Integrated Advanced Microwave Sounding Unit-A (AMSU-A)
Engineering Test Report
Radiated Emissions and SARR, SARP, DCS Receivers, Link Frequencies EMI Sensitive Band
Test Results, AMSU-A1, S/N 109

Contract No. NAS 5-32314
CDRL 207

Submitted to:
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Submitted by:
Aerojet
1100 West Hollyvale Street
Azusa, California 91702
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TABLE OF CONTENTS

1. INTRODUCTION ......................................................................................................................... 1
   1.1 General ...................................................................................................................................... 1
   1.2 Purpose ..................................................................................................................................... 1
   1.3 Scope ......................................................................................................................................... 1
   1.4 Summary of Test Results ......................................................................................................... 1

2. TEST PROGRAM .......................................................................................................................... 2
   2.1 Test Article ............................................................................................................................... 2
   2.2 Test Starting and Completion Dates .......................................................................................... 2
   2.3 Instrumentation ........................................................................................................................ 2
   2.4 Test Frequencies ...................................................................................................................... 2
   2.5 Operational Mode .................................................................................................................... 4
   2.6 Test Location ............................................................................................................................ 4
   2.7 Test Procedure ........................................................................................................................ 4
   2.8 Test Results .............................................................................................................................. 6

3. SUPPLEMENTARY INFORMATION ......................................................................................... 8
   3.1 Supplementary Information ..................................................................................................... 8

TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>SARR, SARP, DCS Receiver Channel Guard Limits</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>METSAT Special Frequencies</td>
<td>4</td>
</tr>
</tbody>
</table>

FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radiated Narrowband Limits for Electric Field Emissions METOP Only</td>
<td>7</td>
</tr>
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</table>
1. INTRODUCTION

1.1 General
This document contains the procedures and test results of the radiated emissions tests performed on the AMSU-A1 instrument, part number 1331720-2, serial number 109. The test was performed as described in paragraph 3.4.6 of AE-26151/5E Test Procedure, Electromagnetic Interference (EMI)/Electromagnetic Radiation (EMR) and Electromagnetic Compatibility (EMC) for Advanced Microwave Sounding Unit-A (AMSU-A), dated 11 February 1999.

1.2 Purpose
The purpose of this report is to describe the tests performed and to present the backup data collected to verify that the AMSU-A1 instrument meets the specified requirements. The tests performed encompass the discrete frequencies of the DCS, SARR, and SARP sensitive bands described in paragraph 3.6.1.4.1 of the Interface Specification, IS-3267415. In addition, the METOP requirements for the Advanced Microwave Sounding Unit-A1, Instrument Interface Control Document, MO-IC-MMT-A1-0001, paragraph 4.3.1.3.3, were incorporated. The requirement consisted of the radiated emissions per test method RE02, 14 kHz to 18 GHz, and the discrete frequencies of Table 4.3.1.3-2 in the ICD. This requirement is presented in Figure 1 of this document.

1.3 Scope
This document describes the test performed by Aerojet, and it is presented in the following manner:

Section 1 Contains general introductory material and a summary of the test results.
Section 2 Contains a detailed description of the test plan, test procedure, and test results.
Section 3 Contains supplementary test information, pertinent test data, and the list of test equipment used.

1.4 Summary of Test Results
2. TEST PROGRAM

2.1 Test Article
The AMSU-A system passively monitors radiation from the earth's surface and atmosphere in the microwave portion of the spectrum. The instruments incorporate fifteen total-power super heterodyne type radiometers. The system is composed of two independent instruments. The module designated as AMSU-A2 contains the two lowest-frequency channels, i.e., Channel 1 has the 23.8 GHz frequency and Channel 2 has the 31.4 GHz frequency. The module designated as AMSU-A1 contains the thirteen remaining channels with frequencies from 50.3 GHz to 89 GHz.

Periodic on-board calibration is accomplished by using an in-flight blackbody calibration and cold space as energy reference sources. During each scan, the shrouded reflector observes 30 earth scene cells with one sample period each and two calibration target cells with two sample periods each. Complete end-to-end in-flight calibration from the antenna to the AMSU-A instrument output is provided for each channel. This will yield the maximum in-flight calibration accuracy that gives the radiometric data the required sensitivity and precision.

At each frequency, the half power antenna beamwidth is a constant 3.33°. Thirty contiguous scene resolution cells spaced 3.33° along the scan line are sampled in a stepped-scan fashion every eight seconds. The scan covers 50° on each side of the satellite path.

2.2 Test Starting and Completion Dates
The AMSU-A1 instrument, serial number 109, was tested between December 17 and 22, 1999.

2.3 Instrumentation
All instrumentation were suitable for the purpose intended. Each instrument used was within its certification period. Instrumentation accuracy was verified by calibration in accordance with MIL-STD-45662 as implemented and controlled by Aerojet standard operating procedures. The attached Test Data Sheet 2, in Section 3, contains the list of the equipment with pertinent traceability information.

2.4 Test Frequencies
The test frequencies were selected from paragraph 3.6.1.4.1 of the interface specification, IS-3267415, and are listed in Tables I and II. The RE02 METOP requirements are presented in Figure 1 and the table within the figure.
<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Radiation Limit (dBm)</th>
<th>E-Field Limit * (dB μV/m)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>118.00 - 120.00</td>
<td>-100</td>
<td>18.9</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>120.00 - 121.450</td>
<td>-125</td>
<td>-6</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>121.450 - 121.485</td>
<td>-145</td>
<td>-26</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>121.485 - 121.515</td>
<td>-150</td>
<td>-31</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>121.515 - 121.550</td>
<td>-145</td>
<td>-26</td>
<td>121.5 MHz</td>
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<tr>
<td>121.550 - 123.000</td>
<td>-125</td>
<td>-5.9</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>123.000 - 125.000</td>
<td>-100</td>
<td>19.2</td>
<td>121.5 MHz</td>
</tr>
<tr>
<td>236.000 - 240.000</td>
<td>-100</td>
<td>24.9</td>
<td>243.0 MHz</td>
</tr>
<tr>
<td>240.000 - 242.925</td>
<td>-125</td>
<td>0</td>
<td>243.0 MHz</td>
</tr>
<tr>
<td>242.925 - 242.975</td>
<td>-145</td>
<td>-20</td>
<td>243.0 MHz</td>
</tr>
<tr>
<td>242.975 - 243.025</td>
<td>-150</td>
<td>-25</td>
<td>243.0 MHz</td>
</tr>
<tr>
<td>243.025 - 243.075</td>
<td>-145</td>
<td>-20</td>
<td>243.0 MHz</td>
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<td>243.075 - 246.000</td>
<td>-125</td>
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<td>243.0 MHz</td>
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<td>246.000 - 250.000</td>
<td>-100</td>
<td>25.3</td>
<td>243.0 MHz</td>
</tr>
<tr>
<td>385.100 - 401.100</td>
<td>-100</td>
<td>29.4</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>401.100 - 405.900</td>
<td>-125</td>
<td>4.5</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>405.900 - 406.000</td>
<td>-145</td>
<td>-15.5</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>406.000 - 406.100</td>
<td>-150</td>
<td>-20.5</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>406.100 - 406.200</td>
<td>-145</td>
<td>-15.5</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>406.200 - 411.000</td>
<td>-125</td>
<td>4.6</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>411.000 - 425.000</td>
<td>-100</td>
<td>29.9</td>
<td>406.05 MHz</td>
</tr>
<tr>
<td>396.000 - 401.500</td>
<td>-125</td>
<td>4.4</td>
<td>401.65 MHz</td>
</tr>
<tr>
<td>401.500 - 401.600</td>
<td>-145</td>
<td>-15.6</td>
<td>401.65 MHz</td>
</tr>
<tr>
<td>401.600 - 401.700</td>
<td>-150</td>
<td>-20.6</td>
<td>401.65 MHz</td>
</tr>
<tr>
<td>401.700 - 401.800</td>
<td>-145</td>
<td>-15.6</td>
<td>401.65 MHz</td>
</tr>
<tr>
<td>401.800 - 406.000</td>
<td>-125</td>
<td>4.5</td>
<td>401.65 MHz</td>
</tr>
</tbody>
</table>

* E-field limits have been calculated by METOP and are for reference only. The following formula has been applied for translating Power levels to Field strength levels.

\[
E[\text{dB}_\mu\text{V/m}] = P[\text{dBm}] - Gr[\text{dB}] + 20 \log(f[\text{Hz}]) - 42.7
\]

where \( P \) is the received power, \( Gr \) is the gain of the receiving antenna and \( f \) is the frequency. Note that \( Gr \) has arbitrarily been set to 0 dB (isotropic) in calculating the above levels. E-field limits would have to be adjusted to reflect actual antenna characteristics.
Table II  METSAT Special Frequencies

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Receiver/Ampl Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>59.458 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>60.10 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>141.360 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>142.9 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>282.733 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>285.813 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>371.921 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>375.972 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>624.925 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>631.730 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>743.841 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>751.944 MHz ±0.5 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>121.5 MHz ±15 kHz *</td>
<td>-150 dBm (Bandwidth 100 Hz)</td>
</tr>
<tr>
<td>243 MHz ±25 kHz *</td>
<td>-150 dBm (Bandwidth 100 Hz)</td>
</tr>
<tr>
<td>401.650 MHz ±50 kHz *</td>
<td>-150 dBm (Bandwidth 100 Hz)</td>
</tr>
<tr>
<td>406.05 MHz ±50 kHz *</td>
<td>-150 dBm (Bandwidth 100 Hz)</td>
</tr>
<tr>
<td>2010-2040 MHz</td>
<td>-120 dBm</td>
</tr>
</tbody>
</table>

* METOP replaces these frequencies with the frequencies in Table I.

2.5 Operational Mode
The AMSU-A1 instrument was tested in the IN-ORBIT (full scan) mode of operation. In this mode, the antenna is rotating continuously and all the circuits are working. The maximum electric field radiated emissions are produced in this mode of operation.

2.6 Test Location
This test was conducted in the shielded enclosure located in Building 183 of the Aerojet test facility.

2.7 Test Procedure
This test procedure insures that the AMSU-A1 instrument can demonstrate compliance in meeting the radiated emissions limits presented in Figure 1, and Tables I and II. The test procedure that was followed during conduction of the test conforms with the Process Specification, Test Procedure, Electromagnetic Interference (EMI)/Electromagnetic Radiation (EMR) and Electromagnetic Compatibility (EMC) for Advanced Microwave Sounding Unit-A (AMSU-A), document number AE-26151/5E paragraph 3.4.6.
The steps that were followed during the conduct of the test are the following:
Step 1. Connect the antenna to the proper receiver/amplifier port. Verify that the AMSU-A is operating in the IN ORBIT mode.

Step 2. Allow the EMC test equipment to warm up for a minimum of 10 minutes.

Step 3. Program the spectrum analyzer system (HP 8566B) to automatically scan and plot all narrowband data from 14 kHz to 1 GHz, switching the appropriate antenna/amplifier throughout the frequency range.

Step 4. All data shall be below the limits shown in Figure 8 (AE-26151/5E). If any emissions are observed to exceed the limit line, command the computer to print the measured levels.

Step 5. If any narrowband signals exceed the limits, perform an ambient test and determine the source of the emanations. Reduce or eliminate the source, if external to the AMSU-A instrument, and repeat the test.

Step 6. Set up horn antenna (RGA-180) one meter from the point of maximum radiation.

Step 7. Self-calibrate the signal analyzer.

Step 8. Sweep throughout the frequency range of 1 to 18 GHz, in a minimum of two ranges, recording the observed narrowband emission levels.

Step 9. All data shall be below the limits shown on Figure 8 (AE-26151/5E); if not, perform step 5.

Step 10. Affix all plots, photos, calculations, and related information to TDS 2.

Step 11. After disconnecting the horn antenna, set the signal analyzer to one of the four frequencies listed in 3.4.6 (AE-26151/5E) with the appropriate frequency span.

Step 12. Activate the series preamplifier (HP 71210 of the spectrum analyzer (HP 71200)) and reduce the test equipment bandwidth to 10 kHz or less until the appropriate sensitivity is attained.

Step 13. Program the signal analyzer for noise averaging to a minimum of eight times. Verify that the sensitivity noise level is below the required level.

Step 14. Connect the antenna to the signal analyzer amplifier input.

Step 15. The measurement should be within the ambient level, and no narrowband frequencies should be detected at the specified frequency above the sensitivity level specified in 3.4.6 (AE-26151/5E). Plot the screen presentation.

Step 16. Repeat steps 11 through 15 while performing a measurement on the remaining frequencies.

Step 17. Record the information regarding the test on TDS 2 and attach all plots, photos, calculations, and other related information.

Step 18. Repeat steps 11 through 15 while performing measurements on the frequencies depicted on Table III (AE-26151/5E).

Step 19. Repeat step 17.

NOTE: Reference to "frequencies listed in 3.4.6 (AE-26151/5E)" means Table II of this document. Reference to "Figure 8 (AE-26151/5E)" is the same as Figure 1 of this document. Reference to "Table III" is the same as Table I of this document.
2.8 Test Results

No radiated emissions were recorded above the specified sensitivity levels. The emissions detected were ambient emissions produced by the Halon System. Some emissions were introduced into the shielded enclosure via the interconnect cables. In this case, the cables were moved to an area of minimum emissions, i.e., until the detected emissions were below the specified level.

The recorded data is presented in this order:

Plots 1 through 14 Cover the frequency range from 118.00 MHz to 125.00 MHz. The odd numbered plots represent the antenna in the horizontal position. The even numbered plots represent the antenna in the vertical position. The emission that approximated the limit was a signal at 121.499 MHz, 0.12 dBm below limit with the antenna in the vertical position. See plot 8.

Plots 15 through 21 Cover the frequency range from 236.00 MHz to 250 MHz. The test was conducted with a circularly polarized antenna, for this and all subsequent measurements above 200 MHz. The emission that approximated the limit, in this frequency range, was a signal at 243.023 MHz, 0.60 dB below the limit. See plot 18.

Plots 22 through 28 Cover the frequency range from 385.10 MHz to 425.00 MHz. The emission that neared the limit was detected at 409.992 MHz, 0.16 dB below the limit. See plot 27.

Plots 29 through 33 Cover the frequency range from 396.00 MHz to 406.00 MHz. The detected emission that approximated the limit was a signal at 401.626 MHz, 0.11 dB below the limit.

Plots 34 and 35 Represent the telemetry frequency of 2.010 to 2.040 GHz. All detected emissions in this frequency are a minimum of 4 dB below the limit. This test was performed in the horizontal and vertical polarization of the double-ridged guide antenna. See plot 34.

Plots 36 through 51 Contain the twelve special frequencies from 59.458 MHz to 751.944 MHz listed in Table II. The frequencies between 59.458 to 142.9 MHz were tested with the antenna in two polarities. All recorded emissions were detected over 33 dB below the limit.

Plots 52 through 57 These plots present the test method RE02, electric field emissions, throughout the frequency range of 14 kHz to 18 GHz. The frequency ranges of 30 MHz to 200 MHz and 1 to 18 GHz were performed with the antenna in two polarities. The emission that nears the specification, i.e., 11 dB below the limit was detected at 18 MHz. See plot 52.

Plots 58 through 68 Cover the METOP special frequencies listed in Figure 1. The frequency range between 400 and 500 MHz was measured with a circularly polarized antenna. The levels were 15 dB below the limit. The other five frequencies between 1217 and 5852 MHz were tested with the double-ridged guide antenna in two polarities. The recorded emission that approximates the limit was recorded at 2.052 GHz where the level is 7.04 dB below the limit. See plot 63.
Figure 1 Radiated Narrowband Limits for Electric Field Emissions METOP Only
3. SUPPLEMENTARY INFORMATION

3.1. Supplementary Information
This section contains the Test Data Sheet, Plots, and the equipment list.
**TEST DATA SHEET 2 (Sheet 1 of 3)**

3.4.6: RE02 Test

Test Setup Verified: [Signature]

### 3.4.6.3.1 Step 1: Test Equipment Log

<table>
<thead>
<tr>
<th>Item</th>
<th>Manufacturer</th>
<th>Model/Part No.</th>
<th>Aerojet Inventory No.</th>
<th>Calibration Date</th>
<th>Calibration Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectrum Analyzer</td>
<td>HP</td>
<td>70004 A</td>
<td>55447</td>
<td>10-19-99</td>
<td>5-19-00</td>
</tr>
<tr>
<td>Plotter</td>
<td>HP</td>
<td>9490 A</td>
<td>57760</td>
<td>CNR</td>
<td>CNR</td>
</tr>
<tr>
<td>Spectrum Analyzer</td>
<td>HP</td>
<td>8566 B</td>
<td>54861</td>
<td>11-20-99</td>
<td>6-20-00</td>
</tr>
<tr>
<td>Active Rod Antenna</td>
<td>EMCO</td>
<td>9301 B</td>
<td>55635</td>
<td>1-7-99</td>
<td>1-7-00</td>
</tr>
<tr>
<td>Biconical Antenna</td>
<td>EMCO</td>
<td>98110</td>
<td>C200224</td>
<td>2-24-99</td>
<td>2-24-00</td>
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<tr>
<td>Biconical Antenna</td>
<td>EMCO</td>
<td>3110</td>
<td>55361</td>
<td>11-11-99</td>
<td>11-11-00</td>
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<tr>
<td>Double Ridged Guide Antenna</td>
<td>Electro Metrics</td>
<td>86180</td>
<td>L508357</td>
<td>11-11-99</td>
<td>11-11-00</td>
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<tr>
<td>Log Conical Antenna</td>
<td>Electro Metrics</td>
<td>LC425</td>
<td>L508358</td>
<td>2-25-99</td>
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<td>Computer</td>
<td>HP</td>
<td>9836</td>
<td>16134-15</td>
<td>CNR</td>
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<tr>
<td>Plotter</td>
<td>HP</td>
<td>7475 A</td>
<td>47417</td>
<td>CNR</td>
<td>CNR</td>
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<tr>
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<td>HP</td>
<td>2671 G</td>
<td>07202</td>
<td>CNR</td>
<td>CNR</td>
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<tr>
<td>Amplifier</td>
<td>HP</td>
<td>8441 F</td>
<td>0p H64</td>
<td>C200230</td>
<td>9-15-99</td>
</tr>
<tr>
<td>Amplifier, Microwave</td>
<td>HP</td>
<td>8449 B</td>
<td>C200203</td>
<td>8-9-97</td>
<td>8-9-00</td>
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</table>
### 3.4.6.3.2: Emission Measurements

<table>
<thead>
<tr>
<th>Step</th>
<th>Antenna/Frequency</th>
<th>Band</th>
<th>Required</th>
<th>Emissions within limits?</th>
<th>Comments/Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>All except Horn</td>
<td>Narrow</td>
<td>See Figure 6</td>
<td>✓</td>
<td>52 &amp; 53</td>
</tr>
<tr>
<td></td>
<td>14 kHz to 1 GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>All except Horn</td>
<td>Bread</td>
<td>See Figure 6</td>
<td>✓</td>
<td>54 &amp; 65</td>
</tr>
<tr>
<td></td>
<td>14 kHz to 1 GHz</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Horn, RGA-180</td>
<td>Narrow</td>
<td>See Figure 6</td>
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<td>54 &amp; 65</td>
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<tr>
<td></td>
<td>1 to 2 GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Biconical, EMCO 3104</td>
<td>Narrow</td>
<td>No narrow-band freq. &gt; -150 dBm</td>
<td>✓</td>
<td>7 &amp; 8</td>
</tr>
<tr>
<td></td>
<td>121.5 MHz with Ampl</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Log Conical, EMCO 3101</td>
<td>Narrow</td>
<td>No narrow-band freq. &gt; -150 dBm</td>
<td>✓</td>
<td>18, 25, &amp; 31</td>
</tr>
<tr>
<td></td>
<td>243 MHz, 401.65 MHz, &amp; 406.05 MHz with Ampl</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Horn, RGA-180</td>
<td>Narrow</td>
<td>No narrow-band freq. &gt; -120 dBm</td>
<td>✓</td>
<td>34 &amp; 35</td>
</tr>
<tr>
<td></td>
<td>2010 to 2040 MHz with Ampl</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Biconical/Log Conical</td>
<td>Narrow</td>
<td>No narrow-band freq. &gt; -60 dBm</td>
<td>✓</td>
<td>34 Through 51</td>
</tr>
<tr>
<td></td>
<td>59.458 to 751.944 MHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>400 to 500 MHz</td>
<td>Narrow</td>
<td>-107.1 dBm</td>
<td>✓</td>
<td>58</td>
</tr>
<tr>
<td>21</td>
<td>102 to 18 GHz</td>
<td>Narrow</td>
<td>Figure 3</td>
<td>✓</td>
<td>56 &amp; 51</td>
</tr>
<tr>
<td>21</td>
<td>1217 to 1227 MHz</td>
<td>Narrow</td>
<td>-111.8 dBm</td>
<td>✓</td>
<td>59 &amp; 60</td>
</tr>
<tr>
<td>21</td>
<td>1565 to 1614 MHz</td>
<td>Narrow</td>
<td>-111.2 dBm</td>
<td>✓</td>
<td>61 &amp; 62</td>
</tr>
<tr>
<td>21</td>
<td>2051.9 to 2055 MHz</td>
<td>Narrow</td>
<td>-126.7 dBm</td>
<td>✓</td>
<td>68 &amp; 64</td>
</tr>
<tr>
<td>21</td>
<td>5254.7 to 5255.3 MHz</td>
<td>Narrow</td>
<td>-122.8 dBm</td>
<td>✓</td>
<td>65 &amp; 66</td>
</tr>
<tr>
<td>21</td>
<td>5450 to 5825 MHz</td>
<td>Narrow</td>
<td>-80.7 dBm</td>
<td>✓</td>
<td>67 &amp; 68</td>
</tr>
</tbody>
</table>

**NOTE:** Attach all backup data generated during the test (photos, printouts, plots, test logs, additional comments or observations, etc.) to this data sheet.
### 3.4.6.3.2: Emission Measurements

<table>
<thead>
<tr>
<th>Step</th>
<th>Antenna*/Frequency Range (MHz)</th>
<th>Band</th>
<th>Radiation Limit (dBm)</th>
<th>Emissions within limits?</th>
<th>Comments/Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>118.000 - 120.000</td>
<td>Narrow</td>
<td>-100 / Table IV</td>
<td>Yes</td>
<td>142</td>
</tr>
<tr>
<td>22</td>
<td>120.000 - 121.450</td>
<td>Narrow</td>
<td>-125 / Table IV</td>
<td>Yes</td>
<td>864</td>
</tr>
<tr>
<td>22</td>
<td>121.450 - 121.485</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>864</td>
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<tr>
<td>22</td>
<td>121.515 - 121.550</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>9710</td>
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<td>22</td>
<td>121.550 - 123.000</td>
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<td>-125 / Table IV</td>
<td>Yes</td>
<td>11712</td>
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<td>Narrow</td>
<td>-100 / Table IV</td>
<td>Yes</td>
<td>13714</td>
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<td>23</td>
<td>236.000 - 240.000</td>
<td>Narrow</td>
<td>-100 / Table IV</td>
<td>Yes</td>
<td>15</td>
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<tr>
<td>23</td>
<td>240.000 - 242.925</td>
<td>Narrow</td>
<td>-125 / Table IV</td>
<td>Yes</td>
<td>16</td>
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<tr>
<td>23</td>
<td>242.925 - 242.975</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>17</td>
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<td>23</td>
<td>243.025 - 243.075</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>19</td>
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<td>243.075 - 246.000</td>
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<td>-125 / Table IV</td>
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<td>20</td>
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<td>246.000 - 250.000</td>
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<td>23</td>
<td>385.100 - 401.100</td>
<td>Narrow</td>
<td>-100 / Table IV</td>
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<td>22</td>
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<tr>
<td>23</td>
<td>401.100 - 405.900</td>
<td>Narrow</td>
<td>-125 / Table IV</td>
<td>Yes</td>
<td>23</td>
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<td>23</td>
<td>405.900 - 406.000</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>24</td>
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<td>23</td>
<td>406.100 - 406.200</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
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<td>23</td>
<td>406.200 - 411.00</td>
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<td>-125 / Table IV</td>
<td>Yes</td>
<td>27</td>
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<td>23</td>
<td>411.000 - 425.000</td>
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<td>-100 / Table IV</td>
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<td>396.000 - 401.500</td>
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<td>-125 / Table IV</td>
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<td>23</td>
<td>401.500 - 401.600</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
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<td>30</td>
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<td>23</td>
<td>401.700 - 401.800</td>
<td>Narrow</td>
<td>-145 / Table IV</td>
<td>Yes</td>
<td>32</td>
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<td>23</td>
<td>401.800 - 406.000</td>
<td>Narrow</td>
<td>-125 / Table IV</td>
<td>Yes</td>
<td>33</td>
</tr>
</tbody>
</table>

* All frequency ranges are to be performed with antenna in both vertical and horizontal polarization.

**Unit**: AMSU-A1 1391720-3

**Serial No.**: 109

**Shop Order**: 787921  Oper 50-0-00

**Signature/Date**: 22 Dec 99

**Engineer**: [Signature]

**Quality Control**: [Signature]

**Customer Representative**: [Signature]
13:38:38 DEC 17, 1999 REDZ SARR & SARP PLOT 2
RL -40.00 dBm Ant. Vertical MKR #1 FRQ 119.995 MHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
119.995 MHz -108.99 dBm

AMSU-A1 SAMPLE
1581720-3
SN 104
S0 7879.21
OP 50-0-00
AE 2615/52
Par 346

-100 dBm

START 118.000 MHz STOP 120.000 MHz
*RB 1.00 kHz VB 1.00 kHz ST 6.000 sec
13:41:06 DEC 17, 1999 REOZ SARR & SARP
RL -80.00 dBm Ant Vertical MKR #1 FRQ 120.268 MHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
120.268 MHz  -128.74 dBm

-125 dBm

START 120.000 MHz
STOP 121.450 MHz

*RB 1.00 kHz VB 1.00 kHz ST 4.350 sec
12:57:45 DEC 17, 1999 RE02 SARR & SARP PLOTS

RL -80.00 dBM Ant. Horizontal: MKR #1 FRQ 121.460 63 MHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
121.460 63 MHz
-145.51 dBM

START 121.450 00 MHz STOP 121.485 00 MHz
*RB 30.0 Hz *VB 10.0 kHz ST 116.7 sec

SAMPLE
AMSU-A1
13817220-5
SN 109
50 787921
Op 50-0-00
AE 26151/5E
Par 5.4.6

Signatures

-145 dBm
13:59:11 DEC 17, 1999
REOZ SARR & SARP
PLOT
RL -80.00 dBm Ant Vertical MKR #1 FRQ 121.472 01 MHz
*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS
MARKER
121.472 01 MHz
-146.05 dBm

AMSU-A1 SAMPLE
1381720-3
SH 109
50 787921
OP 50-0-00
AE 26157/5E
Ver 3.4.6

START 121.450 00 MHz
STOP 121.485 00 MHz
*RB 30.0 Hz VB 30.0 Hz
ST 116.7 sec
Date: 13:26:41 DEC 17, 1999

RL: -80.00 dBm
Ant. Horizontal MKR #1 FRQ 121.536 26 MHz

*ATTEN 0 dB
10.00 dB/DIV

AEROJET ELECTRONIC SYSTEMS

MARKER
121.536 26 MHz
-145.49 dBm

1

8

-145 dBm

START 121.515 00 MHz
STOP 121.550 00 MHz

*RB 30.0 Hz  VB 30.0 Hz
ST 116.7 sec

Sample:
AMSU-A1
1531720-3
SN 109
5078792
DP 5D-0-00
AE 26/31/92
Par 54.6

Signature:
14:51:19 DEC 17, 1999  REOZ  SARR  &  SARP  PLOT 12
RL -80.00 dBm Ant. Vertcal  MKR #1 FRQ 122.498 MHz

*ATTEN 0 dB
10.00 dB/DIV  AEROJET ELECTRONIC SYSTEMS

MARKER
122.498 MHz
-129.79 dBm

-125 dBm

START 121.550 MHz  STOP 123.000 MHz
*RB 1.00 kHz  VB 1.00 kHz  ST 4.350 sec
13:32:22 DEC 17, 1999 RE02 SARR & SARP PLOT 13
RL -40.00 dBm Ant. Horizontal MKR #1 FRQ 124.998 MHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
124.998 MHz
-120.83 dBm

1

8

-100 dBm

START 123.000 MHz
STOP 125.000 MHz
*RB 1.00 kHz VB 1.00 kHz ST 6.000 sec

AMSU-A1 SAMPLE
1831720-3
SN 107
50 787921
OP 50-5-00
AE 2015/5E
Par 3.4.6

[Signature]
<table>
<thead>
<tr>
<th><strong>ATTEN</strong> 0 dB</th>
<th>-125.45 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00 dB/DIV</td>
<td>AEROJET ELECTRONIC SYSTEMS</td>
</tr>
<tr>
<td>MARKER</td>
<td>AMSU-A1 SAMPLE</td>
</tr>
<tr>
<td>124.998 MHz</td>
<td>SD 787921</td>
</tr>
<tr>
<td>-125.45 dBm</td>
<td>Op 50-0-00</td>
</tr>
<tr>
<td></td>
<td>AE 24151/3E</td>
</tr>
<tr>
<td></td>
<td>Par 8.4.6</td>
</tr>
</tbody>
</table>

**Plot Details:**
- **Start:** 123.000 MHz
- **Stop:** 125.000 MHz
- **RB:** 1.00 kHz
- **VB:** 1.00 kHz
- **ST:** 6.000 sec
<table>
<thead>
<tr>
<th>ATTEN</th>
<th>0 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00 dB/DIV</td>
<td>AEROJET ELECTRONIC SYSTEMS</td>
</tr>
<tr>
<td>MARKER</td>
<td></td>
</tr>
<tr>
<td>236.250 MHz</td>
<td></td>
</tr>
<tr>
<td>-125.78 dBm</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-100 dBm</td>
<td></td>
</tr>
</tbody>
</table>

START 236.000 MHz  STOP 240.000 MHz
* RB 10.0 kHz  VB 10.0 kHz  ST 120.0 msec
**Plot 16**

**RL**: -80.00 dBm

**MKR #1 FRQ**: 241.920 MHz

**ATTEN**: 0 dB

**10.00 dB/DIV**

**MARKER**

- **FREQ**: 241.920 MHz
- **Level**: -136.85 dBm

**SAMPLE**

- **Model**: AMSU-A1
- **Serial**: 1881720-3
- **SN**: 104
- **Date**: 07/07/92
- **Op**: 600-00
- **LE**: 26/151/5E
- **PA**: 84.8

**START** 240.000 MHz

**STOP** 242.925 MHz

**RB**: 1.00 kHz

**VB**: 1.00 kHz

**ST**: 8.775 sec
<table>
<thead>
<tr>
<th>Plot 19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RL -80.00 dBm</strong></td>
</tr>
<tr>
<td><strong>MKR #1 FRQ 243.072 56 MHz</strong></td>
</tr>
<tr>
<td><strong>-146.02 dBm</strong></td>
</tr>
<tr>
<td><strong>MARKER</strong></td>
</tr>
<tr>
<td><strong>243.072 56 MHz</strong></td>
</tr>
<tr>
<td><strong>-146.02 dBm</strong></td>
</tr>
<tr>
<td><strong>START 243.025 00 MHz</strong></td>
</tr>
<tr>
<td><strong>STOP 243.075 00 MHz</strong></td>
</tr>
<tr>
<td>*<strong>RB 30.0 Hz</strong></td>
</tr>
<tr>
<td><strong>VB 30.0 Hz</strong></td>
</tr>
<tr>
<td><strong>ST 166.7 sec</strong></td>
</tr>
</tbody>
</table>
14:41:19 DEC 20, 1999 REO2 SARR 4 SARP PLOT 20
RL -80.00 dBm
MKR #1 FRQ 244.995 MHz
*ATTEN 0 dB
10.00 dB/DIV

MARKER
244.995 MHz
-125.82 dBm

-125 dBm

START 243.075 MHz
STOP 246.000 MHz
*RB 1.00 kHz
VB 1.00 kHz
ST 0.775 sec
RL -40.00 dBm

*ATTEN 0 dB
10.00 dB/DIV

RES BANDWIDTH
100 kHz

-115.80 dBm

AMSU-A1
1531720-3
SN 109
SD 787921
Op 50-0-00
AE 26151/5E
Par S.4.6

START 385.10 MHz
STOP 401.10 MHz

*RB 100 kHz
VB 100 kHz
ST 10.00 msec
<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency (MHz)</th>
<th>Power (dBm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>403.926</td>
<td>-137.27</td>
</tr>
<tr>
<td>1</td>
<td>403.926</td>
<td>-137.27</td>
</tr>
<tr>
<td>2</td>
<td>403.926</td>
<td>-125</td>
</tr>
</tbody>
</table>

**Notes:**
AMSU-A1 SAMPLE
1831726-3
3N109
50787921
Op 50-0-00
AE 26.151/SE
Par 8.4.6

**Specifications:**
- Start: 401.100 MHz
- Stop: 405.900 MHz
- RB: 1.00 kHz
- VB: 1.00 kHz
- ST: 14.40 sec

**Date and Time:**
09:49:37, Dec 20, 1999

**Reference:**
REO2 SAER $SAER PLOT 23

**Markers:**
MKR #1 FRQ 403.926 MHz

**Gain:**
RL -80.00 dBm
<table>
<thead>
<tr>
<th>ATTEN 0 dB</th>
<th>-147.61 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.00 dB/DIV</td>
<td></td>
</tr>
</tbody>
</table>

### Marker

- **Frequency:** 405.954 MHz
- **Power:** -147.61 dBm

AMSU-A1 Sample

- 1331720-3
- 3N109
- 50767921
- OP 53-0-00
- 1E 24151/5
- Par 344.6

**Scope Settings**

- **Start Frequency:** 405.900 MHz
- **Stop Frequency:** 406.000 MHz
- **RB:** 30.0 Hz
- **VB:** 30.0 Hz
- **ST:** 333.3 sec
<table>
<thead>
<tr>
<th>Marker</th>
<th>Frequency</th>
<th>Power Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>406.045 MHz</td>
<td>-150.88 dBm</td>
<td></td>
</tr>
</tbody>
</table>

**Plot Details:**
- **Date:** DEC 20, 1999
- **Time:** 10:49:39
- **RL:** -80.00 dBm
- **MKR #1 FRQ:** 406.045 MHz
- **Gain:** 0 dB
- **Divider:** 10.00 dB/DIV
- **Sample:** AMSU-A1 1361720-5 SN/109 50787921 OP 50-0-00 AE 26151/5E Par 846
- **Stability:** ST 333.3 sec
- **RB:** 30.0 Hz
- **VB:** 30.0 Hz

**Note:** The graph shows a baseline reading of -150 dBm with a signal line running from 406.000 MHz to 406.100 MHz.
RL -80.00 dBm
MKR #1 FRQ 406.145 3 MHz

*ATTEN 0 dB
10.00 dB/DIV

MARKER

406.145 3 MHz
-147.08 dBm

START 406.100 0 MHz

*RB 30.0 Hz
VB 30.0 Hz

STOP 406.200 0 MHz
ST 333.3 sec
<table>
<thead>
<tr>
<th>ATTN (dB)</th>
<th>Marker</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>422.50 MHz</td>
<td>AMSU-A1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1831720-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SN 109</td>
</tr>
<tr>
<td>10.00 dB/DIV</td>
<td></td>
<td>50 78 79 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Op 30-0-00</td>
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<tr>
<td></td>
<td></td>
<td>4E 26/51/5E</td>
</tr>
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<td></td>
<td></td>
<td>Par 3.46</td>
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</tbody>
</table>

**Plot 28**

**12:33:06 DEC 20, 1999 REOZ SARR & SARP**

**RL:** -40.00 dBm

**MKR #1 FRQ:** 422.50 MHz

**-122.74 dBm**

**START:** 411.00 MHz

**STOP:** 425.00 MHz

**RB:** 30.0 kHz

**VB:** 30.0 kHz

**ST:** 46.64 msec
<table>
<thead>
<tr>
<th>Time</th>
<th>DEC 20, 1999</th>
<th>14:07:40</th>
</tr>
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<td>RL</td>
<td>-80.00 dBm</td>
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<tr>
<td>*ATTEN</td>
<td>0 dB</td>
<td></td>
</tr>
<tr>
<td>10.00 dB/DIV</td>
<td></td>
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<tr>
<td>MARKER</td>
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</tr>
<tr>
<td>Frequency</td>
<td>401.626 MHz</td>
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<tr>
<td>Level</td>
<td>-150.11 dBm</td>
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<td>SAMPLE</td>
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<td>AMSU-A1</td>
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<td>158/1720-3</td>
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<td>SN 109</td>
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<td>SO 78 7921</td>
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<td>OP 50-0-00</td>
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<td>AE 2615115E</td>
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<td>Signature</td>
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<td>Graph</td>
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<tr>
<td>START</td>
<td>401.600 MHz</td>
<td>STOP 401.700 MHz</td>
</tr>
<tr>
<td>*RB</td>
<td>30.0 Hz</td>
<td>VB 30.0 Hz</td>
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<tr>
<td>ST</td>
<td>333.3 sec</td>
<td></td>
</tr>
<tr>
<td>ATTEN 0 dB</td>
<td>10.00 dB/DIV</td>
<td>-147.54 dBm</td>
</tr>
<tr>
<td>MARKER</td>
<td>401.725 1 MHz</td>
<td>-147.54 dBm</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
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</tr>
</tbody>
</table>

-145 dBm

START 401.700 0 MHz
STOP 401.800 0 MHz

*RB 30.0 Hz VB 30.0 Hz ST 333.3 sec

Sample
AMS6-61
1831720-3
SN 109
5D 187921
Op 50-0-00
AE 26151/BE
Par 3.4.0
<table>
<thead>
<tr>
<th>ATTN</th>
<th>0 dB</th>
<th>AEROJET ELECTRONIC SYSTEMS</th>
<th>-126.51 dBm</th>
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</thead>
<tbody>
<tr>
<td>10.00 dB/DIV</td>
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<tr>
<td>MARKER</td>
<td></td>
<td>AMSU-41</td>
<td>SAMPLE</td>
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<td>1331720-3</td>
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<td>SN 107</td>
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<td>2.021 GHz</td>
<td>-126.51 dBm</td>
<td>60 787921</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>05 50-0-00</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>AE 26121/15E</td>
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</tr>
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<td></td>
<td></td>
<td>Par 3.4.6</td>
<td></td>
</tr>
</tbody>
</table>

START 2.010 00 GHz   STOP 2.040 00 GHz
*RB 10.0 kHz  VB 10.0 kHz  ST 900.0 msec
14:32:53 DEC 21, 1999  R002 Special Frequency
RL -40.00 dBm  Ant Vertical  MKR #1 FRQ 2.022 41 GHz

*ATTEN 0 dB
10.00 dB/DIV  AEROJET ELECTRONIC SYSTEMS

MARKER
2.022 41 GHz
-126.63 dBm

SAMPLE
AMSU-A1
138/720-3
SW 109

50 78 79 21
0p 50.0-00
AE 26/51/5E
Par 3.4.6

START 2.010 00 GHz
STOP 2.040 00 GHz
*RB 3.00 kHz  VB 3.00 kHz
ST 10.00 sec
<table>
<thead>
<tr>
<th>Frequency</th>
<th>dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>695 MHz</td>
<td>-3</td>
</tr>
<tr>
<td>59.457 MHz</td>
<td>-9.2</td>
</tr>
<tr>
<td>SPAN 1 kHz</td>
<td>-1</td>
</tr>
<tr>
<td>VBW 10 kHz</td>
<td>0</td>
</tr>
<tr>
<td>RES BW 3 kHz</td>
<td>0</td>
</tr>
</tbody>
</table>

**Biconical/Horizontal:**
- REF: 0.0 dBm
- ATTEN: 10 dB

**Special Frequency:**
- Marker: 59.457 MHz
- ZH: 0 dBm
- DL: -60.0 dBm

**Plot:**
- Parm 34

**Remarks:**
- Measurements are taken in dBm, with reference to 0 dBm.
- Frequency and attenuation are specified.
- Span and VBW settings are noted for clarity.

**Annotations:**
- Additional notes and signatures are present on the plot.
- Specific markers and labels are provided for reference.

**Additional Details:**
- The plot includes grid lines for precision in measurements.
- Units and scales are clearly marked for easy interpretation.

---

**Plot Details:**
- The plot is labeled with frequency and dBm values.
- Specific measurements and settings are indicated with clear annotations.
- The overall layout is designed for data clarity and ease of use.

---

**Signatures:**
- A signature is present, indicating approval or verification.
- Other signatures or notes are marginal, providing context or additional information.

---

**Graphical Elements:**
- The graph includes a grid for accurate placement of data points.
- Specific markers and lines are used to highlight important measurements.
- The layout is functional, with space for additional notes.
### Biconical/Vertical

**REF** 0.0 dBm  **ATTEN** 10 dB  **Special Frequency**

<table>
<thead>
<tr>
<th>HP</th>
<th>17 Dec 99</th>
<th>4MSU-A1</th>
<th>PLOT 37</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB</td>
<td></td>
<td>1531720-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SN 109</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD 787121</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Op 59-0-00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 26181/5E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perf 3.4.4</td>
<td></td>
</tr>
</tbody>
</table>

**MARKER**

- 59.457 615 MHz
- -93.20 dBm

**DL**

- 60.0 dBm

- -60 dBm

**CENTER** 59.458 00 MHz

**RES BW** 3 kHz

**VBW** 10 kHz

**SPAN** 1.00 kHz

**SWP** 33.3 msec
<table>
<thead>
<tr>
<th>.Marker</th>
<th>60.099 917 MHz</th>
<th>-93.40 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center</td>
<td>60.100 00 MHz</td>
<td></td>
</tr>
<tr>
<td>RES BW</td>
<td>3 kHz</td>
<td></td>
</tr>
<tr>
<td>VBW</td>
<td>10 kHz</td>
<td></td>
</tr>
<tr>
<td>SPAN</td>
<td>1.00 kHz</td>
<td></td>
</tr>
<tr>
<td>SWP</td>
<td>33.3 msec</td>
<td></td>
</tr>
</tbody>
</table>

**Biconical/Horizontal**

**REF 0.0 dBm**

**ATTEN 10 dB**

**Special Frequency**

**RE02**

**MKR 60.099 917 MHz**

**-93.40 dBm**

**10 dB/**

**-60.0 dBm**

**-60 dBm**

**AMSU-A1**

**12/172-3**

**SN 109**

**7879121**

**Op 50-0-00**

**AE 26/261/5E**

**Par 8.45**

**Plot 38**
### Biconical/Vertical

**REF 0.0 dBm**  
**ATTEN 10 dB**

<table>
<thead>
<tr>
<th>Date</th>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Dec99</td>
<td>60.100 151 MHz</td>
<td>AMSU-A41 SW 1881.20-5</td>
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<tr>
<td></td>
<td></td>
<td>SD 787921 OP 50-0-08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE 2G151/5E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plot 30</td>
</tr>
</tbody>
</table>

**MARKER**

-60.0 dBm

-60 dBm

---

**CENTER 60.100 00 MHz**  
**RES BW 3 kHz**  
**VBW 10 kHz**  
**SPAN 1.00 kHz**  
**SWP 33.3 msec**
<table>
<thead>
<tr>
<th>hp</th>
<th>10 dB/</th>
<th></th>
<th></th>
<th>17 Dec 99</th>
<th>AMSU-41</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 dB/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1881720-3</td>
</tr>
<tr>
<td>DL 10 dB/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SN 109</td>
</tr>
<tr>
<td>DL -60.0 dBm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50 727921</td>
</tr>
<tr>
<td>DL -90 dBm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CP 50-0-00</td>
</tr>
<tr>
<td>MARKER</td>
<td></td>
<td>141.359 875 MHz</td>
<td></td>
<td></td>
<td>AE 26101/3E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Par 3.4.6</td>
</tr>
</tbody>
</table>

**Biconical/Horizontal**

**REF 0.0 dBm**

**ATTEN 10 dB**

**Special Frequency**

**MKR 141.359 875 MHz**

**-93.60 dBm**

**CENTER 141.360 00 MHz**

**RES BW 3 kHz**

**VBW 10 kHz**

**SPAN 1.00 kHz**

**SWP 33.3 msec**
<table>
<thead>
<tr>
<th>Biconical/Horizental</th>
<th>REO2</th>
<th>MKR 142.900 139 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>REF 0.0 dBm</td>
<td>ATTEN 10 dB</td>
<td>Special Frequency</td>
</tr>
<tr>
<td>10 dbm</td>
<td></td>
<td>-93.40 dBm</td>
</tr>
</tbody>
</table>

**MARKER**

| 142.900 139 MHz | -93.40 dBm |

**CENTER**

<table>
<thead>
<tr>
<th>142.900 00 MHz</th>
<th>SPAN 1.00 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES BW 3 kHz</td>
<td>SWP 33.3 msec</td>
</tr>
<tr>
<td>VBW 10 kHz</td>
<td></td>
</tr>
</tbody>
</table>
Biconical/Vertical

REF 0.0 dBm
ATTEN 10 dB

17 Dec 99

MKR 142.899 849 MHz
-93.70 dBm

AMSU-A1
1331720.3
SN109

50 7879 21
Op 50-0-00
AE 26151/GE
Par 8.4C

MARKER
142.899 849 MHz
-93.70 dBm

DC
-60.0 dBm

CENTER 142.900 00 MHz
RES BW 3 kHz
VBW 10 kHz
SPAN 1.00 kHz
SWP 33.3 msec
LOG CONICAL
REF 0.0 dBm ATTEN 10 dB Spec. Frequency

RE02 MKR 282.733 107 MHz
-93.70 dBm

17 Dec 199

MARKER
282.733 107 MHz
-93.70 dBm

DL
-60.0 dBm

-60 dBm

CENTER 282.733 00 MHz
RES BW 3 KHz VBW 10 KHz
SPAN 1.00 KHz SWP 33.3 msec
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker freq.</td>
<td>285.813 340 MHz</td>
</tr>
<tr>
<td>Ref. level</td>
<td>-93.00 dBm</td>
</tr>
<tr>
<td>Attenuation</td>
<td>10 dB</td>
</tr>
<tr>
<td>Center freq.</td>
<td>285.813 00 MHz</td>
</tr>
<tr>
<td>Span</td>
<td>1.00 kHz</td>
</tr>
<tr>
<td>RES BW</td>
<td>3 kHz</td>
</tr>
<tr>
<td>VSWR BW</td>
<td>10 kHz</td>
</tr>
<tr>
<td>SWP</td>
<td>33.3 msec</td>
</tr>
</tbody>
</table>

Special Frequency: -93.00 dBm

Plot: 46
<table>
<thead>
<tr>
<th>HP</th>
<th>10 dB</th>
<th>REF 0.0 dBm</th>
<th>ATTEN 10 dB</th>
<th>Special Frequency</th>
<th>REOZ</th>
<th>MKR 375.972 359 MHz</th>
<th>-92.80 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17 Dec 99</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AM50-41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SN 109</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>SN 7879 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Op 50-0-00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AE 26151/SE</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Par 3.4.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MARKER**

- CENTER 375.972 00 MHz
- SPAN 1.00 kHz
- RES BW 3 kHz
- VBW 10 kHz
- SWP 33.3 msec

(Handwritten signature)
LOG CONICAL

REF 0.0 dBm

ATTEN 10 dB

MKR 624.925 368 MHz

-92.80 dBm

10 dB/

17 Dec 99

AMSU-A1

SN 109

06 787921

Op 50-0-00

AE 26/1/5E

Plot 48

Par 5.4.6

MARKER

DL 624.925 368 MHz

-92.80 dBm

-60.0 dBm

CENTER 624.925 00 MHz

RES BW 3 KHz

VBW 10 KHz

SPAN 1.00 kHz

SWP 33.3 msec
**LOG CONICAL**

**REF 0.0 dBm**

**ATTEN 10 dB**

Special Frequency

MKR 743.840 863 MHz

-92.90 dBm

---

**MARKER**

743.840 863 MHz

-92.90 dBm

---

CENTER 743.841 00 MHz

RES BW 3 kHz

VBW 10 kHz

SPAN 1.00 kHz

SWP 33.3 msec
### LOG CONICAL REOZ

<table>
<thead>
<tr>
<th>HP</th>
<th>REF 0.0 dBm</th>
<th>ATTEN 10 dB</th>
<th>SFL 751.943 878 MHz</th>
<th>-93.50 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 dB/</td>
<td></td>
<td>17 Dec 94</td>
<td></td>
</tr>
</tbody>
</table>

**MARKER**

<table>
<thead>
<tr>
<th>DL</th>
<th>751.943 878 MHz</th>
<th>-93.50 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*CENTER 751.944 00 MHz*  
*RES BW 3 kHz*  
*VBW 10 kHz*  
*SPAN 1.00 kHz*  
*SWP 33.3 msec*
## Emission Level [dBuV/m]

**AEROJET ELECTRONIC SYSTEMS**

**EMISSION LEVEL [dBuV/m]**

<table>
<thead>
<tr>
<th>hp</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td><strong>METOP</strong></td>
</tr>
<tr>
<td>60</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>20</td>
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<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**PLT 55**

**17 Dec 1999 14:17:23**

| **AMSU-A1/METOP** |
| **RADIATED NARROWBAND EMISSIONS** |
| **FULL SCAN MODE/ANT. VERTICAL** |

**Specifications**

- **1381720-3**
- **SN 109**
- **SD 787921**
- **Op 50-0-00**
- **4E 26151/5E**
- **Par 8.4E**

**Frequency [MHz]**

[Graph showing emission levels across frequency bands]
**REO2 Special Frequency**

**RL** -40.00 dBm

**MKR #1 FRQ** 435.5 MHz

**ATTEN 0 dB**

**10.00 dB/DIV**

**AEROJET ELECTRONIC SYSTEMS**

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>MARKER</th>
<th>435.5 MHz</th>
<th>-122.35 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**AMSU-A1**

SN: 109

**7877921**

**50-0-000**

**AE 26181/SE**

**Par 3.4.6**

**START 400.0 MHz**

**STOP 500.0 MHz**

**RB 10.0 kHz**

**VB 10.0 kHz**

**ST 3.000 sec**

**-107.1 dBm/m**

(20dBμV/m)
<table>
<thead>
<tr>
<th>ATTEN 0 dB</th>
<th>10.00 dB/DIV</th>
<th>AEROJET ELECTRONIC SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARKER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.222 20 GHz</td>
<td>-121.73 dBm</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RL -40.00 dBm  Ant. Horizontal MKR #1 FRQ 1.222 20 GHz**

**AUSU-41**
**SN 109**
**50 78 7921**
**Op 50-6-00**
**AE 26/51/8**
**Par 5.4.6**

**-111.8 dBm/m**

**START 1.217 00 GHz**

**STOP 1.257 00 GHz**

**RB 10.0 kHz**

**VB 30.0 kHz**

**ST 1.200 sec**
11:14:45 DEC 17, 1999 RED Special Frequency
RL -40.00 dBm Ant. Vertical MKR #1 FRQ 1.246 50 GHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
1.246 50 GHz
-122.05 dBm

SAMPLE
AMSU-AI
1381720-5
5N109

Per 5.4.6

-111.8 dBm/m
(19dBpV/m)

START 1.217 00 GHz
*RB 10.0 kHz  *VB 10.0 kHz
STOP 1.257 00 GHz ST 1.200 sec

Plot 60

Signature
10:35:39 DEC 17, 1999 RE02 Special Frequency
RL -40.00 dBm Ant. Vertical MKR #1 FRQ 1.597 95 GHz
*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
1.597 95 GHz
-121.50 dBm

SAMPLE
AMS-V-41
1331720-3
SN 109
SN 7B7921
Op 50-0-00
AE 26151/5E
Par 8.4.6

-111.2 dBm/m
(21 dBµV/m)

START 1.565 00 GHz
*RB 10.0 kHz
*VB 30.0 kHz
STOP 1.614 00 GHz
ST 1.470 sec
### Experimental Data

**Date:** 10:41:49 DEC 17, 1999

**Equipment:** REDZ Special Frequency

**RL:** -80.00 dBm

**Ant. Horizontal:** MKR #1

**FRQ:** 2.052 164 GHz

**ATTEN:** 0 dB

**DIV:** 10.00 dB/DIV

**Sample Information:**
- AMSU-A1
- Sample Number: 1581720-5
- SN: 109
- Sample Code: 787921
- Op: 50-0-00
- IE: 2.0151/5E
- Par: 5.46

**Markers:**
- Start: 2.051 900 GHz (with noise)
- Stop: 2.055 000 GHz

**RB:** 1.00 kHz

**VB:** 30.0 kHz

**Timing:** ST 9.300 sec
**TIME:** 13:29:35  DEC 21, 1999  REO2  Special Frequency

**RL:** -80.00 dBm  **Int Vertical:** MKR #1  **FRQ:** 5.254 787 8 GHz

<table>
<thead>
<tr>
<th><em>ATTEN</em></th>
<th>0 dB</th>
<th>10.00 dB/DIV</th>
<th>AEROJET ELECTRONIC SYSTEMS</th>
<th>-138.14 dBm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MARKER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.254 787 8 GHz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-138.14 dBm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
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</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-122.8 dBm/m (18 dBµV/m)

---

**START:** 5.254 700 0 GHz  **STOP:** 5.255 300 0 GHz

*RB 1.00 kHz  VB 1.00 kHz  ST 1.800 sec
13:36:08 DEC 21, 1999 REO2 Special Frequency
RL -40.00 dBm Ant. Horizontal MKR #1 FRQ 5.474 GHz

*ATTEN 0 dB
10.00 dB/DIV AEROJET ELECTRONIC SYSTEMS

MARKER
5.474 8 GHz
-125.14 dBm

-80.7
dBm/m
(61 dBuV/m)

START 5.450 0 GHz
STOP 5.825 0 GHz
*RB 10.0 kHz VB 10.0 kHz
ST 11.25 sec

AM40-A1 SAMPLE
1981920-3
SN 10.9
50 787921
0m 50-0-00
AE 20.51/mK
Par 9 4 6
**14:35:19 DEC 21, 1999**

**RE02 Special Frequency**

**RL -40.00 dBm**

**Ant Vertical**

**MKR #1**

**FRQ 5.780 9 GHz**

**-125.25 dBm**

**ATTEN 0 dB**

**10.00 dB/DIV**

**AEROJET ELECTRONIC SYSTEMS**

**MARKER**

**5.780 9 GHz**

**-125.25 dBm**

**-80.7 dBm/m**

**(61 dBμV/m)**

**START 5.450 0 GHz**

**STOP 5.825 0 GHz**

**RB 10.0 kHz**

**VB 10.0 kHz**

**ST 11.25 sec**

**AMSU-11**

**1391720-3**

**SN 109**

**50 787921**

**DP 30-0-00**

**AE 2015-1/5E**

**Pat 5.4.0**
This is the Engineering Test Report, Radiated Emissions and SARR, SARP, DCS Receivers, Link Frequencies EMI Sensitive Band Test Results, AMSU-A1, S/N 109, for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).
PREPARATION OF THE REPORT DOCUMENTATION PAGE

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Block 11. **Contract or Grant No.** Provide when applicable.

Block 12. **Sponsoring Agency Name and Address.** National Aeronautics and Space Administration, Washington, D.C. 20546-0001. If contractor report, add NASA installation or HQ program office.

Block 13. **Type of Report and Period Covered.** NASA formal report series; for Contractor Report also list type (interim, final) and period covered when applicable.

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Block 16. **Abstract.** The abstract should be informative rather than descriptive and should state the objectives of the investigation, the methods employed (e.g., simulation, experiment, or remote sensing), the results obtained, and the conclusions reached.

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### Report Title:
Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Engineering Test Report

### Authors:
A. Valdez

### Performing Organization:
Aerojet
1100 W. Hollyvale
Azusa, CA 91702

### Sponsoring Agency:
NASA
Goddard Space Flight Center
Greenbelt, Maryland 20771

### Funding Number:
NAS 5-32314

### Report Abstract:
This is the Engineering Test Report, Radiated Emissions and SARR, SARP, DCS Receivers, Link Frequencies EMI Sensitive Band Test Results, AMSU-A1, S/N 109, for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

### Subject Terms:
- EOS
- Microwave System
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**TITLE**  
Engineering Test Report  
Radiated Emissions and SARR, SARP, DCS Receivers, Link Frequencies  
EMI Sensitive Band Test Results, AMSU-A1, S/N 109

**DOCUMENT NO.**  
Report 11665  
March 2000

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