KHz      | --                | Y7/PWB                 | GPS RTC                |

#### Power Supply

| Manufacturer | Model #      | Serial # | Type                                                                                                                                           |
|--------------|--------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------|
| FRIWO        | 3003612-0001 | --       | <input checked="" type="checkbox"/> Switched-mode: (Frequency) 110-250Hz<br><input type="checkbox"/> Linear <input type="checkbox"/> Other: -- |

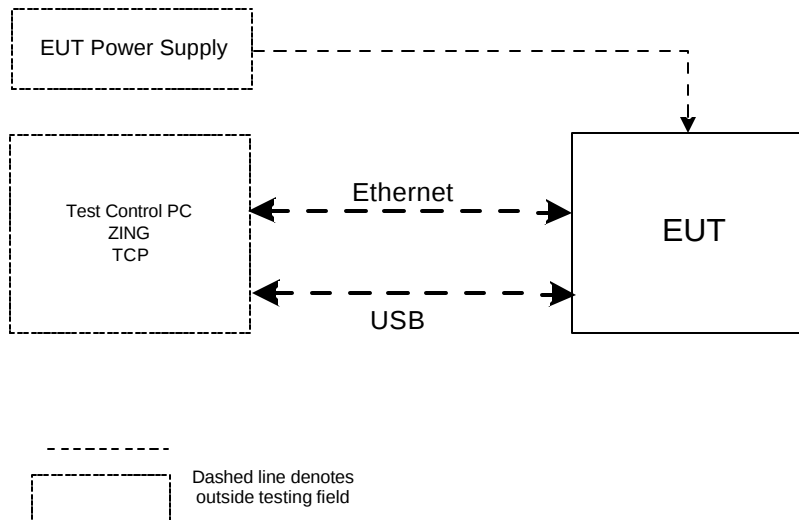
| Power Line Filters |         |                 |
|--------------------|---------|-----------------|
| Manufacturer       | Model # | Location in EUT |
| Multiple           | 22pF    | C950 PWB        |
| Multiple           | 10uF    | C723 PWB        |
| Murata Electronics | 3A 1206 | L141            |

| Critical EMI Components (Capacitors, ferrites, etc.) |              |                 |     |                        |
|------------------------------------------------------|--------------|-----------------|-----|------------------------|
| Description                                          | Manufacturer | Part # or Value | Qty | Component # / Location |
| Ceramic Capacitor                                    | Multiple     | 0.047uF         | 5   | C839-C843 PWB          |
| Ceramic Capacitor                                    | Multiple     | 100pF           | 5   | C835-C838, C844 PWB    |
| Resistor                                             | Multiple     | 47Ohm           | 5   | R743, R744-R747 PWB    |
| Resistor                                             | Multiple     | 33Ohm           | 2   | R661, R650 PWB         |
| Ceramic Capacitor                                    | Multiple     | 22pF            | 4   | C955-C958 PWB          |

| EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise. |
|-----------------------------------------------------------------------------------------------|
|-----------------------------------------------------------------------------------------------|

Metallic coating on bottom plastic housing. Top housing is Magnesium. All interface ports have EMI RC filters.

**System Configuration Block Diagram** -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



**1.2 Related Submittal Grant**

None

**1.3 Tested System Details**

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

**1.4 Test Methodology**

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

| TEST                        | FCC CFR 47#                       | PASS/FAIL        |
|-----------------------------|-----------------------------------|------------------|
| Radiated Emissions          | 15.209(a)                         | Pass             |
| Deactivation                | 15.247(a)                         | Pass             |
| Radiated Spurious Emissions | 15.247(b)                         | Pass             |
| Emissions Bandwidth         | 15.247(c)                         | Pass             |
| Duty Cycle Measurements     | ANSI C63.4, Appendix 14, Para. 10 | Information Only |

Both Conducted and Radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 25 GHz).

**1.5 Test Facility**

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC  
10040 Mesa Rim Road  
San Diego, CA 92121-2912  
Phone: 858 546 3999  
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

## **2.0 SYSTEM TEST CONFIGURATION**

### **2.1 Justification**

The EUT was initially tested for FCC emissions in the following configuration:

See Block Diagram

### **2.2 EUT Exercise Software**

None

### **2.3 Special Accessories**

None

### **2.4 Equipment Modifications**

None

### **2.5 Configuration of Test System**

See Block Diagram

Report No. SC202038-03A

### **3.0 RADIATED EMISSIONS EQUIPMENT/DATA**

See following page(s).

Report No. SC202038-03A

**Test Conditions: RADIATED EMISSIONS: FCC Part 15.209(a)**

**The RADIATED EMISSIONS measurements were performed at the San Diego Testing Facility:**

☐ - Test not applicable

■ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

**Testing was performed at a test distance of:**

■ - 3 meters

**Test Equipment Used:**

| Model No.  | Prop. No. | Description       | Manufacturer     | Serial No. | Cal Due Date |
|------------|-----------|-------------------|------------------|------------|--------------|
| LPB 2520/A | 739       | Antenna, Bilog    | Antenna Research | 1170       | 05/03        |
| ESVS 30    | 6723      | EMI Test Receiver | Rohde & Schwarz  | 830350/006 | 12/02        |

**Remarks:** \_\_\_\_\_

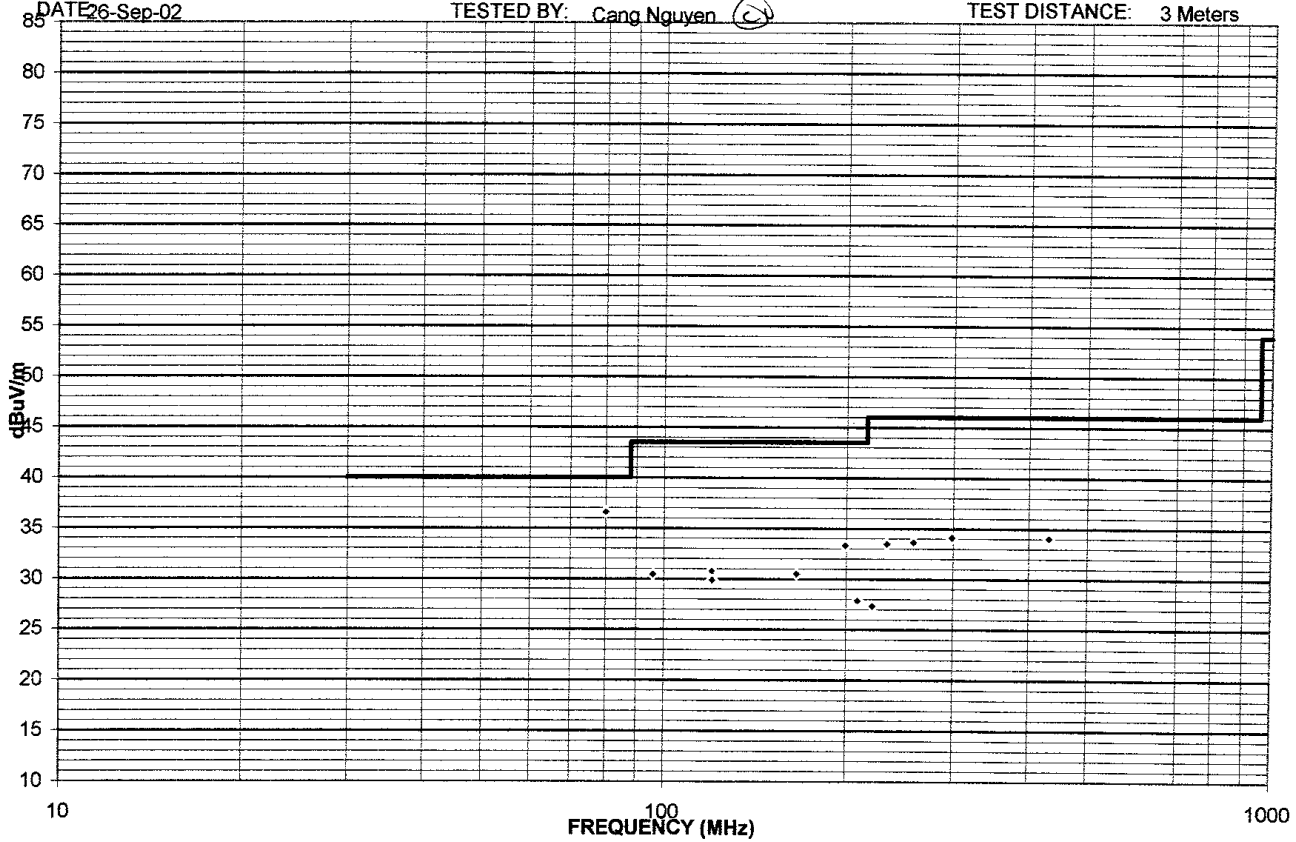
\_\_\_\_\_

REPORT NO: SC202038  
 COMPANY: Hughes Network Systems  
 EUT: Inmarsat Early Entry Terminal  
 EUT MODE: Transmit Channel 0  
 DATE: 26-Sep-02

SPEC: FCC Part 15 para 15.109(a)

TESTED BY: Cang Nguyen (C)

TEST DISTANCE: 3 Meters



REPORT No: SC202038

SPEC: FCC Part 15 para 15.209(a)

**CUSTOMER:** Hughes Network Systems

TEST DIST: 3 Meters

E U T: Inmarsat Early Entry Terminal

TEST SITE: 2

EUT MODE: Transmit Channel 0

BICONICAL: 739

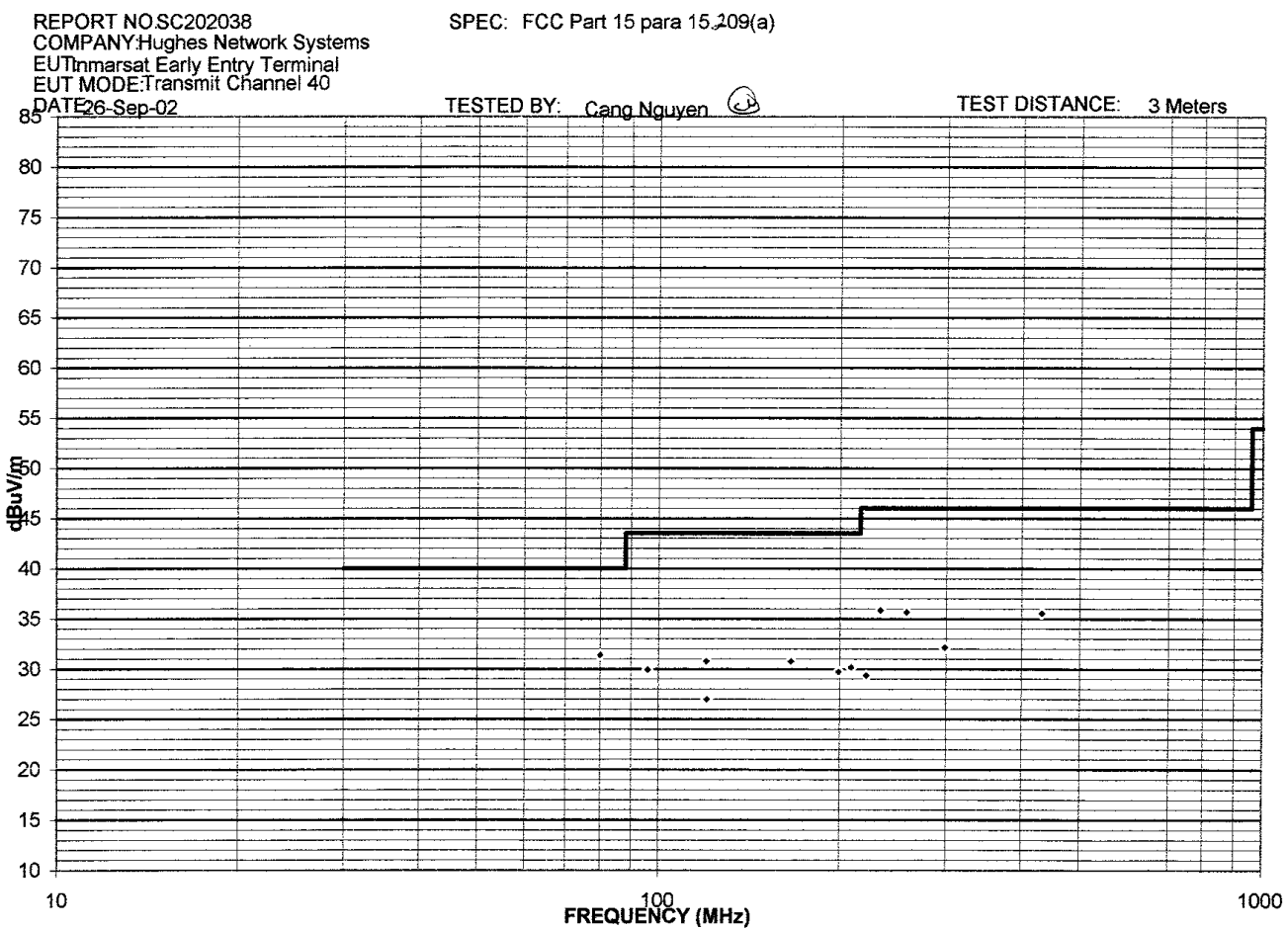
DATE: 26-Sep-02 TESTED BY: Cang Nguyen (C)

LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.  
110VAC 60Hz

RCVR: 6723

[illegible]



REPORT No: SC202038

SPEC: FCC Part 15 para 15.209(a)

**CUSTOMER:** Hughes Network Systems

TEST DIST: 3 Meters

**E U T:** Inmarsat Early Entry Terminal

TEST SITE: 2

EUT MODE: Transmit Channel 40

BICONICAL: 739

DATE: 26-Sep-02 TESTED BY: Cang Nguyen

LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.  
110VAC 60Hz

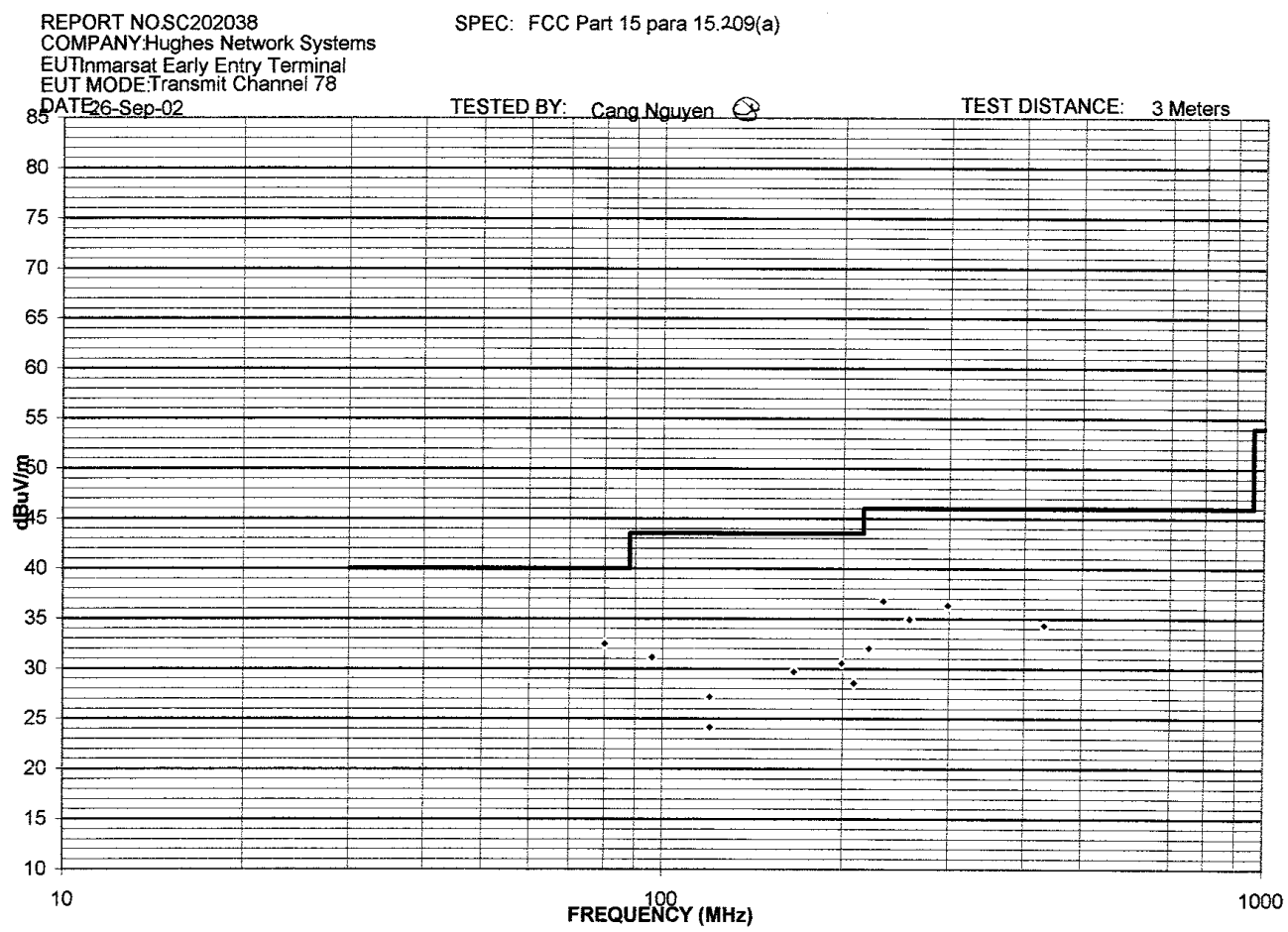
RCVR: 6723

Temperature: 26 Relative Humidity: 51%

|                   | Temperature | 20              |
|-------------------|-------------|-----------------|
| <b>EUT MARGIN</b> | -8.6        | dB at 80.06 MHz |

ver 1.8b

[illegible]



REPORT No: SC202038

SPEC: FCC Part 15 para 15.209(a)

**CUSTOMER:** Hughes Network Systems

TEST DIST: 3 Meters

E U T: Inmarsat Early Entry Terminal

TEST SITE: 2

EUT MODE: Transmit Channel 78

BICONICAL: 739

DATE: 26-Sep-02 TESTED BY: Cang Nguyen (CP)

LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth.  
110VAC 60Hz

RCVR: 6723

[illegible]

Report No. SC202038-03A

**4.0 OPERATION WITHIN THE BAND OF 2400-2483.5 MHz EQUIPMENT/DATA**  
**5.0 MAXIMUM PEAK POWER OUTPUT < 1 WATT EQUIPMENT/DATA**  
**6.0 RADIATED SPURIOUS EMISSIONS RESTRICTED BANDS EQUIPMENT/DATA**  
**7.0 DUTY CYCLE MEASUREMENTS EQUIPMENT/DATA**

See following page(s).

# Notes and Equipment Lists for SC-202038

Hughes Network

EUT: Inmarsat Early Entry Terminal

## For 15.247(a) Operation within the band of 2400-2483.5 MHz

### Test Equipment Used:

| Model Number | Prop. # | Description       | Manufacturer    | Serial No. | Cal. Dates |
|--------------|---------|-------------------|-----------------|------------|------------|
| hp8566B      | 721     | Spectrum Analyzer | Hewlett Packard | 2542A12099 | 9/23/03    |
| CBL6111      | 461     | Bilog Antenna     | Chase           | 1291       | n.c.r.     |

15.247(a)(1)(ii) 20 dB Bandwidth less than 1 MHz

Spectrum Analyzer Plots demonstrate 20 dB BW as 720 kHz as measured in SR2 with Spectrum Analyzer #721 and Antenna #462

15.247(a)(1) Carrier Channel Separation greater than 20 dB Bandwidth

Spectrum Analyzer Plot demonstrate separation of 1005 kHz (typical) as measured in SR2 with Spectrum Analyzer #721 and Antenna #462

15.247(a)(1)(ii) Average time of occupancy no greater than 0.4 seconds within 30 seconds

Spectrum Analyzer Plot demonstrate time of occupancy as measured in SR2 with Spectrum Analyzer #721 and Antenna #462

Average time in 1 second =  $14 \times 0.5$  milliseconds = .007 seconds

Average time in 30 seconds =  $30 \times 0.007$  seconds = 210 milliseconds or 0.21 seconds

15.247(a)(1)(ii) At least 75 Hopping frequencies

Spectrum Analyzer Plot demonstrate 79 Hopping Frequencies as measured in SR2 with Spectrum Analyzer #721 and Antenna #462

## For 15.247(b) Maximum Peak Power Output < 1 Watt

Data sheets report power output for Channels 0, 40 and 78 in dBuV as measured on the Roof Site with Spectrum Analyzer #407 and antenna horn #251. See below.

The following calculation was made to convert 1 watt to dBuV (see data sheets)

$E = \text{square root of } (30 \times 1 \text{ Watt} \times \text{antenna gain}) \text{ divided by distance}$

antenna gain = 1

distance = 3 meters

$E = 1.83 \text{ Volts/m}$

Converting to dBV/m:

$= 20 \times \log(\text{Volts}) + 120 \text{ dB}$

125.2

### Results:

| Frequency (MHz) | Max. Power Level (dBuV) |         | Max. Power Level (mW) |         |
|-----------------|-------------------------|---------|-----------------------|---------|
|                 | Peak                    | Average | Peak                  | Average |
| 2402            | 96.7                    | 82.3    | 1.403                 | 0.051   |
| 2440            | 97.2                    | 82.9    | 1.574                 | 0.058   |
| 2480            | 97.3                    | 83.0    | 1.611                 | 0.060   |

## For 15.247(c) Spurious Emissions For Restricted Bands (15.205(a))

### Test Equipment Used:

| Model Number | Prop. # | Description       | Manufacturer    | Serial No. | Cal. Dates |
|--------------|---------|-------------------|-----------------|------------|------------|
| hp8566B      | 407     | Spectrum Analyzer | Hewlett Packard | 2311A02209 | 11/13/02   |

|                 |      |                    |                      |            |         |
|-----------------|------|--------------------|----------------------|------------|---------|
| hp8566B         | 721  | Spectrum Analyzer  | Hewlett Packard      | 2542A12099 | 9/23/03 |
| ESVS30          | 6723 | EMC Receiver       | Rhode & Schwartz     | 833825/003 | 12/8/02 |
| LPB2520/A       | 739  | Antenna, Biconical | Antenna Research     | 1170       | 5/3/03  |
| 3115            | 251  | Antenna, Horn      | Electro Mechanics Co | 2595       | 12/1/03 |
| 3115            | 6669 | Antenna, Horn      | Electro Mechanics Co | 5412-4364  | 12/1/03 |
| Preamp 2-20 GHZ | 719  | Preamp             | TUV PS               | na         | n.c.r.  |
| Preamp 1-18 GHZ | 6784 | Preamp             | Miteq/TUV PS         | na         | n.c.r.  |
| CBL6111         | 461  | Bilog Antenna      | Chase                | 1291       | n.c.r.  |
| 12A-18          | 6377 | Antenna, Horn      | M.I. Technologies    | 215300     | n.c.r.  |
| 11975A          | 6381 | Amplifier          | Hewlett Packard      | 2517A00639 | n.c.r.  |
| 11970K          | 6386 | Harmonic Mixer     | Hewlett Packard      | 3003A05400 | n.c.r.  |

Duty Cycle was measured in SR2 with Spectrum Analyzer #721 and Antenna 461

"On Time" was found to be 520 microseconds (typical burst) x 37 bursts in a 100 millisecond time period

Duty Cycle = .52 ms x 37 / 100 ms x 100 % = 19.2 %

No emissions other than the intentional radiators were evident. Investigations were documented by data sheets for Channels 0, 40, 78, Spectrum Analyzer plots for Duty Cycle, frequency scans from 7500 MHz to 18000 MHz and from 18000 MHz to 24000 MHz

Data sheets report emissions found from 30 MHz to 1000 MHz as measured at OATS Canyon 2 with the receiver #6723 and antenna #739.

Data Sheets report no emissions from 1000 MHz to 18000 MHz as measured on the Roof Site with Spectrum Analyzer #407, preamplifier #719, antenna horn #251.

Due to the 2483.5 to 2500 MHz restricted band adjacent to the authorized band of operation, for Channel 78 a Band Edge measurement was required at 2483.5 the highest emission in 2483.5 to 2500 MHz

The Channel 78 frequency fundamental was measured:

|                | Ant. Vert | Ant. Horz |                              |
|----------------|-----------|-----------|------------------------------|
| with 1 MHz BW  | 62.3      | 60.7      | (peak measured values- dBuV) |
| with 30 kHz BW | 59.7      | 58.3      |                              |
| difference:    | 2.6       | 2.4       |                              |

The band edge emission was found to be:

|  |      |      |
|--|------|------|
|  | 28.7 | 25.6 |
|--|------|------|

Therefore the emissions were reported as

|  |      |      |      |
|--|------|------|------|
|  | 26.1 | 23.2 | dBuV |
|--|------|------|------|

For average emissions, due to the pulse modulation, the duty cycle was used to calculate average:

|            |      |   |
|------------|------|---|
| Duty Cycle | 19.2 | % |
|------------|------|---|

Average emission strength = peak emission strength + 20 x log (duty cycle)

Spectrum Analyzer Plots confirm no emissions from 7500 MHz to 18000 MHz as measured in SR5 with Spectrum Analyzer #721, preamplifier #6784, antenna horn #453

Spectrum Analyzer Plots confirm no emissions from 18000 MHz to 24000 MHz as measured in SR5 with Spectrum Analyzer #721, preamplifier #6784, antenna horn #453, preamplifier 6381, harmonic mixer 6386

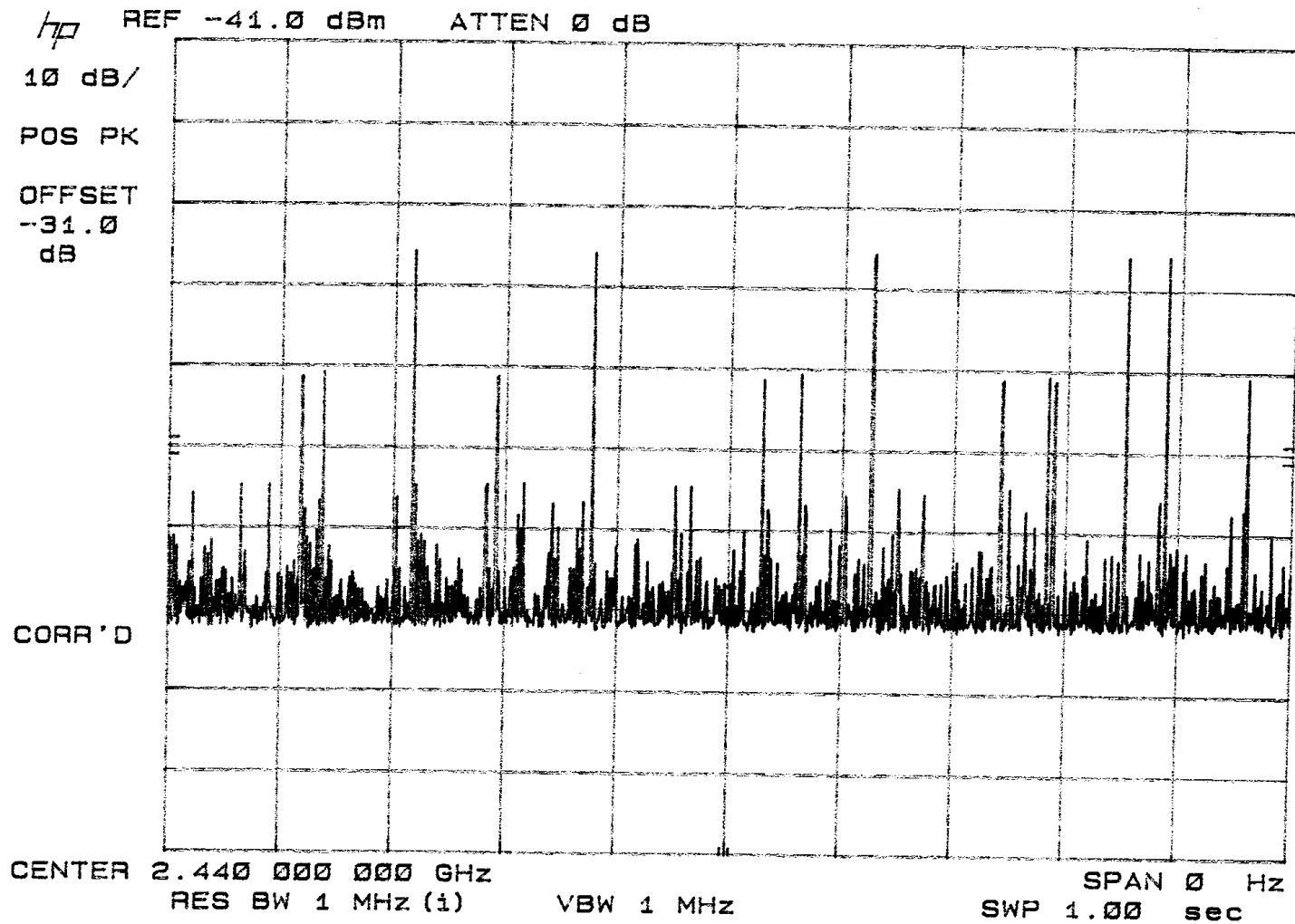
Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

Sept. 24, 2002

47 CFR Part 15.247 (a)(1)(ii) Average Occupancy Time

Test Room: SR2 / TEST ENGR: AAL *RAB*





CF = Antenna Factor + Cable Loss

y.beta231

CF = Antenna Factor + Cable Loss

**TÜV AMERICA, INC.** 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

v.beta231

[illegible]

CF = Antenna Factor + Cable Loss - Preamplifier Gain

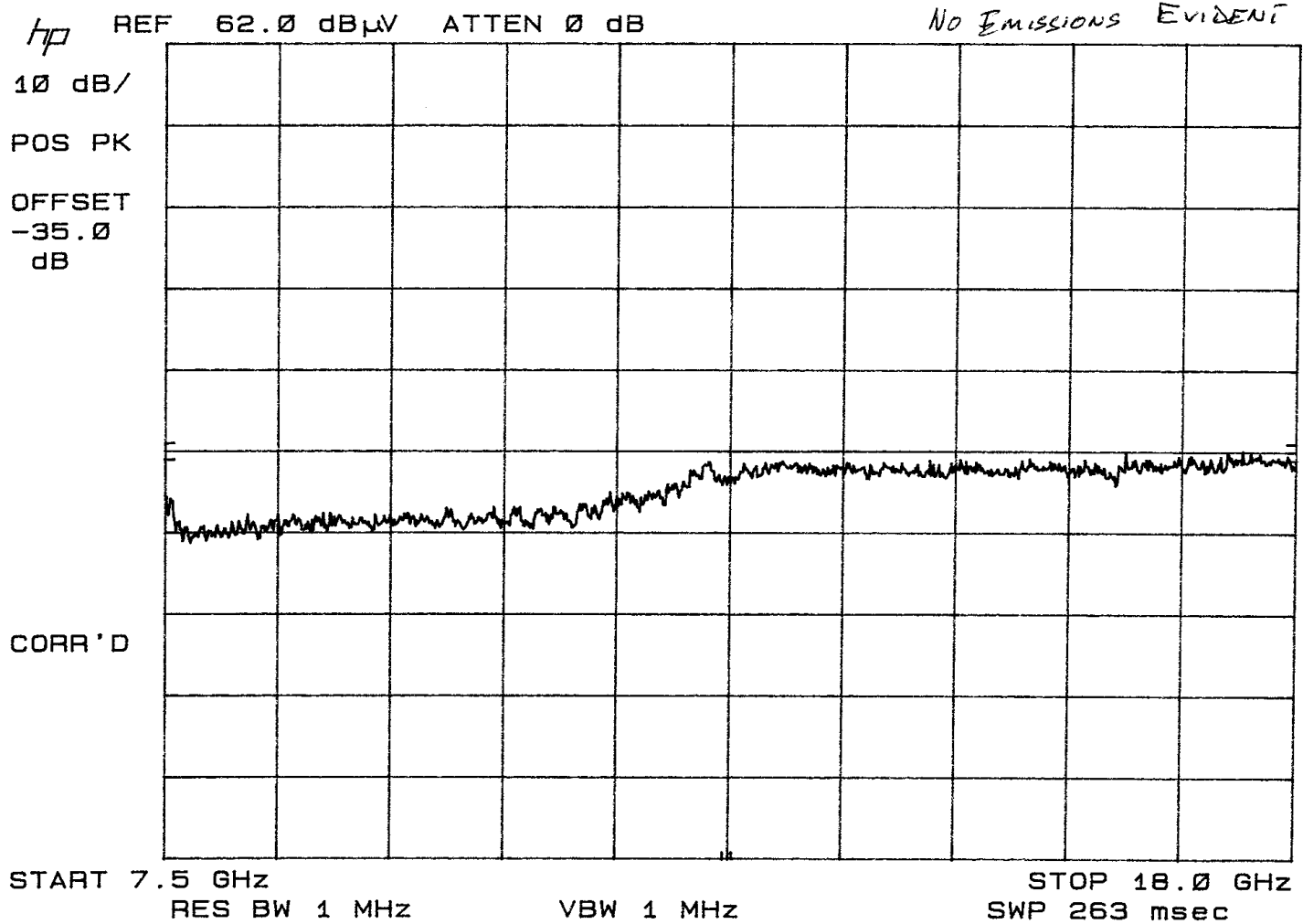
**TÜV AMERICA, INC.** 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

CF = Antenna Factor + Cable Loss - Preamplifier Gain

**TÜV AMERICA, INC.** 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Hughes SC-202038 INMARSAT EARLY ENTRY TERMINAL  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 0

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *AAL*  
ANT: VERTICAL



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

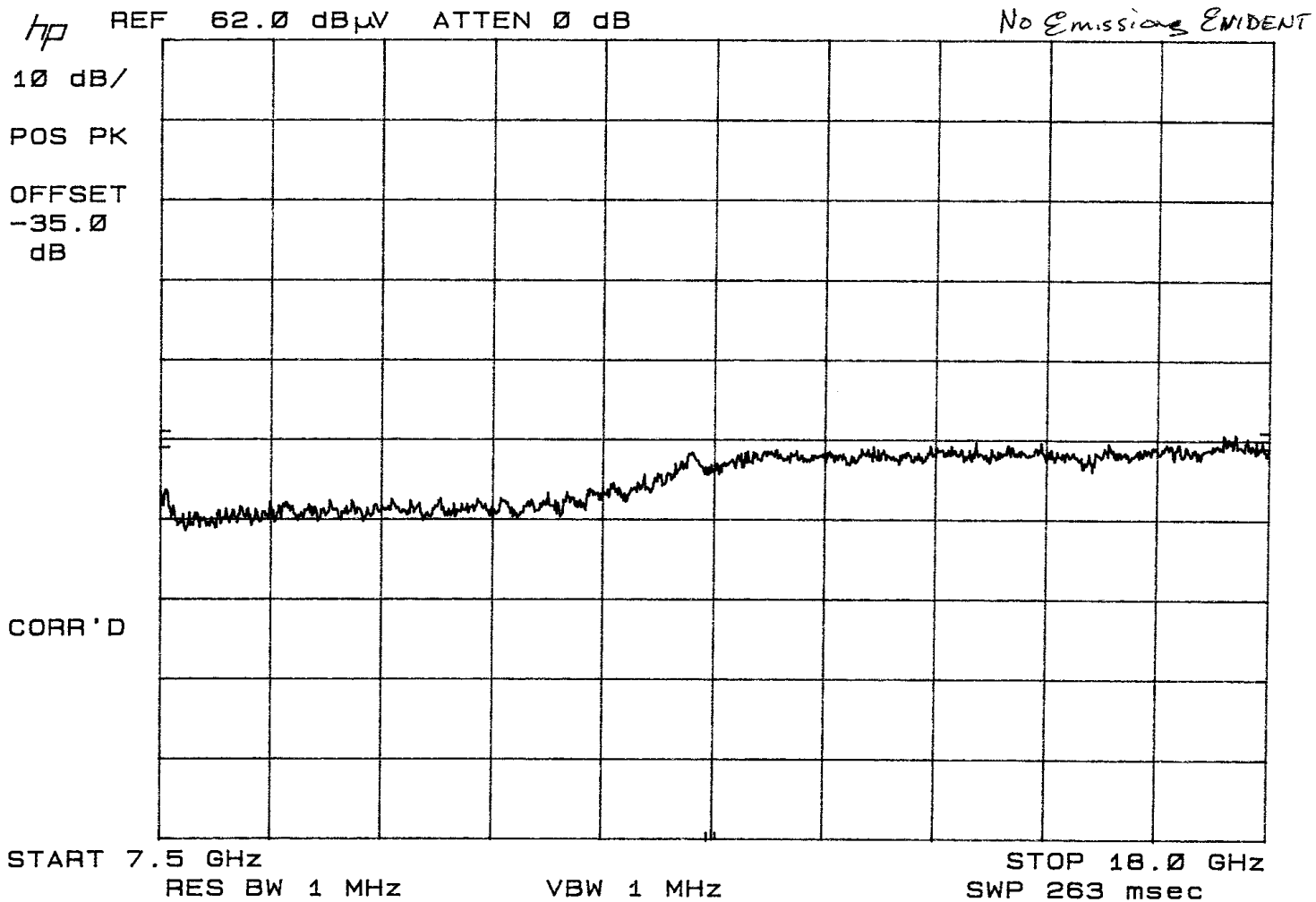
Sept.25, 2002

47 CFR Part 15.247(c) Radiated Spurious

Test Room:SR5 / TEST ENGR: AAL *AAL*

47 CFR Part 15.205(a) Restricted Bands - Channel 0

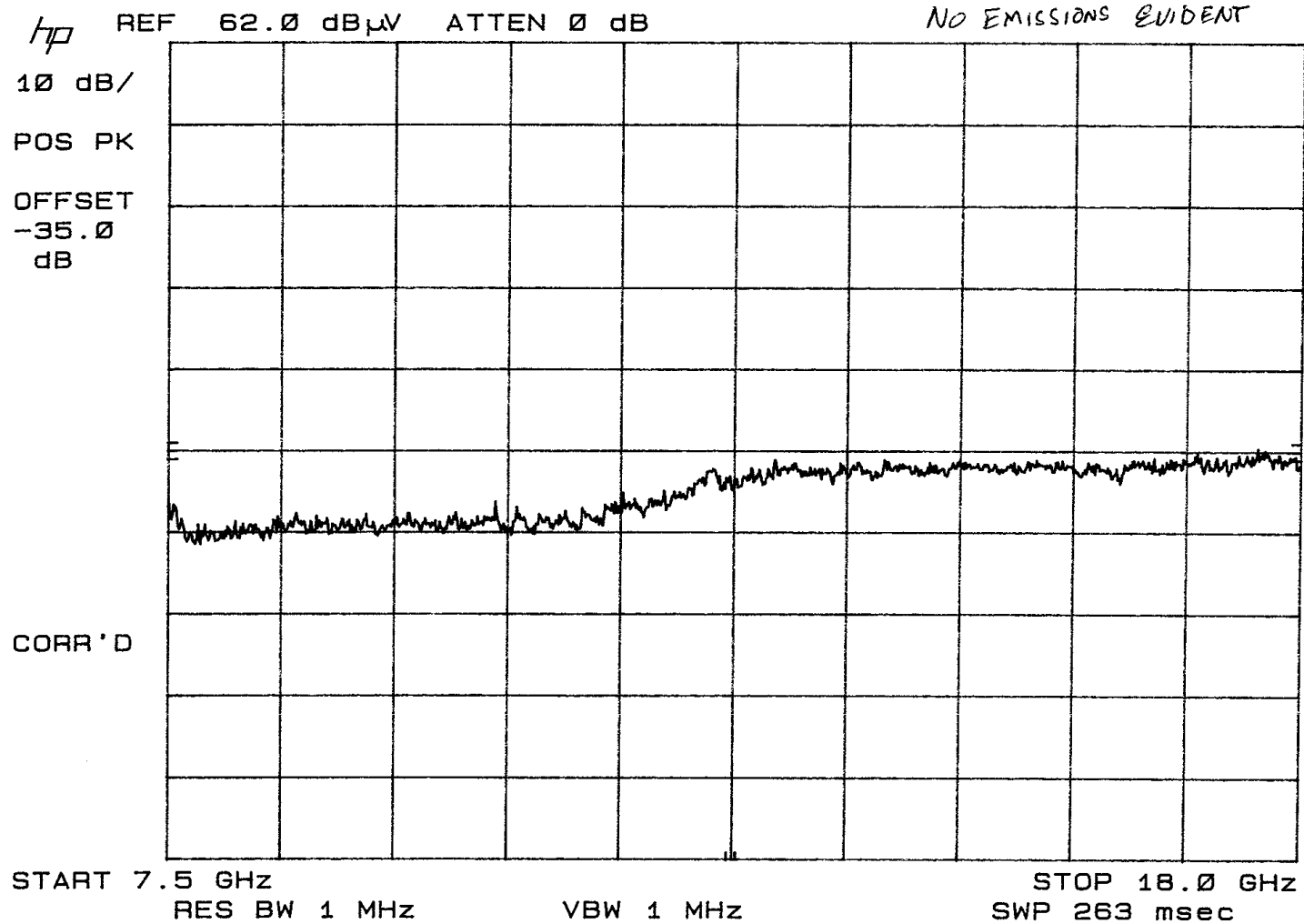
ANT: HORIZONTAL



Hughes SC-202038  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 40

INMARSAT EARLY ENTRY TERMINAL

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *RA*  
ANT: VERTICAL



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

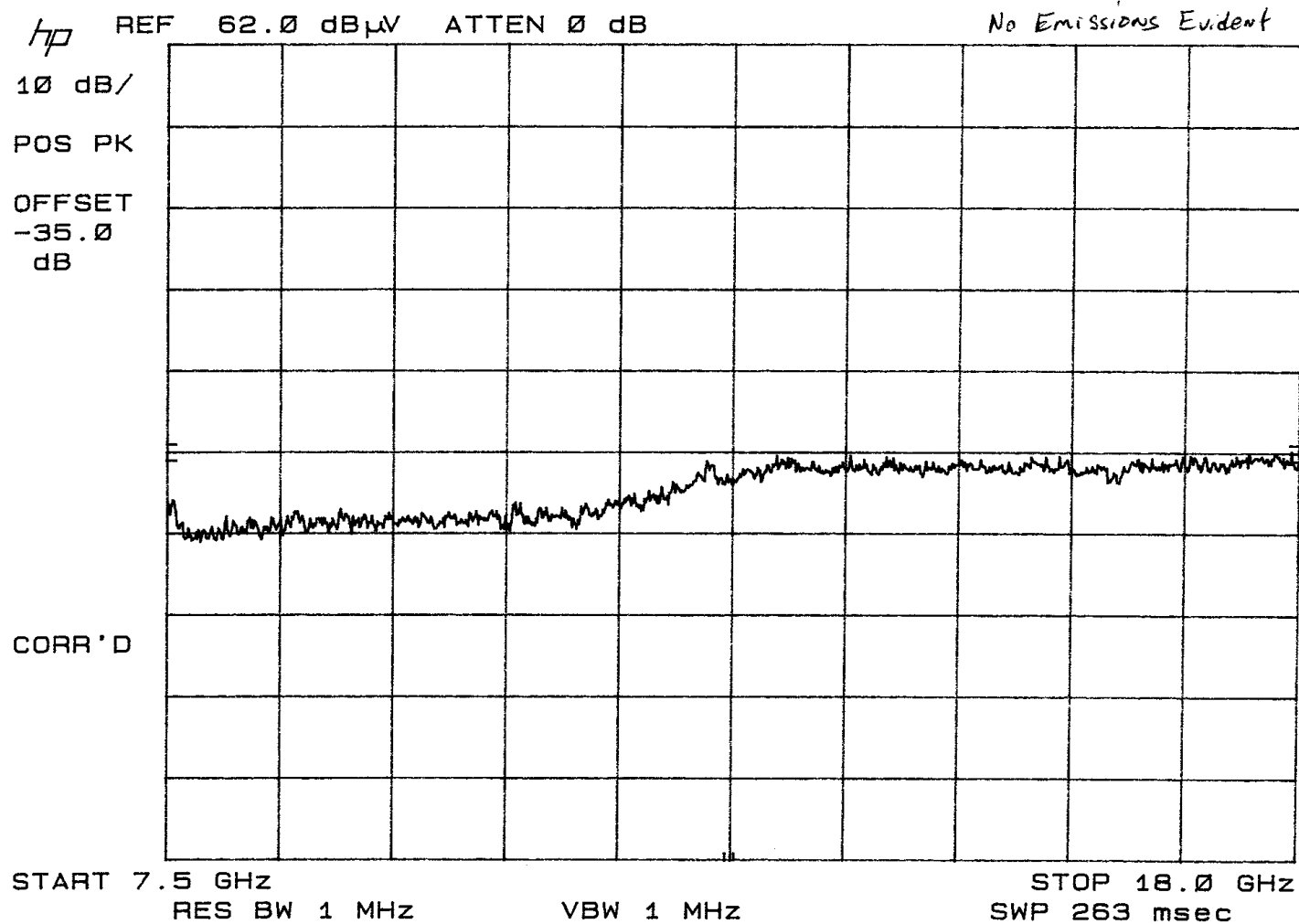
Sept.25, 2002

47 CFR Part 15.247(c) Radiated Spurious

Test Room:SR5 / TEST ENGR: AAL *AAS*

47 CFR Part 15.205(a) Restricted Bands - Channel 40

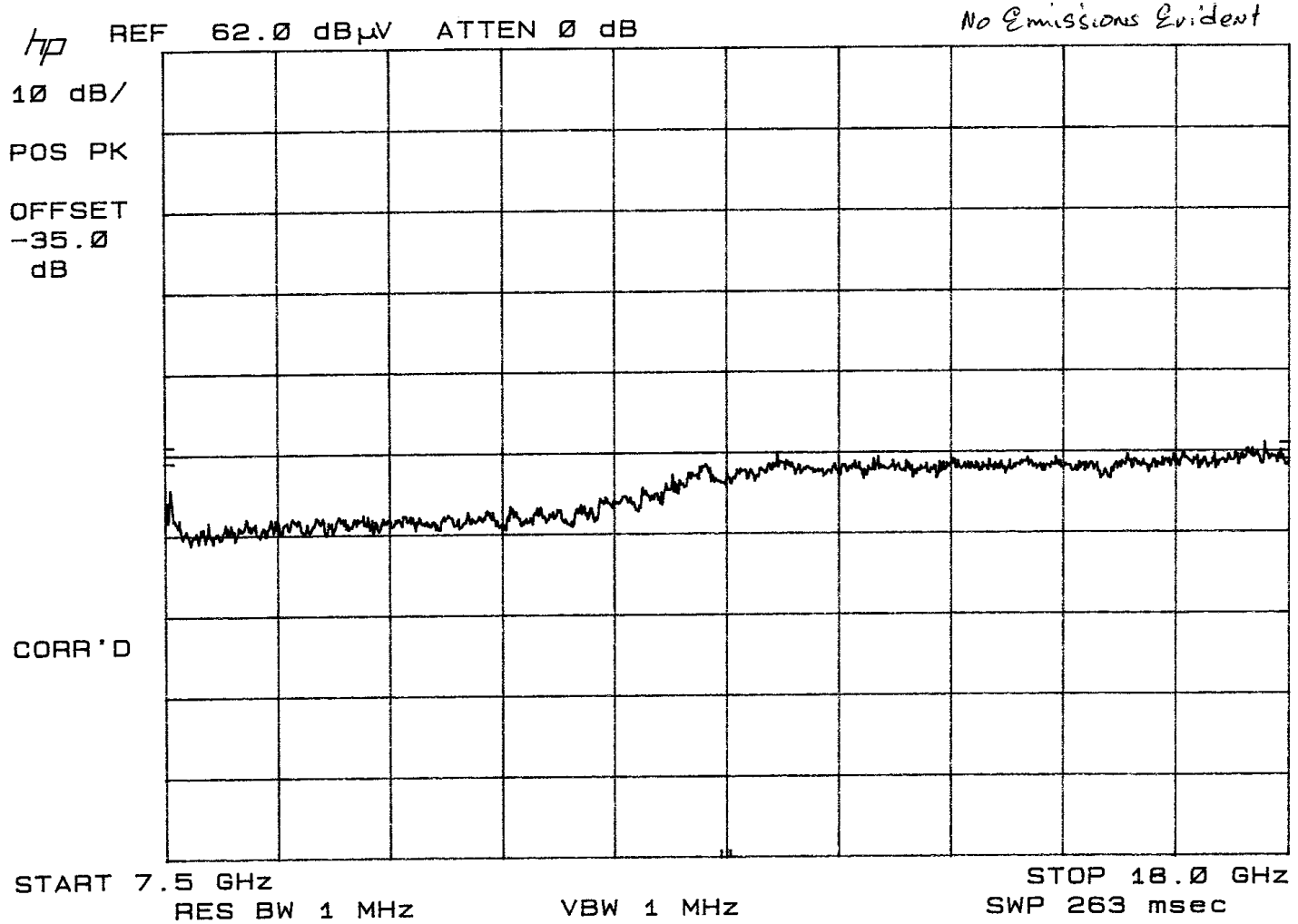
ANT: HORIZONTAL



Hughes SC-202038  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 78

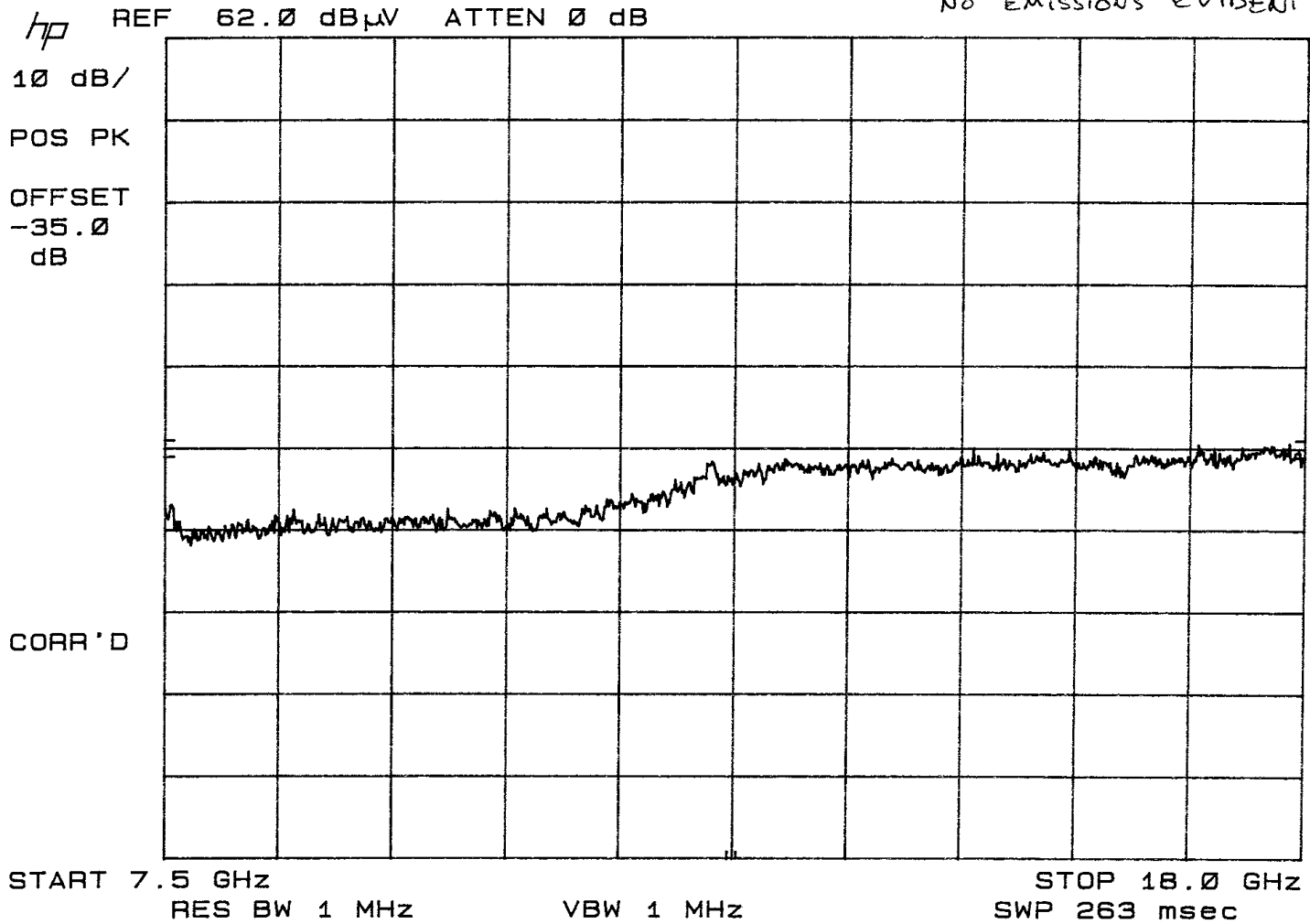
INMARSAT EARLY ENTRY TERMINAL

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *AAL*  
ANT: HORIZONTAL



Hughes SC-202038 INMARSAT EARLY ENTRY TERMINAL  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 78

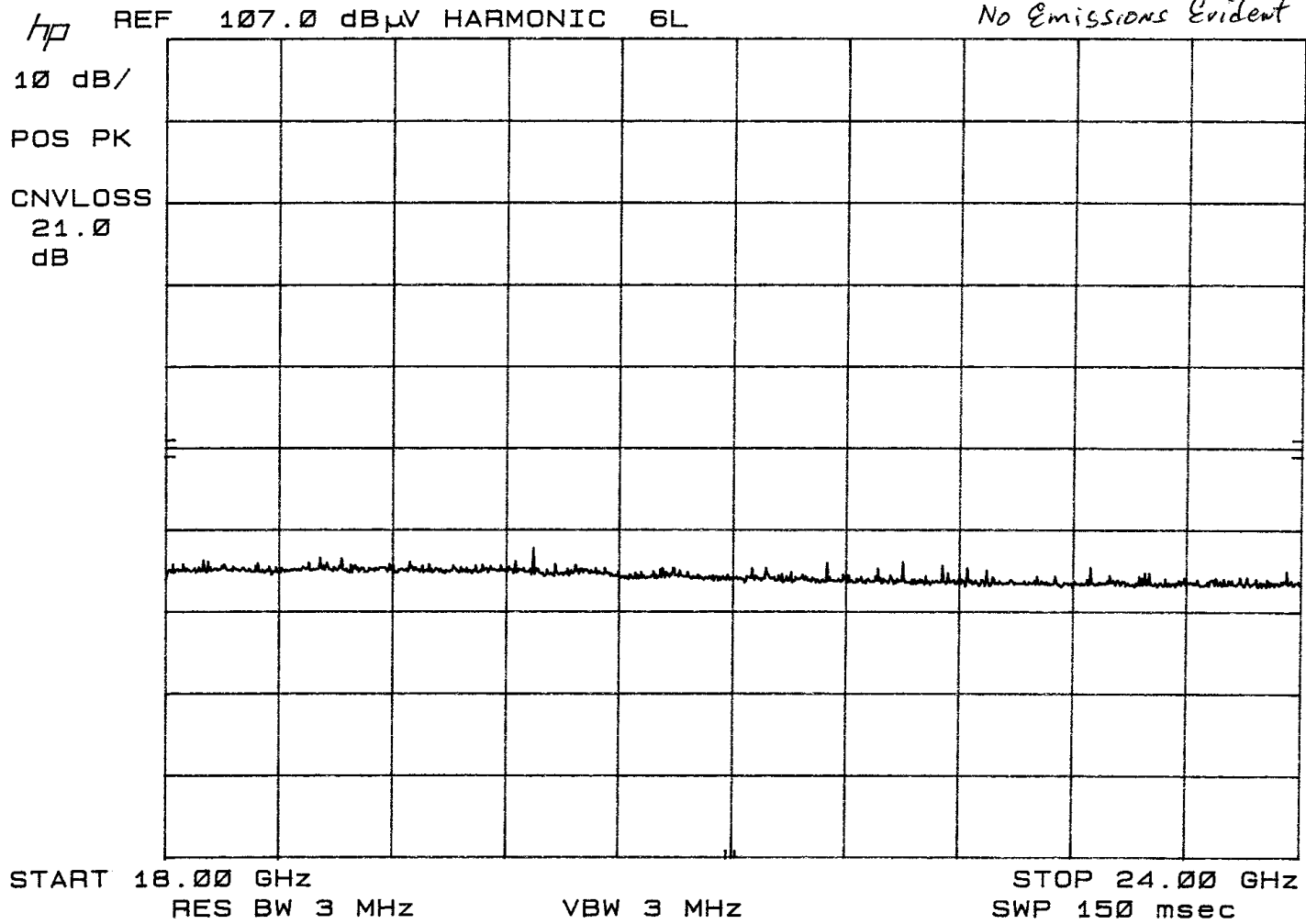
Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *AAL*  
ANT: VERTICAL  
NO EMISSIONS EVIDENT



Hughes SC-202038  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 78

INMARSAT EARLY ENTRY TERMINAL

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *hsp*  
ANT: VERTICAL



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

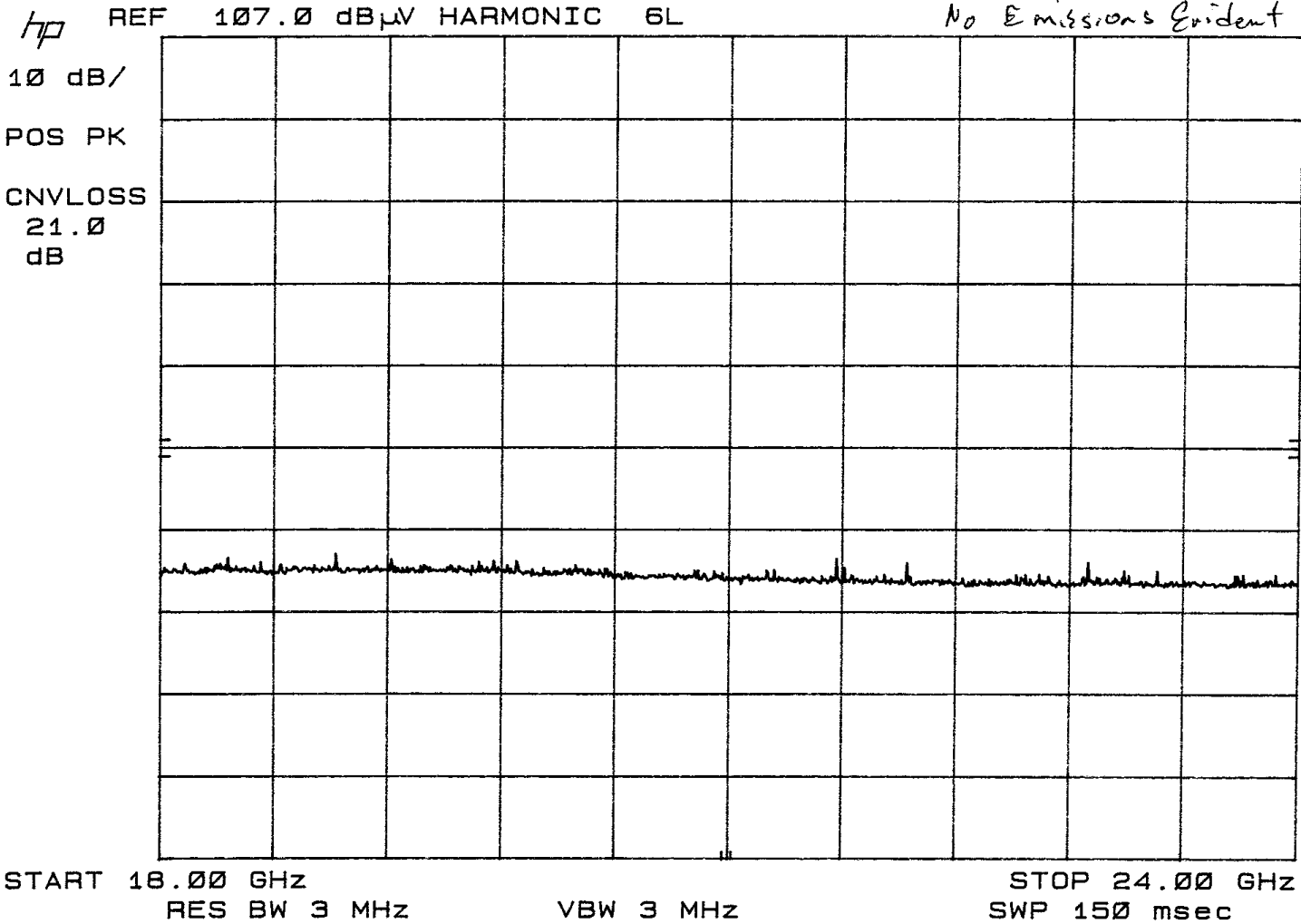
Sept.25, 2002

47 CFR Part 15.247(c) Radiated Spurious

Test Room:SR5 / TEST ENGR: AAL

47 CFR Part 15.205(a) Restricted Bands - Channel 78

ANT: HORIZONTAL



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

Sept.25, 2002

47 CFR Part 15.247(c) Radiated Spurious

Test Room:SR5 / TEST ENGR: AAL

*AAL*

47 CFR Part 15.205(a) Restricted Bands - Channel 40

ANT: HORIZONTAL

*hp* REF 107.0 dB $\mu$ V HARMONIC 6L

*No Emissions Evident*

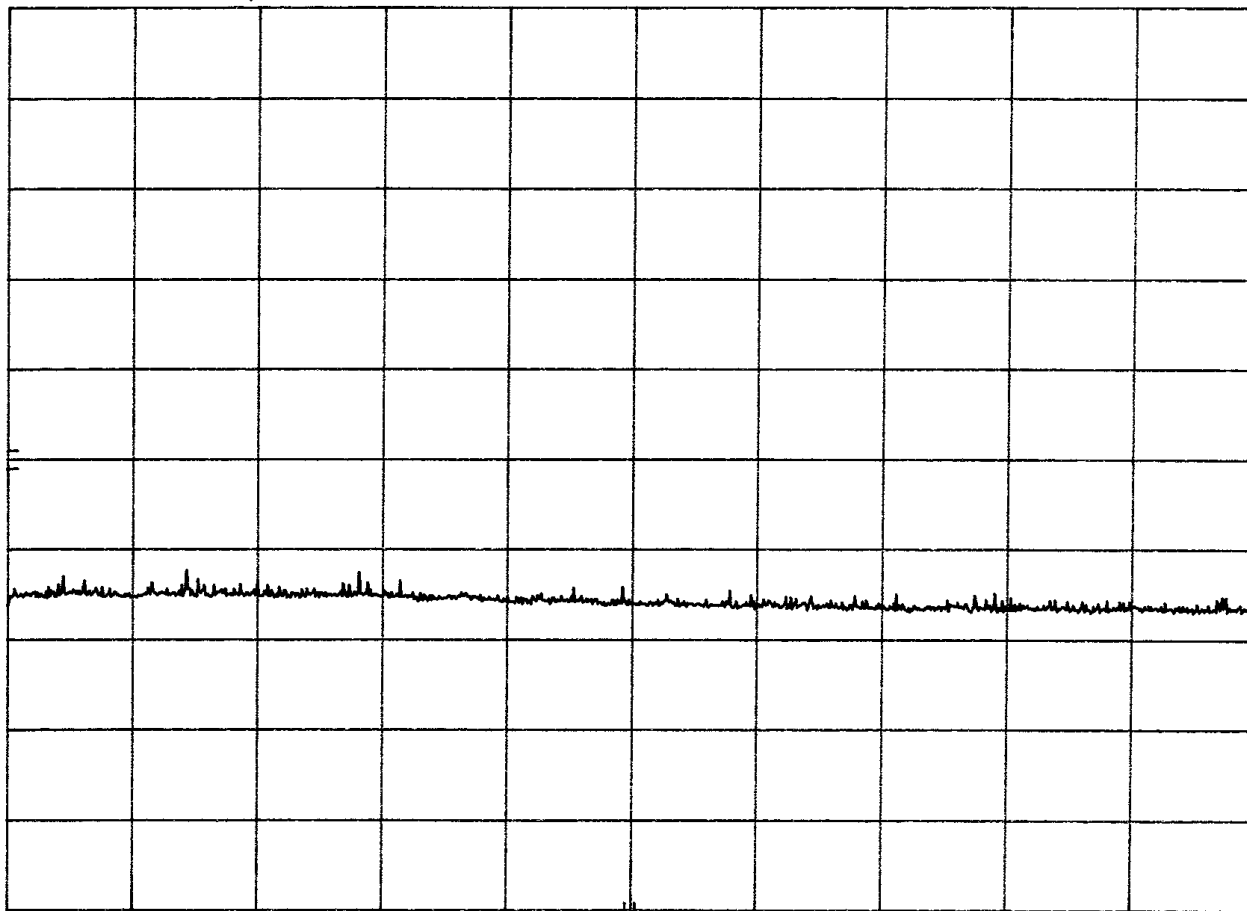
10 dB/

POS PK

CNVLOSS

21.0

dB



START 18.00 GHz

RES BW 3 MHz

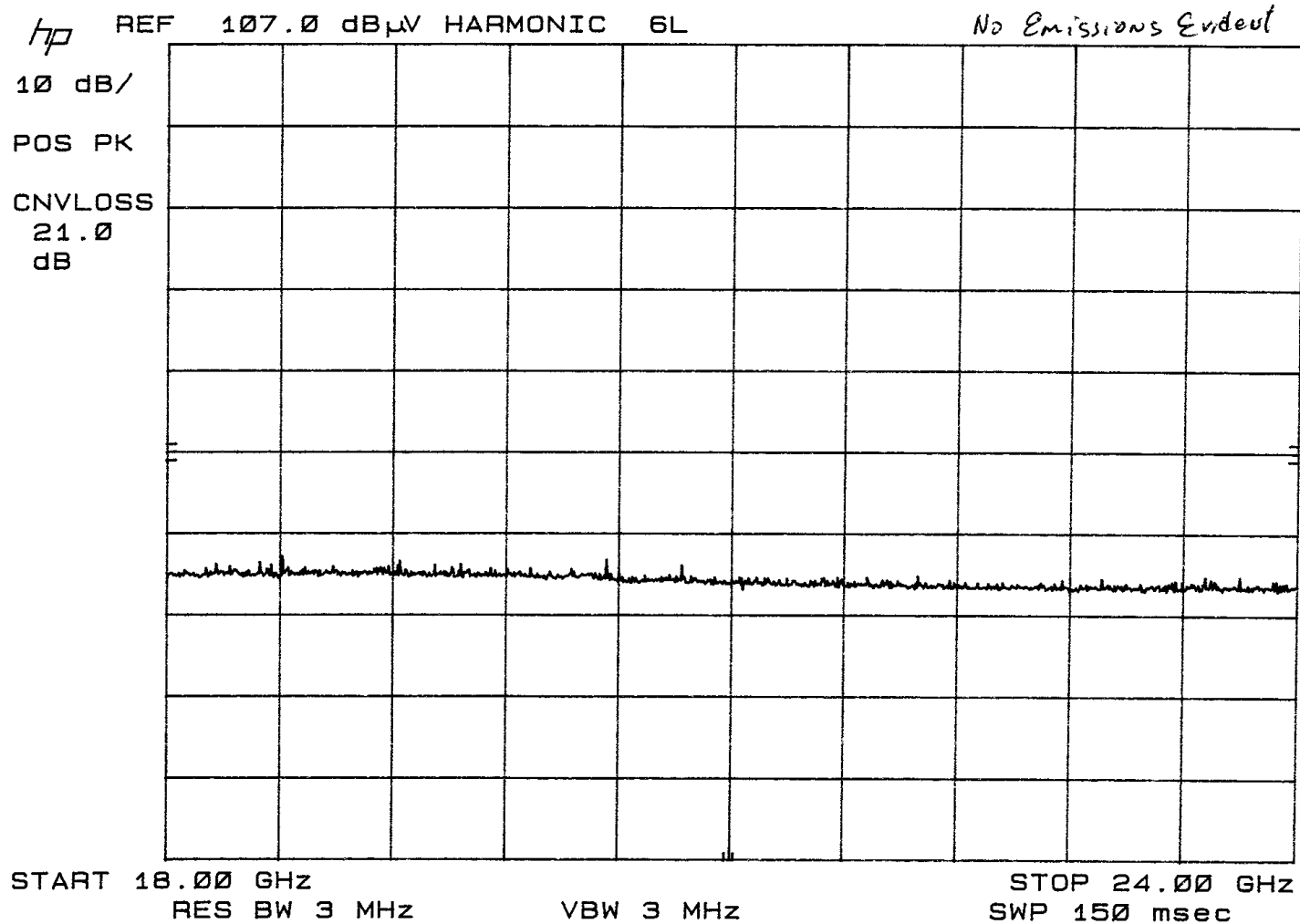
VBW 3 MHz

STOP 24.00 GHz

SWP 150 msec

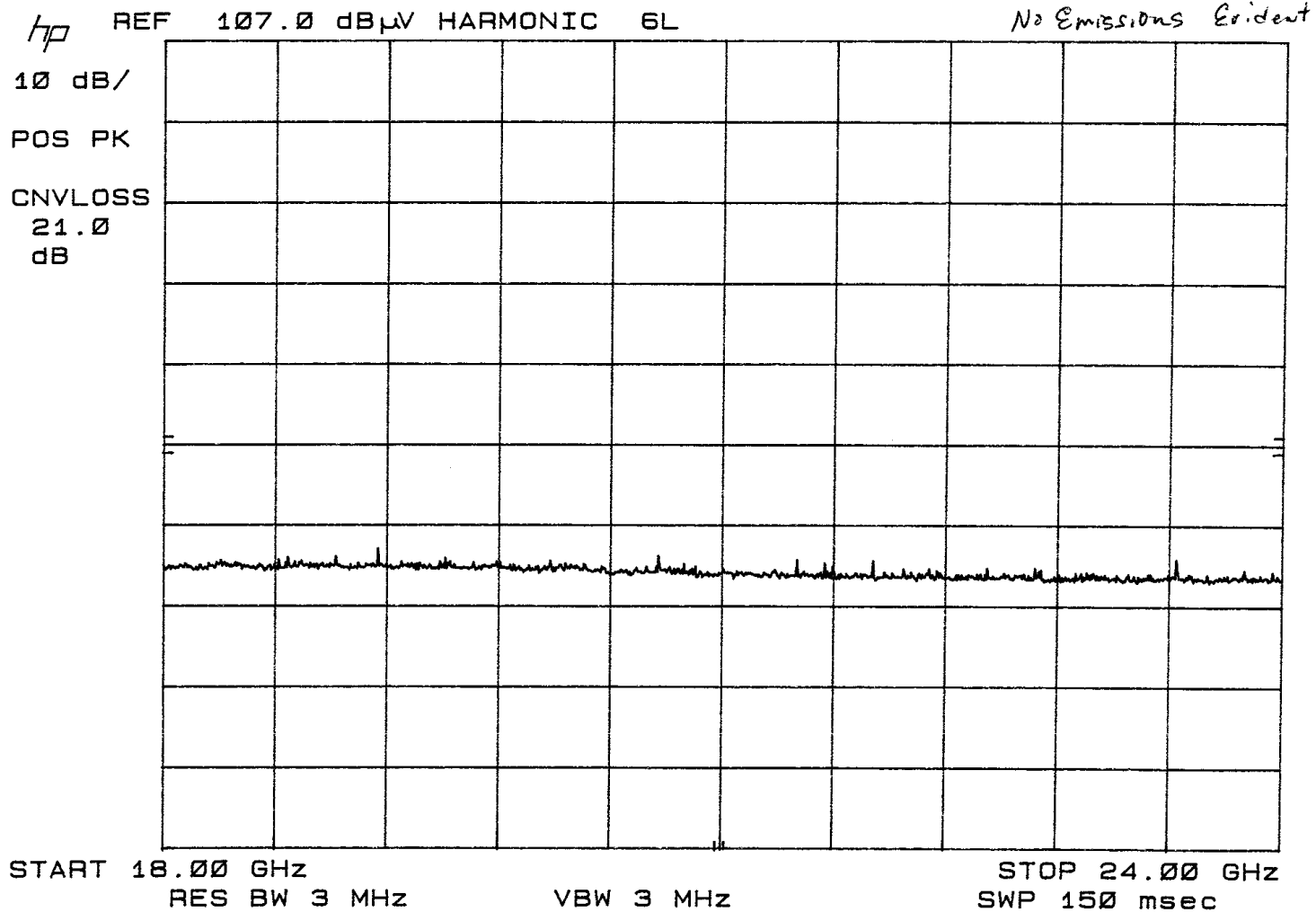
Hughes SC-202038 INMARSAT EARLY ENTRY TERMINAL  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 40

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *AN*  
ANT: VERTICAL



Hughes SC-202038 INMARSAT EARLY ENTRY TERMINAL  
47 CFR Part 15.247(c) Radiated Spurious  
47 CFR Part 15.205(a) Restricted Bands - Channel 0

Sept.25, 2002  
Test Room:SR5 / TEST ENGR: AAL *KAF*  
ANT: VERTICAL



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

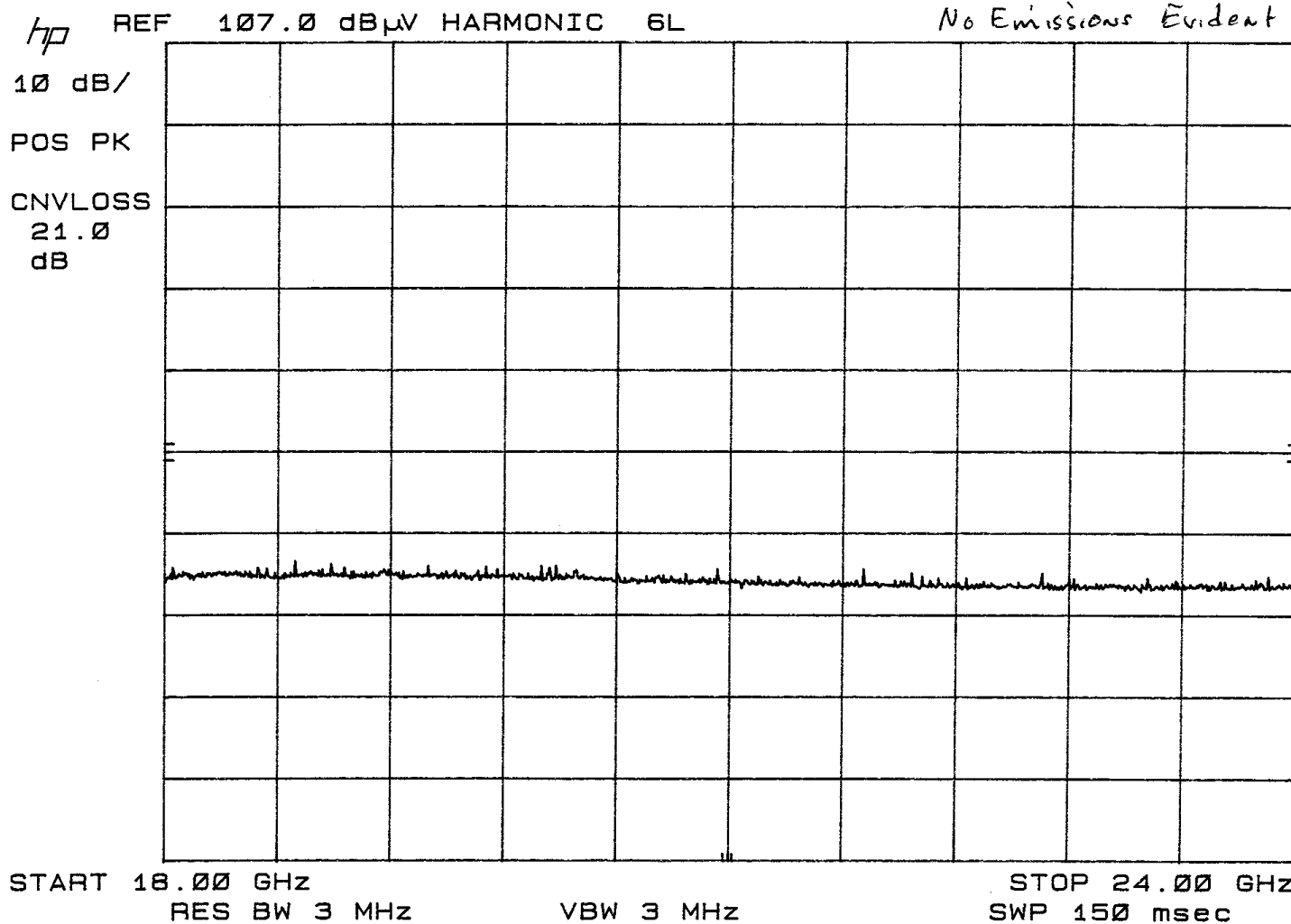
Sept.25, 2002

47 CFR Part 15.247(c) Radiated Spurious

Test Room:SR5 / TEST ENGR: AAL *AAL*

47 CFR Part 15.205(a) Restricted Bands - Channel 0

*ANT: HORIZONTAL*



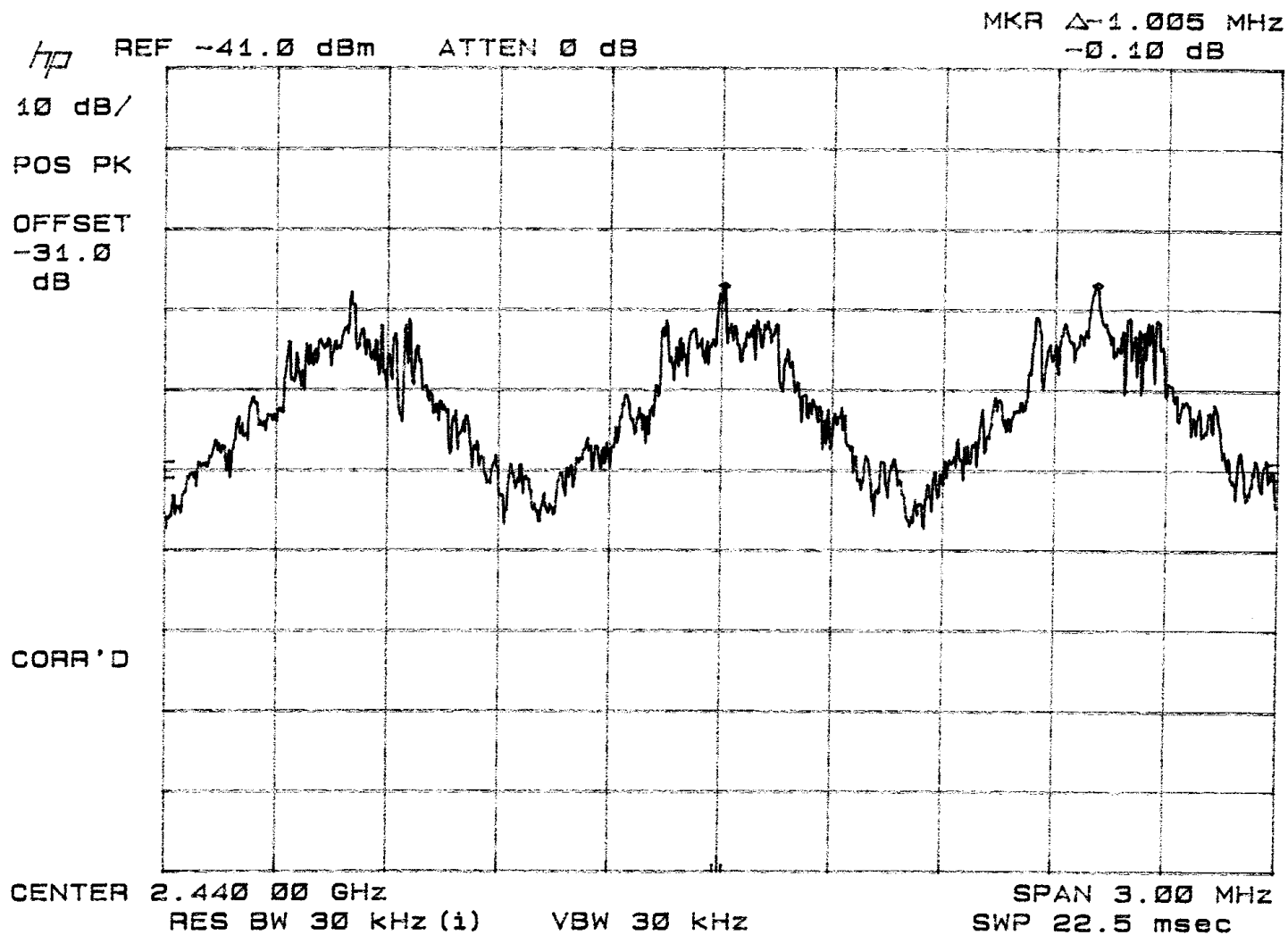
Hughes SC-202038

47 CFR Part 15.247 (a)(1) Carrier Channel Separation > 720 kHz

INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002

Test Room:SR2 / TEST ENGR: AAL *AAL*



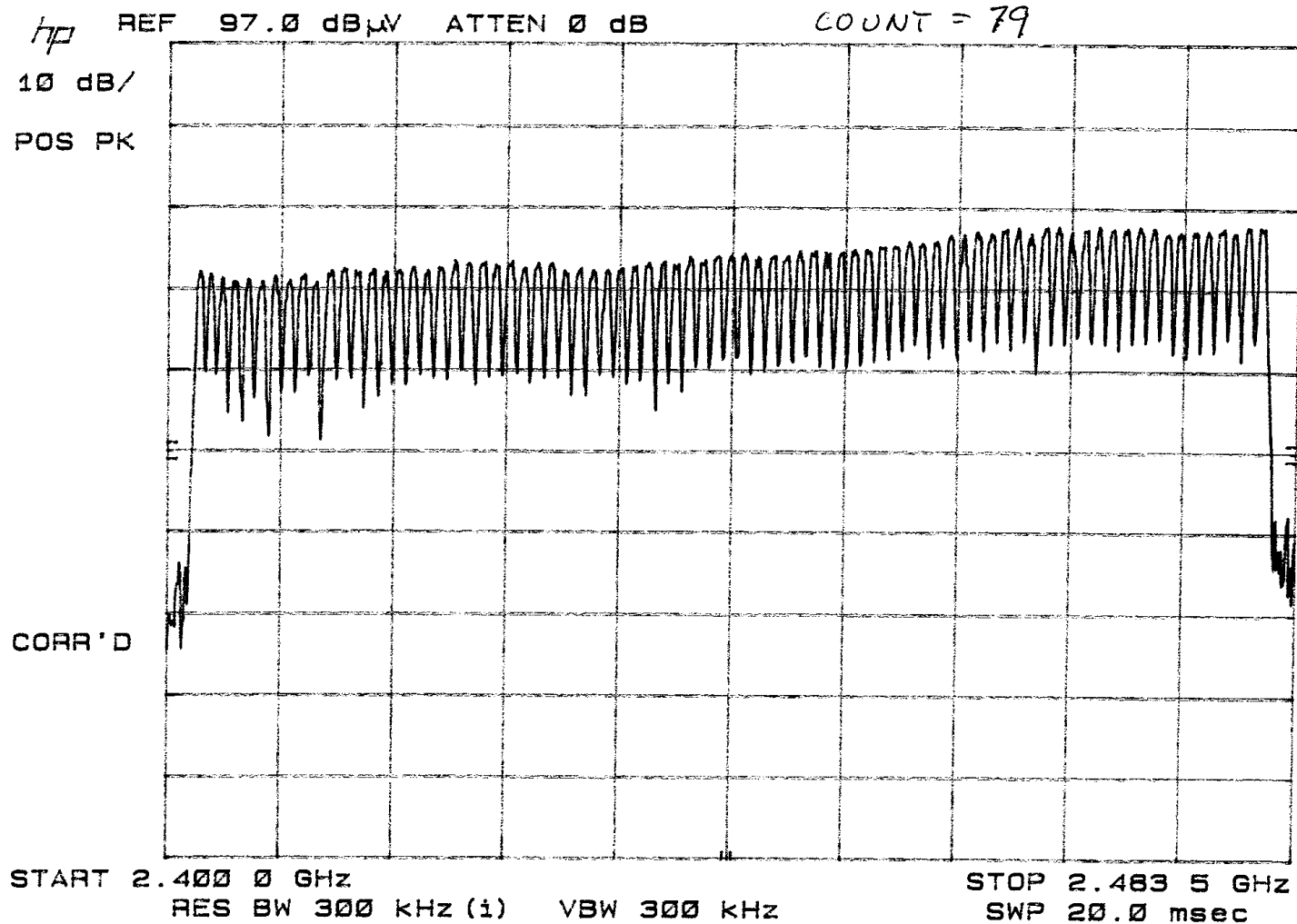
Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002

47 CFR Part 15.247 (a)(1)(ii) Number Hopping Frequencies > 75

Test Room:SR2 / TEST ENGR: AAL *AA*



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002

47 CFR Part 15.247 (a)(1)(ii) 20 dB Bandwidth < 1 MHz

Test Room:SR2 / TEST ENGR: AAL *AAL*

Channel 78

MKR  $\Delta$  720 KHz  
-0.80 dB

*hp* REF 100.0 dB $\mu$ V ATTEN 10 dB

10 dB/

POS PK

CORR'D

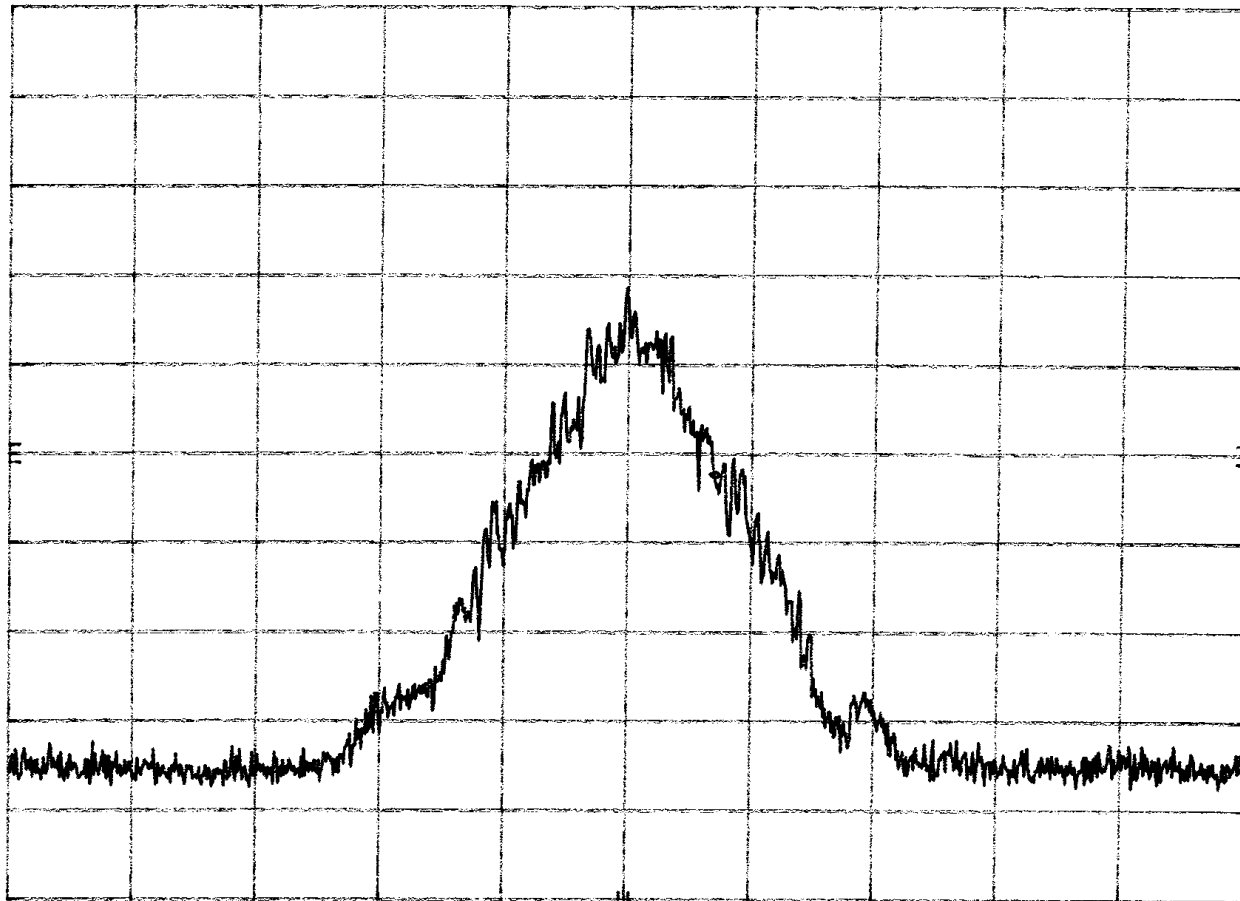
CENTER 2.480 00 GHz

RES BW 10 KHz (i)

VBW 10 KHz

SPAN 5.00 MHz

SWP 375 msec



Hughes SC-202038

INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002

47 CFR Part 15.247 (a)(1)(ii) 20 dB Bandwidth < 1 MHz

Test Room:SR2 / TEST ENGR: AAL *MA*

Channel 40

MKR  $\Delta$  660 KHz

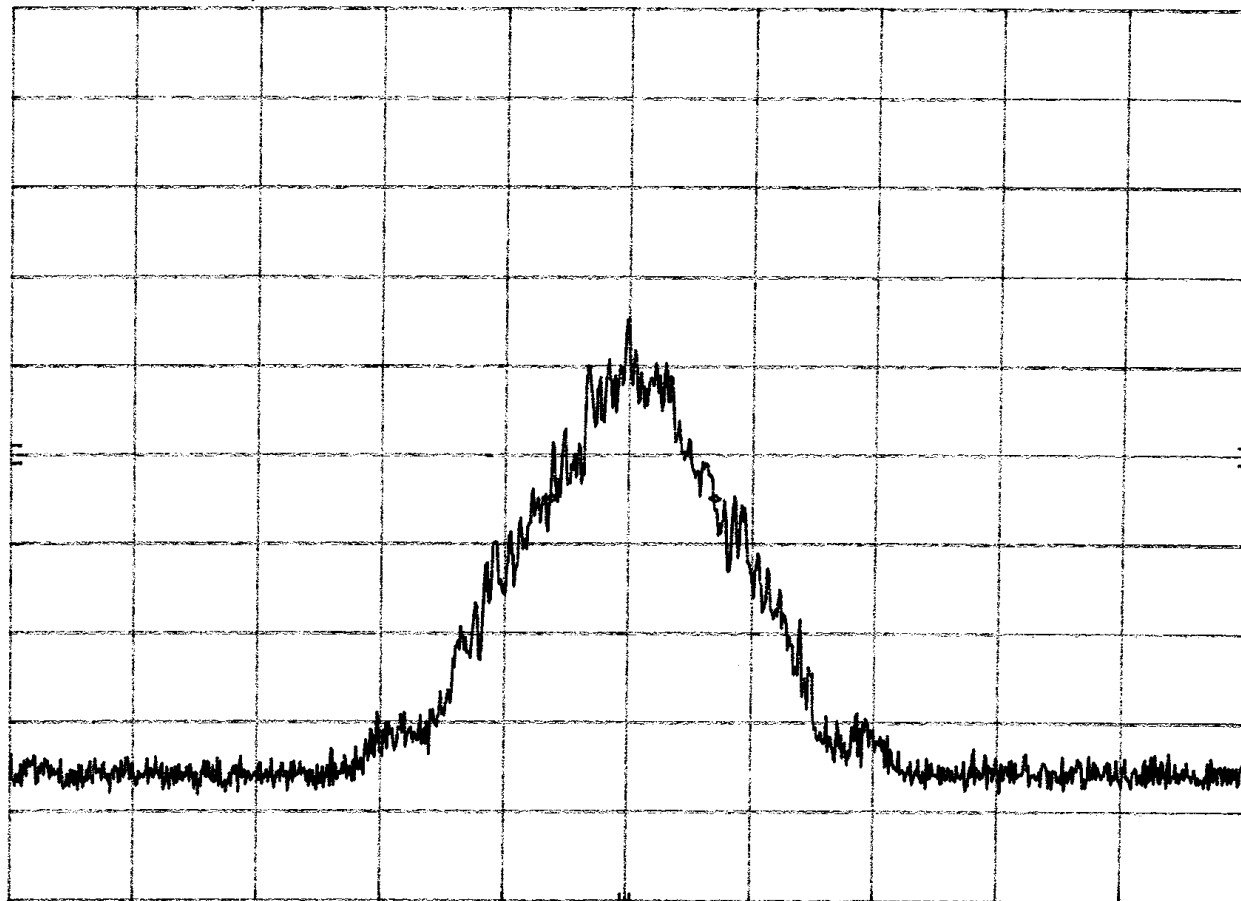
0.00 dB

*HP* REF 100.0 dB $\mu$ V ATTEN 10 dB

10 dB/

POS PK

CORR'D



CENTER 2.442 00 GHz

RES BW 10 KHz (1)

VBW 10 KHz

SPAN 5.00 MHz

SWP 375 msec

Hughes SC-202038

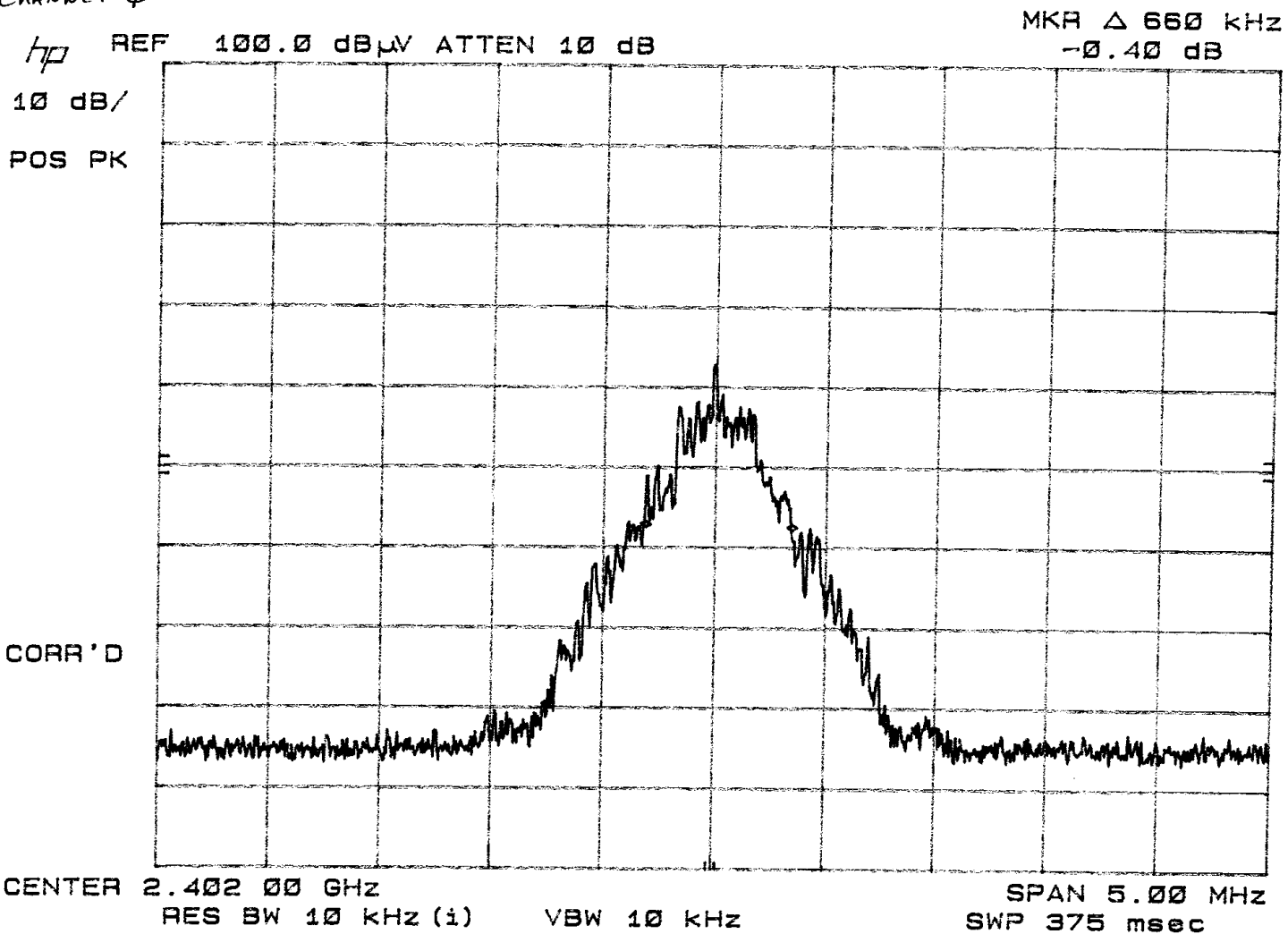
INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002

47 CFR Part 15.247 (a)(1)(ii) 20 dB Bandwidth < 1 MHz

Test Room:SR2 / TEST ENGR: AAL *AK*

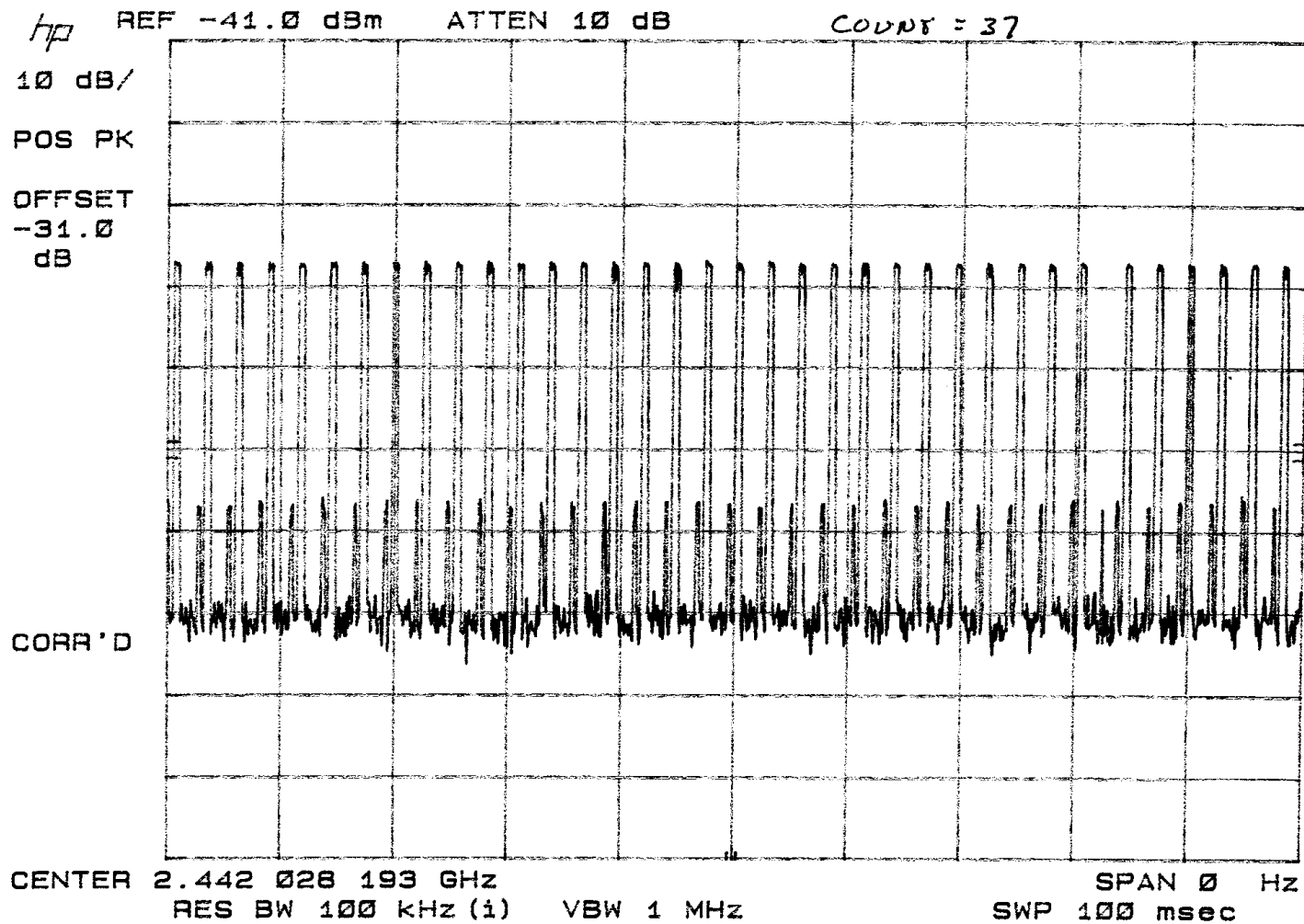
Channel  $\phi$



Hughes SC-202038  
47 CFR Part 15.247 Duty Cycle

INMARSAT EARLY ENTRY TERMINAL

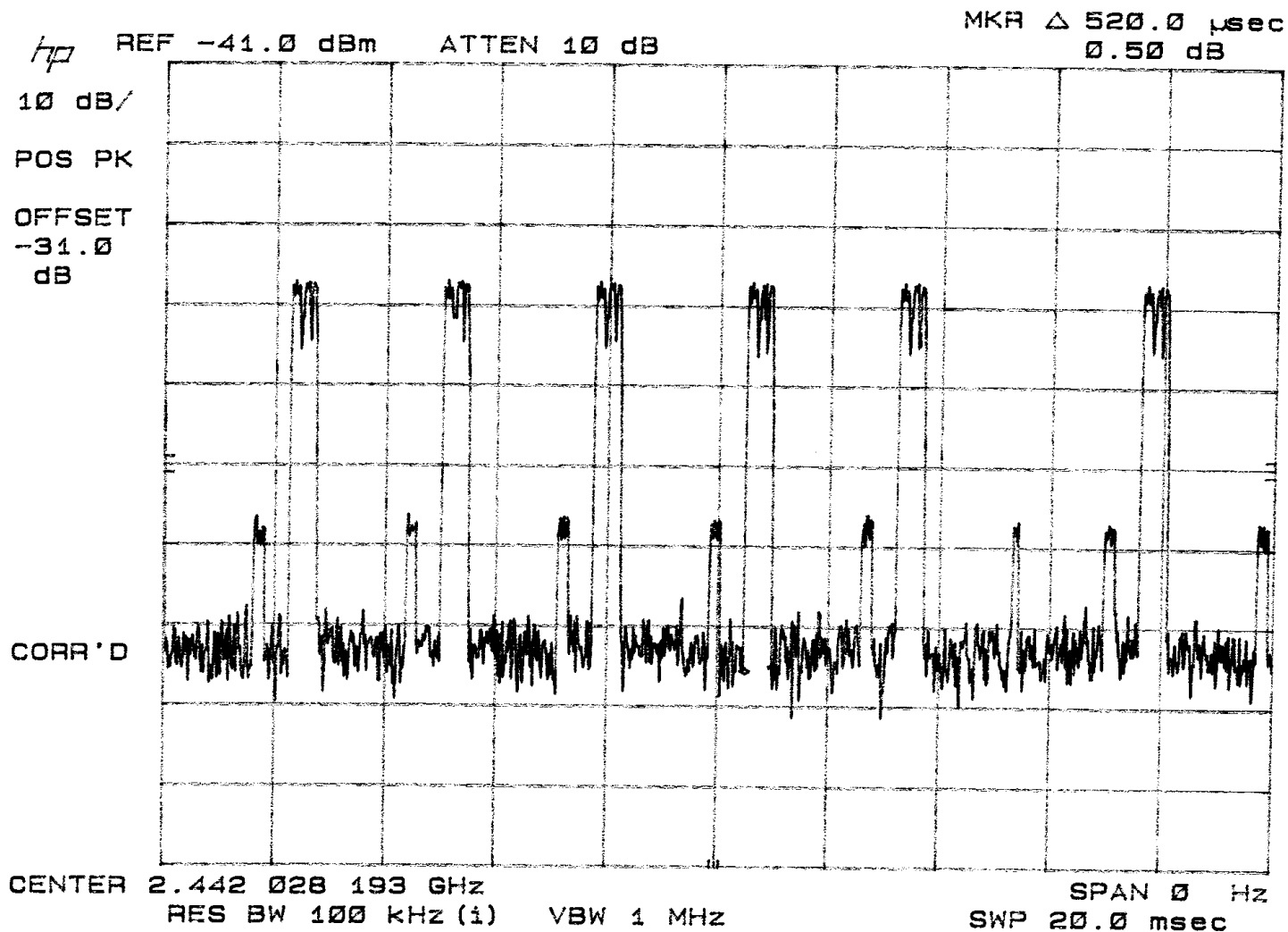
Sept. 24, 2002  
Test Room: SR2 / TEST ENGR: AAL *KAF*



Hughes SC-202038  
47 CFR Part 15.247 Duty Cycle

INMARSAT EARLY ENTRY TERMINAL

Sept.24, 2002  
Test Room:SR2 / TEST ENGR: AAL *AS*



Report No. SC202038-03A

## 8.0 ATTESTATION STATEMENT

### GENERAL REMARKS:

### SUMMARY:

All tests were performed per CFR 47, Part(s) 15.209(a); 15.247(a); 15.247(b); 15.247(c)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 15.209(a); 15.247(a); 15.247(b); 15.247(c)

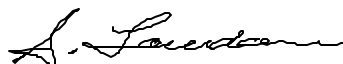
- TÜV AMERICA, INC. -

Responsible Engineer:



Jim Owen  
(EMC Chief Engineer)

Responsible Technician:



Alan Laudani  
(EMC Technician)