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1640 S. Clementine St.
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UC Berkeley

Stereo-Impact-Plastic Suite

EMI Qualification Test Report

Control Number: 12343

Berkeley
University of California

Prepared for: University of California, Berkeley
Berkeley, CA 94720

Prepared By: Chris Cowdell
EMC Tempest Engineering

Date: 14 February 2005

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1.1 EQUIPMENT UNDER TEST

- STEREO IMPACT/PLASTIC FM1

- Boom (Including STE-D, STE-U, SWEA, MAG) A361
- Serial Number 001

- PLASTIC .... Not Included in Test

- IDPU A560
- Part Number / Serial Number 001

- SEP Main (Includes attached HET and LET instruments,
  plus the SEP Central electronics box) .... A191 AHEAD
- Serial Number 001

- SIT A193
- Serial Number 1

- SEPT-E A201
- Serial Number 1

- SEPT-NS A201
- Serial Number 2

1.2 GROUND SUPPORT INSTRUMENTATION (GSE - NOT UNDER TEST)

- Spacecraft Emulator .... Emulator #2, (running Emulator software version 3)
- C&T GSE .... IMPACT 5 (running stgsect software version 9-30-2004
- MAG GSE .... version 7-20-2003
- STE GSE .... version 7-20-2004
- SWEA GSE .... version 7-20-2004
- Bench Power Supply .... HP 6654A
- Thermal GSE N14530
- STEREO IMPACT Power Switch Box and Actuator GSE .... Prototype
- SEP GSE .... Information Not Available

1.3 TESTING DETAILS

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- Overview of Testing .... Table 2-2

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- Schematic Diagram of Intra-system Harnessing .... Figure 3-5
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1.5 Standards of Record

- EMI Performance Limits and Test Methods.. Stereo EMC Control Plan .... and EMI Requirements Specification, Johns Hopkins Applied . ... Physics Lab Dwg No. 7381-9060, Rev C, 6 Jan 2003
- Test Points ....Stereo-Impact EMC Test Procedure, Impact_EMC A doc, 8 Mar 2004

1.6 Reference Documents

The following documents are closely interrelated with this specification. Many documents can be found on the Berkeley STEREO/IMPACT FTP site: http://sprg.ssl.berkeley.edu/impact/dwc

1) 7381-9012B, IMPACT_ICD (IMPACT/Spacecraft ICD, on the APL web page)
2) 7381-9030, EMC spec (EMC requirements, on the APL web page)
3) 7381-9003, Environmental Spec (STEREO Environmental Test requirements, on APL web page)
4) ICD/IMPACT_CTM (IMPACT command & telemetry database)
5) ICD/IMPACTGrounding (grounding diagram)
6) ICD/IMPACTHarnessSpec (intra-instrument harness specification)
7) Plans/STEREO-IMPACT-PAIP (Performance Assurance Plan)
8) Plans/IMPACTEnvTestPlan (IMPACT Environmental Test Plan)
9) Plans/IMPACTContaminationControlPlan (IMPACT Contamination Control Plan)
10) MIL-STD-461A/B/C - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
11) MIL-STD-462 - Measurement of Electromagnetic Interference Characteristics

1.7 Monitoring for indication of Stereo Impact susceptibility

EUT performance was monitored by the customer. Detailed records were kept by the customer representatives as susceptibility testing progressed. Customer test data records are included in tables for each susceptibility test.

1.8 Instrumentation Calibration

Test equipment types, serial numbers, model numbers and calibration due dates were recorded in separate instrumentation calibration tables and included together with the results of each test. All test instrumentation was properly calibrated in accordance with recommended manufacturer's instructions and used within its normal calibration period (i.e. shall display a current calibration sticker).

1.8.1 Calibration Traceability

Test equipment and accessories required for measurement in accordance with this standard are calibrated in accordance with the following standards:

- ANSI/NCSL Z540-1.
- ISO 10012-1 entitled “Quality Assurance Requirements for Measuring Equipment.”
- Under an approved calibration program traceable to the National Institute for Standards and Technology (NIST), such as MIL-HBK-52A, as guidance for MIL-STD-45662A.

1.8.2 Accessory Instrumentation Calibration

Measurement antennas (passive), current probes, field sensors and other devices used in the measurement loop are calibrated every two years, unless otherwise specified by the procuring activity, or when damage is apparent. Active antennas are calibrated every year. Passive antenna calibration is in strict conformance with ARP 958, “Electromagnetic Interference Antennas: Standard Calibration Requirements and Methods”.

1.9 EMI TEST PLAN

All testing was conducted in strict conformance to the methods, procedures and limits defined in the two documents referenced in paragraph 1.8.

1.10 CERTIFICATION OF ACCURACY

I hereby certify that the results of EMI testing on the Stereo Impact components, is a true and accurate representation of its performance under the conditions described in this report. In addition, all test instrumentation displayed a valid calibration sticker and was used in strict accordance with the manufacturers' instructions.

Robert B. Cowdell
Registered Professional Engineer, Quality Engineering
State of California License No QU-1517

2 DETAILED SUMMARY TABLES

Table 2-1. Test Sample Identification Record

1. Equipment Under Test (EUT)

1. Name	STEREO IMPACT	Date: September – October 2004
Part No.	FM1	Input Voltage: 28 VDC
Serial No.	See listing in paragraph 1.1 for a listing of STEREO IMPACT Components	

2. Susceptibility Monitoring Instrumentation

1. Name	See paragraph 1.2 for a complete listing	2. Name	
Manufacturer		Manufacturer	
Part No.		Part No.	
Serial No		Serial No.	
3. Name			
Manufacturer			
Part No.		Cal Due	
Serial No			

3. Support Instrumentation (Not Under Test)

1. Name	Harrison 28 VDC Power Supply	2. Name	
Part No.	1583	Part No.	
Serial No	003	Serial No.	

4. Test Configuration Details

- EUT placed on the copper ground plane; 10 cm from the front edge.
- All EUT cables were placed 5 cm above on the copper ground plane and 10 cm from the front edge as long as possible.
- EUT Test Station was placed outside the shielded room.
- 10 ufd capacitors were placed in the input power leads, except where not required.
- The EUT input power cable was unshielded, except when foil shielding was added for an RE02 testing option.
- The EUT was powered by a stand-alone 28 VDC power supply located outside the shielded room.

5. Standards of Record

- EMI Performance Limits: ...STEREO EMC Control Plan and EMI Requirements Specification, Dwg. No. 7381-9030, Rev C
- EMI Test Methods:............ STEREO EMC Control Plan and EMI Requirements Specification, Dwg. No. 7381-9030, Rev C
- EMI Test Plan ....STEREO IMPACT EMI Test Procedure (IMPACT_A, Version A, 2004 Mar 08)

6. Test Personnel

Test Director	Bob Cowdell	UCB QA Engr:	Ron Jackson
EMI Test Engineers:	Bryan Cowdell, Chris Cowdell	UCB Engineering	Dave Curtis
GSFC Control	Kelly Henderson	SCS Cognizant Engineer	Branislav Kesman
		UCB Mechanical Support	Jeremy McCauley

Table 2-2. Overview of EMI Test Results

EMI Test	Description	Pass/Fail Limit (12)	Notes	Pass/ Fail
Bonding	EMI Test Instrumentation Bonding and Grounding	Para 3.1.13	1	Pass
CE01	Conducted Emissions on Power Leads 100 Hz – 15 kHz	Fig 1, Fig 2	2, 13	See notes
CE03	Conducted Emissions on Power Leads (15 kHz – 50 MHz)	Para 4.2, Fig 1, Fig 2	2, 13	See notes
CE07 Voltage	Steady State Time Domain Voltages on Input Power Leads	Para 4.4, Limit = 700 mv p-p for DM and 500 mV p-p for CM	4	Pass
CE07 Current	Steady State Time Domain Currents on Input Power Leads	. Para 4.4, Limit = 200 mA p-p for DM and 50 1mA p-p for CM	5	Pass
CS01	Power Lead Conducted Susceptibility (30 Hz – 51 kHz)	Para 4.5	6. 9, 14	See notes
CS02	Power Lead Conducted Susceptibility (49 kHz – 400 MHz)	Para 4.6	7. 9, 15	See notes
CS06	Power Lead Spike Susceptibility	Para 4.7	8, 9, 16	See notes
RE01	Radiated Magnetic Field Emissions (100 Hz – 50 kHz)	Para 4.8, Figure 4.8	10, 17	See notes
RE02	Radiated Electric Field Emissions (2 kHz – 10 GHz)	Para 4.8, Figure 4.9		Fail
RS03	Radiated Electric Field Susceptibility (14 kHz – 15 GHz)	Para 4.10	11, 18	See notes

Notes:
1. Measure at 9 test points
2. Test on 44 power and harness leads
3. Test on four input power supplies
4. Time domain voltage tests at up to 15 test points
5. Time domain current tests at up to 39 test points
6. Test on 4 power inputs pausing at 1, 2, 5, 10 intervals with 10-2 minute pauses.
7. Test on 4 power inputs pausing at 1, 2, 5, 10 intervals with 12-2 minute pauses.
8. Test on 4 power inputs with spikes #1 and #2, 20 V line to line and 10 V return to chassis, plus and minus
9. Power input under test driven and tested on dedicated power supply.
10. Test Boom (3 positions), Plastic, IDPU, SEP-C, SIT, SEP-E, SEPT-N (9 boxes + power leads and interconnects) + 2 Ambients.
11. (14 kHz – 1 GHz) @ 10V/M & (1 - 10 GHz) @ 20V/M with stop at 1, 2, 5, 10 intervals and 500 MHz steps above 1 GHz (32-2 minute pauses) + 3 special bands (2.2 - 2.3, 5.5 - 5.9, 8.4 - 8.5 GHz) @ 40 V/M Also Note Modulation variations:(1) 14 kHz – 100 MHz @ CW, (2) 100 MHz – 10 GHz @ 1 kHz 50% AM Square Wave Modulation, (3) 480 Hz FM Modulation from 8.4-8.5 GHz. See Section 13.0 for detailed test results.
12. Pass/Fail Limits All limits are from STEREO EMC Control Plan and EMI Requirements Specification, Dwg. No. 7381-9030, Rev C except Bonding which is from STEREO IMPACT EMI Test Procedure (IMPACT_A, Version A, 2004 Mar 08).
13. Passing conditions noted for several units.
14. Several responses noted. See Section 8.0.
15. Several responses noted. See Section 9.0.
16. Several responses noted. See Section 10.0.
17. Various units failed.
18. Several responses noted. See Section 13.0

3 GENERAL INFORMATION

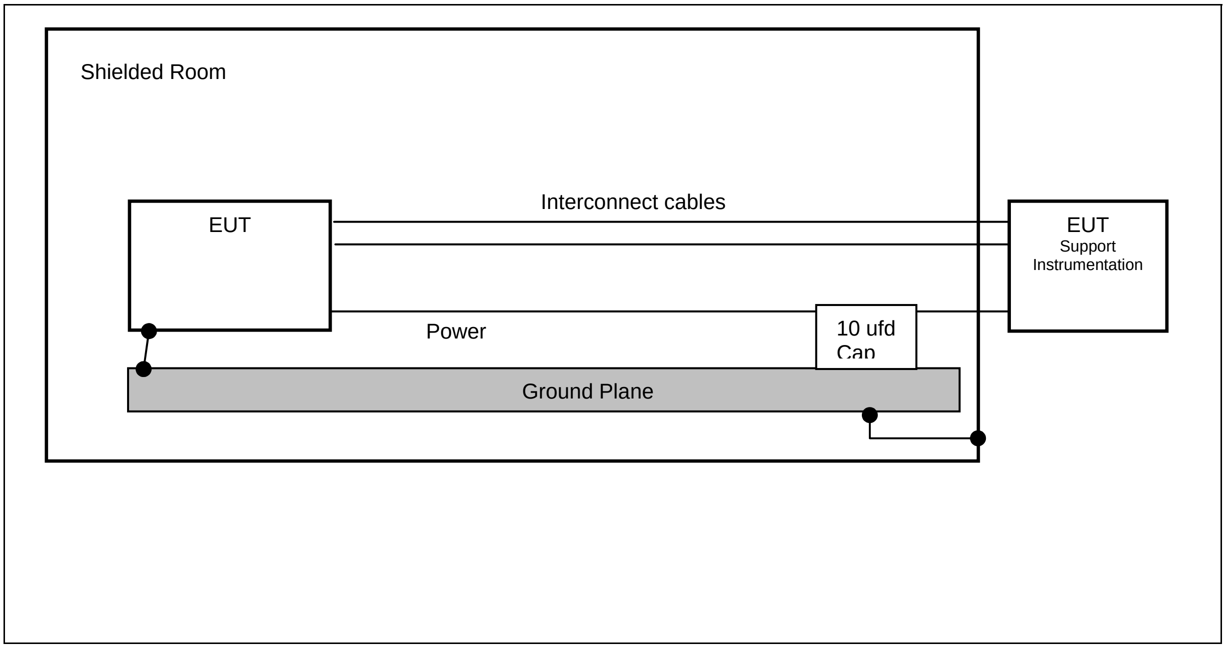


Figure 3-1. Schematic Configuration for EMI Testing on the Stereo Impact

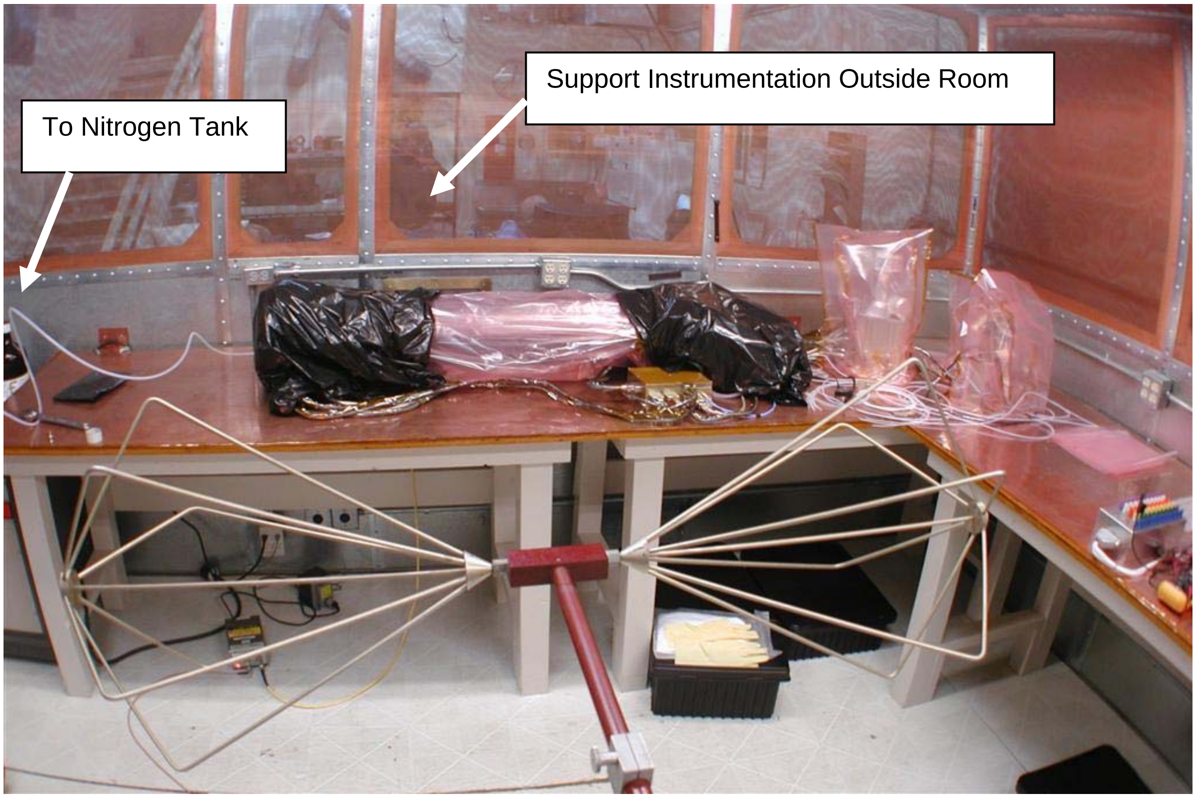


Figure 3-2. Configuration for EMI Testing on the Stereo Impact

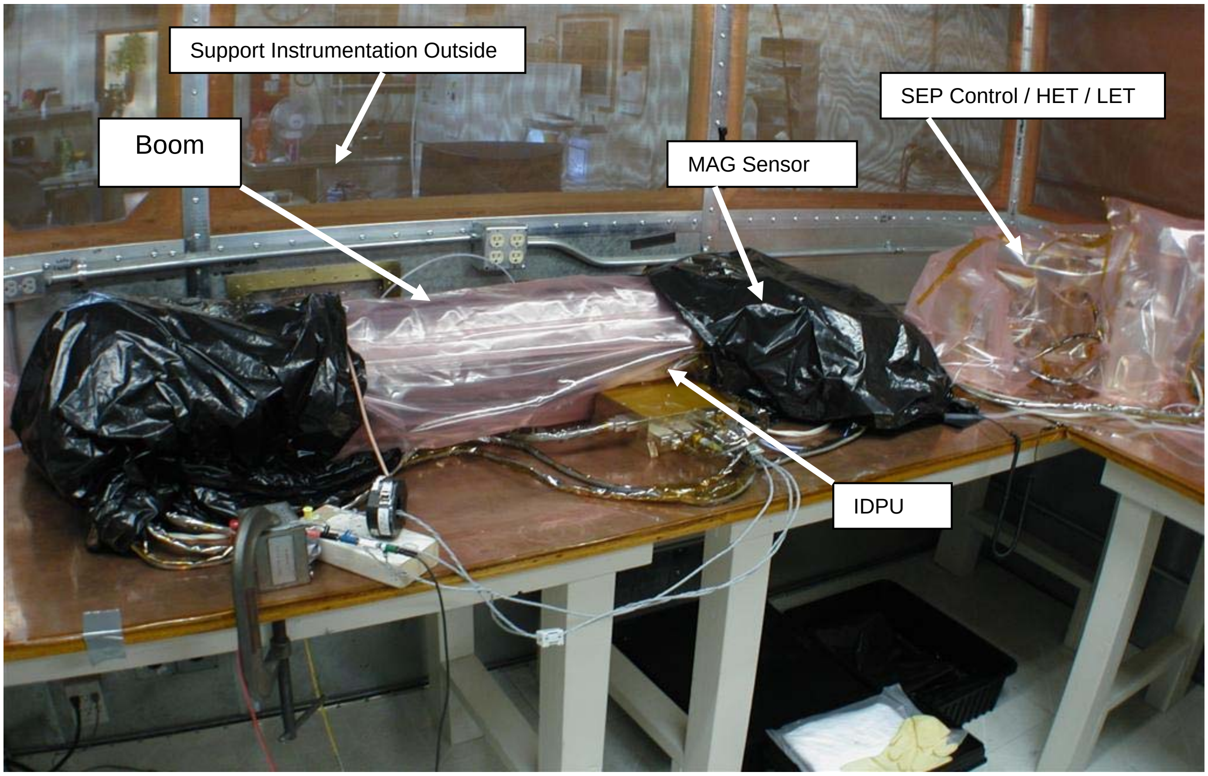


Figure 3-3. Close-up of the Stereo-Impact Configuration

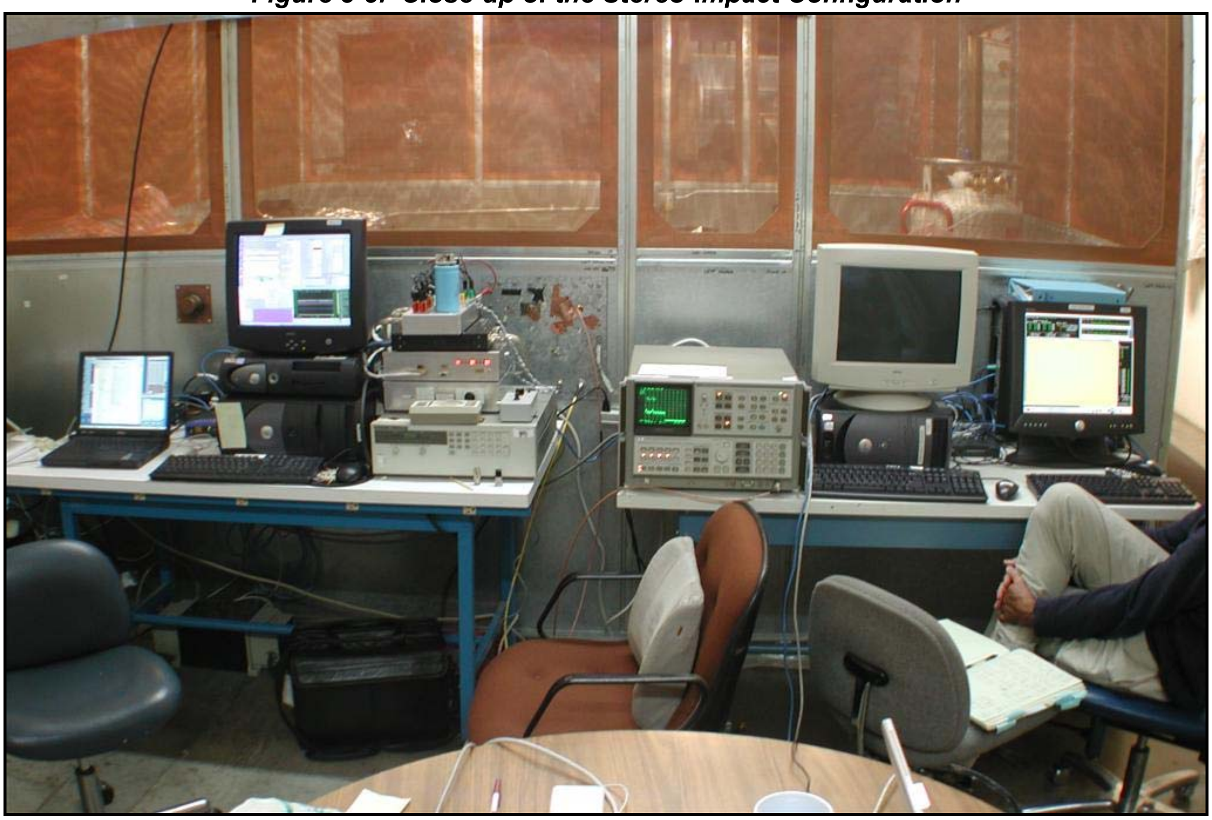


Figure 3-4. Test Instrumentation Located Outside the Shielded Room

Figure 2-1, IMPACT Intra-instrument Harnessing (PLASTIC not shown)

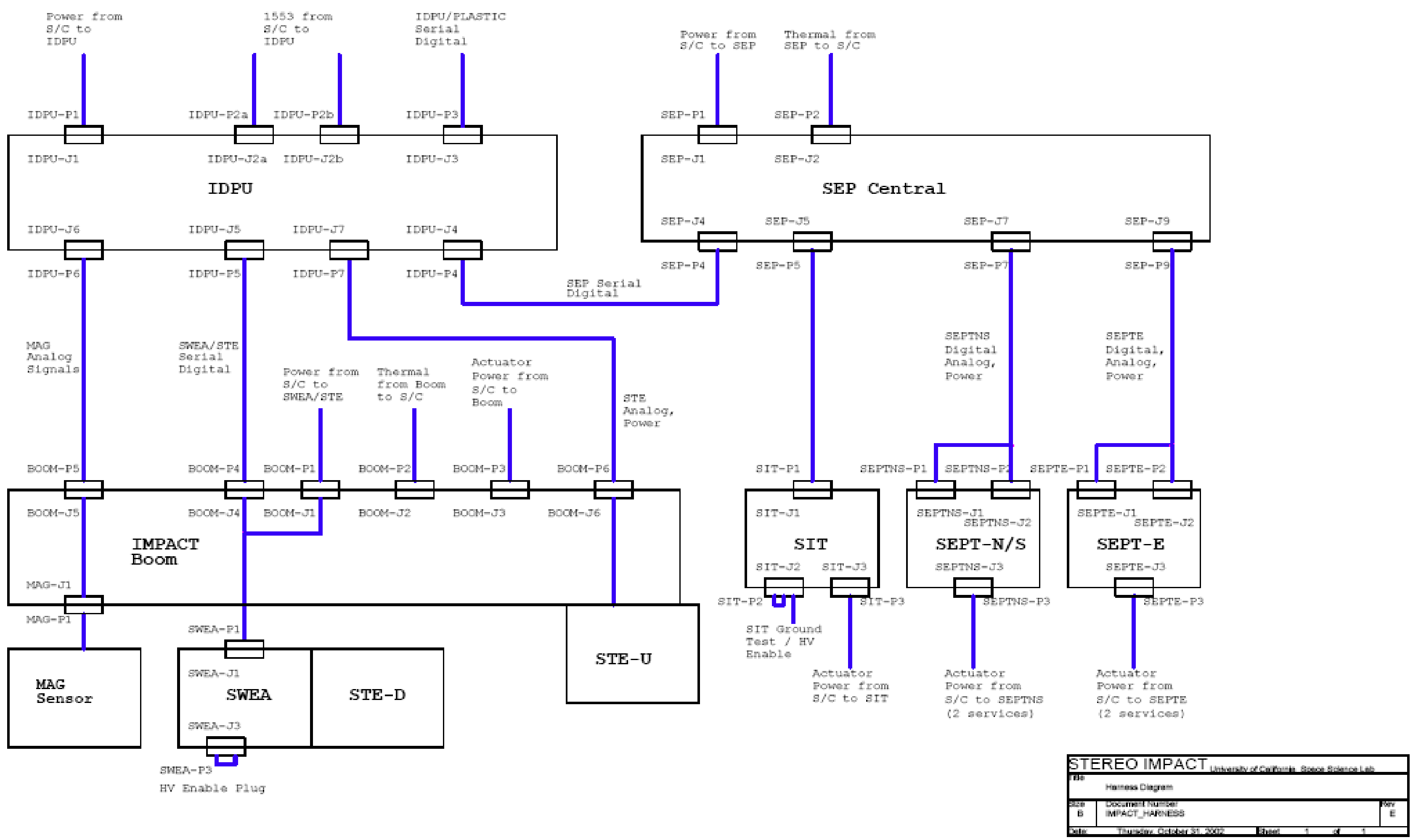


Figure 3-5. Test. Intra-Instrument Harnessing

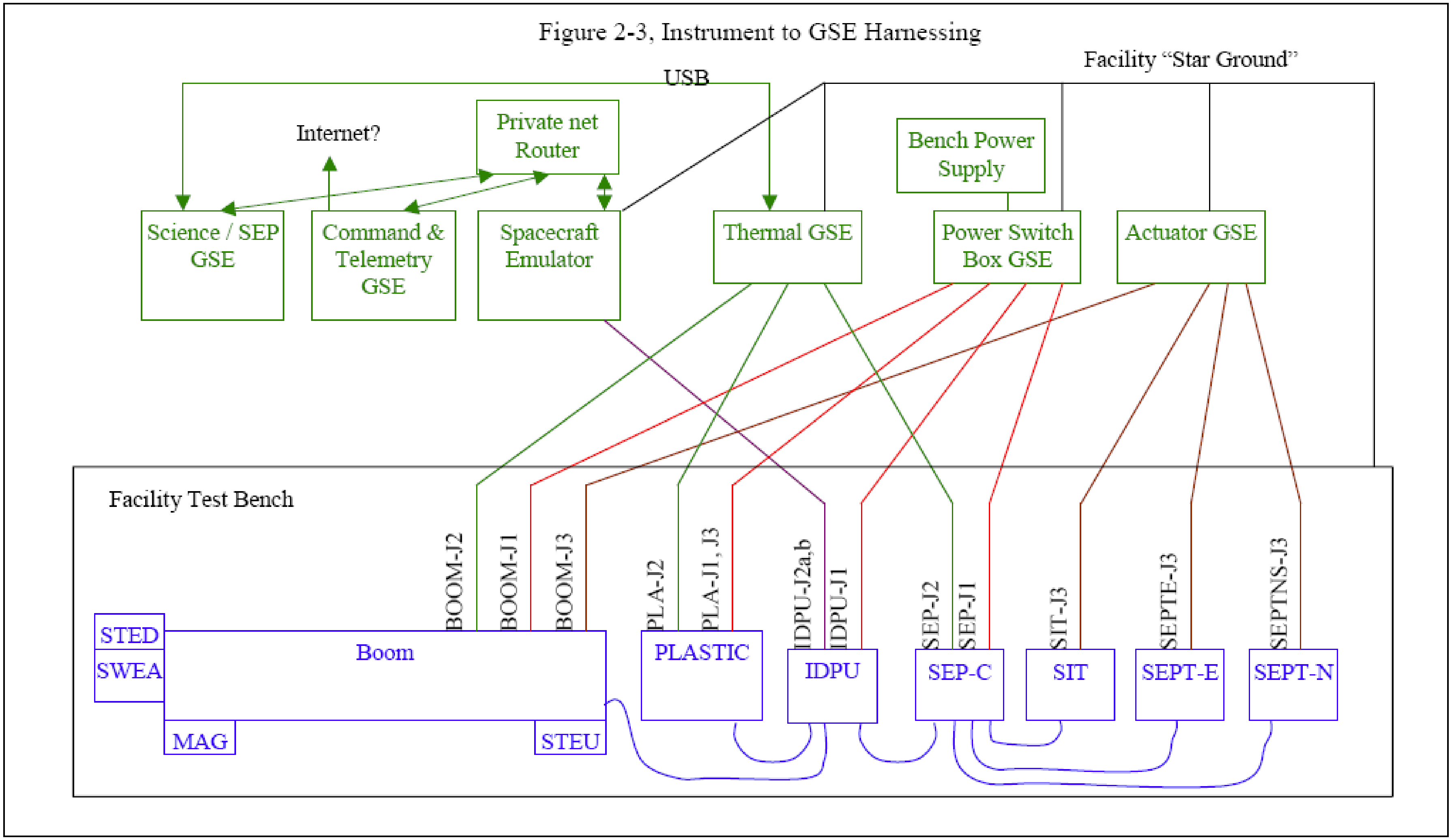


Figure 3-6 . Schematic Diagram of the STEREO-IMPACT EMI Test Configuration

4 BONDING AND GROUNDING TESTS

4.1 TEST RESULTS

- EUT Bonding. ....50 milliohms
- EMI Instrumentation ....< 2.5 milliohms

4.2 TEST DETAILS

- Bonding Test Data ....Table 4-1
- Test Equipment Calibration Record ....Table 4-2

4.3 LIMITS OF ACCEPTABILITY

DC resistance measurements between any two adjacent exterior case parts (including top covers, connector shells, brackets, etc.) shall not exceed 2.5 milliohms. (P 3.2.3.2)

4.4 PURPOSE

The purpose of bonding and grounding tests is to verify that the bonding and grounding requirements of MIL-STD-462 for EMI test instrumentation are properly implemented. In addition, the bonding and grounding conditions of the EUT are measured in order to detect any high resistance conditions that might lead to failures during testing. Proper bonding between metal parts of the system under test is necessary to prevent shock hazards and to ensure normal system performance during EMI testing.

4.5 FURTHER TEST PLAN DEFINITIONS

Mounting surfaces of each unit shall be clean and free of paint or other insulating material and shall be capable of providing a DC bond resistance of no greater than 2.5 milliohms when mounted to the next larger assembly structure. The lowest practicable bond resistance is desired to minimize voltage gradients. Direct metal-to-metal electrical bonding is preferred. Every unit shall have provisions for ground straps because direct metal to metal bonding may be prevented by the STEREO mounting fixtures which could create a gap; an electrically conductive mounting material such as Cho-Seal shall be used to bridge any gap. Ground straps shall be short and wide (length to width ratio less than 6 to 1), with at least two widely separated straps for each package with a perimeter greater than 60 cm. If necessary, multiple short, ground wires may be used in place of ground straps approximating the length to width ratio. Bolts or screws, by themselves, are never considered suitable electrical bonds and therefore must be accompanied by acceptable bonding mechanisms (such as direct metal-to-metal contact). (P 3.2.3.1)

4.5.1 Multi-layer thermal blankets

Multi-layer thermal blankets shall have all conductive (i.e., metalized) layers electrically bonded together and to chassis (structure) ground with a resistance not to exceed 10 ohms. A minimum of two ground wires is required for each blanket. A ground connection is required within one meter of any location on each blanket. The measured resistance between each pair of adjacent ground wires is not to exceed 10 ohms prior to connection to the spacecraft. Exposed outer surface resistivity must accommodate the electrostatic requirements of Paragraph 3.2.6.2. Exterior electrostatic drain coating connection to grounded inner conductive layers must be verified during blanket fabrication. (P 3.2.3.3)

4.5.2 Doors and Other Hinged or Shafted Devices

Doors and other hinged or shafted devices that have an exterior exposure shall have a ground strap, wire, or conductive spring across the hinge or shaft to provide a reliable bond resistance not exceeding one hundred ohms to assure a drain path for electrostatic charge. (P 3.2.3.4)

4.5.3 Spacecraft Structure

Spacecraft Structure bond resistance shall be maintained at 10 milliohms or less as measured, and recorded during assembly and in the Integration Test Log, (P 3.2.3.6). Upon integration with the Spacecraft, each unit (e.g., boxes, Instruments, antennas, masts, brackets, etc.) shall provide, with no interface cables attached (other than flight ground straps where appropriate), a measured bond resistance to the next larger assembly structure of 2.5 milliohms or less. Measured bond resistance values shall be recorded in the Integration Test Log. If a bond is subsequently broken, it shall again be verified by measurement. (P 3.2.3.7). Spacecraft-to-spacecraft and spacecraft-to-vehicle interfaces shall be clean and conductive to provide a mating bond resistance not exceeding 2.5 milliohms. (P 3.2.3.8)

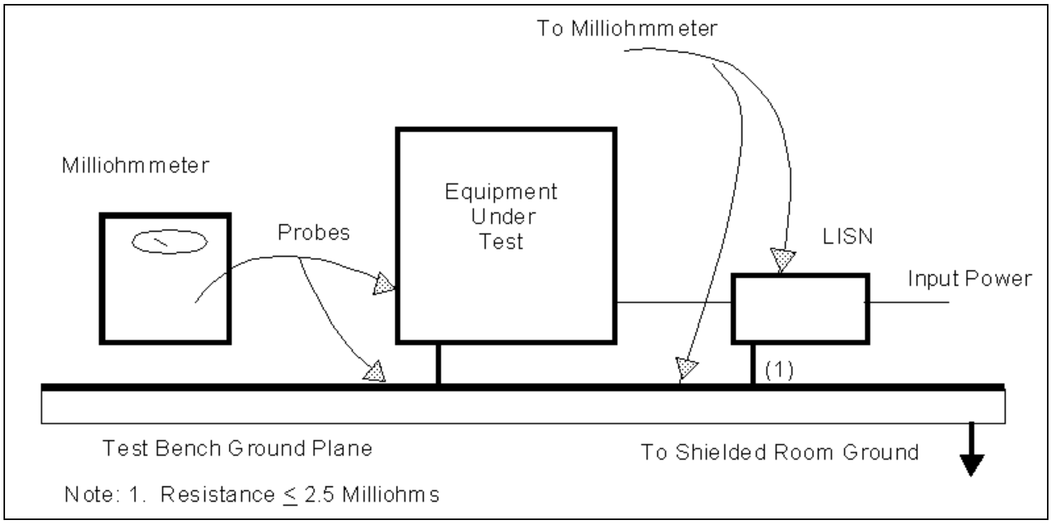


Figure 4-1. Configuration for Bonding Tests

Table 4-1. Bonding Test Data Record for EMI Test Instrumentation

Resistance (Milliohms)	Test Points		Notes
	From	To	
0.5	10 uF Capacitor #1	Test Bench Ground Plane	None
0.5	10 uF Capacitor #2	Test Bench Ground Plane	None
1.5	Monopole Antenna Counterpoise	Test Bench Ground Plane	None
1.2	LISN	Test Bench Ground Plane	None
0.5	Shielded Room Wall	Test Bench Ground Plane	None

EUT: Stereo Impact P/N: 7643800-030-702 S/N: 319 Date: 18 Oct 2004
EUT Mode: Power Off Stereo Engr: Dave Curtis Test Engr: Bryan Cowdell

Table 4-2. Bonding Test Equipment Calibration Record

Instrument	Manufacturer/Model	Serial No.	Cal Due Date
Milliohmmeter	HP 4328A	1828J05455	08 Dec 2004

5 CE01 - CE03: CONDUCTED EMISSIONS, INPUT POWER LEADS (100 HZ – 50 MHZ)

5.1 TEST RESULTS:

IDPU Power Service Current

- Primary Power +28 VDC Differential Mode Current .... Fail (Figure 5-7)
- Primary Power 28 VDC Return Differential Mode Current...................................... Fail (Figure 5-8)
- Primary Power True Differential Mode Current... Pass (Figure 5-9)
- Primary Power Common Mode Spectrum Power and Return .... Fail (Figure 5-10)
- MAG Heater +28 VDC Differential Mode Current... Fail (Figure 5-11)
- MAG Heater 28 VDC Return Differential Mode Current .... Fail (Figure 5-12)
- MAG Heater True Differential Mode Current .... Fail (Figure 5-13)
- MAG Heater Common Mode Spectrum Power and Return.................................. Fail (Figure 5-14)

IDPU Common Mode Harness Currents

- Power Harness (IDPU J1)... Fail (Figure 5-15)
- 1553 Harness (IDPU J2a, b)...Fail Figure 5-16
- PLASTIC Harness (IDPU J3)... Marginal (Figure 5-17)
- SEP Harness (IDPU J4).. Pass (Figure 5-18)
- SWEA Harness (IDPU J5) .... Marginal (Figure 5-19)
- MAG Harness (IDPU J6)... Marginal(Figure 5-20)
- STE-U harness (IDPU J7).. Pass (Figure 5-21)

SEP Power Service Current

- +28 VDC Differential Mode Current .... Fail (Figure 5-22)
- 28 VDC Return Differential Mode Current .... Fail (Figure 5-23)
- True Differential Mode Current .... Fail (Figure 5-24)
- Common Mode Spectrum Power and Return... Fail (Figure 5-25)
- Common Mode Current SEP Survival Heater and Return Leads Shorted/Data Not Taken (Figure 5-26)

SEP Harness Common Mode Current

- Power Harness (SEP J1 .... Fail (Figure 5-27)
- Thermal Harness (SEP J2) .... Fail (Figure 5-28)
- SIT Actuator Harness (J3) .... (Data Not Taken)
- SIT Harness (SET J5) .... Fail (Figure 5-29)
- SEPT-E Harness (SET J7).. Pass (Figure 5-30)
- SEPT-NS Harness (SEP J9)... Pass (Figure 5-31)

SEPT-E / NS Harness Common Mode Current

- SEPT-E Actuator Harness (SEPT E J3) .... Marginal (Figure 5-32)
- SEPT-NS Actuator Harness (SEPT NS J3).. Marginal (Figure 5-33)

SWEA/STE-D Power Service Current

- +28 VDC Differential Mode Current .... Pass (Figure 5-34)
- 28 VDC Return Differential Mode Current .... Pass (Figure 5-35)
- Common Mode Spectrum Power and Return... Fail (Figure 5-36)
- Common Mode Current SWEA Heater and Return .... Fail (Figure 5-37)
- Common Mode Current Deployment Heater and Return .... Fail (Figure 5-38)

SWEA/STE-D Harness Common Mode Current

- Power Harness (Boom J1) .... Fail (Figure 5-39)
- Thermal Harness (Boom J2) .... Pass (Figure 5-40)
- Actuator Harness (Boom J3) .... Pass (Figure 5-41)

5.2 TEST DETAILS

- Test Configuration .... Figure 5-1, Figure 5-2, Figure 5-3
- Test Data (+28 VDC Input Power Lead) .... Figure 5-7, Figure 5-8
- Test Data (28 VDC Return Lead) .... Figure 5-9, Figure 5-10
- Test Equipment Calibration Record .... Table 5-1

5.3 STANDARD OF RECORD:

- EMI Test Method .... MIL-STD-462, Notice 1 (1 Aug 68), CE03
- CE01CE03 Pass/Fail Limits .... APL Dwg No 7381-9030, Rev B Figures 1 and 2 (Figure 5-6)

5.4 CUSTOMER NOTES

Notes taken by the customer during the progress of CE01-CE03 testing are included in Table 5-2.

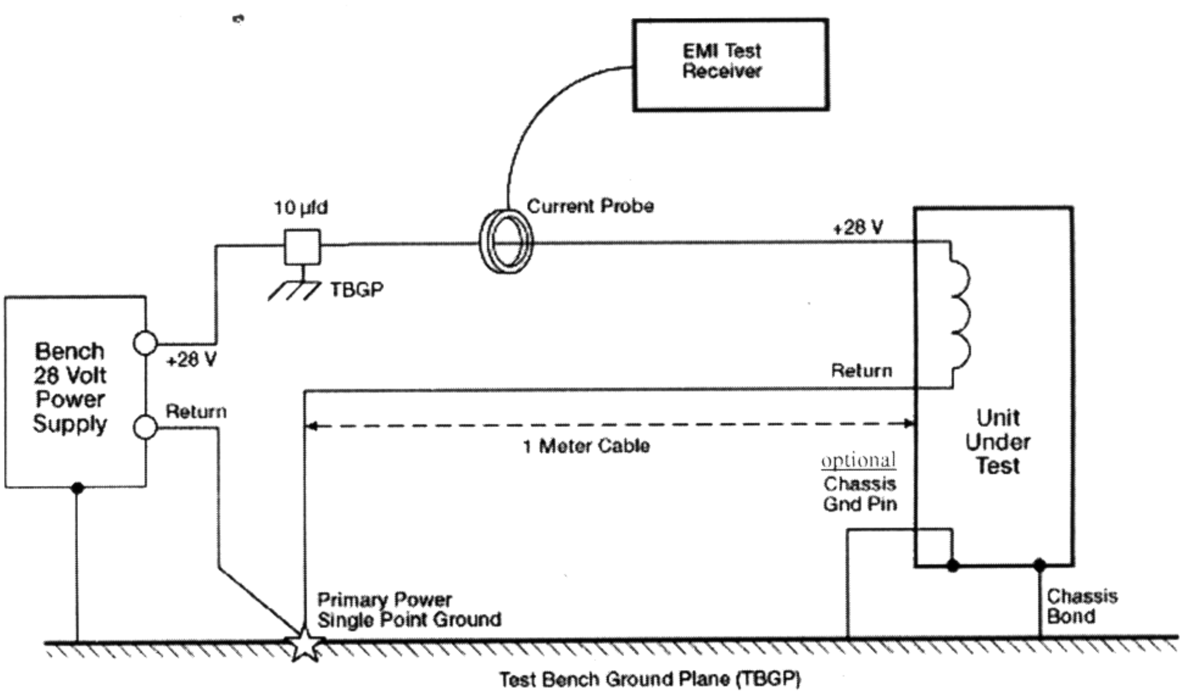


Fig. 5.4. CE-01 & CE-03 test configuration.

Figure 5-1. Schematic Configuration for Conducted Emissions (CE01 - CE03) Testing

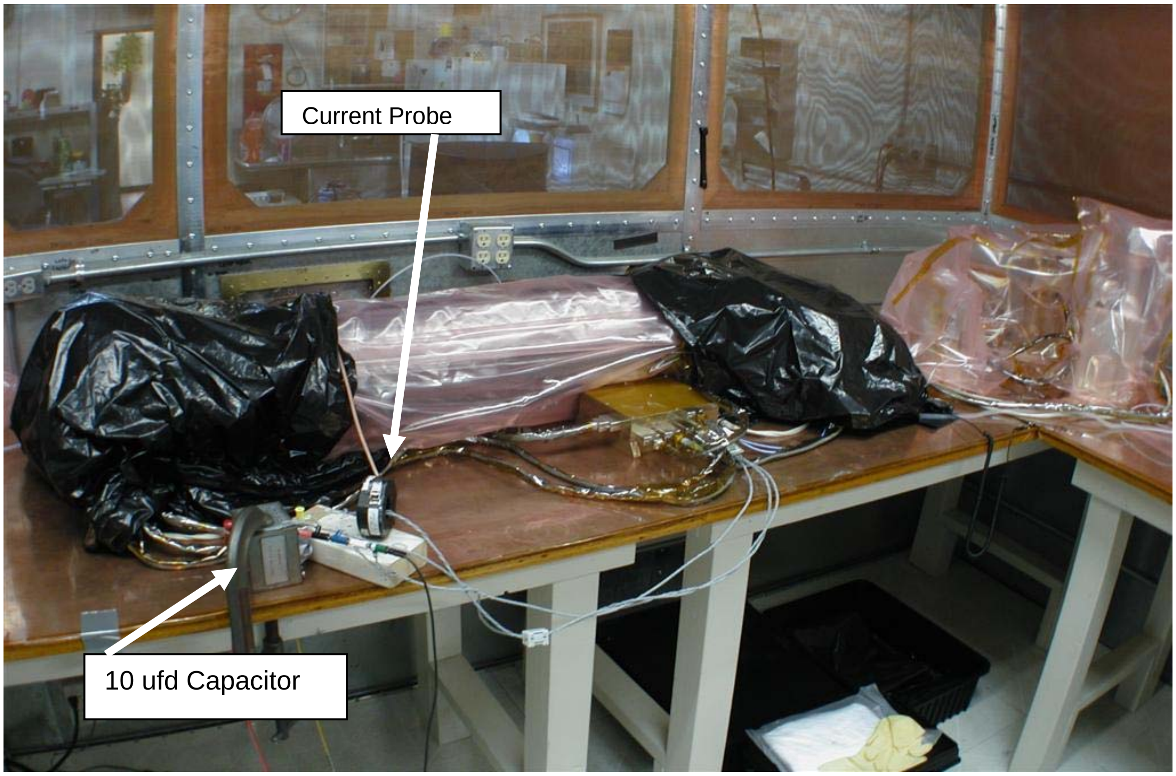


Figure 5-2. Conducted Emissions (CE03) Test Configuration on the Input Power Leads

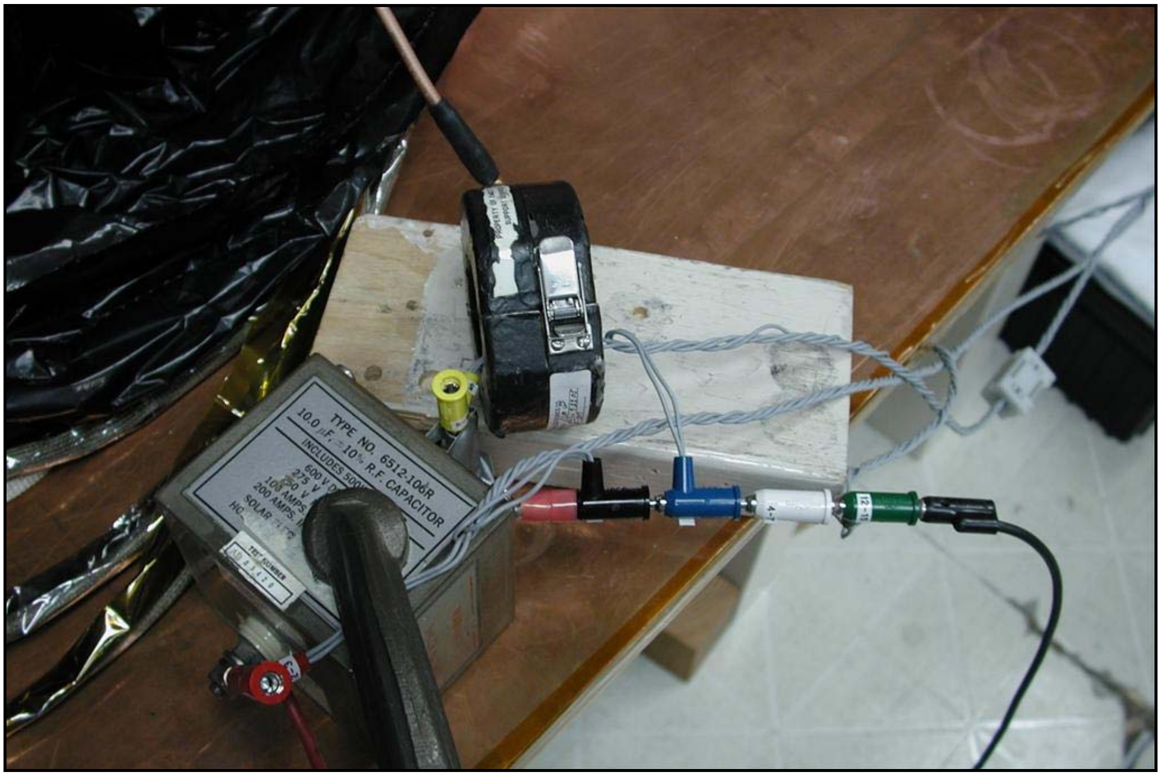


Figure 5-3. Close-up of STEREO IMPACT Input Power Lead (Differential Mode)

Figure 5-4. Close-up of Stereo Impact Input Power Leads (Common Mode)

Figure 5-5. Close-up of Stereo Impact Input Power Leads (Common Mode)

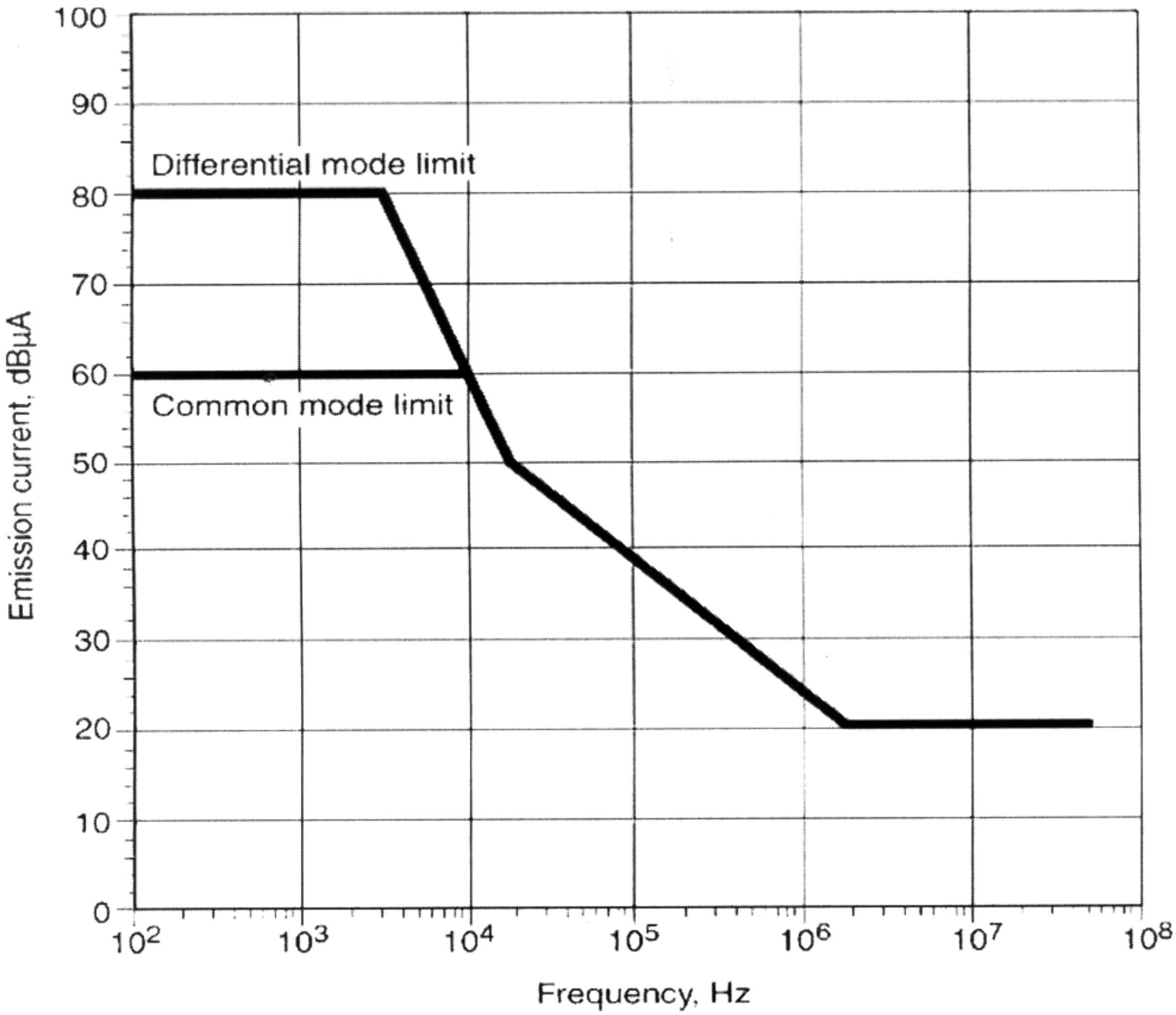


Fig. 1 & 2. CE-01 & CE-03 conducted emissions limits.

Figure 5-6. CE01 – CE03 Common and Differential Mode Limits

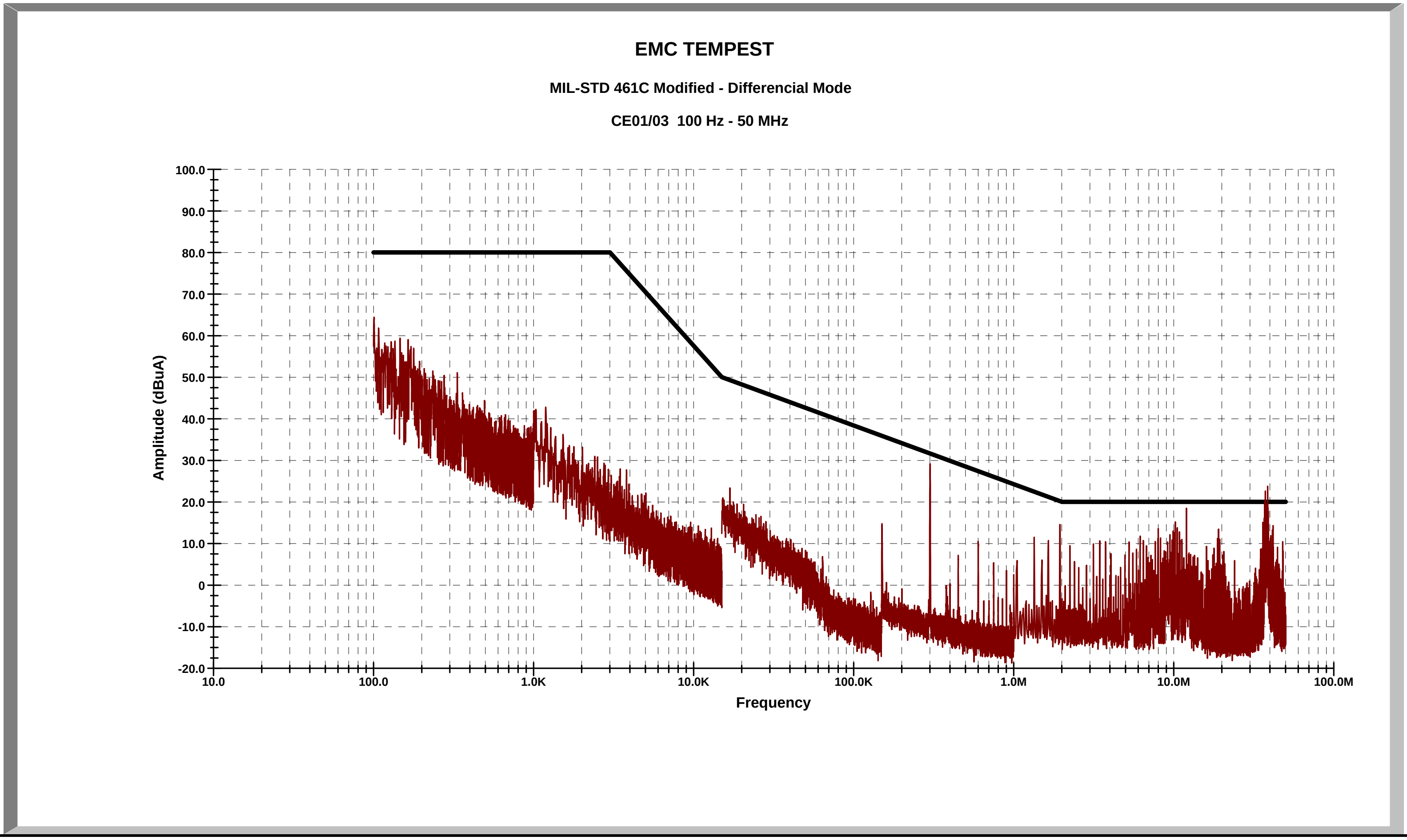


Figure 5-7. CE01 - CE03 Differential Mode Current Test Results: IDPU +28 VDC Input Power Lead with Ferrites

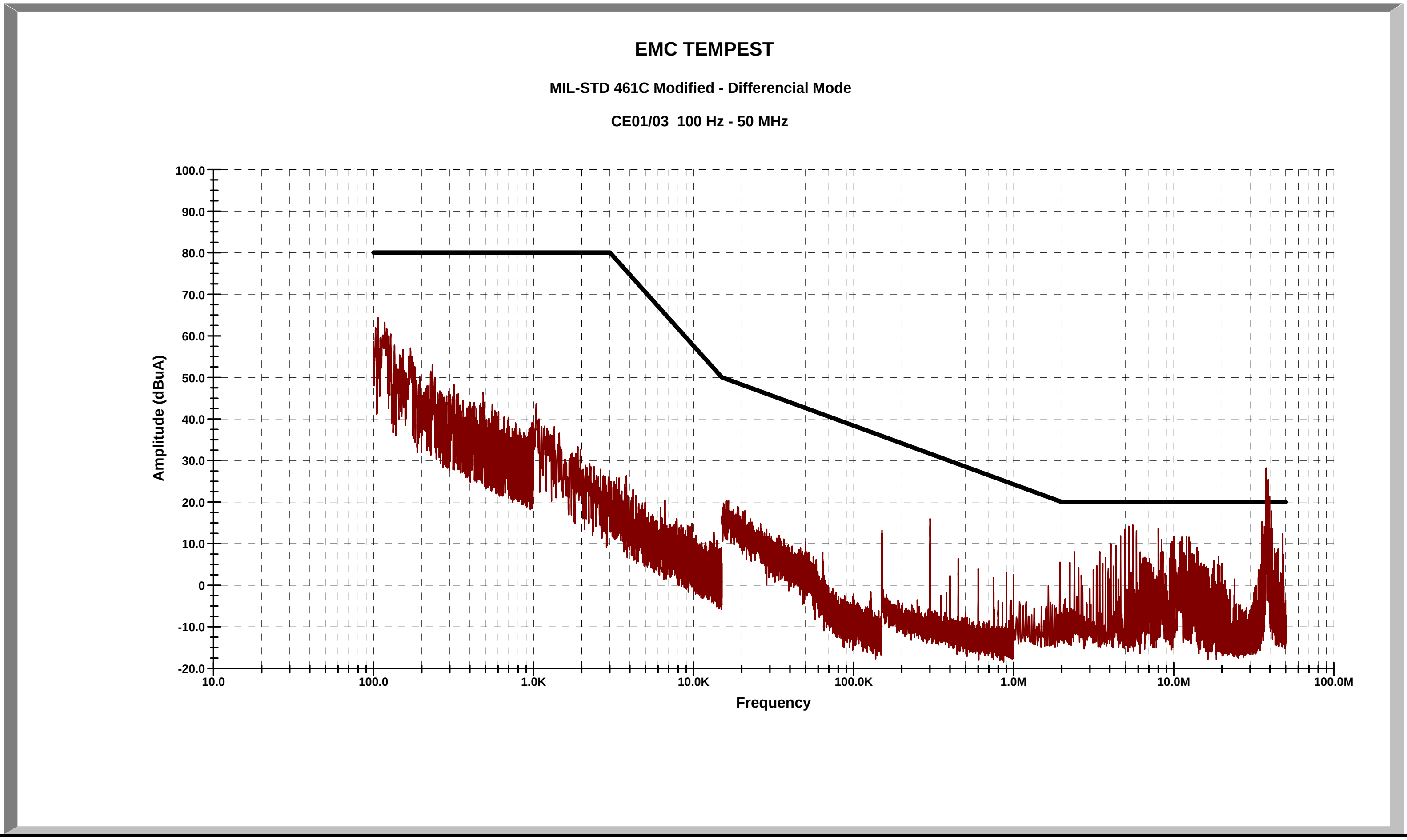


Figure 5-8. CE01 - CE03 Differential Mode Current Test Results: IDPU 28 VDC Return Power Lead with Ferrites

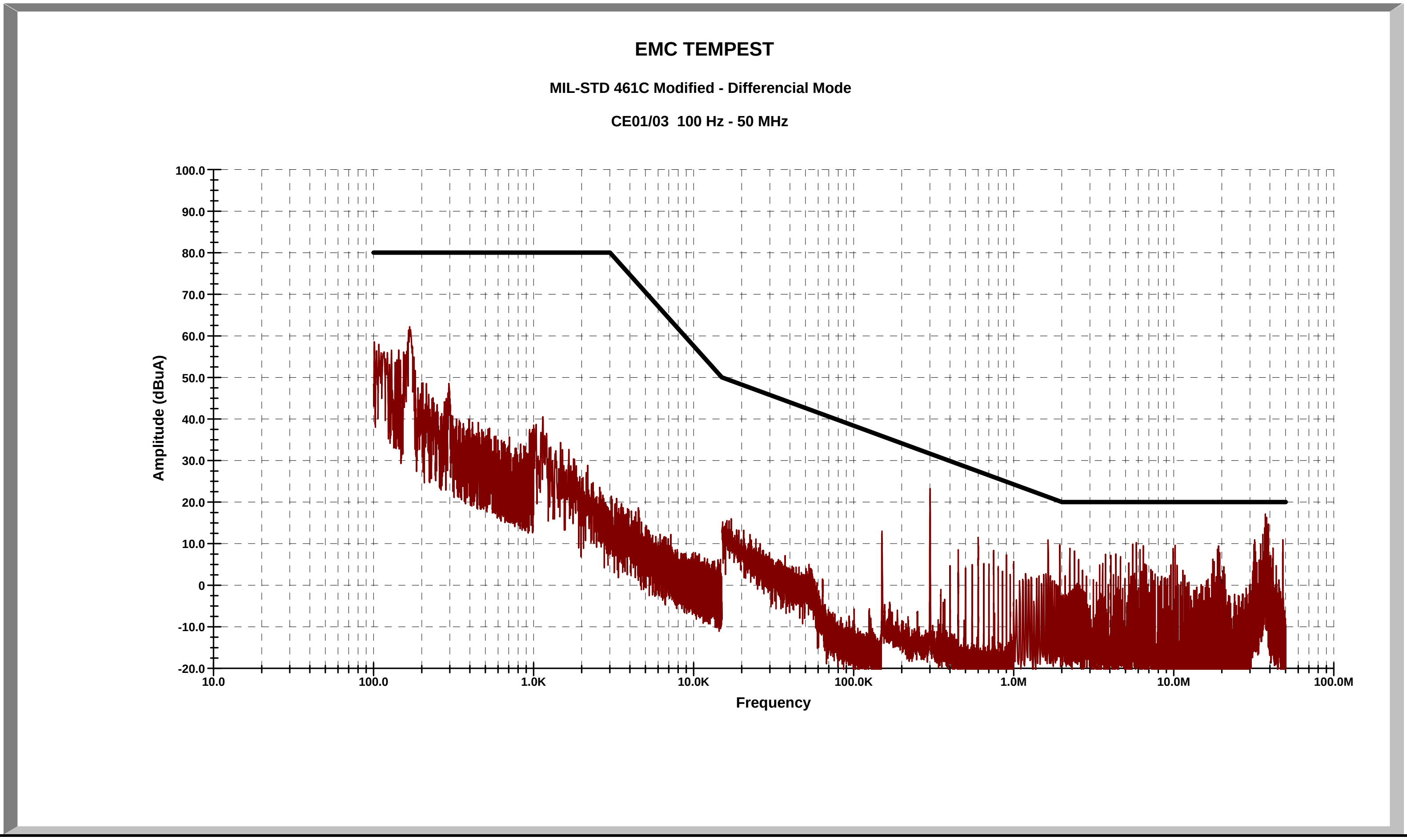


Figure 5-9. CE01 - CE03 True Differential Mode Current Test Results: IDPU ± 28 VDC Return Power Lead with Ferrites

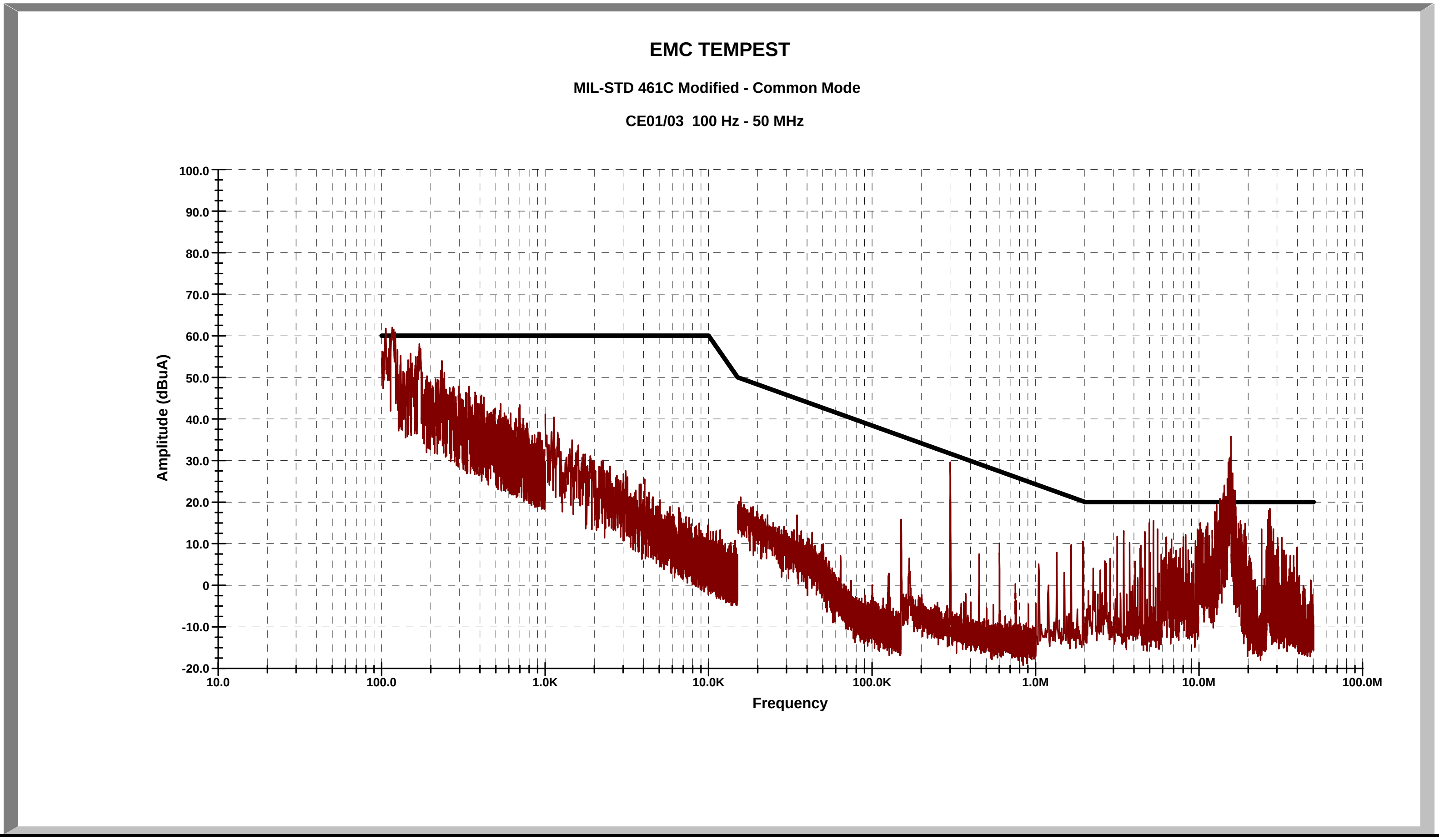


Figure 5-10. CE01 - CE03 Common Mode Current Spectrum Test Results: IDPU 28 VDC Power and Return Leads

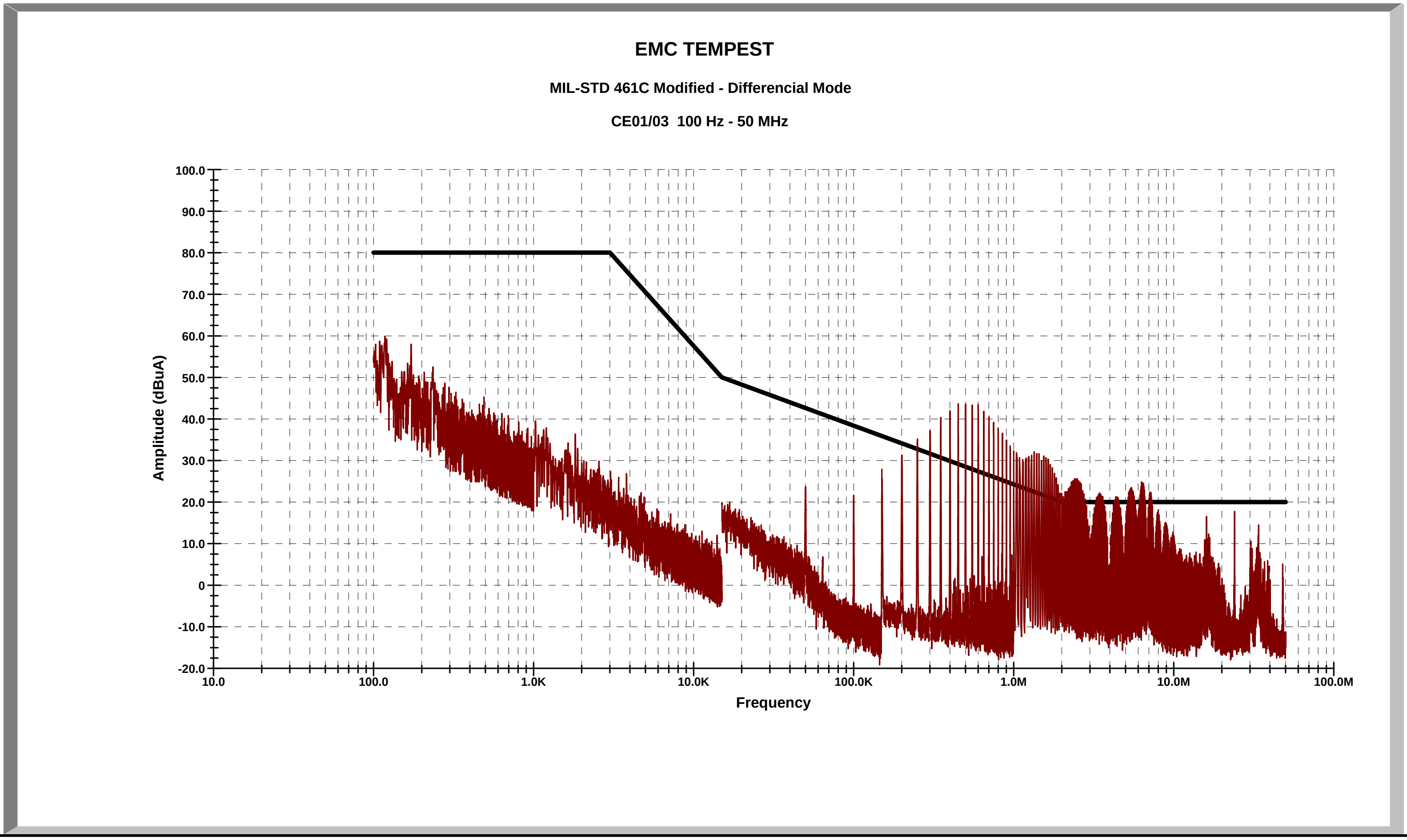


Figure 5-11. CE01 - CE03 Differential Mode Current Test Results: MAG Heater +28 VDC Power Lead with Ferrites

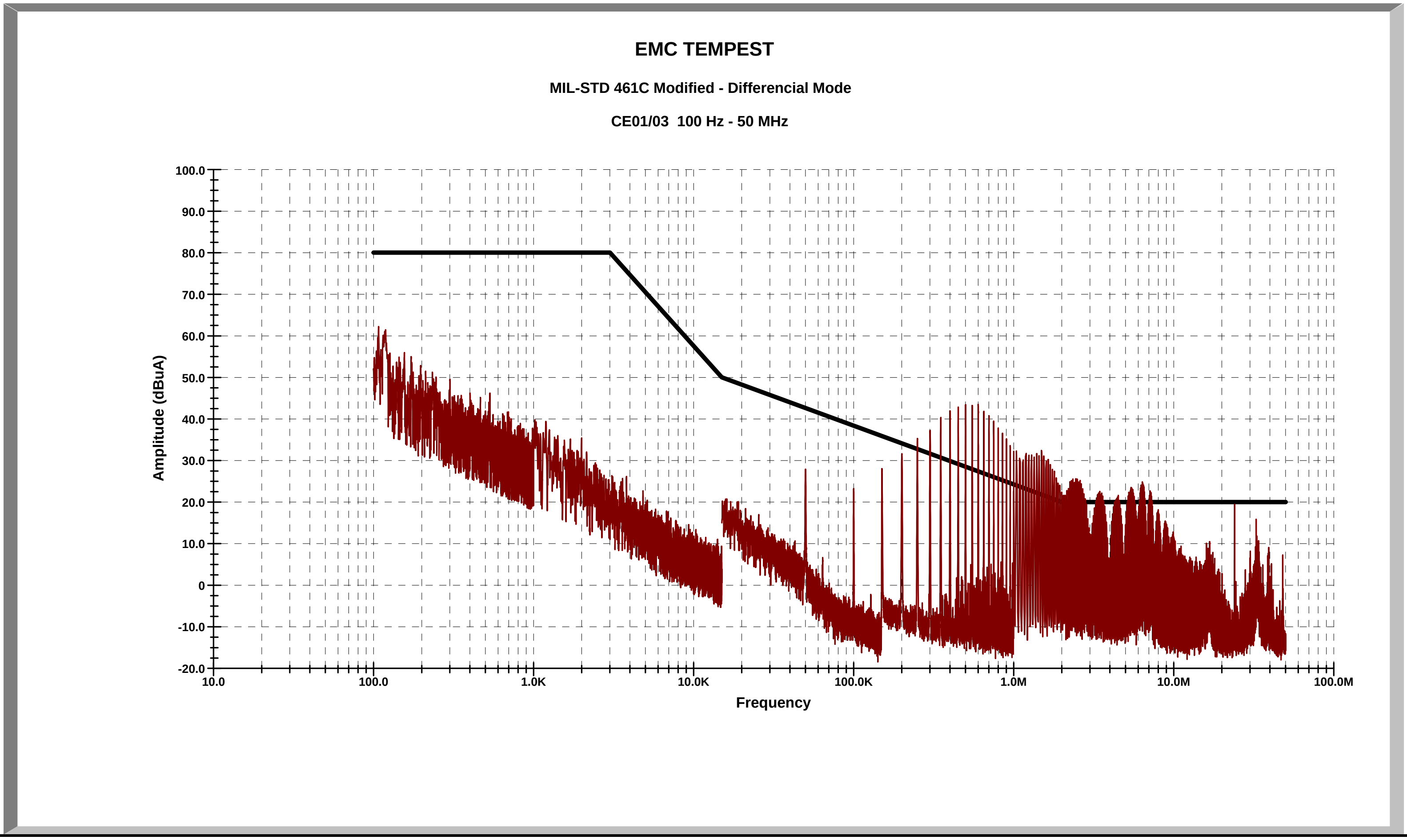


Figure 5-12. CE01 - CE03 Differential Mode Current Test Results: MAG Heater 28 VDC Power Return Lead with Ferrites

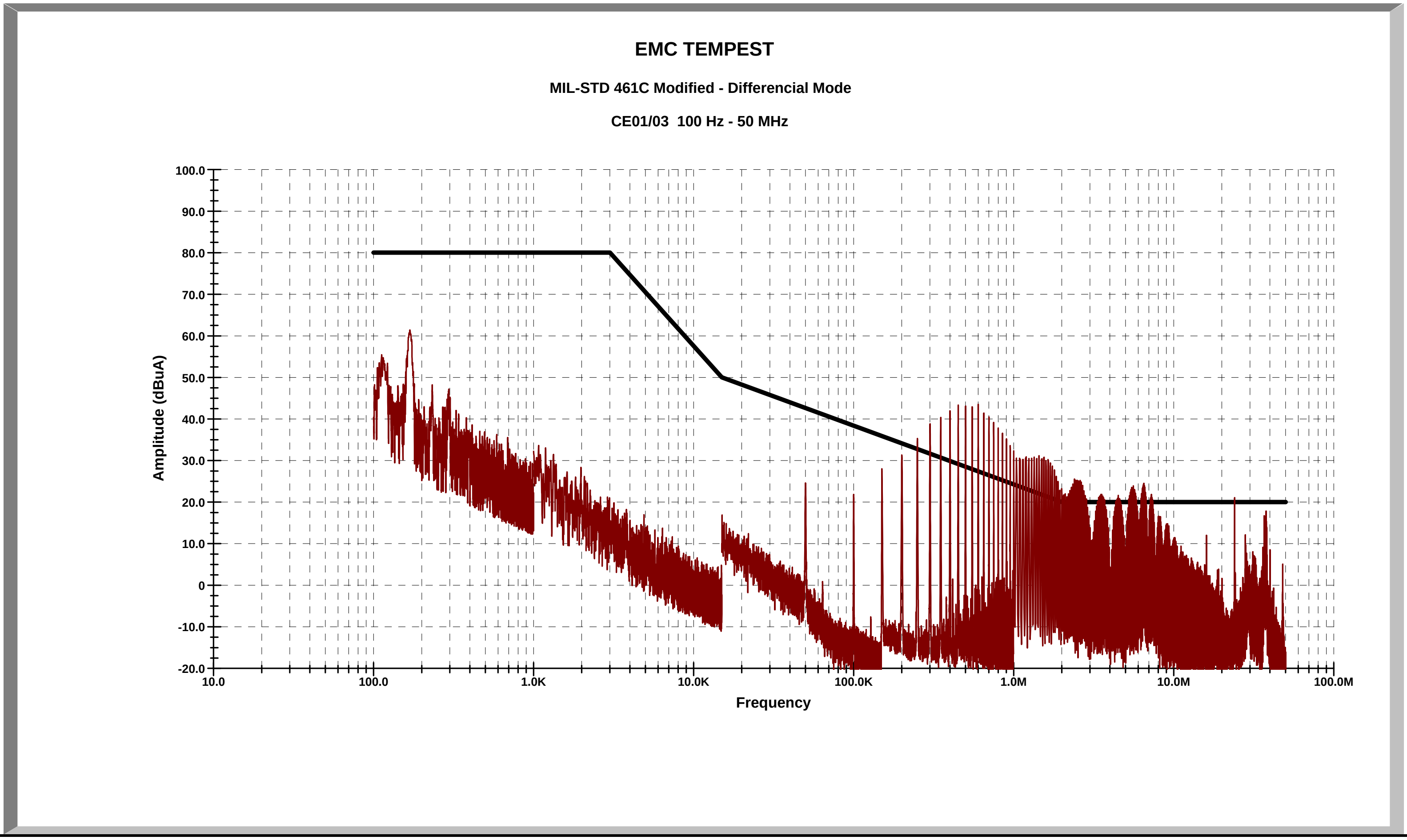


Figure 5-13. CE01 - CE03 True Differential Mode Current Test Results: MAG Heater 28 VDC Power Leads with Ferrites

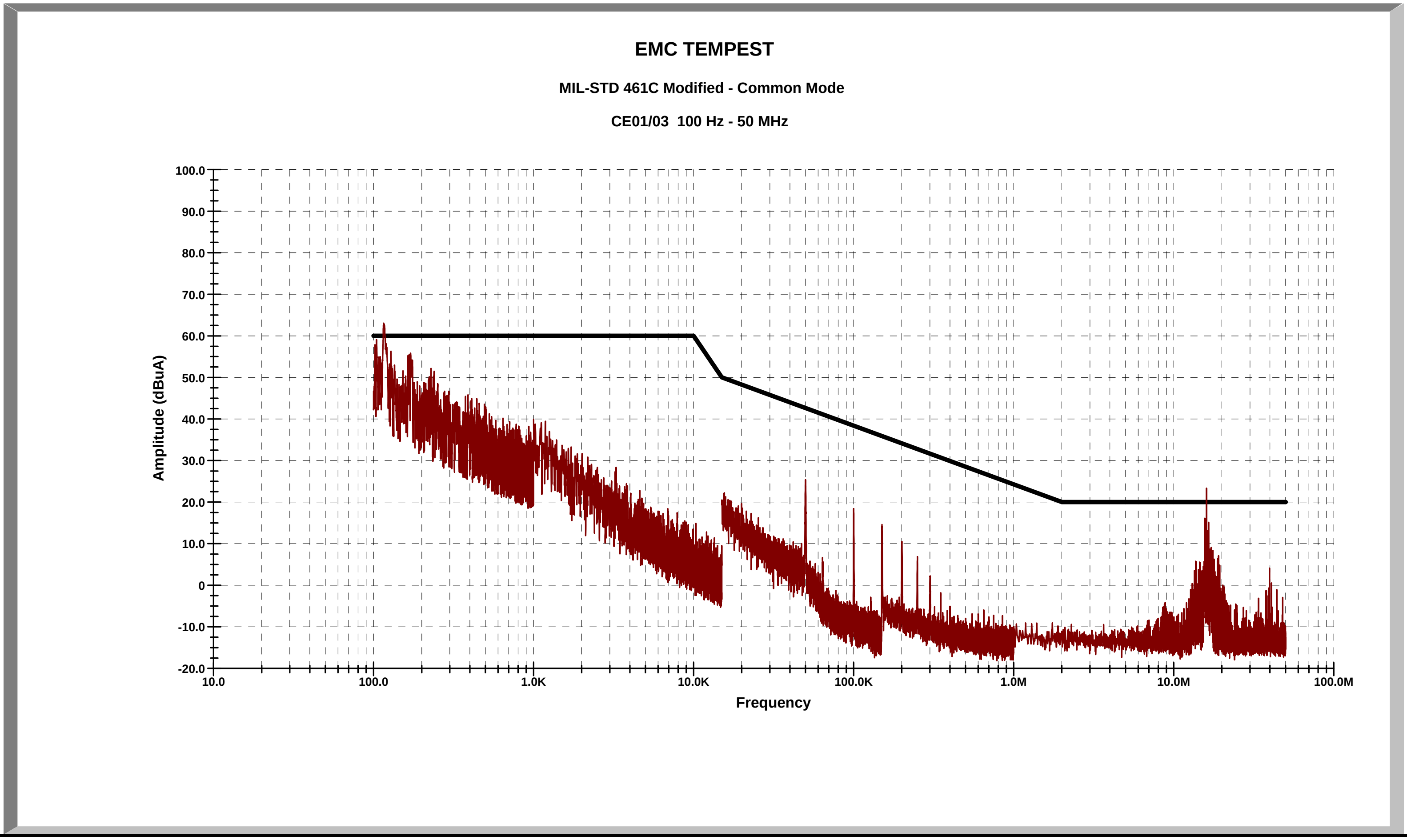


Figure 5-14. CE01 - CE03 Common Mode Current Test Results: MAG Mode +28 VDC Power and Return Leads

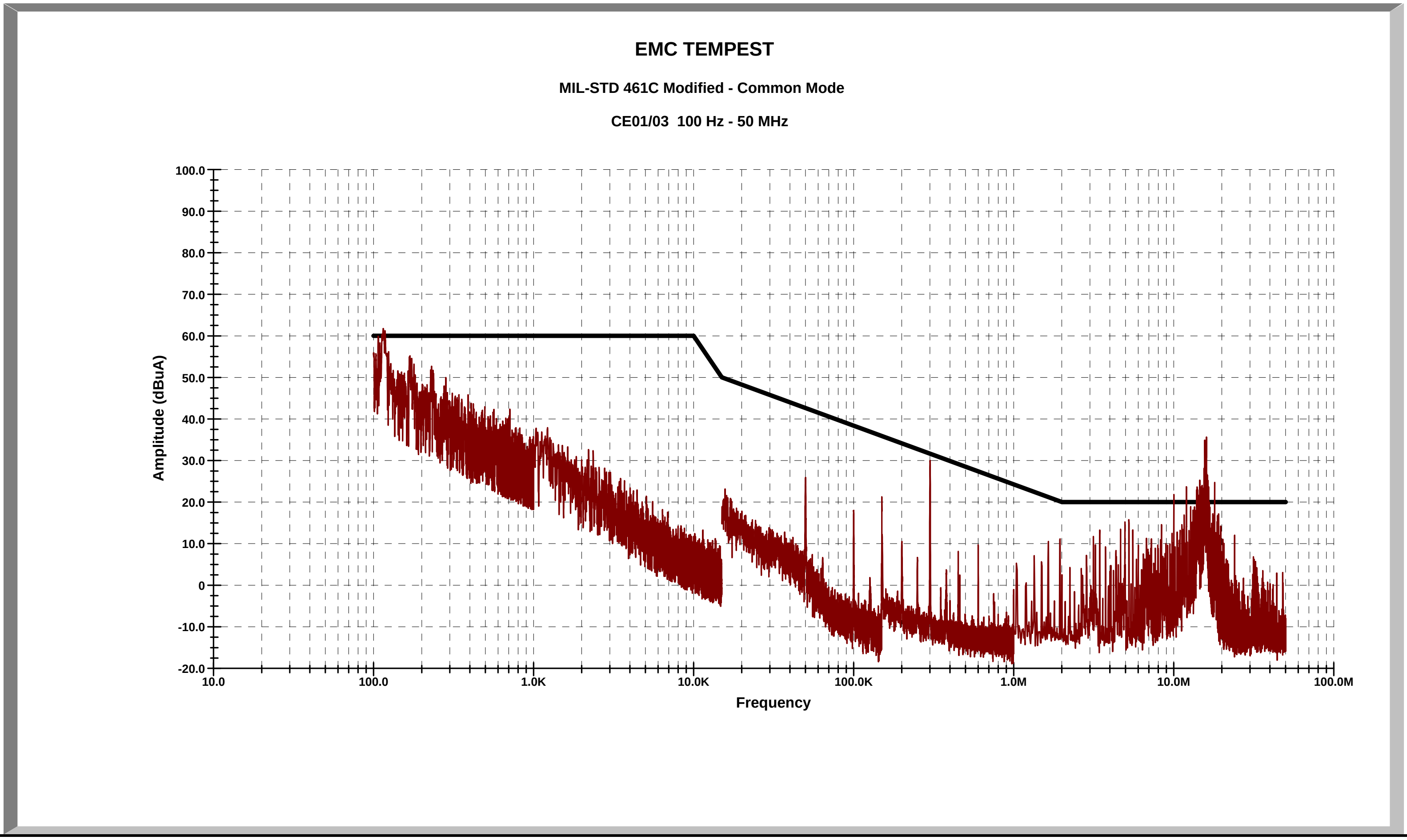


Figure 5-15. CE01 - CE03 Common Mode Current Test Results: IDPU Power Harness (IDPU J1)

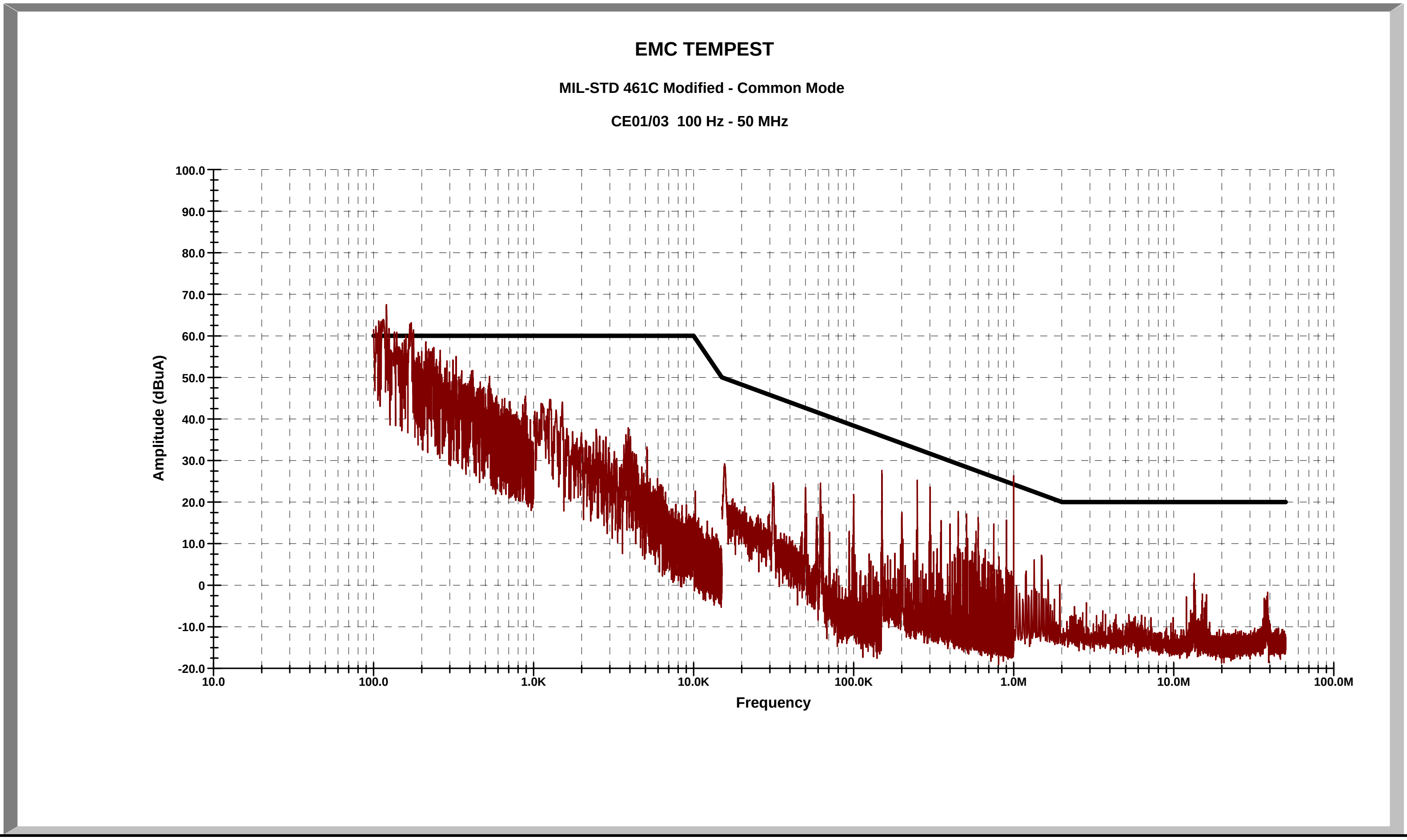


Figure 5-16. CE01 - CE03 Common Mode Current Test Results: 1553 Harness (IDPU J2a,b)

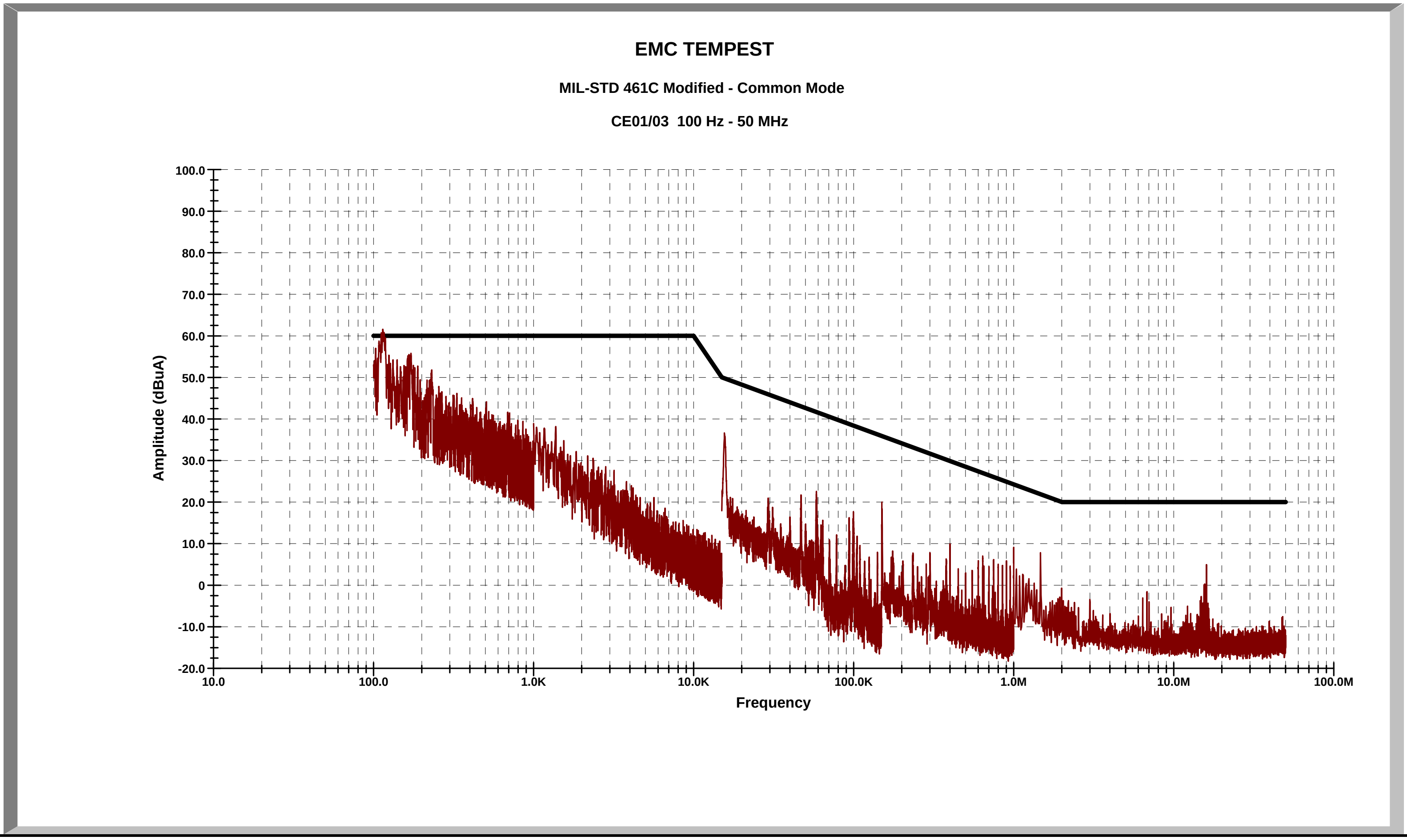


Figure 5-17. CE01 - CE03 Common Mode Current Test Results: PLASTIC Harness (IDPU J3)

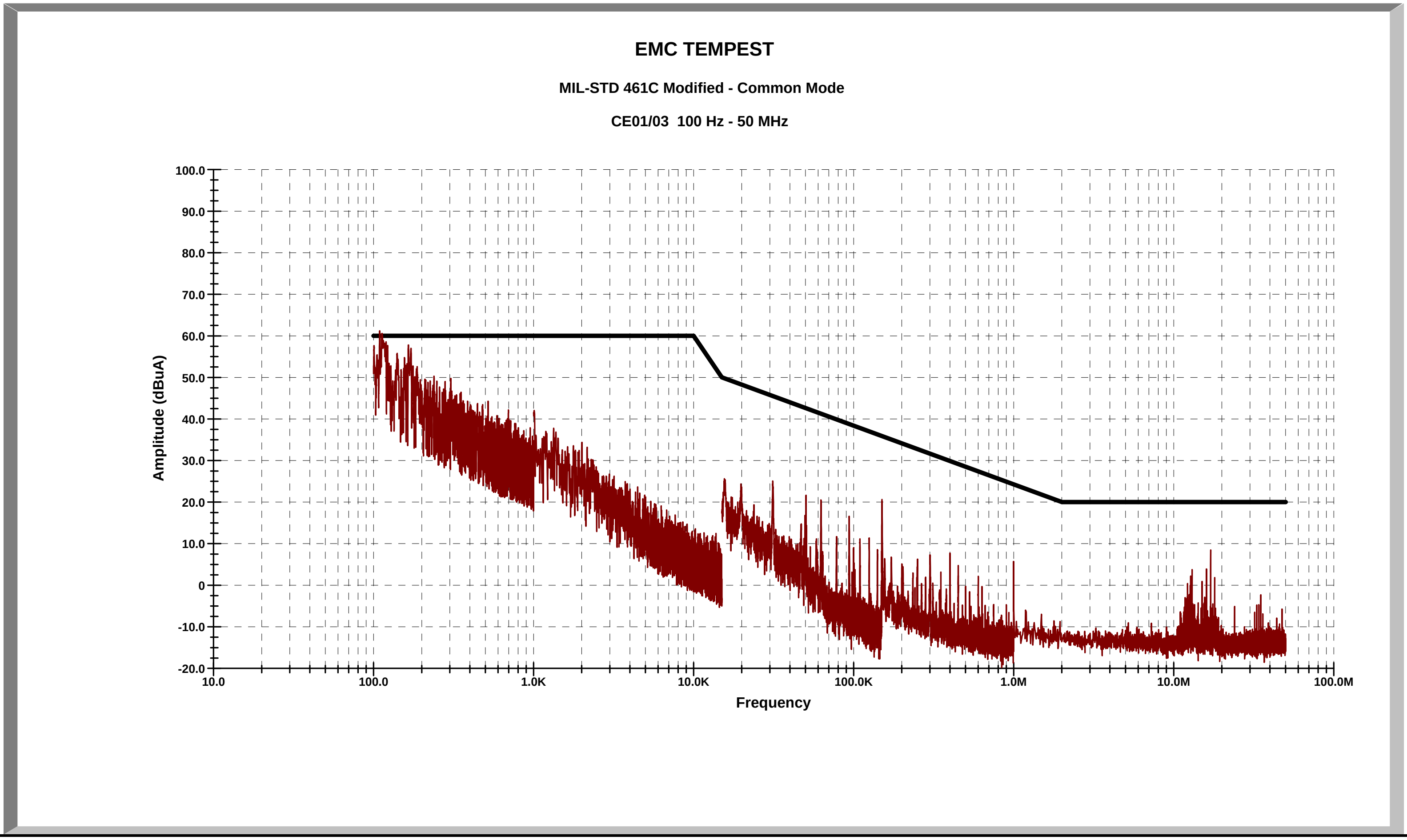


Figure 5-18. CE01 - CE03 Common Mode Current Test Results: SEP Harness (IDPU J4)

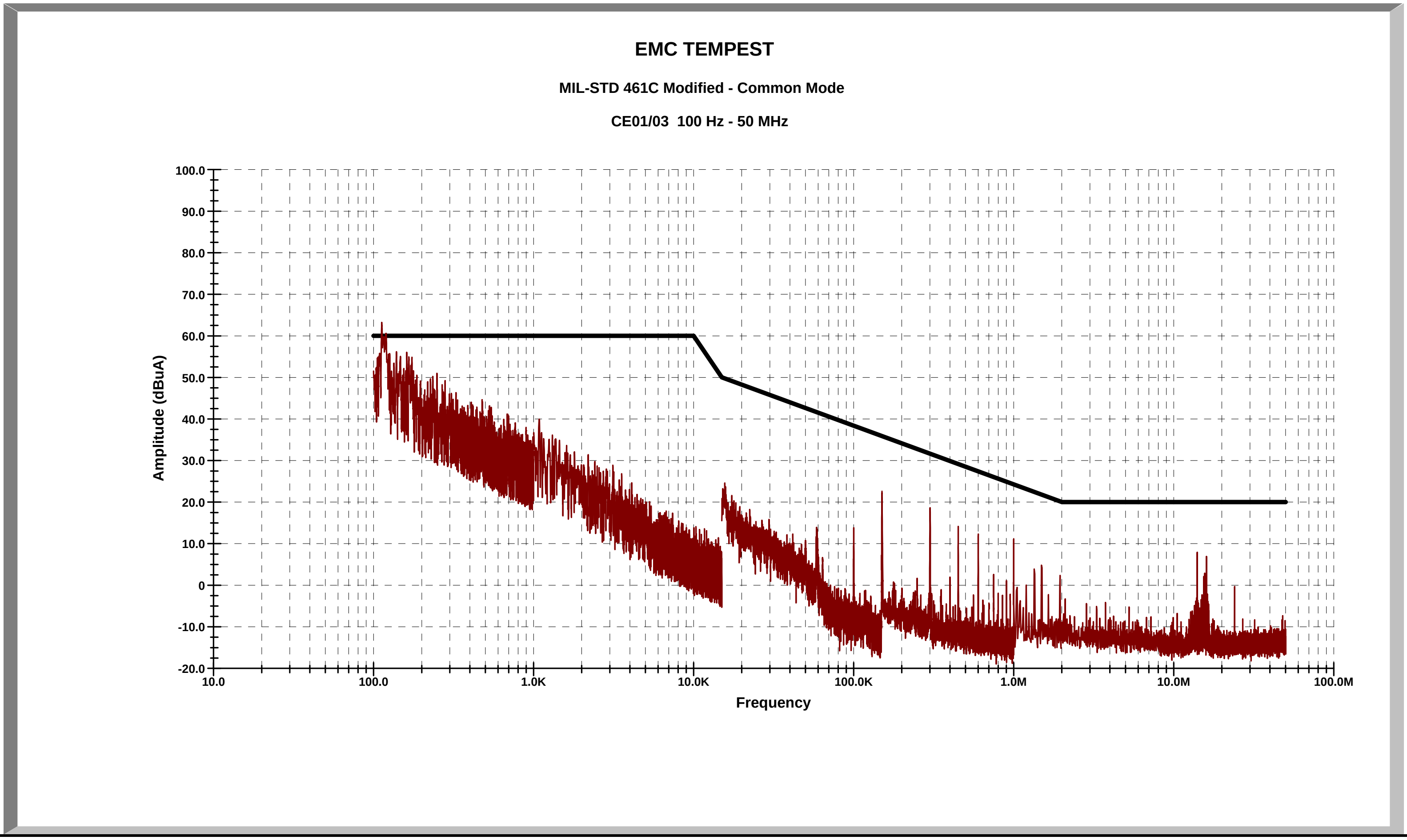


Figure 5-19. CE01 - CE03 Common Mode Current Test Results: SWEA Harness (IDPU J5)

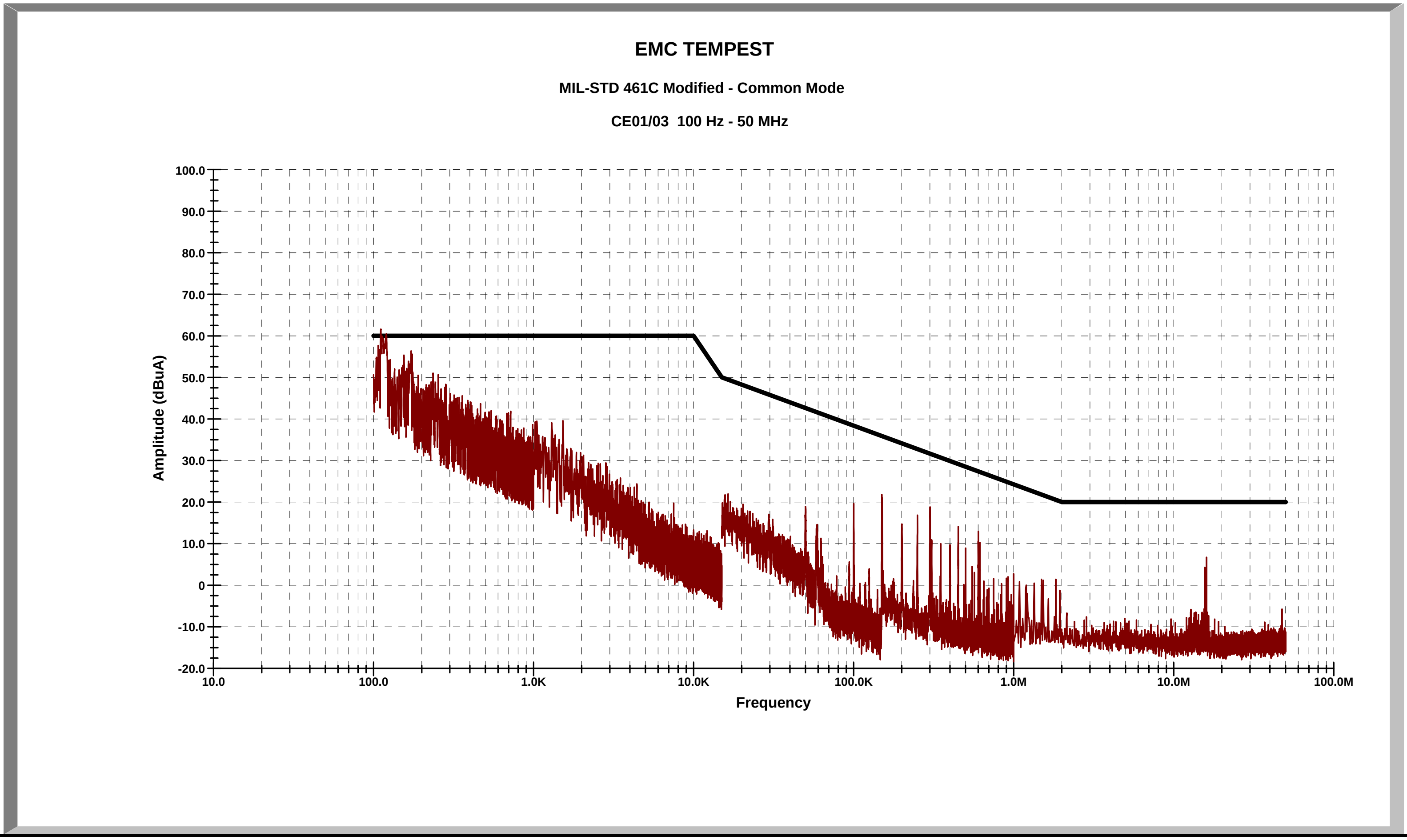


Figure 5-20. CE01 - CE03 Common Mode Current Test Results: MAG Harness (IDPU J6)

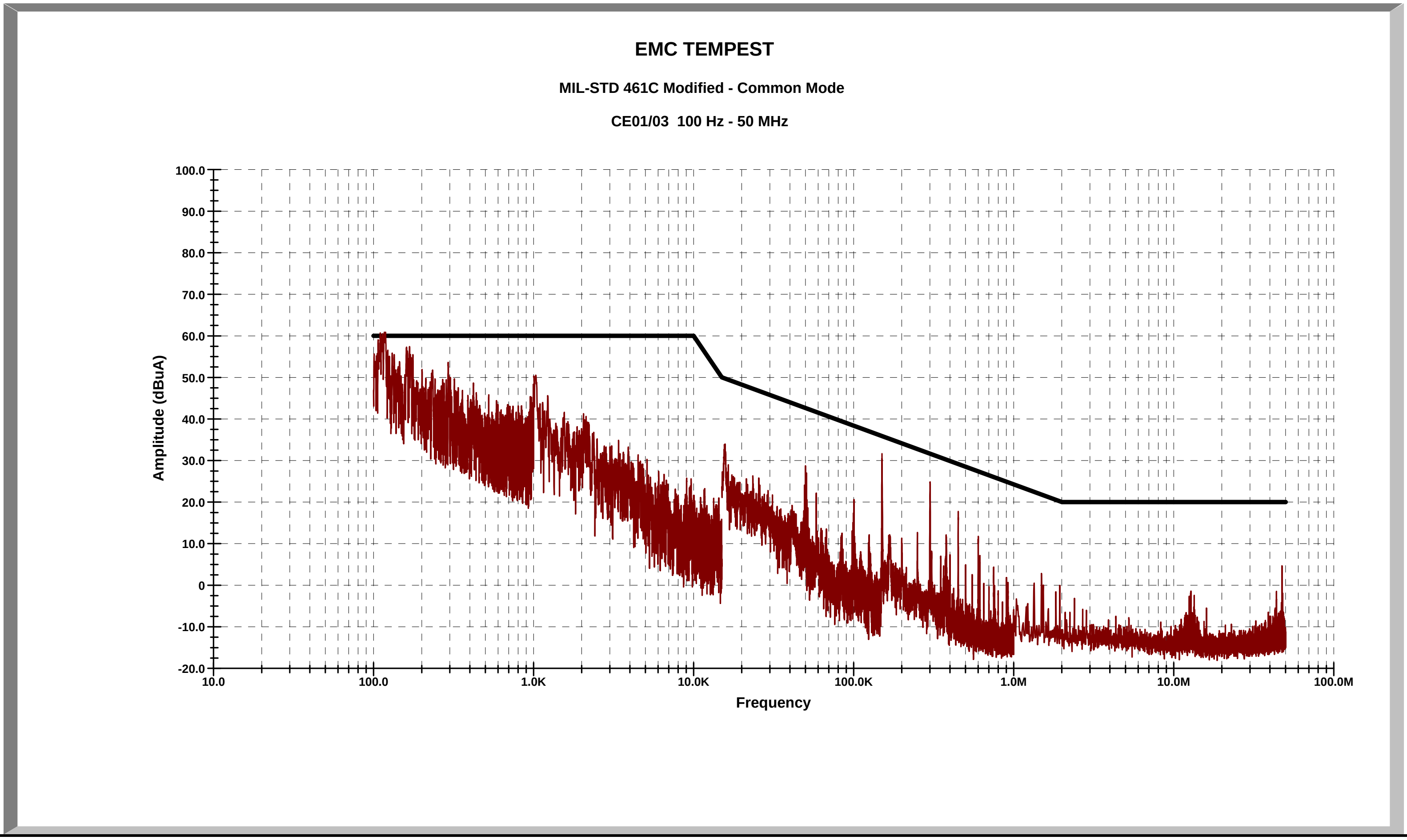


Figure 5-21. CE01 - CE03 Common Mode Current Test Results: STE-U Harness (IDPU J7)

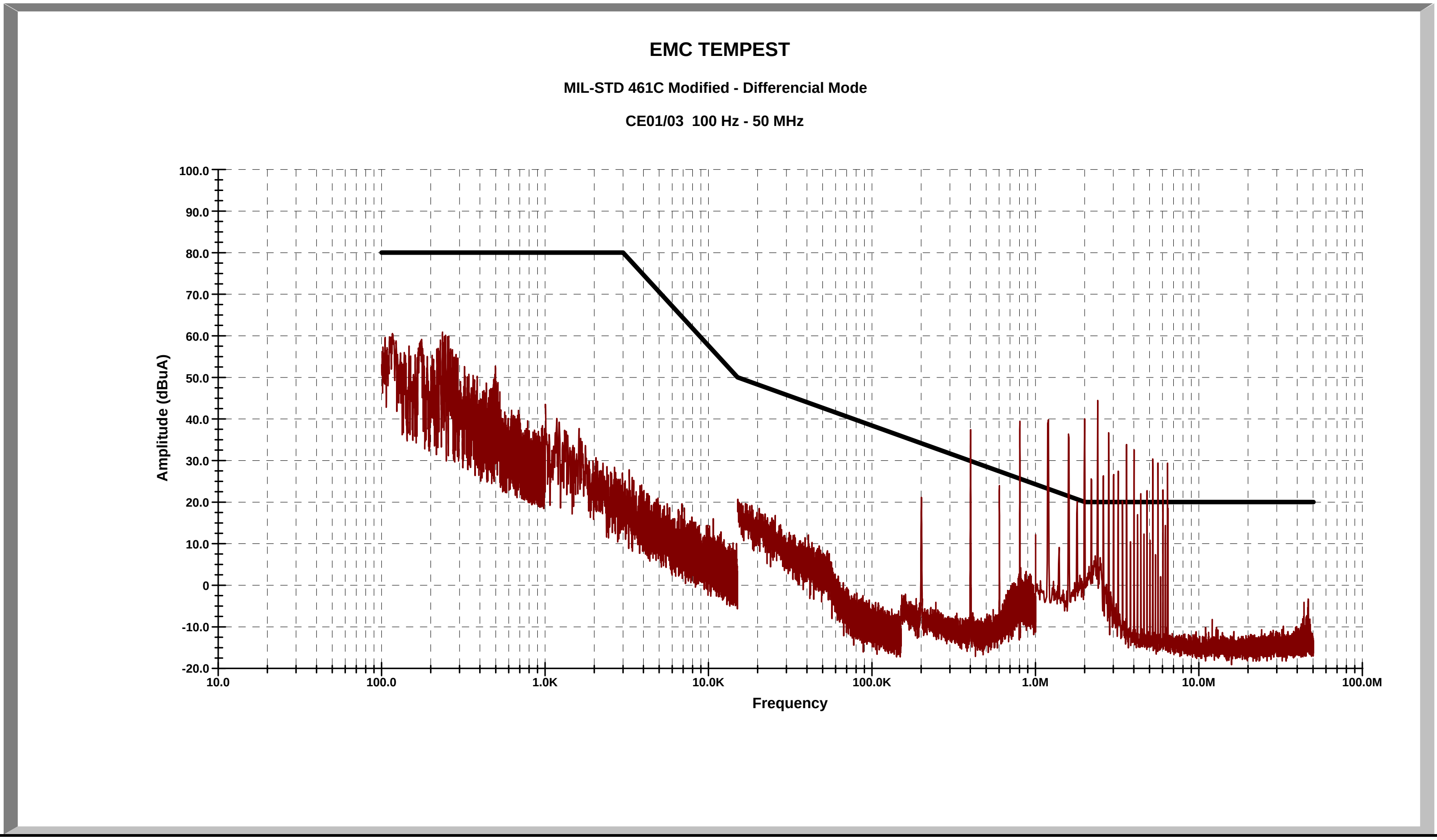


Figure 5-22. CE01 - CE03 Differential Mode Current Test Results: SEP +28 VDC Power Lead

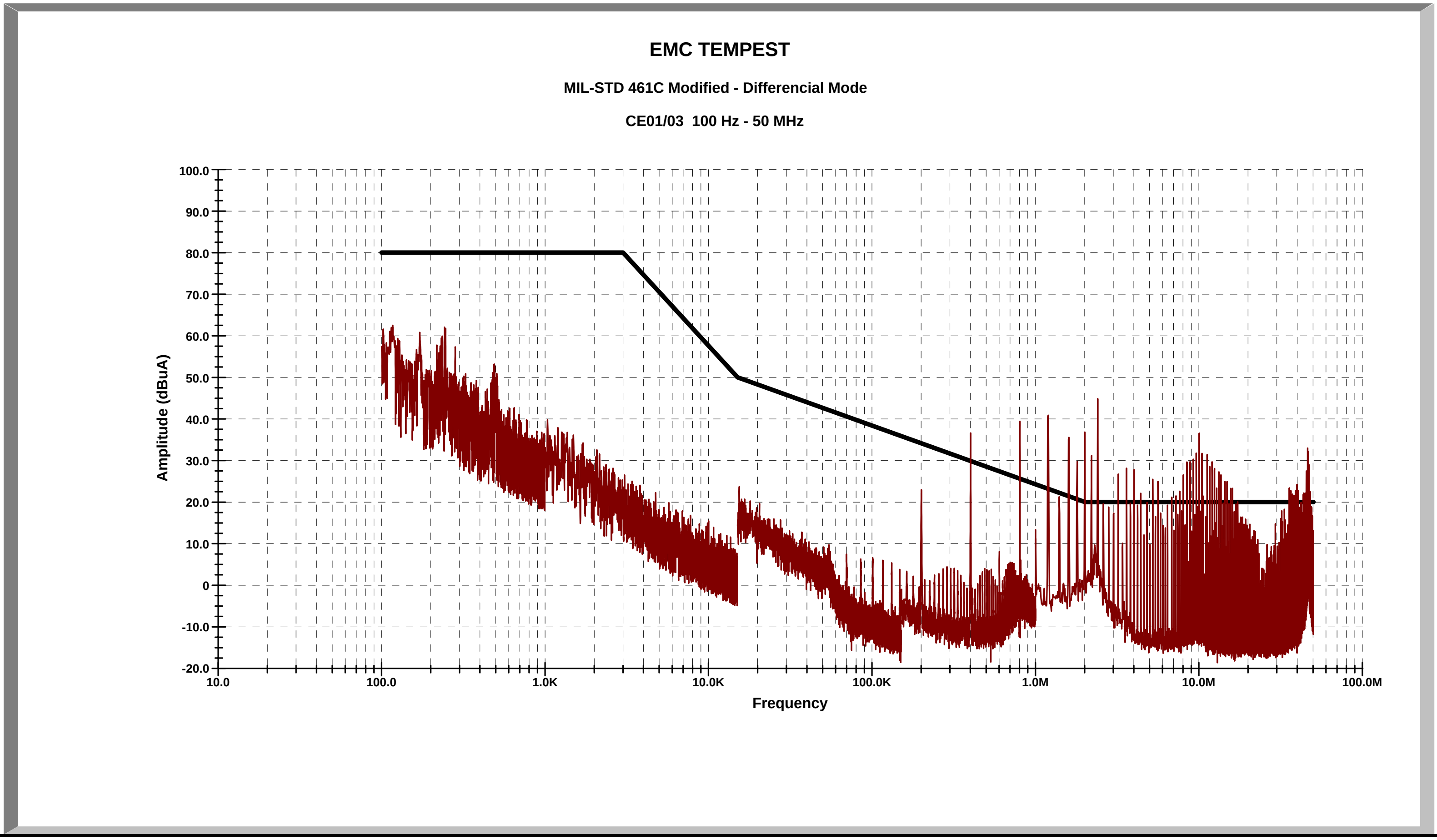


Figure 5-23. CE01 - CE03 Differential Mode Current Test Results: SEP 28 VDC Power Return Lead

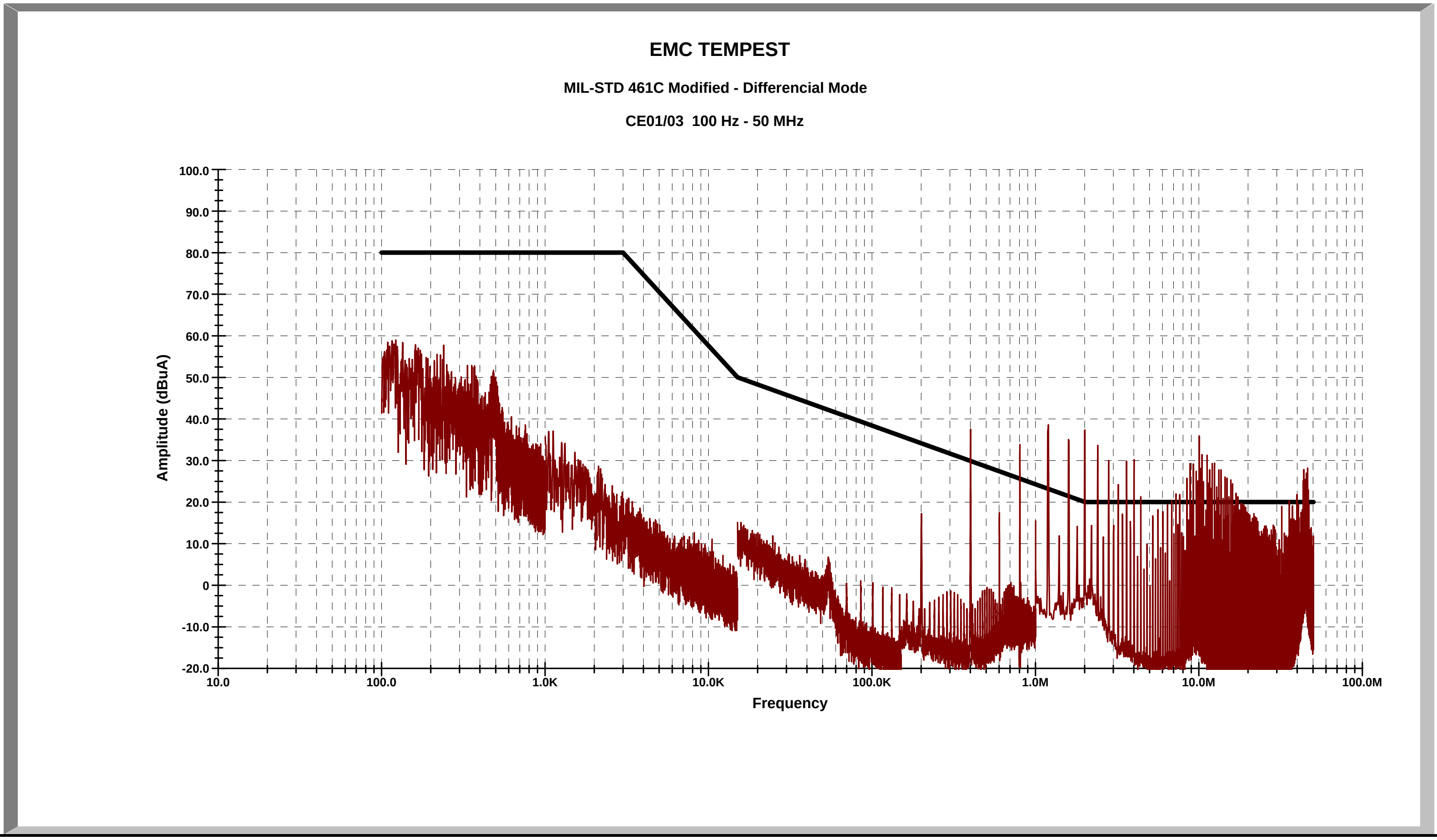


Figure 5-24. CE01 - CE03 True Differential Mode Current Test Results: SEP 28 VDC Power Bus

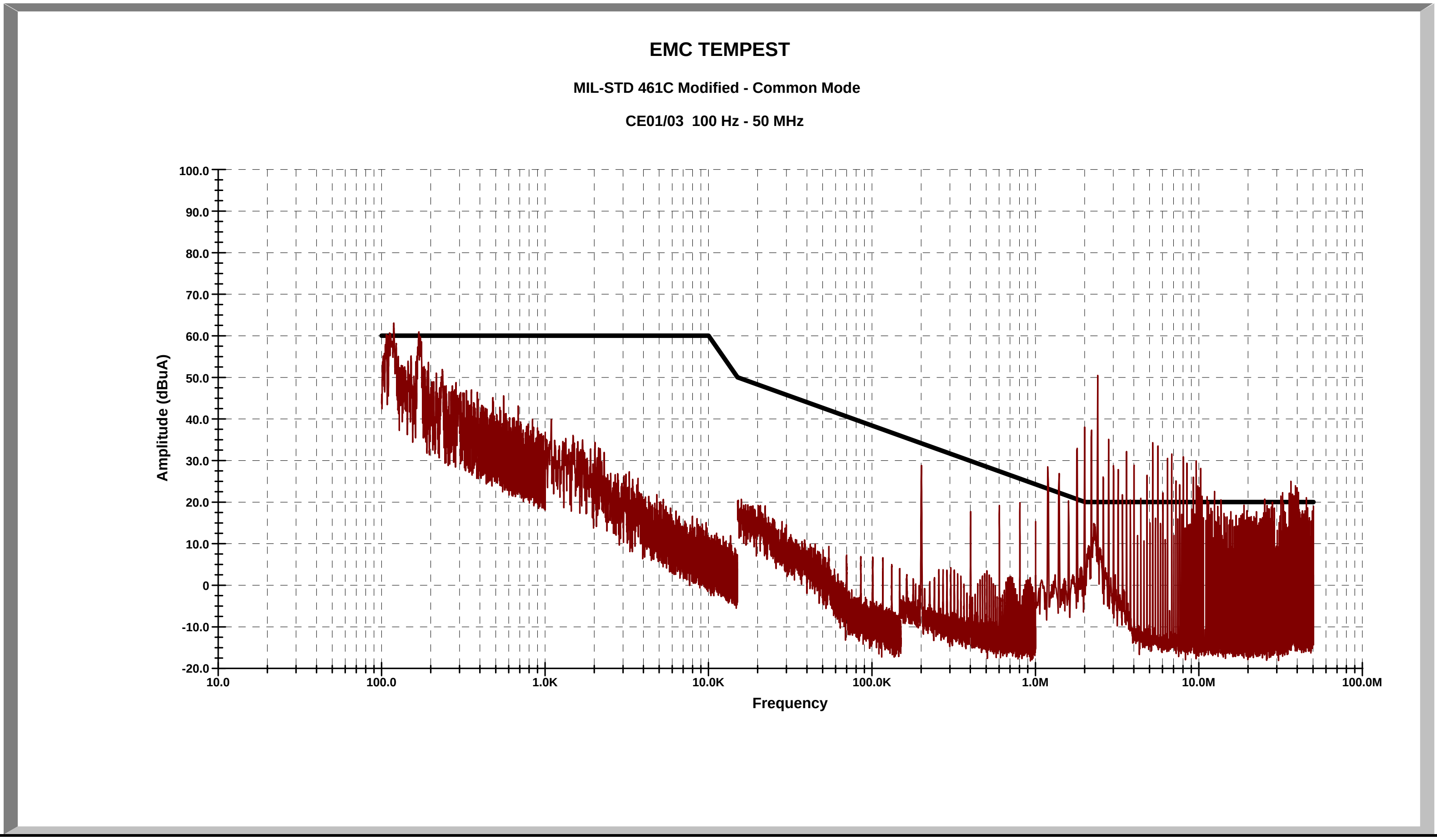


Figure 5-25. CE01 - CE03 Common Mode Test Results: SEP +28 VDC Power and Return Leads

Power Lead was shorted and data was not taken (as per Dave Curtis)

Figure 5-26. CE01 - CE03 Common Mode Test Results: SEP Survival Heater +28 VDC Power and Return Leads

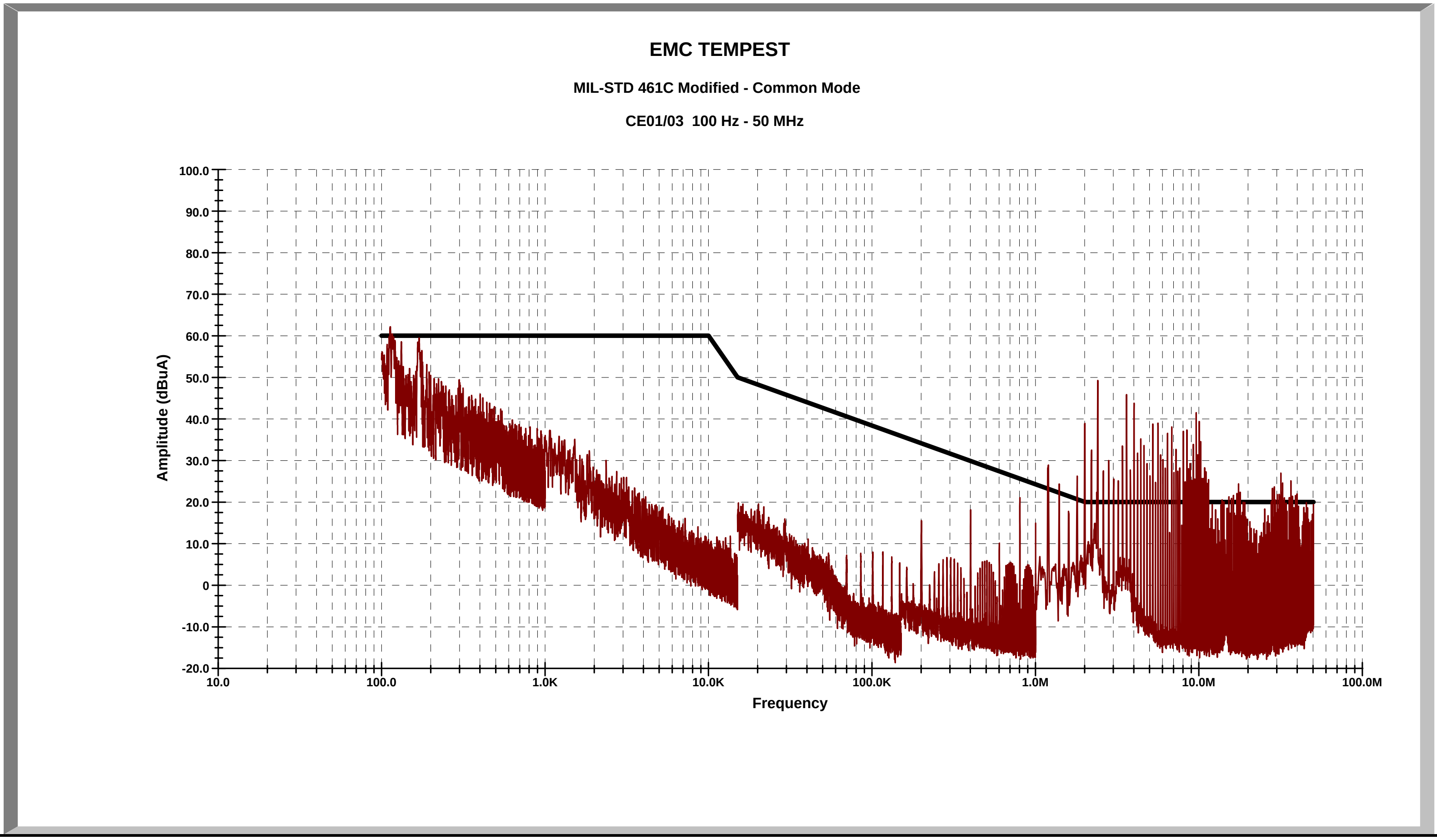


Figure 5-27. CE01 - CE03 Common Mode Test Results: SEP Power Harness (SEP J1)

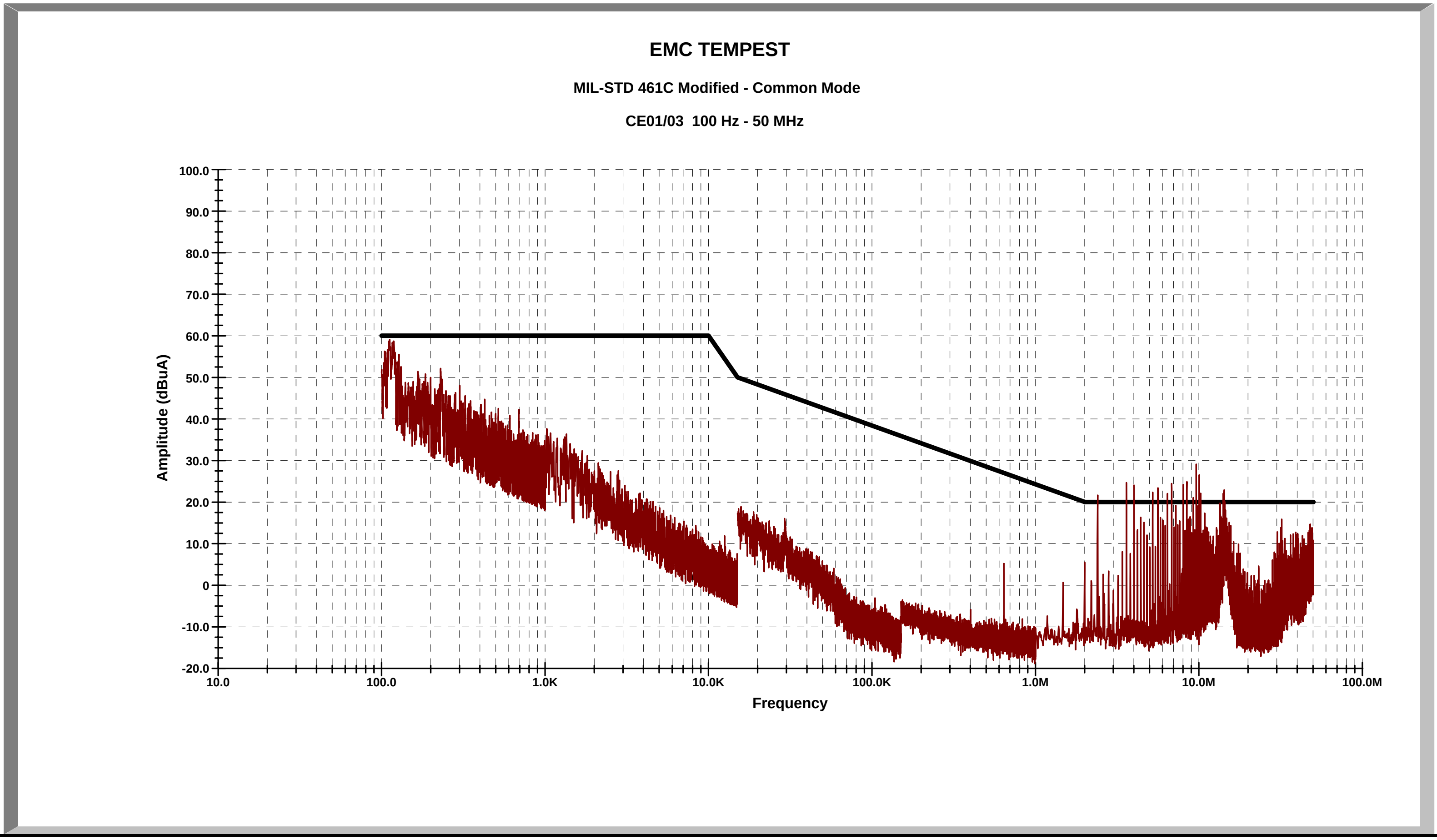


Figure 5-28. CE01 - CE03 Common Mode Test Results: SEP Thermal Harness (SEP J2)

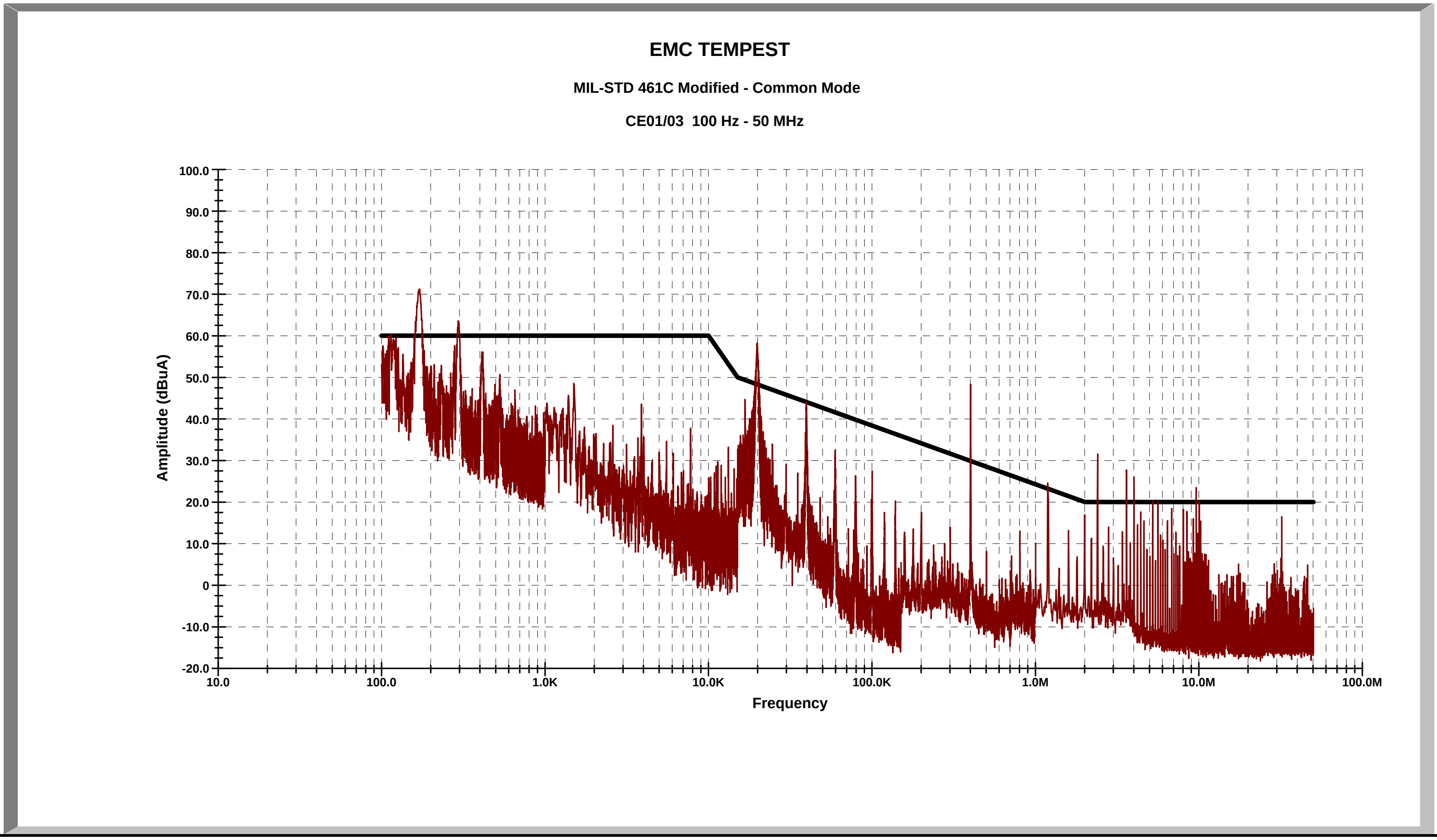


Figure 5-29. CE01 - CE03 Common Mode Test Results: SIT Harness (SEP J5)

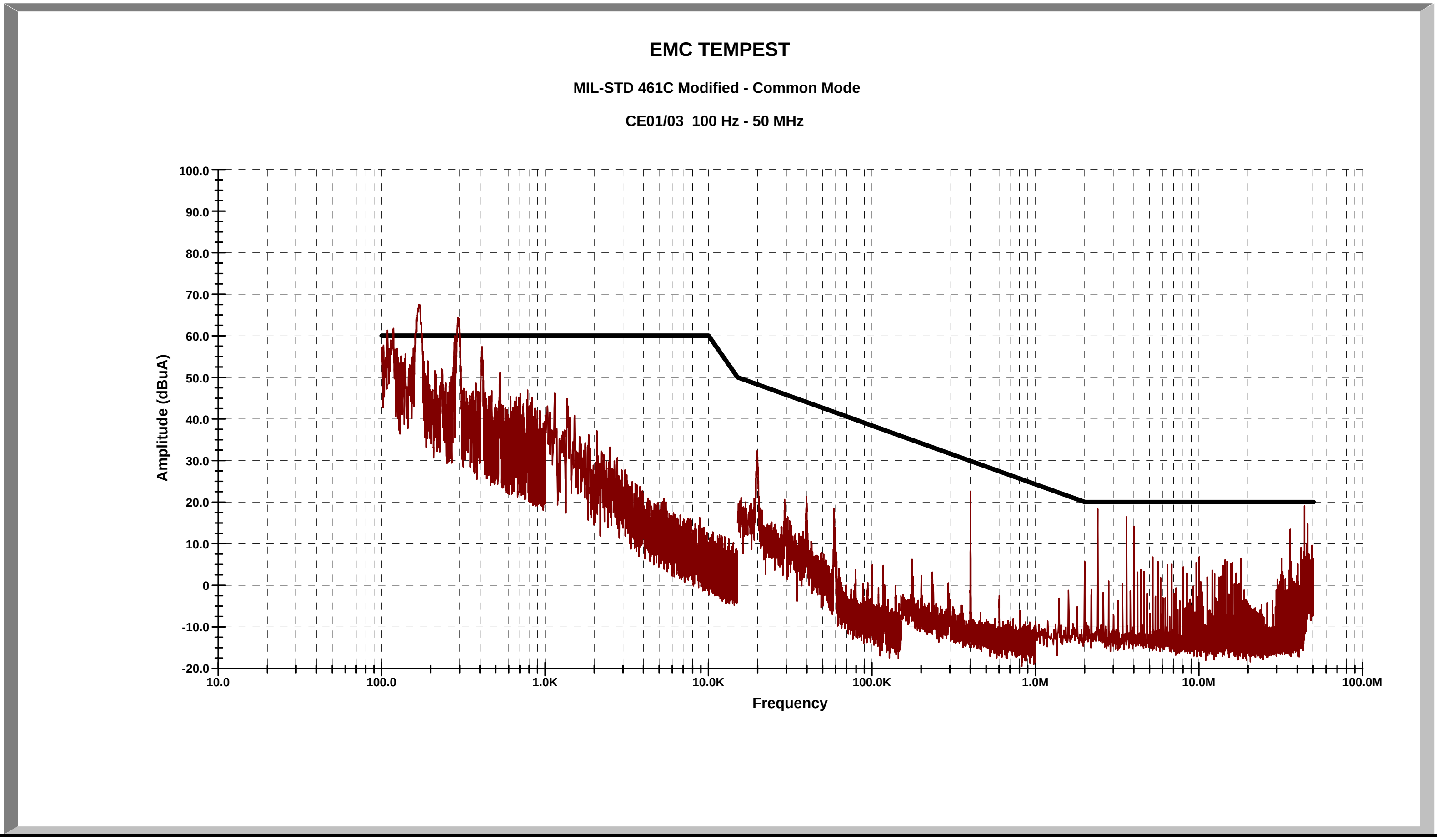


Figure 5-30. CE01 - CE03 Common Mode Test Results: SEPT-E Harness (SEP J7)

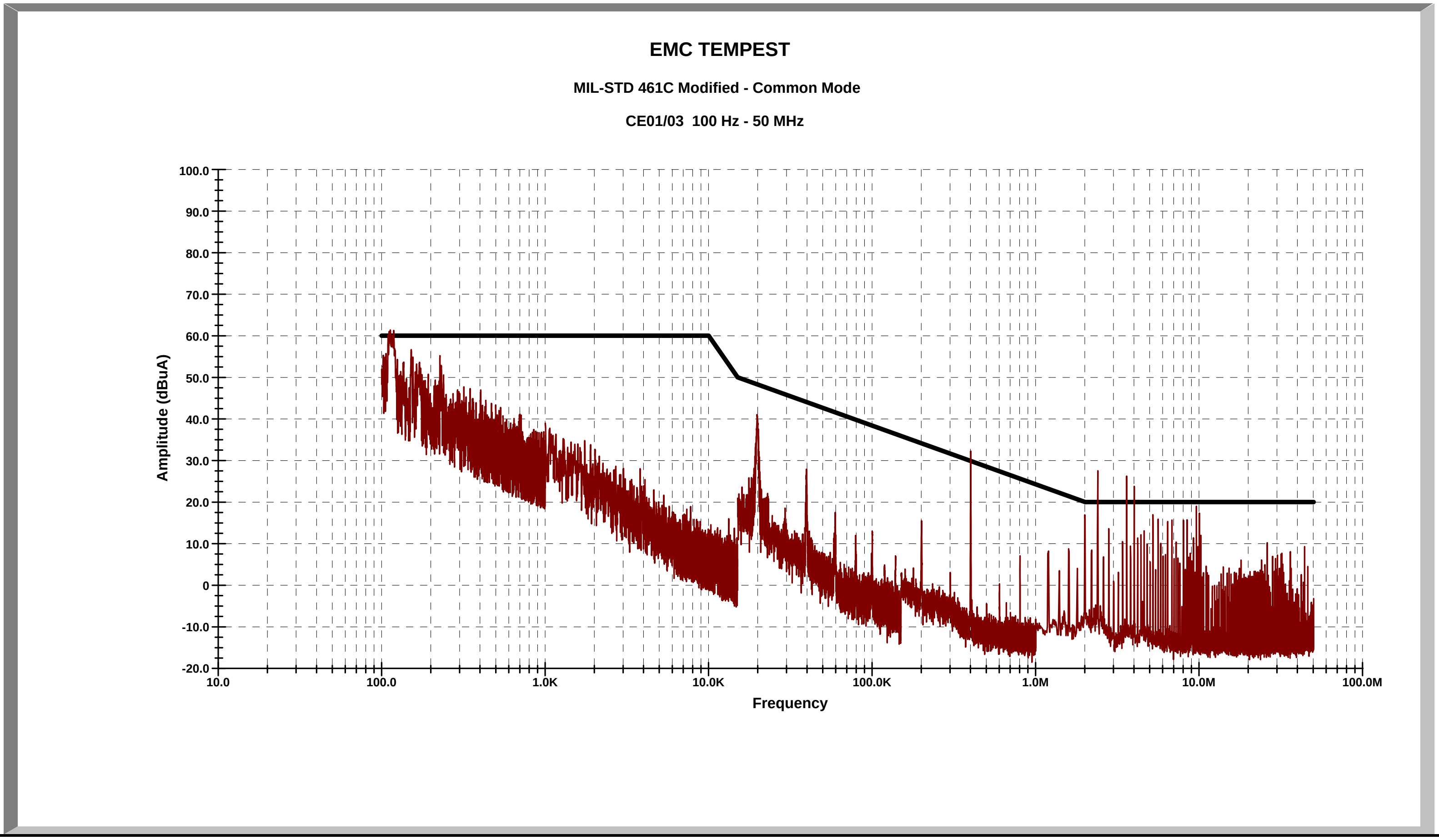


Figure 5-31. CE01 - CE03 Common Mode Test Results : SEPT-NS Harness(SEP J9)

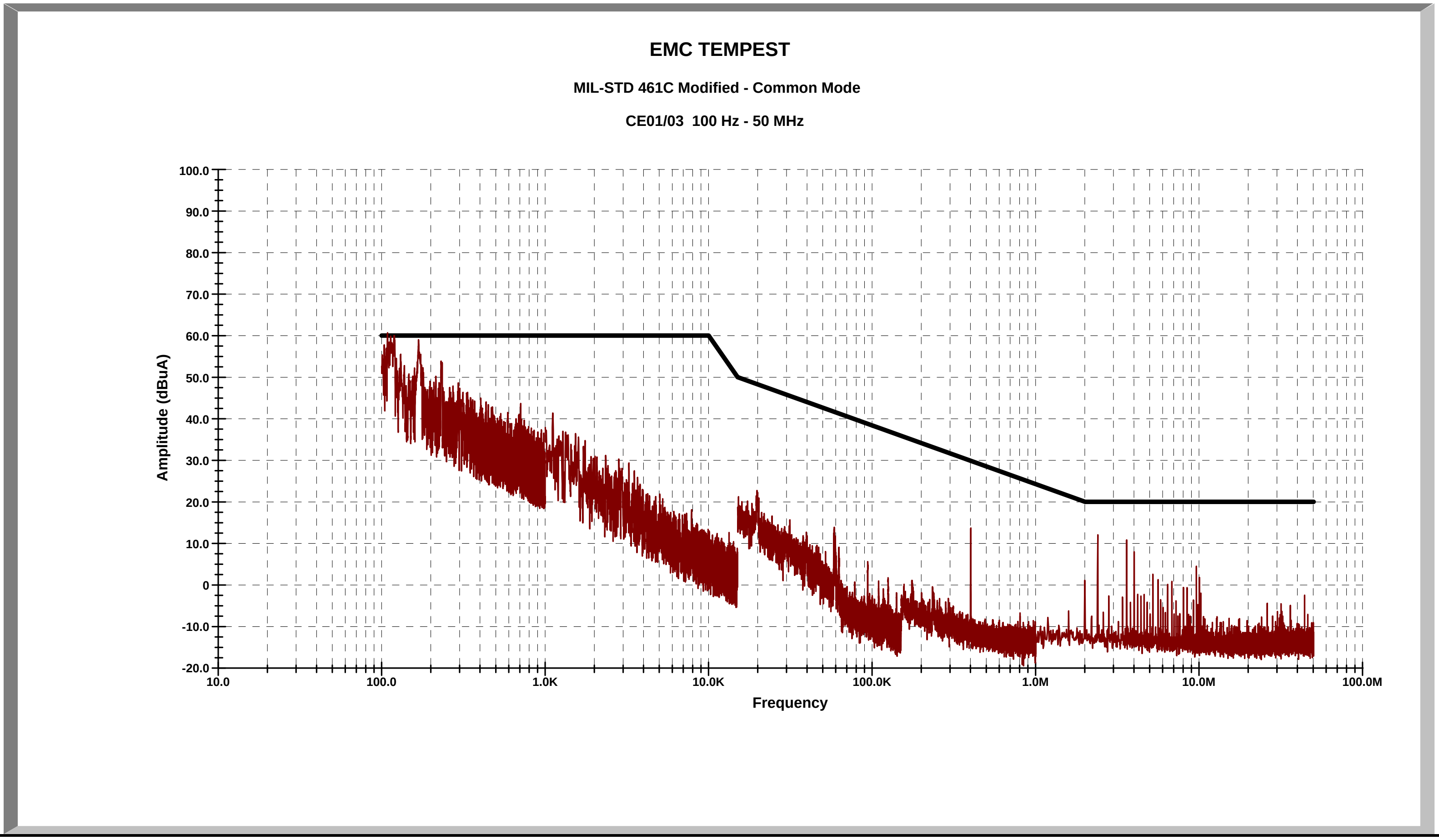


Figure 5-32. CE01 - CE03 Common Mode Test Results : SEPT-E Actuator Harness(SEPT-E J3)

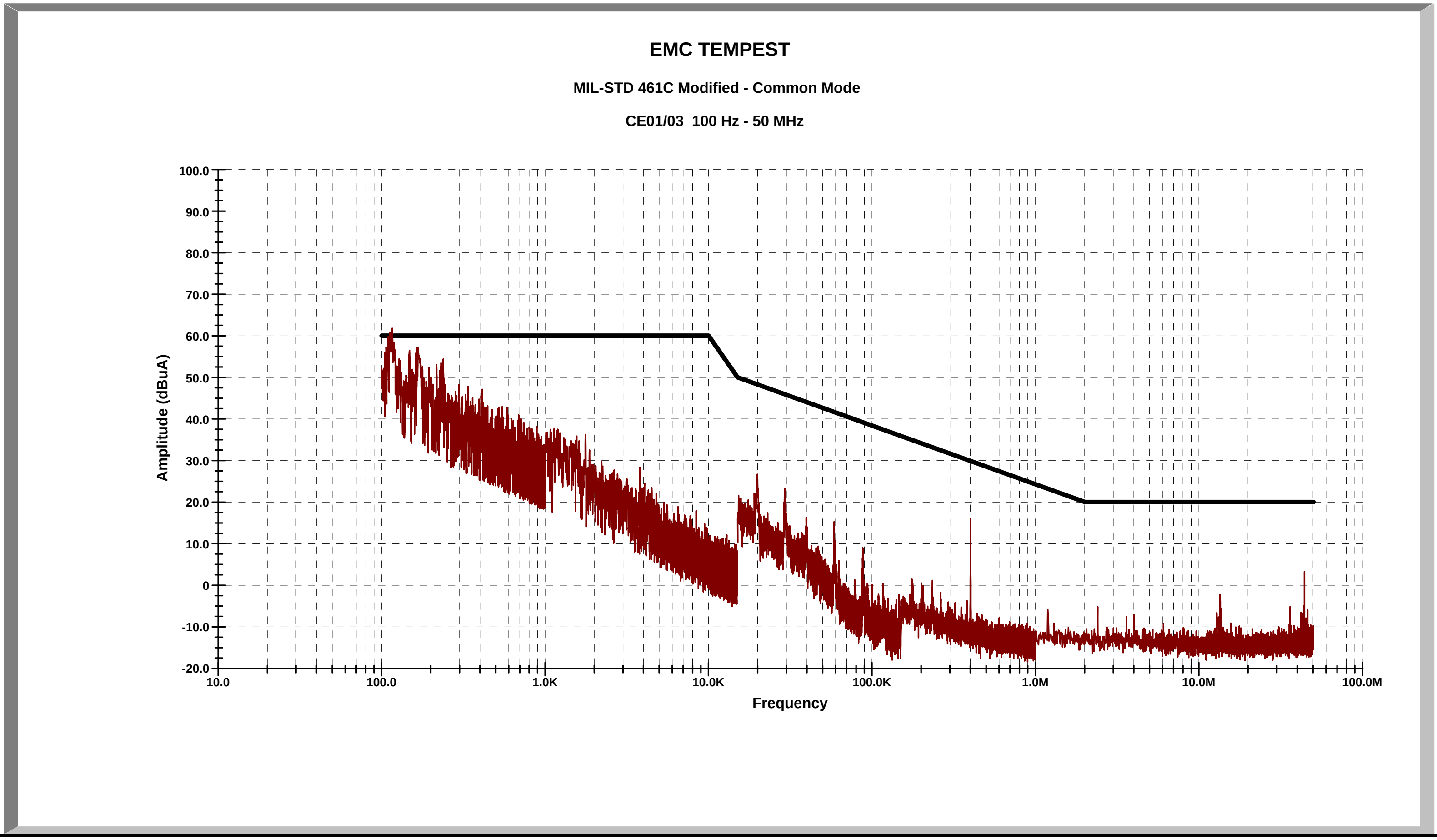


Figure 5-33. CE01 - CE03 Common Mode Test Results: SEPT-NS Actuator Harness (SEPT-NS J3)

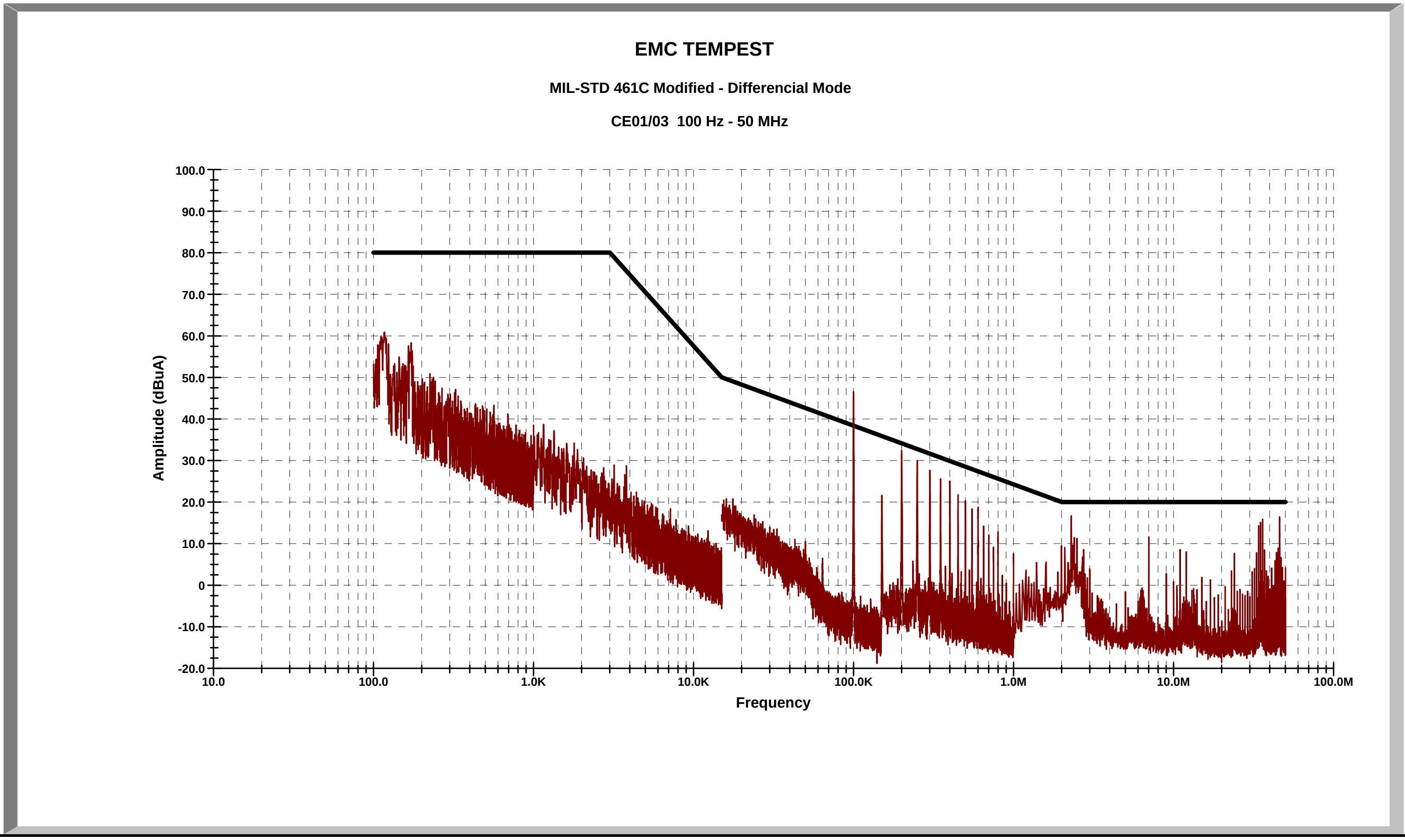


Figure 5-34. CE01 - CE03 Differential Mode Test Results: SWEA/STE +28 VDC Input Power Lead

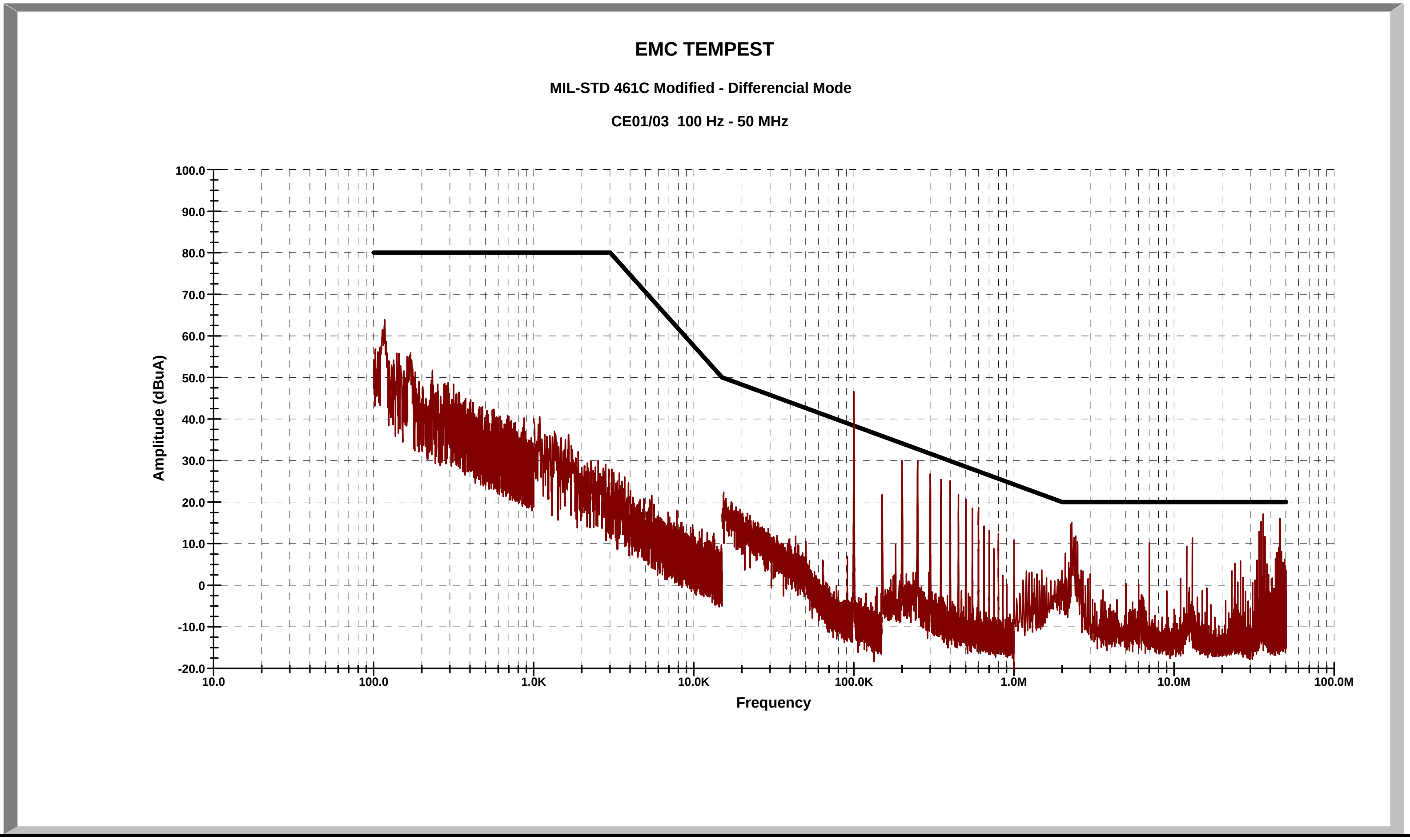


Figure 5-35. CE01 - CE03 Differential Mode Test Results: SWEA/STE 28 VDC Return Power Lead

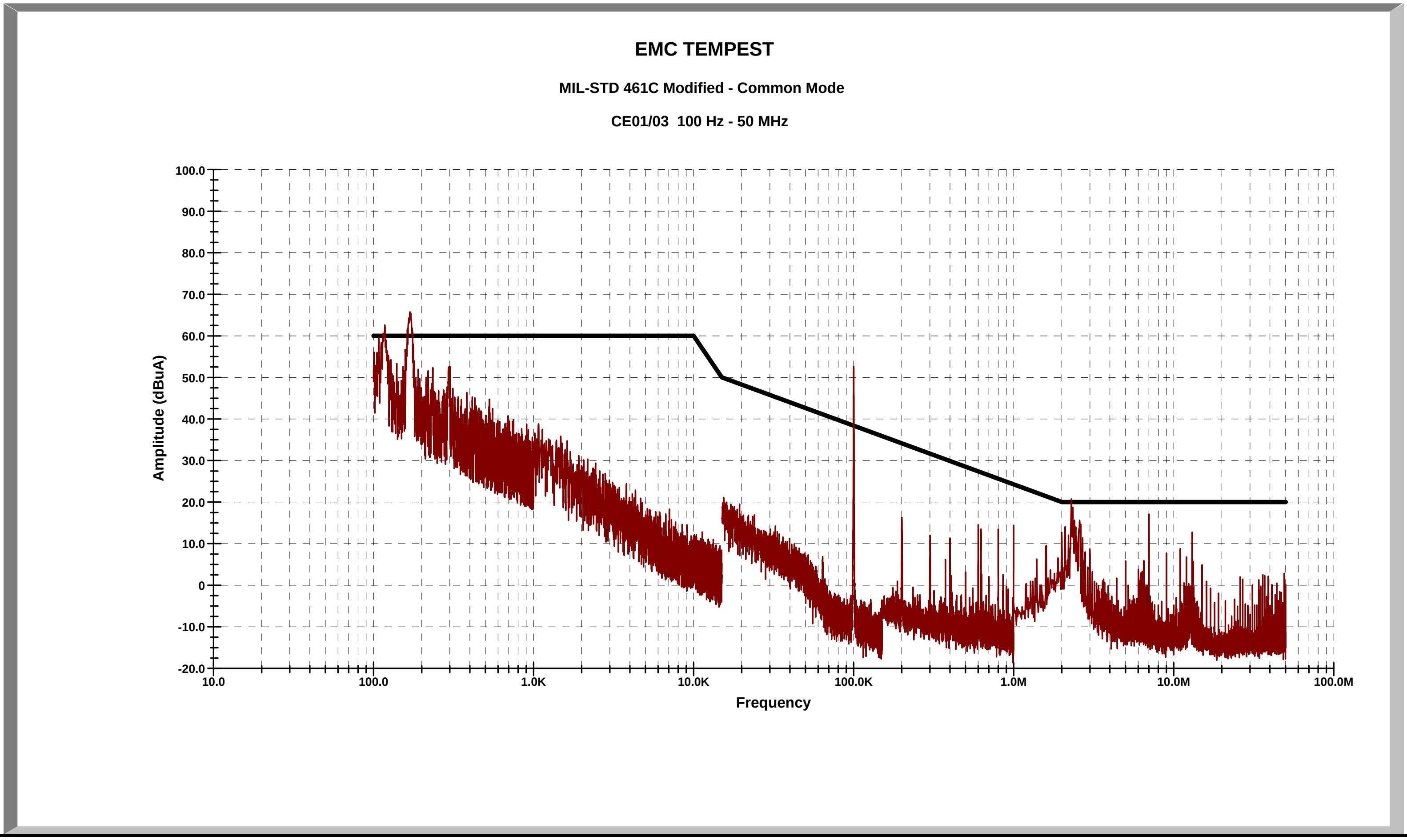


Figure 5-36. CE01 - CE03 Common Mode Test Results: SWEA/STE +28 VDC Input Power and Return Leads

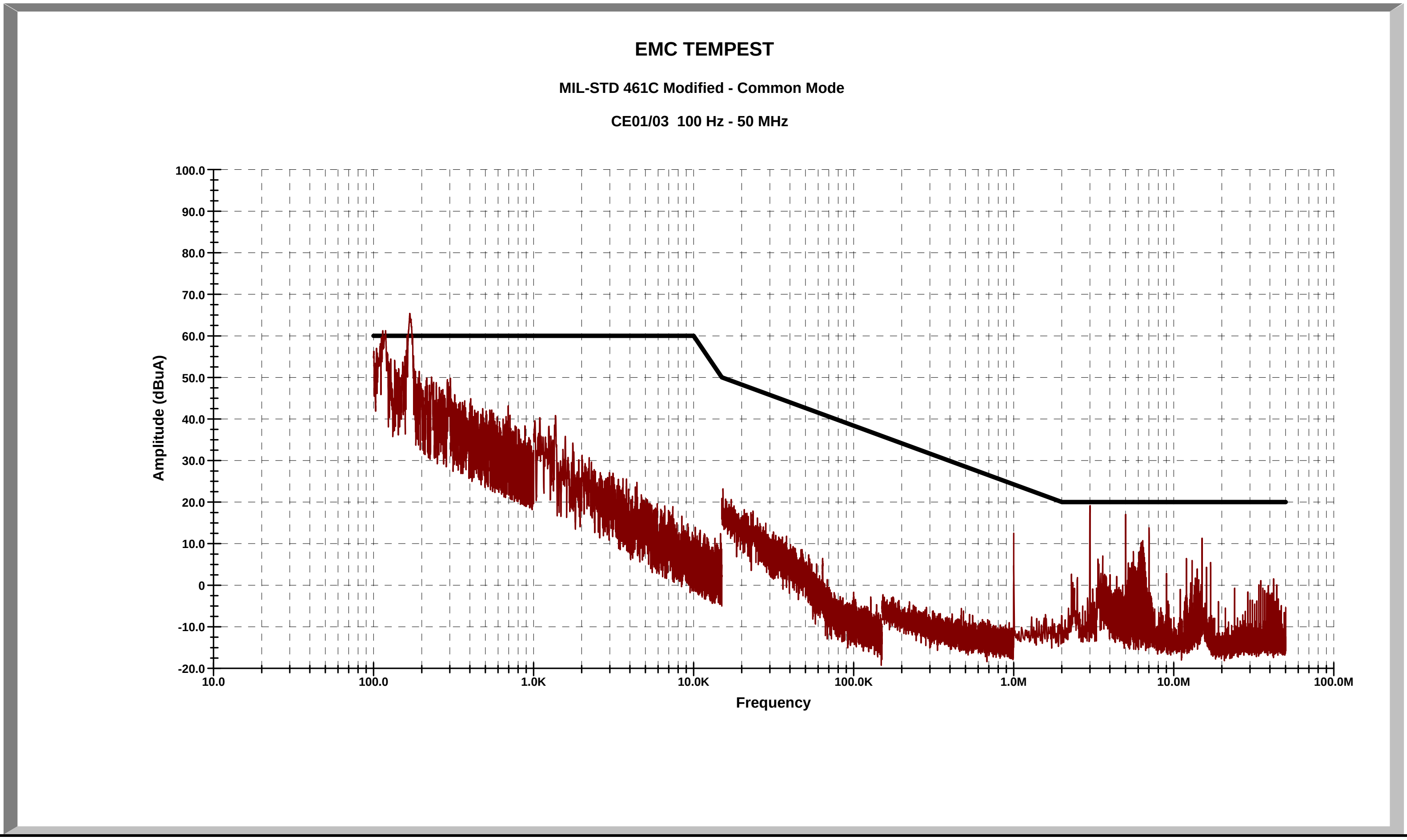


Figure 5-37. CE01 - CE03 Common Mode Current Test Results: SWEA/STE-D Heater and Return Leads

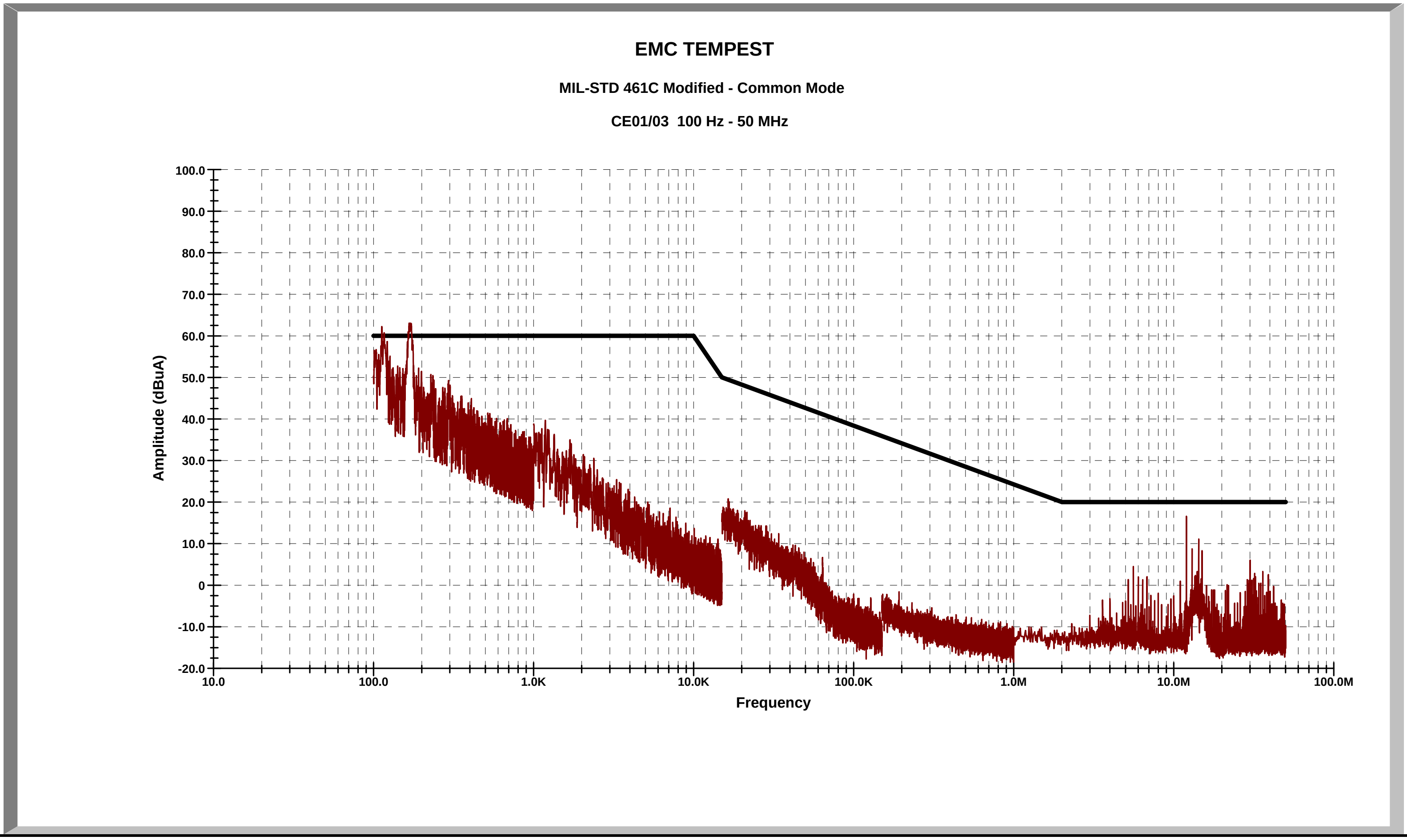


Figure 5-38. CE01 - CE03 Common Mode Current Test Results: SWEA/STE-D Deployment Heater and Return Leads

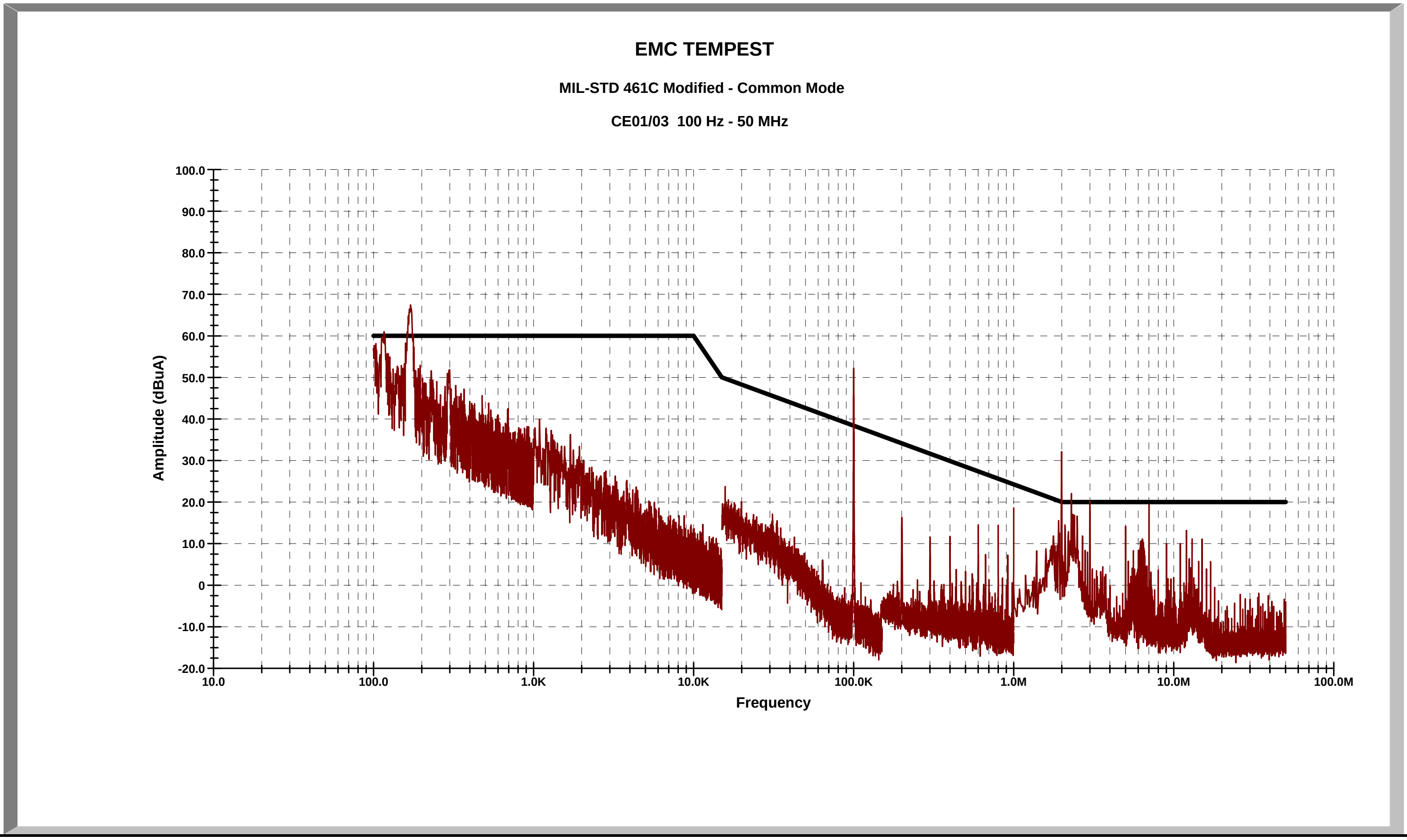


Figure 5-39. CE01 - CE03 Common Mode Test Results: SWEA/STE-D Power Harness (BOOM J1)

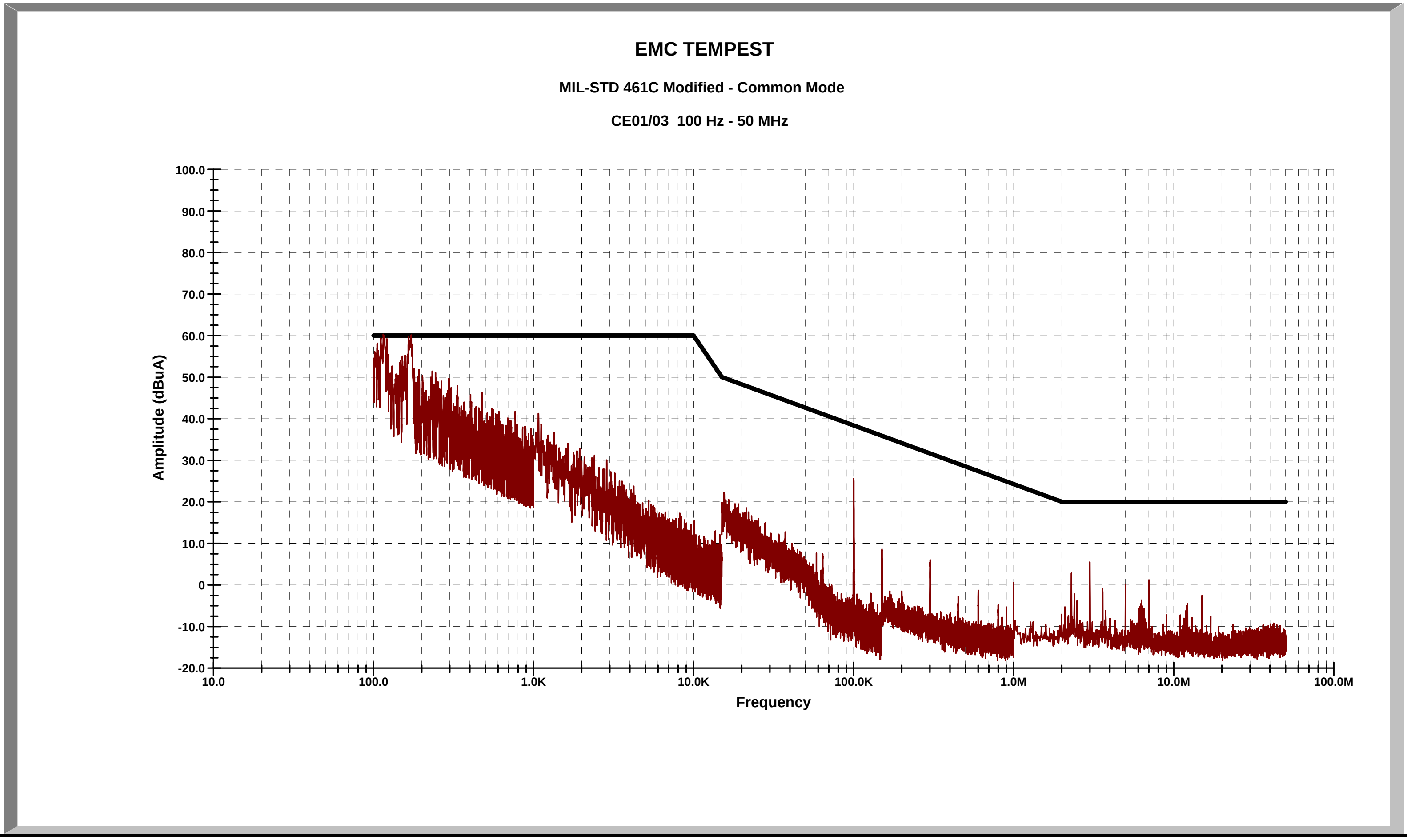


Figure 5-40. CE01 - CE03 Common Mode Test Results: SWEA/STE-D Thermal Harness (BOOM J2)

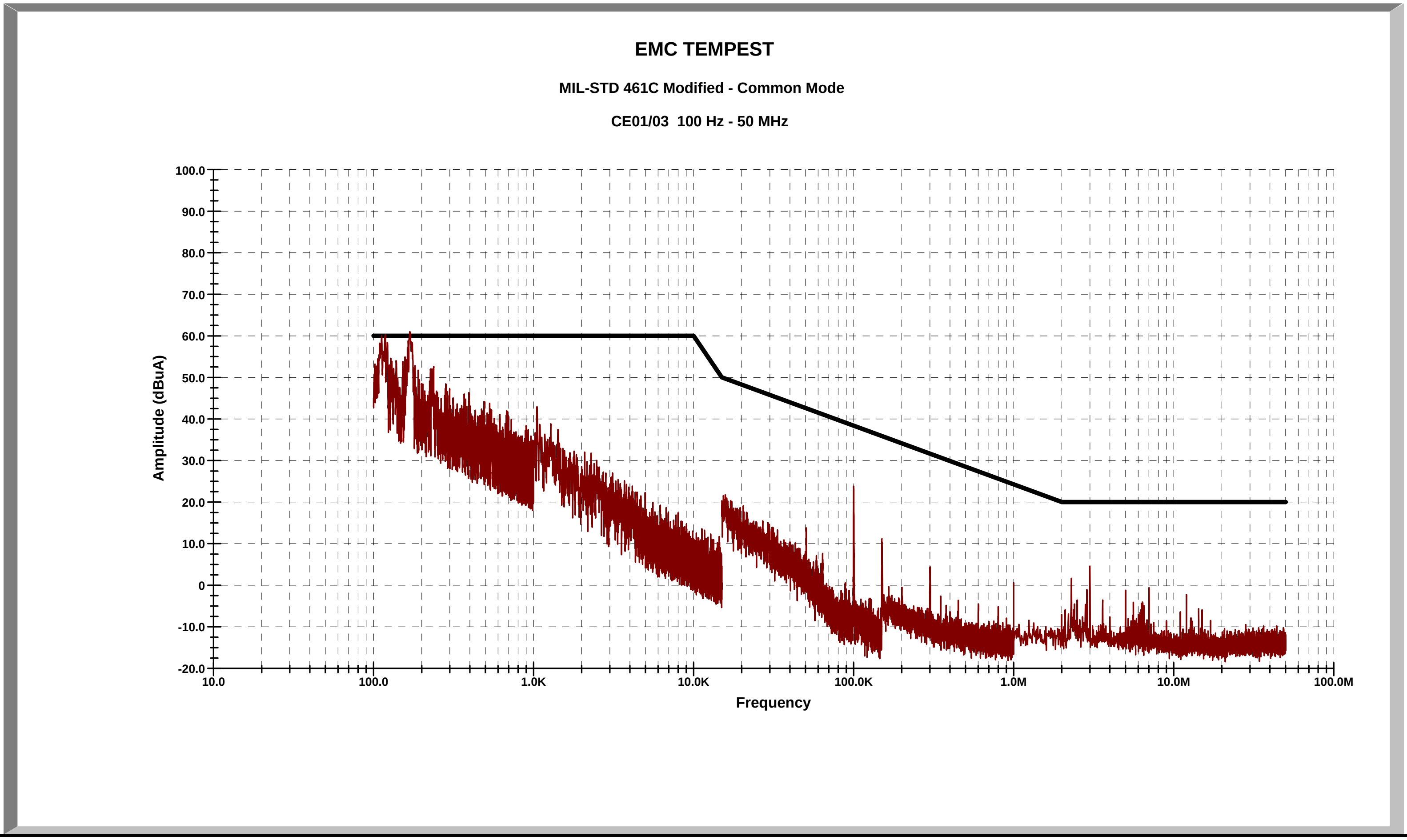


Figure 5-41. CE01 - CE03 Common Mode Test Results: SWEA/STE-D Actuator Harness (BOOM J3)

Table 5-1. CE01 - CE03 Test Equipment Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Spectrum Analyzer	HP 8566B	2403A06385	13 Feb 2005
10 uF Capacitor	Solar 6512-106R	03416	05 Mar 2006
Current Probe	Stoddard 91550-1	BF 507	13 April 2004
PC (For Recording Test Data Printouts)	CJC	RM2 210669	NCR
NCR = No Calibration Required			
EUT: STEREO IMPACT P/N: FM1 STEREO Engr: Dave Curtis		Date:22, 25 Sept 2004 Test Engr: Bryan Cowdell	

Table 5-2. Customer Notes on CE01-CE03 Testing

Unit	Frequency	dB above limit	Source
IDPU	37MHz	10	Power harness resonance? Not in true DM (killed the 15MHz with a ferrite CM filter)
MAG	250kHz-6MHz	10	50KHz converter harmonics; not in CM
MAG	15kHz	3	Power harness resonance; CM only, not quite killed by ferrite on power harness
Boom	172Hz	5	SWEA sample rate (only CM exceeds spec)
Boom	100KHz	15	SWEA LVPS
Boom J1	2.00MHz	12	SWEA shift clock?
SEP	1.2M-10MHz	30	200KHz converter harmonics; CM & DM. Also on SEP to SIT, SEPT harnesses
SEP-J5	19.8KHz	10	SEP to SIT harmess
EUT: STEREO IMPACT P/N: FM1 STEREO Engr: Dave Curtis EUT Mode: ______			Date: 22, 26 Sept 2004. Test Engr: Bryan Cowdell

6 CE07: TIME DOMAIN CONDUCTED CURRENT EMISSIONS

6.1 TEST RESULTS

IDPU Power Service Current Measurements

- Differential Mode Current, Power line, <200mA p-p .... Pass
- Differential Mode Current, Return line, <200mA p-p.................... Pass
- Common Mode Current, Power and Return, <50mA p-p .... Pass
- Differential Mode current, MAG Power line, <200mA p-p.................... Pass
- Differential Mode current, MAG Return line, <200mA p-p .... Pass
- Common Mode current, MAG Heater and Return, <50mA p-p .... Pass

IDPU Harness Common Mode Current Measurements

- Common Mode Current, 1553 harness (IDPU-J2a,b), <50mA p-p.................... Pass
- Common Mode Current, Power harness (IDPU-J1), <50mA p-p .... Pass
- Common Mode Current, PLASTIC harness (IDPU-J3), <50mA p-p.................... Pass
- Common Mode Current, SEP harness (IDPU-J4), <50mA p-p .... Pass
- Common Mode Current, SWEA harness (IDPU-J5), <50mA p-p.................... Pass
- Common Mode Current, MAG harness (IDPU-J6), <50mA p-p .... Pass
- Common Mode Current, STE-U harness (IDPU-J7), <50mA p-p.................... Pass

SEP Power Service Current Measurements

- Differential Mode Current, Power line, <200mA p-p .... Pass
- Differential Mode Current, Return line, <200mA p-p .... Pass
- Common Mode Current, Power and Return, <50mA p-p .... Pass
- Common Mode Current, SEP Survival Heater and Return, <50mA p-p............Shorted/Not Tested

SEP Harness Common Mode Current Measurements

- Common Mode Current, Power harness (SEP-J1), <50mA p-p.................... Pass
- Common Mode Current, Thermal harness (SEP-J2), <50mA p-p.................... Pass
- Common Mode Current, SIT harness (SEP-J5), <50mA p-p .... Pass
- Common Mode Current, SEPT-E harness (SEP-J7), <50mA p-p .... Pass
- Common Mode Current, SEPT-NS harness (SEP-J9), <50mA p-p .... Pass
- Common Mode Current, SIT Actuator harness (SIT-J3), <50mA p-p.................... N/A

SEPT-E / SEPT-NS Actuator Harness Common Mode Current Measurements

- Common Mode Current, SEPT-E Actuator harness (SEPT-E J3), <50mA p-p.................... Pass
- Common Mode Current, SEPT-NS Actuator harness (SEPT-NS J3), <50mA p-p.................... Pass

SWEA/STE-D Power Service Current Measurements

- Differential Mode Current, Power line, <200mA p-p .... Pass
- Differential Mode Current, Return line, <200mA p-p.................... Pass
- Common Mode Current, Power and Return, <50mA p-p .... Pass
- Common Mode Current, SWEA heater and Return, <50mA p-p.................... Pass
- Common Mode Current, Deployment Heater and Return, <50mA p-p.................... Pass

SWEA/STE-D Harness Common Mode Current Measurements

- Common Mode Current, Power harness (BOOM-J1), <50mA p-p.................... Pass
- Common Mode Current, Thermal harness (BOOM-J2), <50mA p-p.................... Pass
- Common Mode Current, Actuator harness (BOOM-J3), <50mA p-p .... Pass

6.2 PASS/FAIL REQUIREMENTS

- Requirements....................see Figure 6-2
- Differential Mode Currents.................... <200 mA p-p
- Common Mode Currents.................... <50 mA p-p

6.3 TEST DETAILS

- Test Configuration Schematic....................Figure 6-1
- Test Configuration Photographs....................Figure 6-3 through Figure 6-6
- Test Data....................Figure 6-7
- Test Data Summary....................Table 6-1
- Test Equipment Calibration Record....................Table 6-2

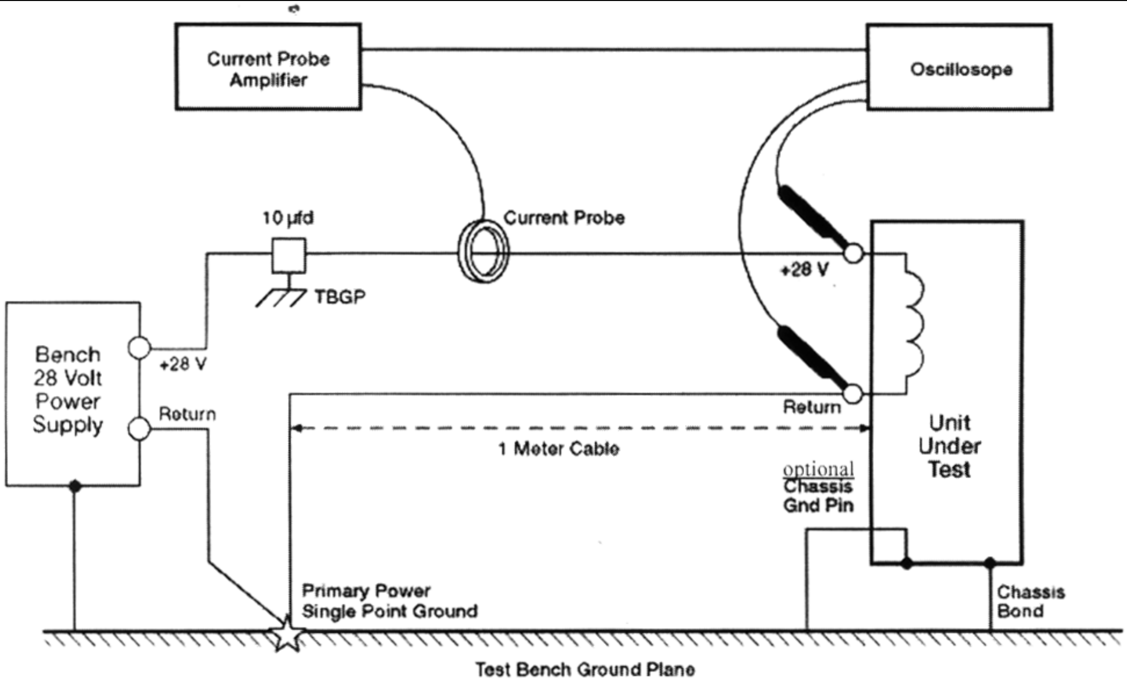


Fig. 5.6. CE-07 test configuration.

Figure 6-1. Schematic Configuration for Conducted Current Emissions (CE07) Testing

4.4. CE-07 Ripple and Spike Emissions, Time Domain

This test requirement is to demonstrate that the broadband levels of conducted ripple and spikes (both voltage and current) on input power and interface signal lines do not exceed the specified limits as observed in the time domain. Applicable test parameters and limits are as follows:

A) Common and Differential Mode currents shall be measured on the power lines as described in section 4.1, and the bulk common mode current shall be measured on all interfaces. Differential voltage measurements are to be made between +28 V input and return. Common mode voltage measurements are to be made between a) +28 V input and chassis, and b) 28 V input return and chassis.
B) Measurements are to be performed with a current probe and oscilloscope which, when used together, provide an AC coupled bandwidth from at least 10 Hz to 12 MHz. Voltages are to be measured with a high impedance differential input oscilloscope with at least a 50 MHz AC coupled bandwidth.
C) Time domain conducted voltage ripple shall not exceed 700 mV peak–to–peak for differential measurements. Common mode voltage shall not exceed 500 mV peak–to–peak.
D) Time domain conducted current ripple and spikes shall not exceed 200 mA peak–to–peak for differential measurements and 50 mA peak–to–peak for common mode measurements.

Figure 6-2. CE07 Pass/Fail Requirements

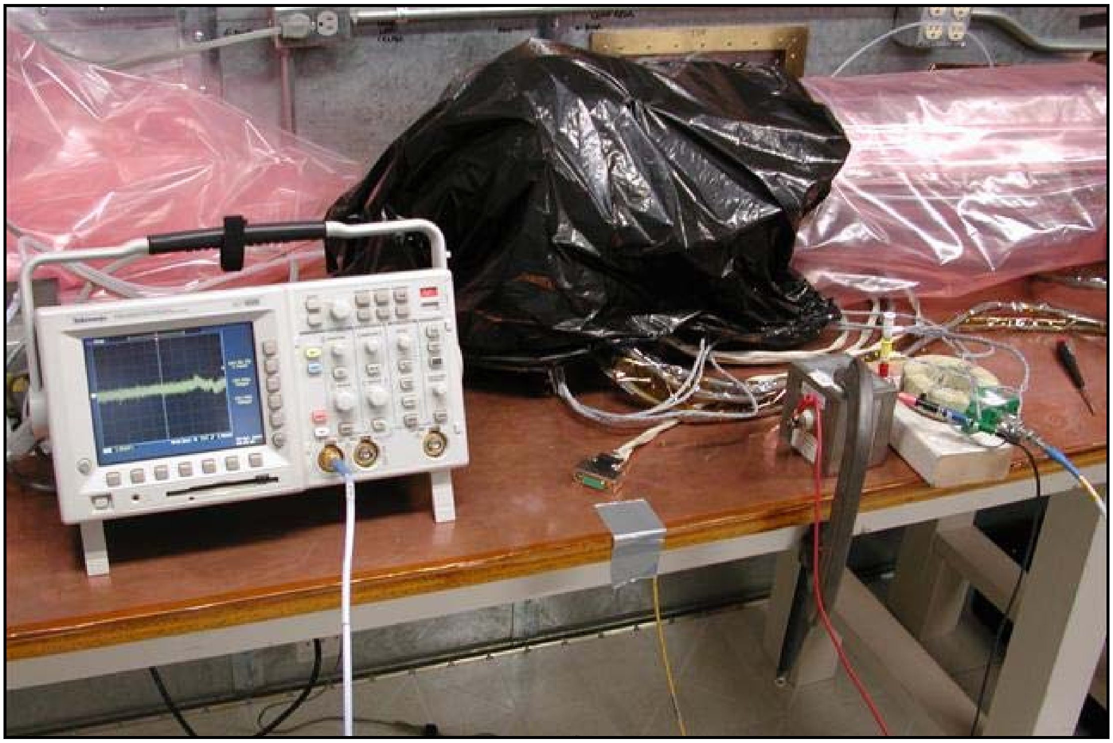


Figure 6-3. Conducted Emissions (CE07) Test Configuration on the Input Power Leads

Figure 6-4. Close-up of the CE01-CE03 Configuration on Boom Input Power Leads

Figure 6-5. Conducted Emissions (CE07) Test Configuration on IDPU Input Power Leads

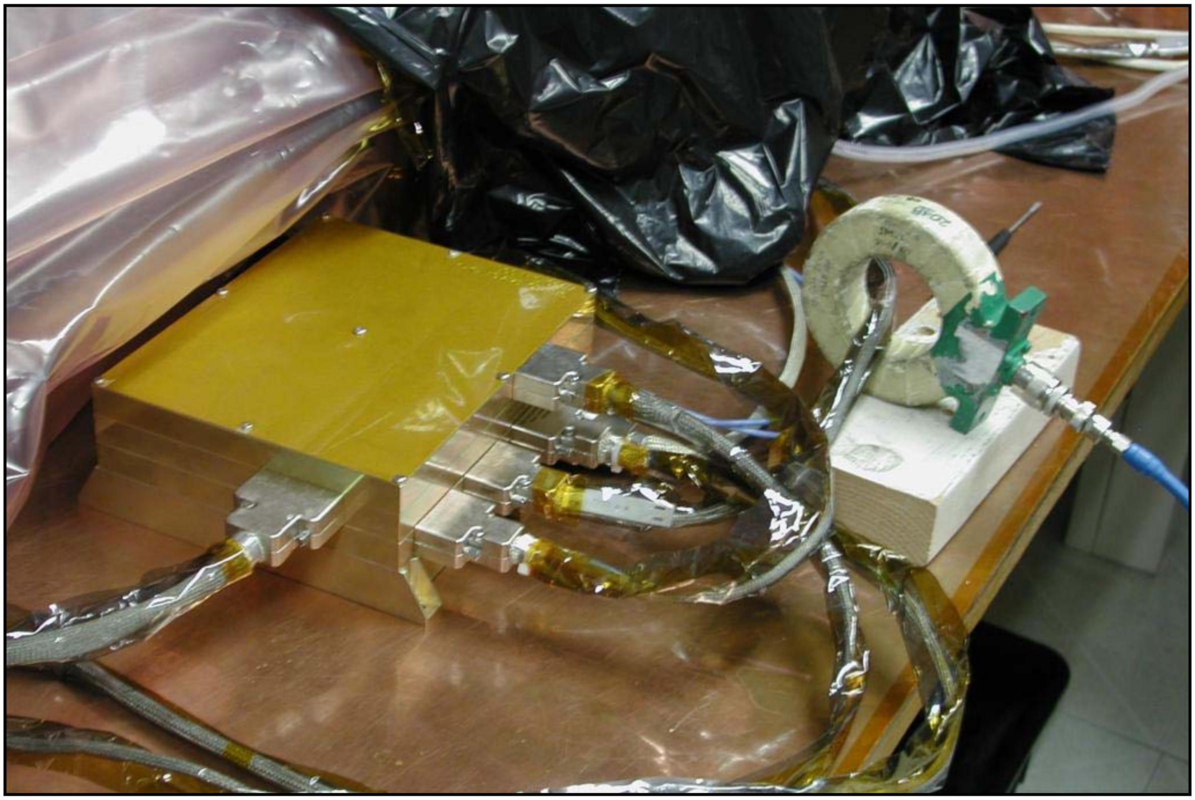
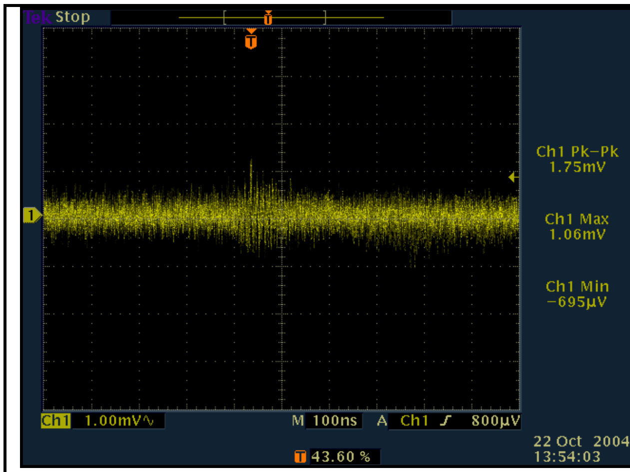
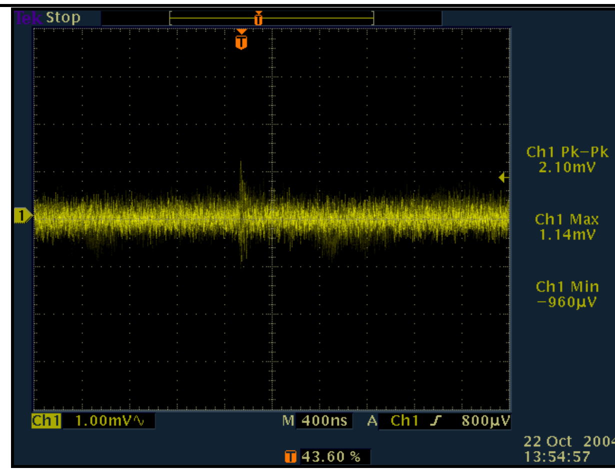


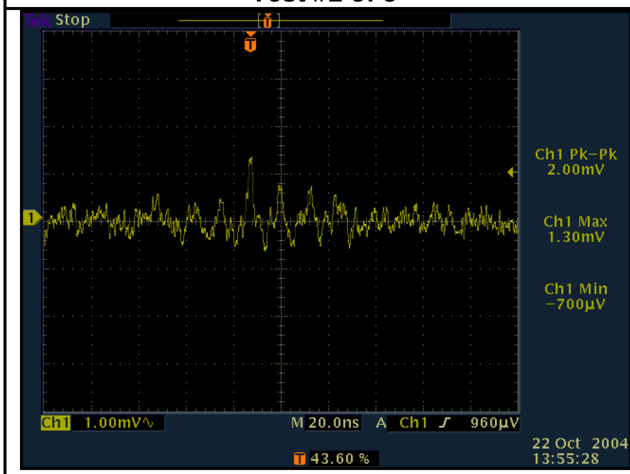
Figure 6-6. Close-up of Stereo Impact IPDU Input Power Leads



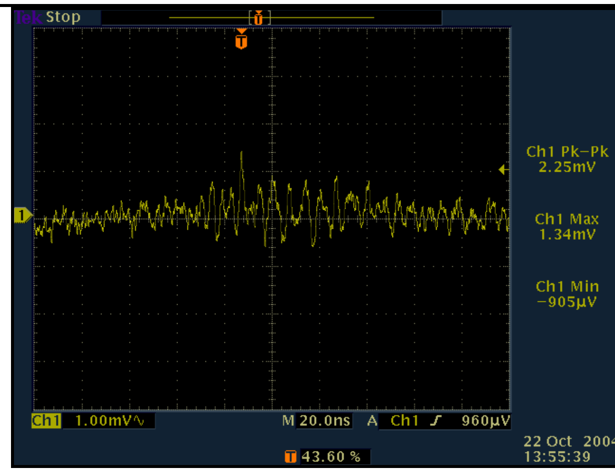
Test #1 of 5



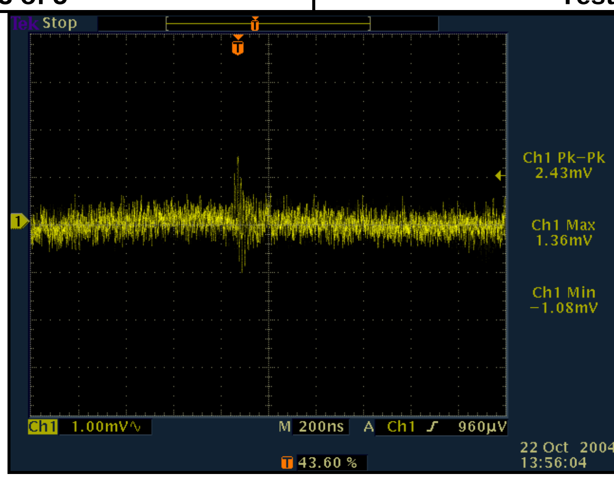
Test #2 of 5



Test #3 of 5



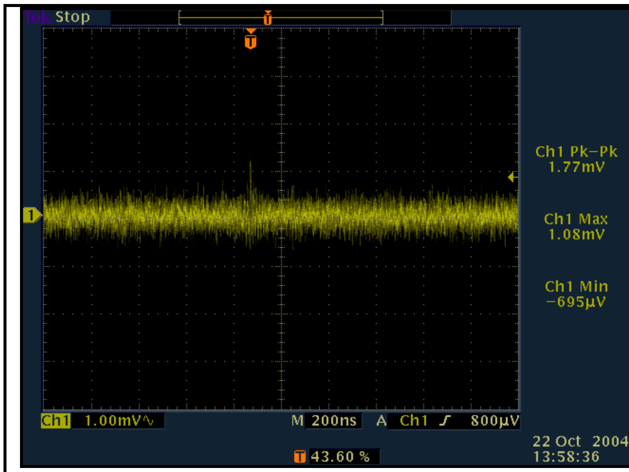
Test #4 of 5



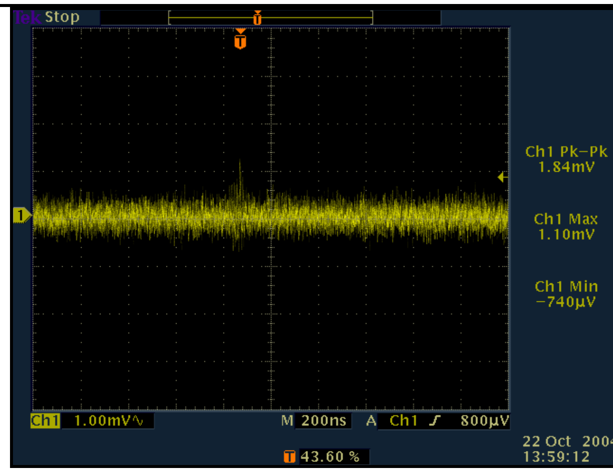
Test #5 of 5

Figure 6-7. Printouts of the Time Domain Conducted Current Emissions (CE07) Testing

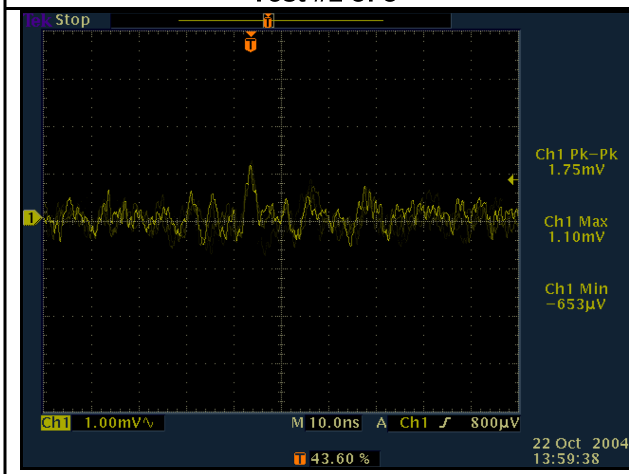
These are the actual plots from the MAG Heater 28VDC Return Line Differential Mode Current Emissions, and are representative of all the other data taken during this (CE07) current test.



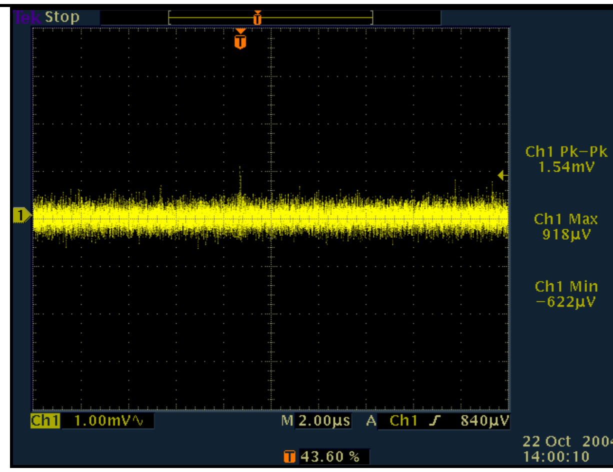
Test #1 of 5



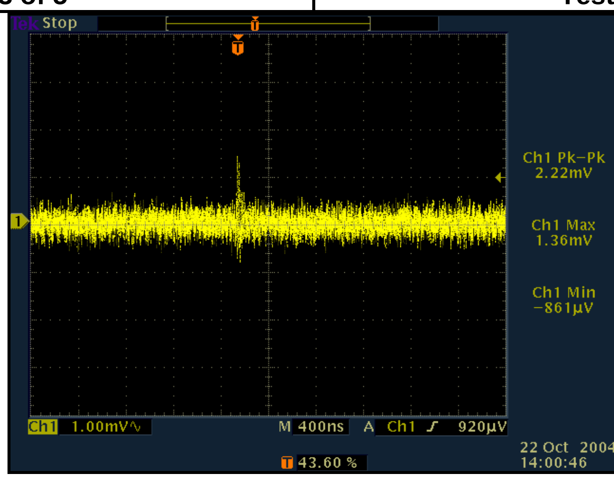
Test #2 of 5



Test #3 of 5



Test #4 of 5



Test #5 of 5

Figure 6-8. Printouts of the Time Domain Conducted Current Emissions (CE07) Testing

These are the actual plots from the MAG Heater Common Mode Current Emissions, and are representative of all the other data taken during this (CE07) current test.

Table 6-1. CE07 Current Emissions Test Data Record

Test Point	Limit (mA p-p)	Measured Level (mAp-p)	Pass/Fail
IDPU Power Service Current Measurements (5x)			
Differential Mode Current, IDPU +28VDC Power line	< 200	42.4, 40.8, 34.2, 42.0, 2.84	Pass
Differential Mode Current, IDPU Return line	< 200	41.4, 37.0, 36.0, 37.4, 39.8	Pass
Common Mode Current, IDPU Power and Return	< 50	14.6, 13.8, 13.8, 14.8, 14.2	Pass
Differential Mode current, MAG +28VDC Power line	< 200	27.2, 26.3, 35.1, 30.0, 24.6	Pass
Differential Mode current, MAG Return line	< 200	17.5, 21.0, 20.0, 22.5, 24.3	Pass
Common Mode current, MAG Heater and Return	< 50	17.7, 18.4, 17.5, 15.4, 22.2	Pass
IDPU Harness Common Mode Current Measurements (5x)			
Common Mode Current, 1553 harness (IDPU J1)	< 50	12.8, 12.3, 13.8, 13.6, 12.2	Pass
Common Mode Current, Power harness (IDPU J2a,b)	< 50	14.4, 13.4, 15.4, 14.8, 13.2	Pass
Common Mode Current, PLASTIC harness (IDPU J3)	< 50	12.2, 13.2, 13.0, 12.1, 11.4	Pass
Common Mode Current, SEP harness (IDPU J4)	< 50	12.2, 13.2, 12.1, 12.0, 14.0	Pass
Common Mode Current, SWEA harness (IDPU J5)	< 50	17.1, 12.2, 14.9, 15.4, 18.6	Pass
Common Mode Current, MAG harness (IDPU J6)	< 50	15.9, 16.1, 16.0, 14.6, 14.0	Pass
Common Mode Current, STE-U Harness (IDPU J7)	< 50	14.2, 13.0, 14.6, 14.0, 13.0	Pass
SEP Power Service Current Measurements (5x)			
Differential Mode Current, SEP +28VDC Power line	< 200	24.8, 24.4, 20.1, 20.2, 22.4	Pass
Differential Mode Current, SEP Return line	< 200	24.6, 27.0, 25.8, 22.8, 26.2	Pass
Common Mode Current, SEP Power and Return	< 50	18.6, 19.3, 18.9, 17.2, 14.6	Pass
SEP Harness Common Mode Current Measurements (5x)			
Common Mode Current, SEP Power harness (SEP-J1)	< 50	15.0, 14.6, 18.0, 14.0, 14.1	Pass
Common Mode Current, SEP Thermal harness (SEP-J2)	< 50	13.0, 14.0, 15.6, 15.0, 13.4	Pass
Common Mode Current, SIT harness (SEP-J5)	< 50	17.4, 23.8, 25.0, 22.0, 22.1	Pass
Common Mode Current, SEPT-E harness (SEP-J7)	< 50	14.8, 19.1, 18.0, 14.0, 15.5	Pass
Common Mode Current, SEPT-NS harness (SEP-J9)	< 50	23.8, 21.2, 20.5, 20.1, 19.5	Pass
Common Mode Current, SIT Actuator harness (SIT-J3)	< 50	N/A	
SEPT-E / SEPT-NS Actuator Harness Common Mode Current Measurements (5x)			
Common Mode SEPT-E Actuator harness (SEPT-E J3)	< 50	13.6, 15.0, 15.2, 15.6, 14.0	Pass
Common Mode SEPT-NS Actuator harness (SEPT-NS J3)	< 50	13.0, 15.2, 13.1, 14.2, 12.9	Pass
SWEA/STE Power Service Current Measurements (5x)			
Differential Mode Current, SWEA/STE +28VDC Power line	< 200	18.6, 18.2, 14.4, 17.4, 15.3	Pass
Differential Mode Current, SWEA/STE Return line	< 200	17.6, 15.6, 18.0, 14.6, 19.0	Pass
Common Mode Current, SWEA/STE Power and Return	< 50	14.6, 17.5, 14.0, 14.0, 15.0	Pass
Common Mode Current, SWEA Heater and Return	< 50	16.8, 16.0, 18.0, 16.1, 13.2	Pass
Common Mode Current, Deployment Heater and Return	< 50	13.8, 17.7, 13.4, 14.2, 14.5	Pass
SWEA/STE-D Harness Common Mode Current Measurements (5x)			
Common Mode Current, Power harness (Boom-J1)	< 50	20.8, 19.5, 18.6, 15.2, 14.8	Pass
Common Mode Current, Thermal harness (Boom-J2)	< 50	13.4, 14.2, 13.0, 13.5, 13.9	Pass
Common Mode Current, Actuator harness (Boom-J3)	< 50	13.2, 14.2, 15.8, 16.6, 14.8	Pass

EUT: STEREO IMPACT   S/N: FM1 ______   Date : 25 October 2004
Stereo Engr: Dave Curtis   Test Engr: Bryan Cowdell

Table 6-2. CE07: Conducted Current Emissions Test Instrumentation Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Scope	Tektronix 3052A	B0016000	25 Jan 2005
10 ufd Feed through Capacitor	Solar 6512-106R	03147, 03148	05 Mar 2006
Current Probe	Pearson Model 110A	2123	27 Dec 2004
NCR = No Calibration Required			

EUT: STEREO IMPACT
Stereo Engr: Dave Curtis
P/N: FM1
Date : 25 October 2004
Test Engr: Bryan Cowdell

7 CE07: TIME DOMAIN CONDUCTED VOLTAGE EMISSIONS

7.1 TEST RESULTS

IDPU Power Service Voltage Measurements

- Differential Voltage Power to Return, <700mV p-p.................... Pass
- Common Mode Voltage, Power to Chassis, <500mV p-p .... Pass
- Common Mode Voltage, Return to Chassis <500mV p-p.................... Pass
- Differential Voltage, MAG Power to MAG Return, <700mV p-p .... Pass
- Common Mode Voltage, MAG Power to Chassis, <500mV p-p .... Pass
- Common Mode Voltage, MAG Return to Chassis <500mV p-p .... Pass

SEP Power Service Voltage Measurements

- Differential Voltage SEP Power to Return, <700mV p-p .... Pass
- Common Mode Voltage, SEP Power to Chassis, <500mV p-p .... Pass
- Common Mode Voltage, SEP Return to Chassis <500mV p-p .... Pass

SWEA/STE-D Power Service Current Measurements

- Differential Voltage SWEA/STE-D Power to Return, <700mV p-p .... Pass
- Common Mode Voltage, SWEA/STE-D Power to Chassis, <500mV p-p.................... Pass
- Common Mode Voltage, SWEA/STE-D Return to Chassis <500mV p-p .... Pass

PLASTIC Power Service Current Measurements (Unit not available)

- Differential Voltage PLASTIC Power to Return, <700mV p-p.................... Not Tested
- Common Mode Voltage, PLASTIC Power to Chassis, <500mV p-p .... Not Tested
- Common Mode Voltage, PLASTIC Return to Chassis <500mV p-p.................... Not Tested

7.2 PASS/FAIL REQUIREMENTS

- Requirements..see Figure 7-2
- Differential Voltage.. <700 mA p-p
- Common Mode Voltage .... <500 mA p-p

7.3 TEST DETAILS

- Test Configuration....................................Figure 7-1, Figure 7-3, Figure 7-4
- Test Data (+28 VDC to Return: Differential Mode) ....Figure 7-5
- Test Data (+28 VDC to Chassis: Common Mode)....................Figure 7-6
- Test Data (28 VDC Return to Chassis: Common Mode) ....Figure 7-7
- Test Data Summary ....Table 7-1
- Test Equipment Calibration Record ....Table 7-2

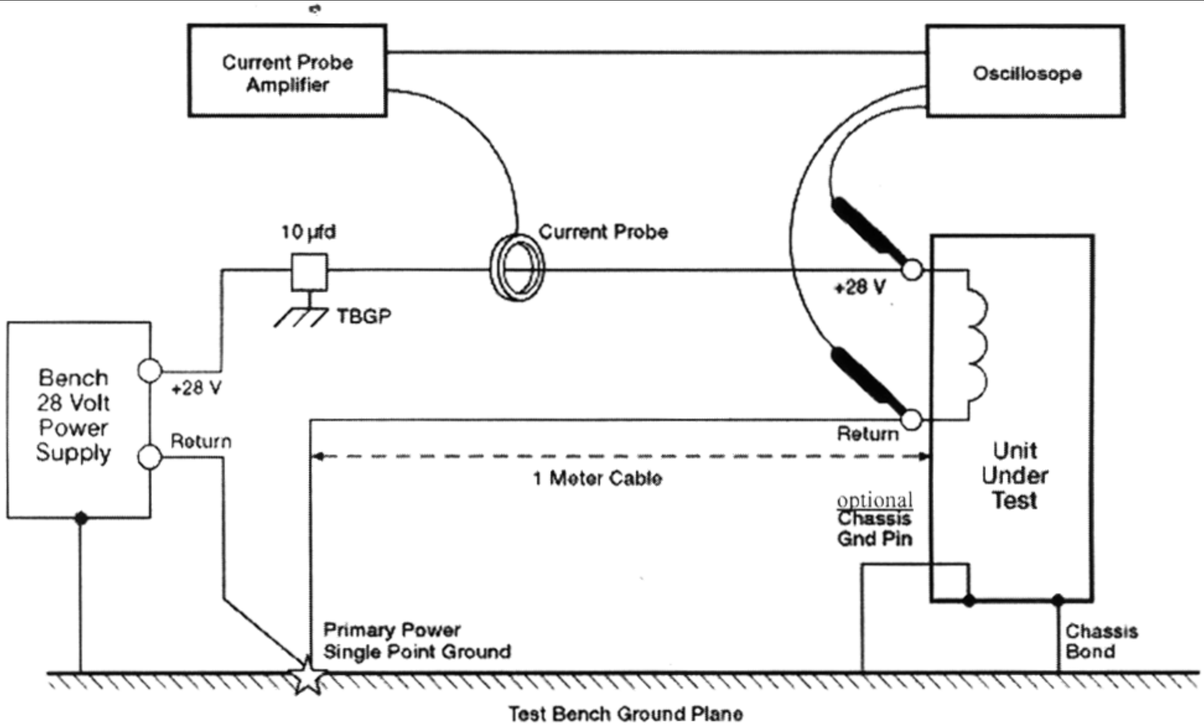


Fig. 5.6. CE-07 test configuration.

Figure 7-1. Schematic Configuration for Conducted Current Emissions (CE07) Testing

4.4. CE-07 Ripple and Spike Emissions, Time Domain

This test requirement is to demonstrate that the broadband levels of conducted ripple and spikes (both voltage and current) on input power and interface signal lines do not exceed the specified limits as observed in the time domain. Applicable test parameters and limits are as follows:

A) Common and Differential Mode currents shall be measured on the power lines as described in section 4.1, and the bulk common mode current shall be measured on all interfaces. Differential voltage measurements are to be made between +28 V input and return. Common mode voltage measurements are to be made between a) +28 V input and chassis, and b) 28 V input return and chassis.

B) Measurements are to be performed with a current probe and oscilloscope which, when used together, provide an AC coupled bandwidth from at least 10 Hz to 12 MHz. Voltages are to be measured with a high impedance differential input oscilloscope with at least a 50 MHz AC coupled bandwidth.

C) Time domain conducted voltage ripple shall not exceed 700 mV peak–to–peak for differential measurements. Common mode voltage shall not exceed 500 mV peak–to–peak.

D) Time domain conducted current ripple and spikes shall not exceed 200 mA peak–to–peak for differential measurements and 50 mA peak–to–peak for common mode measurements.

Figure 7-2. CE07 Pass/Fail Requirements

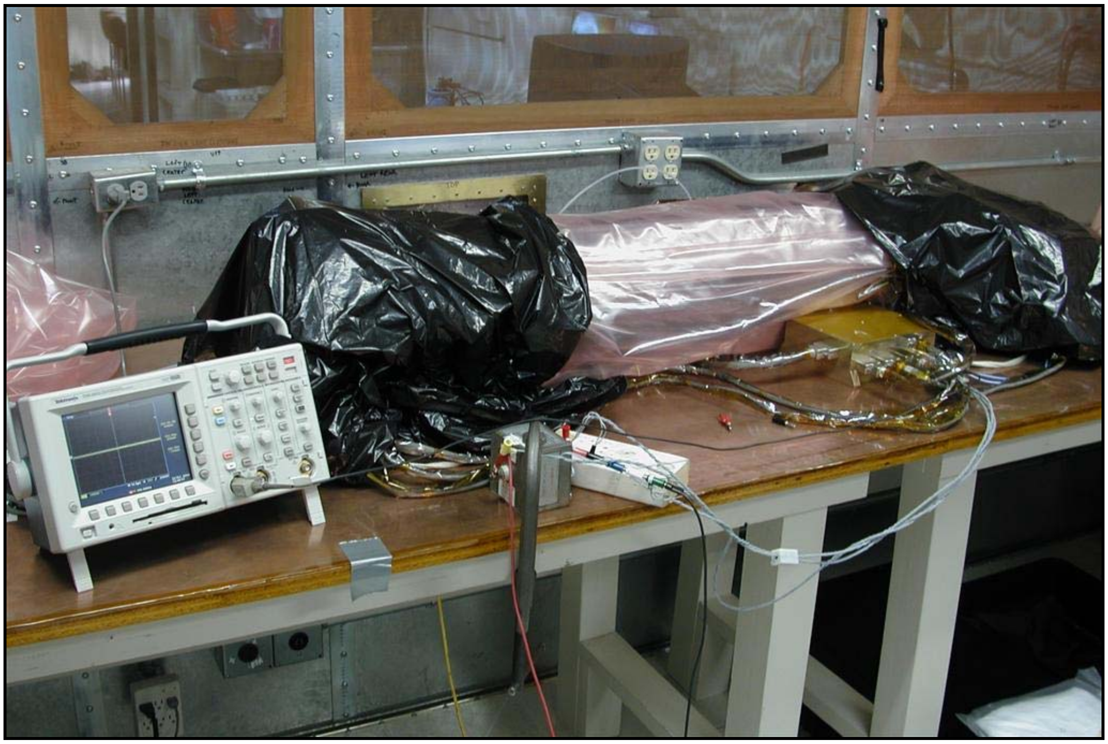


Figure 7-3. Conducted Emissions (CE07) Voltage Test Configuration: Input Power Leads

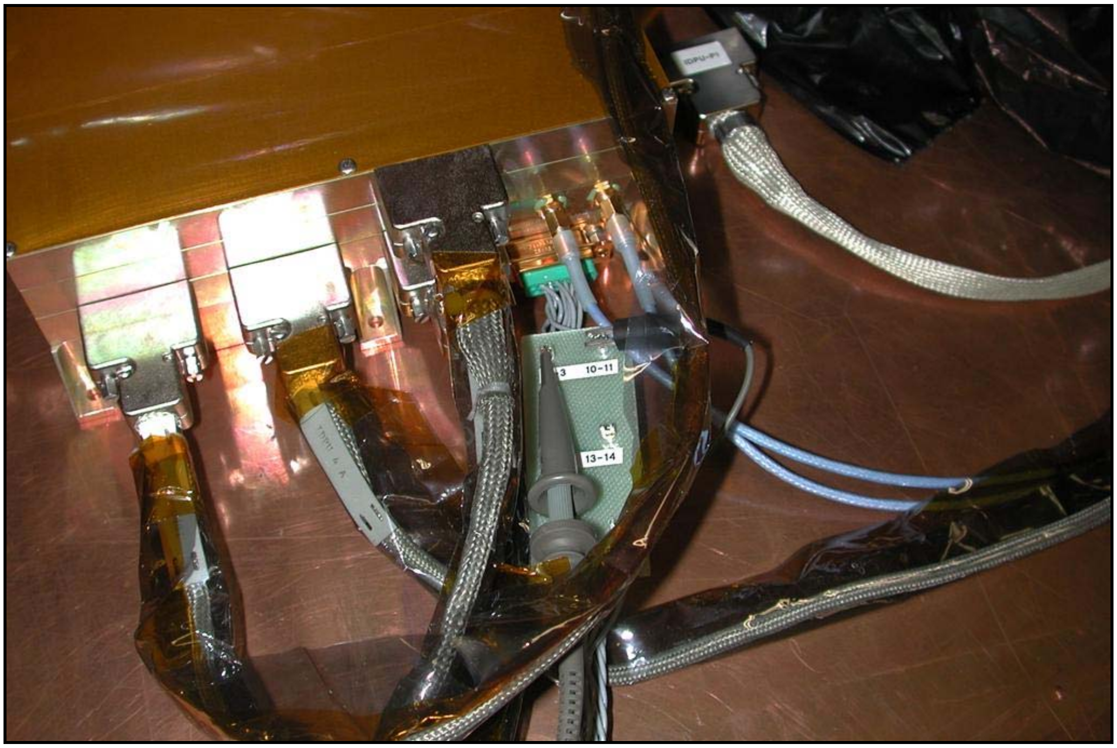
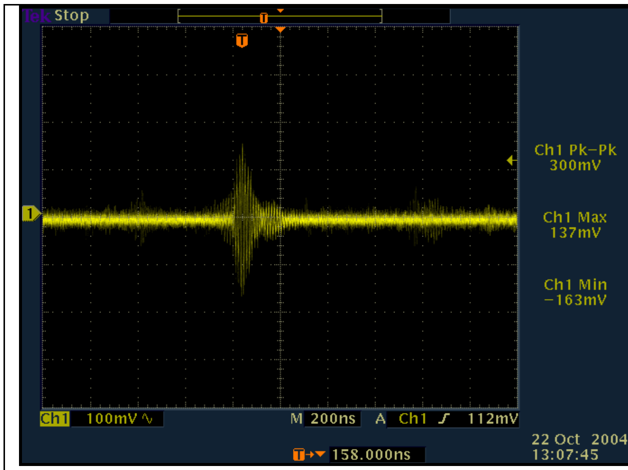
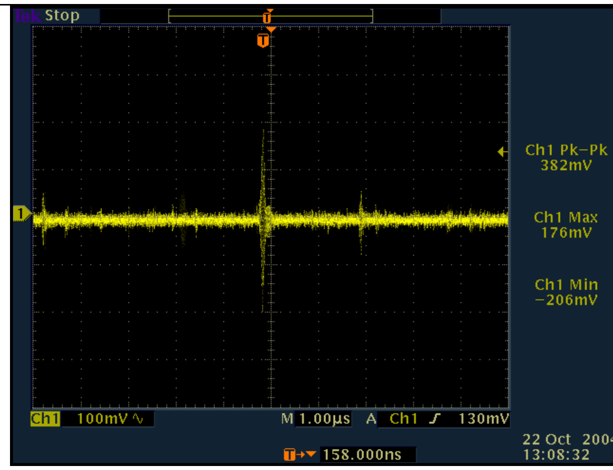


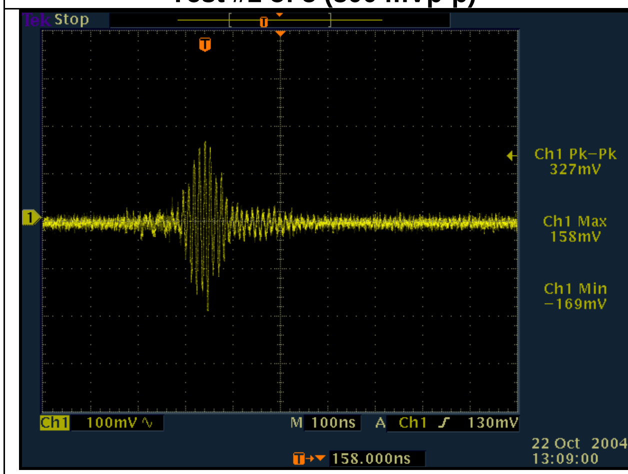
Figure 7-4. Close-up of CE07 Voltage Emissions: Stereo Impact Input Power Leads



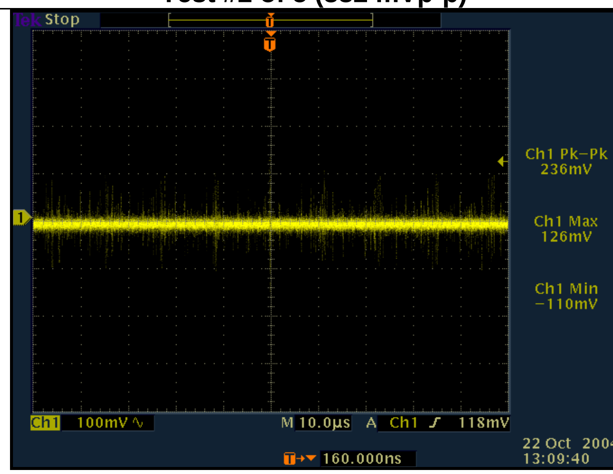
Test #1 of 5 (300 mVp-p)



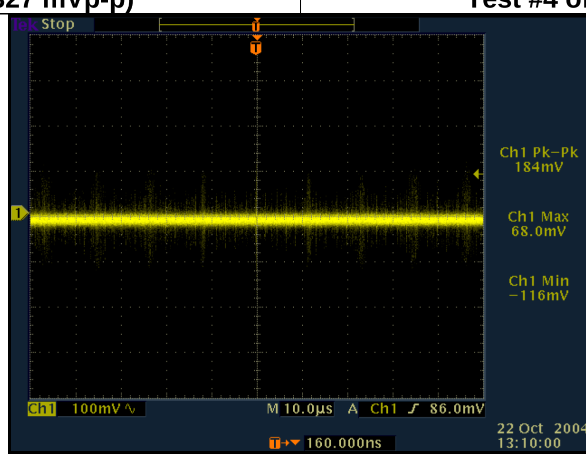
Test #2 of 5 (382 mVp-p)



Test #3 of 5 (327 mVp-p)



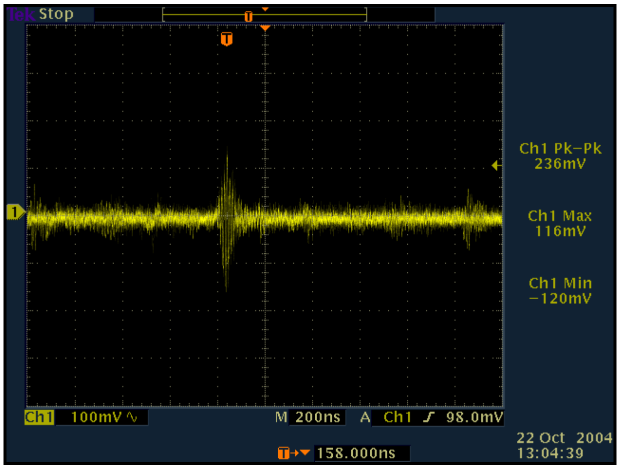
Test #4 of 5 (236 mVp-p)



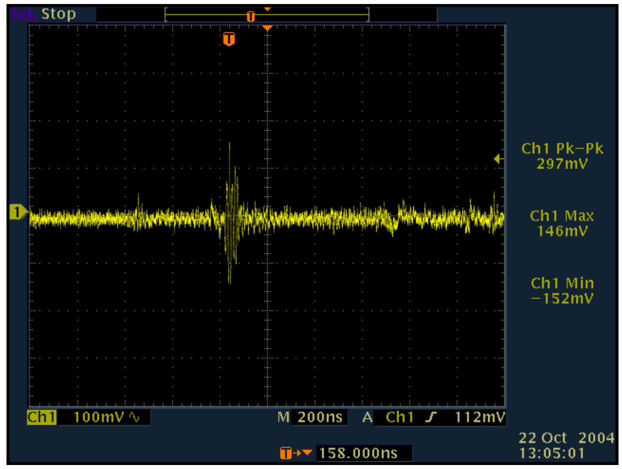
Test #5 of 5 (184 mVp-p)

Figure 7-5. Printouts of the Time Domain DM Conducted Voltage Emissions (CE07) Testing

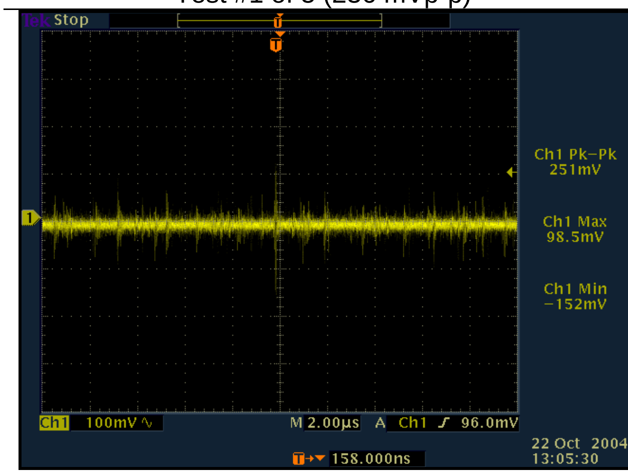
These are the actual plots from the IDPU +28VDC to Return Line Differential Mode Voltage Emissions, and are representative of all the other Voltage Emissions data taken during this (CE07) voltage test.



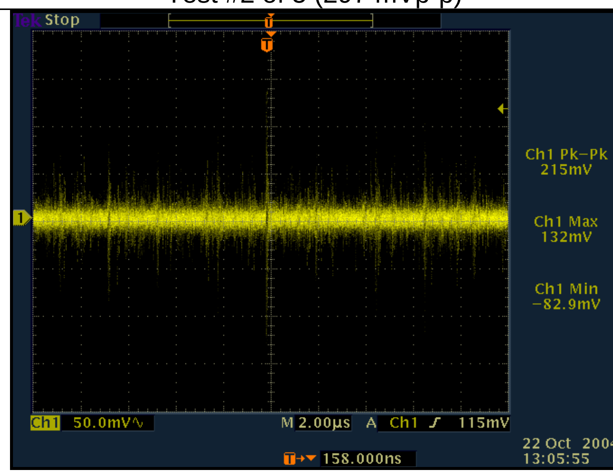
Test #1 of 5 (236 mVp-p)



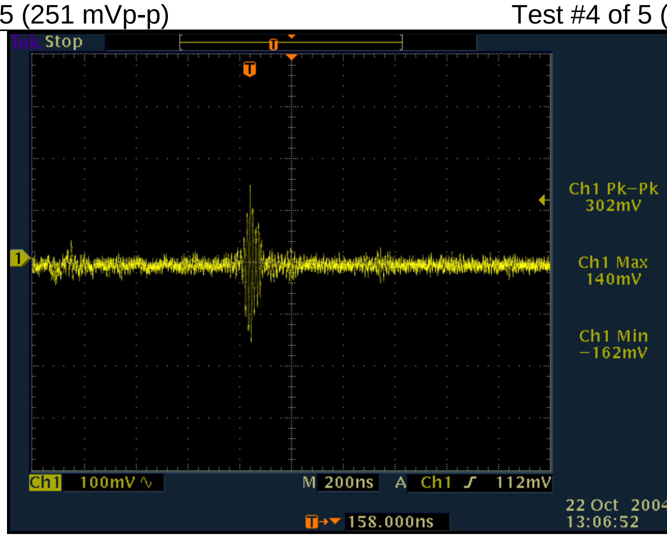
Test #2 of 5 (297 mVp-p)



Test #3 of 5 (251 mVp-p)



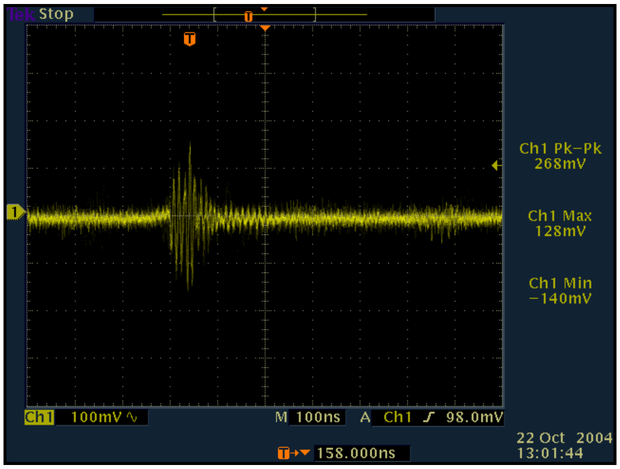
Test #4 of 5 (215 mVp-p)



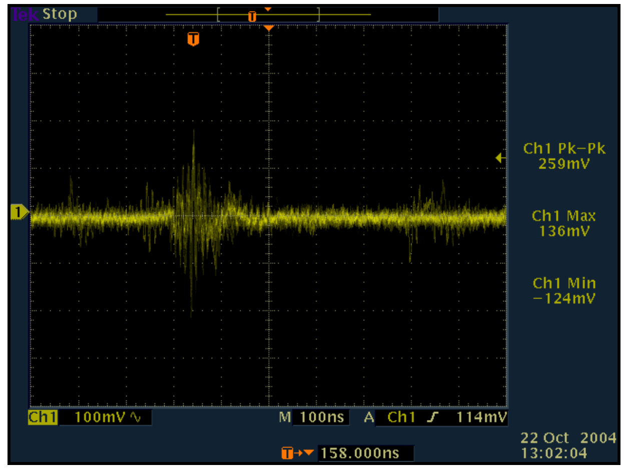
Test #5 of 5 (302 mVp-p)

Figure 7-6. Printouts of the Time Domain CM Conducted Voltage Emissions (CE07) Testing

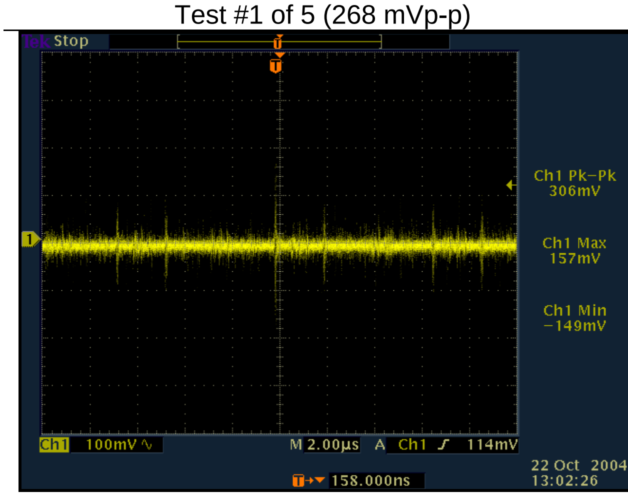
These are the actual plots from the IDPU +28VDC to Chassis Common Mode Voltage Emissions, and are representative of all the other Voltage Emissions data taken during this (CE07) voltage test.



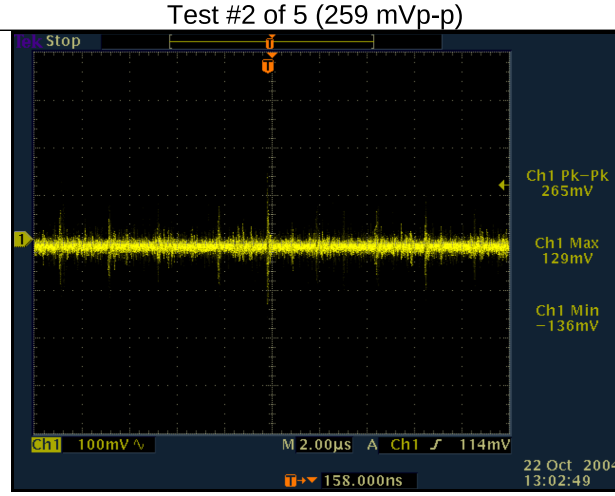
Test #1 of 5 (268 mVp-p)



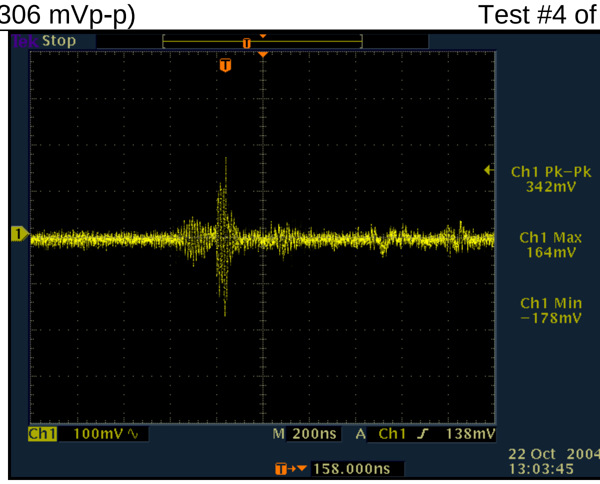
Test #2 of 5 (259 mVp-p)



Test #3 of 5 (306 mVp-p)



Test #4 of 5 (265 mVp-p)



Test #5 of 5 (342 mVp-p)

Figure 7-7. Printouts of the Time Domain CM Conducted Voltage Emissions (CE07) Testing

These are the actual plots from the IDPU 28VDC Return to Chassis Common Mode Voltage Emissions, and are representative of all the other Voltage Emissions data taken during this (CE07) voltage test.

Table 7-1. CE07 Voltage Emissions Test Data Record

Test Point	Limit (mV p-p)	Measured Level (mV p-p)	Pass/Fail
IDPU Power Service Voltage Measurements			
Differential Voltage + Power to Return	< 700	300, 383, 327, 236, 184	Pass
Common Mode Voltage, + Power to Chassis	< 500	236, 297, 251, 215, 307	Pass
Common Mode Voltage, Return to Chassis	< 500	268, 259, 306, 265, 342	Pass
Differential Voltage, MAG + Power to MAG Return	< 700	96, 112, 112, 84, 116	Pass
Common Mode Voltage, MAG + Power to Chassis	< 500	176, 170, 158, 160, 171	Pass
Common Mode Voltage, MAG Return to Chassis	< 500	200, 154, 120, 162, 213	Pass
SEP Power Service Voltage Measurements			
Differential Voltage SEP + Power to Return	< 700	347, 194, 204, 340, 294	Pass
Common Mode Voltage, SEP + Power to Chassis	< 500	464, 482, 469, 394, 394	Pass
Common Mode Voltage, SEP Return to Chassis	< 500	490, 498, 490, 430, 450	Pass
SWEA/STE Power Service Voltage Measurements			
Differential Voltage SWEA/STE + Power to Return	< 700	79, 94, 85, 80, 80	Pass
Common Mode Voltage, SWEA/STE + Power to Chassis	< 500	112, 101, 105, 100, 105	Pass
Common Mode Voltage, SWEA/STE Return to Chassis	< 500	113, 118, 100, 126, 110	Pass
PLASTIC Power Service Voltage Measurements			
Differential Voltage PLASTIC + Power to Return	< 700	was not tested	N/A
Common Mode Voltage, PLASTIC + Power to Chassis	< 500	was not tested	N/A
Common Mode Voltage, PLASTIC Return to Chassis	< 500	was not tested	N/A

EUT: STEREO IMPACT   S/N: FM1 ______   Date : 22 Oct 2004
Stereo Engr: Dave Curtis   Test Engr: Bryan Cowdell

Table 7-2. CE07: Conducted Voltage Emissions Test Instrumentation Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Scope	Tektronix 3052A	B0016000	25 Jan 2005
10 ufd Feedthrough Capacitor	Solar 6512-106R	03148	05 Mar 2006
Scope Probe	Tektronix P6022	N/A	NCR
NCR = No Calibration Required			
EUT: STEREO IMPACT Stereo Engr: Dave Curtis	S/N: FM1	Date : 22 Oct 2004 Test Engr: Bryan Cowdell	

8 CS01: CONDUCTED SUSCEPTIBLITY, INPUT POWER LEADS (30 HZ - 51 KHZ)

8.1 TEST RESULTS

- IDPU +28 VDC Input Power Leads------------Noted responses 30 Hz – 1 kHz and 30 kHz – 50 kHz
- MAG Heater +28 VDC Input Power Leads --------------------------- Noted responses 30 Hz – 100 Hz
- SEP +28 VDC Input Power Leads--- Noted responses at 50 kHz
- SWEA/STE-D and Heater Input Power Leads (BOOM)------------ Noted responses @30Hz -100Hz

8.2 TEST DATA:

- IDPU +28 VDC Input Power Leads..Figure 8-5, Table 8-1, Table 8-2
- MAG Heater +28 VDC Input Power Leads ....Figure 8-6, Table 8-3, Table 8-4
- SEP +28 VDC Input Power Leads ....Figure 8-7,Table 8-5, Table 8-6
- SWEA/STE-D and Heater +28 VDC Input Power Leads...............Figure 8-8, ,Table 8-7**,** Table 8-8

8.3 TEST DETAILS

- Test Configuration Schematic...Figure 8-1
- Test Configuration Photographs ....Figure 8-2, Figure 8-3, Figure 8-4
- Customer Notes .... Table 8-2, Table 8-4, Table 8-6

8.4 CALIBRATION INFORMATION

- Current Probe Calibration ....Figure 8-13
- Test Equipment Calibration Record ....Table 8-9

8.5 STANDARDS OF RECORD:

- EMI Test Method 1. STEREO IMPACT EMI Test Procedure (IMPACT_A, Version A, 2004 Mar 08)
  2. STEREO EMC Control Plan and EMI Requirements Specification, Dwg. No. 7381-9030, Rev C
- Pass/Fail Requirement...Figure 8-9

8.6 ITEMS NOT TESTED

The following items were not tested:

- PLASTIC +28 VDC Input Power Leads .... Not available at time of test
- SEP Heater .... Heater was shorted to chassis and therefore not activated

8.7 CS101 ANALYSIS

- Test currents were always well below the 5 ampere peak to peak limit. This indicates that high impedance circuits were being tested. Test voltages were measured directly with the TDS 3052 scope. Current levels were measured using the Pearson 110A current probe. This probe has a correction factor of 10 from 3 Hz to 20 MHz when connected to the high impedance terminals of the scope.15
- Thus, measured currents on the scope records are raised by a factor of 10 in the test data tables.

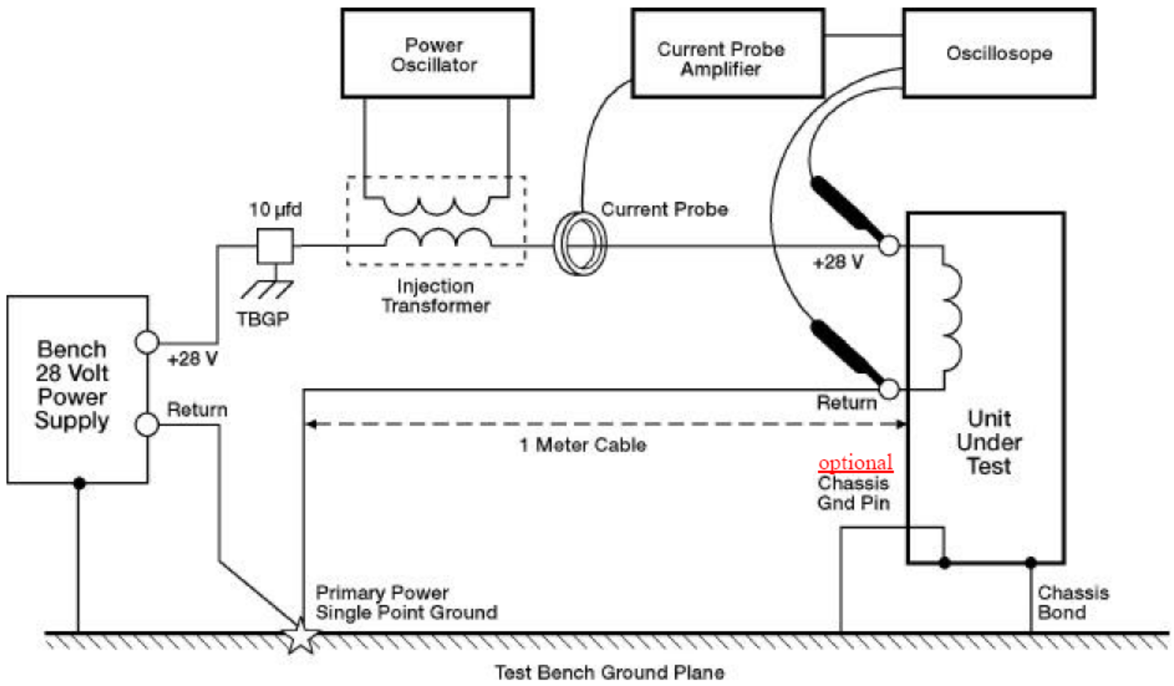


Fig. 5.7. CS-01 test configuration.

Figure 8-1. Conducted Susceptibility (CS01) Test Schematic (30 Hz – 51 kHz)

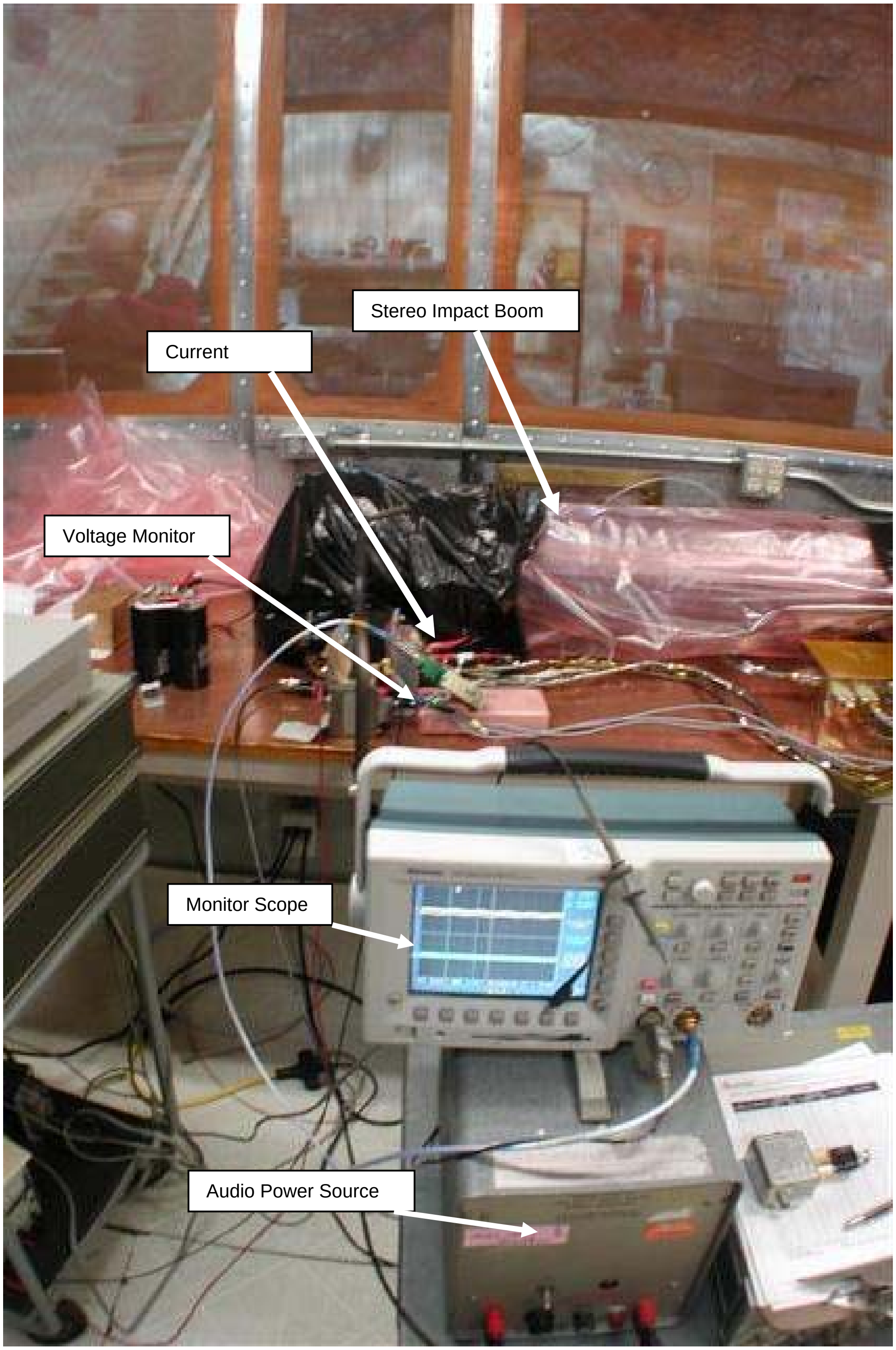


Figure 8-2. Configuration for CS01 Testing (30 Hz – 51 kHz)

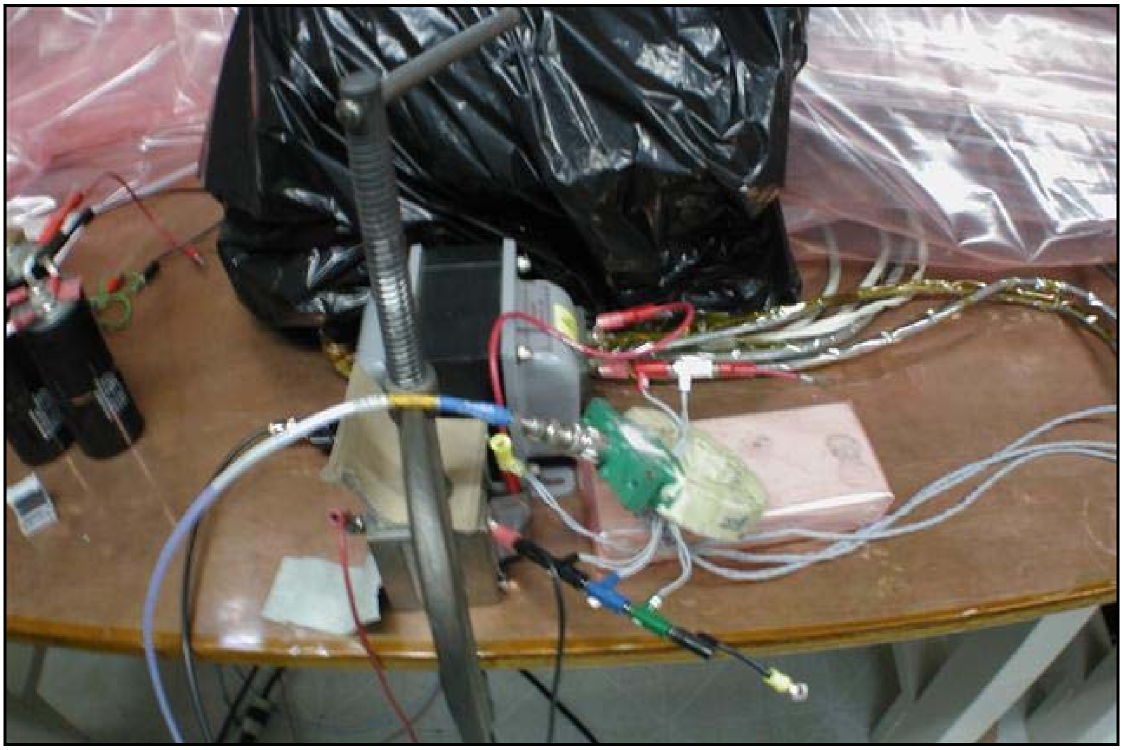
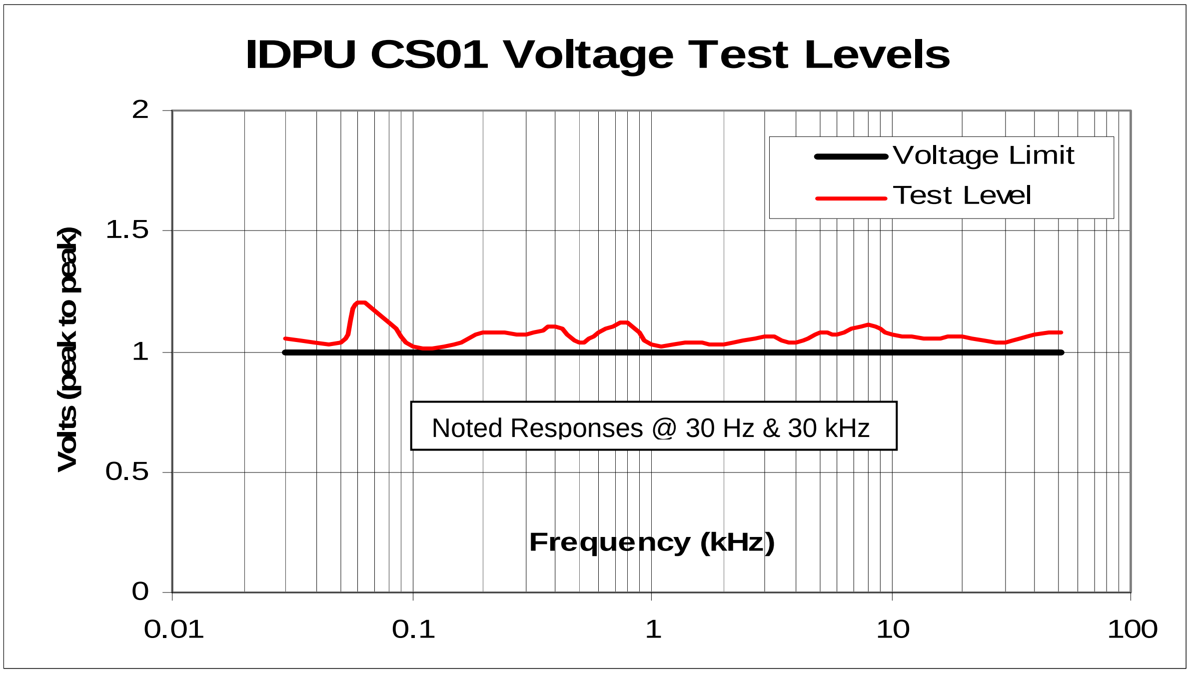


***Figure 8-3. Close-up of Injected Signal Monitoring Instrumentation During CS01 Testing* (30 Hz – 51 kHz)**

Figure 8-4. Close-up of Support Test Instrumentation Outside EMI Room



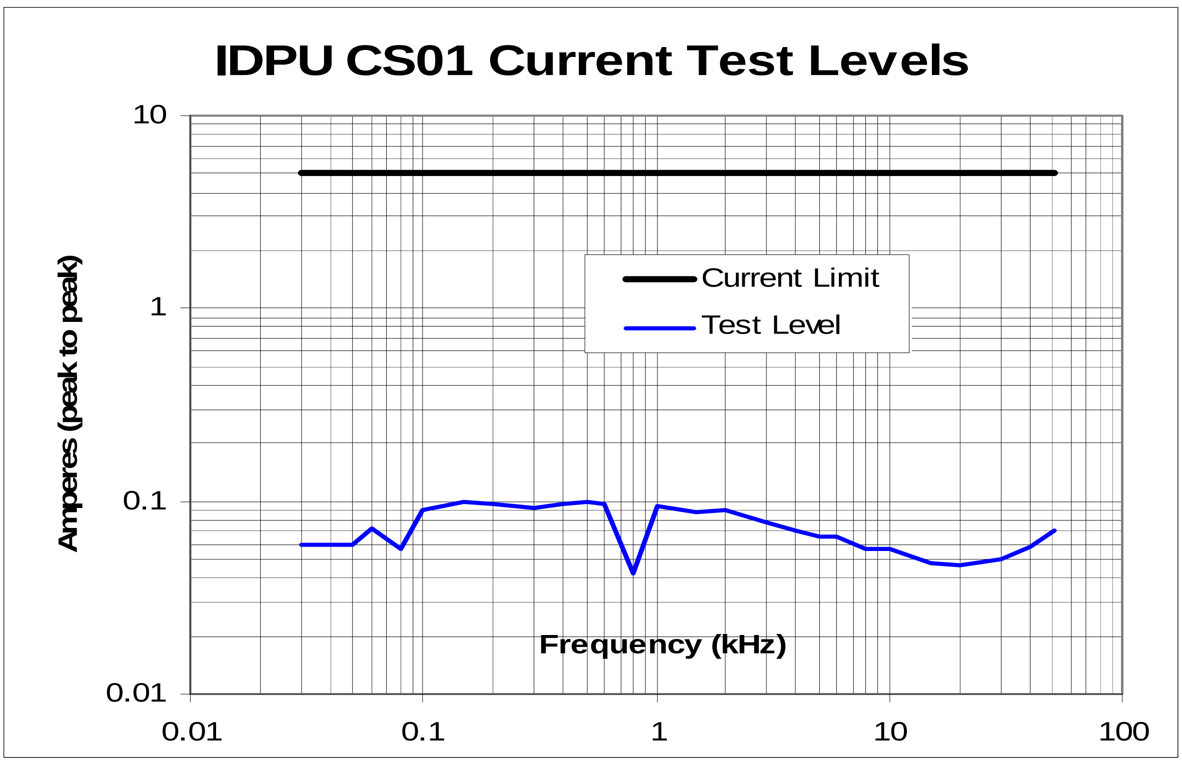
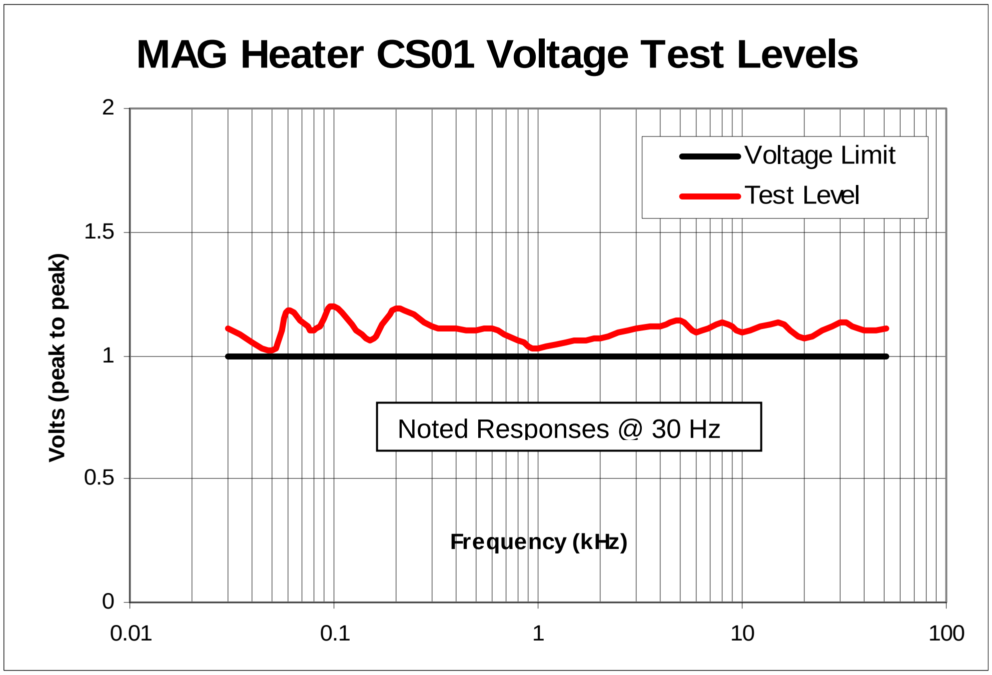


Figure 8-5. Results of CS01 Testing on IDPU 28 VDC Input Power Leads



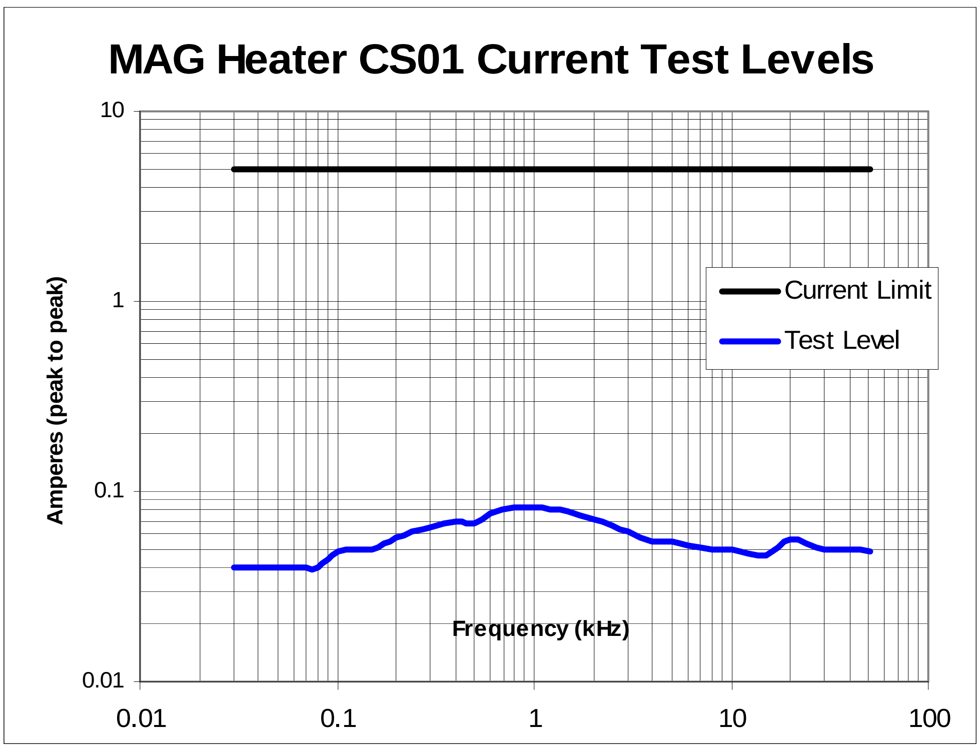
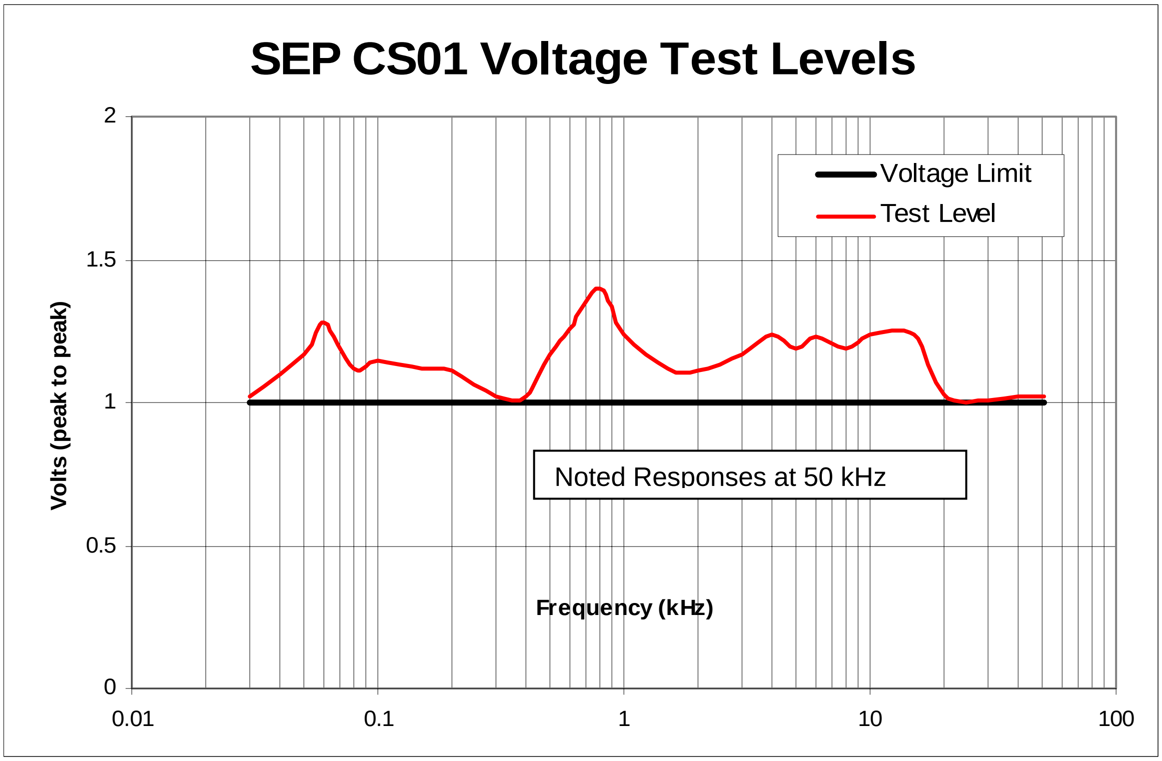


Figure 8-6. Results of CS01 Testing on MAG Heater 28 VDC Input Power Leads



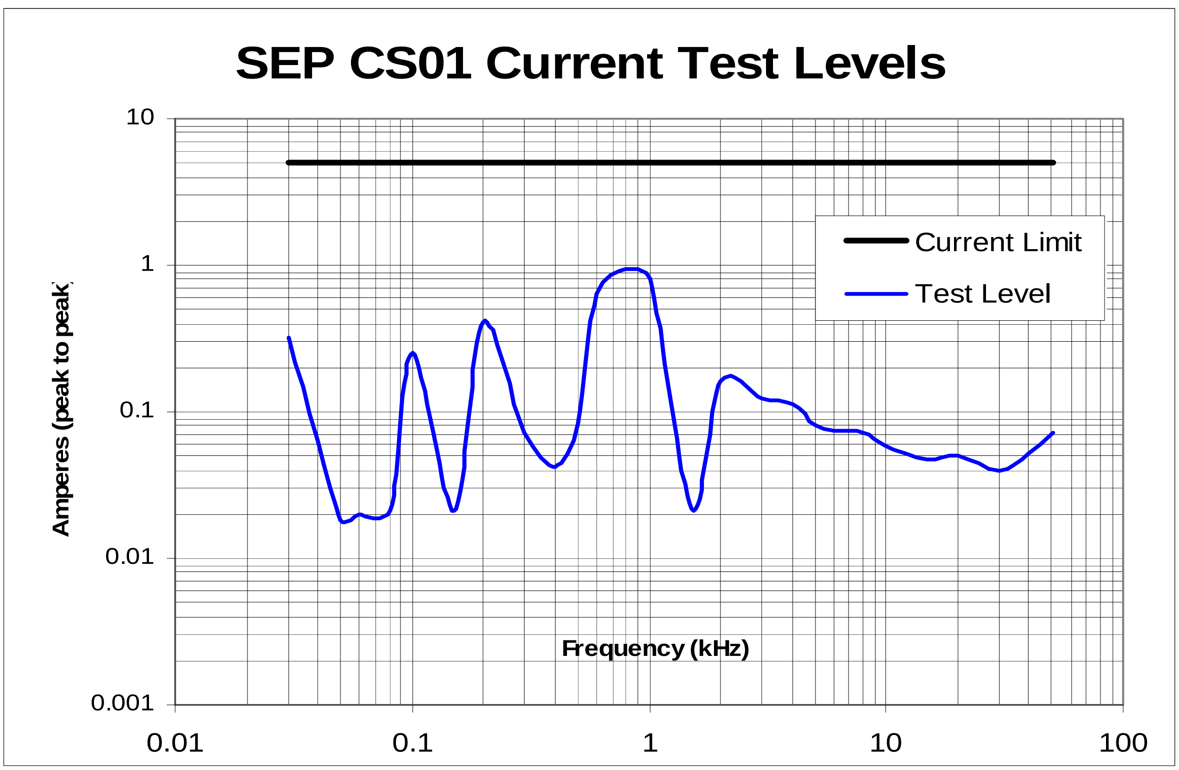
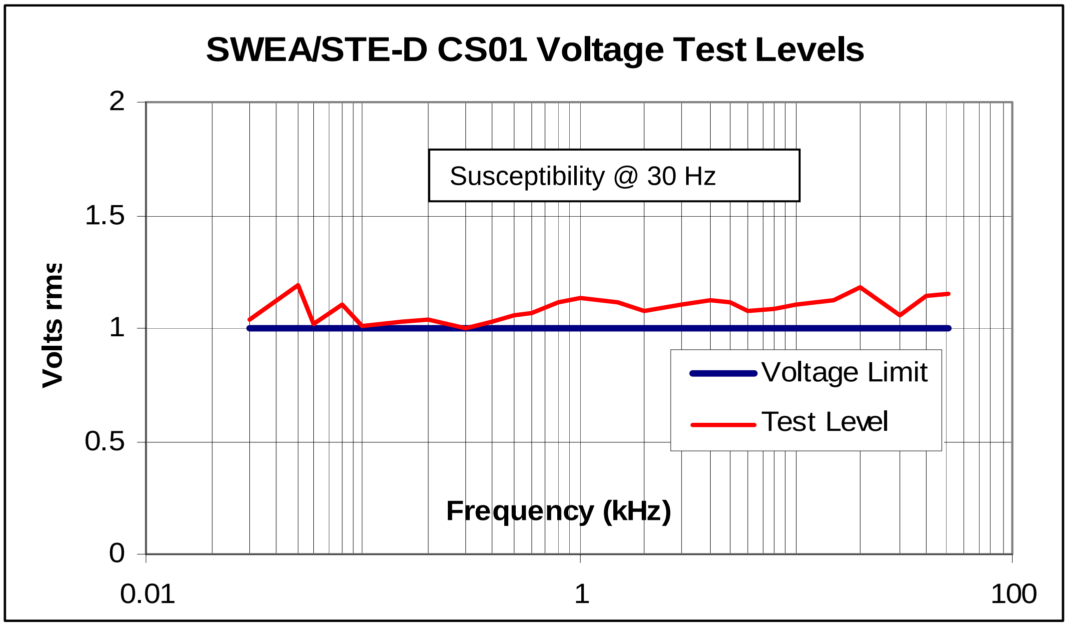


Figure 8-7. Results of CS01 Testing on SEP 28 VDC Input Power Leads (SEP Heater Not Active)



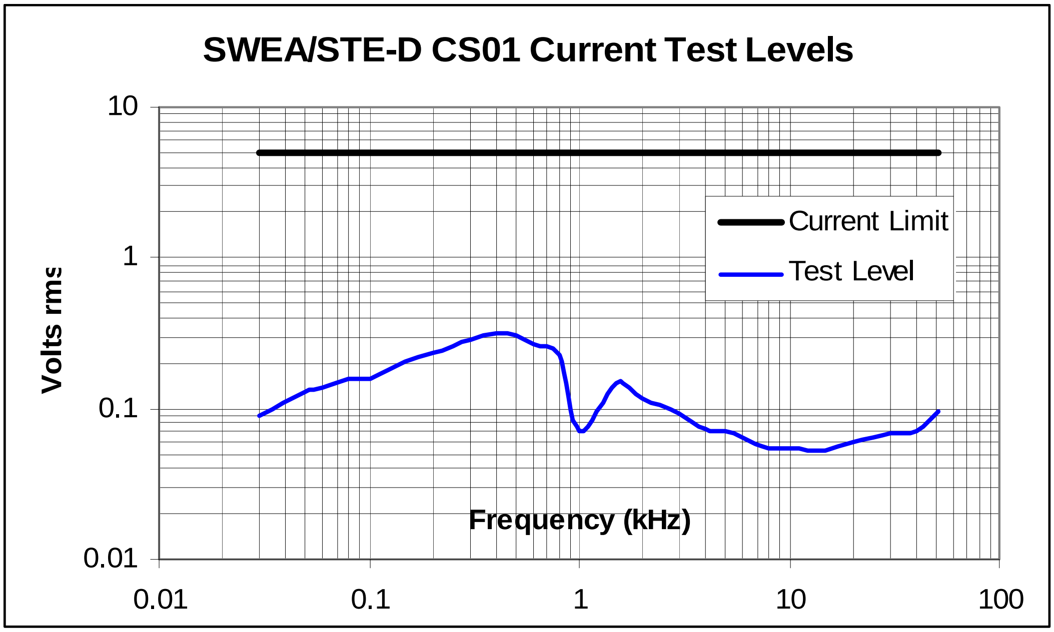


Figure 8-8. Results of CS01 Testing on SWEA/STE-D and Heater 28 VDC Input Power Leads

4.5. CS-01 Conducted Susceptibility, 30 Hz to 51 kHz

This test requirement is to demonstrate that the performance of each Subsystem is not adversely degraded by the presence of low frequency sinusoidal ripple on the primary input power lines. Applicable test parameters are as follows:

A) AC sinusoidal ripple shall be applied to the 28 V primary power input lines to produce a differential input voltage of 1.0 V peak–to–peak.
B) Ripple current injected into the UUT shall be limited to 5 Amps peak-to-peak.
C) Ripple frequency shall be swept over the indicated range while monitoring the Subsystem for susceptibility. The sweep shall be paused at appropriate intervals (e.g., 1,2,5,10) to exercise the Subsystem and record performance.
D) If susceptibility is encountered, then threshold injection levels are to be determined and recorded.
E) Specific criteria for determining susceptibility shall be documented and approved by the EMC Committee prior to testing. At a minimum, survivability with no degradation in performance after the test is required.

Figure 8-9. CS01 Pass/Fail Requirements

Table 8-1. CS01 Susceptibility Test Data Record for IDPU 28 VDC Primary Input Power Leads

Test Frequency	Pass/Fail	Voltage Level (Volts pk-pk)		Current Level (Amps pk-pk)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit (Amps)	Test Level (mA)		
30 Hz	See Note	1.0	1.05	5.0	60	Voltage	MAG noise. Worst at 30Hz (~40 ADC counts RMS). Scales linearly with CS amplitude. Drops to background by 1KHz.
50 (P)		1.0	1.04	5.0	60		
60		1.0	1.2	5.0	72		
80		1.0	1.12	5.0	56		
100 (P)		1.0	0.990	5.0	90		
150		1.0	1.03	5.0	100		
200 (P)		1.0	1.08	5.0	96		
300		1.0	1.07	5.0	92		
400		1.0	1.1	5.0	96		
500 (P)		1.0	1.04	5.0	92		
600		1.0	1.08	5.0	96		
800		1.0	1.12	5.0	42		
1 kHz (P)	Pass	1.0	1.03	5.0	94		No Susceptibility Noted
1.5	Pass	1.0	1.04	5.0	88		
2 (P)	Pass	1.0	1.01	5.0	82		
3	Pass	1.0	1.06	5.0	78		
4	Pass	1.0	1.04	5.0	70		
5 (P)	Pass	1.0	1.08	5.0	66		
6	Pass	1.0	1.07	5.0	66		
8	Pass	1.0	1.11	5.0	56		
10 (P)	Pass	1.0	1.07	5.0	56		
15	Pass	1.0	1.05	5.0	48		
20 (P)	Pass	1.0	1.06	5.0	50		
30	See Note	1.0	1.04	5.0	50		STE rates jump to ~30KHz. Drops to near background at half amplitude, and at 50KHz
40		1.0	1.07	5.0	58		
51 (P)		1.0	1.08	5.0	70		

Tech Notes: 1. (P) = paused 2 minutes at the designated frequency

EUT: IDPU | S/N: FM1 N/A | Date : 27 Oct 2004
Stereo Engr: Dave Curtis | Test Point: IDPU J1 Pins 2-3 (+28), 10-11(Rtn) | Test Engr: Bryan Cowdell

Table 8-2. Customer CS01 Susceptibility Notes on IDPU 28 VDC Primary Input Power

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
30Hz	16:58:10	16:58:10	MAG sees it, max = 44RMS BZ, 8Hz sample rate
50Hz	17:04:00	17:04:00	MAG down to 33RMS @ 8Hz sample rate. Some increase maybe in STE reset rate, not significant
100Hz			Building power glitch. MAG down to background (<10RMS)
30Hz	17:27:00	17:27:00	MAG @<15RMS ?; go to 32Hz sample rate. MAG ~25RMS
30Hz	17:33:45	17:33:45	Half Amplitude. MAG RMS=14RMS See very slow beating
100Hz	17:38:30	17:38:30	MAG=20RMS @ 32Hz sample rate. At 8Hz sample rate, RMS<10
200Hz	17:42:20	17:42:20	MAG=15RMS @ 32Hz sample rate
500Hz	17:45:10	17:45:10	MAG=13RMS @ 32Hz sample rate
1kHz	17:54:10	17:54:10	MAG=11RMS @ 32Hz sample rate, ~background.
2kHz	17:57:40	17:57:40	
5kHz	17:59:50	17:59:50	
10kHz	18:02:20	18:02:20	
20KHz	18:10:10	18:10:10	See some STE noise momentarily as we ramp to 20KHz. Generator makes spikes of higher frequency as it ramps - may see this later. Very short bursts even when we ramp slowly.
30KHz	18:13:00	18:13:00	See lots of counts in STE-U, up to 30Kc/s in det 0
30KHz	18:14:50	18:14:50	Half Amplitude. STE rates drop to 13c/s in det 0
51KHz	18:17:00	18:17:00	STE-U counts down to 140c/s at full amplitude
Done	18:18:00	18:18:00	

EUT: IDPU S/N: FM1 N/A Date : 27 Oct 2004
Stereo Engr: Dave Curtis Test Point: IDPU J1 Pins 2-3 (+28), 10-11(Rtn) Test Engr: Bryan Cowdell
Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Table 8-3. CS01 Susceptibility Test Data Record for MAG Heater 28 VDC Primary Input Power Leads

Test Frequency	Pass/Fail	Voltage Level (Volts pk-pk)		Current Level (pk-pk)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit (Amps)	Test Level (mA)		
30 Hz	See Note	1.0	1.11	5.0	< 40	Voltage	MAG Noise. Worst at 30Hz, ~16 ADC codes. Background by 100Hz
50 **(P)**		1.0	1.02	5.0	< 40		
60		1.0	1.18	5.0	< 40		
80		1.0	1.10	5.0	< 40		
100 **(P)**		1.0	1.20	5.0	48		
150	Pass	1.0	1.06	5.0	50		No Susceptibility Noted
200 **(P)**	Pass	1.0	1.19	5.0	57		
300	Pass	1.0	1.12	5.0	64		
400	Pass	1.0	1.11	5.0	70		
500 **(P)**	Pass	1.0	1.10	5.0	68		
600	Pass	1.0	1.11	5.0	76		
800	Pass	1.0	1.06	5.0	82		
1 kHz **(P)**	Pass	1.0	1.03	5.0	82		
1.5	Pass	1.0	1.06	5.0	78		
2 **(P)**	Pass	1.0	1.07	5.0	72		
3	Pass	1.0	1.11	5.0	62		
4	Pass	1.0	1.12	5.0	54		
5 **(P)**	Pass	1.0	1.14	5.0	54		
6	Pass	1.0	1.09	5.0	52		
8	Pass	1.0	1.13	5.0	50		
10 **(P)**	Pass	1.0	1.09	5.0	50		
15	Pass	1.0	1.13	5.0	46		
20 **(P)**	Pass	1.0	1.07	5.0	56		
30	Pass	1.0	1.13	5.0	49		
40	Pass	1.0	1.10	5.0	50		
51 **(P)**	Pass	1.0	1.11	5.0	48		

Tech Notes: 1. (P) = paused 2 minutes at the designated frequency

EUT: MAG Heater   S/N: FM1 N/A   Date: 27 Oct 2004
Stereo Engr: Dave Curtis   Test Point: IDPU J1 Pins 5-6 (+28), 13-14(Rtn)   Test Engr: Bryan Cowdell

Table 8-4. Customer CS01 Susceptibility Notes on MAG Heater 28 VDC Primary Input Power Leads

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
30Hz	4:29:00 PM	23:30:00	MAG RMS ~16 @ 32Hz sampling
50Hz	4:31:10 PM	23:31:10	MAG RMS ~10 @ 32Hz sampling
100Hz	4:32:50 PM	23:32:50	MAG RMS ~8 @ 32Hz sampling (background)
200Hz	4:35:00 PM	23:35:00	
500Hz	4:36:45 PM	23:36:45	
1kHz	4:38:20 PM	23:38:20	
2kHz	4:39:40 PM	23:39:40	
5kHz	4:41:10 PM	23:41:10	
10kHz	4:42:40 PM	23:42:40	
20KHz	4:44:10 PM	23:44:10	
51KHz	4:45:30 PM	23:45:30	
Off	4:46:50 AM		

EUT: MAG Heater S/N: FM1 N/A Date :27 Oct 2004
Stereo Engr: Dave Curtis Test Point: IDPU J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Table 8-5. CS01 Susceptibility Test Data Record for SEP 28 VDC Primary Input Power Leads

Test Frequency	Pass/Fail	Voltage Level (Volts pk-pk)		Current Level (pk-pk)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit (Amps)	Test Level (mA)		
30 Hz	Pass	1.0	1.02	5.0	<0.320		
50 **(P)**	Pass	1.0	1.17	5.0	<.0180		
60	Pass	1.0	1.28	5.0	.<0200		
80	Pass	1.0	1.12	5.0	.<0210		
100 **(P)**	Pass	1.0	1.15	5.0	0.250		
150	Pass	1.0	1.12	5.0	.0210		
200 **(P)**	Pass	1.0	1.11	5.0	0.410		No Susceptibility Noted
300	Pass	1.0	1.02	5.0	.0720		
400	Pass	1.0	1.02	5.0	.0420		
500 **(P)**	Pass	1.0	1.17	5.0	.0840		
600	Pass	1.0	1.26	5.0	0.630		
800	Pass	1.0	1.4	5.0	0.940		
1 kHz **(P)**	Pass	1.0	1.24	5.0	0.820		
1 kHz	Pass	1.0	1.01	5.0	0.258		No Susceptibility Noted (Retest)
1.5	Pass	1.0	1.12	5.0	.0220	Voltage	
2 **(P)**	Pass	1.0	1.11	5.0	0.160		
3	Pass	1.0	1.17	5.0	0.124		
4	Pass	1.0	1.24	5.0	0.112		
5 **(P)**	Pass	1.0	1.19	5.0	0.080		
6	Pass	1.0	1.23	5.0	0.074		No Susceptibility Noted
8	Pass	1.0	1.19	5.0	0.072		
10 **(P)**	Pass	1.0	1.24	5.0	0.058		
15	Pass	1.0	1.24	5.0	0.048		
20 **(P)**	Pass	1.0	1.03	5.0	0.050		
30	Pass	1.0	1.01	5.0	0.040		
40	Pass	1.0	1.02	5.0	0.052		
51 kHz **(P)**	See Note 3	1.0	1.02	5.0	0.072		Initial Test
51 kHz		1.0	1.08	5.0	0.0068		Retest
		1.0	0.520	5.0	0.0050		Retest 2 ½ Amplitude

Tech Notes: 1. (P) = paused 2 minutes at the designated frequency 2. SEP Heater not tests due to short to chassis.
3. LET L1 counts rise to ~10 counts/sec; <4 counts/sec at half amplitude; baseline ~0; not scientifically significant

EUT: SEP and SEP Heater S/N: FM1 ______ Date :27 Sept 2004
Stereo Engr: Dave Curtis Test Points: SEP IDPU J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: SEP Heater IDPU J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Table 8-6. Customer CS01 Susceptibility Notes SEP 28 VDC Primary Input Power Leads

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
30Hz	10:05:00 AM	17:06:00	
50Hz	10:06:00 AM	17:06:00	
100Hz	10:10:00 AM	17:09:30	~11 c/s in LET, not significant
200Hz	10:12:40 AM	17:12:40	
500Hz	10:17:10 AM	17:17:20	
1kHz	10:20:30 AM	17:20:30	Some increse in STE reset rates, not significant
2kHz	10:23:50 AM	17:23:50	
5kHz	10:27:00 AM	17:27:00	
10kHz	10:30:00 AM	17:30:00	
20KHz	10:32:50 AM	17:32:50	
50KHz	10:36:55 AM	17:36:55	LET L1 rates up to 10c/s, not significant
Retest:			
1kHz	10:40:17 AM	17:40:20	STE reset rates don't come back. Probably light variations.
50kHz	10:45:50 AM	17:45:50	Full Amplitude. LET L1 rates up to 10c/s, not significant
51kHz	10:49:00 AM	17:49:00	Half amplitude. LET L1 rates drop to ~5c/s. (Background ~0c/s)
Off	10:52:00 AM	17:52:00	

EUT: SEP S/N: FM1 N/A Date : 27 Oct 2004
Stereo Engr: Dave Curtis Test Point: IDPU J1 Pins 2-3 (+28), 10-11(Rtn) Test Engr: Bryan Cowdell

Table 8-7. CS01 Susceptibility Test Data Record for SWEA/STE-D and Heater (BOOM) 28 VDC Primary Input Power Leads

Test Frequency	Pass/Fail	Voltage Level (Volts pk-pk)		Current Level (pk-pk)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit (Amps)	Test Level (mA)		
30 Hz	See Note	1.0	1.04	5.0	90	Voltage	MAG Noise. Worst at 30Hz, ~16 ADC codes. Background by 100Hz
50 **(P)**		1.0	1.19	5.0	128		
60		1.0	1.02	5.0	136		
80		1.0	1.10	5.0	160		
100 **(P)**		1.0	1.01	5.0	156		
150	Pass	1.0	1.03	5.0	204		No Susceptibility Noted
200 **(P)**	Pass	1.0	1.04	5.0	232		
300	Pass	1.0	1.00	5.0	284		
400	Pass	1.0	1.03	5.0	314		
500 **(P)**	Pass	1.0	1.06	5.0	302		
600	Pass	1.0	1.07	5.0	270		
800	Pass	1.0	1.11	5.0	228		
1 kHz **(P)**	Pass	1.0	1.13	5.0	70		
1.5	Pass	1.0	1.11	5.0	148		
2 **(P)**	Pass	1.0	1.08	5.0	118		
3	Pass	1.0	1.10	5.0	92		
4	Pass	1.0	1.12	5.0	74		
5 **(P)**	Pass	1.0	1.11	5.0	72		
6	Pass	1.0	1.08	5.0	64		
8	Pass	1.0	1.09	5.0	54		
10 **(P)**	Pass	1.0	1.10	5.0	54		
15	Pass	1.0	1.12	5.0	53		
20 **(P)**	Pass	1.0	1.18	5.0	61		
30	Pass	1.0	1.06	5.0	69		
40	Pass	1.0	1.14	5.0	71		
51 **(P)**	Pass	1.0	1.15	5.0	96		

Tech Notes: 1. (P) = paused 2 minutes at the designated frequency

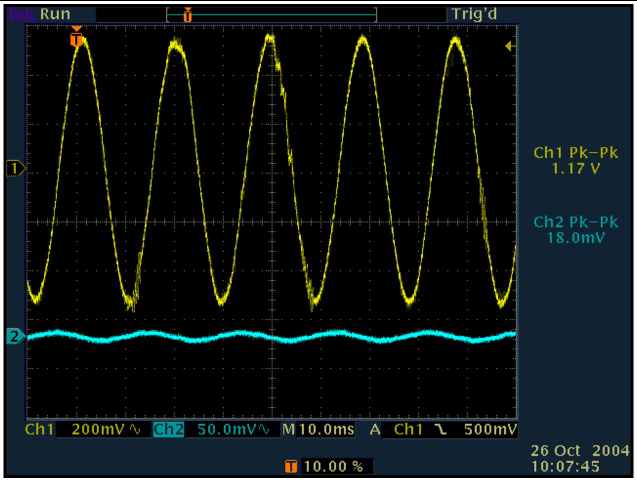
EUT: SWEA/STE-D and Heater S/N: FM1 N/A Date : 27 Oct 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Table 8-8. Customer CS01 Susceptibility Notes SWEA/STE-D and Heater (BOOM) 28 VDC Primary Input Power Leads

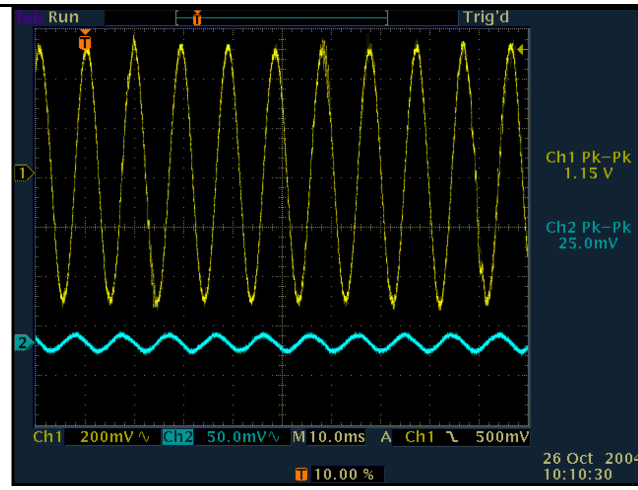
Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
30Hz	4:29:00 PM	23:30:00	MAG RMS ~16 @ 32Hz sampling
50Hz	4:31:10 PM	23:31:10	MAG RMS ~10 @ 32Hz sampling
100Hz	4:32:50 PM	23:32:50	MAG RMS ~8 @ 32Hz sampling (background)
200Hz	4:35:00 PM	23:35:00	
500Hz	4:36:45 PM	23:36:45	
1kHz	4:38:20 PM	23:38:20	
2kHz	4:39:40 PM	23:39:40	
5kHz	4:41:10 PM	23:41:10	
10kHz	4:42:40 PM	23:42:40	
20KHz	4:44:10 PM	23:44:10	
51KHz	4:45:30 PM	23:45:30	
Off	4:46:50 AM		

EUT: SWEA/STE-D and Heater S/N: FM1 N/A Date : 27 Oct 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

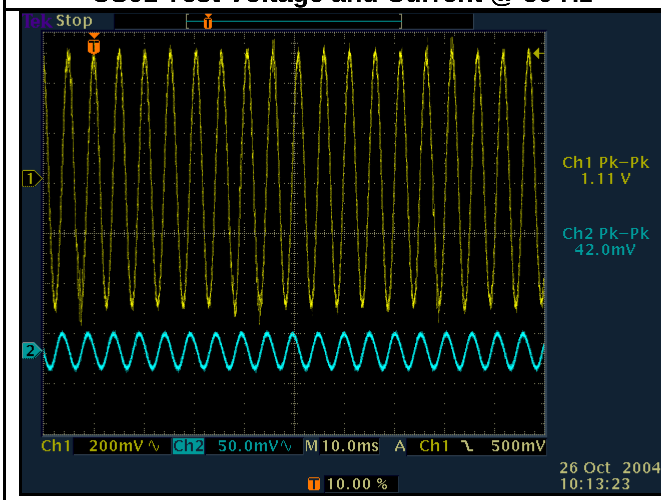
Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step



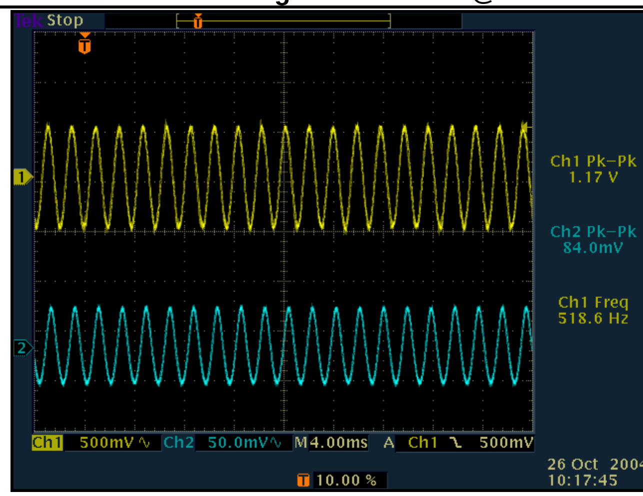
CS01 Test Voltage and Current @ 50 Hz



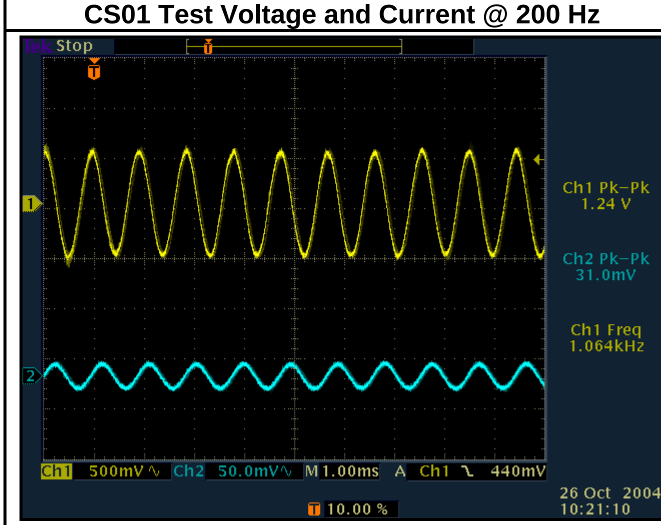
CS01 Test Voltage and Current @ 100 Hz



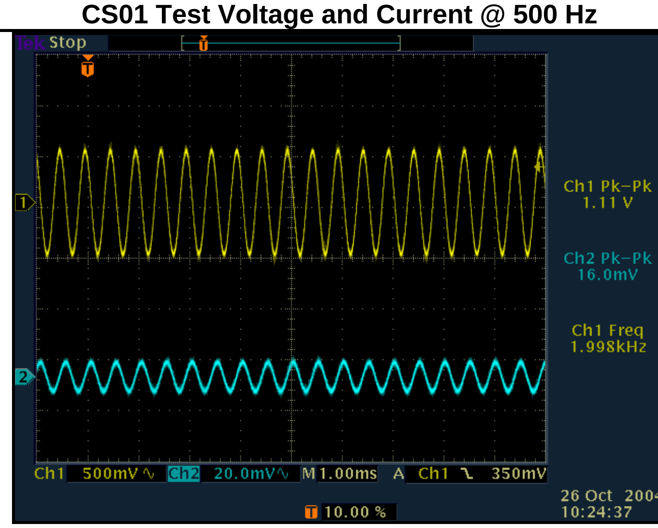
CS01 Test Voltage and Current @ 200 Hz



CS01 Test Voltage and Current @ 500 Hz

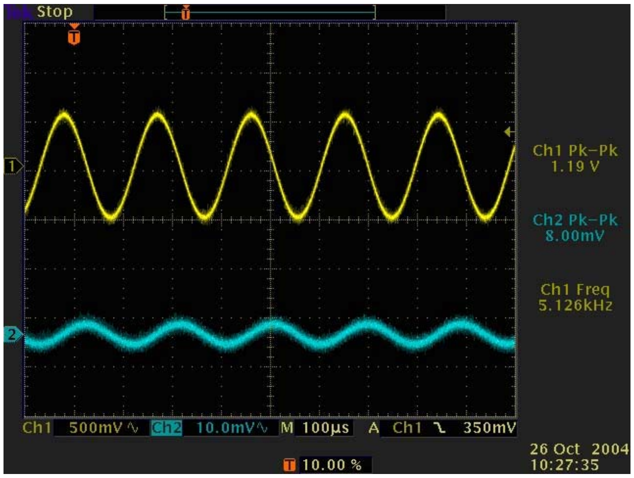


CS01 Test Voltage and Current @ 1 kHz

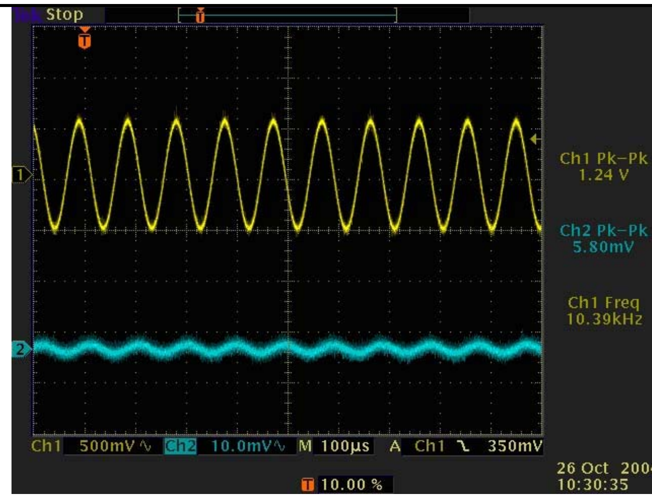


CS01 Test Voltage and Current @ 2 kHz

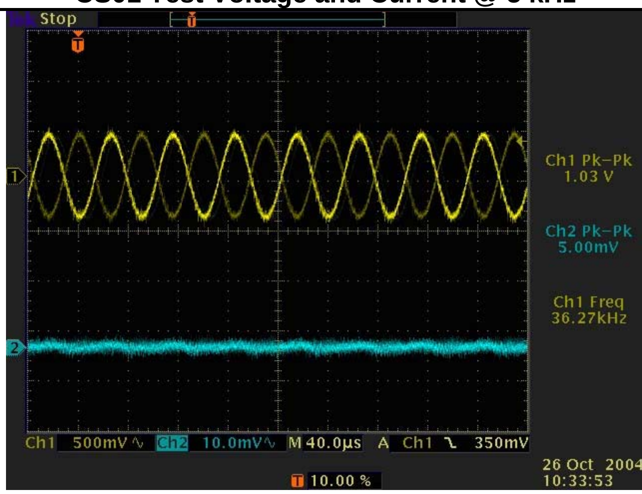
Figure 8-10. CS01 Pause Frequency Test Voltages (Yellow Trace) and Current (Blue Trace) on SEP 28 VDC Power Leads



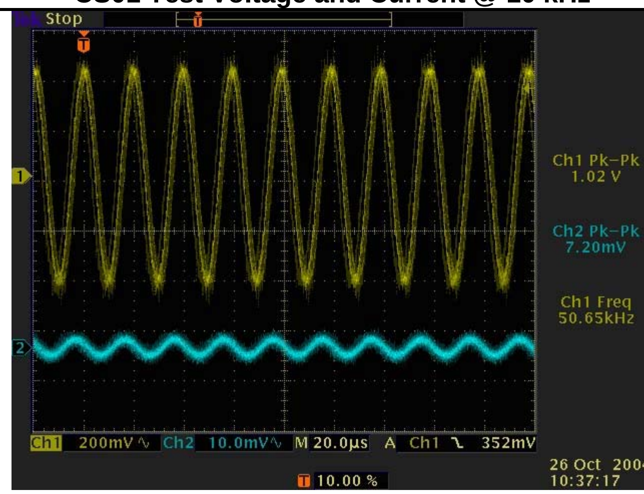
CS01 Test Voltage and Current @ 5 kHz



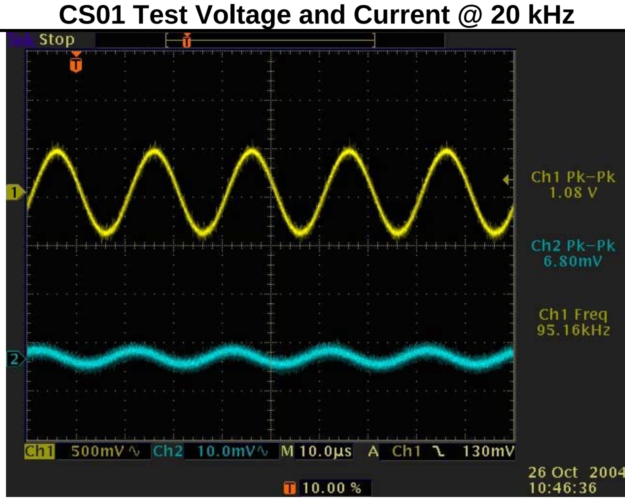
CS01 Test Voltage and Current @ 10 kHz



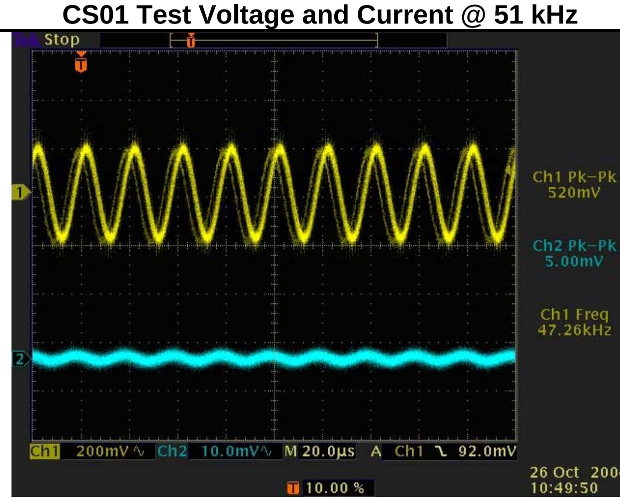
CS01 Test Voltage and Current @ 20 kHz



CS01 Test Voltage and Current @ 51 kHz

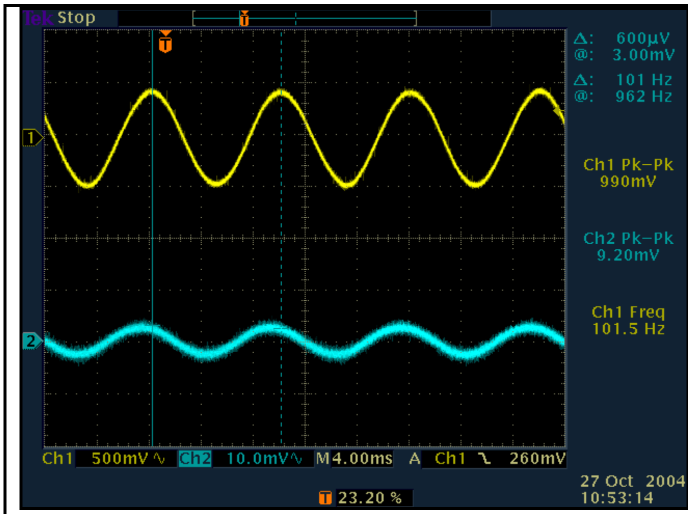


CS01 Retest Voltage and Current @ 51 kHz

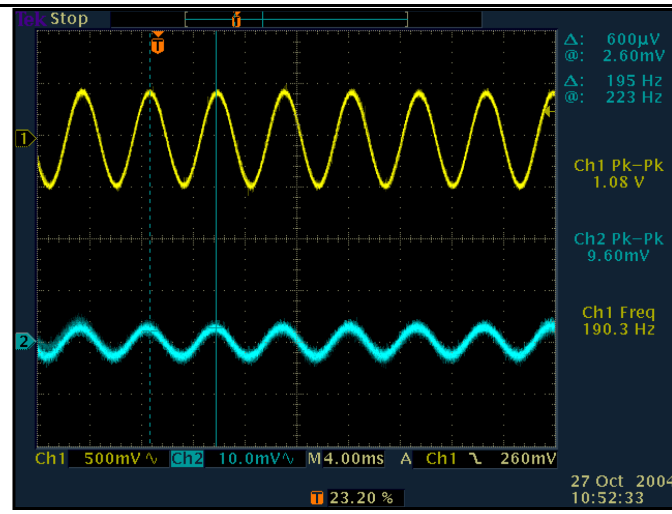


CS01 Half Power Retest Voltage and Current @ 51 kHz

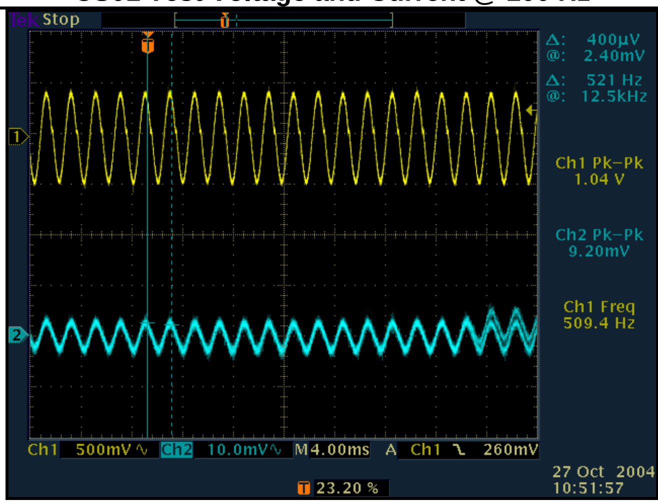
Figure 8-11. CS01 Pause Frequency Test Voltages (Yellow Trace) and Current (Blue Trace) on SEP 28 VDC Power Leads



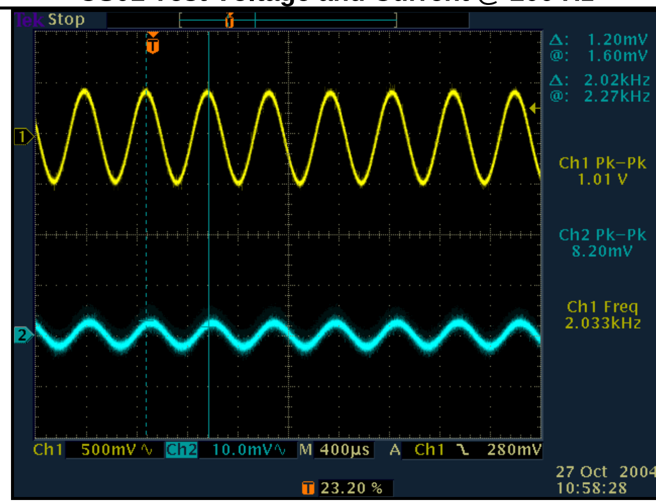
CS01 Test Voltage and Current @ 100 Hz



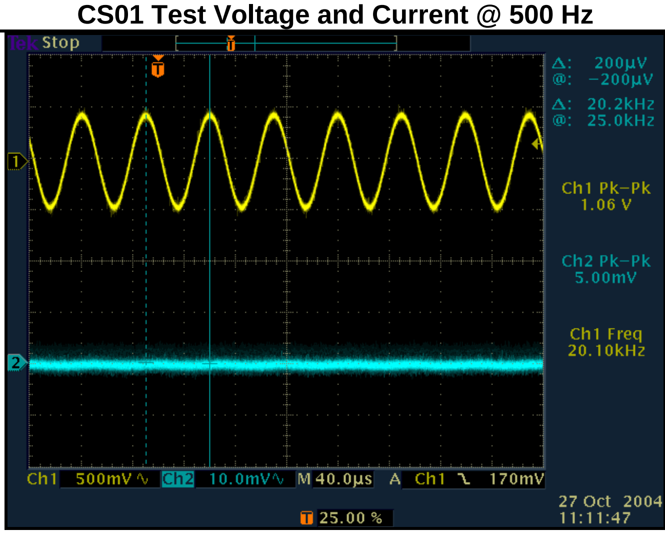
CS01 Test Voltage and Current @ 200 Hz



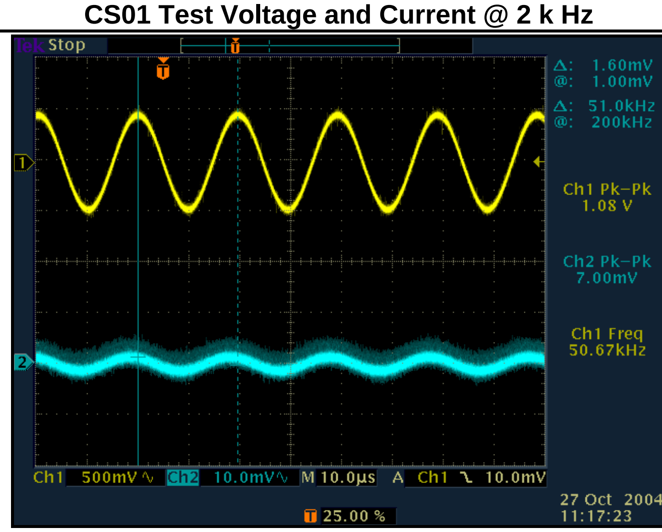
CS01 Test Voltage and Current @ 500 Hz



CS01 Test Voltage and Current @ 2 k Hz



CS01 Test Voltage and Current @ 20 kHz



CS01 Test Voltage and Current @ 51 kHz

Figure 8-12. CS01 Pause Frequency Test Voltages (Yellow Trace) and Current (Blue Trace) on IDPU 28 VDC Power Leads

Cal Date:9-23-2004 Next Cal Due: 9-23—06

Probe Type: Pearson Model 110A **S/N: 03057**

Frequency	Probe Factor (dB)	
	50 Ohms	Hi Z
1 Hz – 6 MHz	26	20
7	25.7	19.7
8	25.5	19.5
10	25.3	19.3
15	24.5	18.5
20	23.5	17.5
30	20	14.0

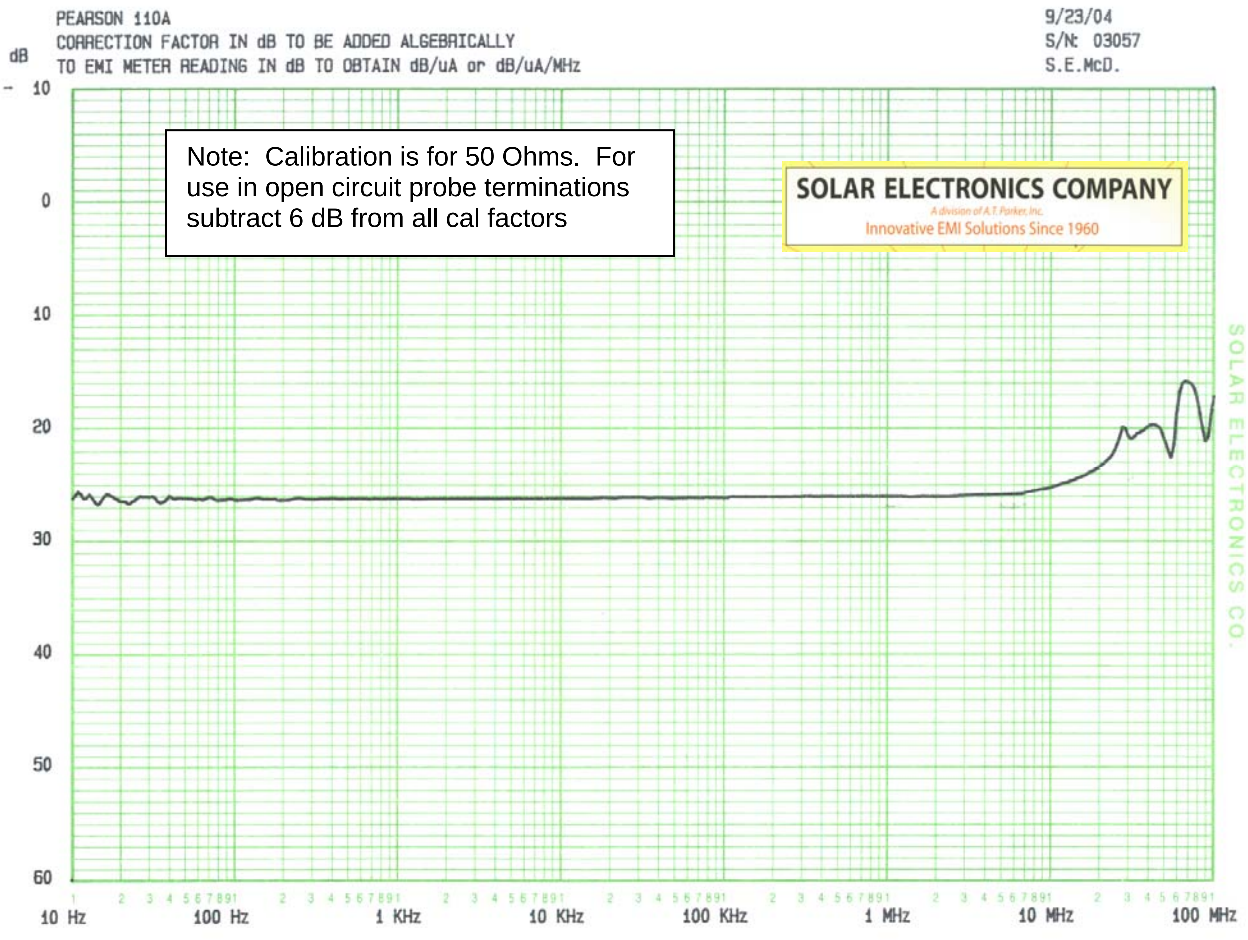


Figure 8-13. Pearson Model 110ACurent Probe Calibration Information

Table 8-9. CS01 Test Equipment Calibration Record

Instrument	Mfr/Model	Serial Number	Calibration Due Date
Signal Generator	HP 652A	0964A02544	
100 W Power Amplifier	Solar 6552-1A	894808	NCR
Injection Transformer	Solar 6220-4	003A	CNR
Scope	Tektronix 3052A	3052-65-7889	25 Jun 2005
Current Probe	Pearson Model 110A	2123	27 Dec 2005
Voltage Probe	Tektronix	2951674-1	NCR
10 ufd Capacitor	Solar 6512-106R	N/A	NCR
NCR = No Calibration Required			

EUT: Stereo Impact
Stereo Engr: David Curtis
S/N: FM1 TBA
Customer QA: Ron Jackson
Date of Testing: 26 Oct 2004
Test Engr: Bryan Cowdell

9 CS02: CONDUCTED SUSCEPTIBLITY, INPUT POWER LEADS (50 KHZ - 400 MHZ)

9.1 OVERVIEW OF TEST RESULTS

- IDPU +28 VDC Input Power Leads..Noted responses @ 50 kHx
- MAG Heater +28 VDC Input Power Leads ....Noted responses @ 260 MHz
- SEP +28 VDC Input Power Leads (SEP Heater not active) .... Noted response at 82 kHz
- SWEA/STE-D and Heater Input Power Leads (BOOM) ....Noted responses @ 100 kHz
- Customer CS02 Notes ....Table 9-3, Table 9-6, Table 9-9, Table 9-12

9.2 TEST DATA:

- IDPU +28 VDC Input Power Leads..Figure 9-5, Table 9-1, Table 9-2
- MAG Heater +28 VDC Input Power Leads ....Figure 9-6, Table 9-4, Table 9-5
- SEP +28 VDC Input Power Leads (SEP Heater not active)...........Figure 9-7, Table 9-7, Table 9-8
- SWEA/STE-D and Heater +28 VDC Input Power Leads............................ Figure 9-8, , Table 9-11

9.3 TEST CONFIGURATION

- Test Configuration Schematic..Figure 9-1,
- Test Setup Photographs .... Figure 9-2, Figure 9-3, Figure 9-4

9.4 TEST INSTRUMENTATION CALIBRATION INFORMATION

- Monitor Probe Correction Factors.. Figure 9-11, Table 9-13
- Test Instrumentation Calibration Record ....Table 9-14

9.5 STANDARDS OF RECORD:

- EMI Test Method.......... 1. STEREO IMPACT EMI Test Procedure (IMPACT_A, Version A, 20041.
- ....2. STEREO EMC Control Plan and EMI Requirements Specification,
- .... Dwg. No. 7381-9030, Rev C
- Pass/Fail Requirements...Figure 9-9
- Derivation of Alternate Current Limits ....Figure 9-10
- Modulation...1 kHz Square Wave

9.6 ITEMS NOT TESTED

The following items were not tested:

- PLASTIC +28 VDC Input Power Leads .... Not available at time of test
- SEP Heater .... Heater was shorted to chassis and therefore not activated

9.7 DERIVATION OF PASS/FAIL LIMITS

The spectrum analyzer was used to monitor both current and voltage limits. The spectrum analyzer detects the peak value of the test signal and displays the level of an rms sine wave. Therefore, both voltage and current test levels on test data sheets are in rms units that are converted from the peak to peak CS02 current and voltage limits. Levels recorded on the Test Data record are then translated back to the peak to peak values.

9.7.1 Voltage Pass/Fail Limits fro the Spectrum Analyzer

Voltage pass/fail limits for the spectrum analyzer were obtained as follows:

- The required test level is 1 volt peak to peak or 354 millivolts rms (i.e. 1 / 2.828)
- 20 log (354 x 10^3 microvolts) = 110.9 dBuV (i.e. 20 log (354X10^3)
- The 40 dB offset of the Solar 7415-3 RF coupler was programmed into the spectrum analyzer so that levels were measured directly.

9.7.2 Current Limits for the Spectrum analyzer

Current pass/fail limits for the spectrum analyzer were obtained as follows:

- The required test level is 600 milliamps peak to peak or 212.2 milliamps rms (i.e. 600 / 2.828)
- 20 log (212.2 X 10^3) microvolts = 106.5 dBuV (i.e. 20 log (212.2X10^3)
- The alternate limit is 106.5 + Current Probe Correction Factor
- Current Probe Correction Factors, as well as the alternate 600 milliampere limits for the spectrum analyzer, are shown in Figure 9-10.
- These levels are then repeated on the Test Data record as Current Limits.
- Currents are than recorded in units of dBuV.

9.8 VOLTAGE TEST DATA CORRECTION (49 KHZ – 400 MHZ)

Voltage levels is dBuV rms are converted to volts-peak-to-peak as follows:

1. Convert dBuV rms to volts rms

   Volts rms = $10^{(\text{dBuV} - 120) / 20}$

2. Convert volts rms to volts peak to peak

   Volts-rms X 2,828 – Volts peak-to-peak

9.9 CURRENT TEST DATA CORRECTION (49 KHZ – 10 MHZ)

- The Pearson Model 110A current probe correction factor, when terminated into the 50-Ohm spectrum analyzer, is 26 dB (i.e. the current probe is reading levels that are 26 dB less than their actual level).
- Levels given in the test data records are in units of dBuA. The 26 dB correction factor is programmed in the spectrum analyzer so that direct readings are made in dBuA.
- Measured data is then corrected to mA peak to peak as follows:

1. Convert dBuA to amps rms:
   $10^{(\text{dBuA rms} - 120) /20}$ = Amps-rms
2. Convert Amps-rms to Amps-peak-to-peak
   Amps-rms X 2.828 – Amps peak-to-peak

9.10 CURRENT TEST DATA CORRECTION (10 MHZ – 400 MHZ)

Measured levels are in units of dBuV-rms. The conversion to mA peak-to-peak is done as follows:

2. Convert to measured rms current:
   dBuV-rms + Current Probe correction factor = dBuA-rms
3. Convert dBuA-rms to mA-rms
   $10^{(\text{dBuA} - 60)/20}$ = mA-rms
4. Convert mA-rms to mA peak-to-peak
   mA-rms X 2.828 = mA peak-to-peak

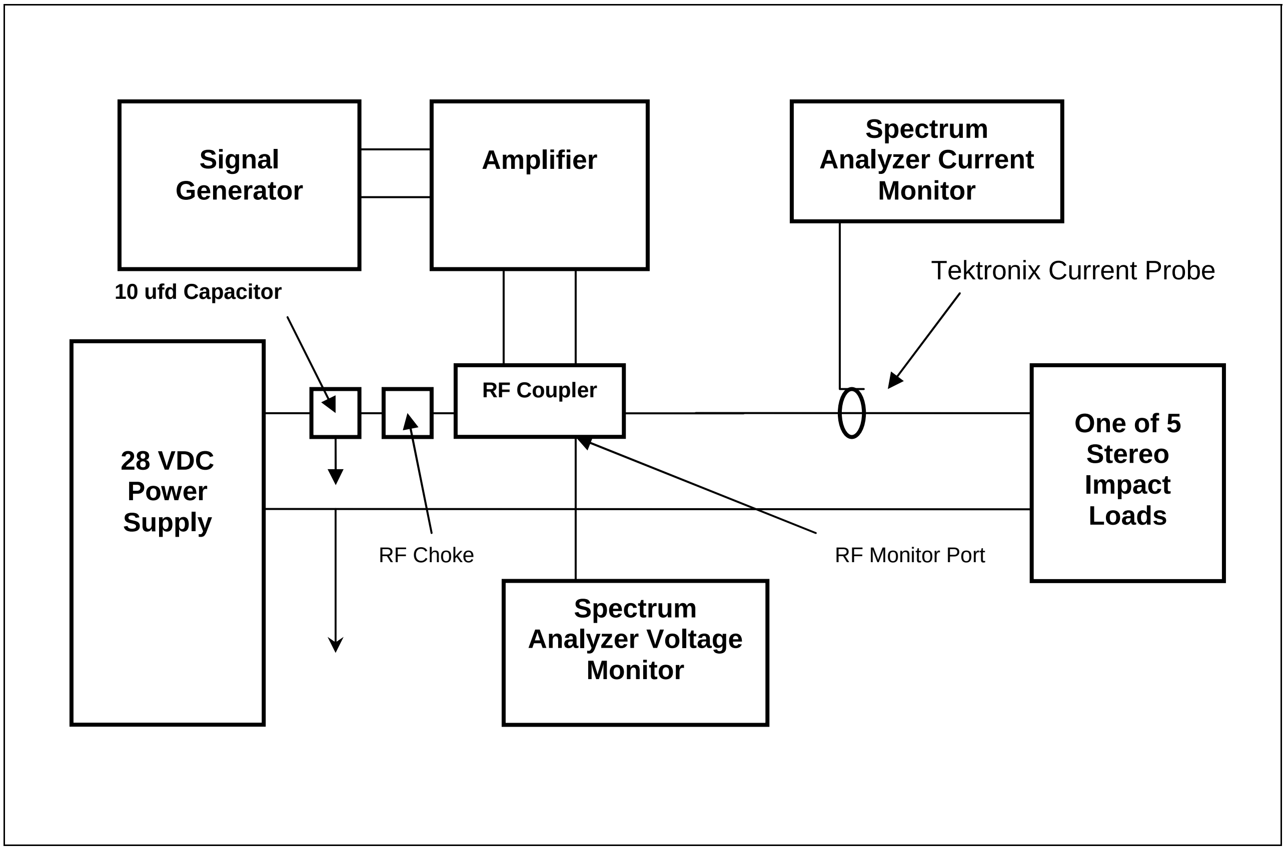


Figure 9-1. Schematic Configuration for CS02 Testing on the STEREO IMPACT System

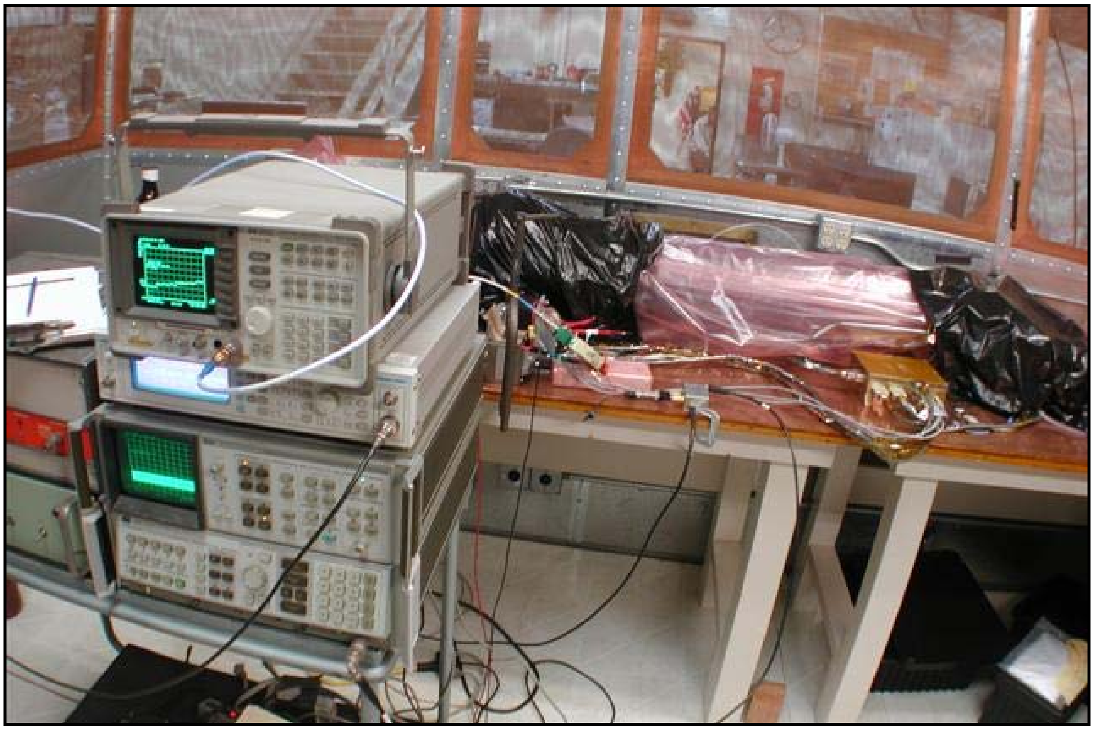


Figure 9-2. Configuration for Stereo Impact CS02 Testing`

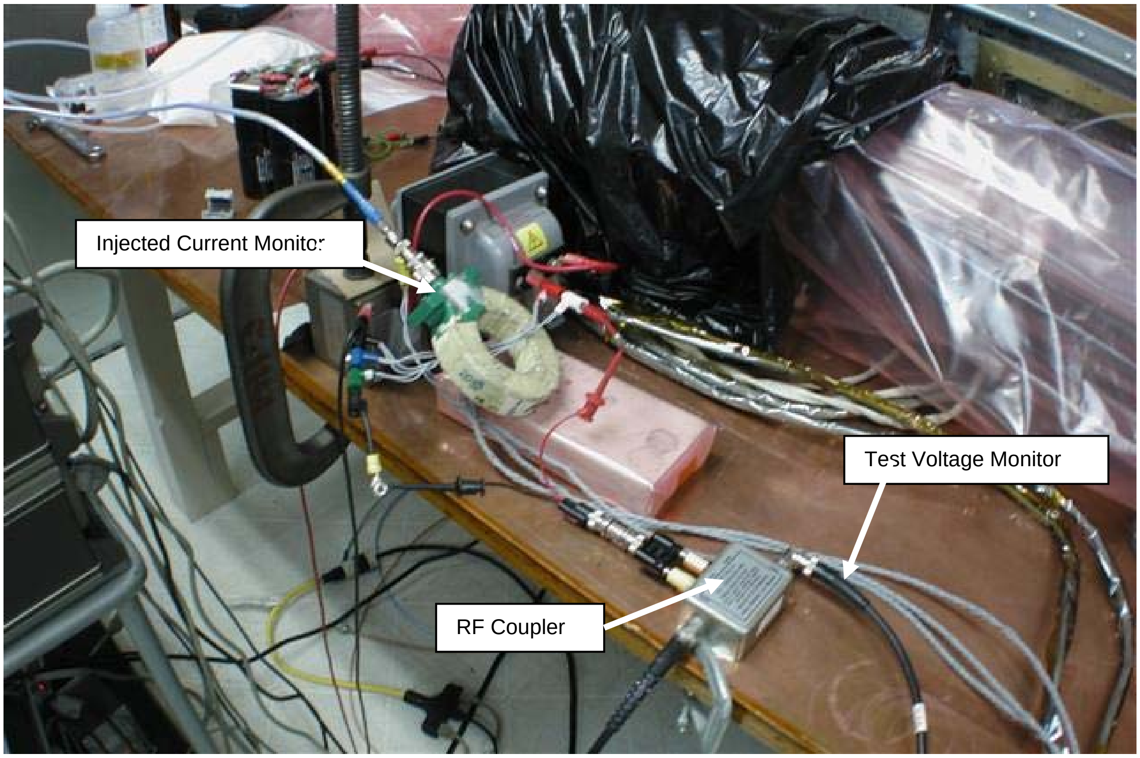


Figure 9-3. Close-up of the RF Coupler and Current Monitor

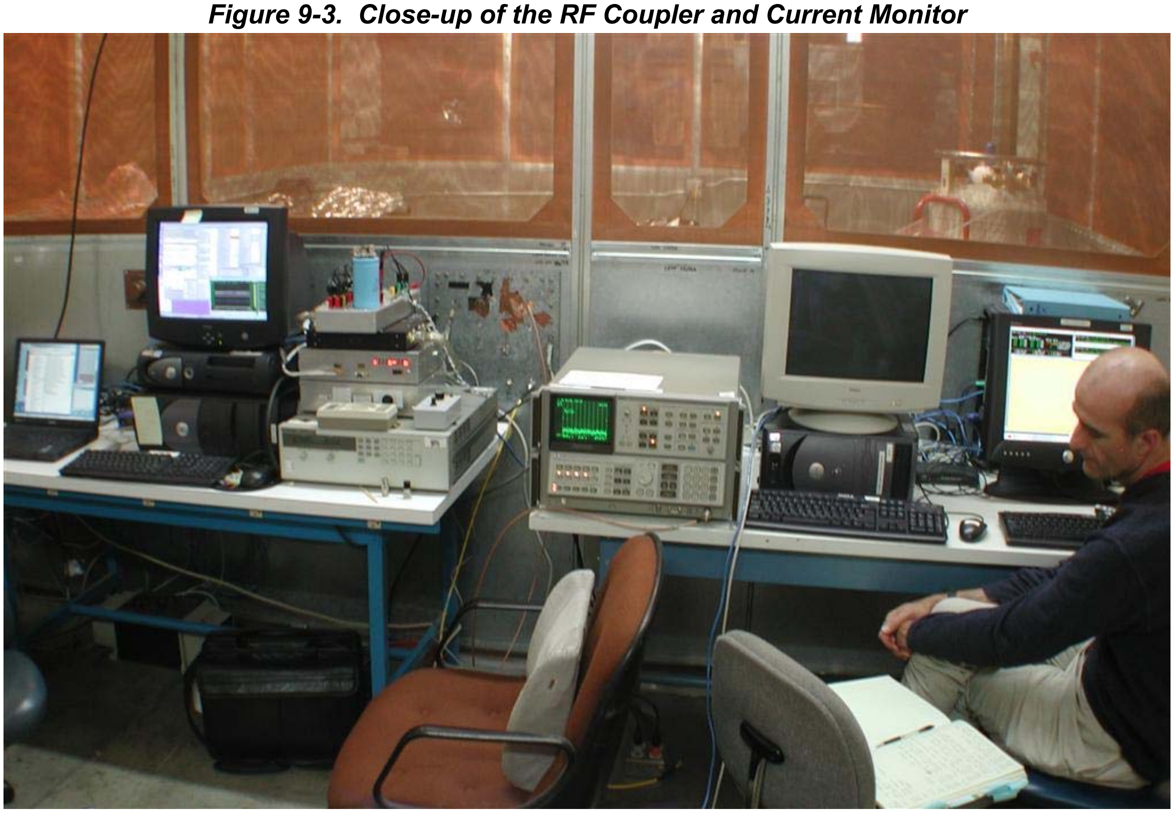
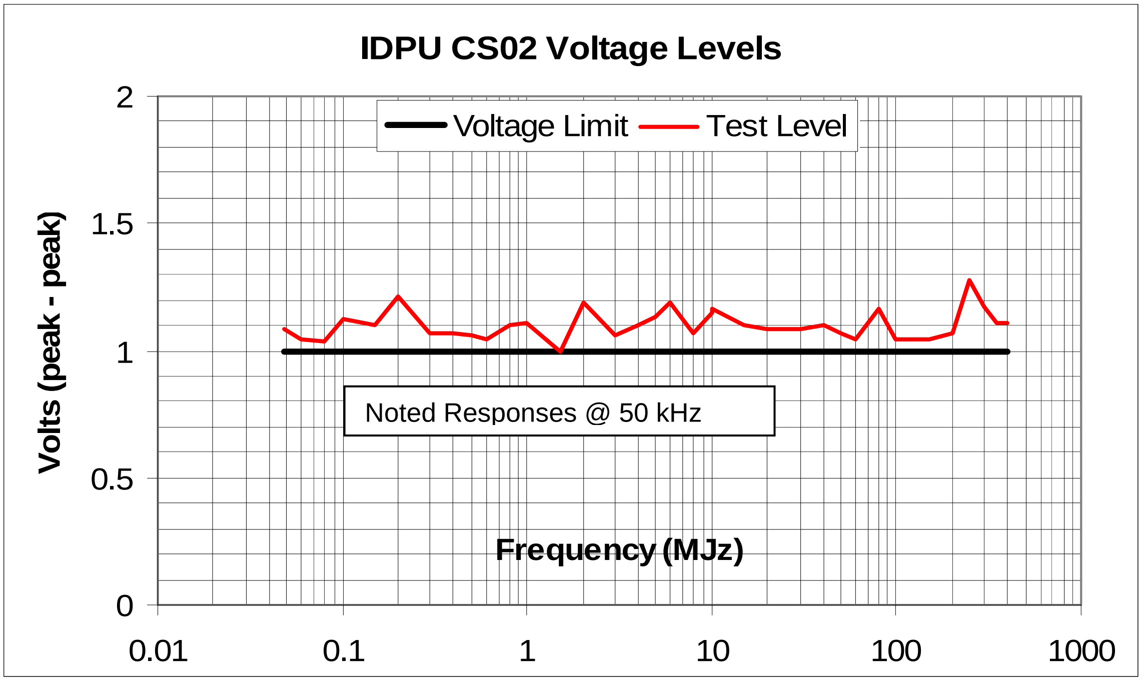


Figure 9-4. Close-up of Support Test Instrumentation Outside EMI Room



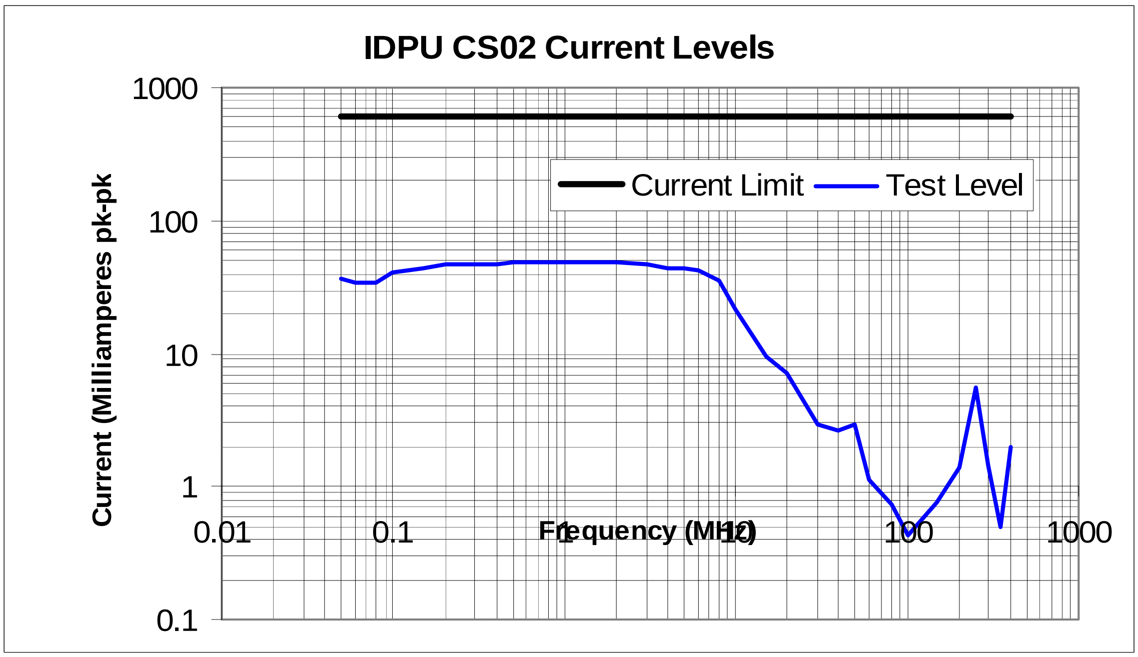
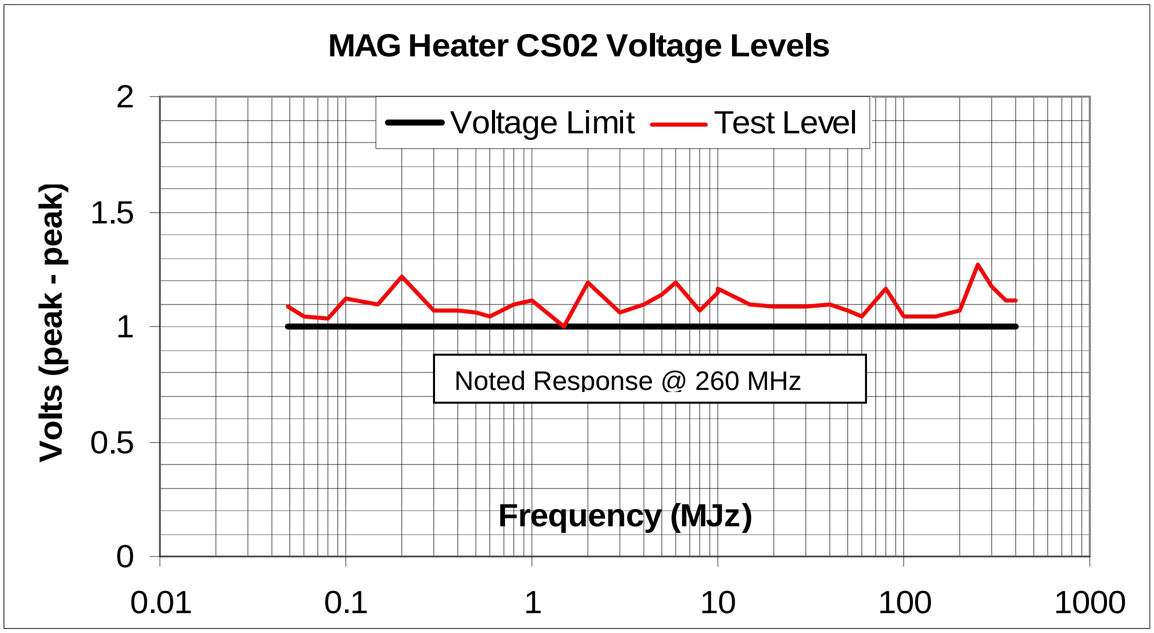


Figure 9-5. IDPU CS02 Test Levels



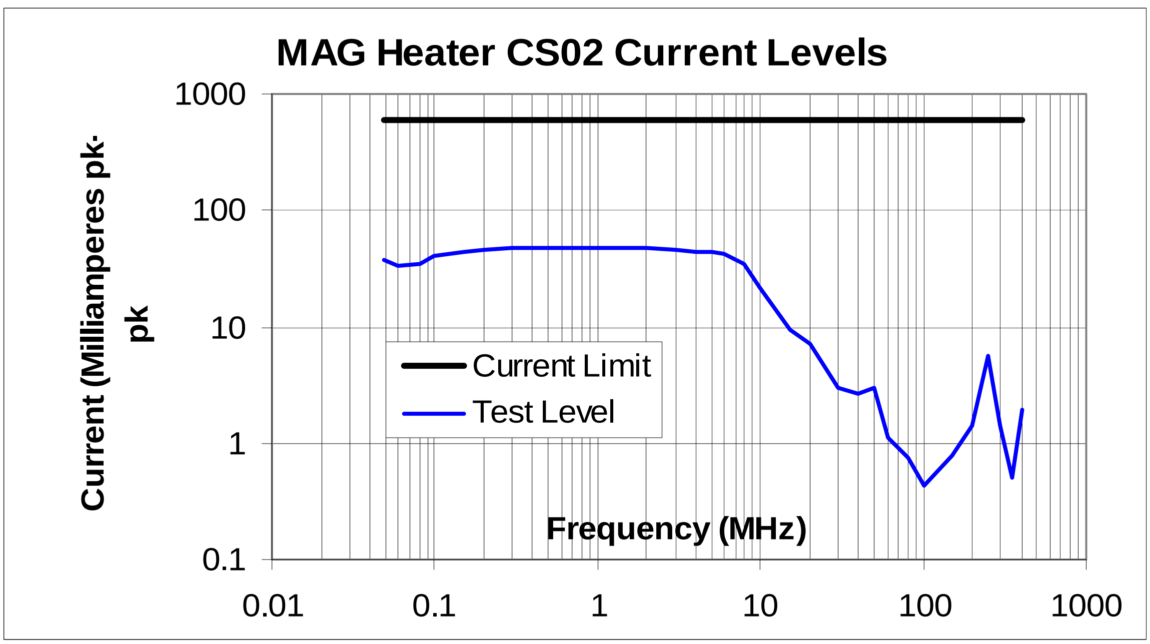
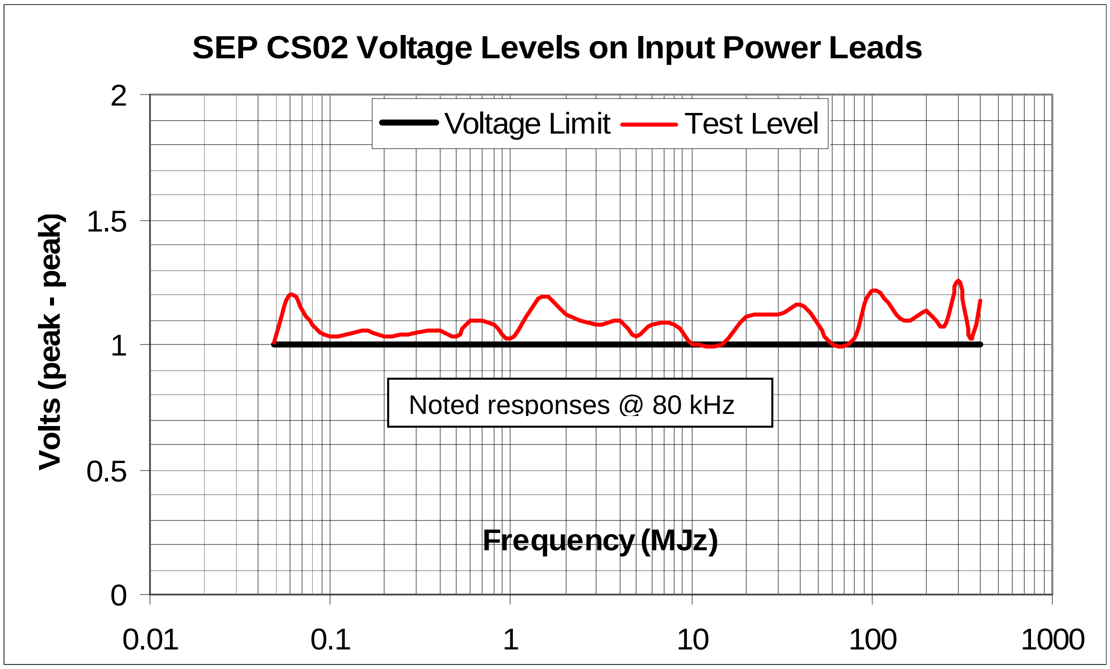


Figure 9-6. MAG Heater CS02 Test Levels



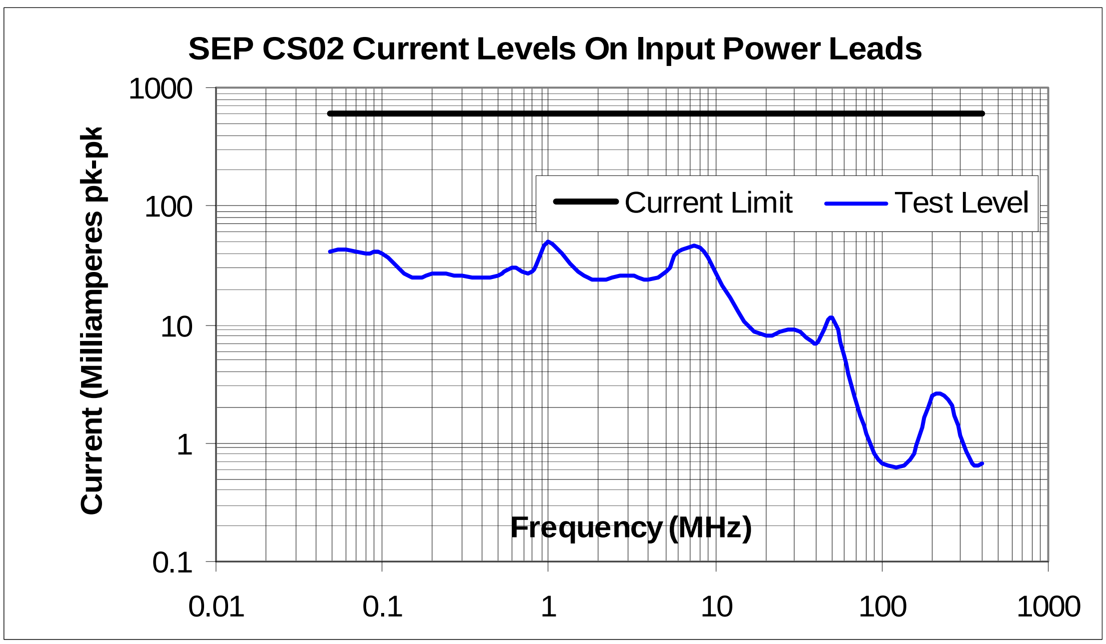
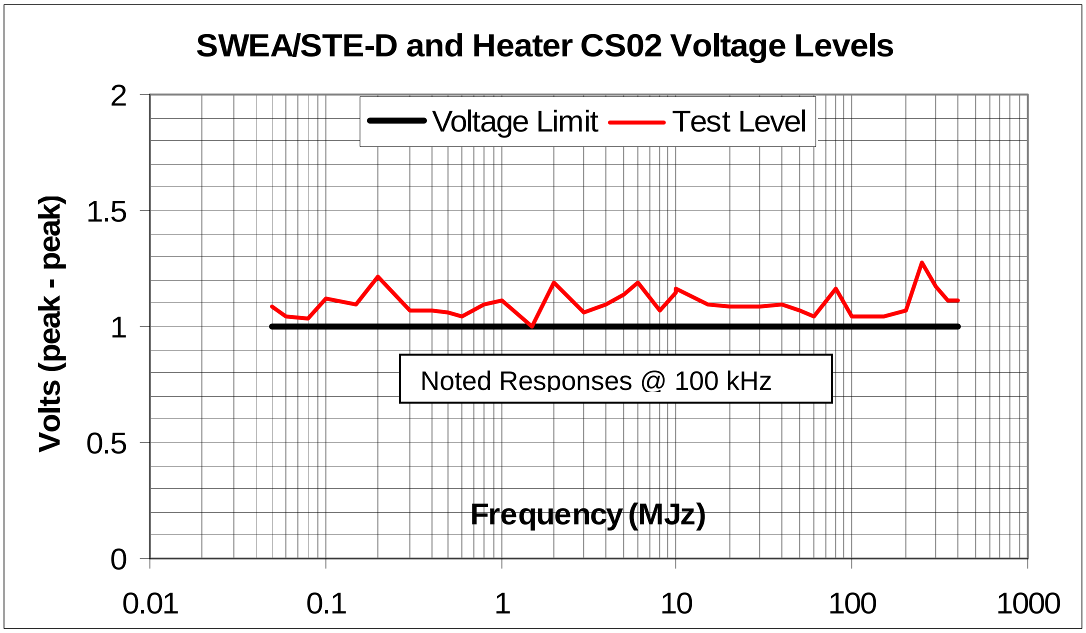


Figure 9-7. SEP CS02 Test Levels



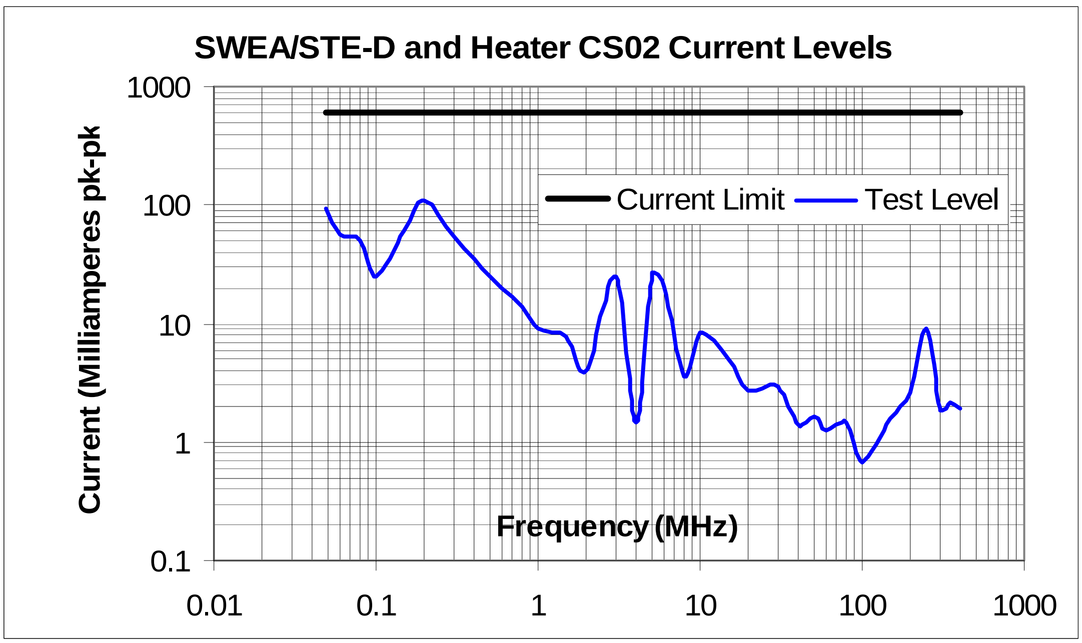


Figure 9-8. SEWEA/STE-D and Heater CS02 Test Levels

4.6. CS-02 Conducted Susceptibility, 49 kHz to 400 MHz

This test requirement is to demonstrate that the performance of each Subsystem is not adversely degraded by the presence of high frequency sinusoidal ripple on the primary input power lines. Applicable test parameters are as follows:

A) AC sinusoidal ripple shall be applied to the 28 V primary power input lines to produce a differential input voltage of 1.0 V peak–to–peak.
B) All test frequencies shall be pulse modulated at 1 kHz with 50% duty factor.
C) Ripple frequency shall be swept over the indicated range while monitoring the Subsystem for susceptibility. The sweep shall be paused at appropriate intervals (e.g., 1,2,5,10) to exercise the Subsystem and record performance.
D) If susceptibility is encountered, then threshold injection levels are to be determined and recorded.
E) Specific criteria for determining susceptibility shall be documented and approved by the EMC Committee prior to testing. At a minimum, survivability with no degradation in performance after the test is required.
F) The 50 ohm 1.0 watt available power limit applies, i.e. ripple current injected into the UUT shall be limited to 600 milliamps peak-to-peak. If this current limit is reached, record the actual voltage level obtained.

Figure 9-9. CS02 Test Requirements and Pass/Fail Limits

Table 9-1. CS02 Susceptibility Test Data Record for IDPU 28 VDC Primary Input Power Leads (49 kHz

Test Frequency	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuA rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
49 kHz **(P)**	See Note	110.9	111.6	106.5	82.4	Voltage	STE Rates at ~3Kc/s. Drop to background at half amplitude and at 100KHz
60		110.9	111.3	106.5	81.5		
80		110.9	111.2	106.5	81.7		
100 **(P)**		110.9	111.9	106.5	83.2		
150	Pass	110.9	111.7	106.5	83.7		No Susceptibility Noted
200 **(P)**	Pass	110.9	112.6	106.5	84.3		
300	Pass	110.9	111.5	106.5	84.5		
400	Pass	110.9	111.5	106.5	84.5		
500 **(P)**	Pass	110.9	111.4	106.5	84.6		
600	Pass	110.9	111.3	106.5	84.6		
800	Pass	110.9	111.7	106.5	84.6		
1 MHz **(P)**	Pass	110.9	111.8	106.5	84.6		
1.5	Pass	110.9	110.9	106.5	84.7		
2 **(P)**	Pass	110.9	112.4	106.5	84.6		
3	Pass	110.9	111.4	106.5	84.3		
4	Pass	110.9	111.7	106.5	83.9		
5 **(P)**	Pass	110.9	112.0	106.5	83.9		
6	Pass	110.9	112.4	106.5	83.6		
8	Pass	110.9	111.5	106.5	81.9		
10 **(P)**	Pass	110.9	112.1	106.5	81.8		

Tech Notes: 1. **(P)** = 2 minute pause

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV

2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA

3. Current levels recorded in dBuA –rms (26 dB probe factor included)

EUT: IDPU   S/N: FM1 ______   Date : 27 October 2004

Stereo Engr: Dave Curtis   Test Point: IDPU J1 Pins 2-3 (+28), 10-11(Rtn)   Test Engr: Bryan Cowdell

Table 9-2. CS02 Test Data Record for IDPU 28 VDC Input Power Leads (10 MHz – 400 MHz)

Test Frequenc (MHz)y	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuV rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
10	Pass	110.9	112.2	127	98.0	Voltage	No Susceptibility Noted
15	Pass	110.9	111.7	128	92.0		
20 **(P)**	Pass	110.9	111.6	128.7	90.2		
30	Pass	110.9	111.6	129.4	83.2		
40	Pass	110.9	111.7	129.9	82.7		
50 **(P)**	Pass	110.9	111.5	130.2	84.1		
60	Pass	110.9	111.3	130.3	75.8		
80	Pass	110.9	117.2	130.6	72.4		
100 **(P)**	Pass	110.9	111.3	130.7	67.9		
150	Pass	110.9	111.3	130.7	72.9		
200 **(P)**	Pass	110.9	111.5	130.8	78.2		
250	Pass	110.9	113.0	130.6	90.0		
300	Pass	110.9	112.3	130.7	78.4		
350	Pass	110.9	111.8	130.8	69.2		
400 **(P)**	Pass	110.9	111.8	130.6	80.9		

Tech Notes: 1. (P) = 2 minute pause

EUT: IDPU Input Power Leads S/N: FM1 ______ Date : 27 October 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Spectrum Analyzer Current Limit = 106.5 + Current Probe Factor

Table 9-3. Customer CS02 Susceptibility Notes on IDPU 28 VDC Primary Input Power Leads (49 kHz

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
49kHz	11:57:50 AM	18:57:50	STE-U counting up to 3KHz.
50KHz	11:59:10 AM	18:59:10	Half Amplitude. STE rates return to background, except det0 = 20c/s
100kHz	12:02:20 PM	19:02:10	STE-U back to background
200kHz	12:05:20 PM	19:05:20	
500kHz	12:08:10 PM	19:08:10	
1MHz	12:11:05 PM	19:11:00	
2MHz	12:13:30 PM	19:13:30	
5MHz	12:15:50 PM	19:15:50	
10MHz	12:18:40 PM	19:18:40	
20MHz	12:23:40 PM	19:23:40	
50MHz	12:28:10 PM	19:28:10	
100MHz	12:31:20 PM	19:31:20	
200MHz	12:35:05 PM	19:35:05	
400MHz	12:40:50 PM	19:40:50	Swap amplifiers between 200 & 400MHz; some glitches during switch.
Off	12:42:00 PM	19:42:00	

EUT: IDPU S/N: FM1 ______ Date : 27 October 2004
Stereo Engr: Dave Curtis Test Point: IDPU J1 Pins 2-3 (+28), 10-11(Rtn) Test Engr: Bryan Cowdell

Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Table 9-4. CS02 Test Data Record for MAG Heater 28 VDC Input Power Leads (49 kHz – 10 MHz)

Test Frequency	Pass/Fail	Voltage Level (dBuV rms)		Current Level dBuV rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
49 kHz **(P)**	Pass	110.9	111.4	106.5	84.8	Voltage	No Susceptibility Noted
60	Pass	110.9	113.8	106.5	83.7		
80	Pass	110.9	111.5	106.5	81.9		
100 **(P)**	Pass	110.9	111.3	106.5	81.7		
150	Pass	110.9	111.8	106.5	82.9		
200 **(P)**	Pass	110.9	111.2	106.5	82.9		
300	Pass	110.9	111.1	106.5	84.2		
400	Pass	110.9	110.9	106.5	84.3		
500 **(P)**	Pass	110.9	111.5	106.5	84.5		
600	Pass	110.9	112.0	106.5	84.4		
800	Pass	110.9	111.9	106.5	83.9		
1 MHz **(P)**	Pass	110.9	111.5	106.5	83.3		
1.5	Pass	110.9	113.4	106.5	83.0		
2 **(P)**	Pass	110.9	111.9	106.5	82.5		
3	Pass	110.9	112.5	106.5	81.1		
4	Pass	110.9	112.0	106.5	82.4		
5 **(P)**	Pass	110.9	111.7	106.5	80.8		
6	Pass	110.9	112.6	106.5	80.7		
8	Pass	110.9	115.3	106.5	80.8		
10 **(P)**	Pass	110.9	117.5	106.5	81.0		

Tech Notes: 1. (P) = 2 minute pause

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Current levels recorded in dBuA –rms (26 dB probe factor included)

EUT: MAG Heater — S/N: FM1 ______ — Date : 26 October 2004
Stereo Engr: Dave Curtis — Test Point: IDPU J1 Pins 5-6 (+28), 13-14(Rtn) — Test Engr: Bryan Cowdell

Table 9-5. CS02 Test Data Record for MAG Heater 28 VDC Input Power Leads (10 MHz – 400 MHz)

Test Frequenc (MHz)y	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuV rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
10	Pass	110.9	113.1	127	98.5	Voltage	No Susceptibility Noted
15	Pass	110.9	111.3	128	92.0		
20 **(P)**	Pass	110.9	112.9	128.7	92.6		
30	Pass	110.9	114.1	129.4	85.7		
40	Pass	110.9	113.9	129.9	83.2		
50 **(P)**	Pass	110.9	114.0	130.2	85.0		
60	Pass	110.9	112.0	130.3	74.1		
80	Pass	110.9	112.4	130.6	66.8		
100 **(P)**	Pass	110.9	111.3	130.7	56.8		
150	Pass	110.9	111.7	130.7	68.9		
200 **(P)**	Pass	110.9	111.8	130.8	79.6		
250	Pass	110.9	112.1	130.6	89.6		
260	See Note	110.9	112.1	130.6	89.6		Supply impedance drops significantly. STE-U rates rise ~600c/s
300	Pass	110.9	111.7	130.7	70.9		No Susceptibility Noted
350	Pass	110.9	111.7	130.8	75.2		
400 **(P)**	Pass	110.9	112.7	130.6	75.9		

Tech Notes: 1. (P) = 2 minute pause

EUT: IDPU Input Power Leads   S/N: FM1 ______   Date : 27 October 2004
Stereo Engr: Dave Curtis   Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn)   Test Engr: Bryan Cowdell

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Spectrum Analyzer Current Limit = 106.5 + Current Probe Factor

Table 9-6. Customer CS02 Susceptibility Notes on MAG Heater 28 VDC Input Power Leads (49 kHz – 400 MHz)

Frequency	*GSE PDT Pause Start Time*	*SOH packet UTC Start Time*	*Notes*
49KHz	2:53:40 PM	21:53:40	
100kHz	2:56:20 PM	21:56:20	
200kHz	2:58:20 PM	21:58:20	
500kHz	3:01:00 PM	22:00:58	
1MHz	3:03:30 PM	22:03:30	
2MHz	3:07:00 PM	22:07:00	
5MHz	3:09:10 PM	22:09:10	
10MHz	3:13:20 AM	22:13:20	
20MHz	3:17:10 PM	22:17:10	
50MHz	3:20:10 PM	22:20:20	
100MHz	3:23:30 PM	22:23:30	
200MHz	3:28:00 PM	22:28:00	
400MHz	3:33:00 PM	22:33:00	Change amplifiers after 200MHz. One spike in STE-U between 200 and 400MHz
260MHz	3:37:30 PM		Current rises (impedance drops). STE det 2,3 rates rise to ~600c/s
Off	3:39:00 AM	22:39:00	

EUT: IDPU Input Power Leads S/N: FM1 ______ Date : 27 October 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Table 9-7. CS02 Test Data Record for SEP 28 VDC Input Power Leads (10 kHz – 10 MHz)

Test Frequency	Pass/Fail	Voltage Level (dBuV rms)		Current Level (mA rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
49 kHz **(P)**	Pass	110.9	111.0	106.5	83.0	Voltage	No Susceptibility Noted
60	Pass	110.9	112.5	106.5	83.4		
80	Pass	110.9	111.6	106.5	82.9		LET L1 peak counts to ~3000 c/s. Significant. Back to background by 200KHz
100 **(P)**	Pass	110.9	111.2	106.5	82.9		
150	Pass	110.9	111.4	106.5	78.6		
200 **(P)**	Pass	110.9	111.2	106.5	79.4		
300	Pass	110.9	111.3	106.5	78.9		No Susceptibility Noted
400	Pass	110.9	111.4	106.5	78.7		
500 **(P)**	Pass	110.9	111.2	106.5	79.1		
600	Pass	110.9	111.7	106.5	80.3		
800	Pass	110.9	111.6	106.5	79.9		
1 MHz **(P)**	Pass	110.9	111.1	106.5	84.8		
1.5	Pass	110.9	112.4	106.5	79.7		
2 **(P)**	Pass	110.9	111.9	106.5	78.4		
3	Pass	110.9	111.6	106.5	78.9		
4	Pass	110.9	111.7	106.5	78.3		
5 **(P)**	Pass	110.9	111.2	106.5	79.7		
6	Pass	110.9	111.6	106.5	83.1		
8	Pass	110.9	111.6	106.5	83.7		
10 **(P)**	Pass	110.9	110.9	106.5	82.8		

Tech Notes: 1. (P) = 2 minute pause
2. CS02 voltage limit is 1 Volt pk-pk = 353 mV rms = 20log(353) + 60 = 110.9 dBuV
3. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
4. Current levels recorded in dBuA –rms (26 dB probe factor included)

EUT: SEP and SEP Heater S/N: FM1 ______ Date : 26 Oct 2004
Stereo Engr: Dave Curtis Test Points: SEP IDPU J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: SEP Heater IDPU J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bob Cowdell

Table 9-8. CS02 Test Data Record for SEP 28 VDC Input Power Leads (10 MHz – 400 MHz)

Test Frequency	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuV rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
10	Pass	110.9	110.9	127	109	Voltage	No Susceptibility Noted
15	Pass	110.9	111.8	128	102		
20 **(P)**	Pass	110.9	111.9	128.7	100.4		
30	Pass	110.9	112.2	129.4	102.1		
40	Pass	110.9	111.6	129.9	100.2		
50 **(P)**	Pass	110.9	110.9	130.2	105		
60	Pass	110.9	111.1	130.3	98.5		
80	Pass	110.9	112.6	130.6	85.6		
100 **(P)**	Pass	110.9	111.7	130.7	80.7		
150	Pass	110.9	112.0	130.7	81.5		
200 **(P)**	Pass	110.9	111.5	130.8	92.4		
250	Pass	110.9	112.9	130.6	91.4		
300	Pass	110.9	111.1	130.7	85.4		
350	Pass	110.9	112.3	130.8	81		
400 (P)	Pass	110.9	112.2	130.6	80.7		

Tech Notes: 1. (P) = 2 minute pause

EUT: SEP Input Power Leads S/N: FM1 ______ Date : 26 October 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Spectrum Analyzer Current Limit = 106.5 + Current Probe Factor

Table 9-9. Customer CS02 Susceptibility Notes on SEP 28 VDC Input Power Leads (49 kHz – 400 MHz)

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
49kHz	1:37:40 PM	20:37:50	LET L1 rates up to ~300c/s
100kHz	1:43:40 PM	20:43:50	LET L1 rates peak at ~80KHz, 3000c/s, significant. L2 also counting
200kHz	1:48:20 PM	20:48:20	LET L1 rates back to background
500kHz	1:54:10 PM	20:54:10	
1MHz	2:00:30 PM	21:00:30	
2MHz	2:05:00 PM	21:05:00	
5MHz	2:09:20 PM	21:09:20	
10MHz	2:15:50 PM	21:15:50	
20MHz	2:20:20 PM	21:20:20	
50MHz	2:27:10 PM	21:27:10	
100MHz	2:33:40 PM	21:33:40	
200MHz	2:42:10 PM	21:42:15	LN2 tank replace (see it in MAG). New amplifier at 2:46
400MHz	2:56:40 PM	21:56:40	
Off	2:59:00 AM		
Retest:			
80kHz	3:01:20 PM	22:01:20	Full amplitude. LET L1 ~3000cs, L2 ~100c/s
80kHz	3:05:10 PM	22:05:10	Half Amplitude (-6dB). LET L1 ~20c/s, L2 ~3c/s max, not significant
80kHz	3:07:40 PM	22:07:40	1/4 Amplitude. Few c/s max, not significant

EUT: SEP Input Power Leads S/N: FM1 ______ Date : 26 October 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Table 9-10. CS02 Test Data Record for SWEA/STE-D and Heater (BOOM) 28 VDC Input Power Leads (49 kHz – 10 MHz)

Test Frequency	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuA rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
49 kHz **(P)**	Pass	110.9	111.6	106.5	90.5	Voltage	No Susceptibility Noted
60	Pass	110.9	111.6	106.5	86.		
80	Pass	110.9	111.9	106.5	84.9		
100 **(P)**	Pass	110.9	111.6	106.5	78.8		STE-D modest noise (<10c/s)
150	Pass	110.9	113.0	106.5	86.8		No Susceptibility Noted
200 **(P)**	Pass	110.9	111.9	106.5	91.7		
300	Pass	110.9	111.7	106.5	85.8		
400	Pass	110.9	111.5	106.5	81.9		
500 **(P)**	Pass	110.9	111.6	106.5	78.9		
600	Pass	110.9	112.2	106.5	76.9		
800	Pass	110.9	112.0	106.5	73.9		
1 MHz **(P)**	Pass	110.9	111.4	106.5	70.0		
1.5	Pass	110.9	111.5	106.5	68.8		
2 **(P)**	Pass	110.9	111.4	106.5	62.9		
3	Pass	110.9	111.8	106.5	78.9		
4	Pass	110.9	111.6	106.5	54.2		
5 **(P)**	Pass	110.9	111.3	106.5	79.1		
6	Pass	110.9	111.6	106.5	77.1		
8	Pass	110.9	112.4	106.5	61.9		
10 **(P)**	Pass	110.9	112.1	106.5	76.3		

Tech Notes: 1. (P) = 2 minute pause

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Current levels recorded in dBuA –rms (26 dB probe factor included)

EUT: SWEA/STE-D and Heater S/N: FM1 ______ Date : 28 Oct 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Table 9-11. CS02 Test Data Record for SWEA/STE-D and Heater (BOOM) 28 VDC Input Power Leads (10 MHz – 400 MHz)

Test Frequenc (MHz)y	Pass/Fail	Voltage Level (dBuV rms)		Current Level (dBuV rms)		Applicable Limit	Susceptibility
		Voltage Limit	Test Level	Alternate Limit	Test Level		
10	Pass	110.9	111.9	127	90.0	Voltage	No Susceptibility Noted
15	Pass	110.9	111.7	128	96.6		
20 **(P)**	Pass	110.9	111.3	128.7	91.6		
30	Pass	110.9	113.5	129.4	93.2		
40	Pass	110.9	111.5	129.9	77.2		
50 **(P)**	Pass	110.9	111.9	130.2	78.9		
60	Pass	110.9	111.3	130.3	76.8		
80	Pass	110.9	112.6	130.6	78.4		
100 **(P)**	Pass	110.9	111.8	130.7	71.8		
150	Pass	110.9	113.5	130.7	79.2		
200 **(P)**	Pass	110.9	111.8	130.8	93.8		
250	Pass	110.9	112.9	130.6	94.4		
300	Pass	110.9	112.2	130.7	80.8		
350	Pass	110.9	111.3	130.8	82.0		
400 **(P)**	Pass	110.9	111.8	130.6	80.8		

Tech Notes: 1. (P) = 2 minute pause

EUT: SWEA/STE-D and Heater S/N: FM1 ______ Date : 28 Oct 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Note 1. CS02 limit is 1 Volt pk-pk = 353 mV rms = 20 log(353) + 60 = 110.9 dBuV
2. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
3. Spectrum Analyzer Alternate Current Limit = 106.5 + Current Probe Factor

Table 9-12. Customer CS02 Susceptibility Notes SWEA/STE-D and Heater (BOOM) 28 VDC Input Power Leads (49 kHz – 400 MHz)

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
49kHz	9:17:50 AM	16:17:50	Some STE-D rates increase, <7c/s det 3, lowest energy bin
100kHz	9:25:00 AM	16:25:00	Some STE-D rates increase, <10c/s det 3, lowest energy bin
200kHz	9:30:50 AM	16:30:50	Some STE-D rates increase, <5c/s det 3, lowest energy bin
500kHz	9:35:20 AM	16:35:20	STE-D to background levels
1MHz	9:40:10 AM	16:40:10	
2MHz	9:42:50 AM	16:42:50	
5MHz	9:48:29 AM	16:48:20	
10MHz	9:54:05 AM	16:54:10	After pause, turn off to change monitor. Back on at 9:57:00
20MHz	10:03:10 AM	17:03:10	
50MHz	10:08:10 AM	17:08:10	
100MHz	10:12:50 AM	17:12:50	
200MHz	10:19:00 AM	17:19:00	After pause, turn off to change amplifiers.
400MHz	10:34:15 AM	17:34:20	
Off	10:35:30 AM		

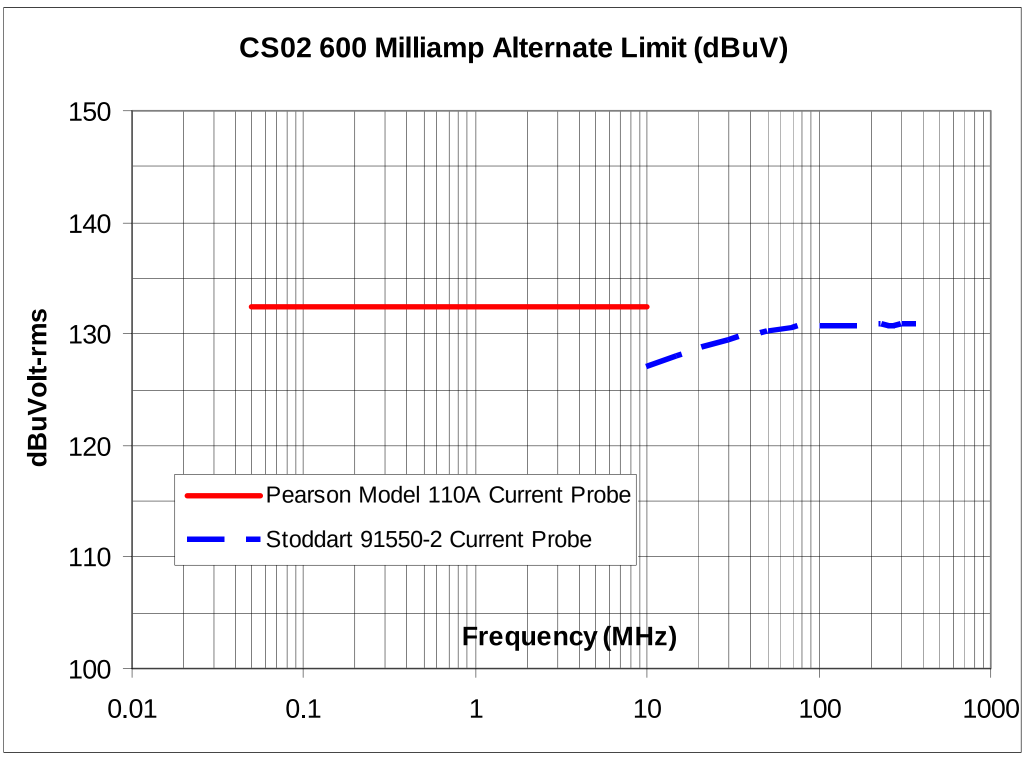
EUT: SWEA/STE-D and Heater S/N: FM1 Date : 28 Oct 2004
Stereo Engr: Dave Curtis Test Points: SWEA/STE-D - Boom J1 Pins 2,3 (+28), 10-11(Rtn)
Test Points: Heater - Boom J1 Pins 5-6 (+28), 13-14(Rtn) Test Engr: Bryan Cowdell

Instrument in Quiet Mode
One minute pauses, followed by ramp-up to the next step

Figure 9-10. Stereo Impact CS02 Current Alternate Limits for the Spectrum Analyzer

Frequency (MHz)	Current Probe Factor (dB)	Spectrum Analyzer Limit (dBuV-rms)	Frequency (MHz)	Current Probe Factor (dB)	Spectrum Analyzer Limit (dBuV-rms)
49 kHz – 10 MHz	26	132.5	150	24.2	130.7
10	20.5	127	175	24.2	130.7
15	21.5	128	200	24.3	130.8
20	22.2	128.7	225	24.3	130.8
30	22.9	129.4	250	24.1	130.6
40	23.4	129.9	275	24.2	130.7
50	23.7	130.2	300	24.3	130.8
60	23.8	130.3	325	24.3	130.8
70	24.0	130.5	350	24.3	130.8
80	24.1	130.6	375	24.3	130.8
100	24.2	130.7	400	24.1	130.6
125	24.2	130.7			

1. Maximum Current Alternate Limit = 600 milliamps-peak to peak = 212.2 milliamps rms = 106.5 dBuA
2. Spectrum Analyzer Alternate Limit = 106.5 + Current Probe Factor
3. Current Probes terminated into the spectrum analyzer @ 50-Ohms



Cal Date:9-23-2004 Next Cal Due: 9-23—06

Probe Type: Pearson Model 110A **S/N: 03057**

Frequency	Probe Factor (dB)	
	50 Ohms	Hi Z
1 Hz – 6 MHz	26	20
7	25.7	19.7
8	25.5	19.5
10	25.3	19.3
15	24.5	18.5
20	23.5	17.5
30	20	14.0

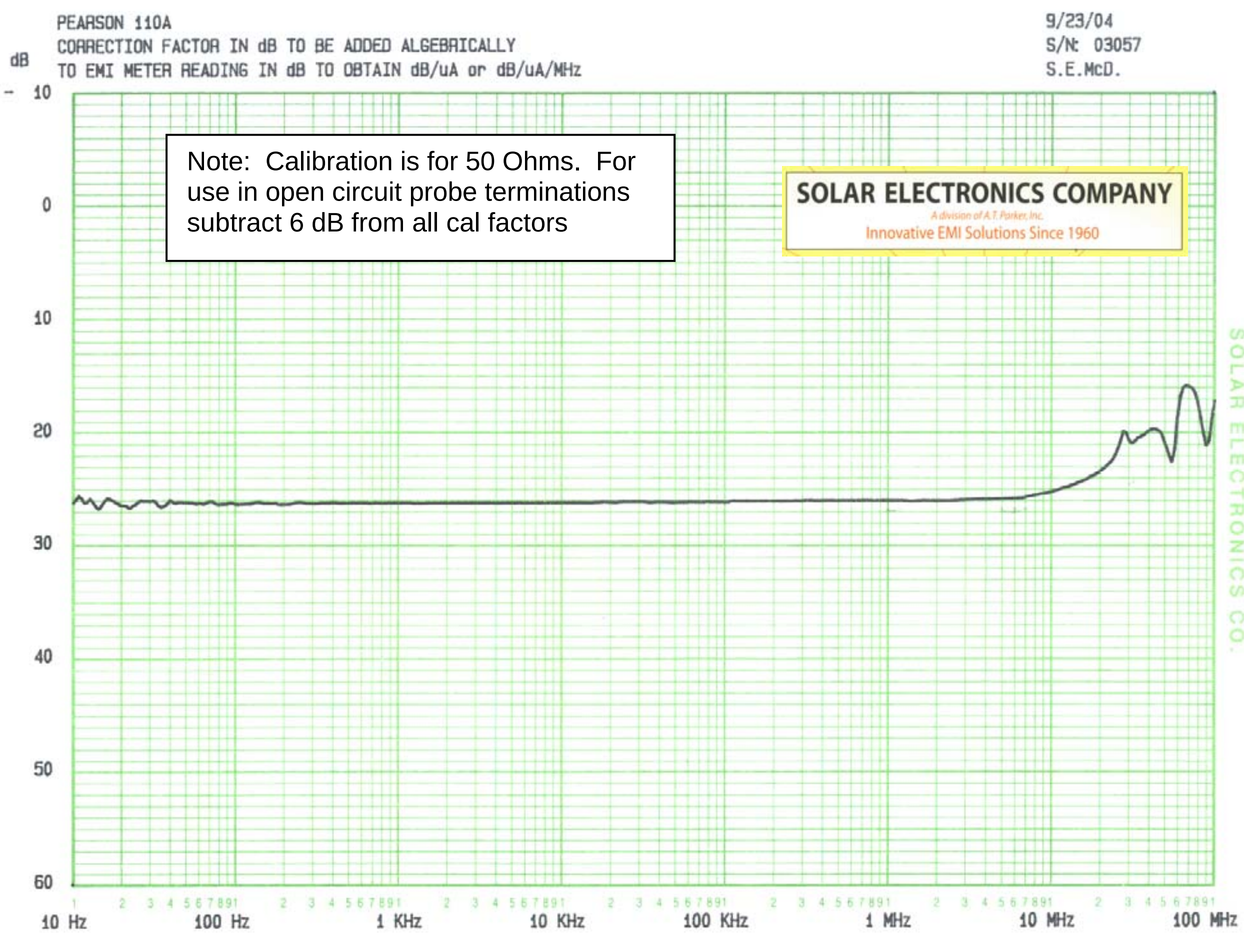


Figure 9-11. Pearson Model 110ACurent Probe Calibration Information

Table 9-13. High Frequency Current Probe Calibration Information

Calibration Data
Loral ELECTRO-OPTICAL SYSTEMS

Frequency	Current Probe Factor (dB >1 Ohm)	Frequency	Current Probe Factor (dB> 1 Ohm)
500 kHz	3.4	60 MHz	23.8
600	4.8	70	24.0
800	7.0	80	24.1
1 MHz	8.7	100	24.2
1.5	11.8	125	24.2
2	13.5	150	24.2
3	16.0	175	24.2
4	17.4	200	24.3
5	18.2	225	24.3
6	18.9	250	24.1
7	19.4	275	24.2
8	19.7	300	24.3
10	20.5	325	24.3
15	21.5	350	24.3
20	22.2	375	24.3
30	22.9	400	24.1
40	23.4	450	20.0
50	23.7	500	7.0
Probe Type: Stoddart 91550-2	S/N: 785-12	Test No. 01122	Cal Due: 26 March 2005

Table 9-14. CS02 Test Equipment Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Spectrum Analyzer	HP 8566B	2403A06385	13 Feb 2005
Signal Generator	HP606B	608-00731	25 April 2004
Signal Generator	HP 8640B	2137A16143	25 Mar 2004
10 ufd Capacitor	Solar 6512-106R	03416	05 Mar 2006
RF Choke	Solar 6220-4A	003A	NCR
RF Coupler	Solar 7415-3	906097/6	27 Nov 2004
Scope	Tektronix TDS 3052A	3052-65-7889	25 Jan 2005
Current Probe (10 kHz – 10 MHz)	Pearson 110A	2123	27 Dec 2005
Current Probe (10 MHz – 400 MHz)	Stoddart 91550-2	785-12	26 March 2005
EUT: STEREO IMPACT	S/N: FM1 ______	Date : 29 October 2004	
Stereo Engr: Dave Curtis		Test Engr: Bryan Cowdell	

10 CS06: CONDUCTED SUSCEPTIBILITY, SPIKES ON POWER LEADS

10.1 TEST RESULTS (+28 VDC TO RETURN)

1. IDPU +28 VDC Input Power Leads.. Responses Noted
2. MAG Heater +28 VDC Input Power Leads .... Responses Noted
3. SEP +28 VDC Input Power Leads .... Responses Noted
4. SWEA/STE-D +28 VDC Input Power Leads....................................... Responses Noted

10.2 TEST RESULTS (RETURN TO CHASSIS GROUND)

5. IDPU +28 VDC Input Power Leads.. Responses Noted
6. MAG Heater +28 VDC Input Power Leads .... Responses Noted
7. SEP +28 VDC Input Power Leads .... Responses Noted
8. SWEA/STE-D +28 VDC Input Power Leads....................................... Responses Noted

10.3 TEST DATA

- +28 VDC to Return.. Table 10-1, Table 10-2
- Return to Chassis Ground .... Table 10-3, Table 10-4
- Customer CS06 Notes .... Table 10-2, Table 10-4

10.4 TEST CONFIGURATION

- Test Configuration Schematic Diagram ....Figure 10-1
- Test Configuration Photographs .... , Figure 10-2, Figure 10-3
- EUT Monitoring for Susceptibility...Figure 10-4

10.5 TEST REQUIREMENTS

Instruction for testing and required test levels are included herein in Figure 10-5 and Figure 10-6. The Stereo-Impact Suite was subjected to the following transient test signals:

- 20 Volt-peak transients at a rate of 2.5 pps, applied between the +28 VDC lead and the Return lead.
- 10 Volt-peak transients at a rate of 2.5 pps applied between the 28 VDC Return lead and chassis.
- Pulse waveshapes are defined in Figure 10-8
- Both positive and negative transients were applied for at least two minutes.
- Waveforms #1 and #2 from Figure 10-8 were used (i.e. pulse widths = 10 usec and 0.150 usec).

10.6 TEST DATA

- Printouts of Transients Applied t the EUT...Figure 10-6, Figure 10-7
- Tabulated Test Data.. Table 10-1, Table 10-3
- Test Equipment Calibration Record ....Table 10-5

10.7 STANDARDS OF RECORD:

- EMI Test Method.......... 1. STEREO IMPACT EMI Test Procedure (IMPACT_A, Version A, 20041.
  ....2. STEREO EMC Control Plan and EMI Requirements Specification,
  ....Dwg. No. 7381-9030, Rev C

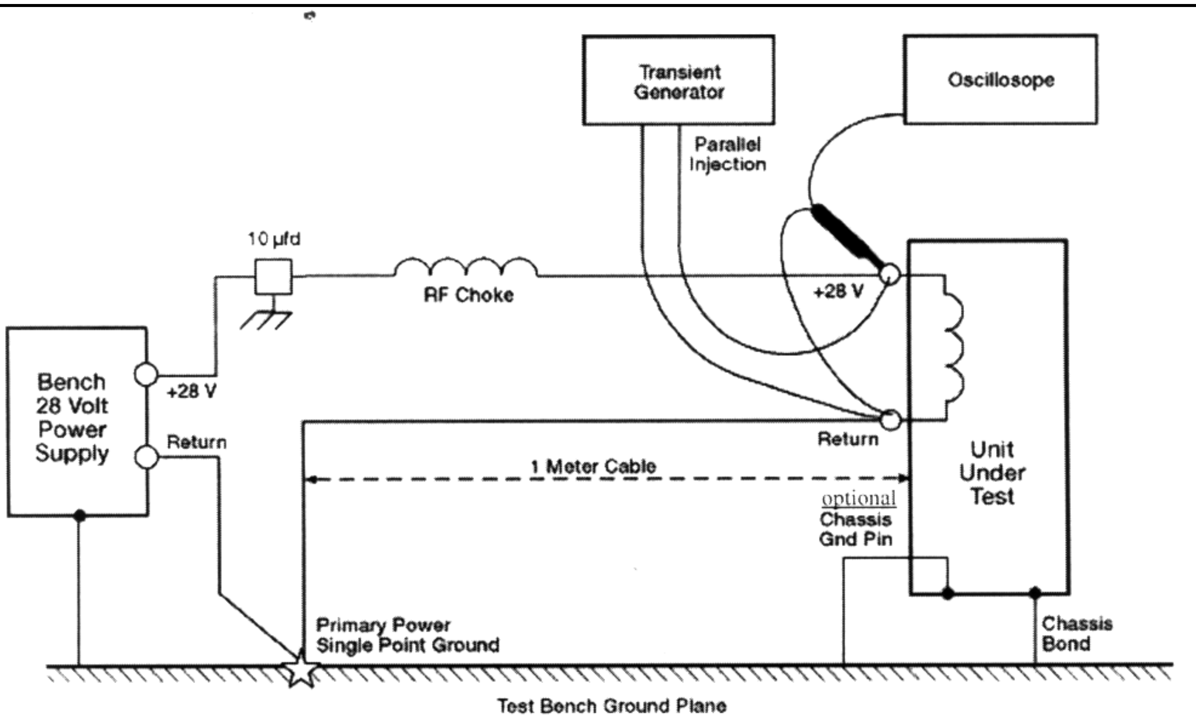


Fig. 5.9. CS-06 test configuration.

Figure 10-1. Instrumentation Setup for CS06 Spike Susceptibility Testing on Input Power Leads

Figure 10-2. General Configuration for CS06 Testing

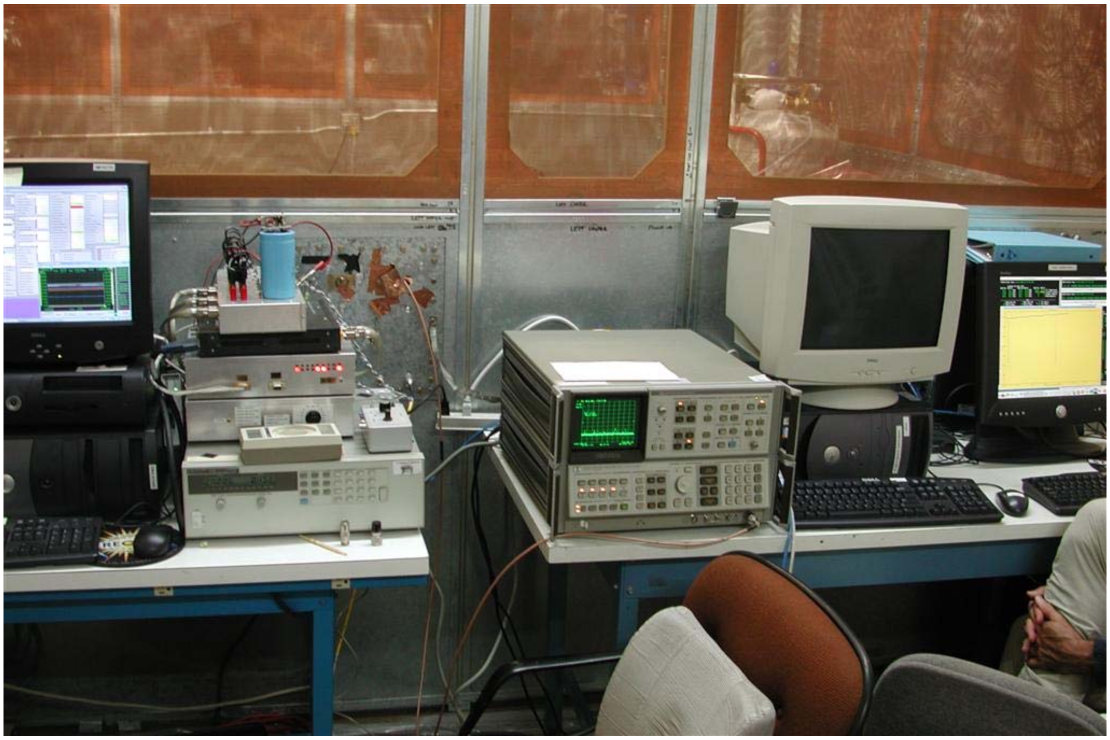


Figure 10-3. Susceptibility Monitoring the Stereo Impact During CS06 Testing

Figure 10-4. Close-up of the CS06 Connection to Stereo Impact Input Power Leads

4.7. CS-06 Conducted Susceptibility, Spikes

This test requirement is to demonstrate that the performance of each Subsystem is not adversely degraded by the presence of transient spikes on the primary input power lines. Applicable test parameters are as follows:

A) Peak transient voltage, relative to nominal line voltage, for MIL-STD-461B spike #1 (slow) and spike #2 (fast) shall be 20 volts differential, 10 volts return-to-chassis, or for each case the maximum obtainable from a Solar Electronics Co. Model 8282-1 Transient Pulse Generator, whichever is less.
B) Both positive and negative spikes are to be applied.
C) These spikes are to be applied a) differentially to the primary power input lines and b) between primary power input return and chassis.
D) Spikes shall be applied at a variable rate from 1 to 5 spikes per second for a duration of at least 2 minutes while monitoring the Subsystem for susceptibility per the criteria used for CS-01 and CS-02.

Figure 10-5. Required CS06 Test Levels from the Stereo-Impact EMI Control Plan

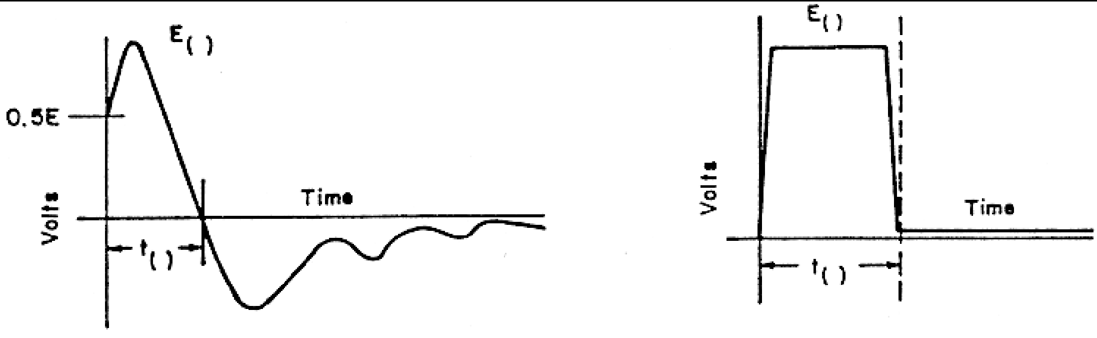
5.9 CS-06 Spike Susceptibility Test Configuration

Transient voltage spikes are applied to the primary power input terminals in accordance with the test configuration shown in Figure 5.9.

Notes:
A) Heater circuits are NOT to be included in this test.
B) Criteria for susceptibility shall be in accordance with the previously approved Tes Procedure.
C) Sufficient spike application time (at least two minutes) shall be provided for the UUT cognizant Lead Engineer to assess and record UUT performance.
D) If susceptibility is encountered, threshold levels are to be determined and recorded.
E) Both spike polarities are to be applied.
F) Spike repetition rate is to be varied from 0.5 to 5 spikes per second for a test duration of at least 2 minutes.
G) A Solar Electronics Co. Model 8282-1 Transient Pulse Generator (or suitable alternative) is to be used.

Fig. 5.9. CS-06 test configuration.

Figure 10-6. CS06 Test Configuration Instructions from the Stereo-Impact EMI Control Plan



NOTE: The test sample shall be subjected to the spike(s) with the waveform shown and with the specified voltage(s) and pulsewidth(s).

FIGURE 2-6. ACCEPTABLE WAVESHAPES FOR CS06 AND RS02

11. CS06

11.1 CS06 applicability. This requirement is applicable to equipment and subsystem AC and DC power leads, including grounds and neutrals which are not grounded internally to the equipment or subsystem.

11.2 CS06 limits. The test sample shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in the individual equipment or subsystem specification, when the test spikes having the waveform shown on figure 2-6 are applied to the AC and DC power input leads for a period of not less than 1 minute at each phase position, and for a total test period not exceeding 15 minutes in duration (in lieu of the values in MIL-STD-462). The values of $E_{( )}$ and $t_{( )}$ are given below. Each spike shall be superimposed on the powerline voltage waveform.

a. Spike #1 (All Services) E_1 = 200 Volts; t_1 = 10 microseconds 20%

b. Spike #2 (Air Force and Navy) E_2 = 200 Volts; t_2 = 0.15 microseconds 20%

Figure 10-7. Transient Spike Requirements from MIL-STD-461B

Table 10-1. CS06 Differential Mode (Plus to Return) Test Data Record

Test Point	Pass/ Fail	Test Pulse Characteristics					Monitoring for EUT Susceptibility
		Pulse Polarity	Pulse Rate	Test Time	Test Level (Volts-pk)	Pulse Width	
IDPU +28 VDC	Responses	Positive	2.5 pps	5 minutes	+20.6	10 usec	See Table 10-2
	Responses	Negative		5 minutes	-20.4	10 usec	See Table 10-2
	Pass	Positive	2.5 pps	5 minutes	+20.3	150 ns	
	Pass	Negative		5 minutes	-20.5	150 ns	
MAG Heater +28 VDC	Responses	Positive	2.5 pps	2.25 minutes	+20.4	10 usec	See Table 10-2
	Responses	Negative		2.25 minutes	-20.6	10 usec	See Table 10-2
	Pass	Positive	2.5 pps	2.25 minutes	+20.6	150 ns	
	Pass	Negative		2.25 minutes	-22.3	150 ns	
SEP +28 VDC	Responses	Positive	2.5 pps	4 minutes	+22.4	10 usec	See Table 10-2
	Responses	Negative		4 minutes	-22.8	10 usec	See Table 10-2
	Pass	Positive	2.5 pps	4 minutes	+22.2	150 ns	
	Pass	Negative		4 minutes	-22.2	150 ns	
SWEA/STE-D +28 VDC (BOOM)	Responses	Positive	2.5 pps	2.25 minutes	+20.4	10 usec	See Table 10-2
	Responses	Negative		2.25 minutes	-20.4	10 usec	See Table 10-2
	Pass	Positive	2.5 pps	2.25 minutes	+20.2	150 ns	
	Pass	Negative		2.25 minutes	-20.2	150 ns	

EUT: STEREO-IMPACT S/N: FM1 Test PointS: +28 VDC to Return Test Time Limit: > 2 minutes Limit Level: +/- 20 V
Pulse Rep Rate Limit: 2.5 pps Date: 27 October 2004 Transient Pulse Width: 10us & 150ns

Table 10-2. Customer CS06 Differential Mode (Plus to Return) Test Notes

Test Point	Test Pulses	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
IDPU+28V to Ret,	+20V, 10us	1:21:50 PM	20:21:50	1553 YF errors, type 40H, @~0.5-1Hz. Also some command sync errors, message errors. Telemetry continues to flow mostly, some packet errors. Continue to ~13:28
	-20V, 10us	1:29:40 PM	20:29:40	STE-U extra counts at ~15c/s. Spectra around bin 7-10 of 256. Also a few 1553 errors, packet checksum errors. Continue to 1:35:30
	+20V, 150ns	1:36:10 PM	20:36:10	Nothing. Continue to 1:40:10
	-20V, 150ns	1:40:30 PM	20:40:40	Nothing. Continue to 1:42:50
Mag Htr +28V to Ret	+20V, 10us	2:03:50 PM	21:03:40	MAG RMS up from 10 to 12. Seems to be test configuration - stays up when amplitude =0. STE-U rates rise a few Hz. Off at 2:07
	-20V, 10us	2:07:40 PM	21:07:40	STE-U rates rise a few Hz. Spectra @ bin 2-3/256. Off at 2:10
	+20V,150ns	2:11:10 PM	21:11:10	No effect. Off at 2:13:30
	-20V, 150ns	2:13:50 PM	21:13:50	No effect. Off at 2:16:00
SEP +28V to Ret	+20V, , 10us	3:56:40 PM	22:56:40	Run till 4:01. See ~1-2c/s in LET L1, L2, L3, HET logain; SIT/SEPT see nothing
	-20V, 10us	4:04:30 PM	23:04:30	Run till 4:09. See ~1-2c/s in LET L1, L2, L3; L3 counts somewhat less than above
	+20V, 50ns	4:11:00 PM	23:11:00	see nothing
	-20V, 150ns	4:16:20 PM	23:16:20	Run till 4:21. See nothing
+28V to Ret	+20V,10us	5:26:50 PM	0:26:50	STE-U, STE-D rates rise ~10c/s, counts to bin ~10/256. Run to 5:29
	-20V, 10us	5:29:40 PM	0:29:40	STE-U, STE-D rates rise ~10c/s, counts to bin ~10/256. Few counts in SWEA, anode 9?. Run to 5:31:40
	+20V,150ns	5:32:00 PM	0:32:00	Nothing
	-20V, 150ns	5:35:00 PM	0:35:00	Nothing. Done at 5:37

EUT: STEREO-IMPACT S/N: FM1 Test Points: +28 VDC to Return Test Time Limit: > 2 minutes Limit Level: +/- 20 V
Pulse Rep Rate Limit: 2.55 pps Date: 27 October 2004 Transient Pulse Width: 10us & 150ns

Table 10-3. CS06 Return to Chassis Test Data Record

Test Point	Pass/ Fail	Test Pulse Characteristics					Monitoring for EUT Susceptibility
		Pulse Polarity	Pulse Rate	Test Time	Test Level (Volts-pk)	Pulse Width	
IDPU 28 VDC Return to Chassis	Responses	Positive	2.5 pps	2.5 min	+ 10.6	10 usec	See Table 10-4
	Responses	Negative		2.5 min	- 10.3	10 usec	See Table 10-4
	Response	Positive	2.5 pps	2.5 min	+ 10.6	150 ns	
	Pass	Negative		2.5 min	- 11.4	150 ns	
MAG Heater 28 VDC Return to Chassis	Responses	Positive	2.5 pps	2.5 min	+ 10.4	10 usec	See Table 10-4
	Responses	Negative		2.5min	- 10.5	10 usec	See Table 10-4
	Pass	Positive	2.5 pps	2.5 min	+ 12.6	150 ns	
	Pass	Negative		2.5 min	- 11.3	150 ns	
SEP 28 VDC Return to Chassis	Responses	Positive	2.5 pps	5 min	+ 10.8	10 usec	See Table 10-4
	Responses	Negative		5 min	- 10.1	10 usec	See Table 10-4
	Pass	Positive	2.5 pps	5 min	+ 11.8	150 ns	
	Pass	Negative		5 min	- 10.4	150 ns	
SWEA/STE-D 28 VDC Return to Chassis	Responses	Positive	2.5 pps	2.25 min	+ 10.5	10 usec	See Table 10-4
	Responses	Negative		2.25 min	- 10.3	10 usec	See Table 10-4
	Pass	Positive	2.5 pps	2.25 min	+ 11.2	150 ns	
	Pass	Negative		2.25 min	- 11.6	150 ns	

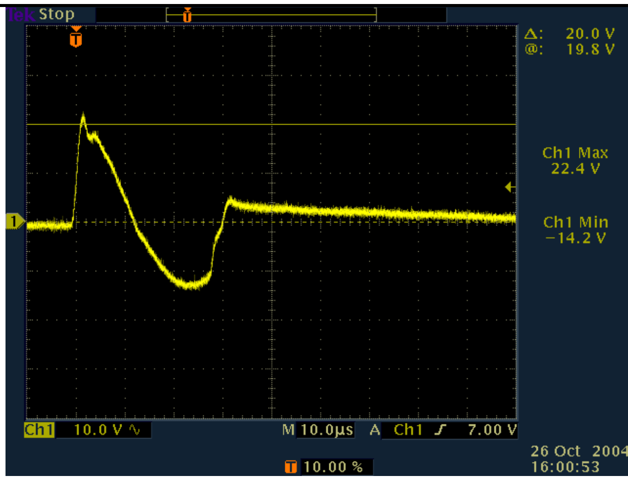
EUT: STEREO-IMPACT S/N: FM1 Test Points: +28 VDC to Return Test Time Limit: > 2 minutes Limit Level: +/-10 V
Pulse Rep Rate Limit: 0.5 – 5 pps Date: 27 October2004 Transient Pulse Width: 10us & 150ns

Table 10-4. Customer CS06 Return to Chassis Test Notes

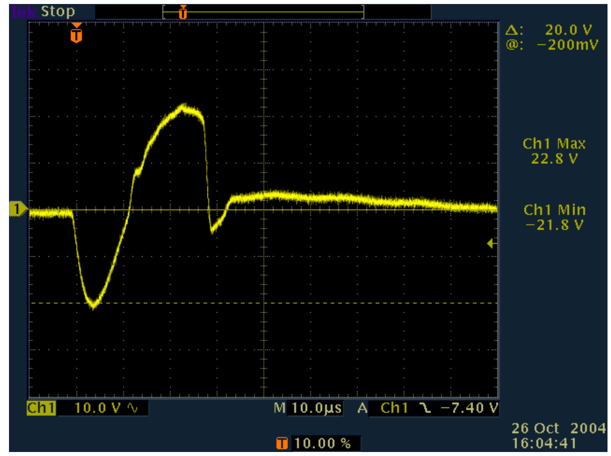
Test Point	Test Pulses	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
IDPU 28 VDC Return to Chassis	+10V, 10us	1:53:10 PM	20:53:10	STE-U extra counts at ~15c/s, mostly det 3. No spectra. No 1553 issues. Continue to 1:55
	-10V, 10us	1:50:30 PM	20:50:30	STE-U extra counts at ~15c/s, mostly det 0,1. Spectra around bin 10 of 256. No 1553 issues. Continue to 1:52:49
	+10V, 150ns	1:48:00 PM	20:48:00	Nothing. Continue to 1:50:00
	-10V, 150ns	1:44:00 PM	20:44:00	One glitch in STE data. Continue to 1:46:50 PM
MAG Heater 28 VDC Return to Chassis	+10V, 10us	2:25:20 PM	21:25:20	STE-U rates rise ~10c/s mostly det 3. Off at 2:27:30
	-10V, 10us	2:22:50 PM	21:22:50	STE-U rates rise ~10c/s mostly det 0. Off at 2:25
	+10V,150ns	2:20:00 PM	21:20:00	No effect. Off at 2:22:10
	-10V, 150ns	2:16:50 PM	21:16:40	No effect. Off at 2:19:30
SEP 28 VDC Return to Chassis	+10V, , 10us	4:25:10 PM	23:25:10	Run till 4:30. See ~1-2c/s in LET L1, L2. L3 sees nothing
	-10V, 10us	4:31:10 PM	23:31:10	Run till 4:36. See ~1-2c/s in LET L1, L2. L3 sees <0.5c/s
	+10V, 50ns	4:37:00 PM	23:37:00	Run till 4:41. See nothing
	-10V, 150ns	4:42:30 PM	23:42:30	Run till 4:46. See nothing
SWEA/STE-D 28 VDC Return to Chassis	+10V,10us	5:45:20 PM	0:45:20	STE-U, STE-D counts rise ~10c/s. No spectra except STE-U det 3. Off at 5:47:30
	-10V, 10us	5:42:30 PM	0:42:30	STE-U, STE-D counts rise ~10c/s. No spectra except STE-U det 3
	+10V,150ns	5:40:00 PM	0:40:00	Nothing. Run to 5:42
	-10V, 150ns	5:37:40 PM	0:37:40	Nothing Run to 5:39:30

EUT: STEREO-IMPACT S/N: FM1 Test PointS: +28 VDC to Return Test Time Limit: > 2 minutes Limit Level: +/- 20 V

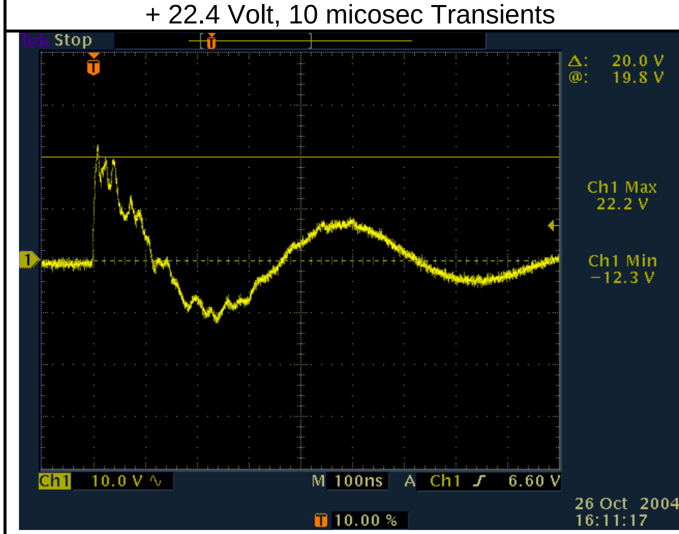
Pulse Rep Rate Limit: 2.55 pps Date: 27 October 2004 Transient Pulse Width: 10us & 150ns



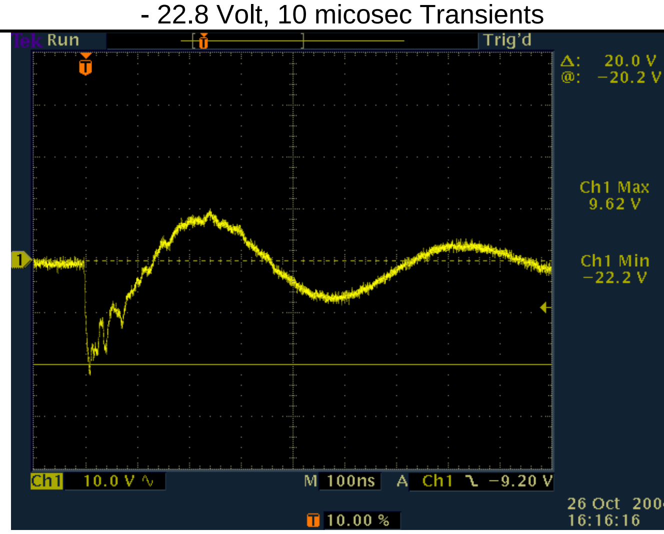
\+ 22.4 Volt, 10 micosec Transients



\- 22.8 Volt, 10 micosec Transients

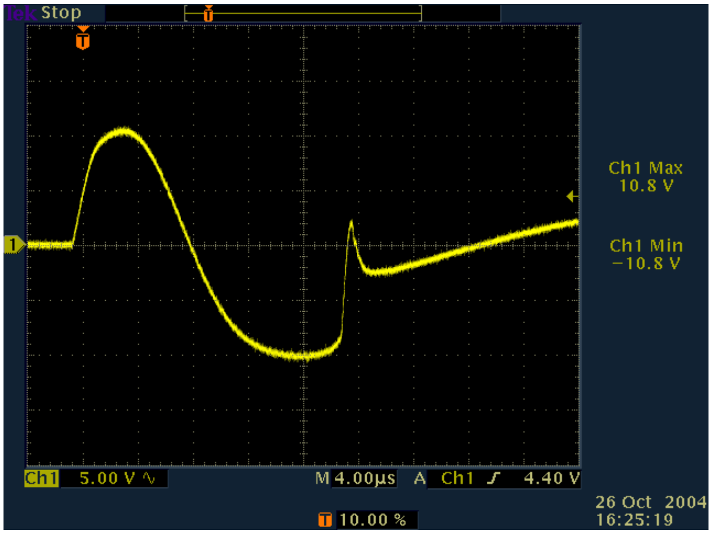


\+ 22.2 Volt, 150 nanosec Transients

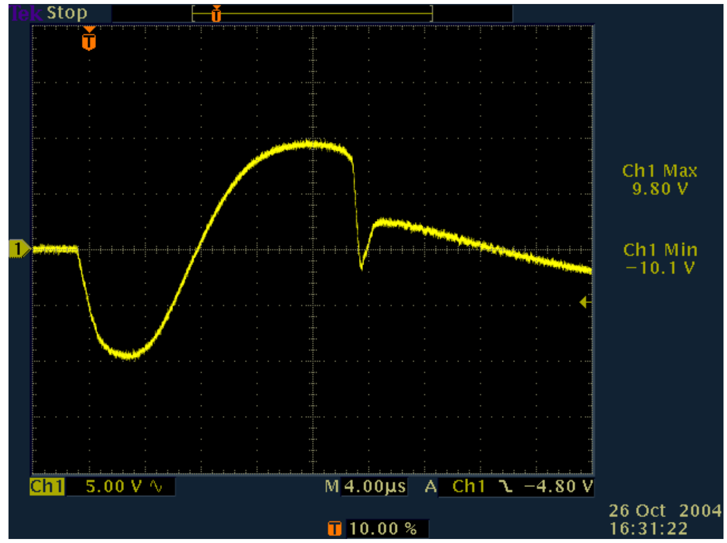


\- 22.2 Volt, 150 nanosec Transients

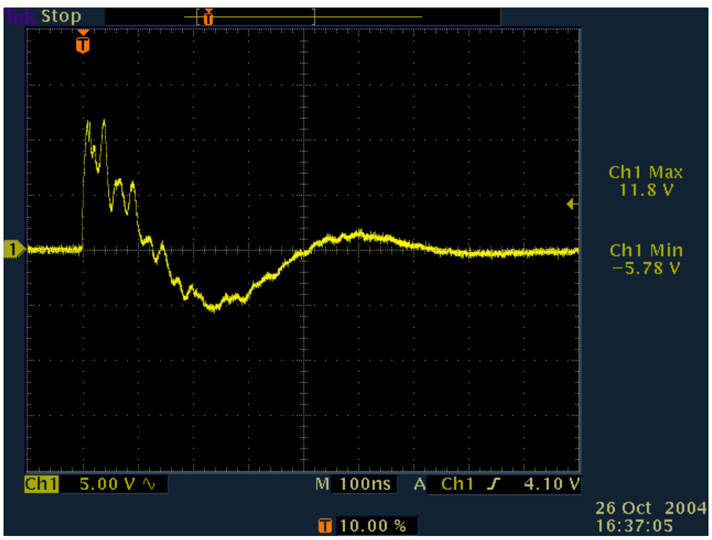
Figure 10-8. Positive and Negative CS06 + 28 VDC to Return Transients on SEP Input Power Leads



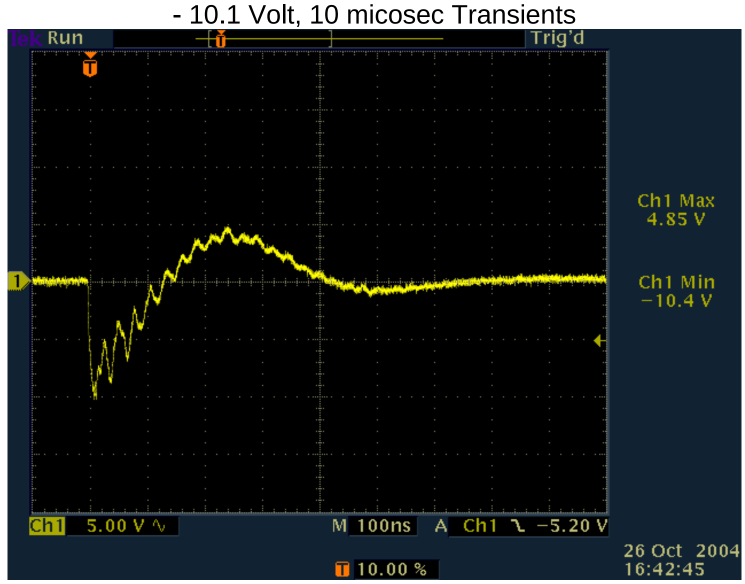
+ 10.8 Volt, 10 micosec Transients



- 10.1 Volt, 10 micosec Transients



+ 11.8 Volt, 150 nanosec Transients



- 10.4 Volt, 150 nanosec Transients

Figure 10-9. Transient Positive and Negative CS06 Return to Chassis Transients on SEP Input Power Leads

Table 10-5. CS06 Test Equipment Calibration Record

Instrumentation	Manufacturer/Model No.	Serial Number	Calibration Due Date
Transient Generator	Solar 8282-1	881830	NCR
Transient Generator	Solar 8282-1	881830	NCR
Monitor Scope	Tektronix 3052A	3052-65-7889	25 Jan 2005
10 ufd Capacitor	Solar 6512-106R	4321	15 Mar 2006
100 X Scope Probe	Tektronix P0009	10SP09	25 Jan 2005
Resistor (5 Ohms @ 1 %)	Dale NH-250	9231	22 Apr 2004
20 Microhenry Inductor	Custom Inductor	N/A	17 Mar 2006
NCR = No Calibration Required			

EUT: STEREO-IMPACT S/N: FM1 Test Points: +28 VDC to Return, Rtn to Chassis Test Time Limit: > 2 minutes
Pulse Rep Rate: 0.5 – 5 pps Date: 27 October 2004 Transient Pulse Width: 10us & 150ns

11 RE01 - MAGNETIC FIELD EMISSIONS TESTING (100 HZ – 49 KHZ)

11.1 TEST RESULTS

Test Point	**Pass/Fail**
• Ambient Emissions	Pass (Figure 11-12)
• STEA/STE – D/MAG Boom End	Fail (Figure 11-13)
• PLASTIC	PLASTIC unit not provided
• IDPU	Fail (Figure 11-15)
• SEP-C	Pass (Figure 11-17)
• SIT	Fail (Figure 11-16)
• SEPT-E	Fail (Figure 11-14)

11.2 RE01 TEST REQUIREMENTS

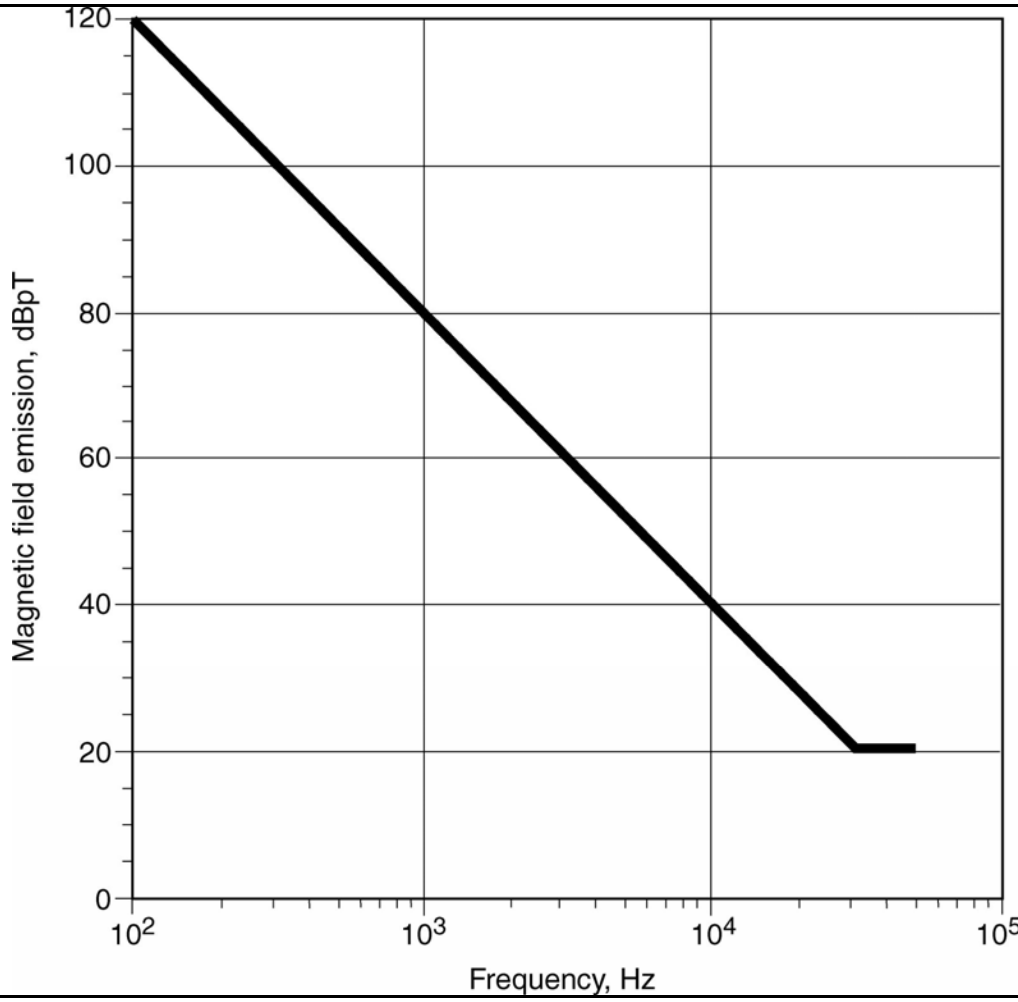
- RE01 Pass/Fail Limits .... Figure 11-1
- Required RE01 Test Points .... Figure 11-2

11.3 TEST DETAILS

- Test Set-up Schematic .... Figure 11-3
- Test Set-up Photographs .... Figure 11-4 through Figure 11-11

11.4 TEST DATA

- Test Data Printouts .... Figure 11-12 through Figure 11-17
- Loop Antenna Factors .... Figure 11-18, Figure 11-19
- Customer Technical Notes .... Table 11-2



4.8 RE-01 Radiated Emissions, Magnetic Field, 100 Hz to 49 kHz

This test requirement is to demonstrate that the levels of low frequency radiated magnetic field emissions from the operating Subsystem do not exceed the specified limits. Applicable test parameters and limits are as follows:

A) Emission limits are 120 dBpT (1000 gamma) starting at 100 Hz then decreasing to 20 dBpT (10 milligamma) at 32 kHz from which it continues at the same level to 49 kHz. Data will be acquired out 51 kHz.

B) The Subsystem is to be scanned on all sides to determine maximum emission levels.

Figure 11-1. Magnetic Emissions (RE01) Limits

11.4.1 RE01

During RE01 measurements, each exposed face of each separate box shall be scanned. For the boom, scan each end of the boom (SWEA/STE-D/MAG at one end and STE-U, harness spool, and connectors at the other), plus a representative point in the middle of the boom. Also scan each of the intra-instrument harnesses. Note locations and frequencies of any exceedance below (spectra to be provided in facility report).

Figure 11-2. Required RE01 Test Points

5.10 RE-01 Magnetic Field Emissions Test Configuration

Low frequency radiated magnetic fields are to be measured in the frequency domain in accordance with the test configuration shown in Figure 5.10. Applicable test parameters are as defined in Paragraph 4.8.

Notes:
- A) All aspects of the UUT are to be investigated to determine maximum field intensities.
- B) Complete data from the three highest intensity locations are to be recorded.
- C) A spacing of 7 cm (2.76 inches) is to be maintained between the measurement loop and the UUT.
- D) Test cables external to the UUT may be shielded and concealed.

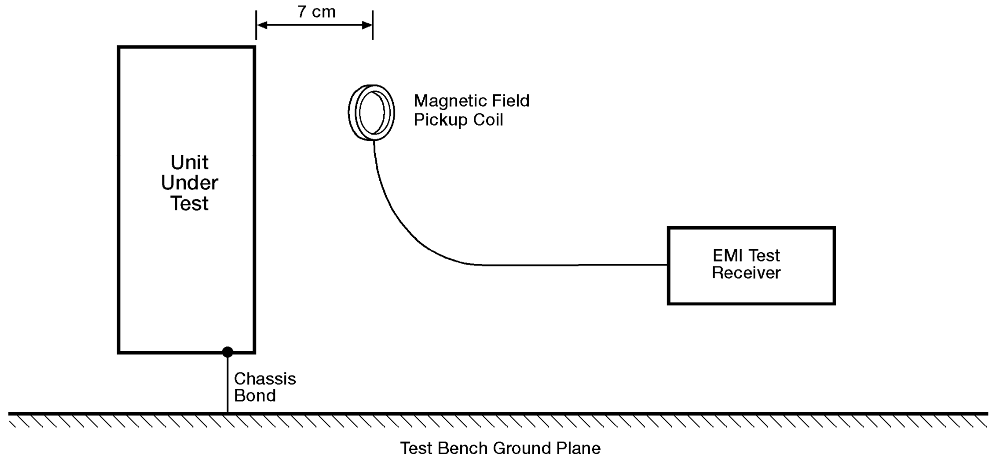


Figure 11-3. Schematic Configuration for RE01 Magnetic Field Emissions Testing

Figure 11-4. Loop Antenna Configuration for RE01 Testing(30 Hz – 49 kHz)

Figure 11-5. Close-up of the RE01 Magnetic Field Loop Testing on the SEP Central/HET/LET Units (30 Hz – 49 kHz)
(Antenna is close to the HET Unit)

Figure 11-6. RE01 Setup for IDPU Testing

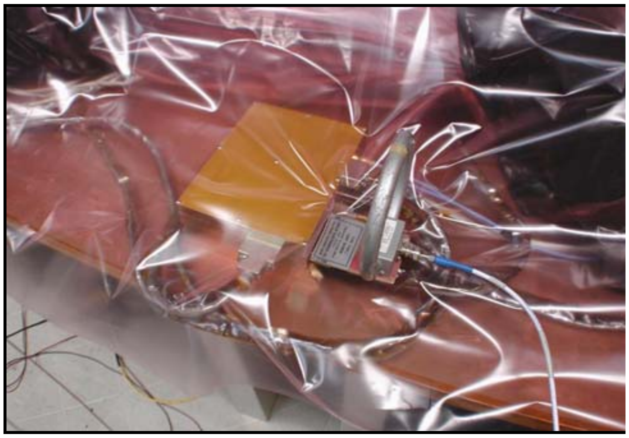


Figure 11-7. Close-up for the Loop at the IDPU

Figure 11-8. RE01 Setup for MAG Sensor Testing

Figure 11-9. RE01 Setup for SIT Testing

Figure 11-10. RE01 Setup for SEP Central/HET/LET
(Antenna is close to the HET Unit)

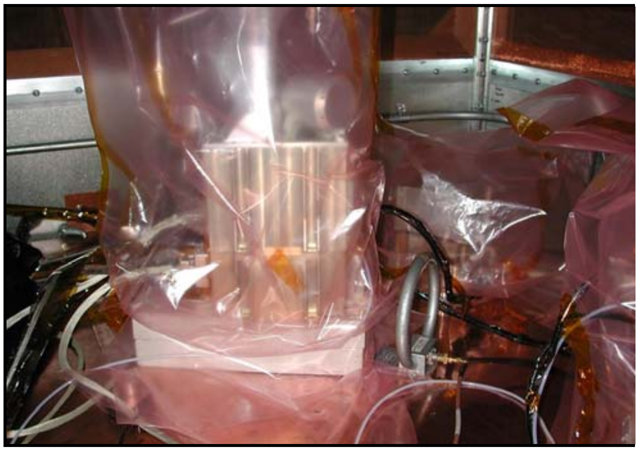


Figure 11-11. RE01Setup for SEP Central/HET/LET
(Antenna is close to the LVPS)

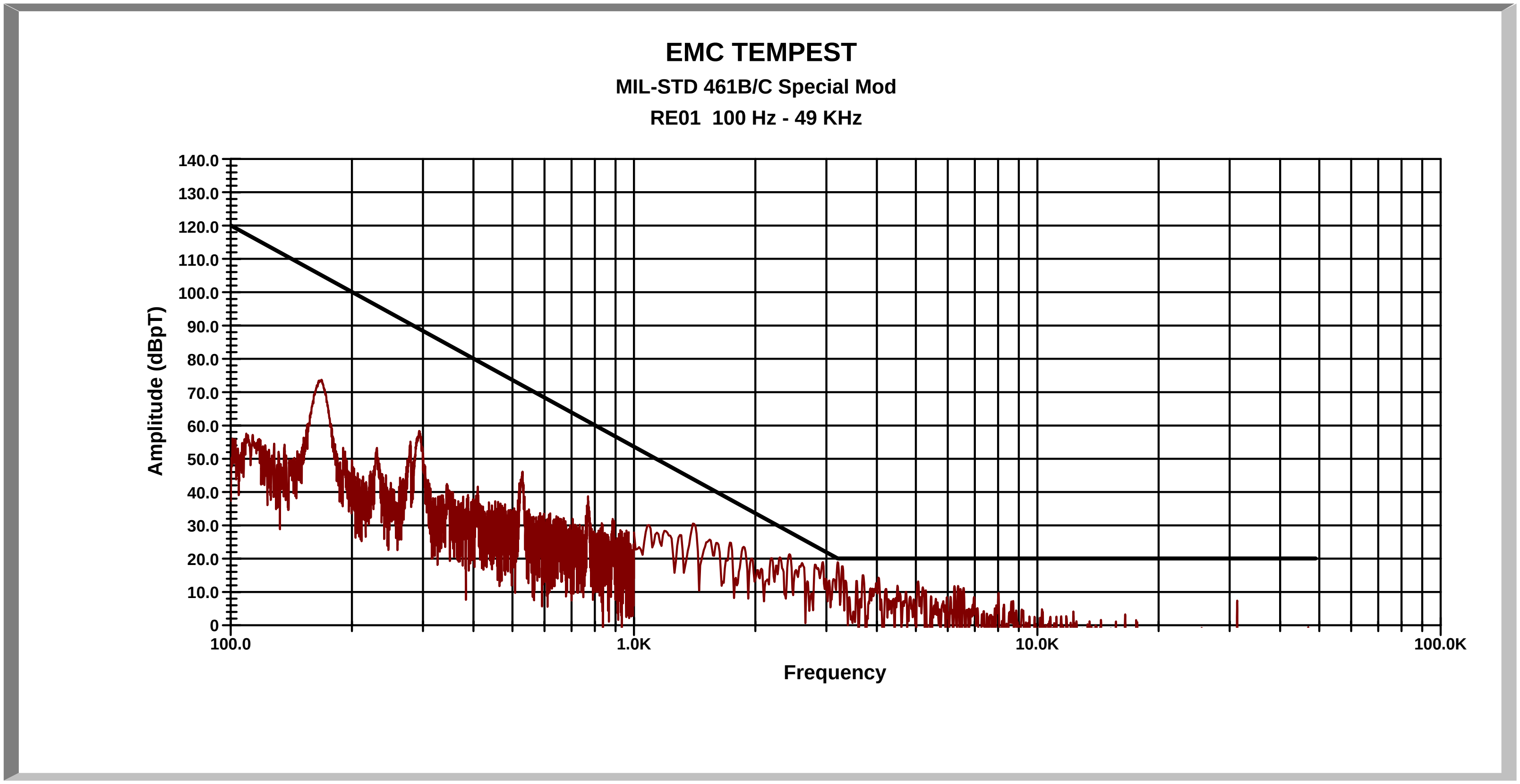


Figure 11-12. Measured RE01 Magnetic Field Ambient Emissions

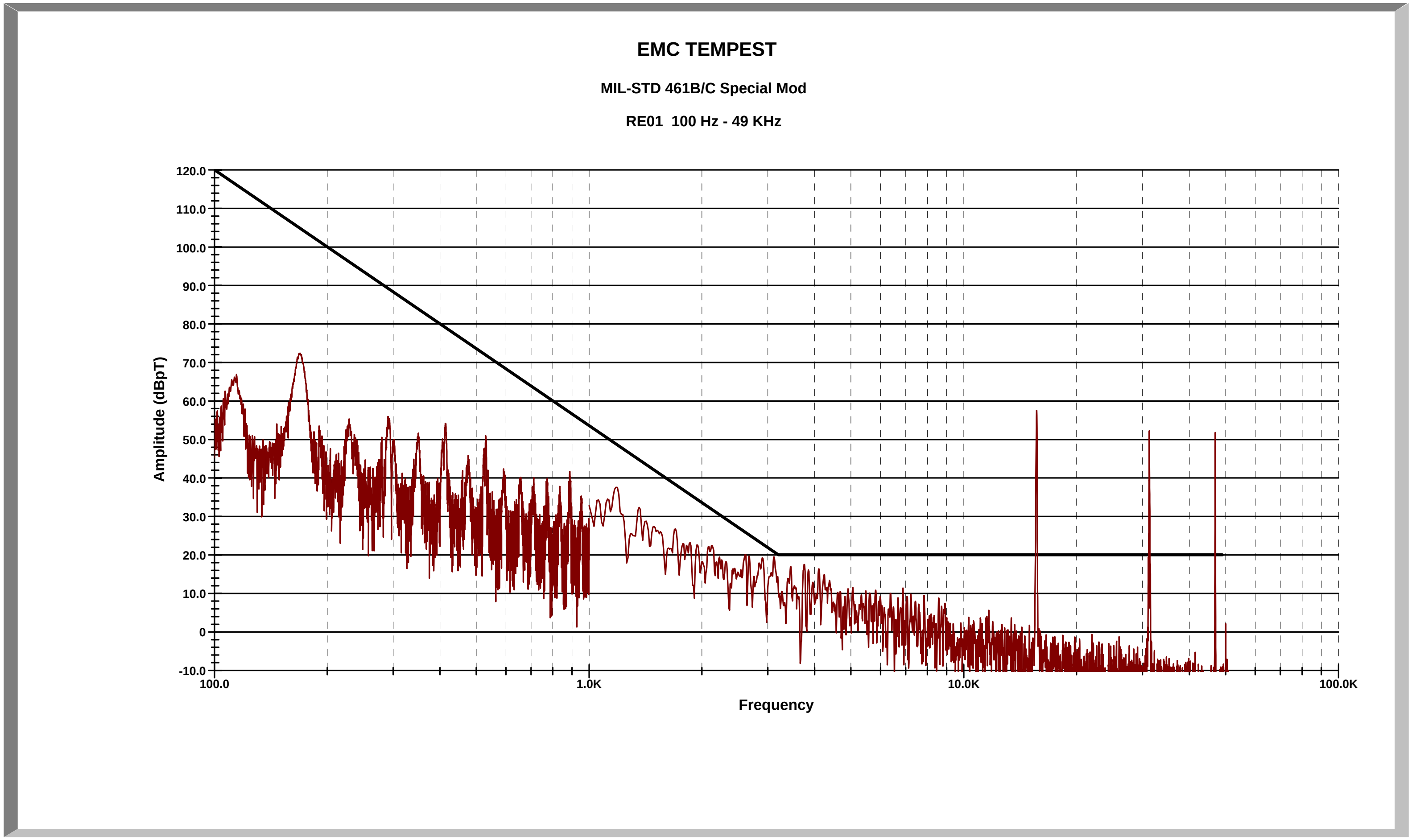


Figure 11-13. Measured RE01 Emissions with the Loop Antenna at Boom Magnetometer (30 Hz – 49 kHz)

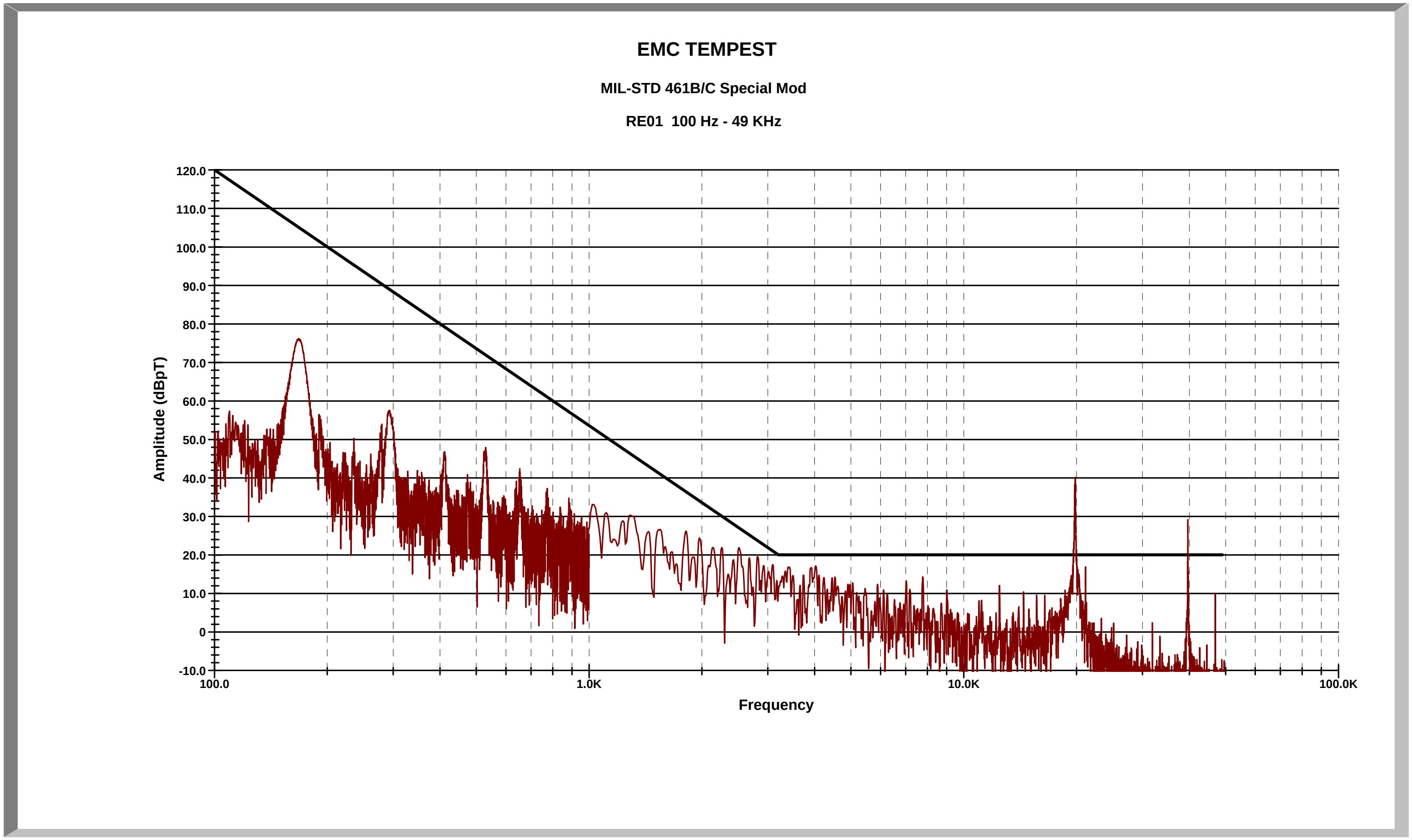


Figure 11-14. Measured RE01 Emissions with the Loop Antenna at the SEPT (30 Hz – 49 kHz)

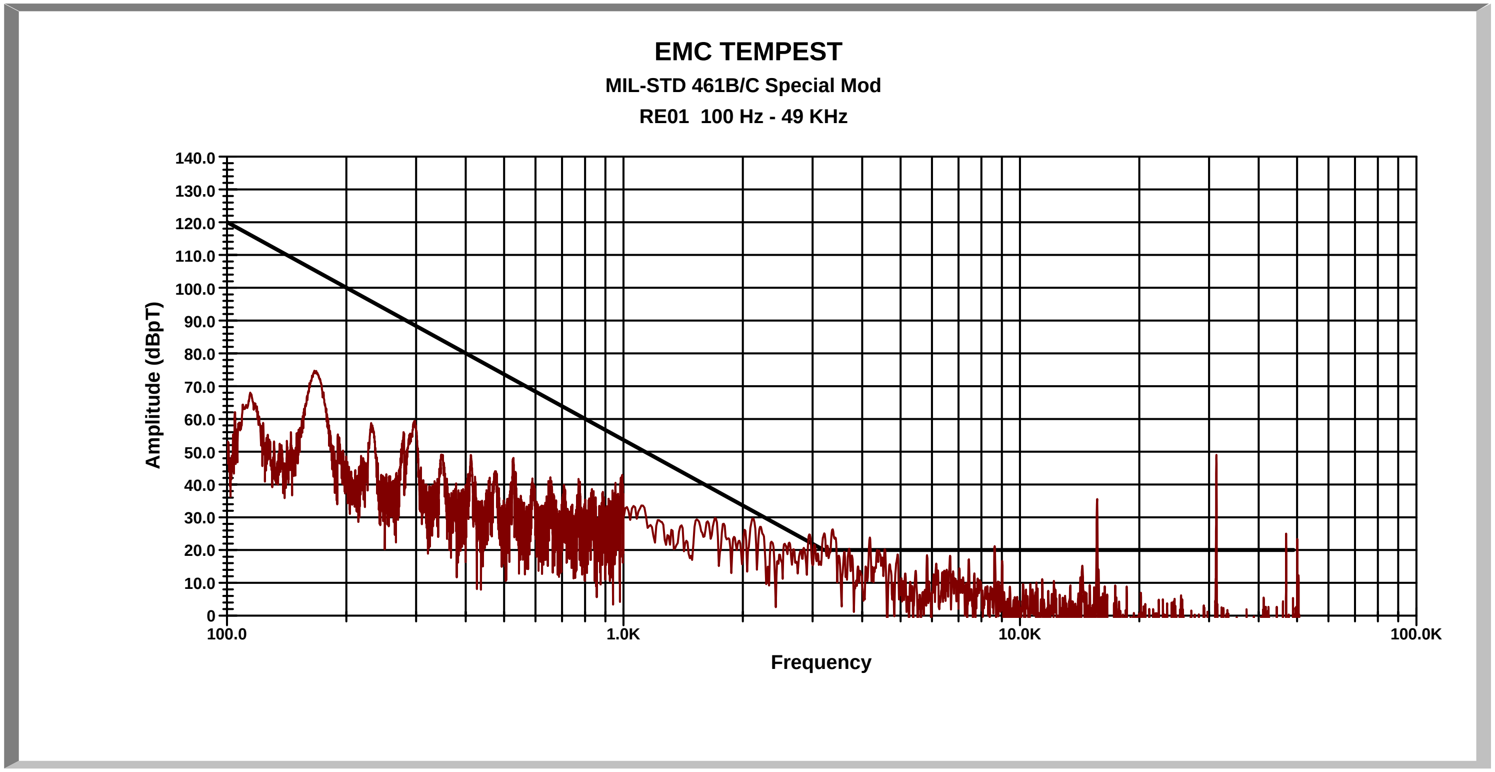


Figure 11-15. Measured RE01 Emissions with the Loop Antenna at the IDPU (30 Hz – 49 kHz)

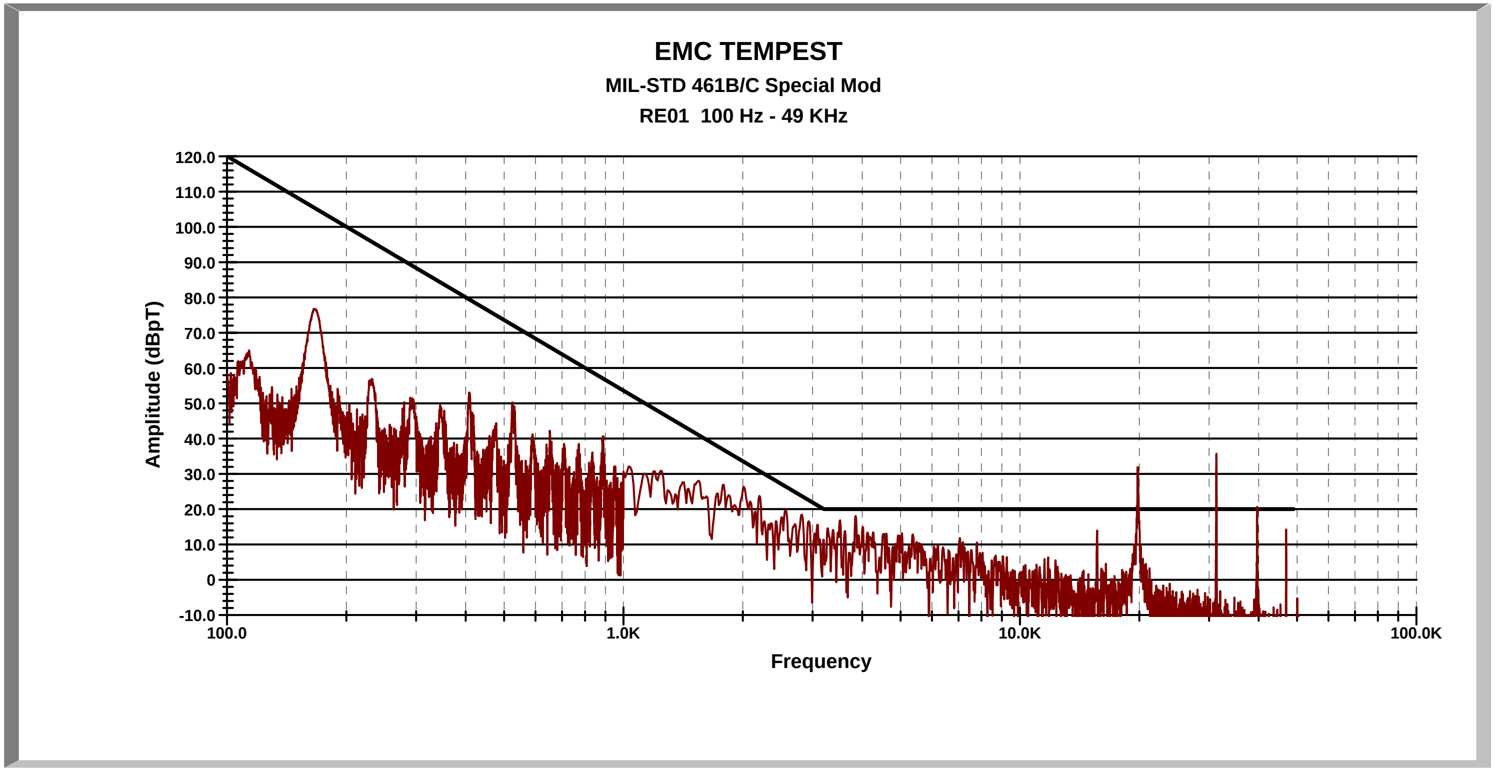


Figure 11-16. Measured RE01 Emissions with the Loop Antenna at the SIT (Central) (30 Hz – 49 kHz)

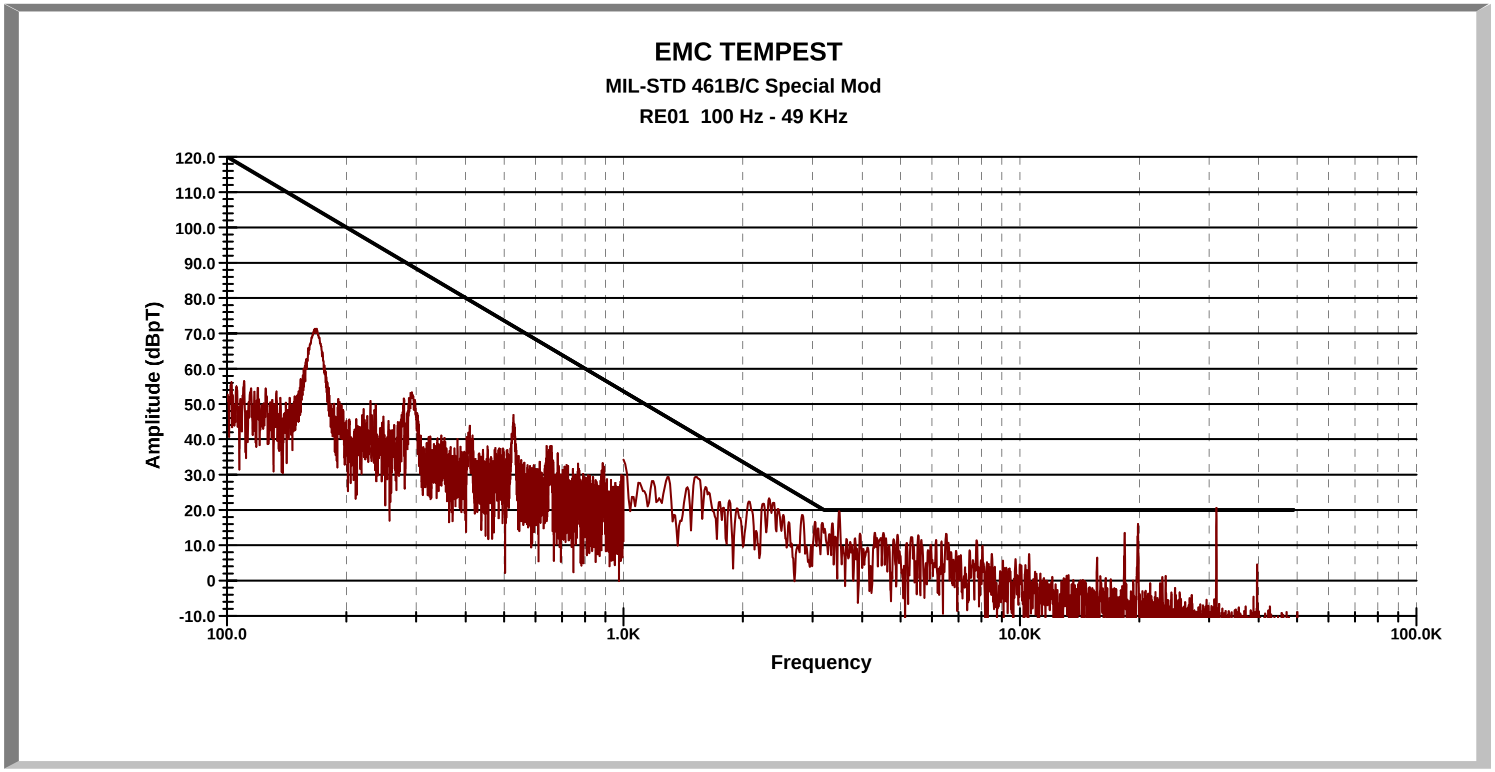
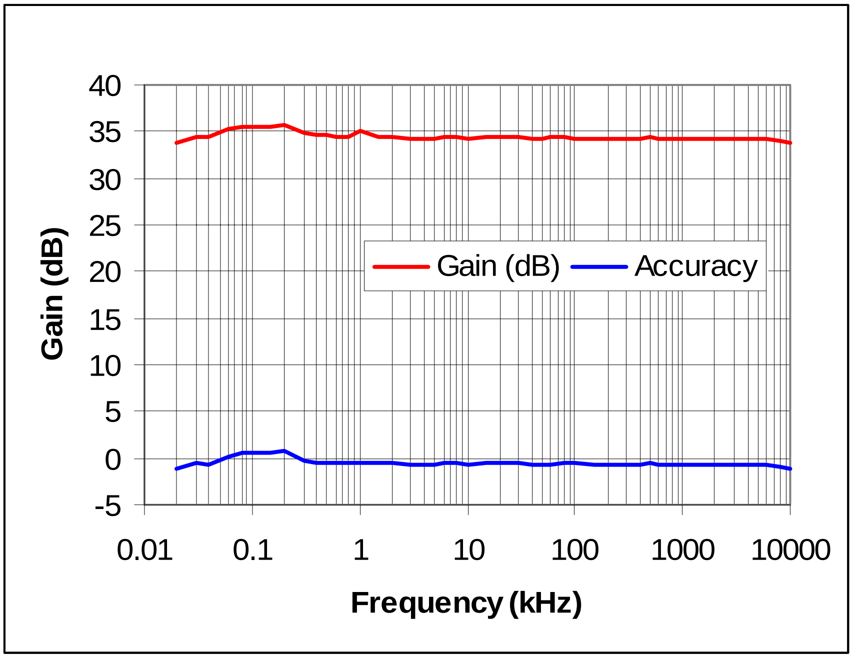


Figure 11-17. Measured RE01 Emissions with the Loop Antenna at the SEP (Central) (30 Hz – 49 kHz)

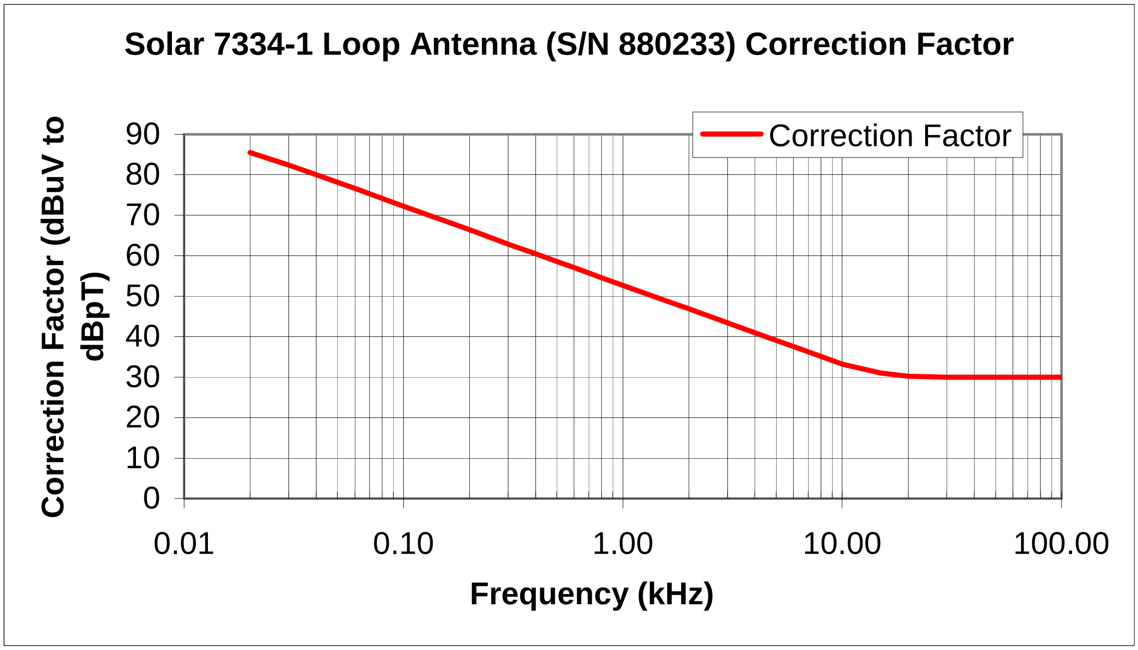
Figure 11-18. 35 dB Low Noise Preamplifier Calibration Information



Model No: HP 8640 S/N: 060506 Cal Due Date:11 December 2006

Frequency (Hz)	*Gain (dB)*	*ΔdB*	*Frequency (Hz)*	*Gain (dB)*	*ΔdB*	*Frequency (Hz)*	*Gain (dB)*	*ΔdB*
20	33.8	-1.2	3	34.3	-0.7	300	34.3	-0.7
30	34.5	-0.5	4	34.3	-0.7	400	34.3	-0.7
40	34.4	-0.8	5	34.3	-0.7	500	34.4	-0.6
60	35.2	0.2	6	34.4	-0.6	600	34.2	-0.8
80	35.5	0.5	8	34.4	-0.6	800	34.2	-0.8
100	35.5	0.5	10	34.3	-0.7	1 MHz	34.3	-0.7
150	35.5	0.5	15	34.4	-0.6	1.5	34.3	-0.7
200	35.7	0.7	20	34.4	-0.6	2	34.3	-0.7
300	34.8	-0.2	30	34.4	-0.6	3	34.3	-0.7
400	34.6	-0.4	40	34.3	-0.7	4	34.3	-0.7
500	34.6	-0.4	50	34.3	-0.7	5	34.2	-0.8
600	34.5	-0.5	60	34.4	-0.7	6	34.2	-0.8
800	34.5	-0.5	80	34.4	-0.6	8	34.0	-1.0
1	35.0	-0.5	100	34.3	-0.6	10	33.8	-1.2
1.5	34.5	-0.5	150	34.2	-0.7			
2	34.5	-0.5	200	34.3	-0.8			

Figure 11-19. Loop Antenna Calibration Information (30 Hz – 100 kHz)



CERTIFICATE OF CALIBRATION CONFORMANCE
Solar Electronics Corporation, Hollywood California

Antenna Type: Solar Five Inch Dia.Loop Model No: 7334-1 Serial No: 992415
Frequency Range: 30 Hz - 100 kHz Calibration Date: 18 October 2003

Frequency	Antenna Factor (dB)	Frequency	Antenna Factor (dB)
30 Hz	82.4	3 kHz	43.4
60	76.6	4	41.0
100	72.2	5	39.1
200	66.4	6	37.6
300	62.9	8	35.1
400	60.5	10	33.2
500	59.5	15	31.0
600	57.1	20	30.2
800	54.6	30	30.0
1 kHz	52.7	40	30.0
1.5	49.3	50	30.0
2	46.9	100	30.0

This antenna has been individually calibrated at a 7-centimeter distance, using one or more of the following procedures:

ANSI C63.5 The American National Standards Institute Committee 63.5
SAE ARP 958 The Society of Automotive Engineers Recommended Practice 958
Calibration Accuracy: ±2 dB Calibration Due: 18 October 2005

Table 11-1. Customer Tabulation of RE01 Out-of-Spec Emissions

Unit	Frequency	dB above limit	Source
MAG	15.6KHz	38	MAG Drive
MAG	31.2KHz	32	MAG Drive
MAG	46.8kHz	31	MAG Drive
SEP	19.8kHz	20	SEP LVPS?
SEP	39.6kHz	10	SEP LVPS?

EUT: STEREO IMPACT S/N: FM1 Date : 21 October 2004
Stereo Engr: Dave Curtis Test Engr: Bryan Cowdell

Table 11-2. Magnetic Field Emissions Test Instrumentation Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Spectrum Analyzer	HP 8566B	2816A05080	16 June 2004
PC (For Recording Test Data Printouts)	CJC	RM2 210669	NCR
Low Noise 35 dB Preamplifier	HP 08640	060506	11 Dec 2006
Loop Antenna (30 Hz – 100 kHz)	Solar 7334-1	9882415	18 Oct 2004

NCR = No Calibration Required

EUT: STEREO IMPACT S/N: FM1 Date : 21 October 2004
Stereo Engr: Dave Curtis Test Engr: Bryan Cowdell

12 RE02: RADIATED E-FIELD EMISSIONS (2 KHZ – 10 GHZ)

12.1 TEST RESULTS:

Antenna Position #1 (Antenna Pointed at All Equipment - Except Boom)

- Vertical Antenna .... Fail
- Horizontal Antenna.. Fail

Position #2 (Antenna Pointed at Boom)

- Vertical Antenna.. Fail
- Horizontal Antenna.. Fail

Ambient Emissions

- Vertical Antenna.. Pass**
- Horizontal Antenna.. Pass

NOTES: ** The GSE was ON during ambient emissions testing/verification, and produced some low frequency out-of-spec emissions (See Figure 12-33). When the computer monitors were turned off, all ambient emissions were reduced to below the limit level.

12.2 TEST DETAILS

- Test Configuration Schematic..Figure 12-1
- Test Setup Photographs ....Figure 12-2 through Figure 12-9
- RE102 Test Descriptions (10 data runs)..Figure 12-12
- EUT Test Data/Plots ....Figure 12-13 through Figure 12-68
- Ambient Emissions..Figure 12-33 through Figure 12-44
- Test Equipment Calibration Record .... Table 12-1 through Table 12-7

12.3 RE02 REQUIREMENTS

- Pass/Fail Limits ....Figure 12-10
- Test Instructions..Figure 12-11

5.11 RE-02 Electric Field Emissions Test Configuration

Radiated electric field emissions are to be measured in accordance with the test configuration shown in Figure 5.11. Applicable test parameters are as defined in Paragraph 4.9. Testing is to be accomplished in a shielded test facility.

Notes: A) All UUT operating modes which produced excessive conducted emissions are to be tested; if none, then at least the mode most likely to radiate is to be tested.
B) Test cables external to the UUT may be shielded and concealed.
C) Two orthogonal axes are to be tested.
D) Horizontal and vertical polarizations are to be tested at frequencies above 20 MHz.
E) Instrument covers must be open (RF transparent covers acceptable).

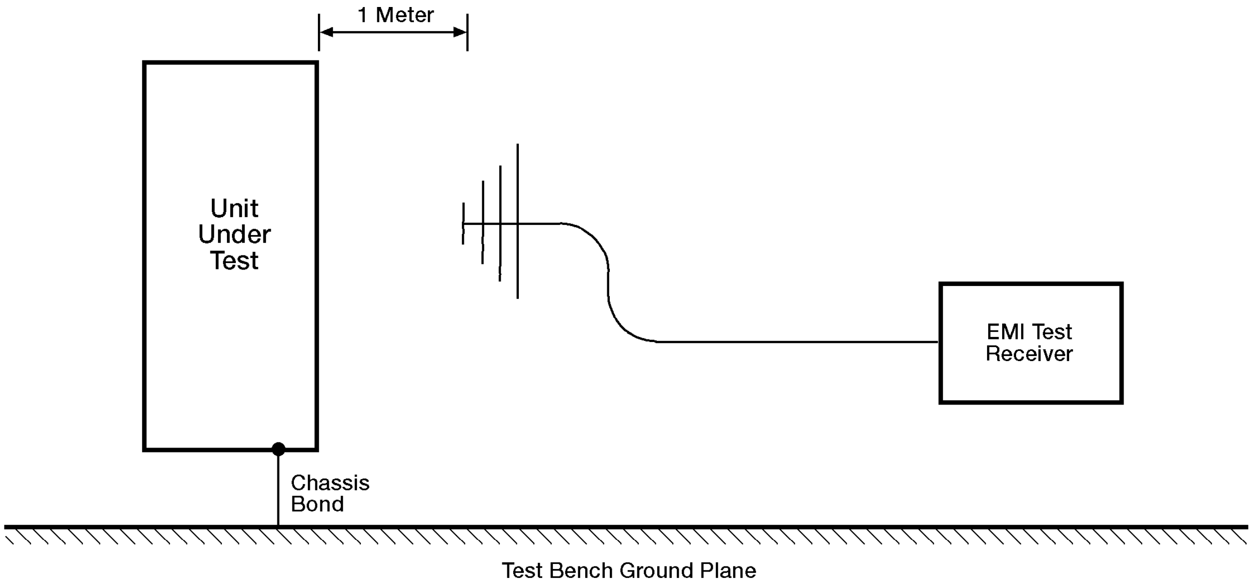


Figure 12-1. Configuration for RE02 Testing

Figure 12-2. Configuration for Stereo Impact RE02 Testing with the Monopole Antenna (2 kHz – 30 MHz)

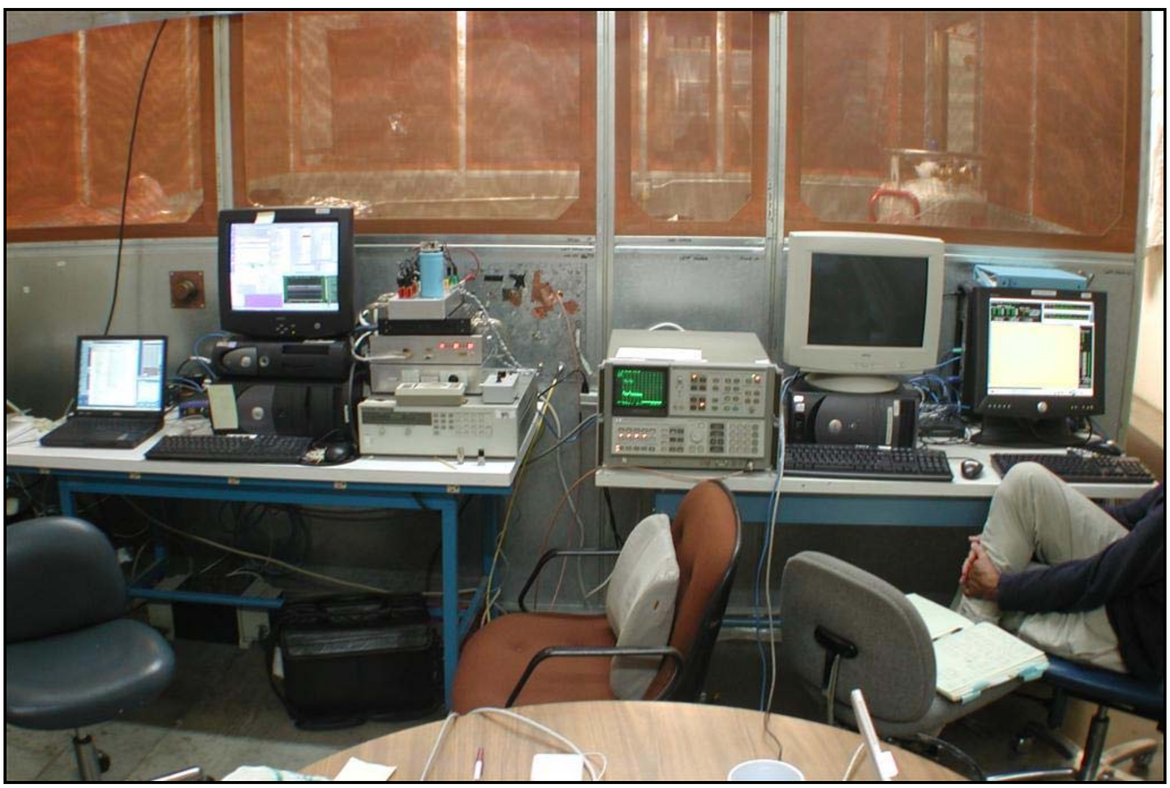


Figure 12-3. STEREO-IMPACT Support Instrumentation Outside the Shielded Room

Figure 12-4. RE02 Vertical Biconical Antenna Position #1 (30 MHz – 200 MHz)

Figure 12-5. RE02 Vertical Biconical Antenna Position #2 (30 MHz – 200 MHz)

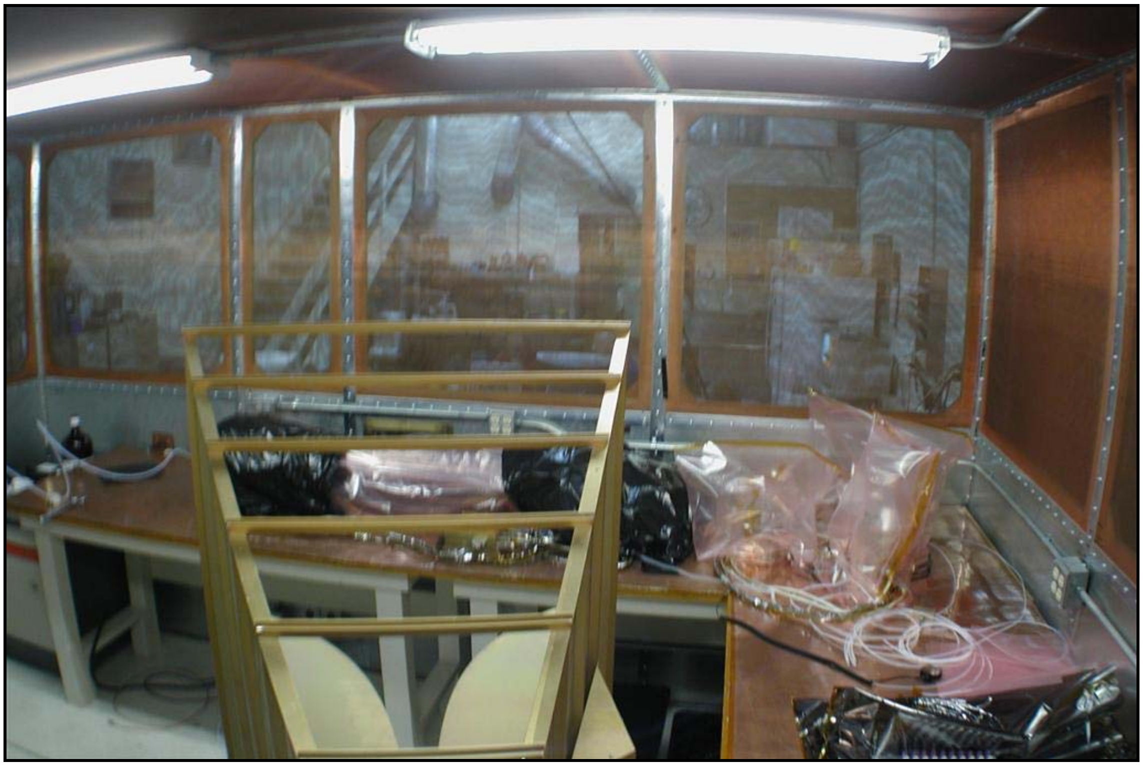


Figure 12-6. RE02 SAS-570 Double Ridged Horn Antenna Position #2 (200 MHz – 1 GHz)

Figure 12-7. RE02 SAS-570 Double Ridged Horn Antenna Position #1 (200 MHz – 1 GHz)

Figure 12-8. RE02 EMCO 3115 Double Ridged Horn Antenna Position #2 (1 GHz – 10 GHz)

Figure 12-9. RE02 EMCO 3115 Double Ridged Horn Antenna Position #1 (1 GHz – 10 GHz)

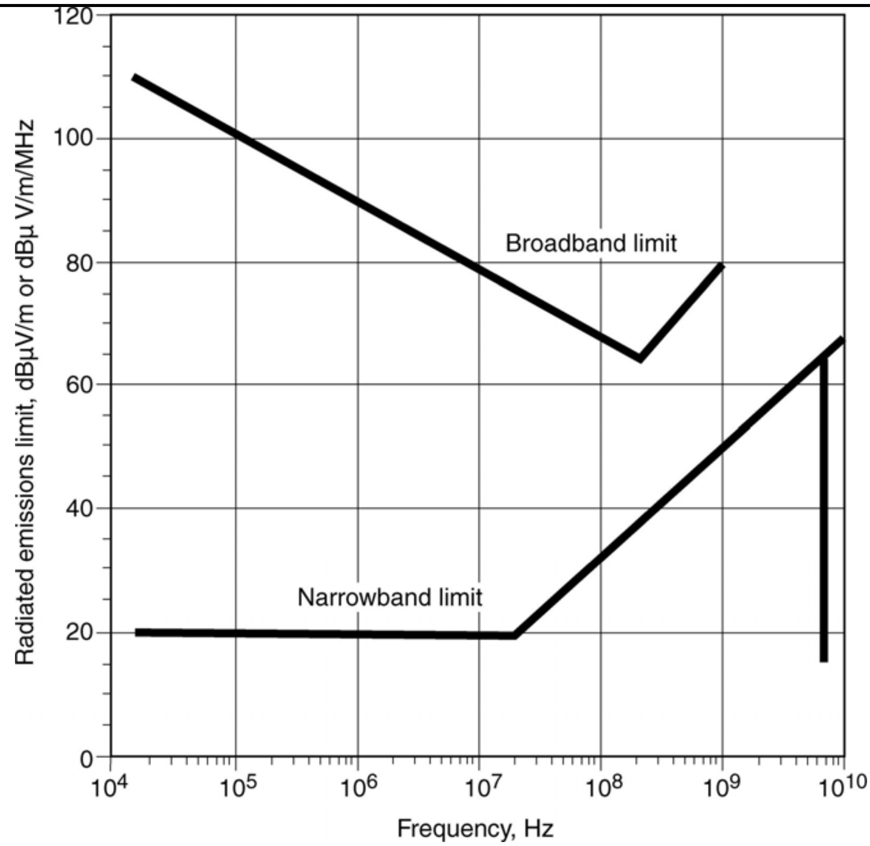


Figure 12-10. Narrowband & Broadband Radiated Emissions (RE02) Limits

4.9 RE-02 Radiated Emissions, Electric Field, 14 kHz to 10 GHz

This test requirement is to demonstrate that the levels of high frequency radiated electric field emissions from the operating Subsystem do not exceed the specified limits. Applicable test parameters and limits are as follow

A) Shielded test interface cables may be used to reduce emissions.
B) Narrowband emission limits are 20 dBµV/m from 14 kHz to 20 MHz then increasing to 70 dBµV/m at GHz. Also, in the band 7180 +/-25 MHz the limit is 15 dBµV/m (10 kHz resolution bandwidth and 5 d noise figure). In the band 408 to 430 MHz the limit is 38.5 dBµV/m only for devices that are on at launch.
C) Broadband emission limits are 110 dBµV/m/MHz at 14 kHz decreasing to 65 dBµV/m/MHz at 200 MHz then increasing to 80 dBµV/m/MHz at 1.0 GHz.
D) Automatic (instrumentation software) narrowband/broadband discrimination may be utilized.

Notes:
1) The PLASTIC and IMPACT Instruments are required to record data, in addition to the above, over the frequency range from 2 kHz to 14 kHz which will be utilized for assessing signals potentially visible to SWAVES. No radiated electric field emission limits are applied to this data. Maximum practicable measurement sensitivity is requested.
2) Instrument covers must be open during radiated emission and susceptibility testing. RF transparent covers must be supplied to prevent contamination.

The two required orientations shall be achieved by first scanning one face, then rotating all the instruments by 90 degrees and repeating.

Figure 12-11. Radiated Emissions Testing Instructions

Figure 12-12. Radiated Emissions Testing Description (for the Corresponding Data Plots)

Test Number	Frequency Range Covered	Antenna Polarities Used	Narrowband (NB) / Broadband (BB)	# of Plots Taken	Notes Concerning Testing	Figures
01	30 – 200 MHz	Vertical & Horizontal	NB	2	Initial Look at system – quick run	Figure 12-13 through Figure 12-14
02	30 – 200 MHz	Vertical	NB/BB	2	SEP & LET OFF – No change in Emissions	Figure 12-15 through Figure 12-16
03	30 – 200 MHz	Vertical	NB	1	SET OFF – Major Emissions Reduction	Figure 12-17
04	30 – 200 MHz	Vertical	NB	1	SEP Quiet Mode, “sniffer” indicated bad cables are the culprit	Figure 12-18
05	2 kHz – 200 MHz	Vertical	NB	2	SEP Quiet Mode, Connectors were Mounted with Screws, Producing a Reduction in Measured Radiated Emissions	Figure 12-19 through Figure 12-20
06	2 kHz – 10 GHz	Vertical & Horizontal	NB/BB	12	**FULL SWEEP** = All Equipment ON in Noisy Mode	Figure 12-21 through Figure 12-32
07	2 kHz – 10 GHz	Vertical & Horizontal	NB/BB	12	**FULL SWEEP** = Full Ambient Emissions Run (UUT OFF / GSE ON) GSE appears to be dragging in/producing noise	Figure 12-33 through Figure 12-44
08	30 – 200 MHz	Vertical	NB/BB	2	SET to SEP Cable was foil shielded	Figure 12-45 through Figure 12-46
09	30 MHz – 10 GHz	Vertical & Horizontal	NB/BB	10	**ALMOST FULL SWEEP** = Full Noisy Mode Antenna Orientation #1 (All equipment except Boom)	Figure 12-47 through Figure 12-56
10	2 kHz – 10 GHz	Vertical & Horizontal	NB/BB	12	**FULL SWEEP** = Full Noisy Mode Antenna Orientation #2 (Antennas pointed to Boom)	Figure 12-57 through Figure 12-68

NOTES: Position #1 = Antennas oriented towards all the equipment, minus the Boom.
Position #2 = Antennas oriented towards the Boom.

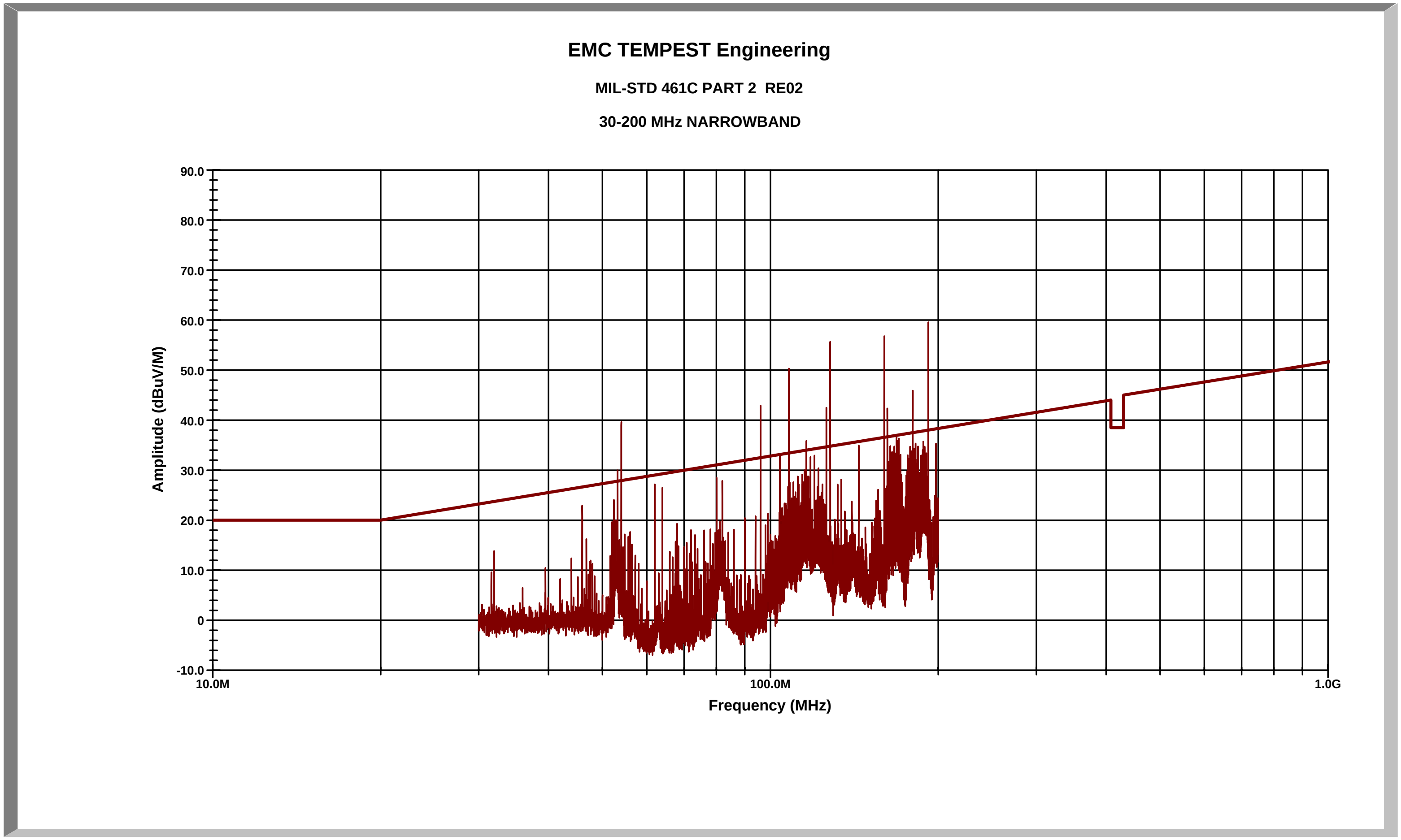


Figure 12-13. Results of RE02 Narrowband Emissions Testing – Run 01a Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
Initial Look at System - All Equipment Running

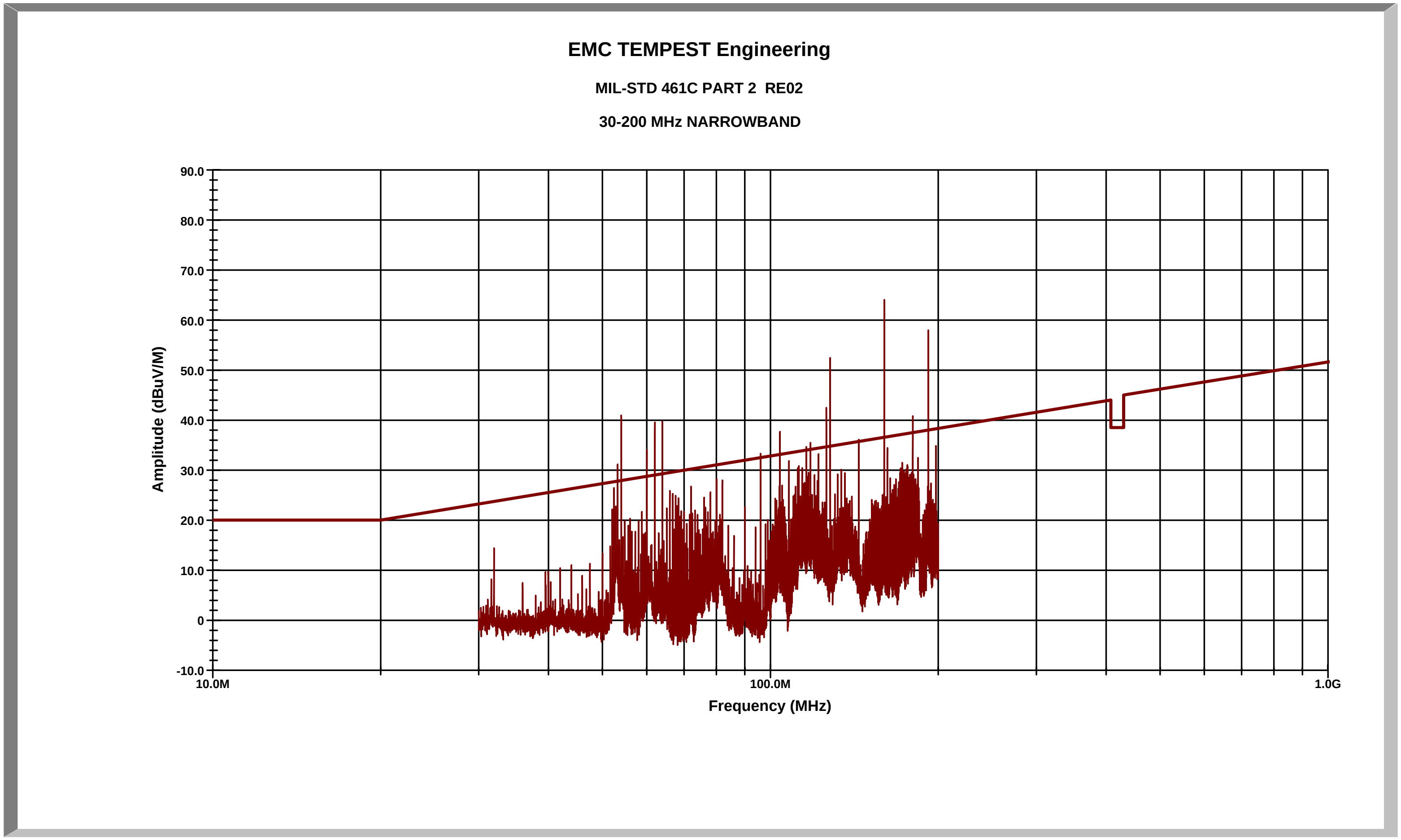


Figure 12-14. Results of RE02 Narrowband Emissions Testing – Run 01b Horizontal Antennas @ Position #1 (30 MHz – 200 MHz)
Initial Look at System - All Equipment Running

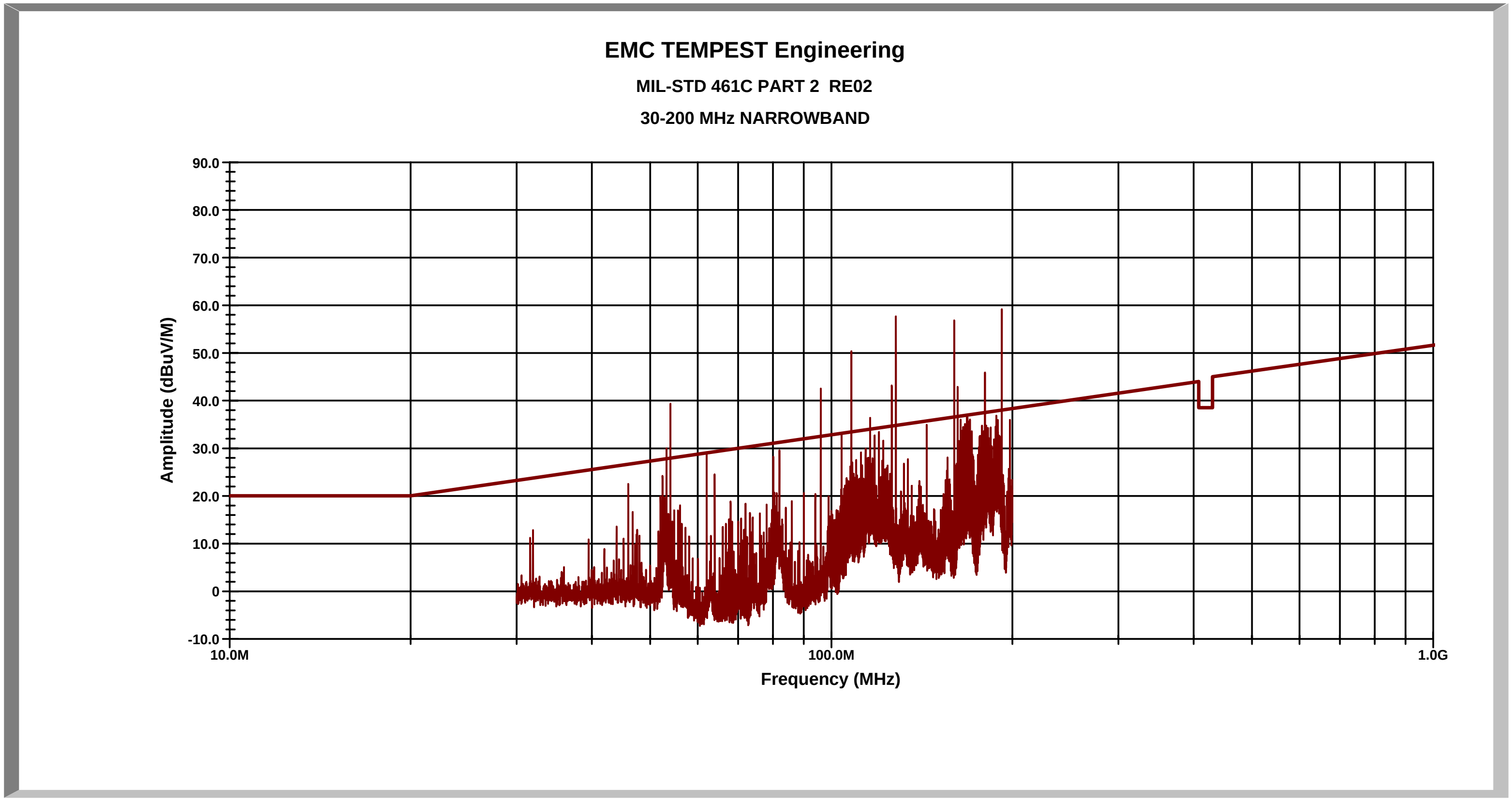


Figure 12-15. Results of RE02 Narrowband Emissions Testing – Run 02a Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
SEP & LET Off, No Real Difference from Run 01 (Baseline)

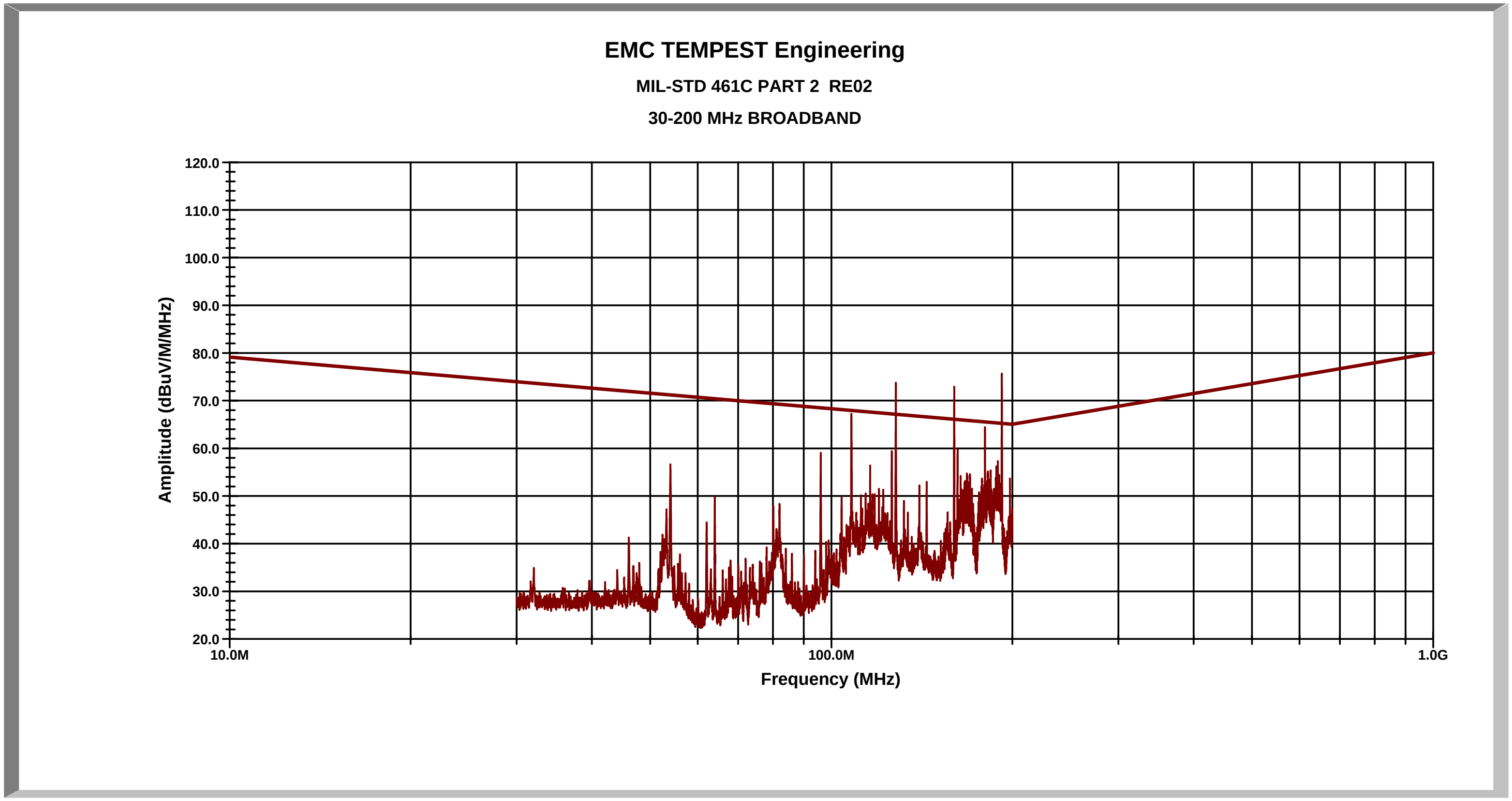


Figure 12-16. Results of RE02 Broadband Emissions Testing – Run 02b Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
SEP & LET Off, No Real Difference from Run 01 (Baseline)

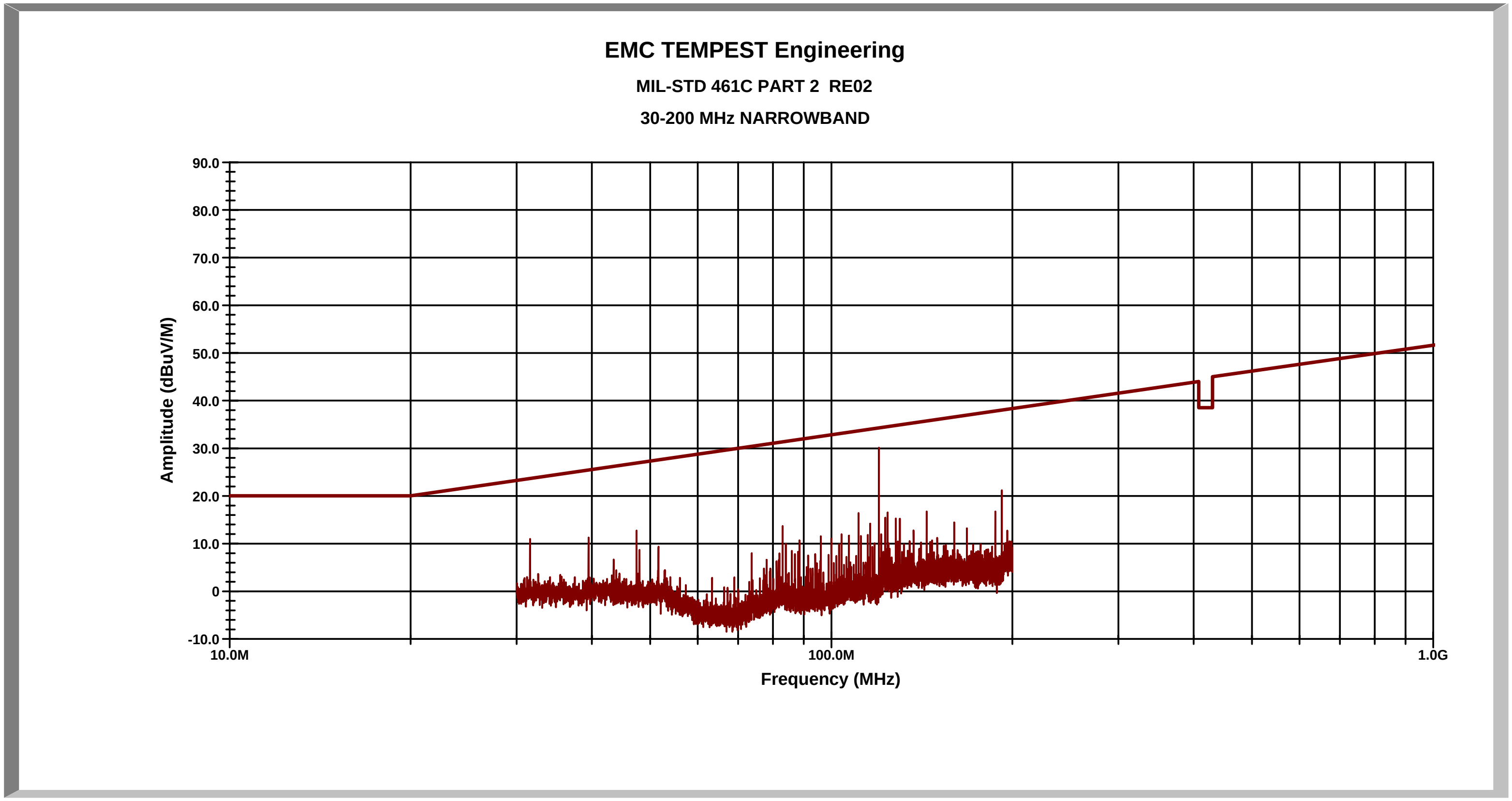


Figure 12-17. Results of RE02 Narrowband Emissions Testing – Run 03 Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
SET Off, Major Emissions Reduction from Runs 01 & 02

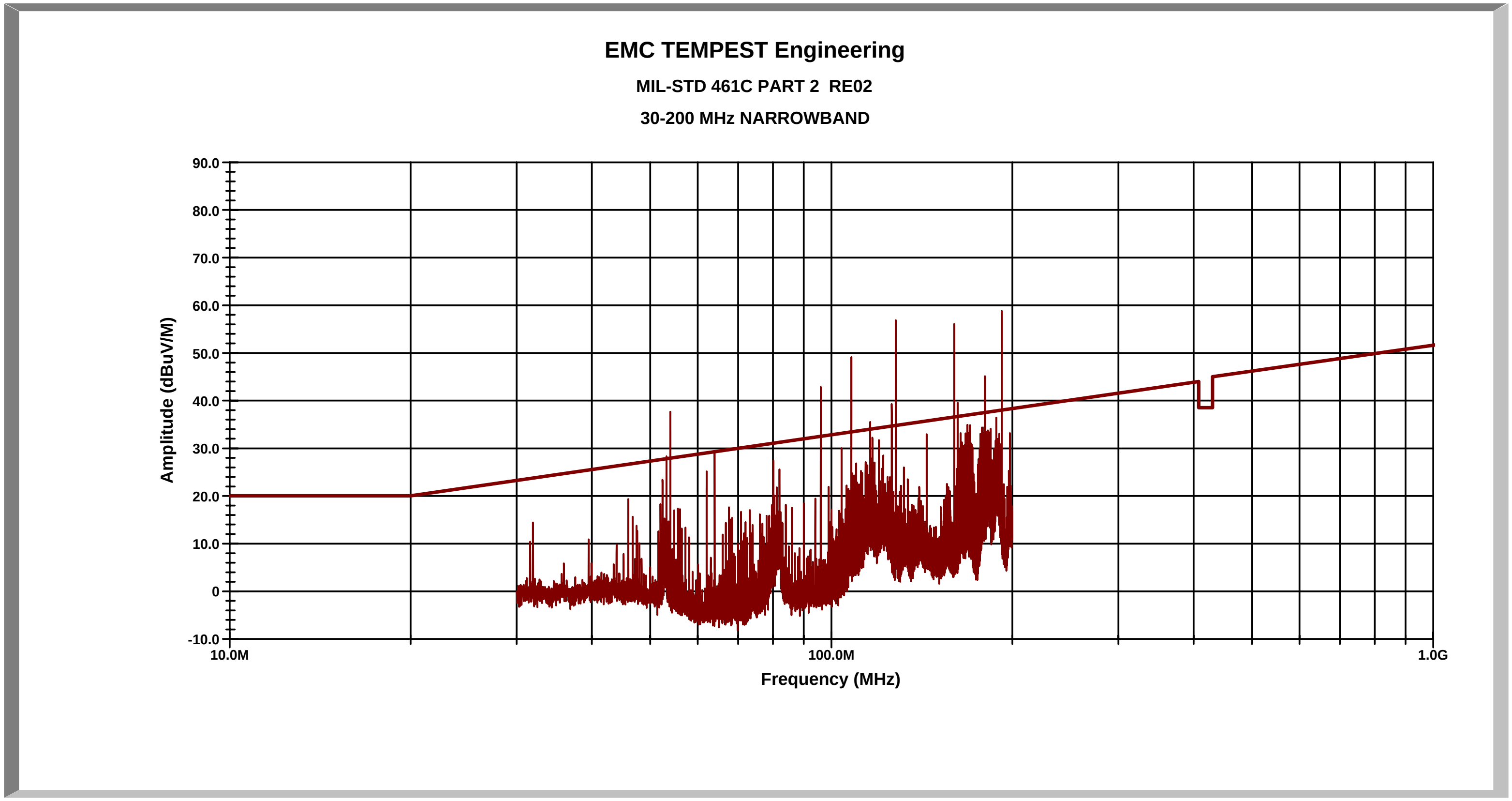


Figure 12-18. Results of RE02 Narrowband Emissions Testing – Run 04 Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
SEP Quiet – The "sniffer" was used to determine that the cables are the problem.

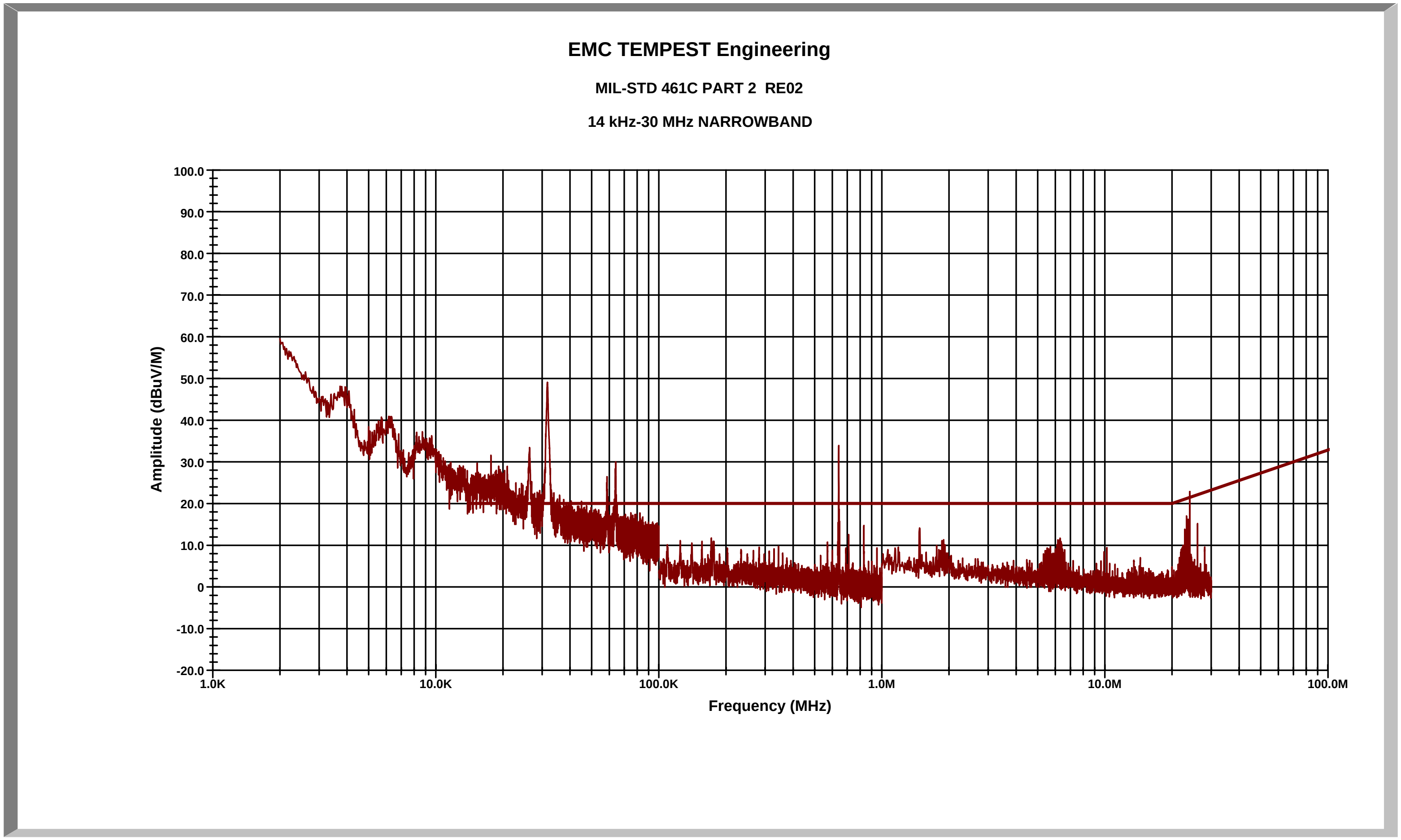


Figure 12-19. Results of RE02 Narrowband Emissions Testing – Run 05a Vertical Antennas @ Position #1 (2 kHz – 30 MHz)
SEP Quiet, SEP J5,J7,J9 Connectors Mounted with Screws

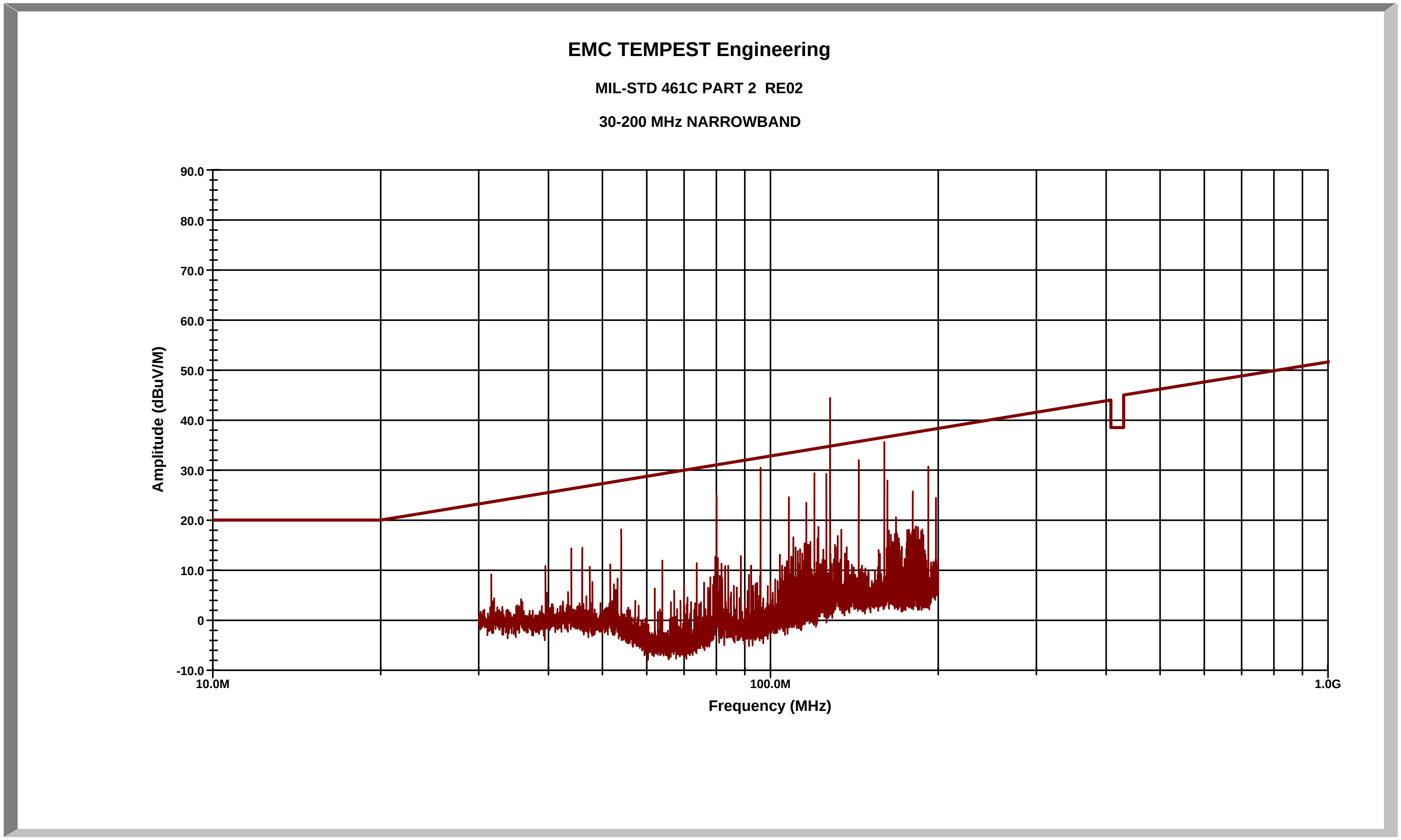


Figure 12-20. Results of RE02 Narrowband Emissions Testing – Run 05b Vertical Antennas @ Position #1 (30 MHz – 200 MHz)
SEP Quiet, SEP J5,J7,J9 Connectors Mounted with Screws – Emissions are Significantly Reduced in the 30 – 200 MHz Range

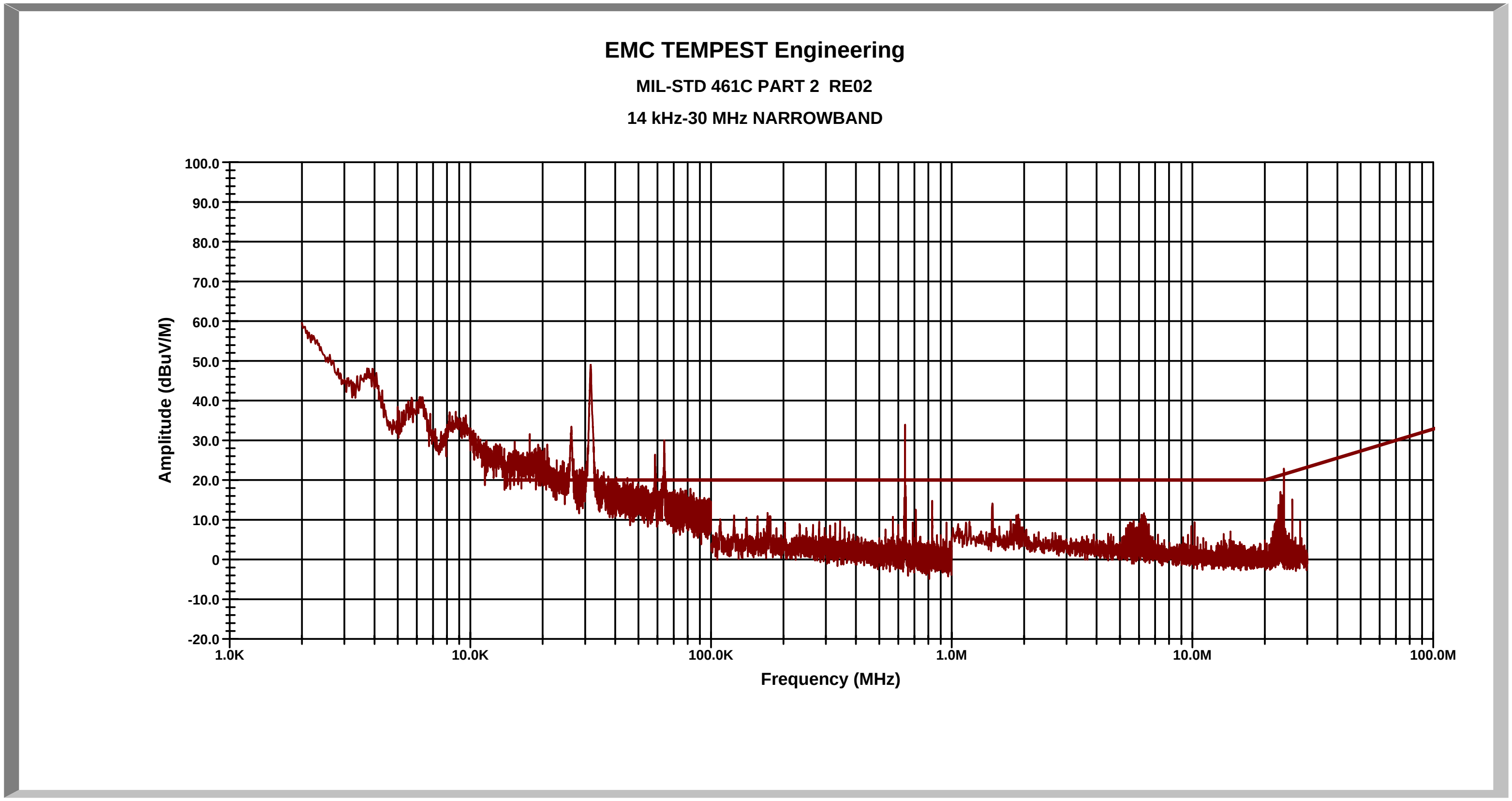


Figure 12-21. Results of RE02 Narrowband Emissions Testing – Run 06a Vertical Antennas @ Position #1 (2 kHz – 30 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

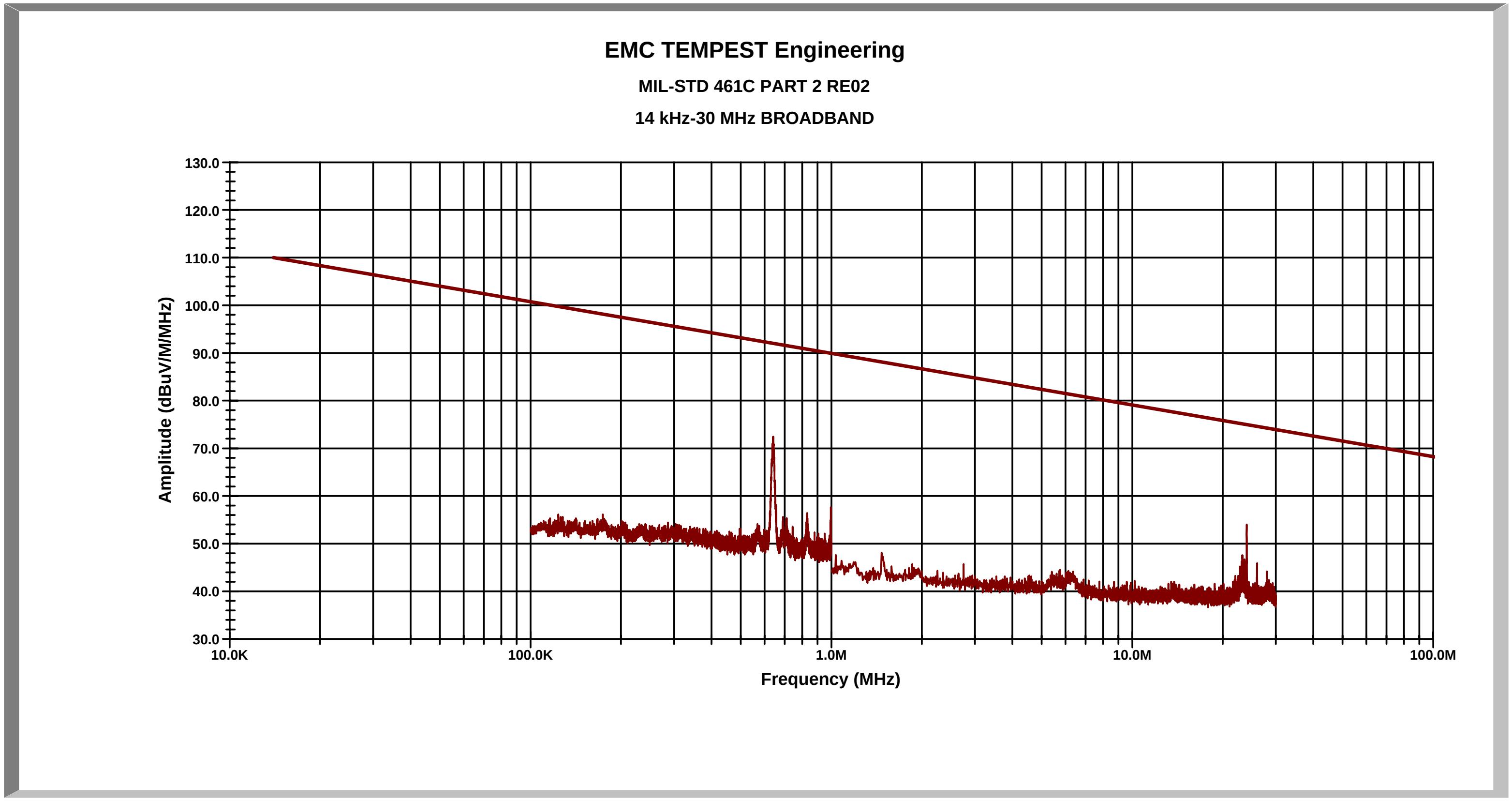


Figure 12-22. Results of RE02 Broadband Emissions Testing – Run 06b Vertical Antennas @ Position #1 (100 kHz – 30 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

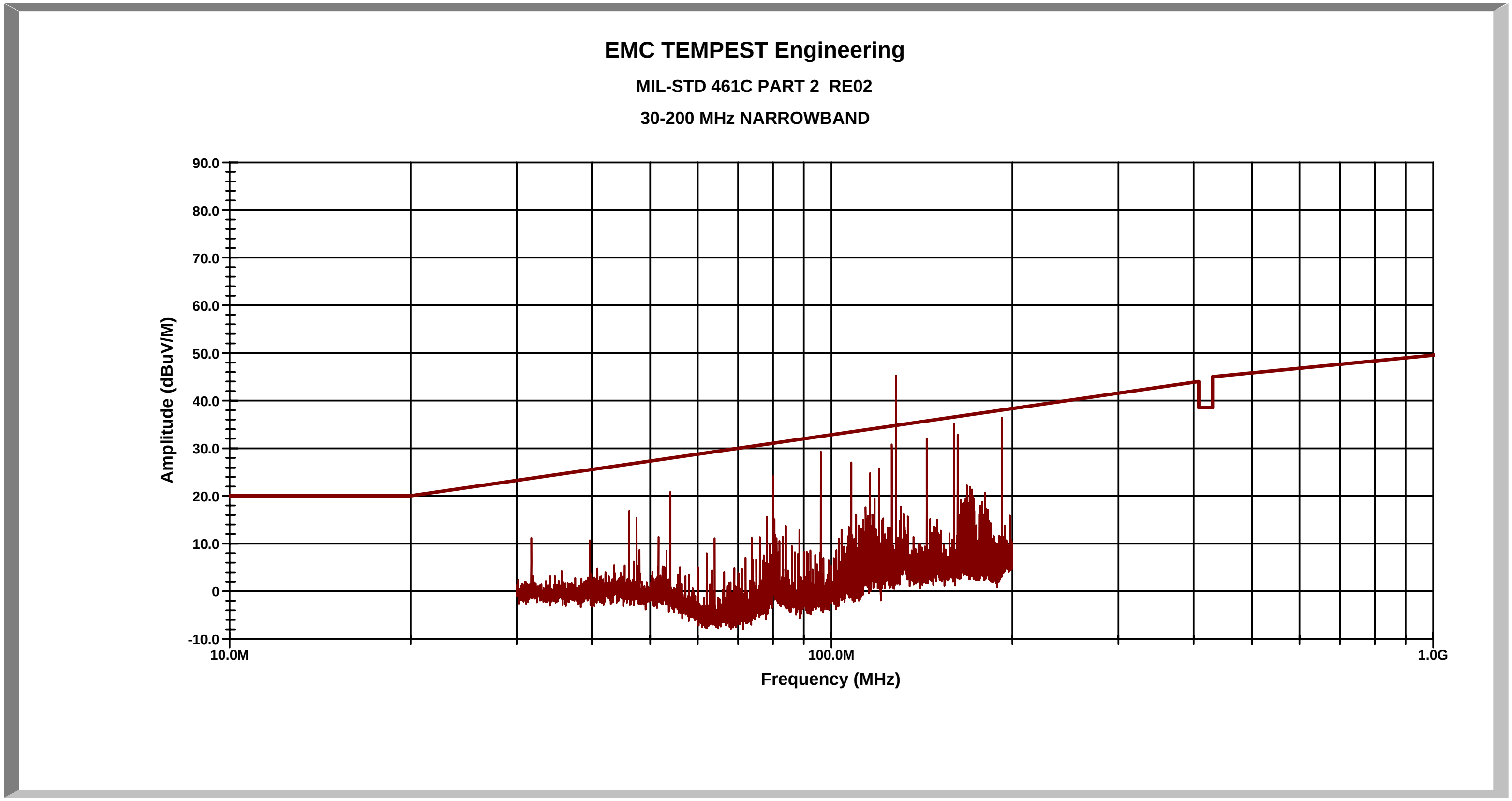


Figure 12-23. Results of RE02 Narrowband Emissions Testing – Run 06c Vertical Antennas @ Position #1 (30 – 200 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

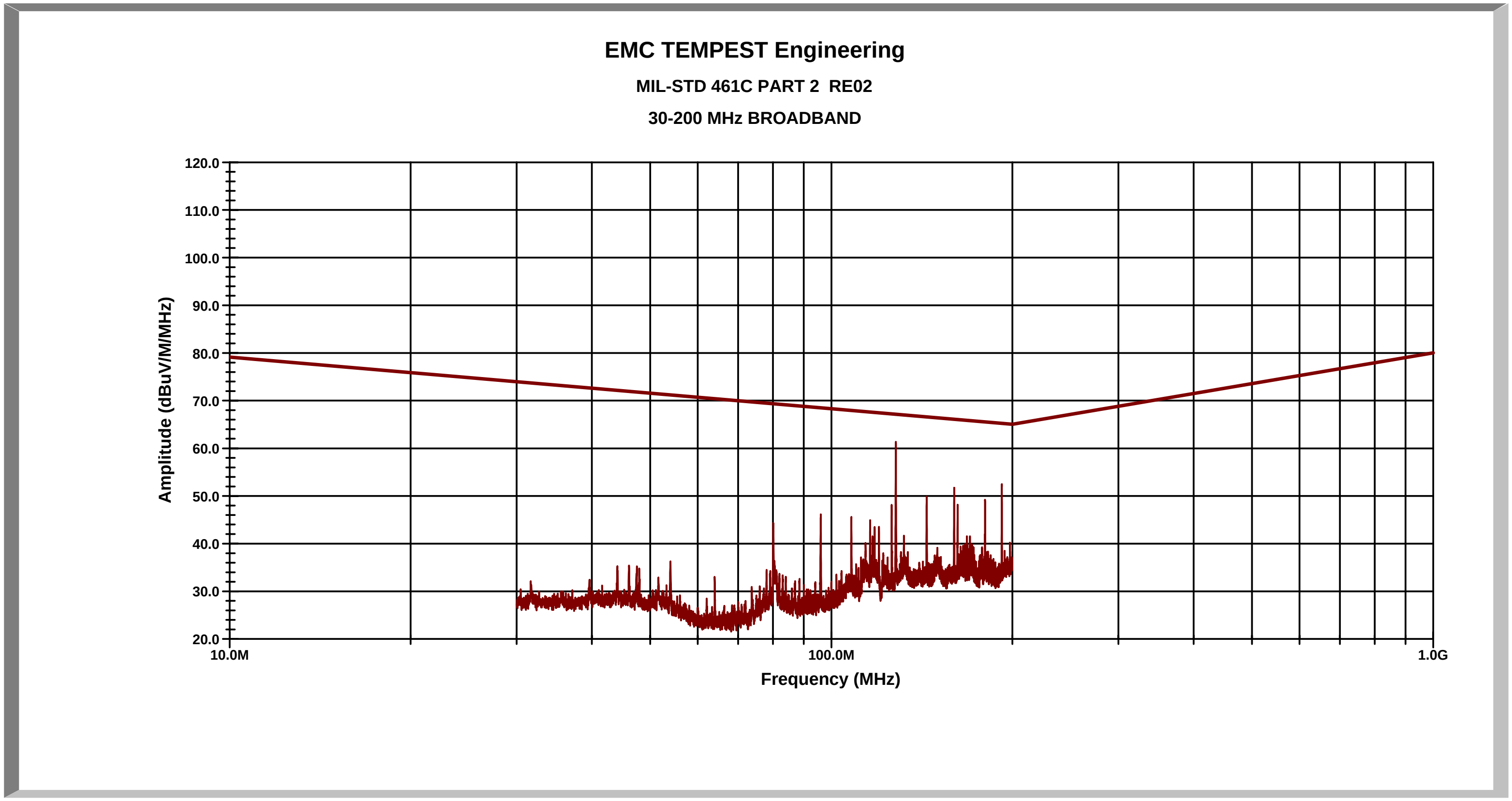


Figure 12-24. Results of RE02 Broadband Emissions Testing – Run 06d Vertical Antennas @ Position #1 (30 – 200 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

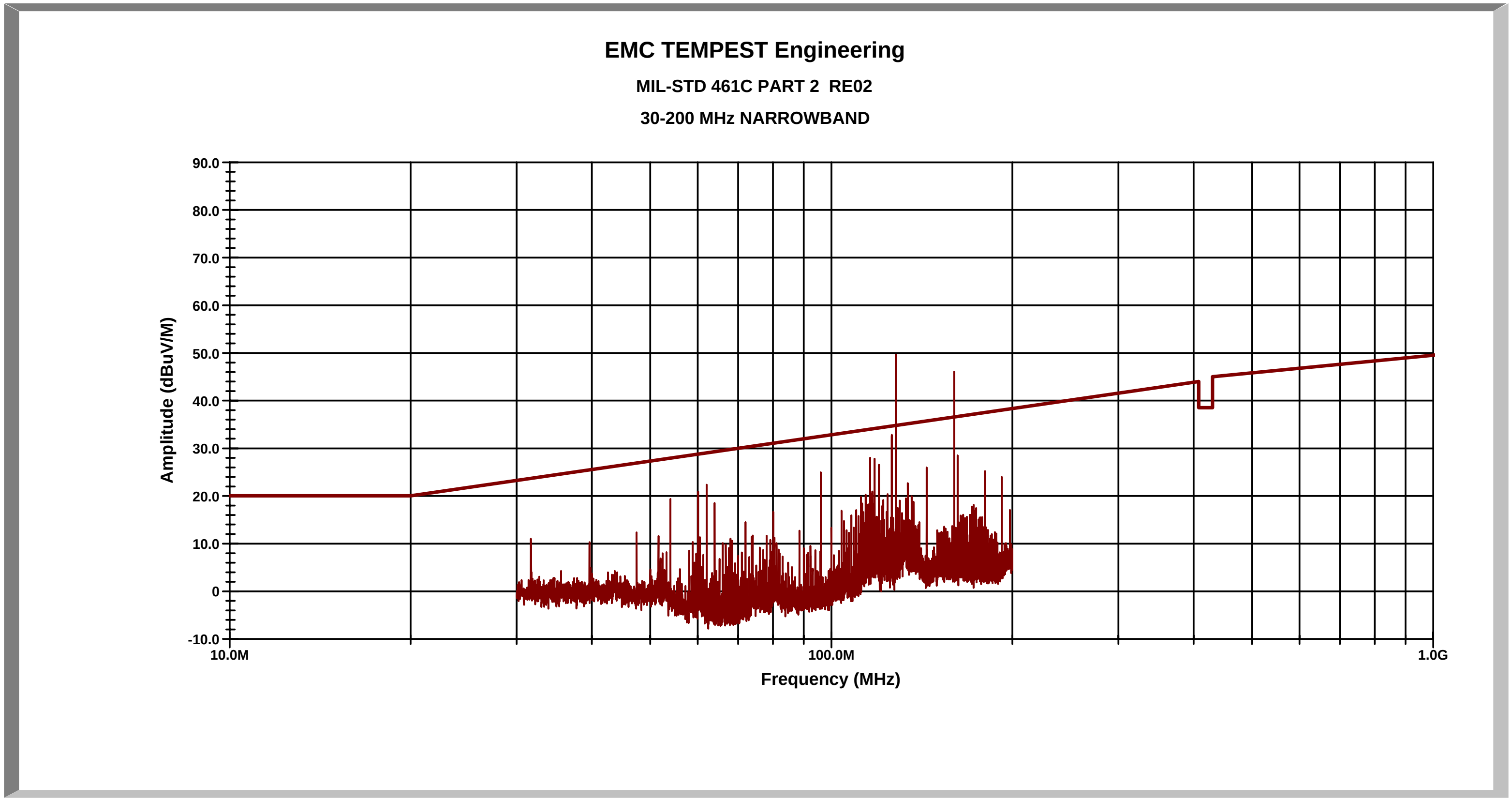


Figure 12-25. Results of RE02 Narrowband Emissions Testing – Run 06e Horizontal Antennas @ Position #1 (30 – 200 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

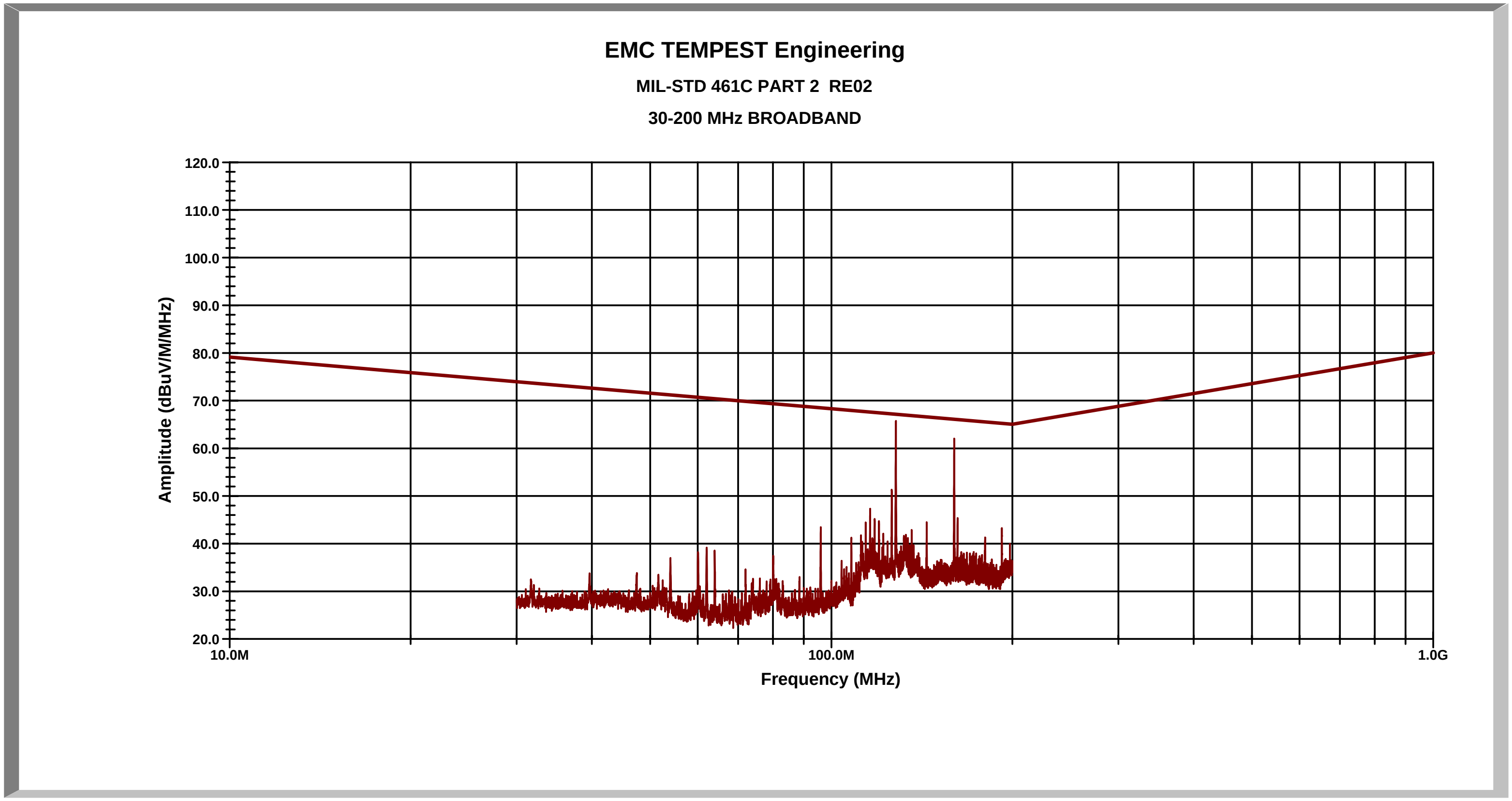


Figure 12-26. Results of RE02 Broadband Emissions Testing – Run 06f Vertical Antennas @ Position #1 (30 – 200 MHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

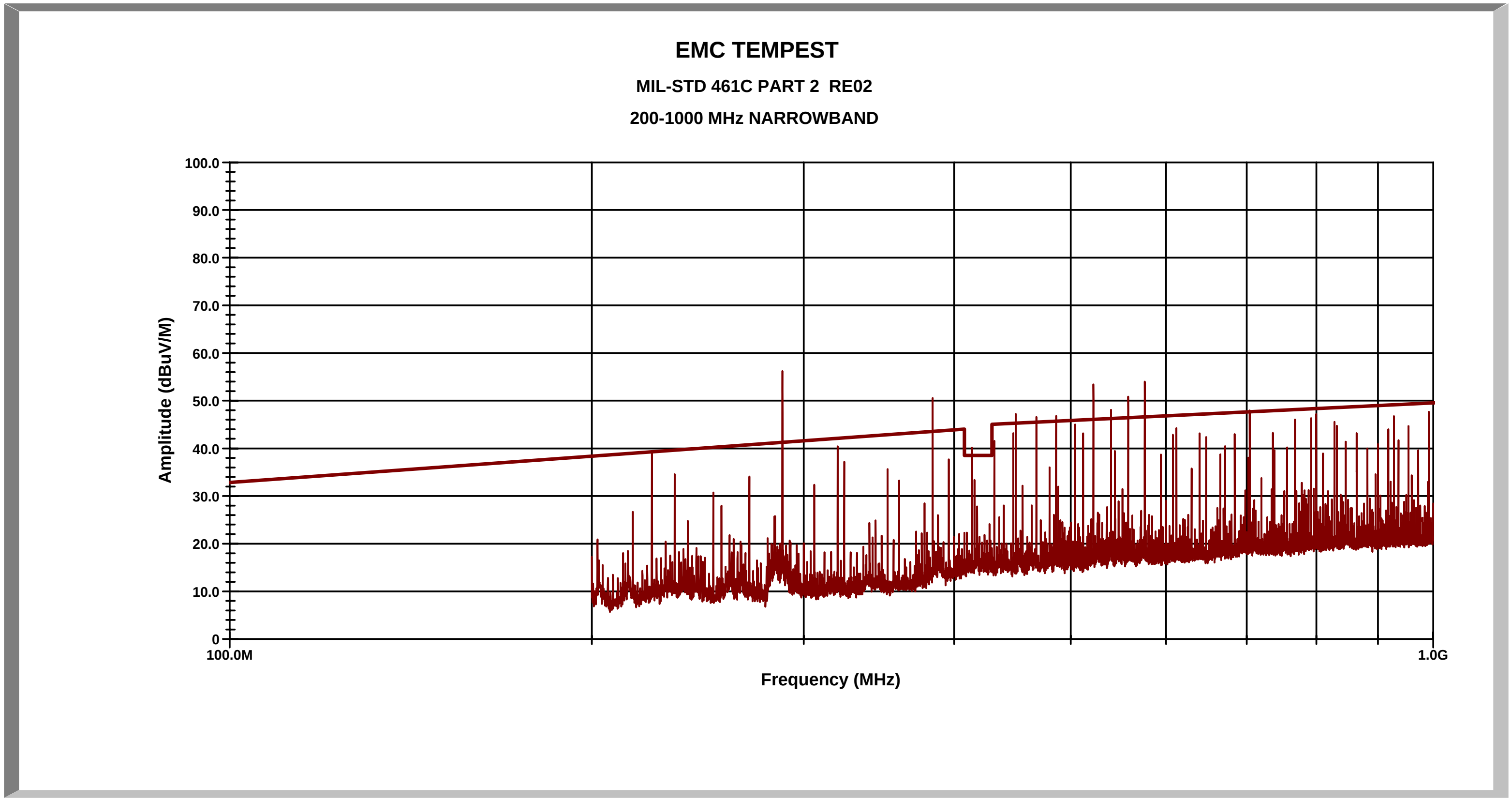


Figure 12-27. Results of RE02 Narrowband Emissions Testing – Run 06g Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

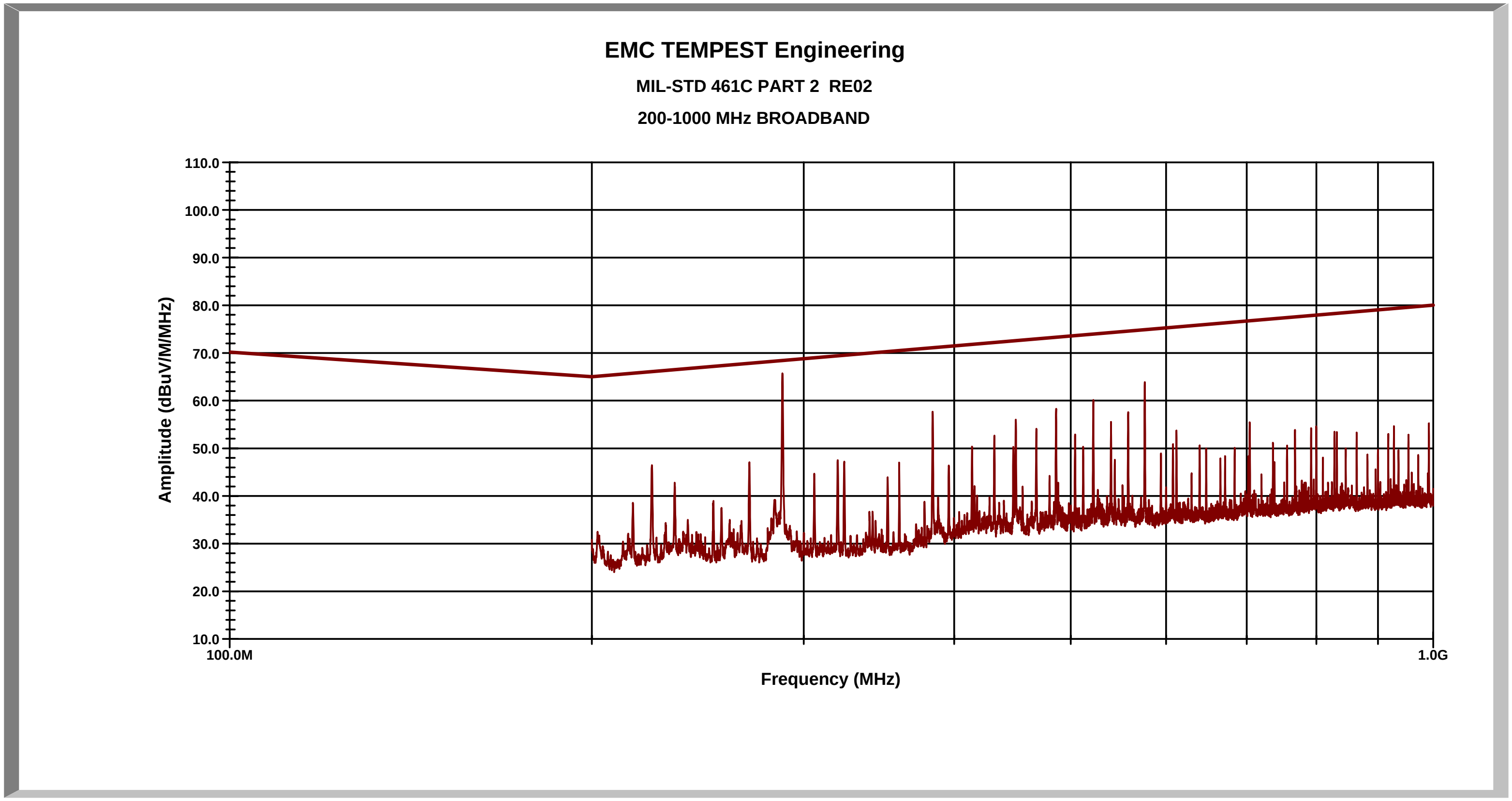


Figure 12-28. Results of RE02 Broadband Emissions Testing – Run 06h Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

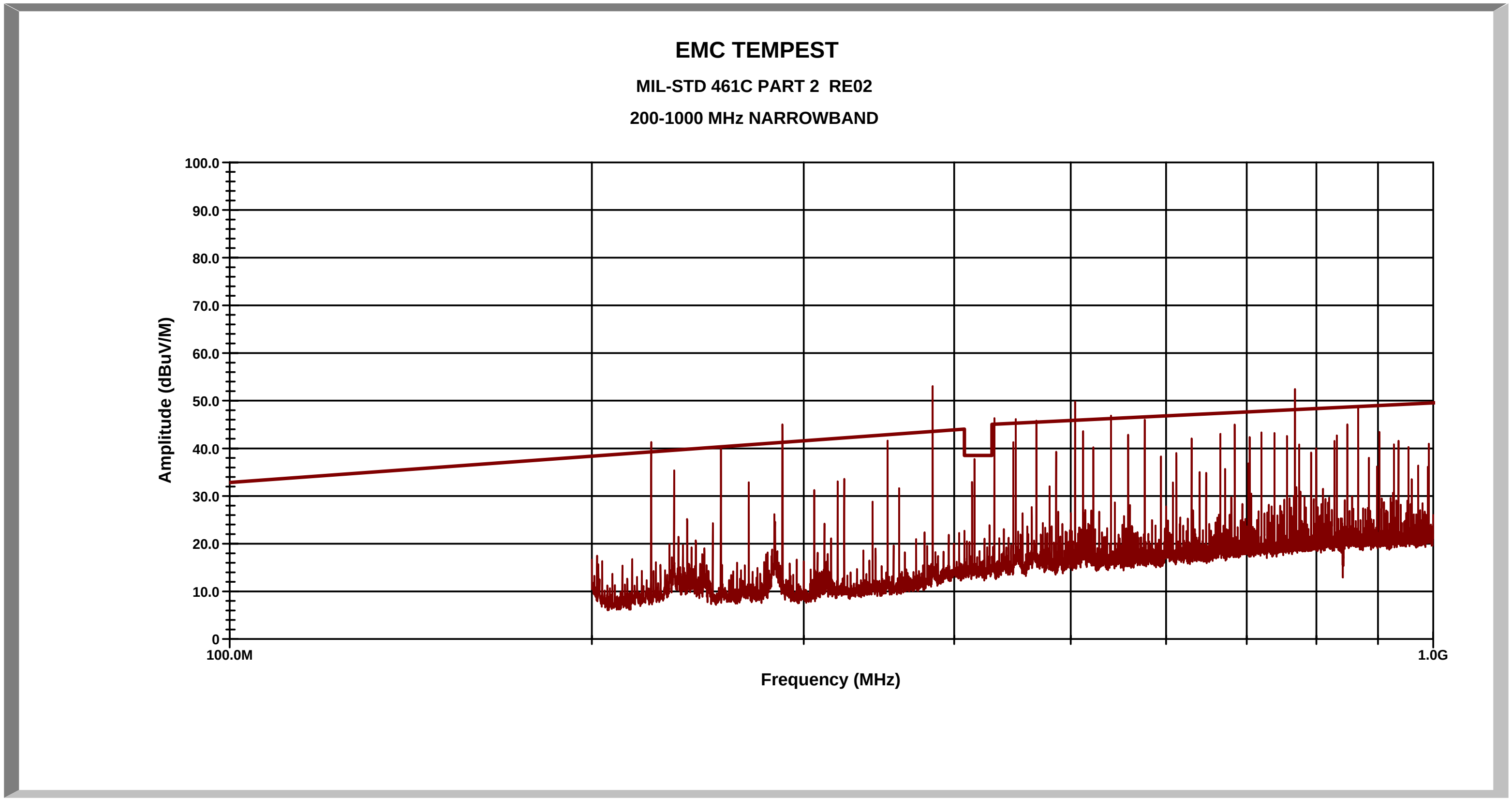


Figure 12-29. Results of RE02 Narrowband Emissions Testing – Run 06i Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

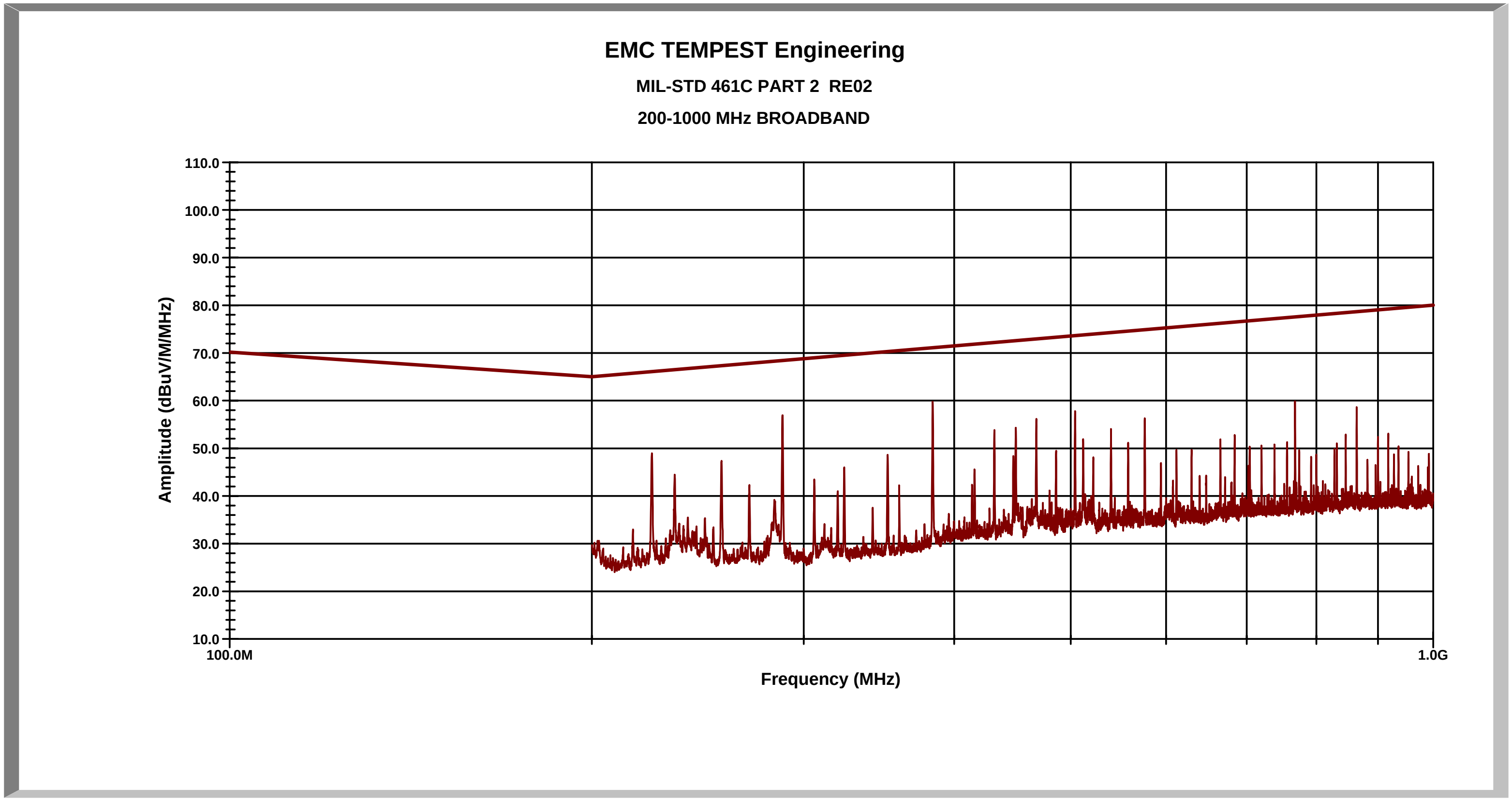


Figure 12-30. Results of RE02 Broadband Emissions Testing – Run 06j Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

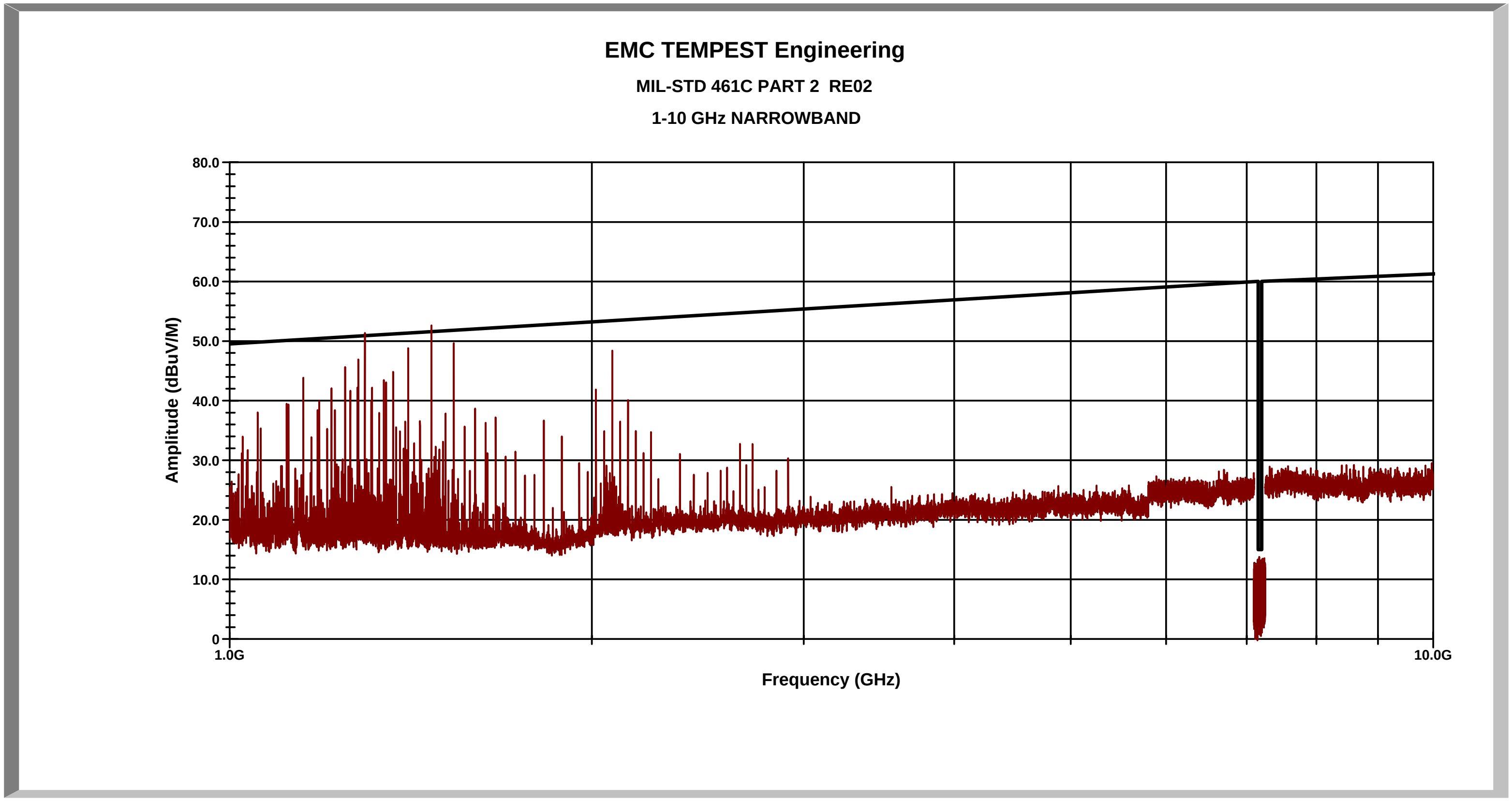


Figure 12-31. Results of RE02 Narrowband Emissions Testing – Run 06k Vertical Antennas @ Position #1 (1 – 10 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

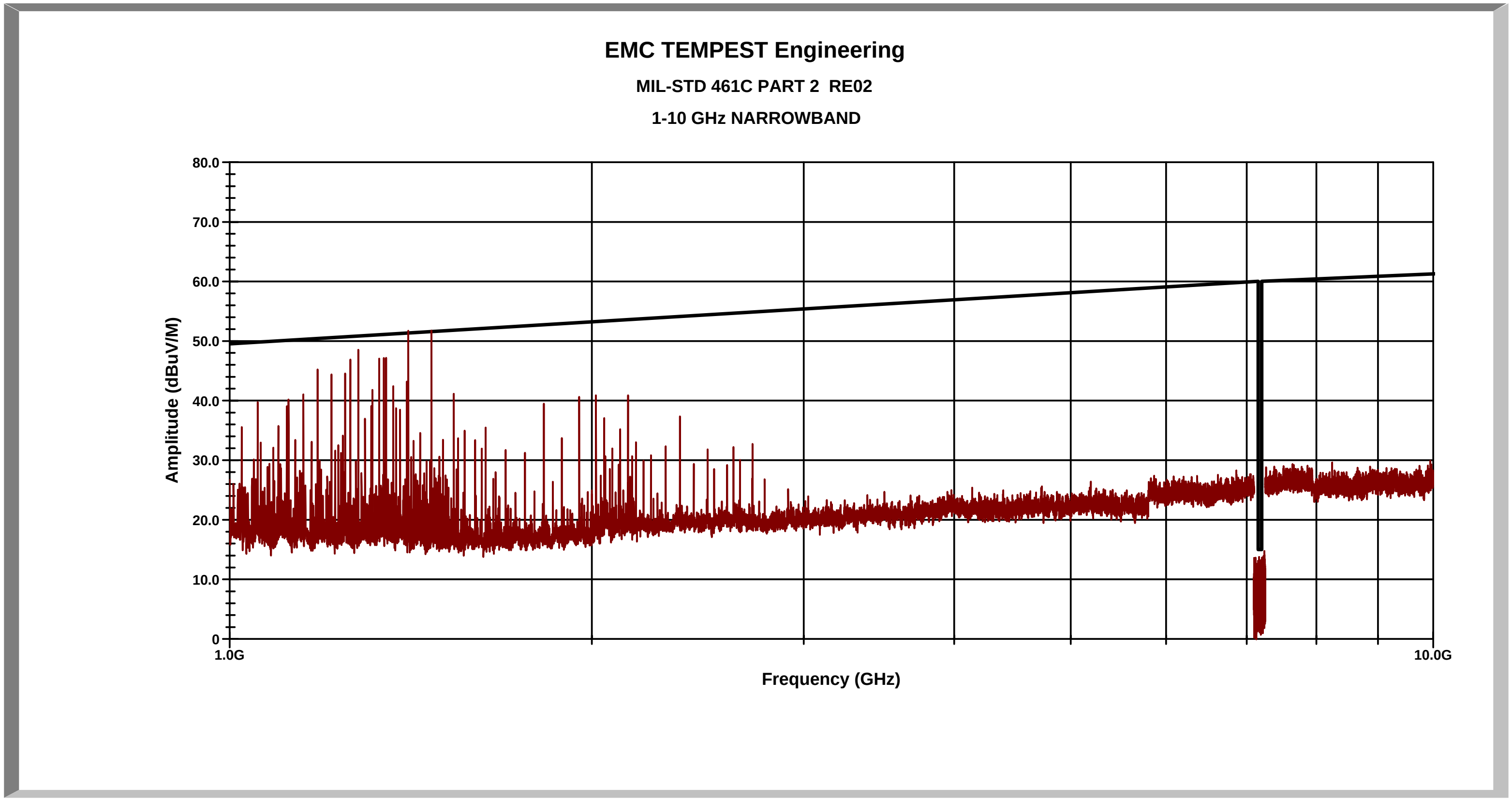


Figure 12-32. Results of RE02 Broadband Emissions Testing – Run 06I Horizontal Antennas @ Position #1 (1 – 10 GHz)
First Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

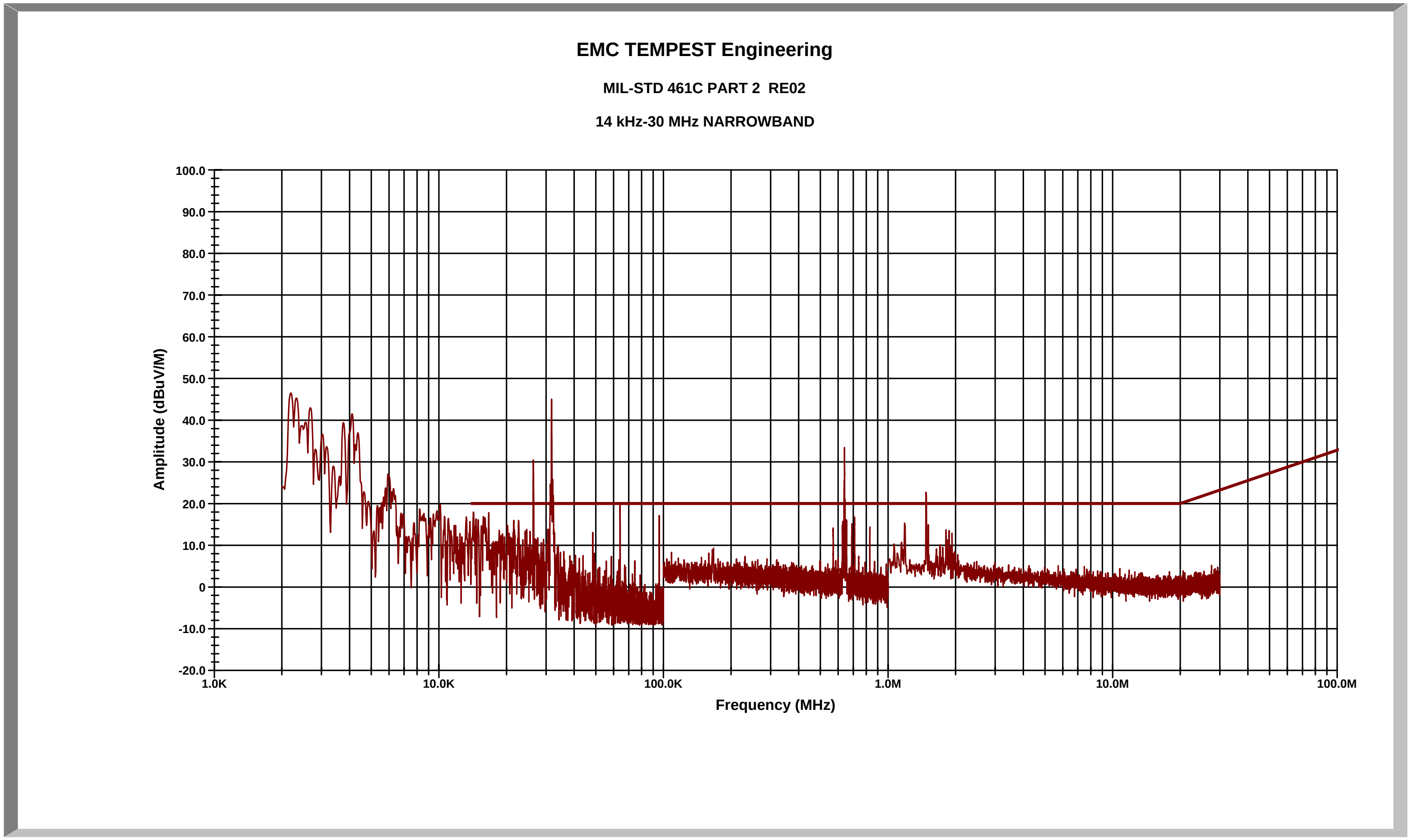


Figure 12-33. Results of RE02 Narrowband Emissions Testing – Run 07a Vertical Antennas @ Position #1 (2 kHz – 30 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) Noted emissions due to GSE

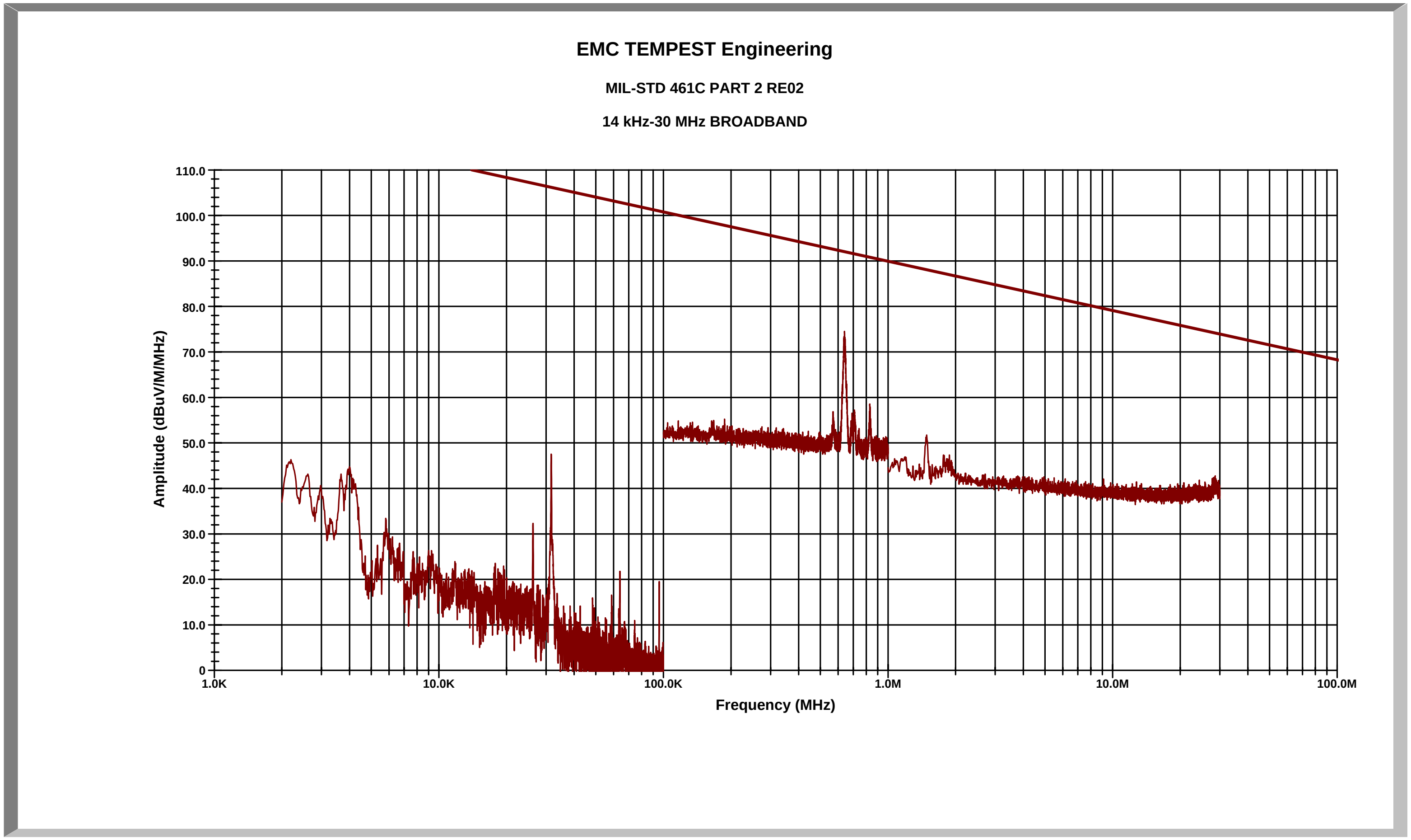


Figure 12-34. Results of RE02 Broadband Emissions Testing – Run 07b Vertical Antennas @ Position #1 (2 kHz – 30 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

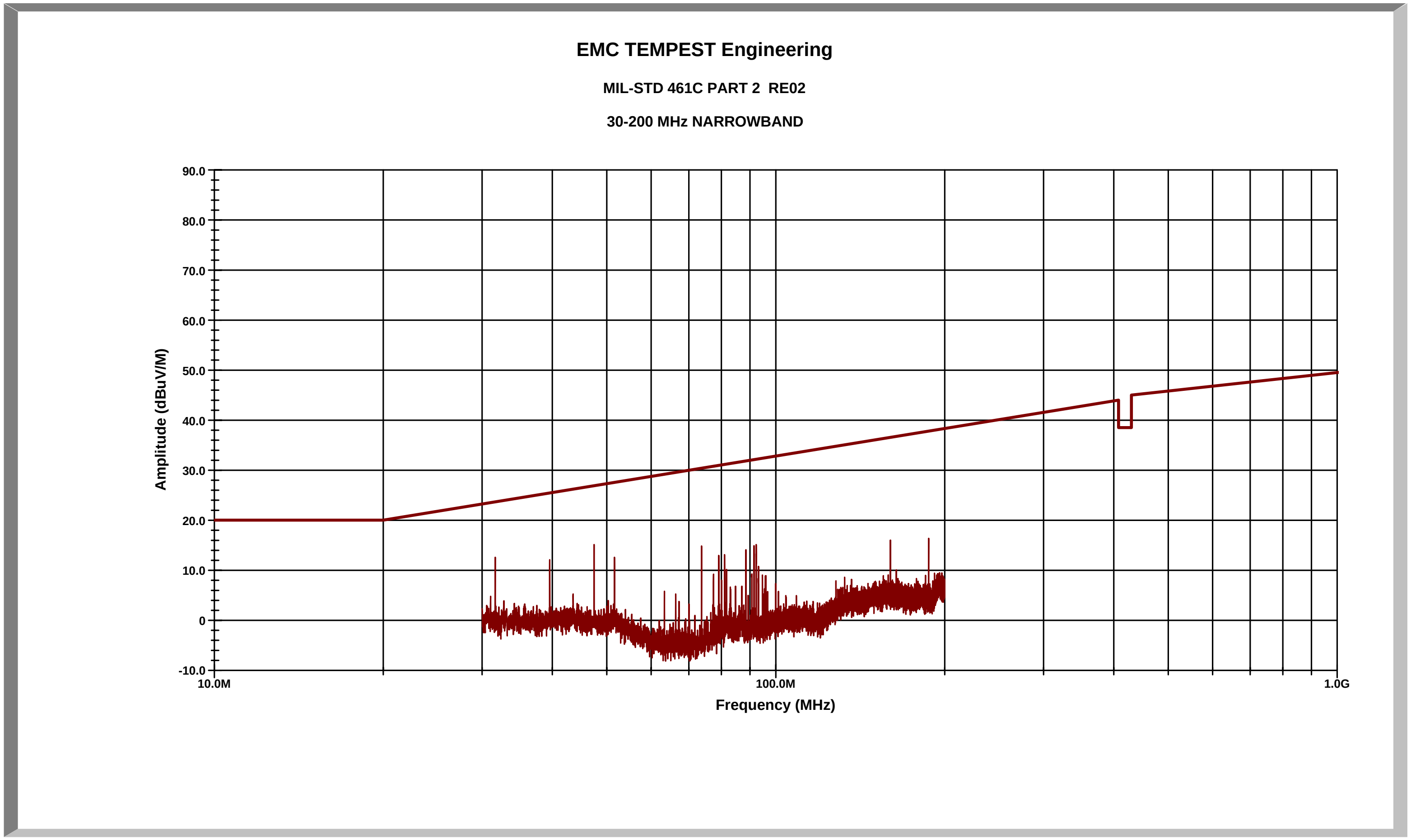


Figure 12-35. Results of RE02 Narrowband Emissions Testing – Run 07c Vertical Antennas @ Position #1 (30 – 200 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

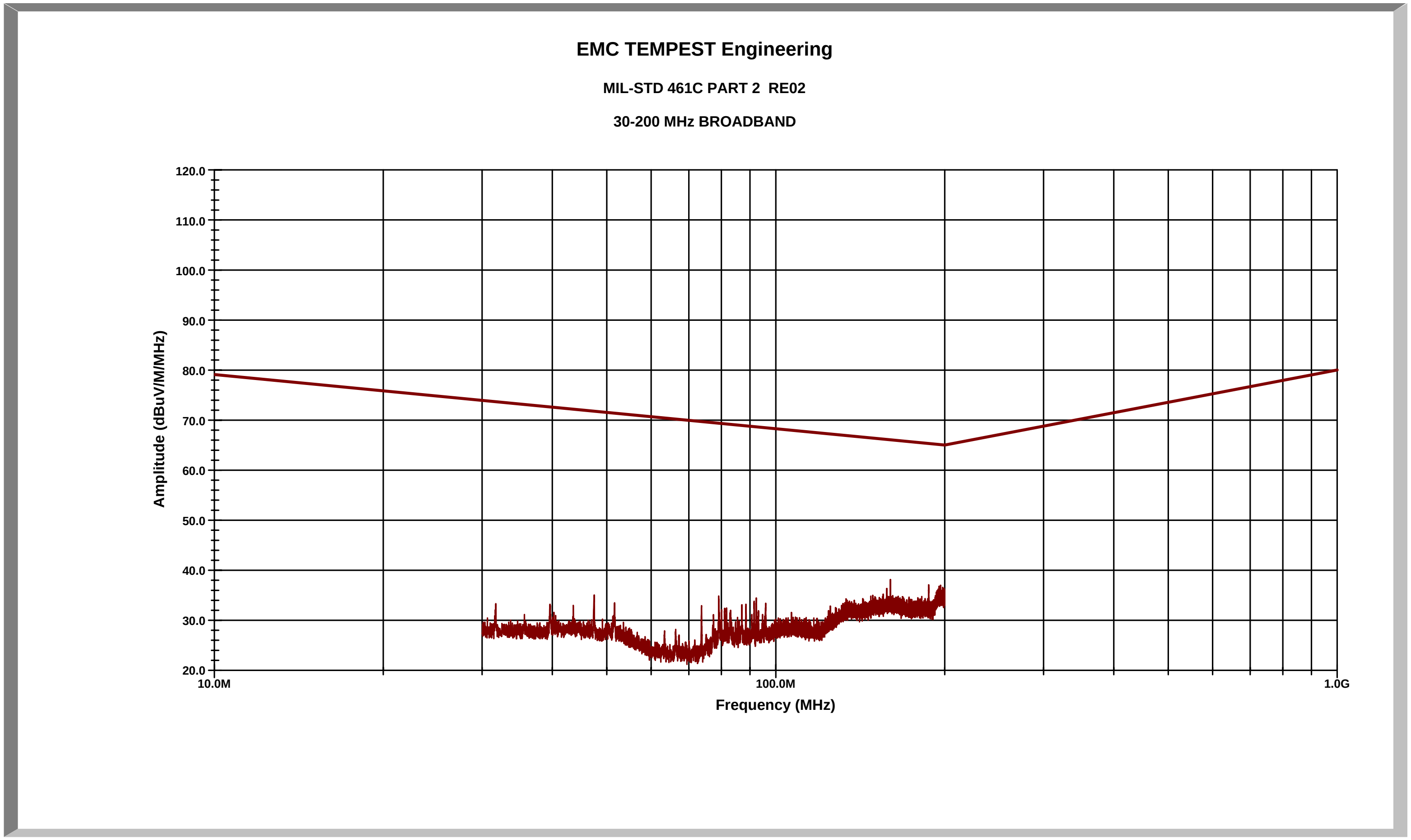


Figure 12-36. Results of RE02 Broadband Emissions Testing – Run 07d Vertical Antennas @ Position #1 (30 – 200 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

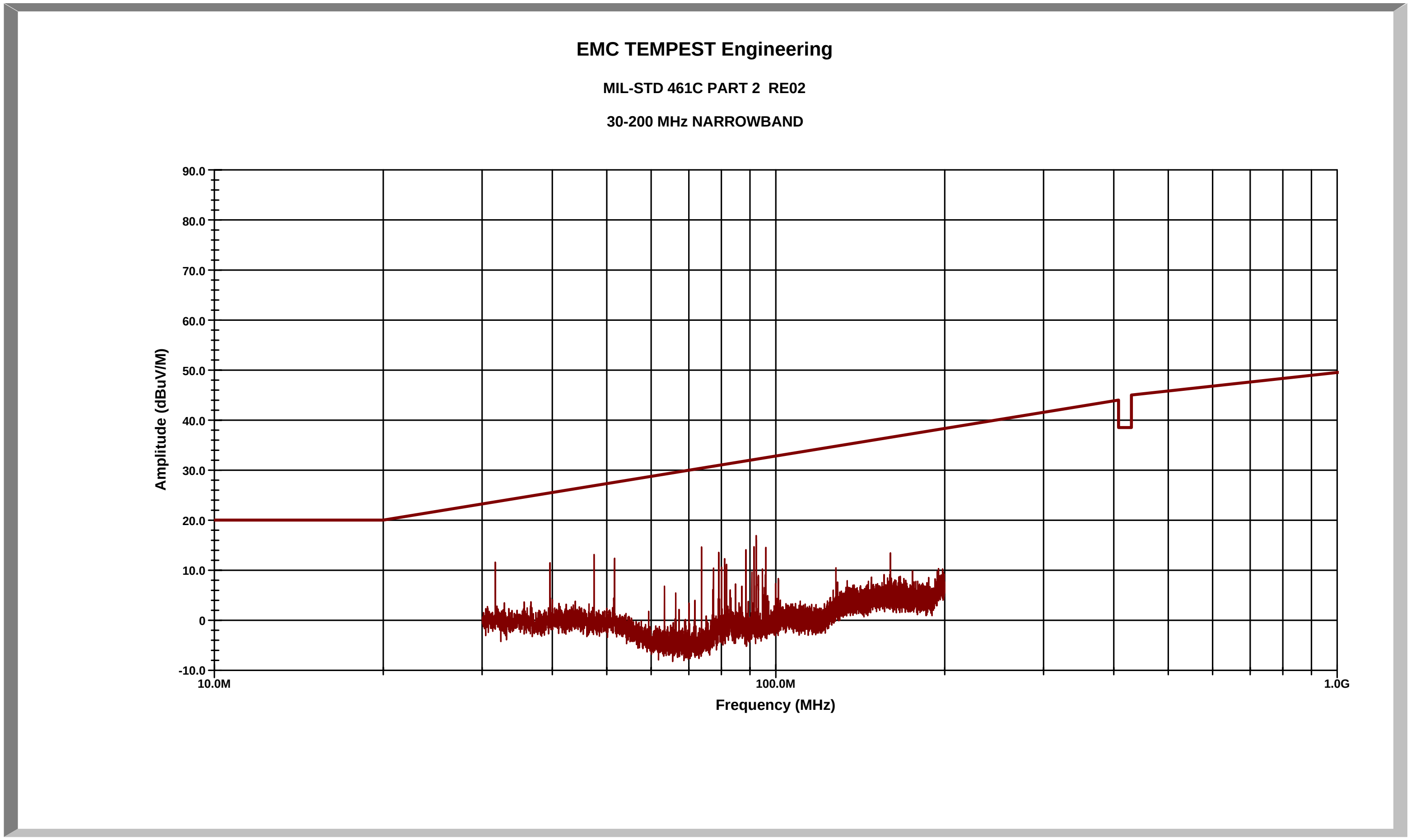


Figure 12-37. Results of RE02 Narrowband Emissions Testing – Run 07e Horizontal Antennas @ Position #1 (30 – 200 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

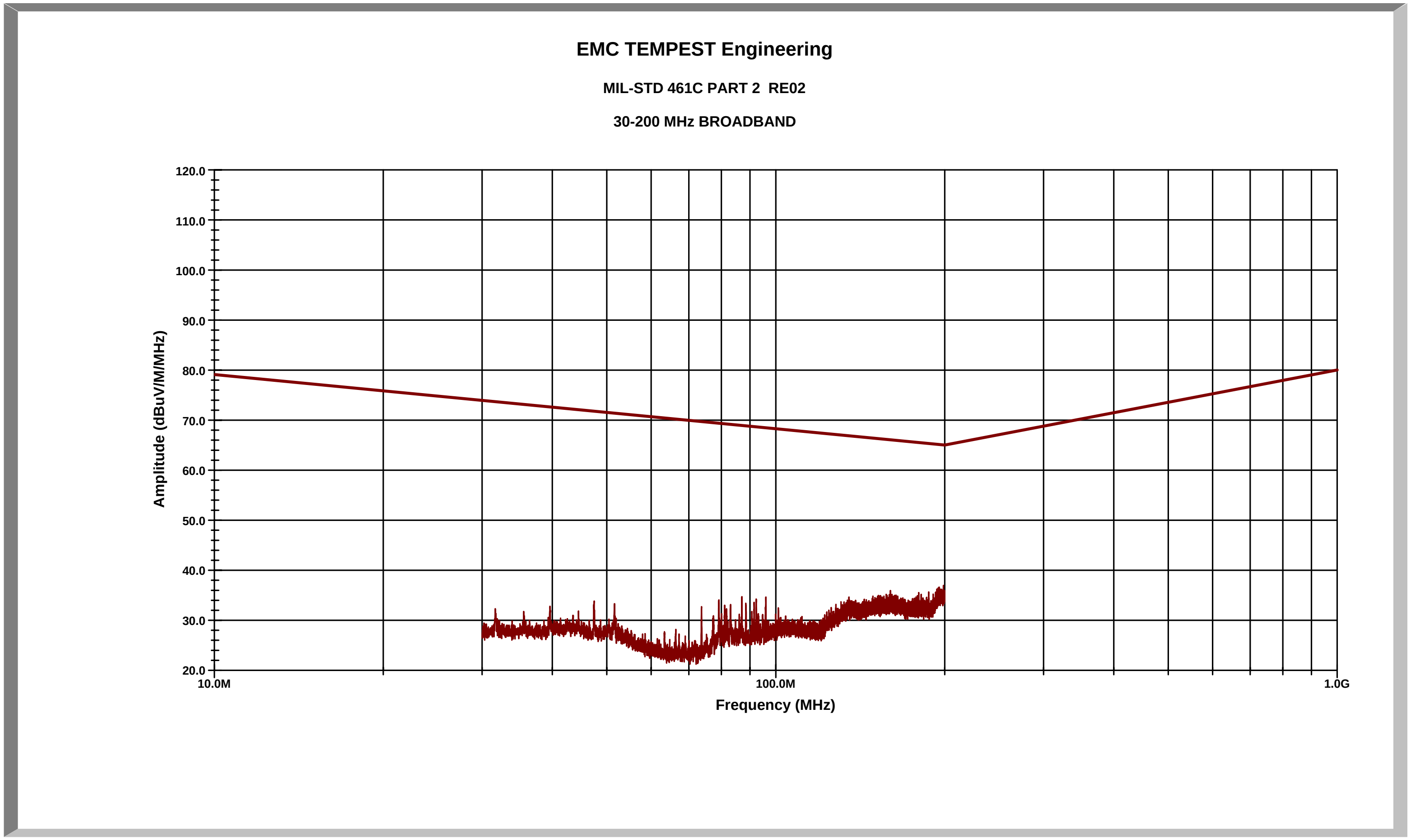


Figure 12-38. Results of RE02 Broadband Emissions Testing – Run 07f Horizontal Antennas @ Position #1 (30 – 200 MHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

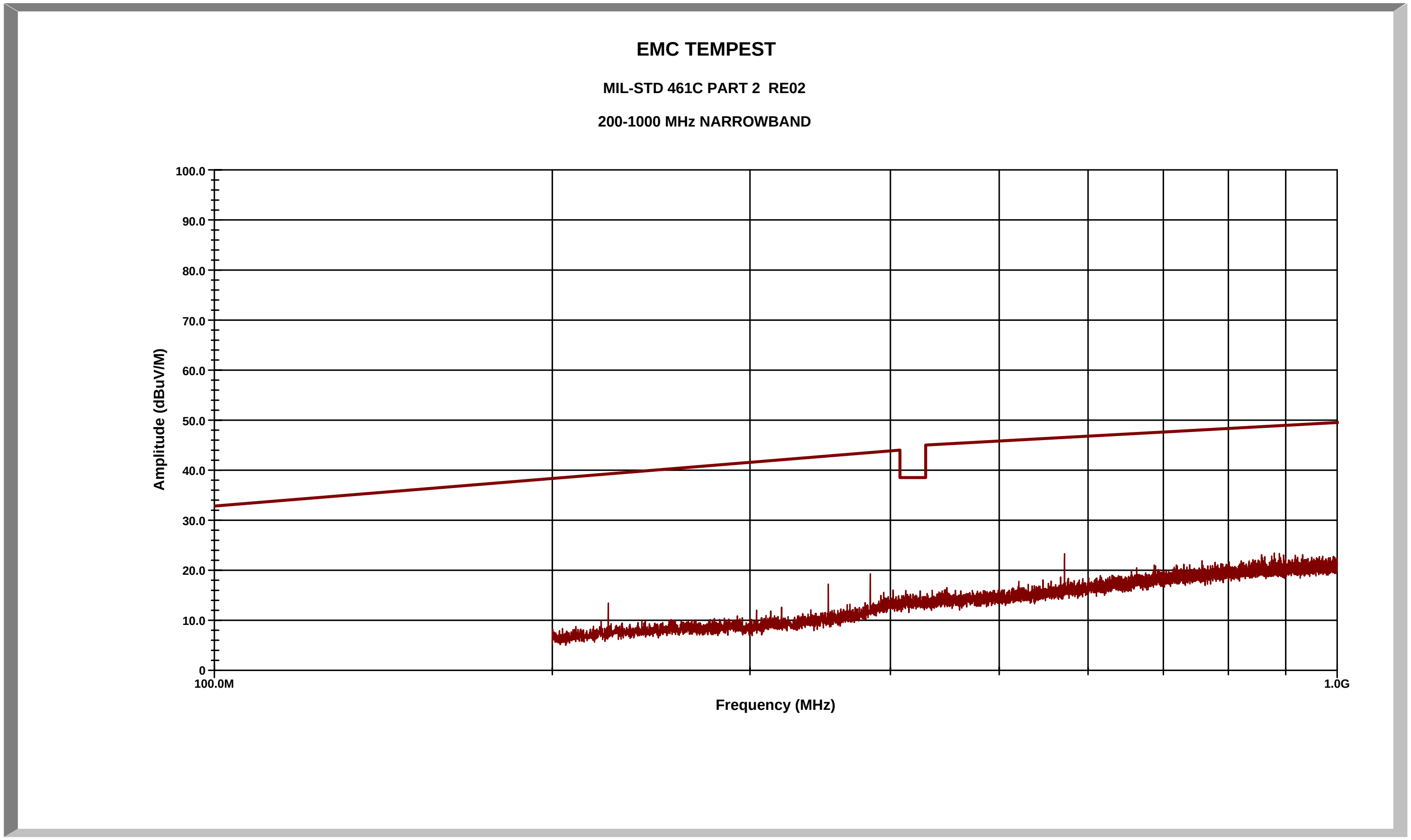


Figure 12-39. Results of RE02 Narrowband Emissions Testing – Run 07g Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

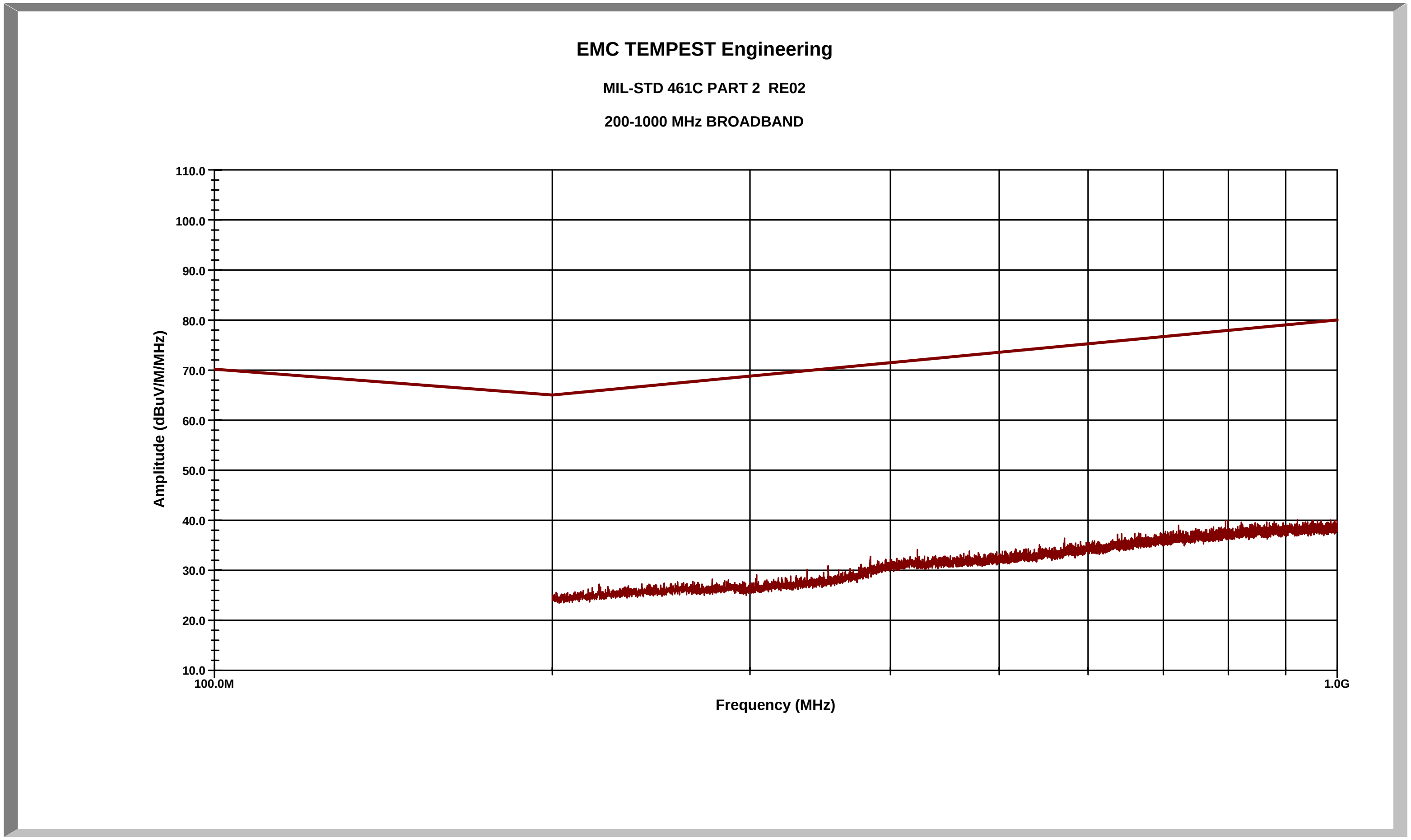


Figure 12-40. Results of RE02 Broadband Emissions Testing – Run 07h Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON)

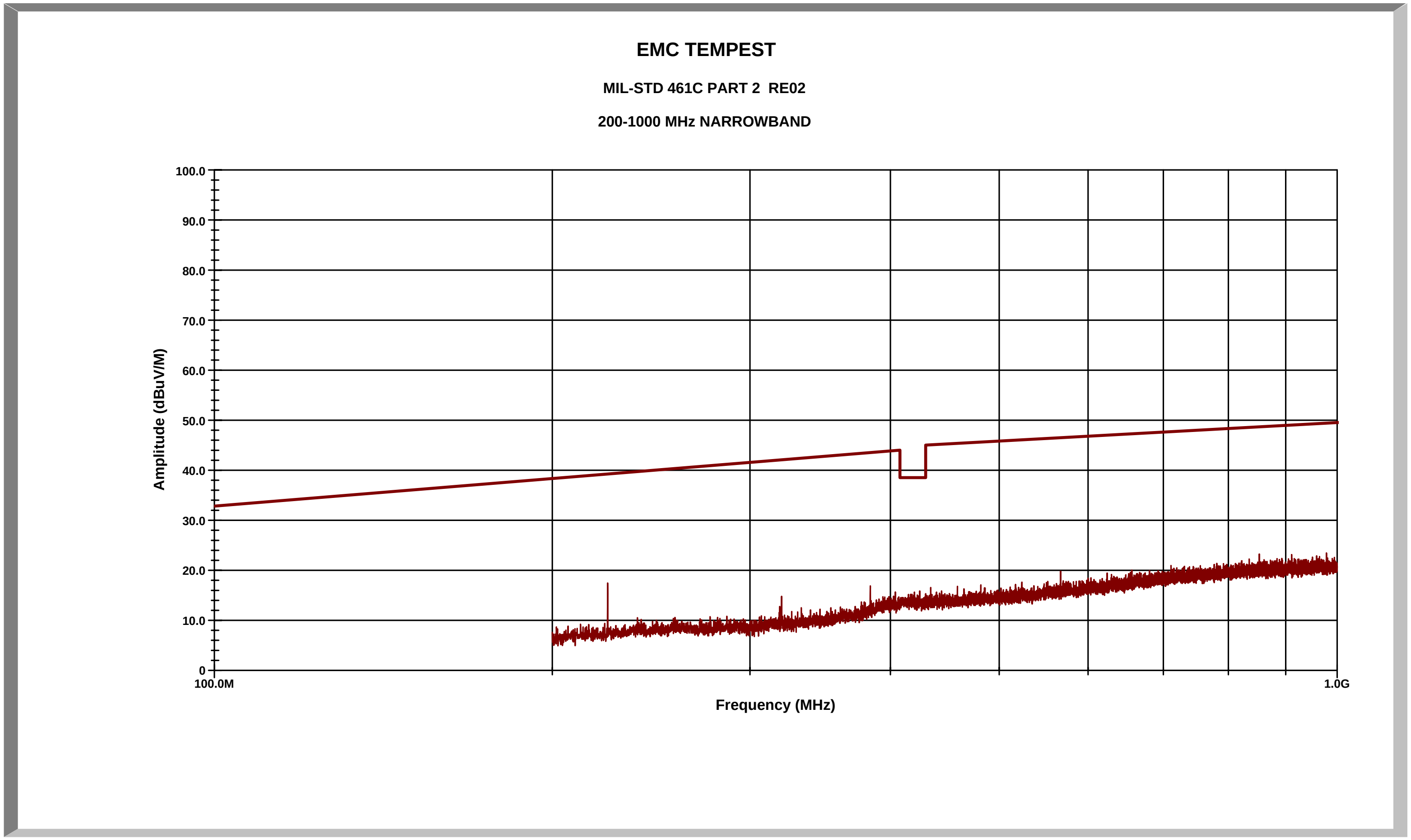


Figure 12-41. Results of RE02 Narrowband Emissions Testing – Run 07i Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

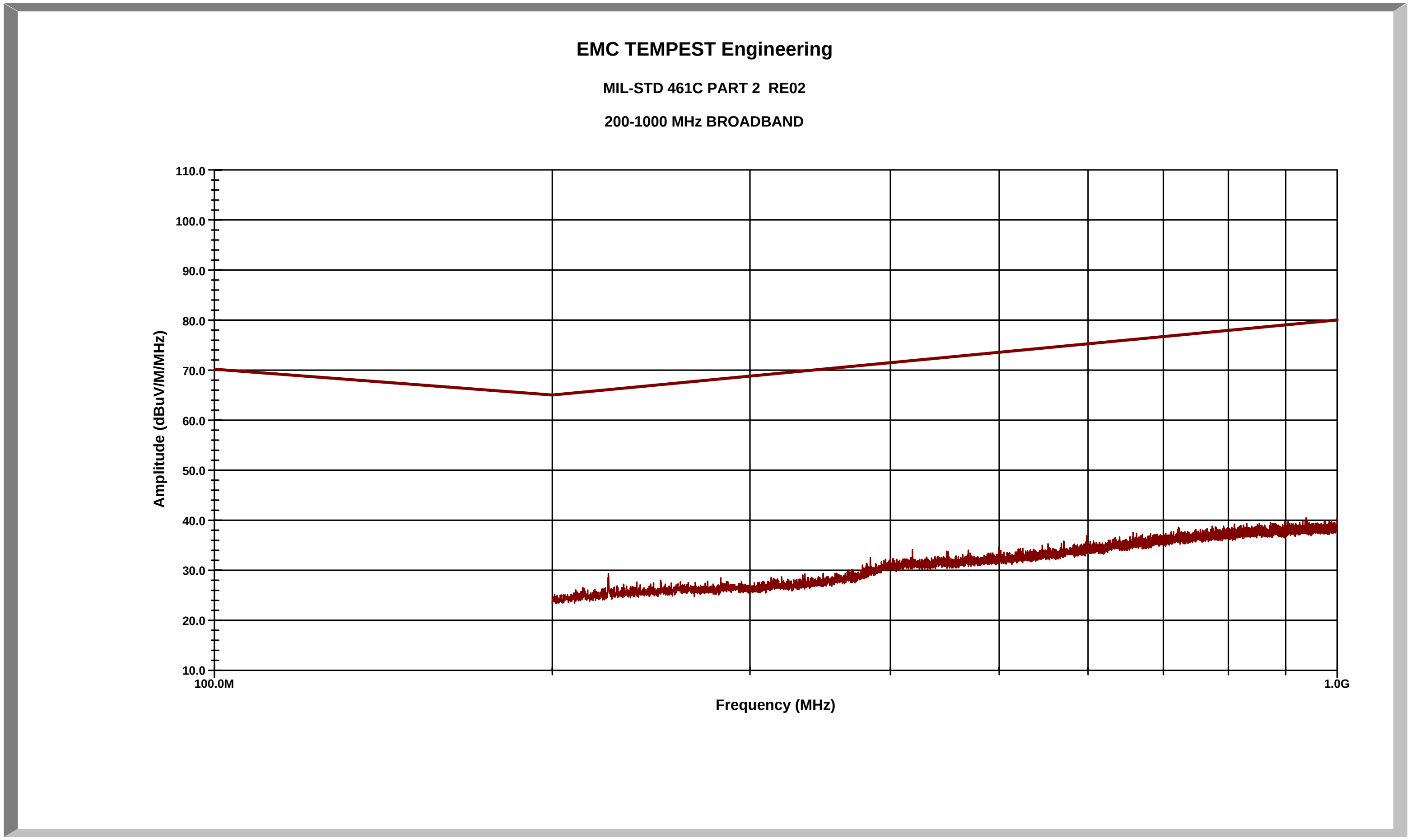


Figure 12-42. Results of RE02 Broadband Emissions Testing – Run 07j Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON)

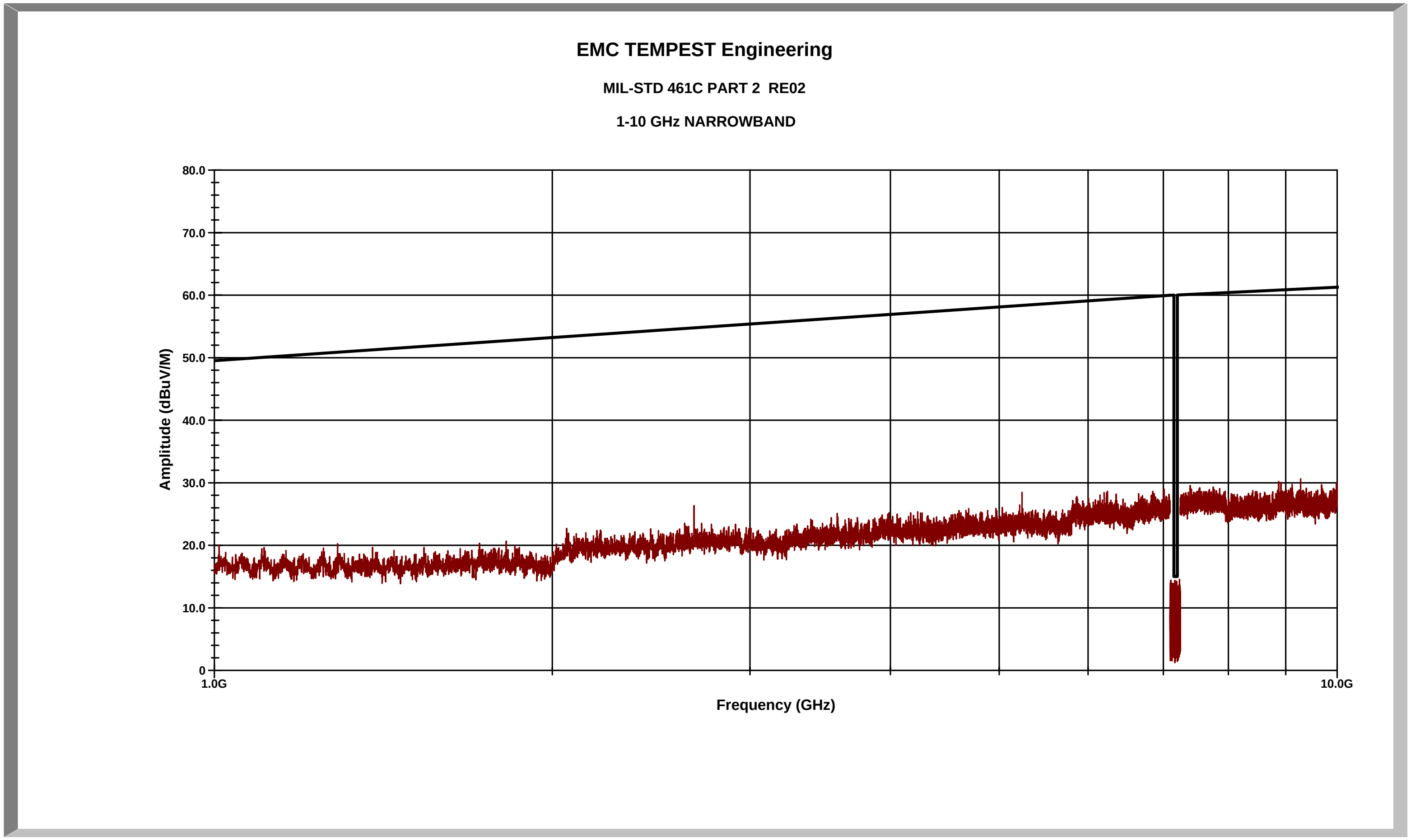


Figure 12-43. Results of RE02 Narrowband Emissions Testing – Run 07k Vertical Antennas @ Position #1 (1 – 10 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

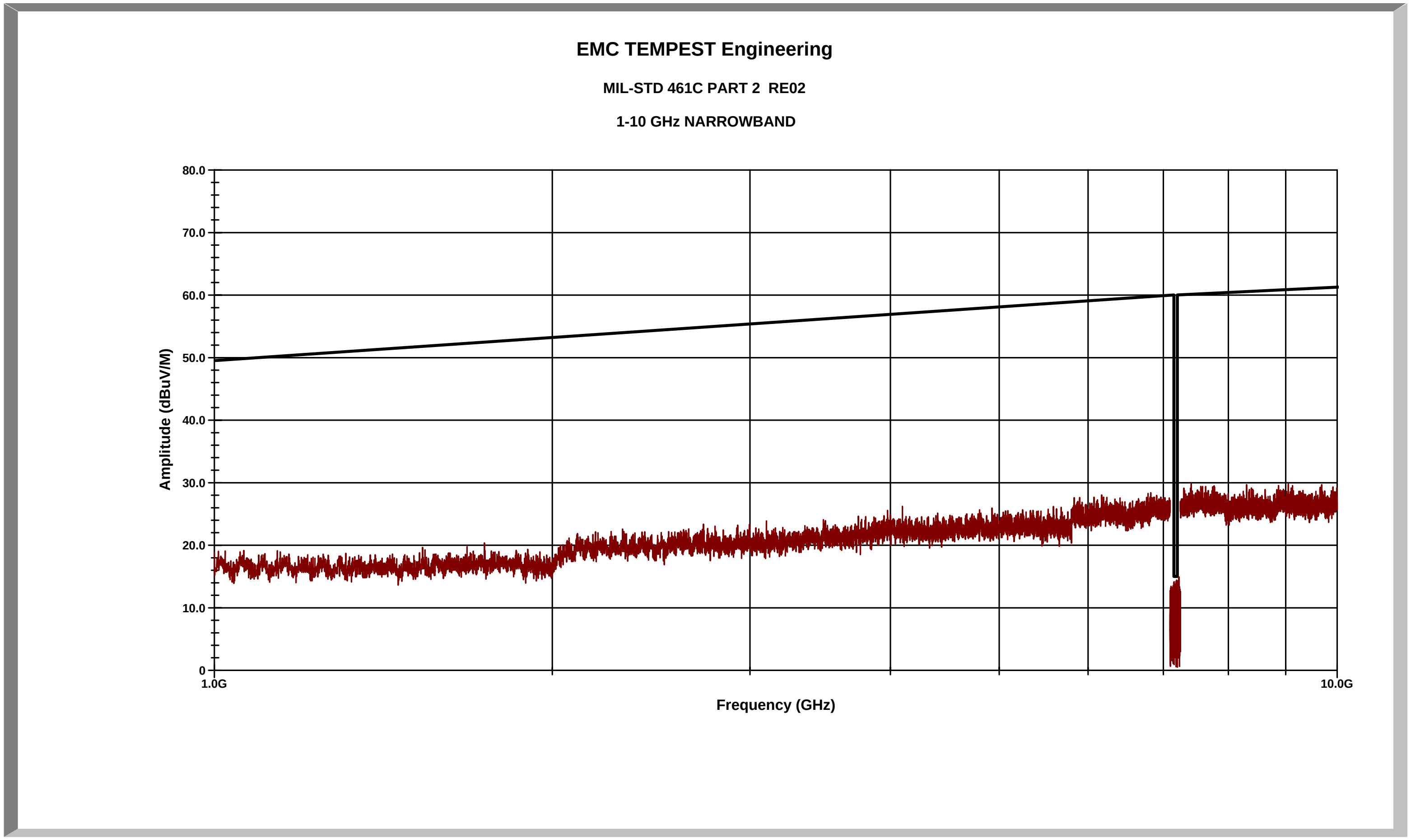


Figure 12-44. Results of RE02 Narrowband Emissions Testing – Run 07I Horizontal Antennas @ Position #1 (1 – 10 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON) - Noted emissions due to GSE

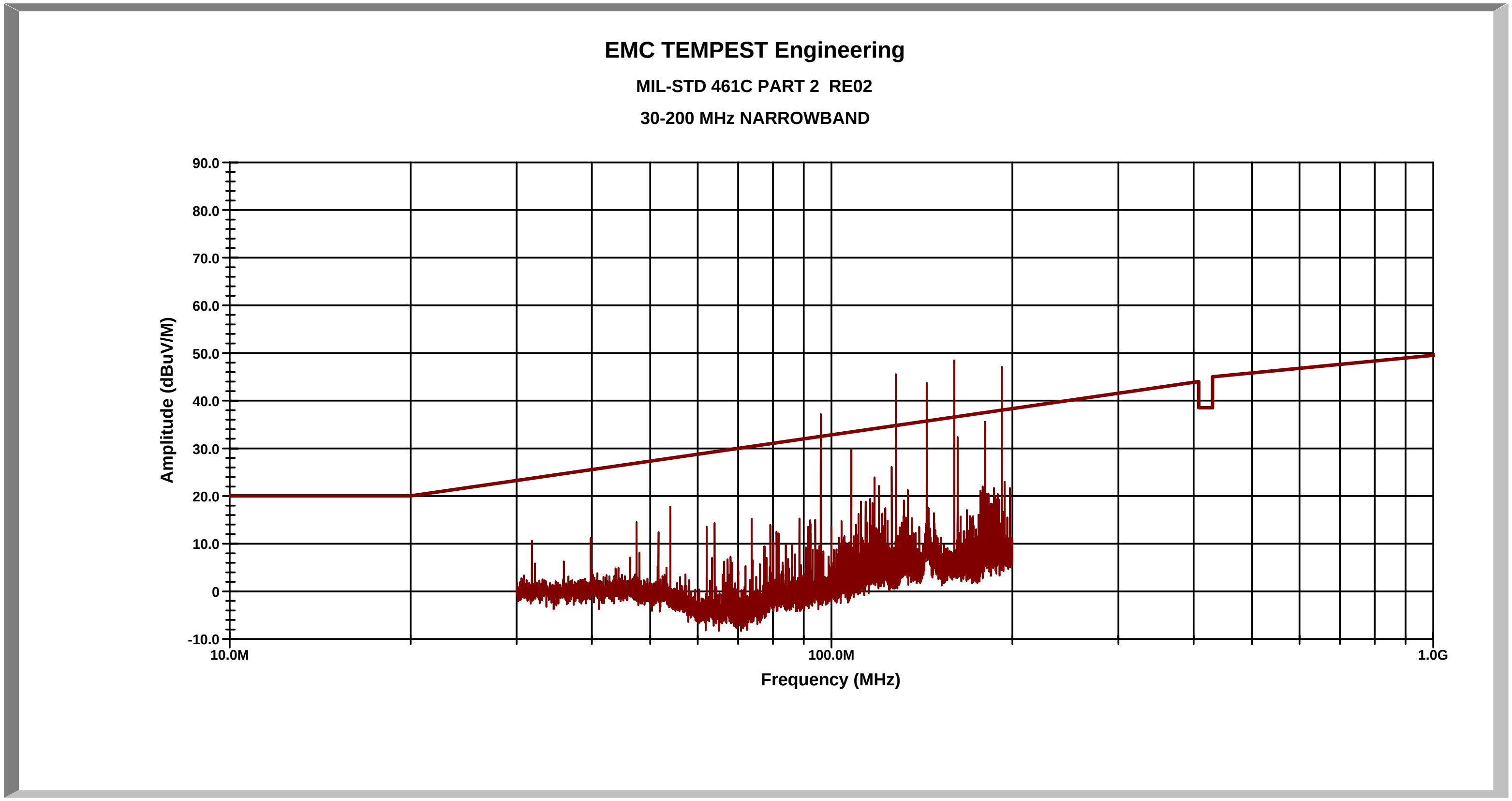


Figure 12-45. Results of RE02 Narrowband Emissions Testing – Run 08a Vertical Antennas @ Position #1 (30 – 200 MHz)
Quick Diagnostic Run – SET to SEP Cable Foil Shielded

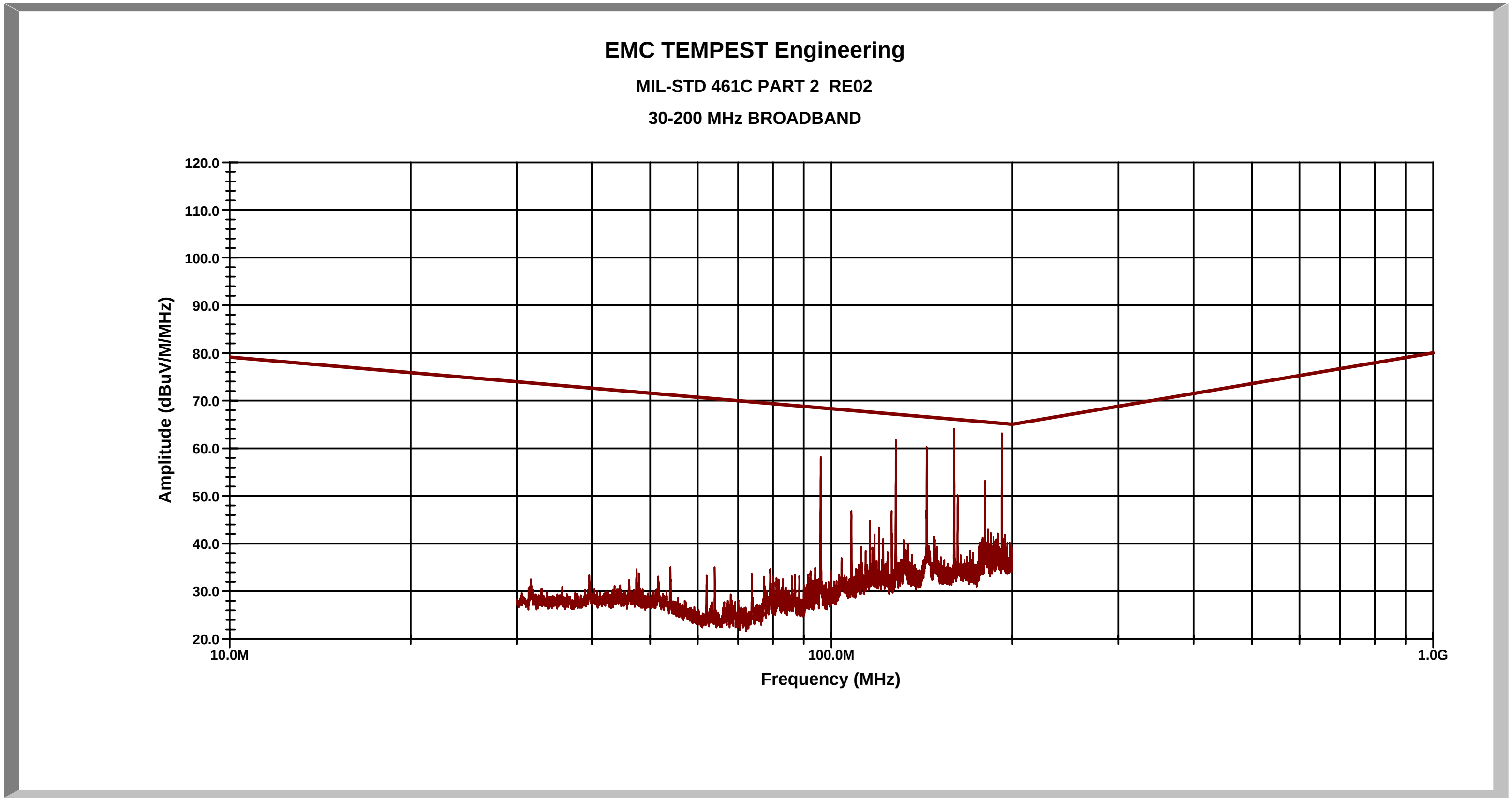


Figure 12-46. Results of RE02 Broadband Emissions Testing – Run 08b Vertical Antennas @ Position #1 (30 – 200 MHz)
Quick Diagnostic Run – SET to SEP Cable Foil Shielded

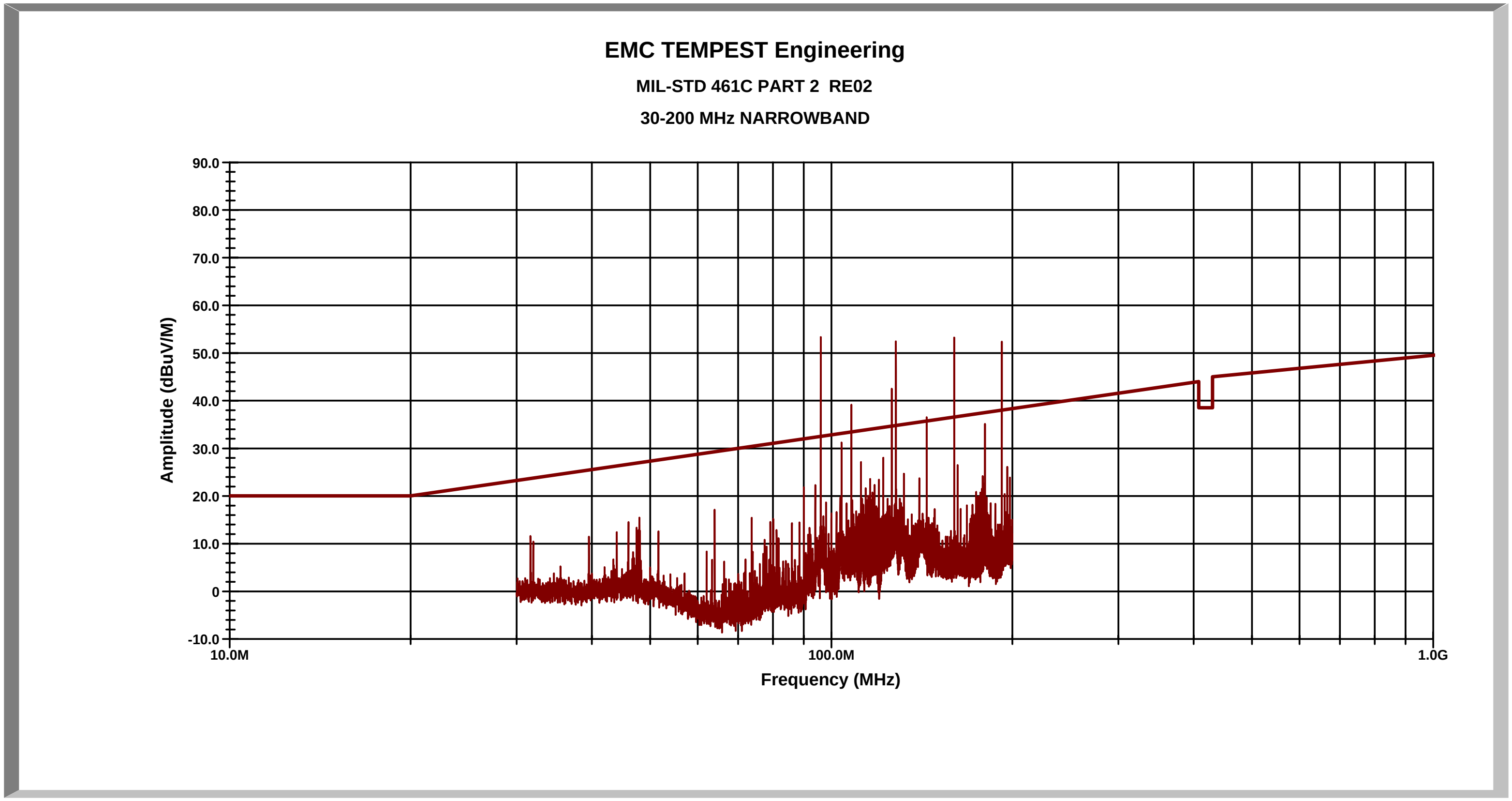


Figure 12-47. Results of RE02 Narrowband Emissions Testing – Run 09a Vertical Antennas @ Position #1 (30 – 200 MHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

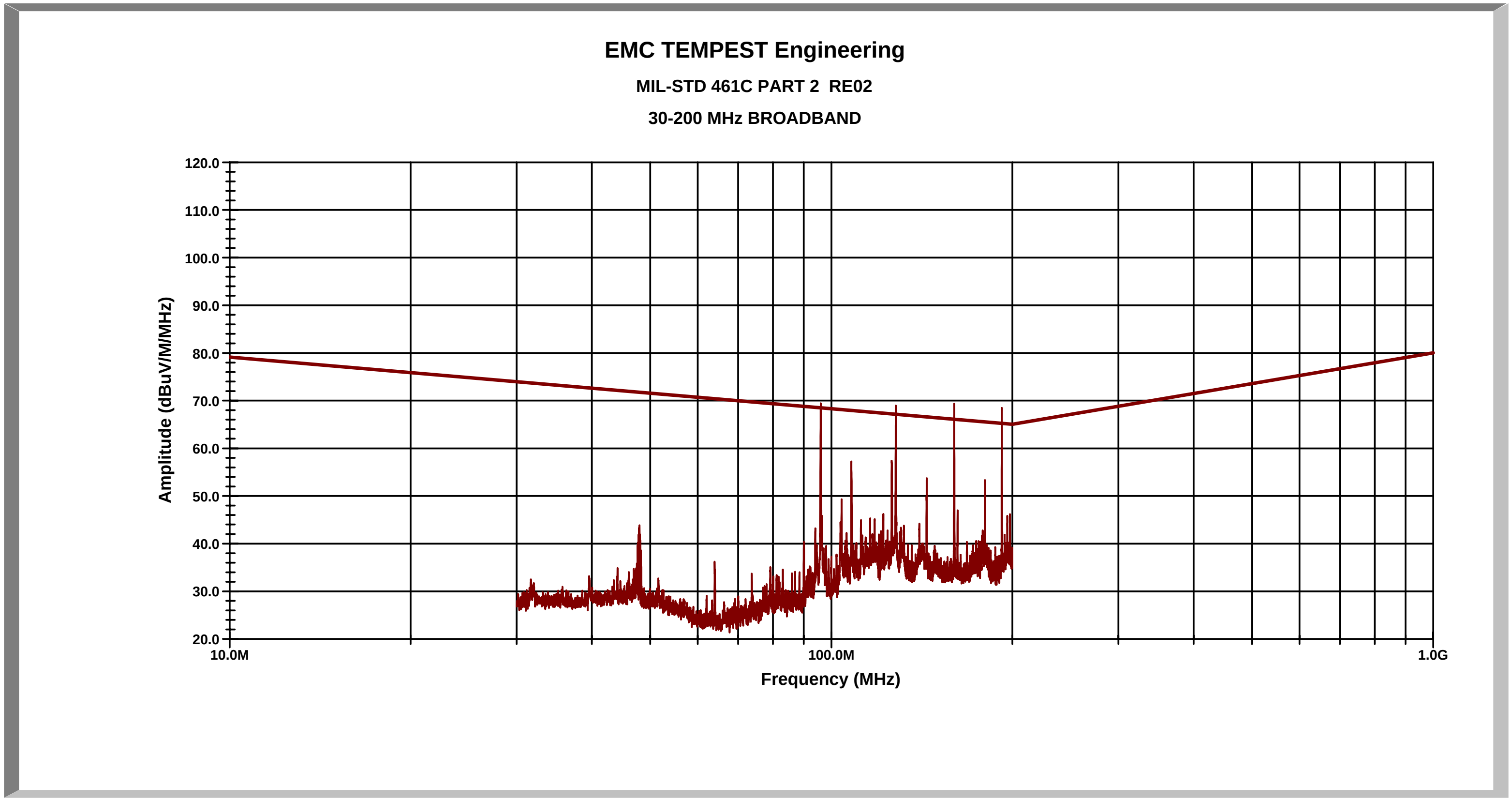


Figure 12-48. Results of RE02 Broadband Emissions Testing – Run 09b Vertical Antennas @ Position #1 (30 – 200 MHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

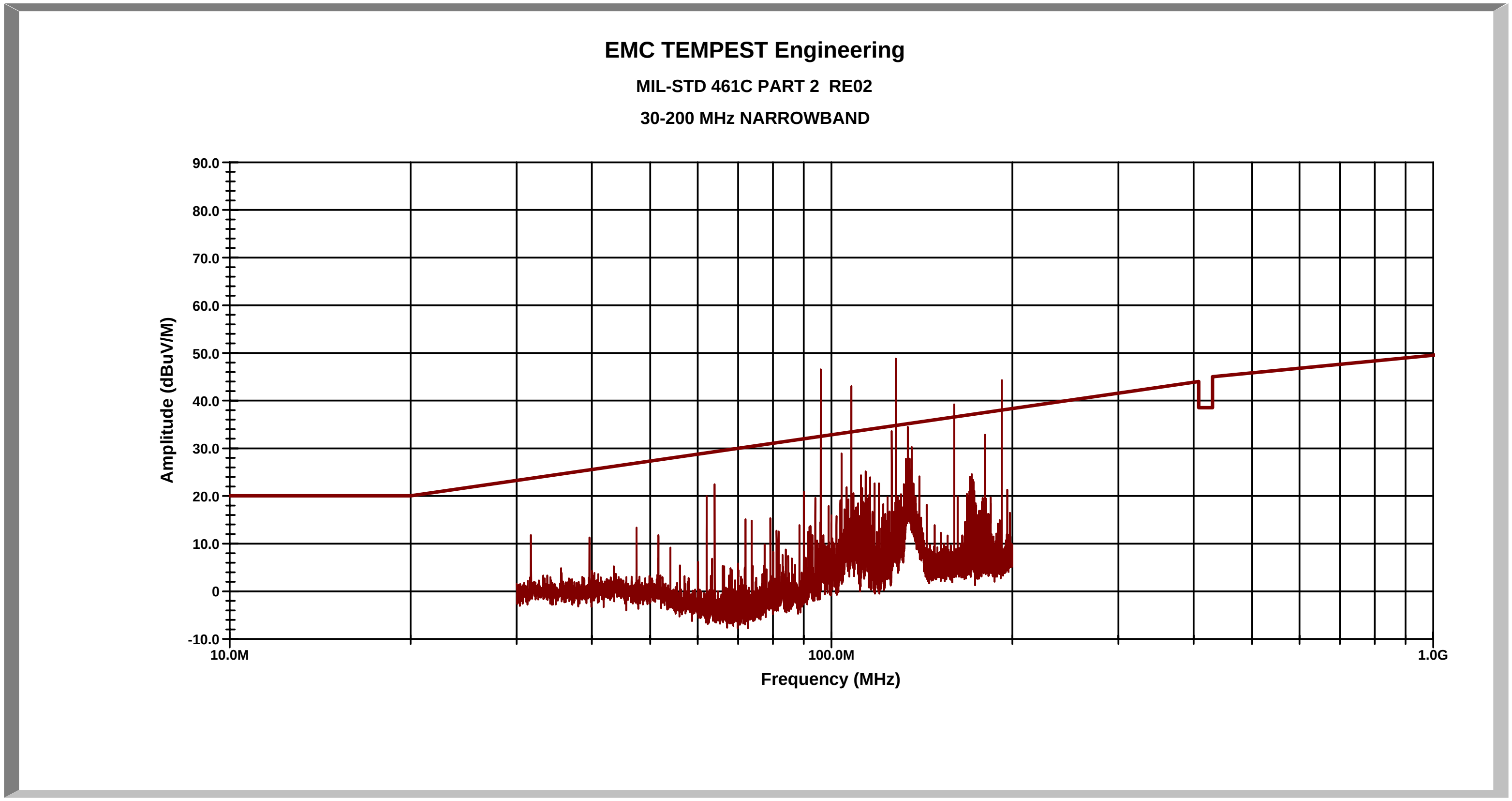


Figure 12-49. Results of RE02 Narrowband Emissions Testing – Run 09c Horizontal Antennas @ Position #1 (30 – 200 MHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

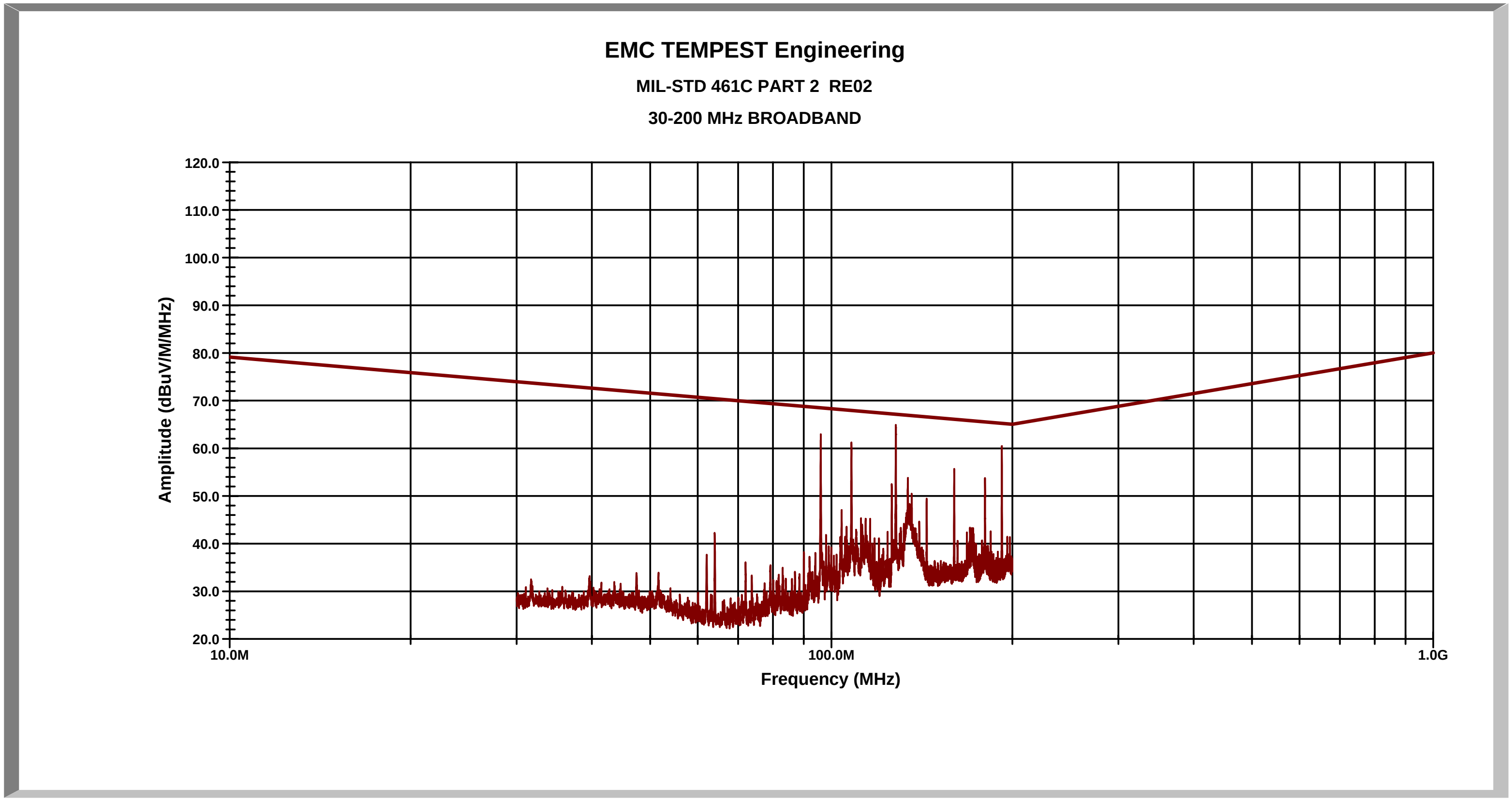


Figure 12-50. Results of RE02 Broadband Emissions Testing – Run 09d Horizontal Antennas @ Position #1 (30 – 200 MHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

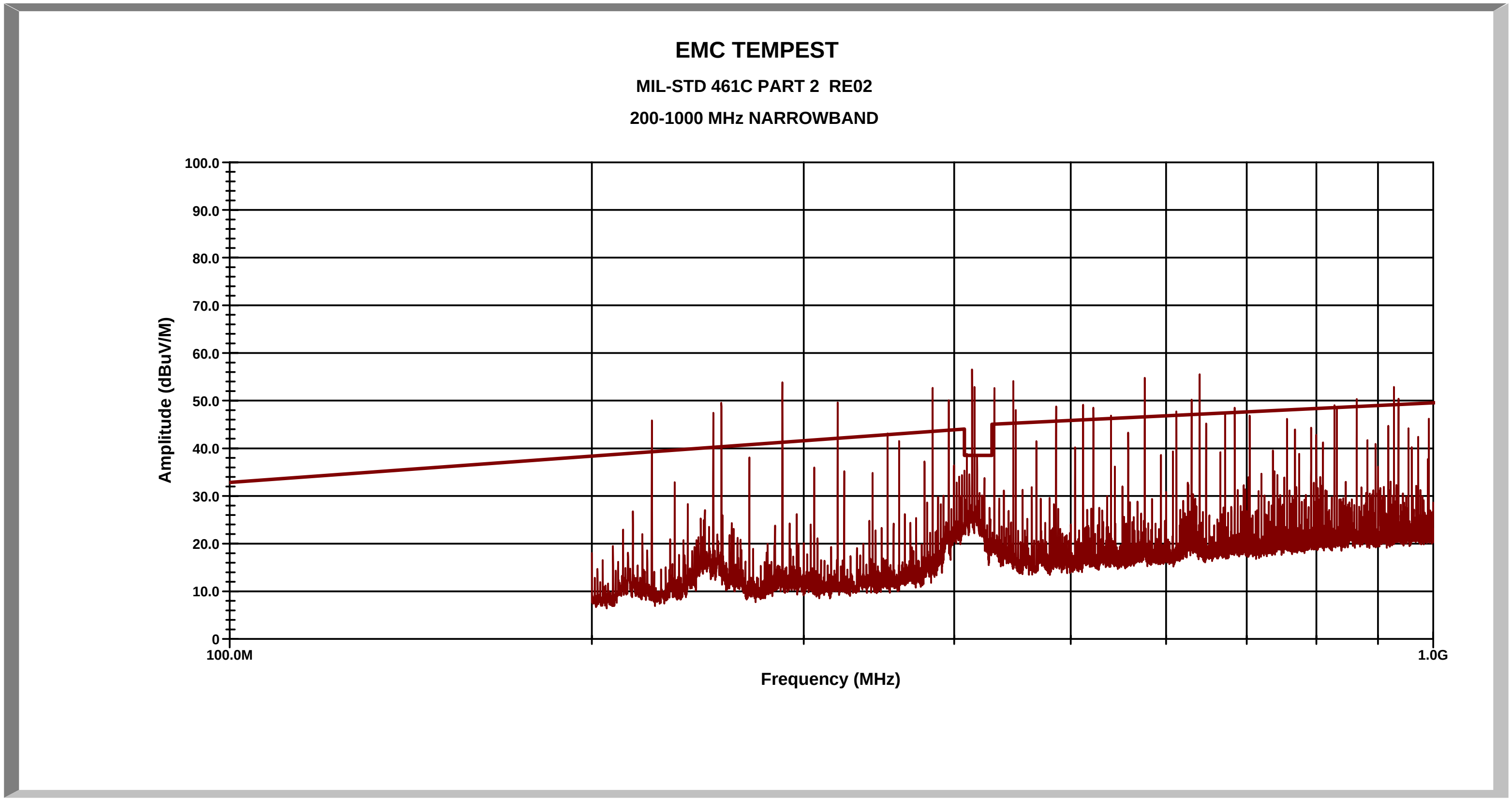


Figure 12-51. Results of RE02 Narrowband Emissions Testing – Run 09e Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

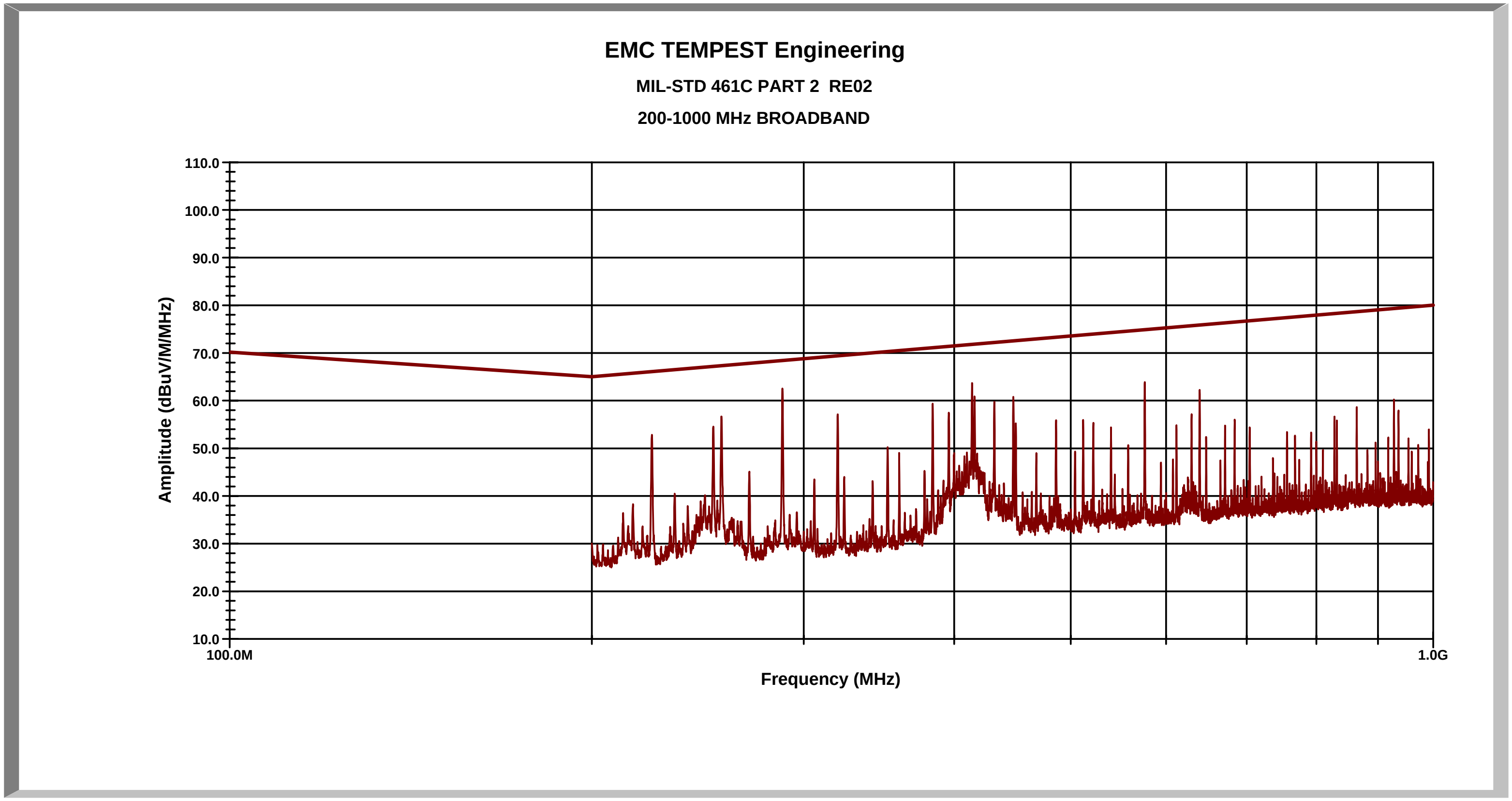


Figure 12-52. Results of RE02 Broadband Emissions Testing – Run 09f Vertical Antennas @ Position #1 (200 MHz – 1 GHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

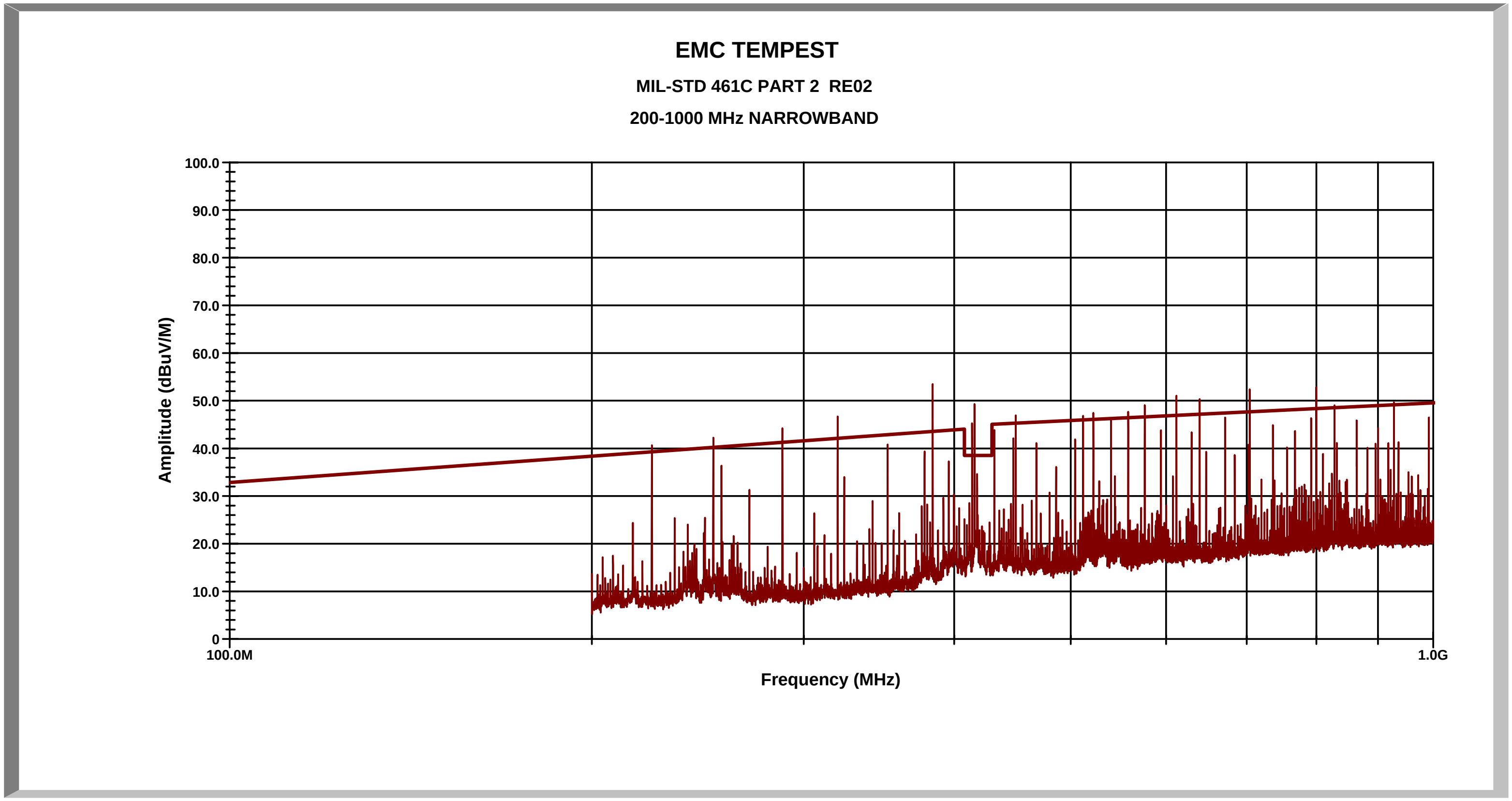


Figure 12-53. Results of RE02 Narrowband Emissions Testing – Run 09g Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

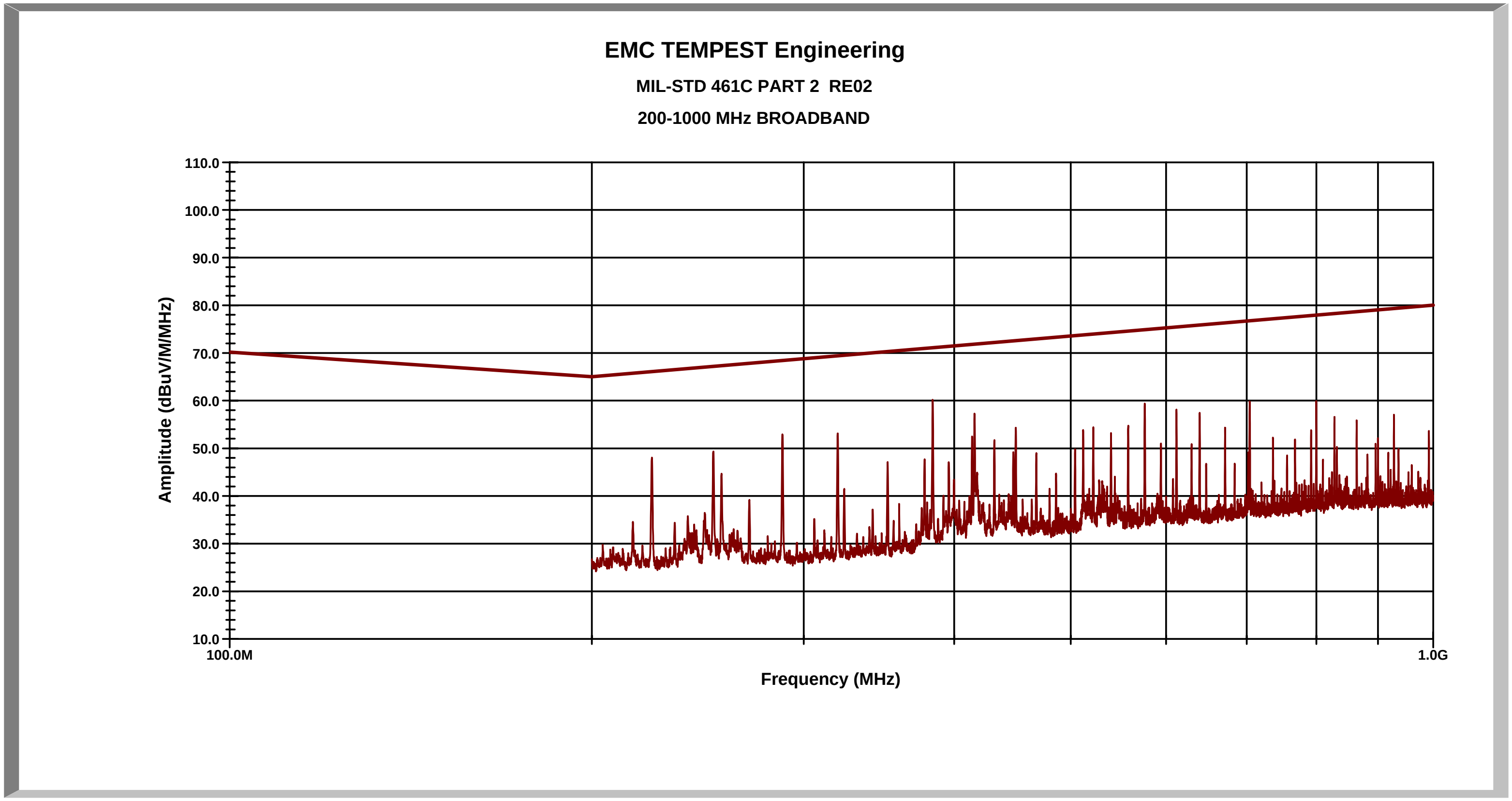


Figure 12-54. Results of RE02 Broadband Emissions Testing – Run 09h Horizontal Antennas @ Position #1 (200 MHz – 1 GHz)
Full Ambient Emissions Run: (UUT OFF / GSE ON)

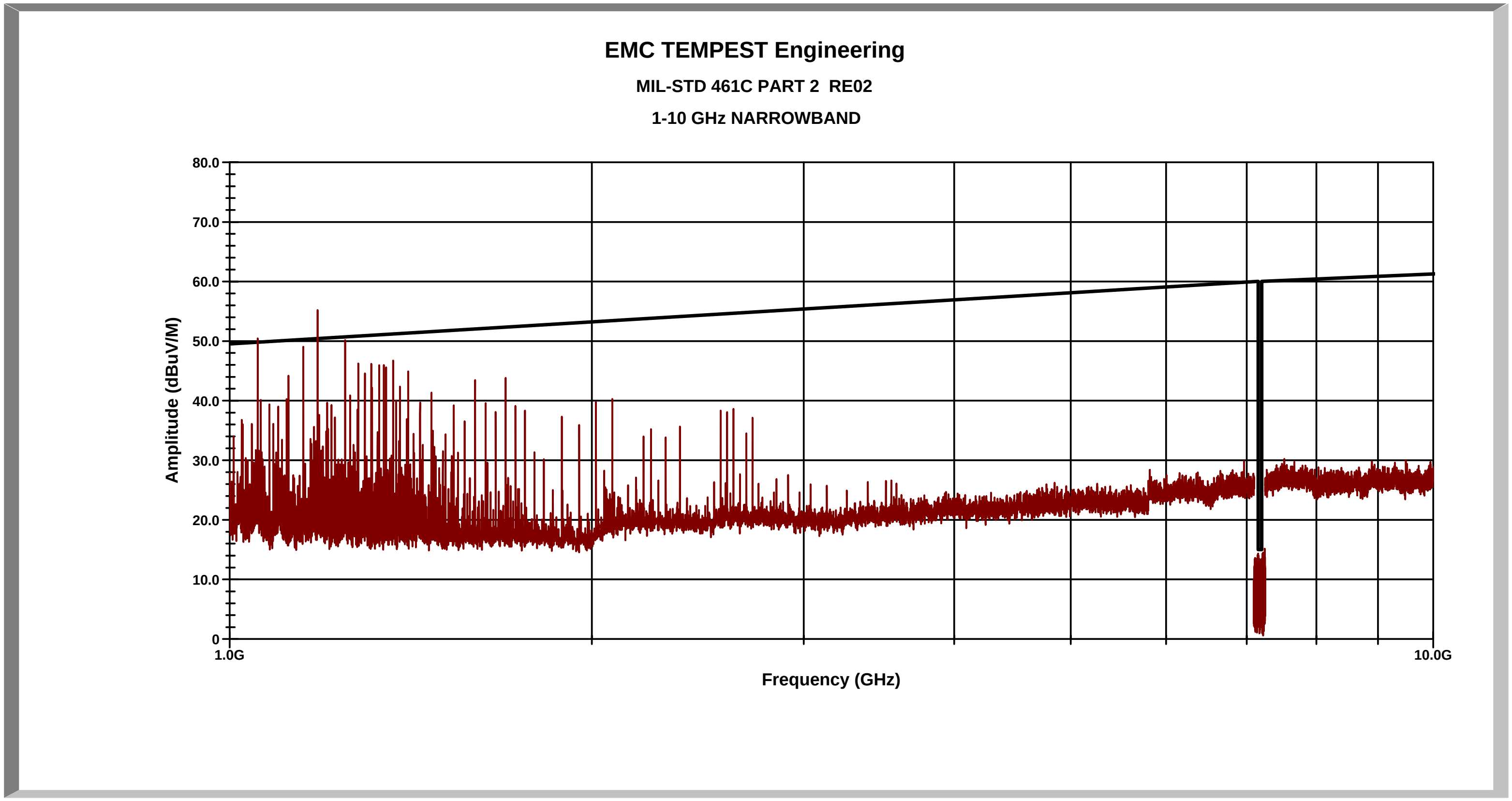


Figure 12-55. Results of RE02 Narrowband Emissions Testing – Run 09i Vertical Antennas @ Position #1 (1 – 10 GHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

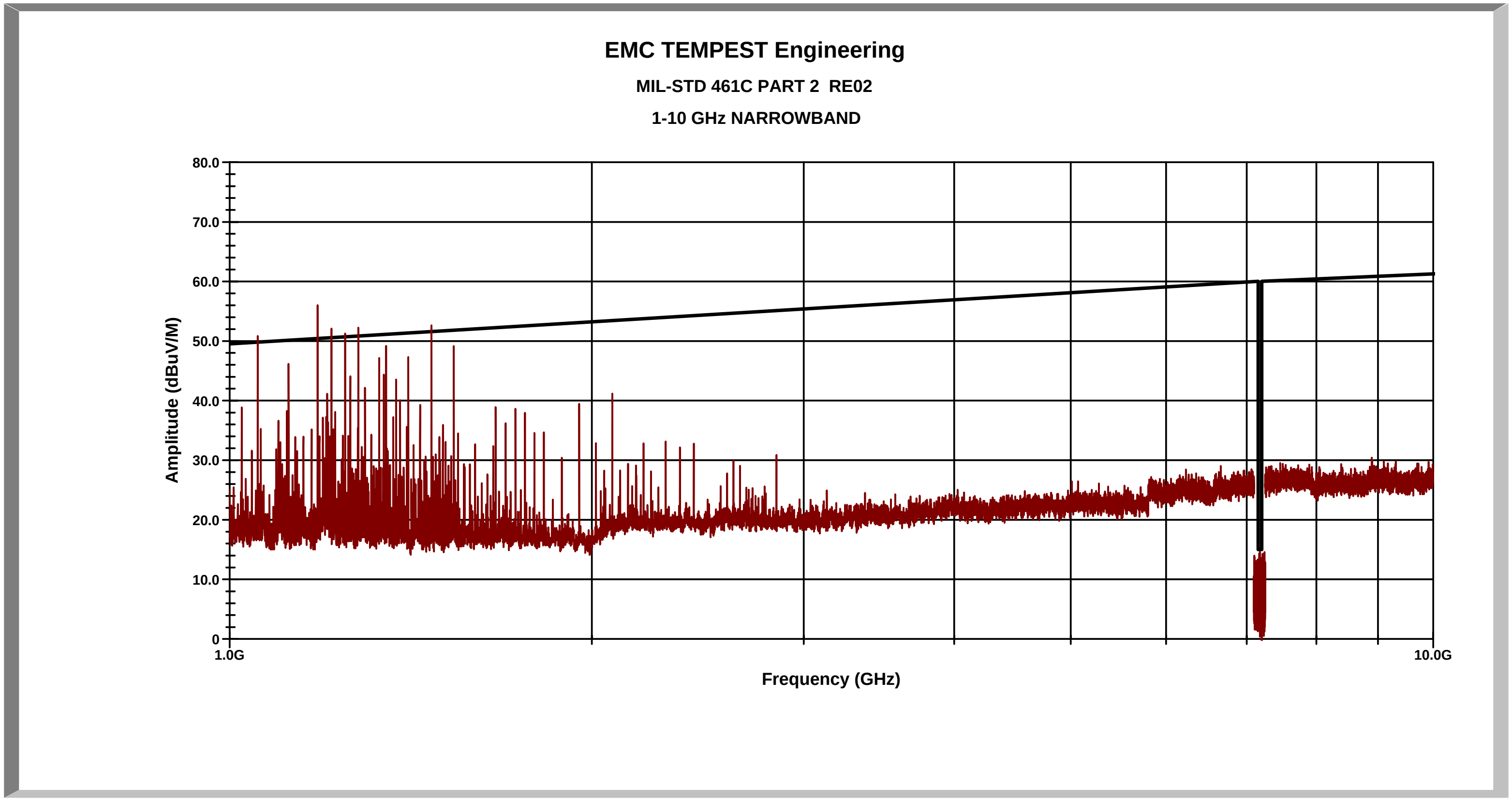


Figure 12-56. Results of RE02 Narrowband Emissions Testing – Run 09j Horizontal Antennas @ Position #1 (1 – 10 GHz)
Full Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

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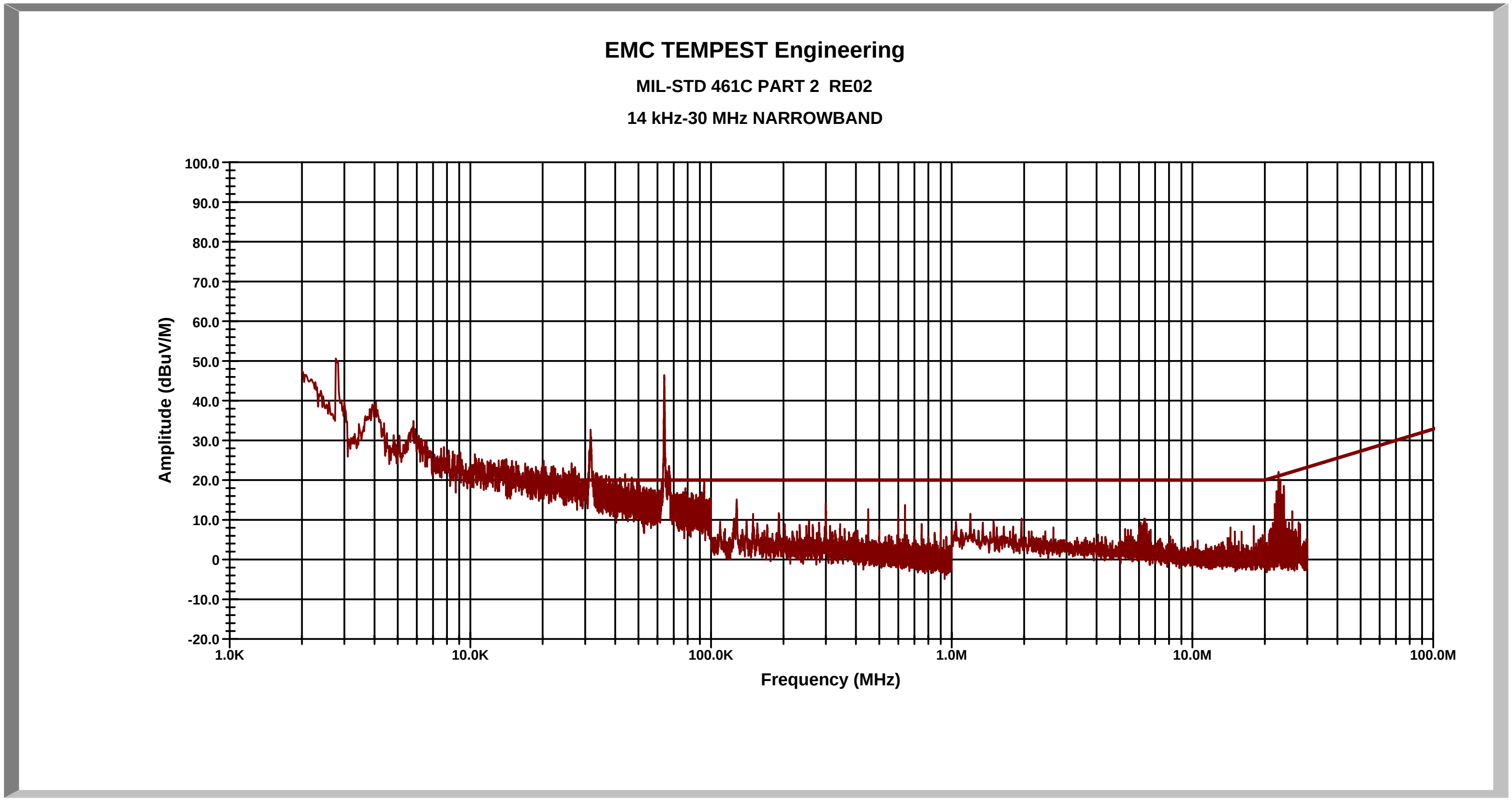


Figure 12-57. Results of RE02 Narrowband Emissions Testing – Run 10a Vertical Antennas @ Position #2 (2 kHz – 30 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

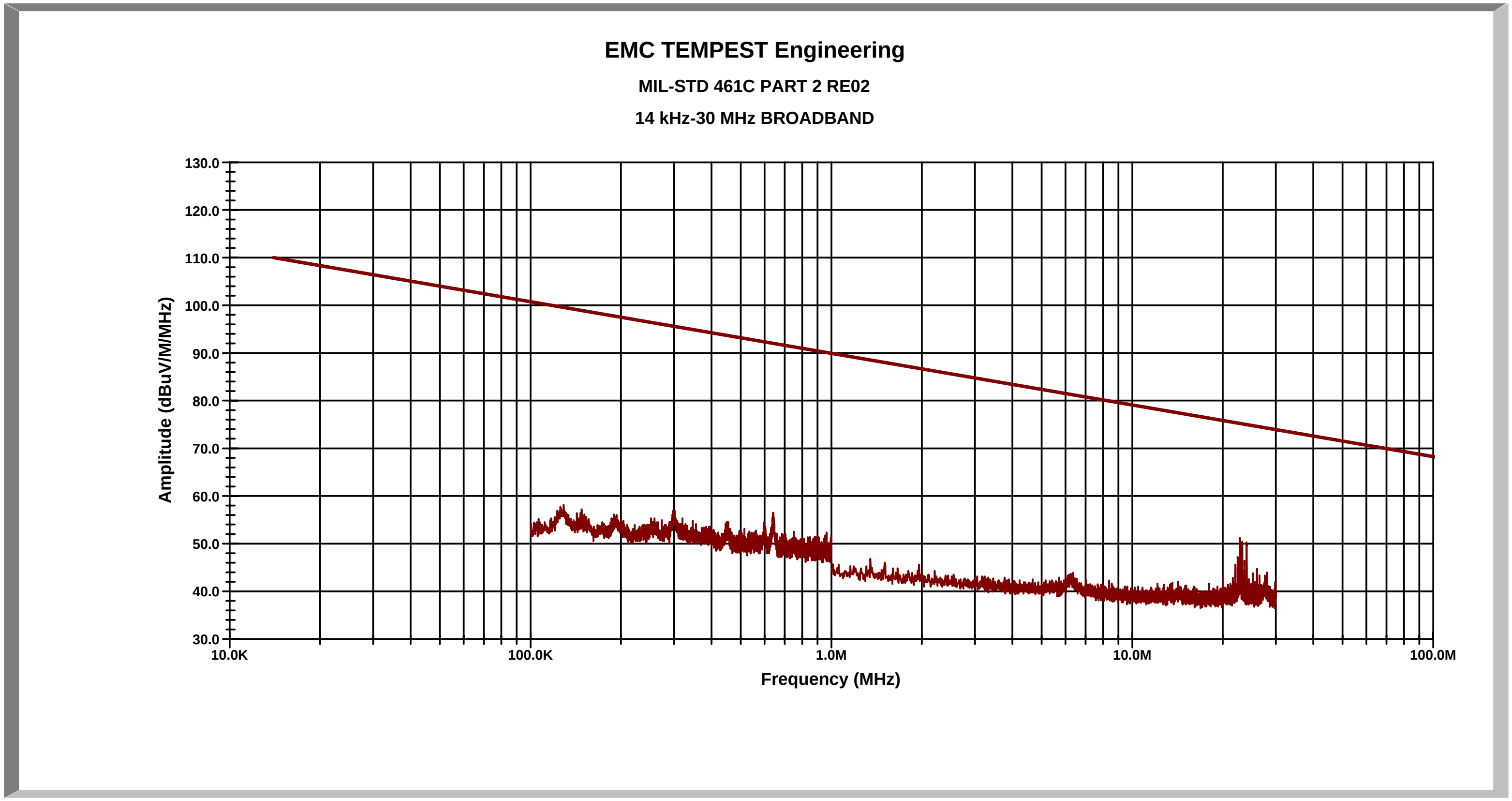


Figure 12-58. Results of RE02 Broadband Emissions Testing – Run 10b Vertical Antennas @ Position #2 (2 kHz – 30 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

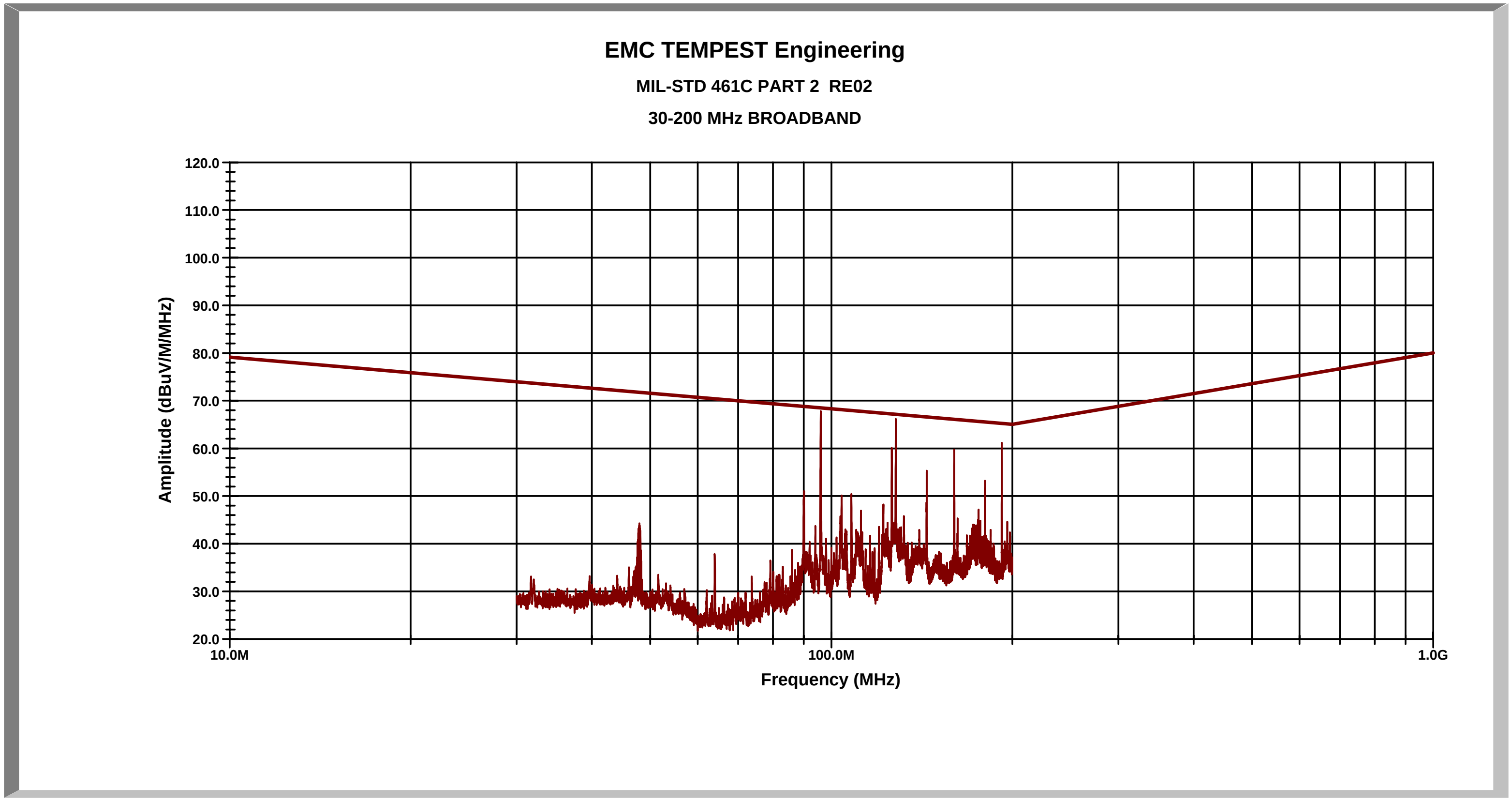


Figure 12-59. Results of RE02 Narrowband Emissions Testing – Run 10c Vertical Antennas @ Position #2 (30 – 200 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

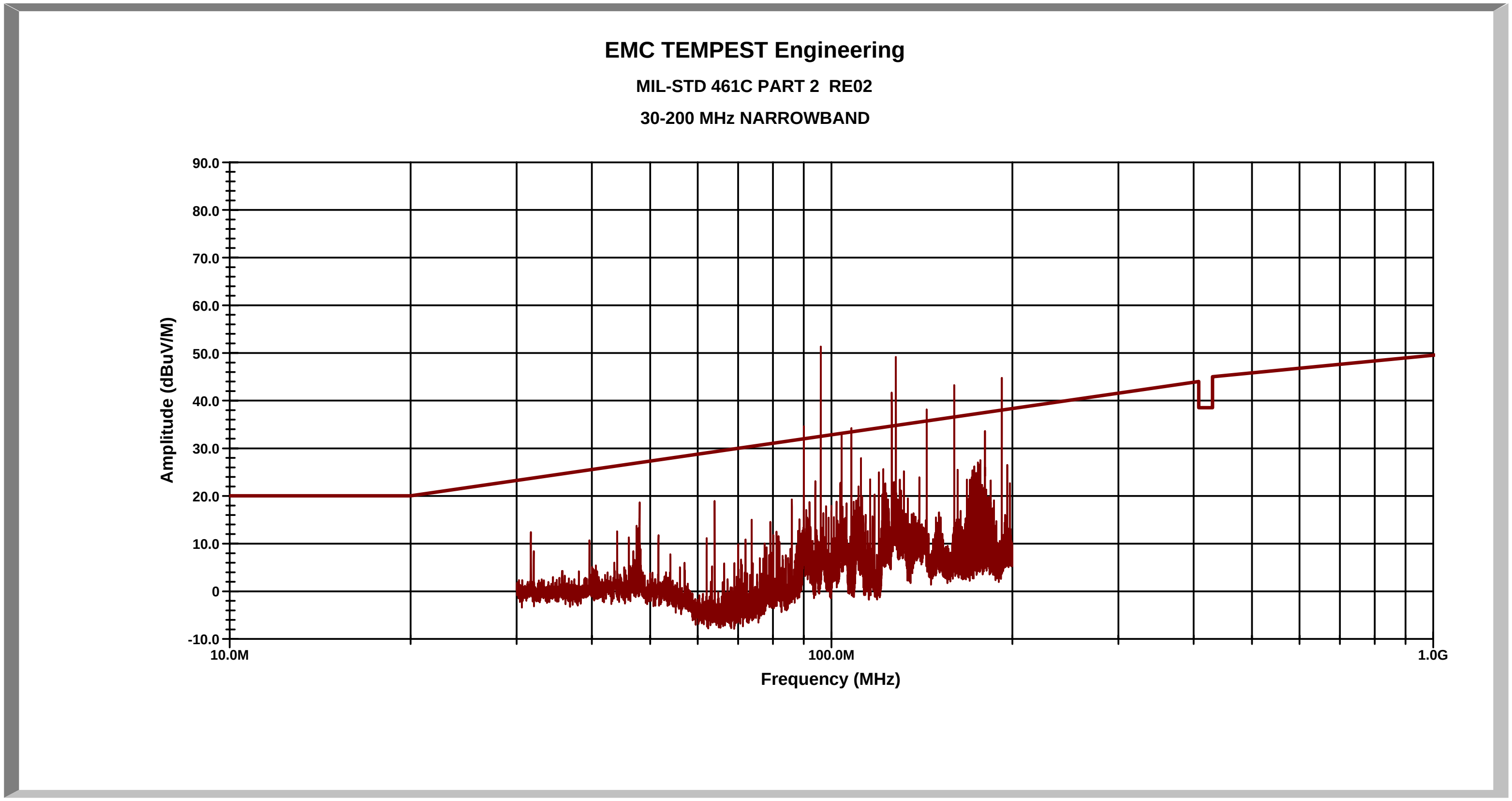


Figure 12-60. Results of RE02 Broadband Emissions Testing – Run 010d Vertical Antennas @ Position #2 (30 – 200 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

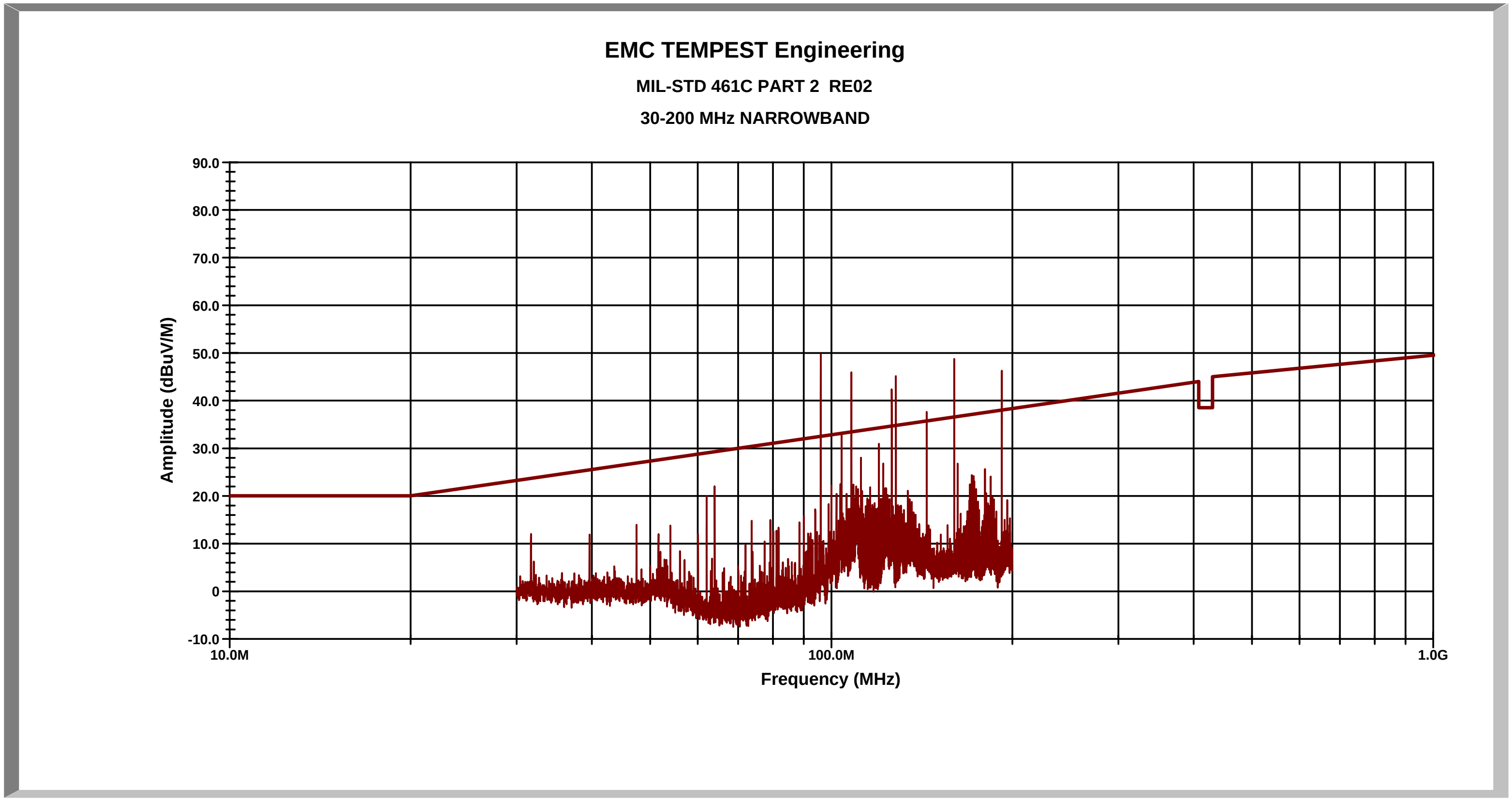


Figure 12-61. Results of RE02 Narrowband Emissions Testing – Run 10e Horizontal Antennas @ Position #2 (30 – 200 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

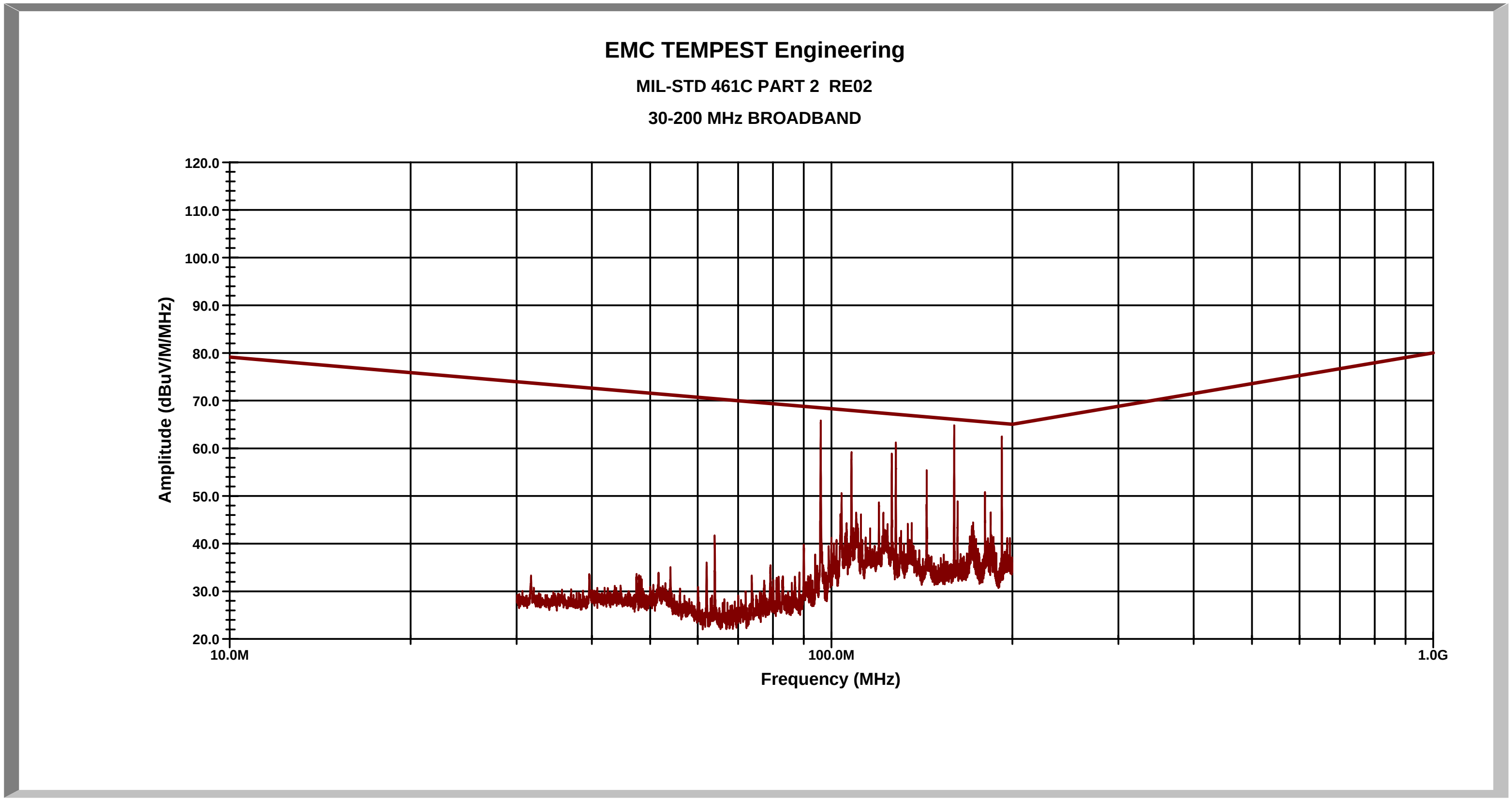


Figure 12-62. Results of RE02 Broadband Emissions Testing – Run 10f Horizontal Antennas @ Position #2 (30 – 200 MHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

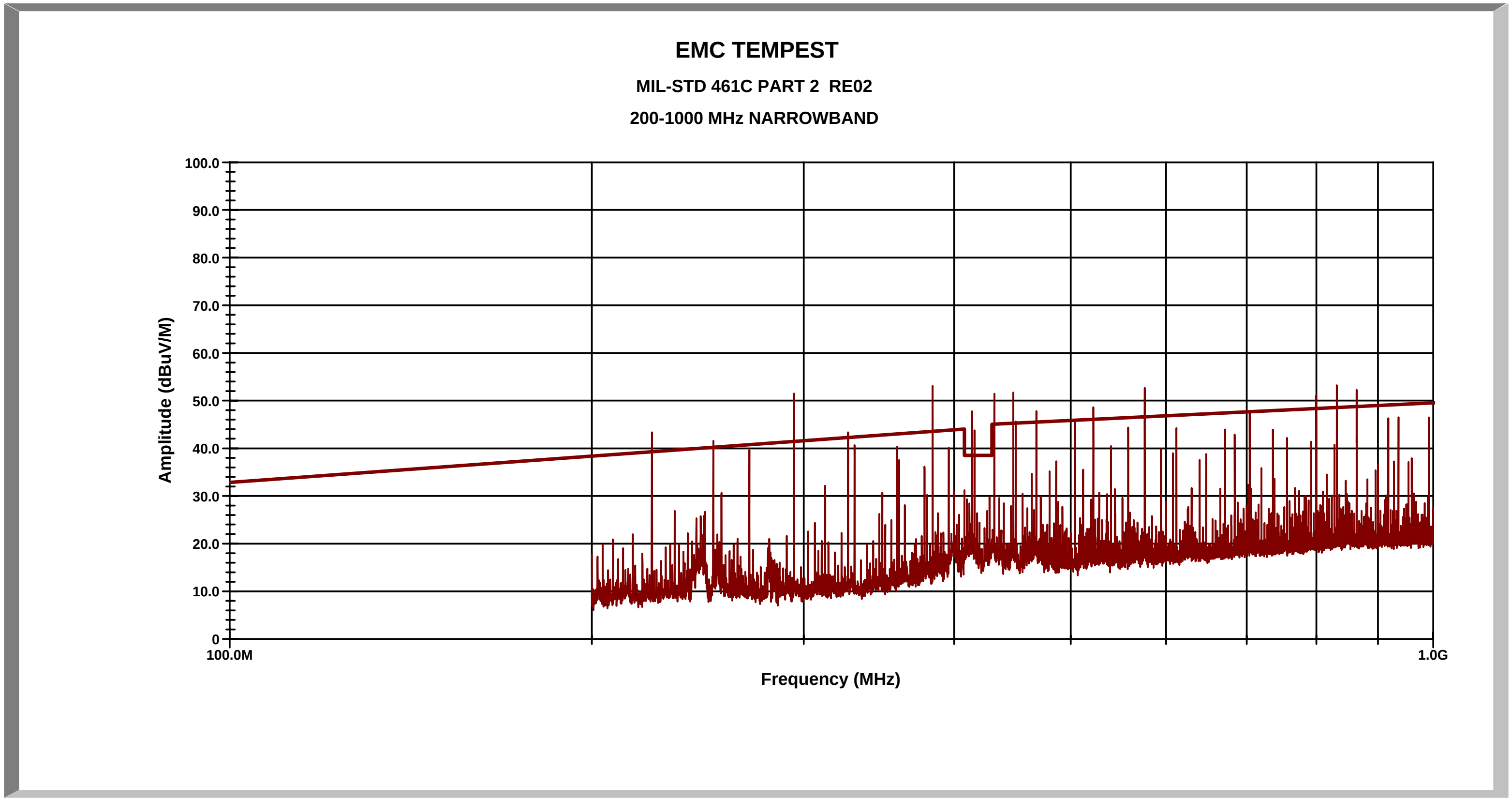


Figure 12-63. Results of RE02 Narrowband Emissions Testing – Run 10g Vertical Antennas @ Position #2 (200 MHz – 1 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

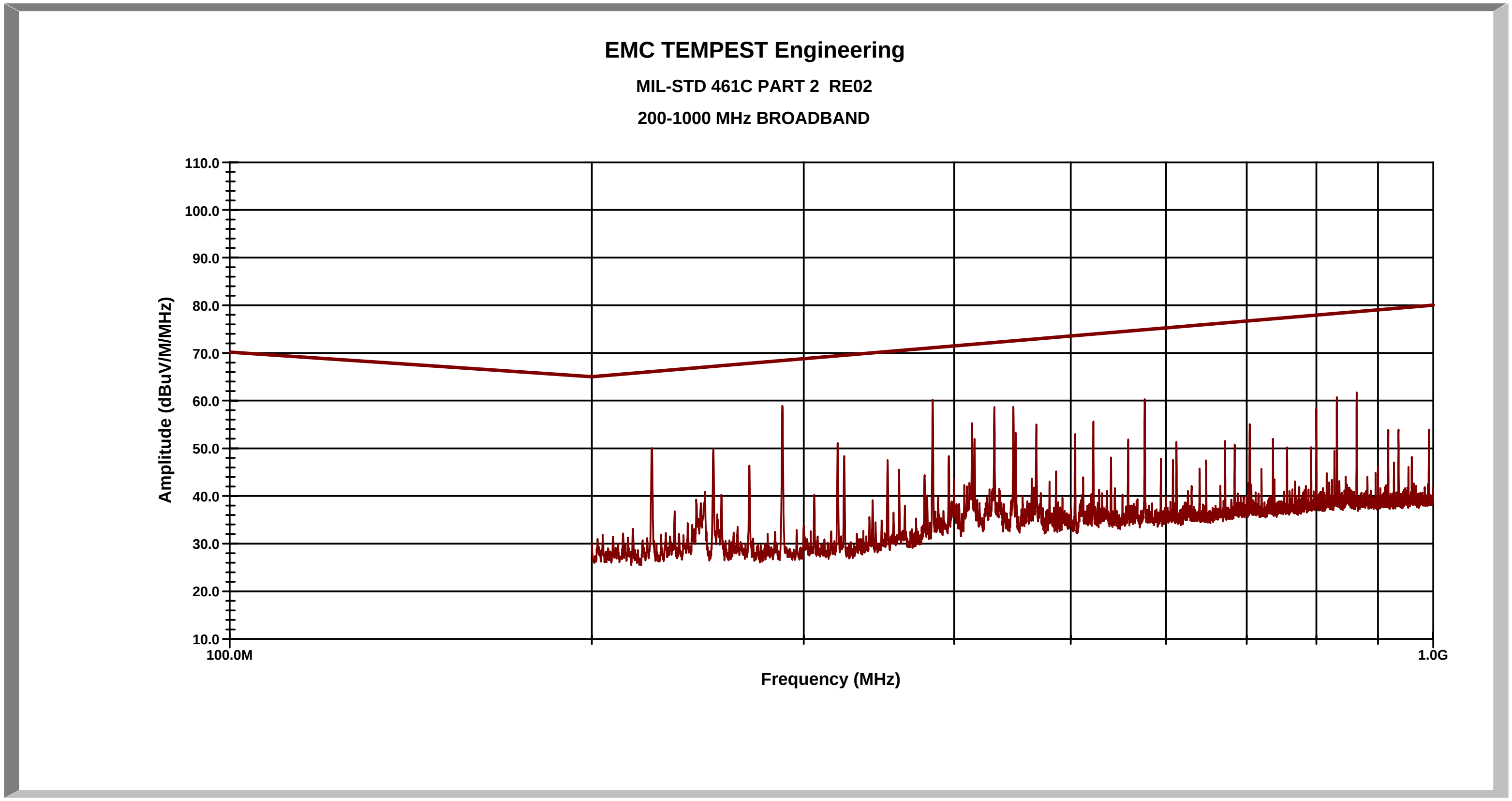


Figure 12-64. Results of RE02 Broadband Emissions Testing – Run 10h Vertical Antennas @ Position #2 (200 MHz – 1 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

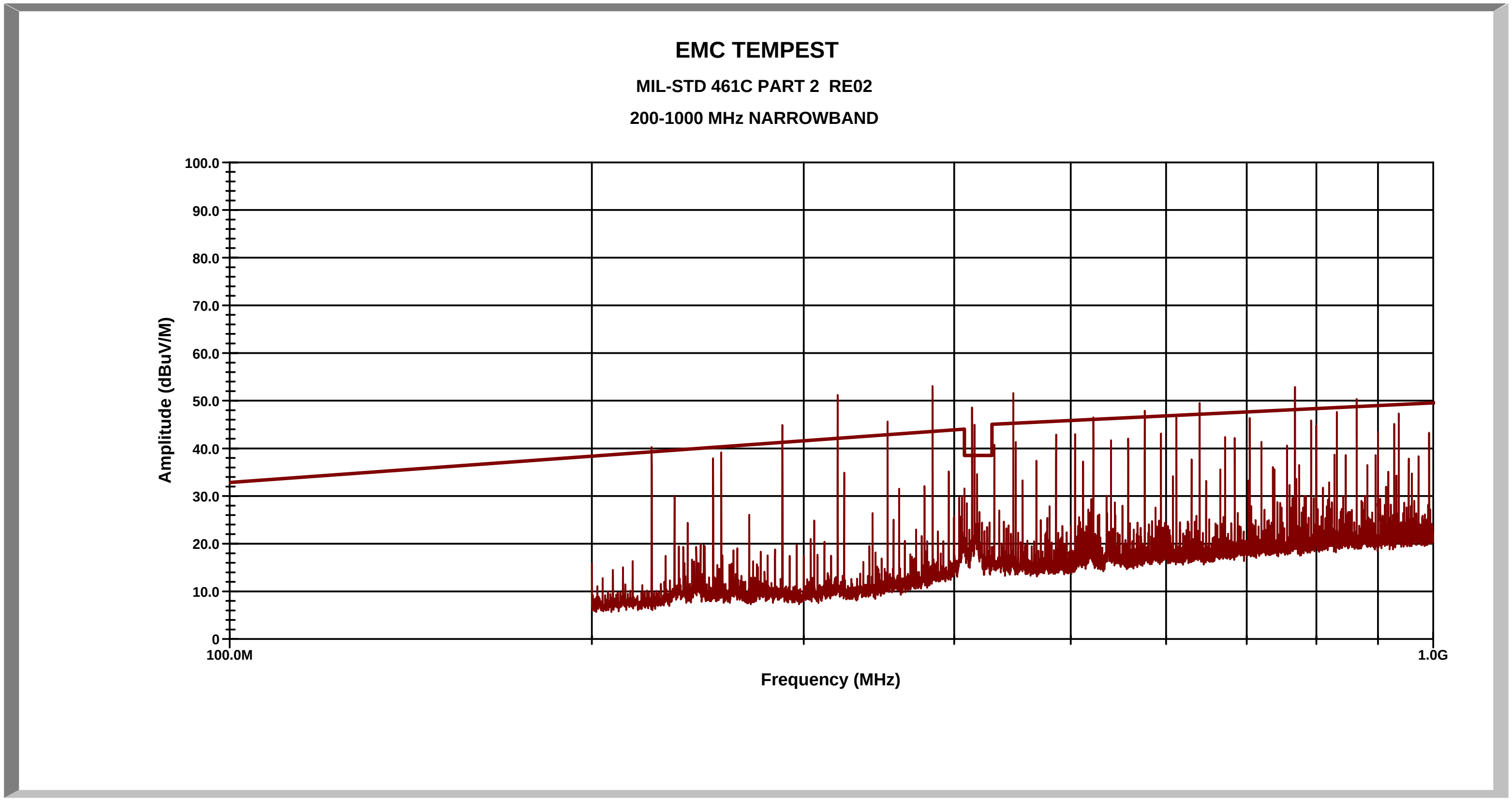


Figure 12-65. Results of RE02 Narrowband Emissions Testing – Run 10i Horizontal Antennas @ Position #2 (200 MHz – 1 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

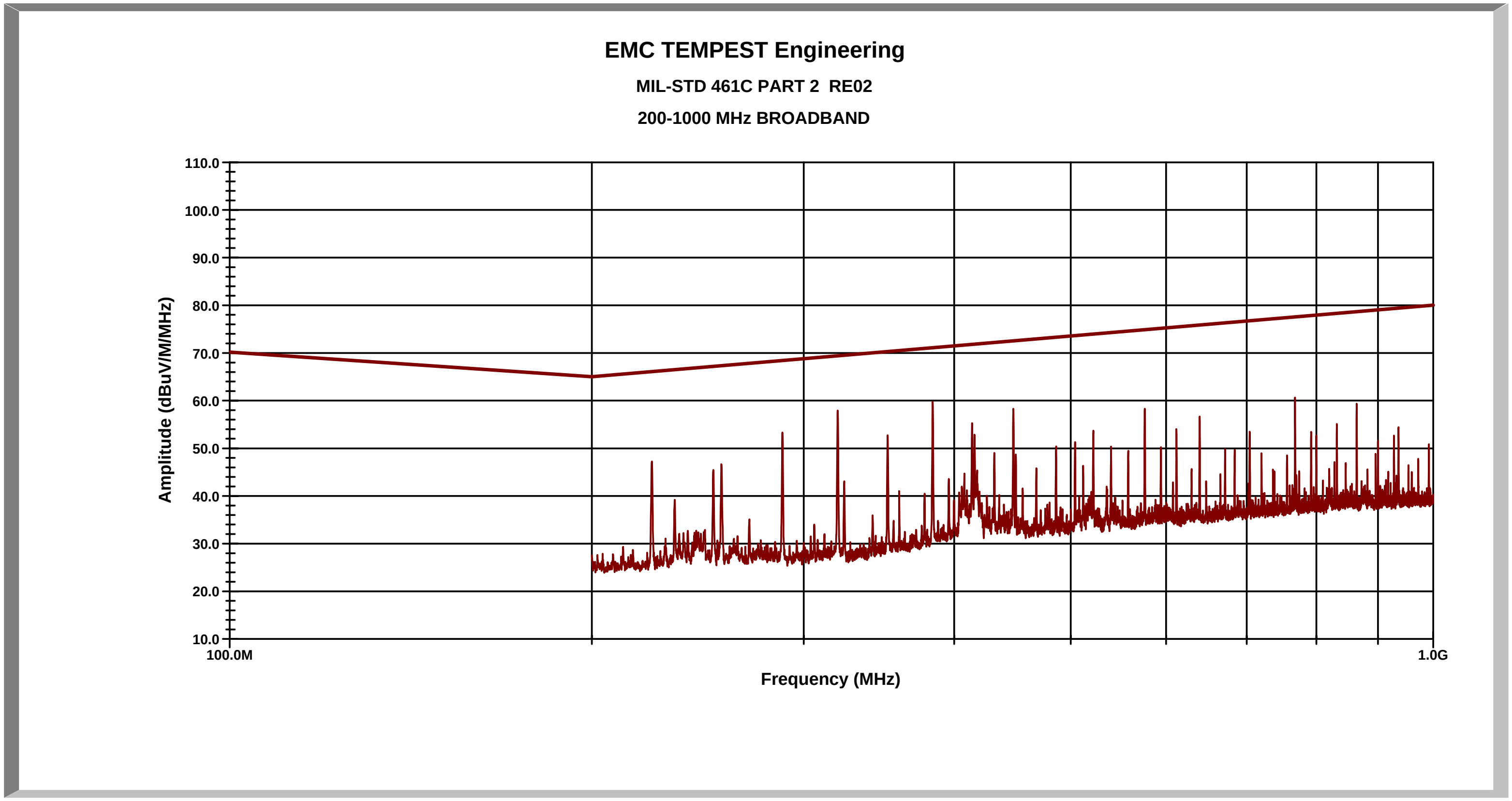


Figure 12-66. Results of RE02 Broadband Emissions Testing – Run 10j Horizontal Antennas @ Position #2 (200 MHz – 1 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

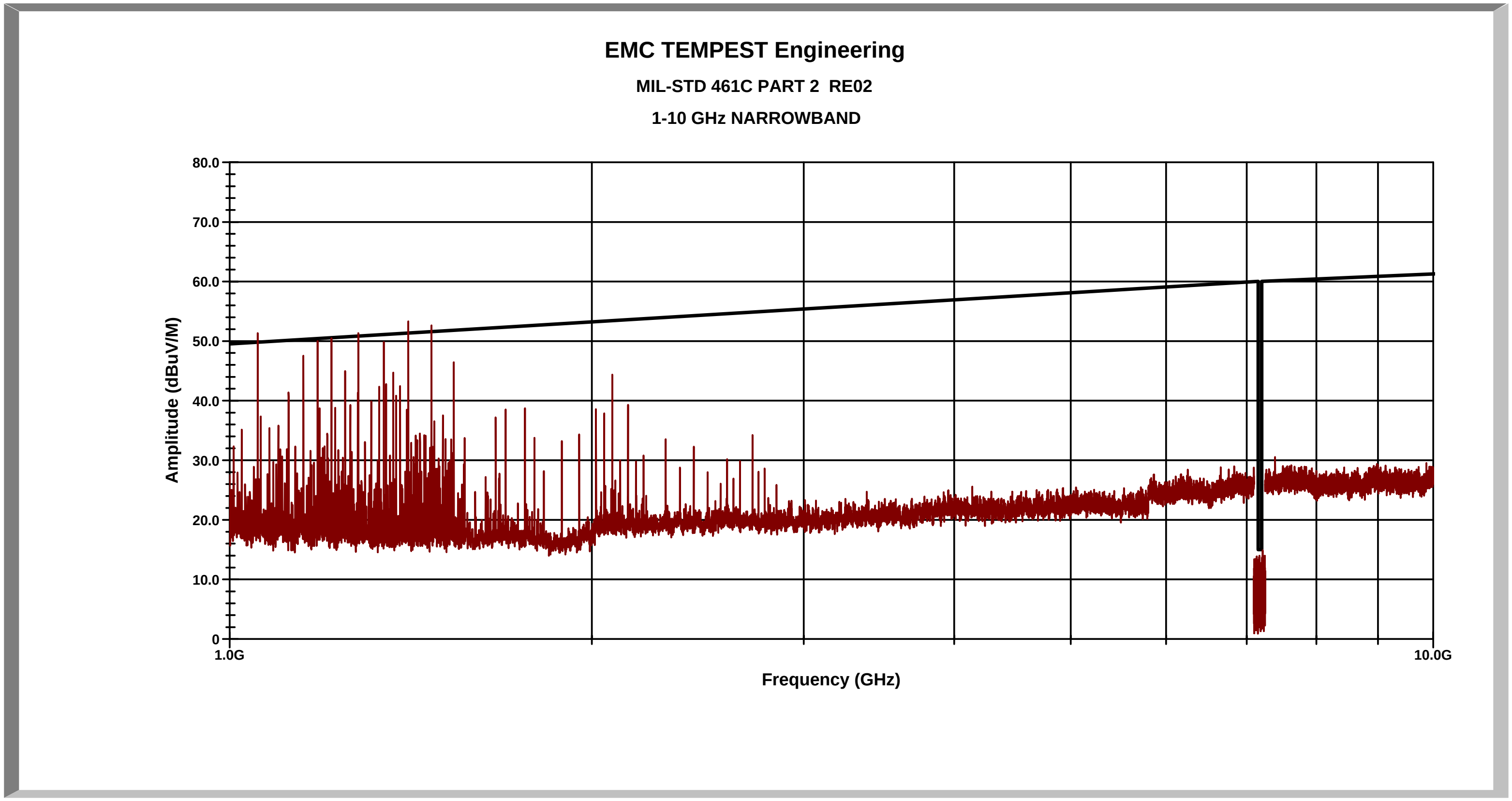


Figure 12-67. Results of RE02 Narrowband Emissions Testing – Run 10k Vertical Antennas @ Position #2 (1 – 10 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

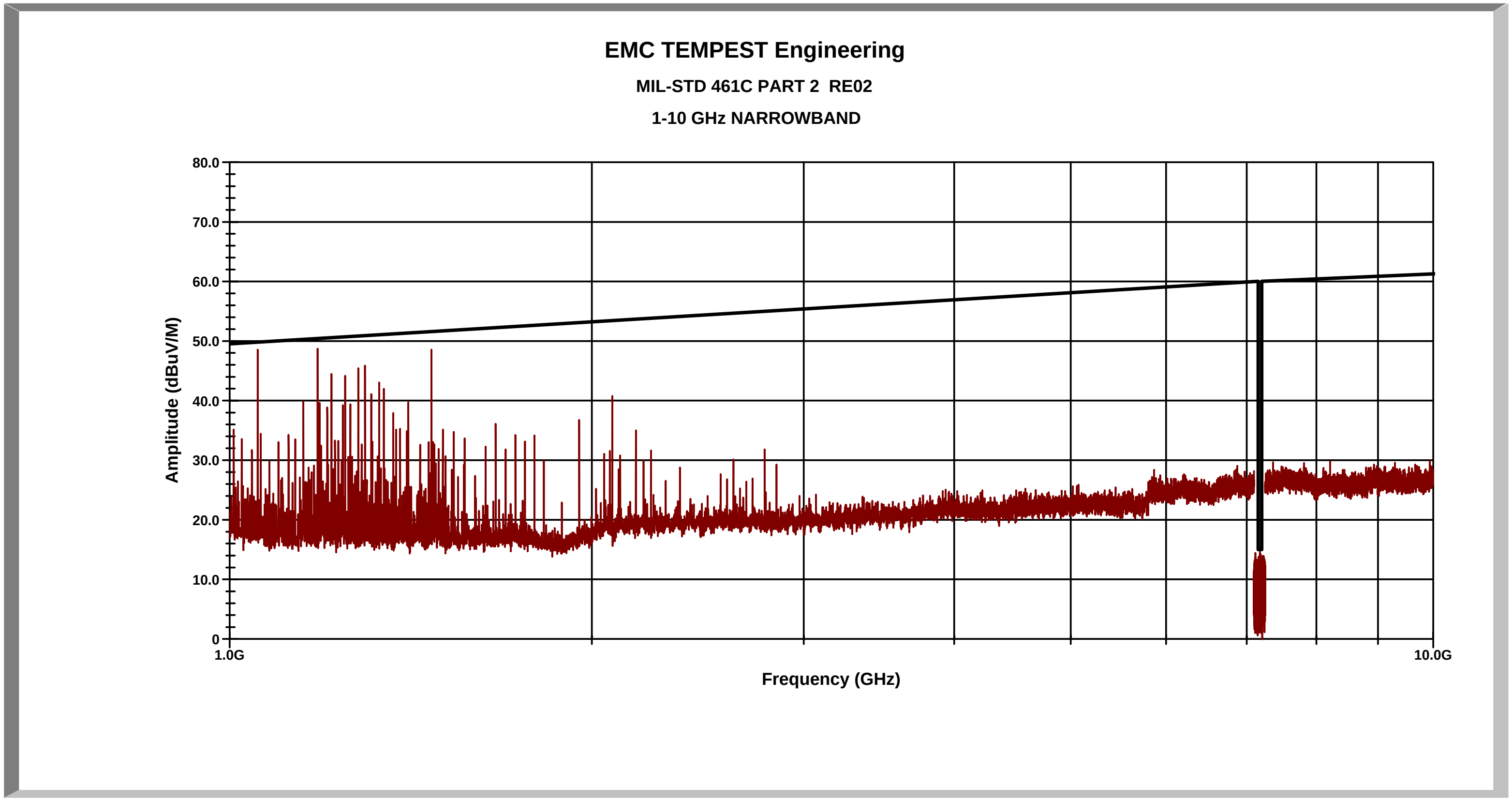
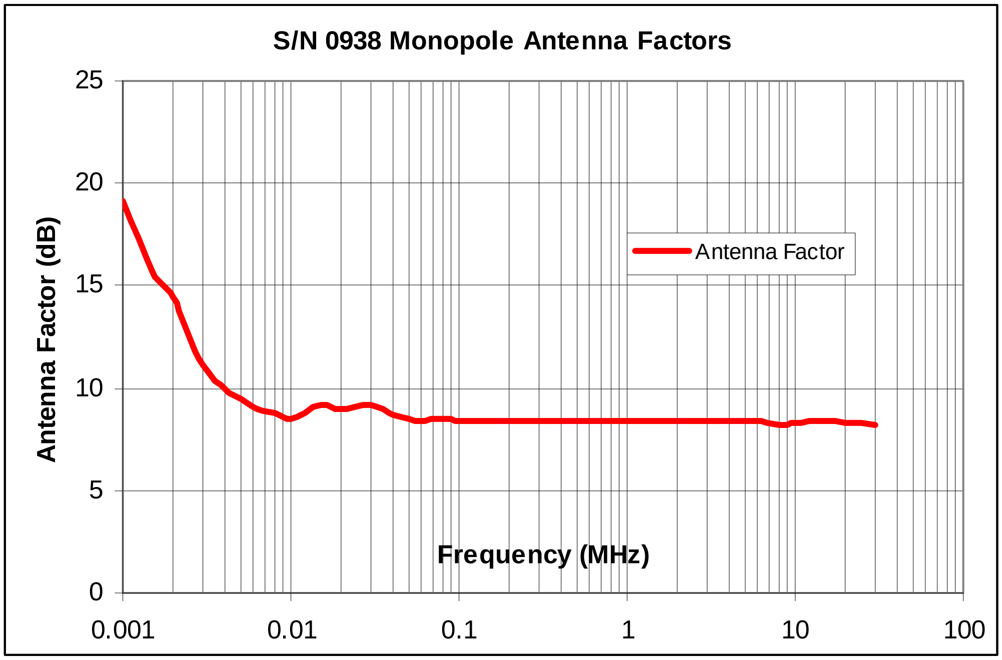


Figure 12-68. Results of RE02 Narrowband Emissions Testing – Run 10I Horizontal Antennas @ Position #2 (1 – 10 GHz)
Full Boom Emissions Run: SEP Full Noisy, SEP J5,J7,J9 Connectors Mounted with Screws

Table 12-1. Singer Model 95010-1 Monopole Antenna [1] Amplifier Calibration



CERTIFICATE OF CALIBRATION CONFORMANCE

Equipment Under Test: Singer 95010-1 Monopole Antenna[1] S/N: 0398 Cal Date: 7 November 2003

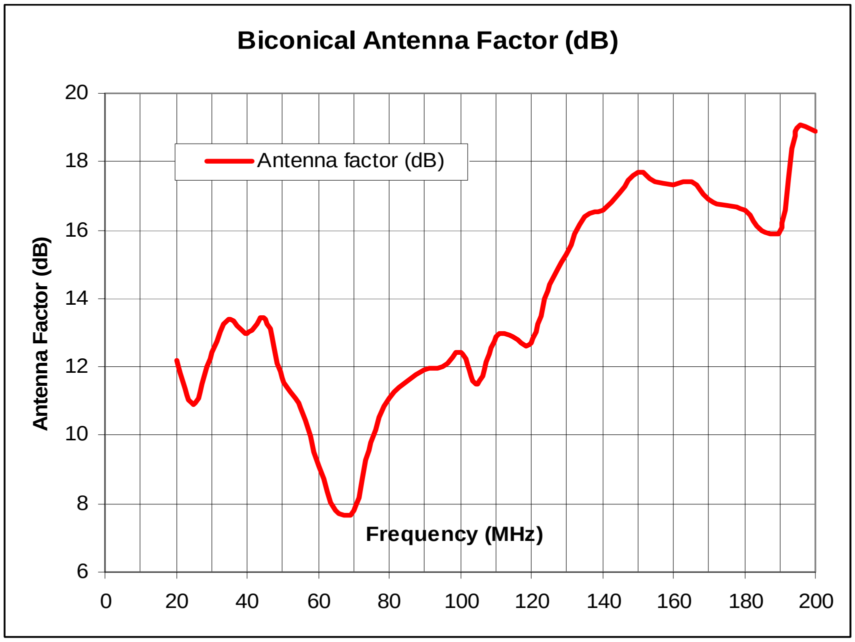
Test Engr: R Cowdell Calibration Due: **7 November 2004**

Frequency	Amp Gain (dB)	Antenna Factor (dB) [5]	Frequency	Amp Gain (dB)	Antenna Factor (dB) [5]
1 kHz	-11.1	19.1	300	-0.41	8.4
1.5	-7.6	15.6	400	-0.39	8.4
2	-6.5	14.5	500	-0.38	8.4
3	-3.1	11.1	600	-0.38	8.4
4	-2.0	10.0	800 kHz	-0.37	8.4
5	-1.5	9.5	1 MHz	-0.36	8.4
6	-1.1	9.1	1.5	-0.37	8.4
8	-0.8	8.8	2	-0.36	8.4
10 kHz	-0.5	8.5	3	-0.35	8.4
14	-1.24	9.2	4	-037	8.4
20	-0.98	9.0	5	-0.37	8.4
30	-1.17	9.2	6	-0.36	8.4
40	-0.69	8.7	8	-0.23	8.2
50	-0.48	8.5	10	-0.33	8.3
60	-0.39	8.4	15	-0.37	8.4
80	-0.45	8.5	20	-0.33	8.3
100	-0.35	8.4	25	-0.25	8.3
150	-0.41	8.4	30	-0.19	8.2
200	-0.37	8.4			

Network Analyzer HP8753E S/N: 2126A00226 Cal Due: 1 Dec 2004

Notes:
1. Antenna calibrated as an amplifier using the Singer 95010-0 50 Ohm adapter
2. Antenna Factor = 8 dB - Antenna Amplifier Gain.

Table 12-2. Biconical Antenna Correction Factors



CERTIFICATE OF CALIBRATION CONFORMANCE

Loral Electro-Optics, Pomona, CA

Frequency (MHz)	Gain (dBi)	Antenna Factor (dB)	Frequency (MHz)	Gain (dBi)	Antenna Factor (dB)
20	-15.9	12.2	120	-0.9	12.7
30	-12.6	12.4	130	-2.8	15.3
40	-10.9	13.0	140	-3.4	16.6
50	-7.5	11.7	150	-3.9	17.7
60	-3.3	9.1	160	-3.0	17.3
70	-0.7	7.8	170	-2.1	16.9
80	-2.8	11.1	180	-1.2	16.6
90	-2.6	11.9	190	-0.2	16.0
100	-2.2	12.4	200	-2.6	18.9
110	-0.2	12.9			

This antenna has been individually calibrated at a one-meter distance, using one or more of the following procedures:

- ANSI C63.5 — The American National Standards Institute Committee 63.5
- SAE ARP 958 — The Society of Automotive Engineers Recommended Practice 958

Antenna Factor = 20 log f (MHz) - Gain (dBi) - 29.8
Gain (dBi) = 10 log (Numeric Gain)
Calibration Accuracy: $\pm$2 dB

Antenna Type: AILTECH Biconical — Model No: 94455-1 — Serial No: 0674
Frequency Range: 20 MHz - 200 MHz — Cal Date: 10 March 2003 — Cal Due: **10 March 2005**
Calibration Source: Loral Electro-Optics Metrology, Pomona,CA

A.H. Systems Inc.
9710 Cozycroft Ave. Chatsworth, CA 91311
Phone (818) 998-0223 Fax (818) 998-6892
E-mail: Info@AHSystems.com
Web site: http://www.AHSystems.com

Horizontal Polarization
1 Meter Calibration, Double Ridge Guide Horn Antenna

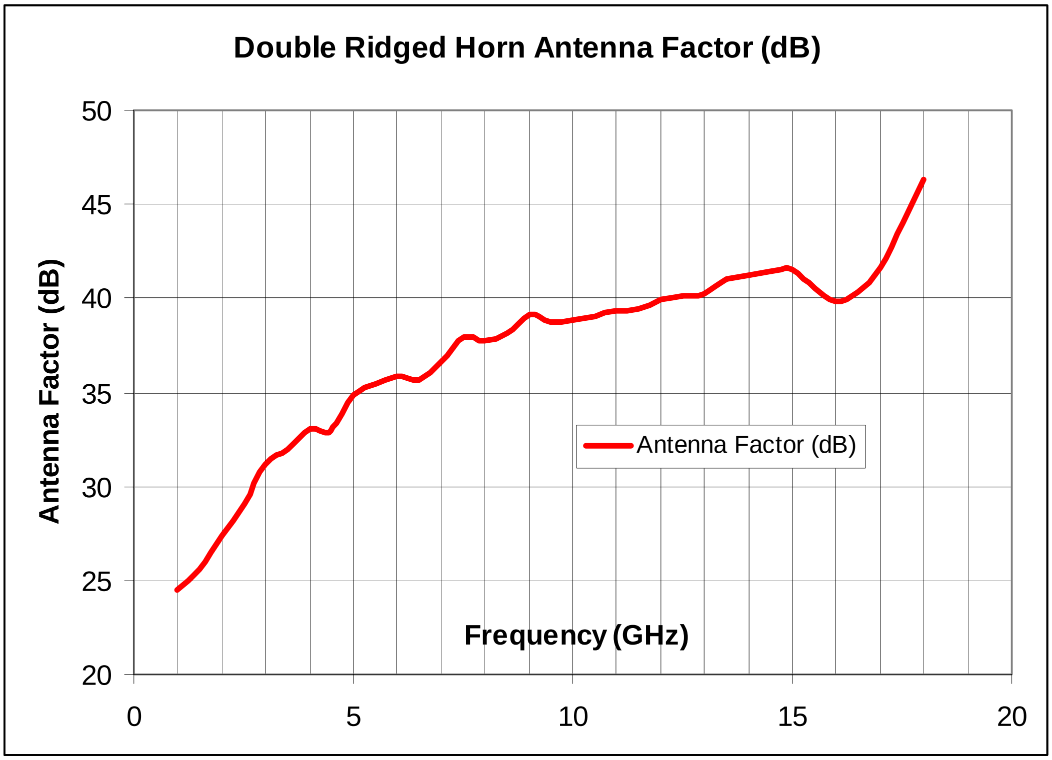
Model: SAS-570 Serial Number: 153 Date: 13-Aug-03

Frequency (MHz)	Antenna Factor (dB/m)	Gain (dBi)	Gain (Numeric)
170	15.1	-0.23	0.95
180	13.0	2.36	1.72
190	11.8	3.99	2.51
200	11.1	5.12	3.25
225	11.7	5.57	3.61
250	11.8	6.38	4.34
275	11.9	7.12	5.15
300	12.4	7.44	5.54
325	13.4	7.04	5.05
350	13.6	7.51	5.64
375	13.8	7.97	6.27
400	13.5	8.80	7.58
425	13.9	8.88	7.73
450	14.7	8.61	7.26
475	16.0	7.75	5.95
500	16.7	7.56	5.70
525	16.7	7.95	6.24
550	16.3	8.77	7.53
575	17.6	7.83	6.07
600	17.7	8.08	6.43
625	17.6	8.54	7.14
650	17.6	8.91	7.77
675	17.6	9.22	8.36
700	17.8	9.31	8.54
725	18.5	8.97	7.89
750	18.1	9.61	9.14
775	18.5	9.54	9.00
800	18.4	9.95	9.88
825	19.2	9.39	8.69
850	19.9	8.98	7.90
875	19.2	9.87	9.71
900	20.1	9.27	8.46
925	20.6	8.96	7.88
950	21.8	8.00	6.31
975	22.2	7.82	6.05
1000	23.2	7.08	5.11
1100	22.7	8.40	6.91
1200	22.7	9.15	8.23
1300	24.1	8.45	7.00
1400	25.3	7.91	6.18
1500	25.3	8.48	7.05
1600	25.4	8.92	7.81
1700	26.0	8.87	7.71
1800	25.8	9.57	9.05
1900	28.2	7.66	5.84

Add antenna factor plus cable loss to receiver reading in dBuV to convert to field intensity in dBuV/meter. Calibration per SAE ARP-958 and/or ANSI C63.5 and/or IEEE 291

Table 12-3. Double Ridged Horn Antenna Calibration Information
(Calibration Due 13 Aug 2005)

Table 12-4. Double Ridged Horn Antenna Calibration Information



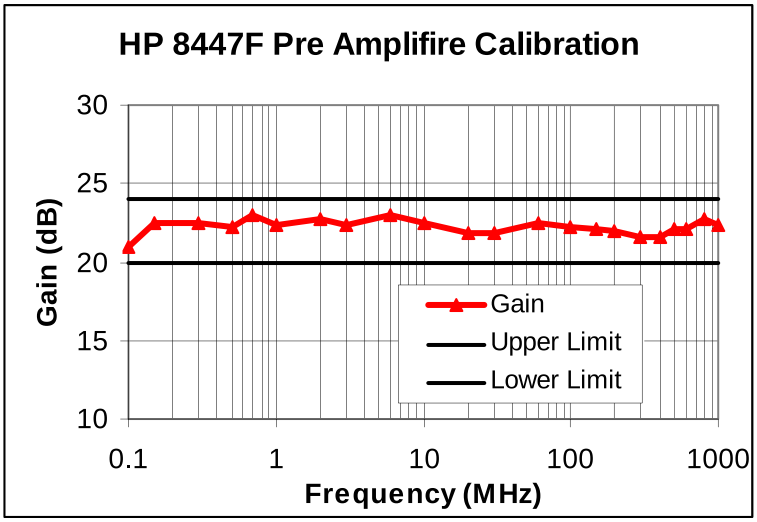
CERTIFICATE OF CALIBRATION CONFORMANCE **The Electromechanics Company, Austin Texas**

Frequency (GHz)	Numeric Gain	Antenna Factor (dB)	Frequency (GHz)	Numeric Gain	Antenna Factor (dB)
1.0	3.74	24.5	10.0	13.89	38.8
1.5	6.59	25.6	10.5	14.58	39.0
2.0	7.74	27.4	11.0	15.10	39.3
2.5	8.05	29.1	11.5	16.16	39.4
3.0	7.16	31.2	12.0	16.85	39.9
3.5	8.07	32.0	12.5	16.02	40.1
4.0	8.31	33.1	13.0	16.85	40.2
4.5	10.61	33.0	13.5	15.28	41.0
5.0	8.54	34.9	14.0	15.62	41.2
5.5	9.08	35.4	14.5	16.00	41.4
6.0	10.02	35.8	15.0	16.93	41.5
6.5	12.18	35.6	15.5	22.28	40.5
7.0	11.29	36.6	16.0	27.98	39.8
7.5	9.5	37.9	16.5	26.93	40.3
8.0	11.5	37.7	17.0	21.04	41.6
8.5	11.81	38.1	17.5	12.90	44.0
9.0	10.52	39.1	18.0	7.91	46.3
9.5	12.75	38.7			

Antenna Type: EMCO Double Ridged Horn Model No: 3115 Serial No: 4057 Frequency Range: 1 GHz - 18 GHz
Cal Date: 06 Oct 2003 Cal Due Date: **06 Oct 2005**

This antenna has been individually calibrated at a one meter distance, using one or more of the following procedures:
ANSI C63.5 The American National Standards Institute Committee 63.5
SAE ARP 958 The Society of Automotive Engineers Recommended Practice 958
Antenna Factor = 20 log f (MHz) - Gain (dBi) - 29.8 Calibration Accuracy: ± 2 dB

Table 12-5. HP8447F Pre Amp Calibration Information



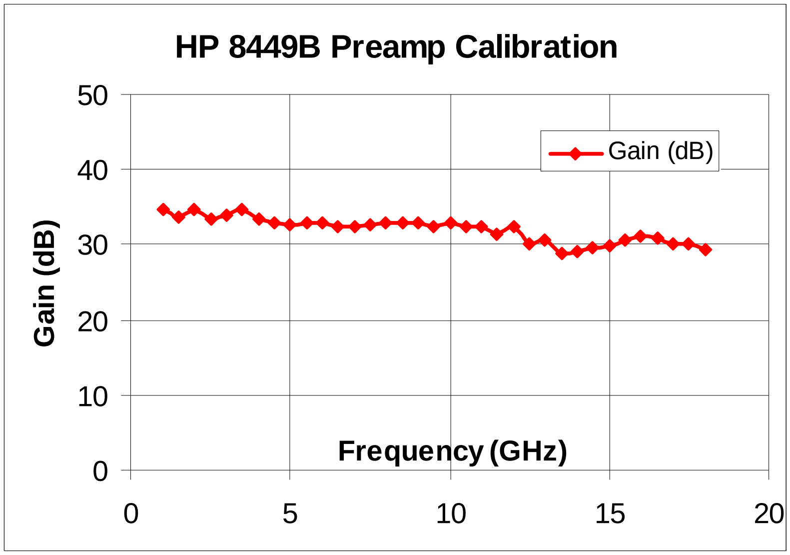
CERTIFICATE OF CALIBRATION CONFORMANCE
The Electromechanics Company, Austin Texas

Frequency	Test Signal Level (dBm)		Gain (dB)	± 2 dB Tolerance	
	Amp Out	Amp In		ΔdB	Pass/Fail
100 kHz	-49.7	-28.7	21	-1	Pass
150 kHz	-49.6	-27.1	22.5	0.5	Pass
300 kHz	-49.7	-27.2	22.5	0.5	Pass
500 kHz	-50.0	-27.8	22.2	0.2	Pass
700 kHz	-49.7	-26.7	23	1	Pass
1 MHz	-50.2	-27.8	22.4	0.4	Pass
2 MHz	-49.4	-26.7	22.7	0.7	Pass
3 MHz	-50.2	-27.8	22.4	0.4	Pass
6 MHz	-50.1	-27.1	23	1	Pass
10 MHz	-49.6	-27.1	22.5	0.5	Pass
20 MHz	-48.8	-27.0	21.8	-0.2	Pass
30 MHz	-50.3	-28.4	21.9	-0.1	Pass
60 MHz	-50.2	-27.7	22.5	0.5	Pass
100 MHz	-50.1	-27.9	22.2	0.2	Pass
150 MHz	-50.4	-28.3	22.1	0.1	Pass
200 MHz	-50.4	-28.4	22	0	Pass
300 MHz	-50.3	-28.7	21.6	-0.4	Pass
400 MHz	-50.5	-28.9	21.6	-0.4	Pass
500 MHz	-50.8	-28.7	22.1	0.1	Pass
600 MHz	-50.4	-28.3	22.1	0.1	Pass
800 MHz	-49.5	-26.8	22.7	0.7	Pass
1 GHz	-48.4	-26.0	22.4	0.4	Pass

Calibration Accuracy: ±2 dB

EUT: HP 8447F Pre Amp (22 dB Section Only)
Frequency Range: 100 kHz - 1 GHz
S/N: 1937A00864
Test Engineer: Bill Toomey
Cal Date: 29 Nov 2002
Calibration Due: **29 Nov 2004**

Table 12-6. HP 8449B Pre Amp Calibration Information



CERTIFICATE OF CALIBRATION CONFORMANCE Loral Electro-Optics, Pomona, CA

Frequency (GHz)	Configuration (dBuV) [2]		Amp Gain (dB)	Frequency	Configuration (dBuV) [2]		Amp Gain (dB)
	Out [3]	In [4]			Out [3]	In [4]	
1	-60.3	-25.7	34.6	10	-23.9	9	32.9
1.5	-61.1	-27.5	33.6	10.5	-23.9	8.5	32.4
2	-23.6	11	34.6	11	-23.9	8.6	32.5
2.5	-21.4	11.9	33.3	11.5	-23.6	7.8	31.4
3	-23.6	10.4	34	12	-24.1	8.2	32.3
3.5	-23	11.7	34.7	12.5	-23	7.2	30.2
4	-21.5	11.8	33.3	13	-22.7	8	30.7
4.5	-21.2	11.8	33	13.5	-23	5.8	28.8
5	-21.5	11.2	32.7	14	-23.1	6	29.1
5.5	-21.9	10.9	32.8	14.5	-24.7	4.8	29.5
6	-23.5	9.3	32.8	15	-25.1	4.8	29.9
6.5	-24.2	8.1	32.3	15.5	-24.1	6.6	30.7
7	-23.5	8.9	32.4	16	-25	6	31
7.5	-23.4	9.2	32.6	16.5	-23.3	7.5	30.8
8	-23.5	9.3	32.8	17	-24.3	5.9	30.2
8.5	-23.2	9.7	32.9	17.5	-25.3	4.9	30.2
9	-23.5	9.4	32.9	18	-26	3.3	29.3
9.5	-23.5	9	32.5				

Notes: 1. Reference antenna amplifier out of test set-up
2. Reference antenna amplifier in test set-up

This amplifier has been individually calibrated using one or more of the following procedures:

- ANSI C63.5 — The American National Standards Institute Committee 63.5
- SAE ARP 958 — The Society of Automotive Engineers Recommended Practice 958

Standards Employed:

HP 8566B Spectrum Analyzer	S/N 2747A05080	Cal Due: 15 June 2006
HP8673M Signal Generator	S/N: 2534A00387	Cal Due: 21 March 2005

Equipment Under Test: HP 8449B Pre-Amplifier S/N: 3008A00831

Cal Date: 21 June 2004 Calibration Due: **21 June 2006**

Table 12-7. RE02 Test Equipment Calibration Record

Test Instrumentation	Manufacturer/Model	Serial Number	Calibration Due
Spectrum Analyzer	HP 8566B	2403A06385	13 Feb 2005
Pre Amplifier (200 kHz – 1 GHz)	HP 8447F	1937A00864	29 Nov 2004
Pre Amplifier (1 GHz – 10 GHz)	HP 8449B	3008A00831	21 June 2006
Monopole Antenna (2 kHz – 30 MHz)	Ailtech 950010-1	0297-05308	07 Nov 2004
Biconical Antenna (30 MHz – 200 MHz)	Ailtech 94455-1	0674	10 Mar 2005
Double Ridged Horn Antenna (200 MHz – 1 GHz)	AH Systems SAS-570	153	13 Aug 2005
Double Ridged Horn Antenna (1 GHz – 18 GHz)	EMCO 3115	9304-4057	6 Oct 2005
NCR = No Calibration Required			
EUT: STEREO IMPACT	S/N: FM1 ______	Date : 20 October 2004	
Stereo Engr: Dave Curtis		Test Engr: Chris Cowdell	

13 RS03 - SUSCEPTIBLITY TO RADIATED, E-FIELDS (10 KHZ –10 GHZ)

13.1 TEST RESULTS:

Antenna Position #1 (Antenna Pointed at All Equipment - Except Boom)

- Vertical Antenna .... Fail
- Horizontal Antenna.. Fail

Position #2 (Antenna Pointed at Boom)

- Vertical Antenna.. Fail
- Horizontal Antenna.. Fail

13.2 TEST CONFIGURATIONS

- Test Configuration Schematic..Figure 13-1
- Test Configuration Photographs ....Figure 13-2 through Figure 13-11

13.3 TEST DATA

Swept Frequency Tests – Position #1

- Vertical Antenna (10 kHz – 1 GHz)..Figure 13-12
- Vertical Antenna (1 GHz – 15 GHz)..Figure 13-14
- Horizontal Antenna (30 MHz – 1 GHz) ....Figure 13-13
- Horizontal antenna (1 GHz – 15 GHz)..Figure 13-15

Discrete Frequency Tests – Position #2

- Horizontal Antenna (1 GHz – 2 GHz, 8.5 GHz) ....Figure 13-16

- Customer Notes Regarding Exceedances..Table 13-1
- Customer Notes on RS03 Testing ....Table 13-2
- Overview of Swept Frequenb6y Test Results..Table 13-3
- Overview of Dwell Frequency and Slow Sweep Frequency Test Results........................Table 13-4
- RS103 Responses at Failure Frequencies ....Table 13-5

- Test Equipment Calibration Record..Table 13-6

13.4 PASS/FAIL REQUIREMENT

- RS03 Test Method ....MIL-STD-462, Notice 6, Method RS03
- 14 kHz – 1 GHz.. @ 10V/M
- 1 - 10 GHz ....@ 20V/M
- Stop at 1, 2, 5, 10 intervals below 1 GHz and 500 MHz steps above 1 GHz
- 2.2 - 2.3, 5.5 - 5.9, 8.4 - 8.5 GHz ....@ 40 V/M
- Modulation variations:

  (1) 14 kHz – 100 MHz @ CW
  (2) 100 MHz – 10 GHz @ 1 kHz 50% AM Square Wave Modulation,
  (3) 480 Hz FM Modulation from 8.4 to 8.5 GHz.

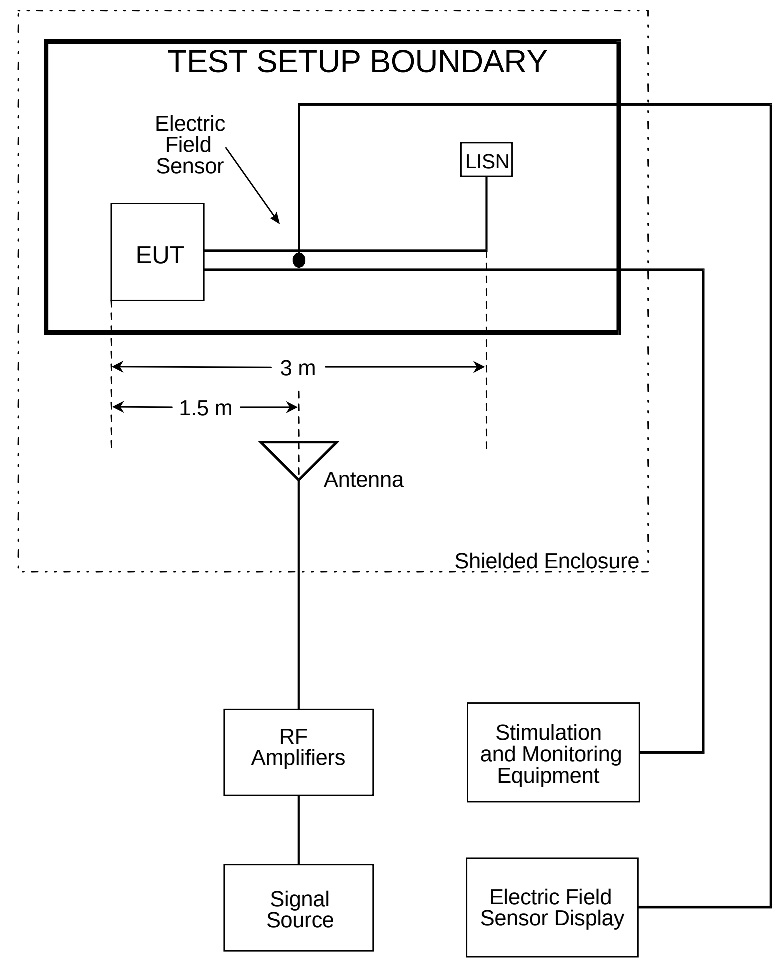


Figure 13-1. Schematic Configuration for EMI Testing on the Stereo Impact 10 kHz – 1 GHz)

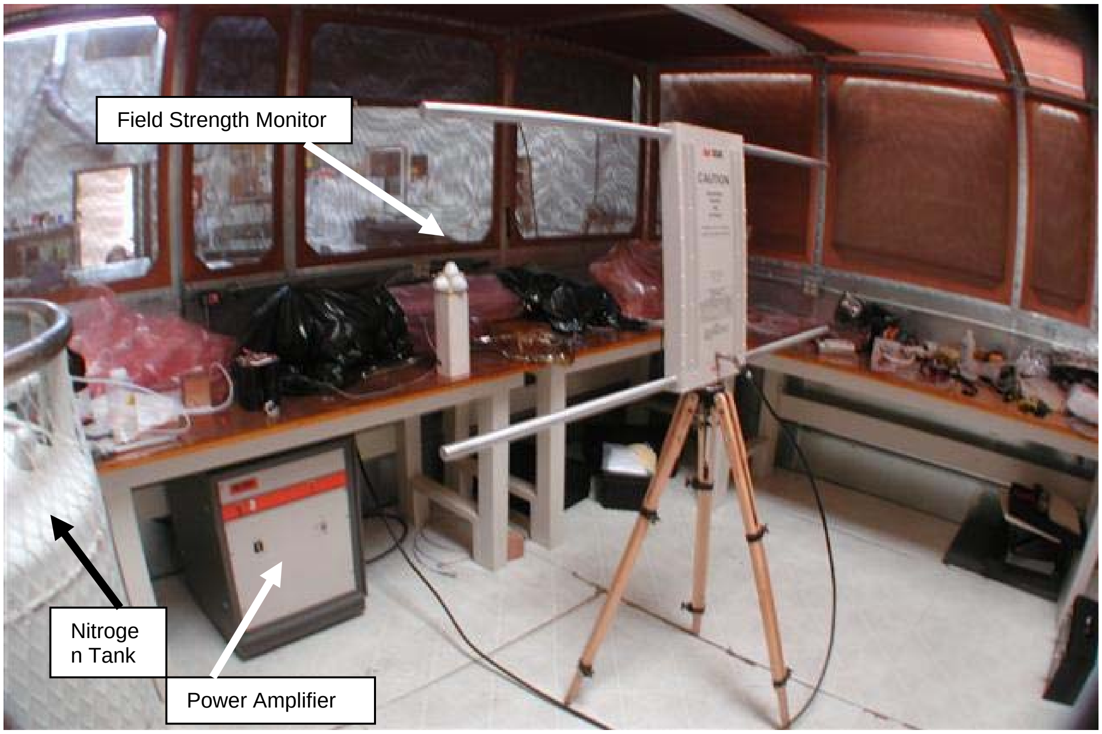


Figure 13-2. Configuration for RS03 Testing on the Stereo Impact (10 kHz – 30 MHz)

Figure 13-3. Configuration for RS03 Testing on the Stereo Impact (30 – 200 MHz) - Vertical Polarization

Figure 13-4. Configuration for RS03 Testing on the Stereo Impact (200 – 1000 MHz) - Vertical Polarization

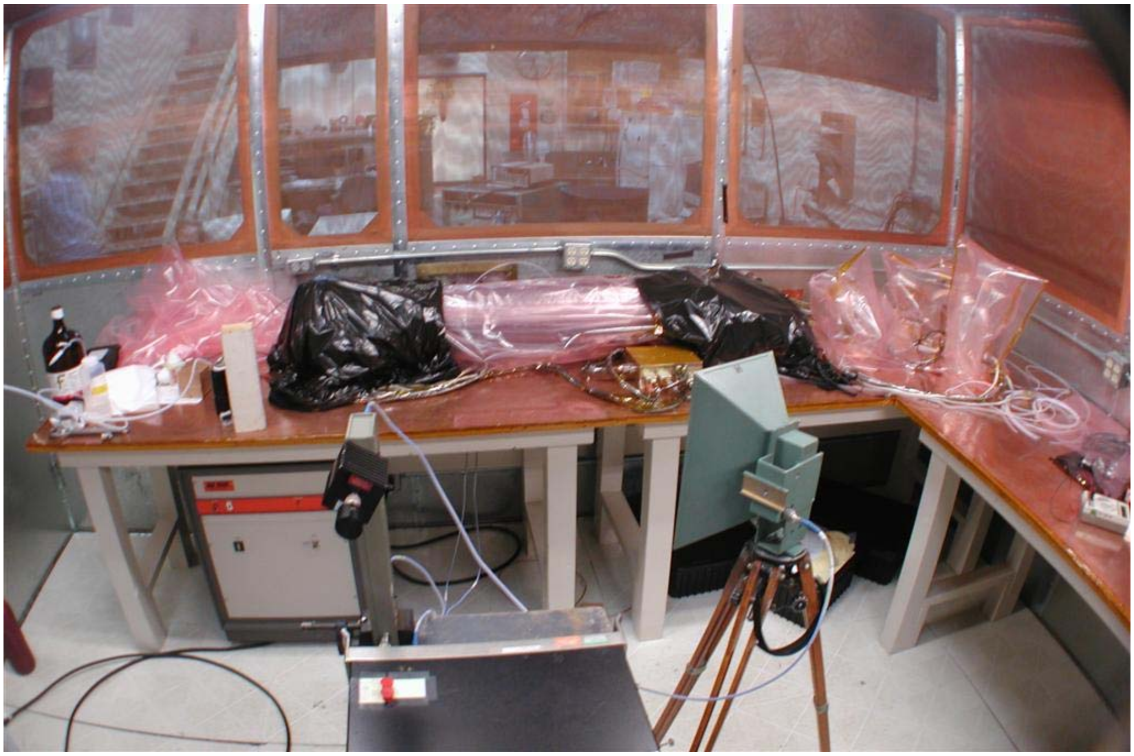


Figure 13-5. Configuration for RS03 Testing on the Stereo Impact (1-2 GHz) - Horizontal Polarization, Antenna Position #2

Figure 13-6. Configuration for RS03 Testing on the Stereo Impact (2 –4 GHz) - Horizontal Polarization – Antenna Position #1

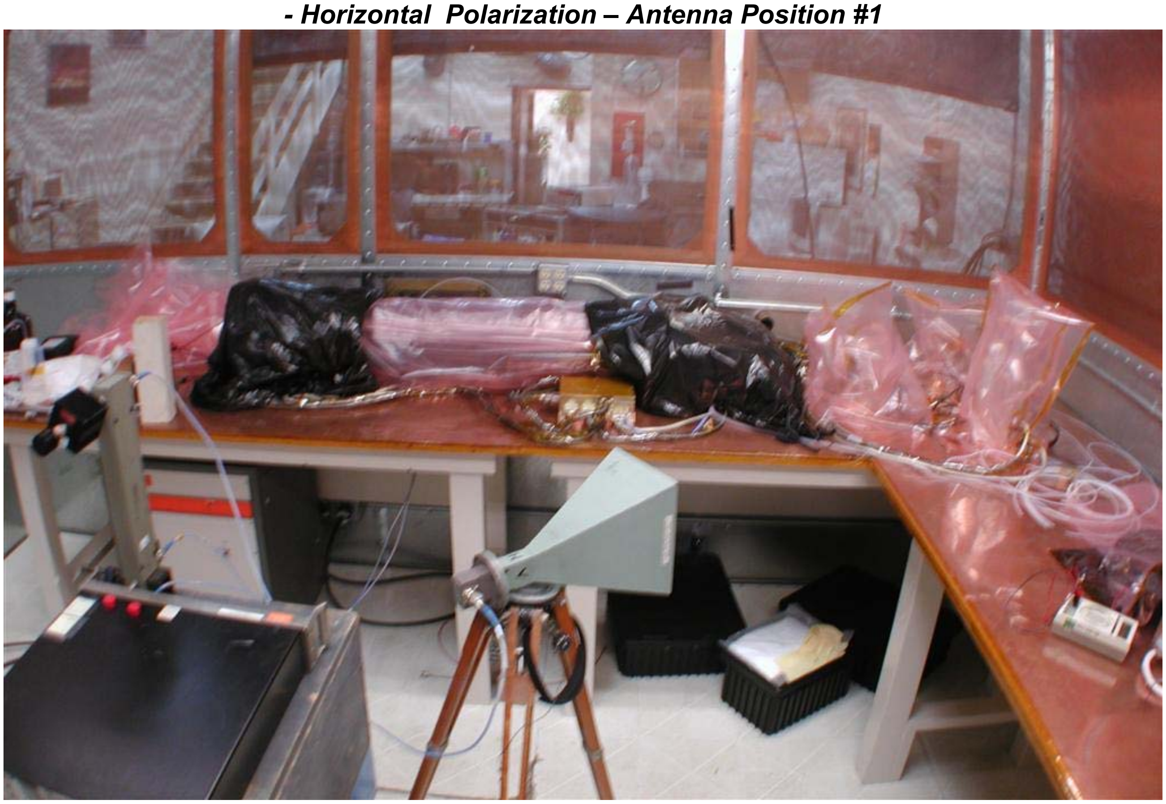


Figure 13-7. Configuration for RS03 Testing on the Stereo Impact (4 –6 GHz) - Horizontal Polarization – Antenna Position #1

Figure 13-8. Configuration for RS03 Testing on the Stereo Impact (6 –8 GHz) - Vertical Polarization – Antenna Position #1

Figure 13-9. Configuration for RS03 Testing on the Stereo Impact (8 – 12 GHz) - Horizontal Polarization– Antenna Position #1

Figure 13-10. Configuration for RS03 Testing on the Stereo Impact (12 – 18 GHz) - Vertical Polarization– Antenna Position #1

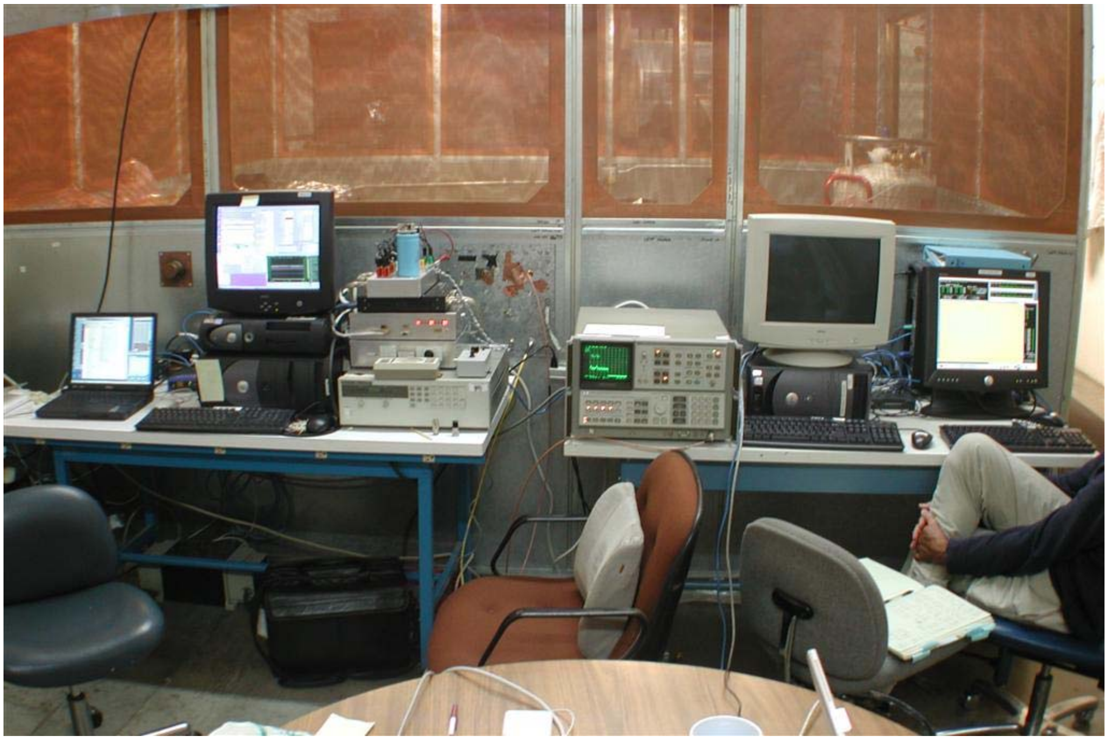


Figure 13-11. Signal Source and Monitoring Equipment Outside the Shielded Room

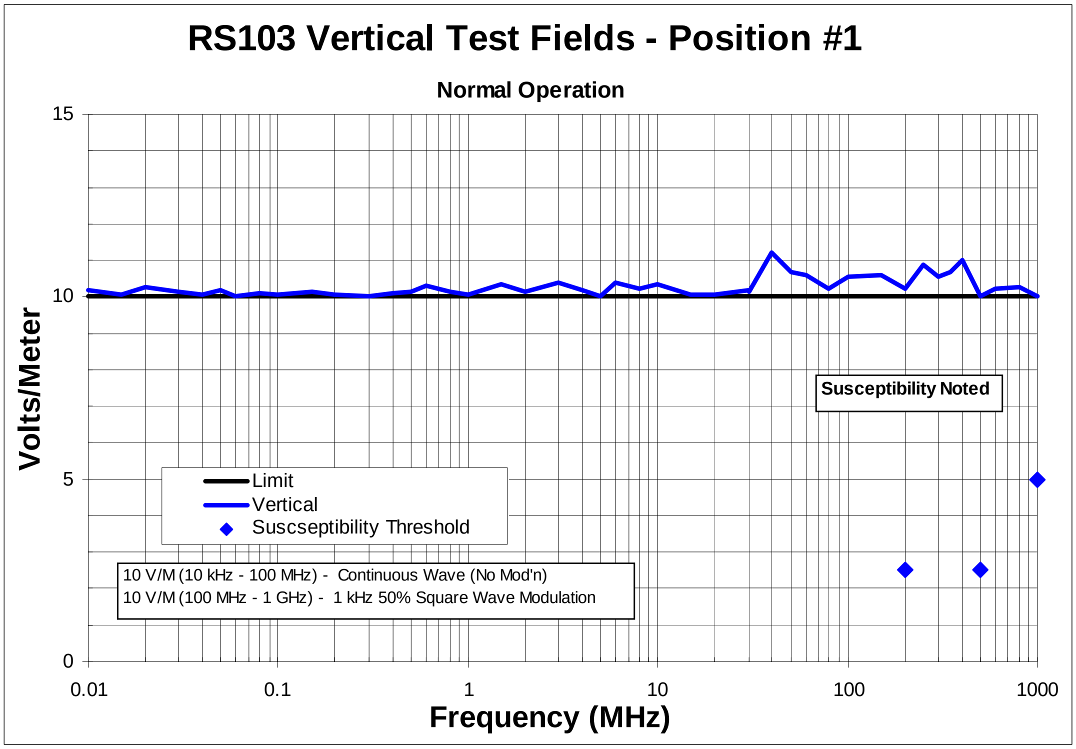


Figure 13-12. RS03 Test Results on the Stereo Impact (10 kHz – 1 GHz) - Vertical Antenna Position #1

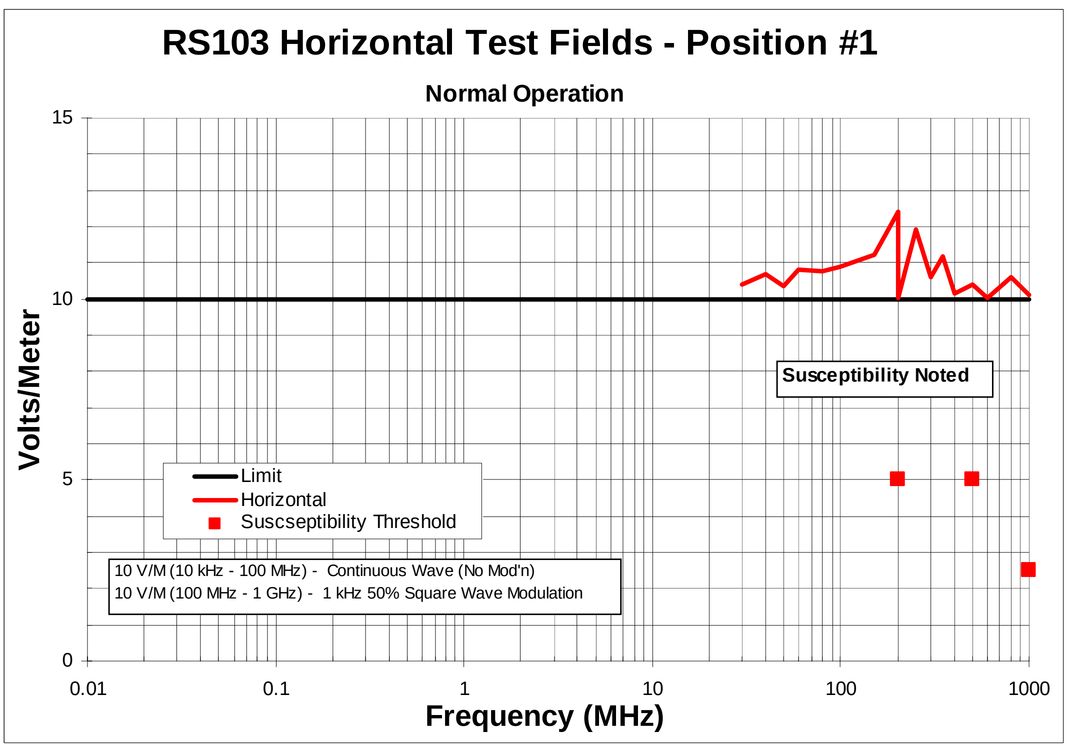


Figure 13-13. RS03 Test Results on the Stereo Impact (30 MHz – 1 GHz) - Horizontal Antenna Position #1

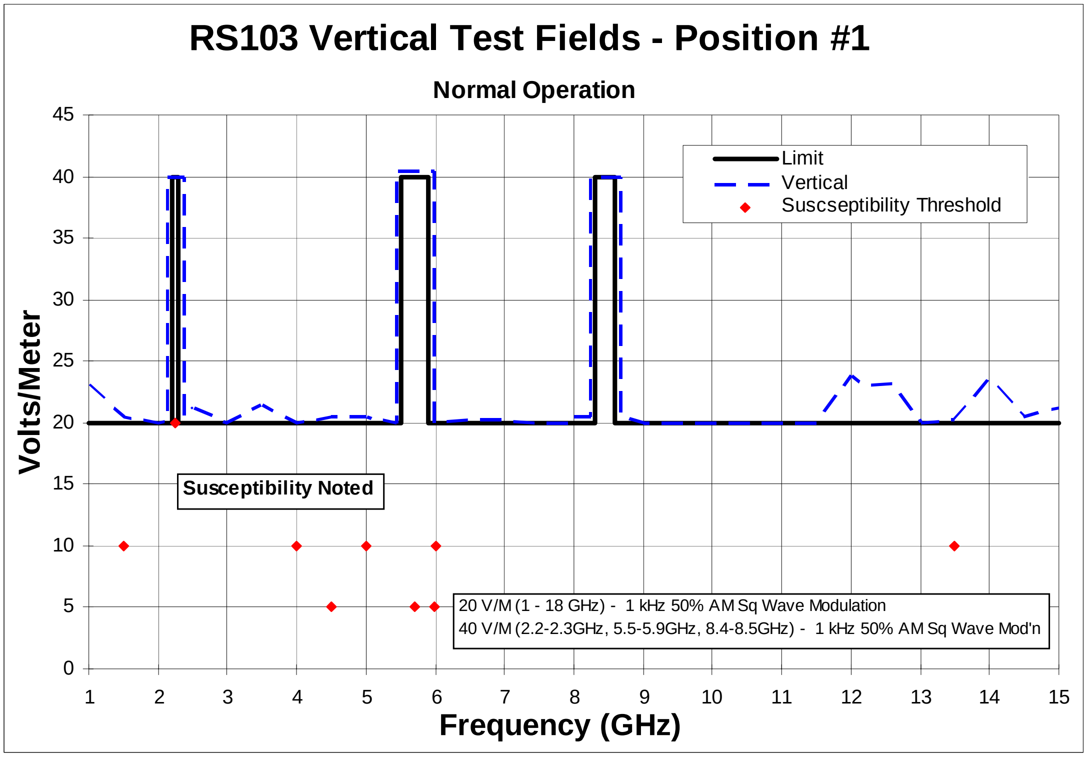


Figure 13-14. RS03 Test Results on the Stereo Impact (1GHz – 15 GHz) - Vertical Antenna Position #1

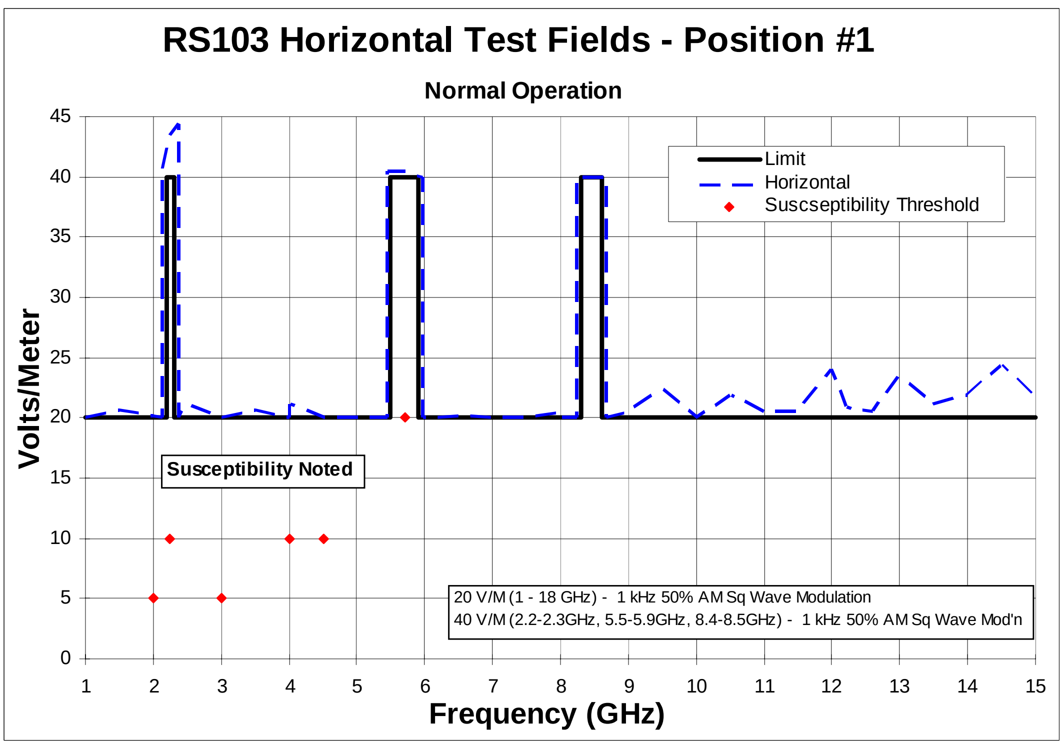


Figure 13-15. RS03 Test Results on the Stereo Impact (1 GHz – 15 GHz) - Horizontal Antenna Position #1

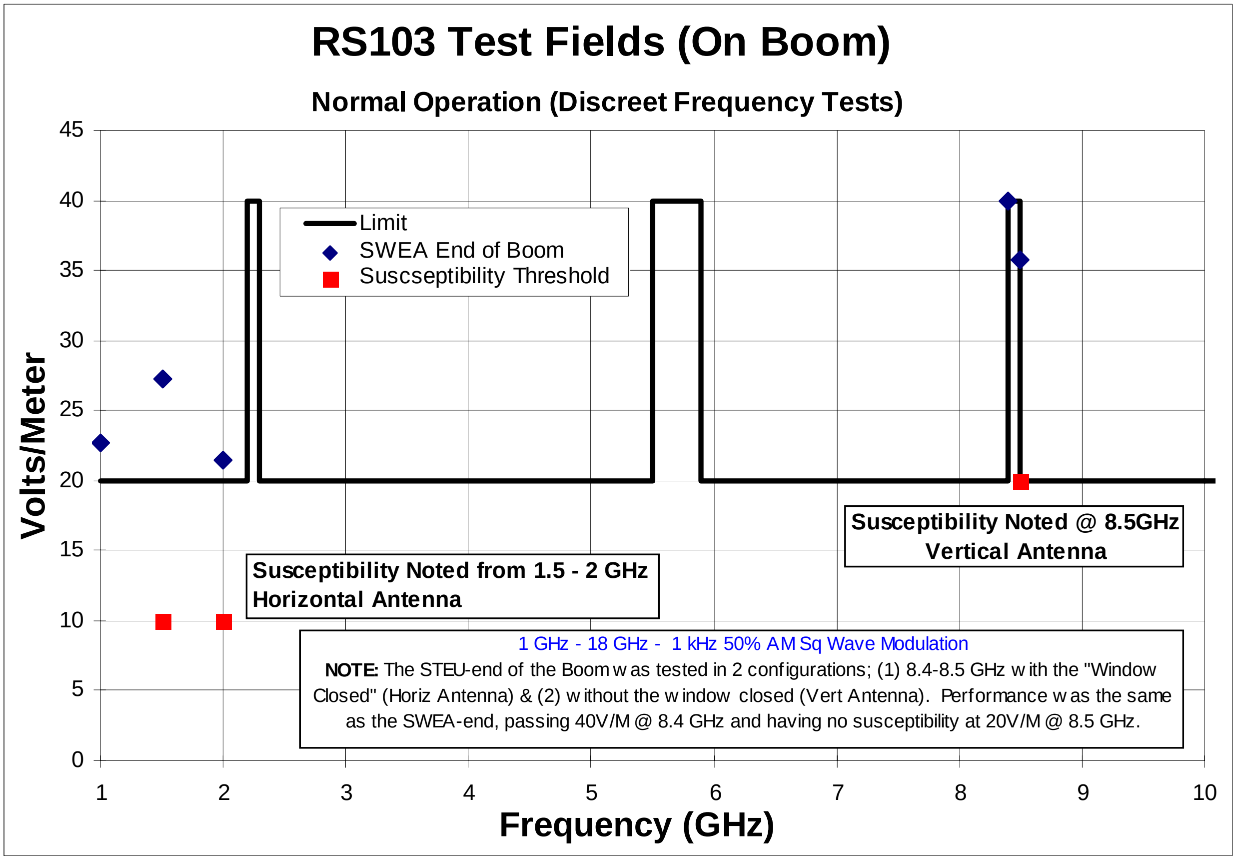


Figure 13-16. RS03 Test Results on the Boom - Position #2 (1 GHz – 2 GHz, 8.5 GHz)

Table 13-1. Customer RS03 Test Notes Regarding Exceedances

Test	EUT	Frequency	Notes
RS03	STE, SIT, SEPT	100MHz-4GHz	Excess counts, sometimes significant, between 100MHz and 4GHz. At 540MHz had to drop the amplitude a factor of 8 to get STE back to background. Typically a factor of 2 or 4 did it.
RS03	STE	4-9GHz	STE continues to see occasional noise up to 13.5GHz.
RS03	STE	8.5GHz	STE sees significant counts at 8.5GHz 40V/m vertical, OK at 20V/m, OK at 8.4GHz 40V/m, OK if antenna not looking directly at STE unit. Quiet with FM modulation (480KHz).

Table 13-2. Customer Notes on RS03 Testing

STEREO IMPACT EMC (2004-10-28)		
RS03, 14KHz-15GHz,		2 minute pauses, followed by ramp-up to next step CW to 100MHz, Modulated above 100MHz. 10V/m to 1GHz, 20V/m above except in 3 transmit bands
Instrument in Quiet mode.		
The above information are customer notes that apply to the following information, all of which constitute Table 13-2.		

Frequency	*GSE PDT Pause Start Time*	*SOH packet UTC Start Time*	*Notes*
14kHz CW	1:09:00 PM	20:09:00	A small increase in MAG (17RMS) and STE background rates (200-400Hz Reset rate, <10c/s LLD) when system started up, before signal applied. Not significant.
20kHz	1:11:00 PM	20:11:00	
50kHz	1:14:30 PM	20:14:30	
100kHz	1:18:30 PM	20:18:30	
200KHz	1:22:30 PM	20:22:30	
500kHz	1:28:20 PM	20:28:20	
1MHz	1:35:00 PM	20:35:00	
2MHz	1:39:10 PM	20:39:10	
5MHz	1:42:20 PM	20:42:20	
10MHz	1:47:10 AM	20:47:10	
20MHz	1:53:10 PM	20:53:10	
30MHz	1:58:00 PM	20:58:00	
Power off to change antennas at 1:59			
30MHz Horiz. CW	2:09:35 PM	21:09:40	
50MHz	2:12:00 PM	21:12:00	
100MHz	2:17:30 PM	21:17:30	
100MHz Mod	2:20:15 AM	21:20:02	1KHz modulation start. See counts in STE-U det 0,1, up to 100c/s
200MHz	2:26:20 PM	21:26:20	Peaks at 1000c/s between 100 & 200MHz, STE-U and STE-D. Actually 2 peaks, one close to 100MHz and the other close to 200MHz with background in between. At 200MHz STE-U det 0 @ 500c/s, rest are lower. Slow rise in HET H2 hi gain over the scan, up to 100c/s, not significant
200MHz	2:29:00 PM	21:29:00	Half amplitude, back to background in STE.
Power off to rotate antenna			
30MHz Vert CW	2:35:45 PM	21:35:50	
50MHz	2:37:30 PM	21:37:30	
100MHz	2:41:30 PM	21:41:30	
100MHz Mod	2:43:50 PM	21:43:50	See STE-U counts up to 1600c/s. STE-D rises to ~200c/s max.
200MHz	2:48:30 PM	21:48:30	Peaks at 1000c/s 100 & 200MHz, STE-U and STE-D, similar to horizontal. At 200MHz, STE-U counts at ~900c/s max, STE-D quiet. SIT SSD and MCP counts 'high'
200MHz	2:51:20 PM	21:51:10	Half amplitude. STE-U still counts ~600c/s max, SIT quiet
200MHz	2:54:10 PM	21:54:10	Quarter amplitude. STE to background
Power off to change antennas at 2:56			Seem to see some suppression of STE reset rates when power amplifier is on. Could be light sensitivity related also. Not significant.

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
200MHz Horiz. No Mod	3:08:40 PM	22:08:40	One glitch at startup in STE rates, then nothing. Should have been modulated - see next
200MHz w/modulation	3:11:50 PM	22:11:50	STE-U rates to 700c/s
200MHz	3:14:25 PM	22:14:30	Half amplitude. STE-U rates to background.
500MHz	3:23:10 PM	22:23:10	Up to 1000c/s STE-U and STE-D betweem 200 and 500MHz. Few spikes to 5000c/s. At 500MHz, STE-U counts to 800c/s, STE-D quiet. SIT counts high.
500MHz	3:25:50 PM	22:25:50	Half Amplitude. SIT, STE to background.
1GHz	3:38:10 PM	22:38:10	STE-U, STE-D spikes to 10,000c/s between 500MHz and 1GHz. SIT has one hi rate packet at ~22:33, and again at 22:39-22:40 (1GHz). STE-U has one current glicth At 1GHz, STE-U rates to 800c/s, STE-D quite. SEPT sees high rates 22:26-22:41
1GHz	3:41:10 PM	22:41:10	Half amplitude. STE-U still counts ~800c/s. SIT quiet
1GHz	3:43:25 PM	22:43:25	Quarter amplitude. STE to background
Off at 3:45:30 to change antenna orientation			
200MHz Vert Mod	3:48:00 PM	22:48:00	STE-U counts at ~800c/s max. STE-D quiet
200MHz	3:50:30 PM	22:50:30	Half Amplitude. STE to background.
500MHz	3:58:00 PM	22:58:00	STE-U, STE-D see rates to 2000c/s between 200 and 500MHz. At 500MHz, STE-U rates to 2000c/s, STE-D quite. SIT counts from 22:57-23:00
500MHz	4:00:15 PM	23:00:15	Half Amplitude. STE-U counts drop to 800c/s. SIT quiet.
500MHz	4:02:35 PM	23:02:35	Quarter amplitude. STE to background
1GHz	4:11:30 PM	23:11:30	STE-U and STE-D see up to 10,000c/s (mostly STE-U) between 500MHz and 1GHz. One glitch in STE-U current. At 1GHz, STE-U rates only slightly enhanced (~100c/s). SIT counts at 23:10 and 23:13. SEPT sees counts at 23:10UT
1GHz	4:13:50 PM	23:13:50	Half Amplitude. STE to background.
541MHz	4:23:00 PM	23:23:00	Full amplitude. Scan back to peak in STE-U current, at 50mA. STE-U rates to 6,000c/s ion 2 detectors, the other two are shut down. Frequency is very tight. SIT counts at 23:19 to 23:23. SEPT counts at 23:16
541MHz	4:24:10 AM	23:24:10	Half Amplitude. Current back to nominal, STE-U rates to 1500c/s, all live
541MHz	4:26:20 PM	23:26:20	Quarter amplitude. STE-U to 800c/s
541MHz	4:29:00 PM	23:29:00	1/8 amplitude. STE-U rates to 15c/s max
1GHz	4:38:35 PM	23:38:40	Scan back up to 1GHz at half amplitude, starting 4:35, background by 700MHz in STE-U. STE-D comes up to 500c/s between 700MHz and 850MHz. STE-U spikes again at ~900MHz. Background at 1GHz
Power down source to switch antennas at 16:43			
Done for the day. Above 1GHz go to 2 antenna positions.			
One at the SEP/IDPU/SWEA/MAG end of the bench, and the other at the boom base/STE-U end			
10/29/2004			
Antenna location #1, pointing at SEP, SWEA, MAG, IDPU			
Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
1GHz, Horiz, Mod, 20V/m	9:18:40 AM	16:18:40	STE-U, STE-D counts to 800Hz. Short pause.
1.2GHz	9:21:00 AM	16:21:00	Signal off to change signal generator. STE-U and STE-D see up to 10,000c/s. SIT counts to 55KHz SEPT counts high 16:18-16:21
1.2GHz	9:23:55 AM	16:23:55	Back up, no pause
1.5GHz	9:26:15 AM	16:26:15	STE-U, STE-D counts to 5,000c/m between 1.2 and 1.5GHz. SIT counts to 50Kc/m. At 2GHz STE rates close background, maybe 100c/s max. SEPT counts high to 16:23-16:26

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
2GHz	9:32:45 AM	16:32:45	Between 1.5 and 2GHz, STE counts peak at 1000c/s, SIT to 30Kc/s. At 2GHz, STE-U rates to 800c/s, STE-D rates at 100c/s, drifting up, SIT to 11Kc/m. SEPT counts high 16:29-16:35, 16:40-16:45
2GHz	9:35:30 AM	16:35:20	Half Amplitude. STE to background. SEPT to background
Source off to change antenna to vertical at 9:38			
1GHz, vert, mod, 20V/m	9:41:30 AM	16:41:30	STE-U counts to 500c/s. STE-D quiet, short pause
1.5GHz	9:47:20 AM	16:47:30	STE counts to 1000c/s between 1 & 1.5GHz. SIT to 50kc/m. SEPT counts high 16:40-16:47. At 1.5GHz, STE close to background.
2GHz	9:56:30 AM	16:56:30	Between 1.5 and 2GHz, STE counts 2 peaks at 500c/s, mostly background. SIT to 2kc/m. SEPT counts high to 16:51. At 2GHz, STE rates to background.
Source off to change back to horiz. At 9:59			
1GHz, horiz, mod, 10V/m	10:05:00 AM	17:05:00	Repeat 1-2GHz ran at half amplitude. At STE-D, see up to 1Kc/s @ 1GHz. SEPT high
2GHz	10:15:00 AM	17:15:00	Between 1 & 2GHz several STE peaks to 1kc/s. SIT to 10Kc/m 17:07 - 17:11. SEPT counts high 17:04-17:10, 17:11-17:13
2GHz, horiz, mod, 5V/m	10:15:30 AM	17:15:30	Sweep backwards at 5V/m to 1GHz. Glitch in STE-D at ~1.7GHz to 100c/s, STE-U to 500c/s at ~1.5GHz, ~1.4GHz, ~1.2GHz, ~1.1GHz. SEPT high at 17:15-17:18, 17:20
1GHz	10:22:30 AM	17:22:30	
Power off to move antenna at 10:23 to point at STE-U, boom base			
1GHz, horiz, mod, 20V/m	10:27:20 AM	17:27:20	STE-U counts to 700c/s. Short pause
1.5GHz	10:31:22 AM	17:31:30	Between 1GHz and 1.5GHz, STE-U and STE-D rates to 800c/s, few glitches to 2000c/s in STE-U. SIT sees 15kc/m. SEPT counts high 17:27-17:31. At 1.5GHz, STE-U rates to 800c/s
1.5GHz	10:34:10 AM	17:34:10	Half Amplitude. STE-U to 700c/s. 1 minute pause
1.5GHz	10:35:20 AM	17:35:20	Quarter amplitude. STE to background. 1 minute pause
2GHz	10:40:30 AM	17:40:30	Between 1.5 and 2GHz, STE-U and STE-D counts to 1000c/s. Sit sees 15kc/m. SEPT counts high 17:38-17:43. At 2GHz, STE-U and STE-D counts to 1000c/s
2GHz	10:42:50 AM	17:42:50	Half amplitude. STE rates to background (<10c/s)
Power off to rotate antenna to vertical, 10:45			
1GHz, vert, mod, 20V/m	10:53:10 AM	17:53:15	STE-U rates to 800c/s. Short pause
1.5GHz	10:56:10 AM	17:56:20	Between 1&1.5GHz STE rates to 800Hz. SIT to 1200c/m at 17:55. SEPT counts high 17:53-17:55. At 1.5GHz, STE-U rates at 600Hz
1.5GHz	10:59:30 AM	17:59:30	Half amplitude. STE to background. Continue at 11:02
2GHz	11:08:45 AM	18:08:50	Between 1.5&2GHz, see spikes to 800c/s STEU, 200c/s STE-D. SEPT high at 18:05. Quiet at 2GHz
Power off to switch antennas at 11:11:30; back to pointing at SEP end.			
2GHz, horizontal, 20V/m	11:51:00 AM	18:51:00	STE at background (glitch during setup). Short pause
2.2GHz, 40V/m	11:54:40 AM	18:54:40	Between 2&2.2GHz, STE rates to 2000c/s, mostly STE-D. At 2.2, quiet at 20V/m, 7,000c/s in STE-U, 600c/s in STE-D at 40V/m. Short pause. Falls off immediately as frequency starts to rise. SEPT rates high
2.25GHz	11:56:20 AM	18:56:20	STE-U rates to 80c/s, STE-D rates to 1000c/s. SEPT rates high.
2.25GHz	12:00:40 PM	19:00:40	Half amplitude (20V/m), STE to background. SEPT rates high.
2.3, back to 20V/m	12:04:30 PM	19:04:30	See peaks to 10,000c/s in SET-D and STE-U between 2.25 and 2.3. SIT counts 12Kc/m. At 20V/m, drops to background (at 12:06). SEPT rates high.
2.5GHz	12:07:30 PM	19:07:30	Between 2.3 and 2.5 see up to 1000c/s in STE-U. At 2.5GHz at background. Pause 3 minutes. SEPT rates high
3GHz	12:12:20 PM	19:12:20	Between 2.5 and 3GHz STE rates peak at 10,000c/s. SIT counts 10Kc/m. SEPT rates high. At 3GHz, STE-U counts at 800c/s, STE-D counts at 1000c/s
3GHz	12:14:45 PM	19:14:45	Half amplitude. Some STE rates still ~100c/s

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
3GHz	12:17:10 PM	19:17:15	Quarter amplitude. STE to background. Back up & start sweeping at 12:19:40
3.5GHz	12:21:40 PM	19:21:40	Between 3&3.5GHz, STE rates to 5000c/s, but settles down to background towards the end. SEPT rates high.
4GHz	12:27:00 PM	19:27:00	Between 3.5&4GHz, some STE-U peaks to 2000c/s. STE-U det 1 at 8000c/s at 4GHz. SEPT quiet
4GHz	12:29:10 PM	19:29:20	Half amplitude. STE to background.
Source off to change antenna orientation at 12:32			
2GHz, horizontal, 20V/m	12:36:50 PM	19:37:00	STE-D rates to 8000c/s. Short pause
2.2GHz, 40V/m	12:39:40 PM	19:39:40	Between 2 & 2.2GHz, STE rates to 5000c/s. SIT counts. SEPT rates high. At 2.2GHz 20V/m, see 9000c/s in STE-D; STE-U quiet. At 40V/m (12:39:40), STE-U rates to 4000c/s, STE-D to 1000c/s.
2.25GHz	12:40:50 PM	19:40:50	STE-D rates to 8000c/s, STE-U quiet. SIT counts. SEPT rates high
2.25GHz	12:43:00 PM	19:43:10	Half amplitude. STE-D to 1000c/s. SIT counts. SEPT rates high
2.25GHz	12:45:10 PM	19:45:10	Quarter amplitude. STE to background. SEPT rates still high. Back up & start sweeping at 12:47
2.3, back to 20V/m	12:47:50 PM	19:47:50	STE rates to 1000c/s at 40V/m. Back to 20V/m at 12:48:30, STE-U to background, STE-D to 200c/s. SIT Counts. SEPT rates high. Start sweeping at 12:49:20
2.5GHz	12:50:35 PM	19:50:40	STE-D rates to 500c/s between 2.3 and 2.5GHz, ~100c/s at 2.5GHz. SIT counts. SEPT rates high.
3GHz	12:54:40 PM	19:54:40	Between 2.5 and 3GHz STE rates to 5000c/s. At 3GHz STE-U at background, STE-D at 70c/s. SIT counts, SEPT rates high.
3.5GHz	12:59:30 PM	19:59:30	Between 3&3.5, STE rates peak at 500c/s. SEPT rates high. At 3.5GHz, STE-D at 60c/s.
4GHz	1:04:20 PM	20:04:02	Between 3.5 and 4GHz, see STE-U rates to 1000c/s, STE-D rates to 50c/s. At 4GHz, STE-U at 800c/s
4GHz	1:06:40 PM	20:06:40	Half amplitude. STE to background.
Source off to change antenna at 1:08:40			
4GHz, Horiz, Mod, 20V/m	1:51:25 PM	20:51:30	Short pause.
4.5GHz	1:54:00 PM	20:54:00	Between 4 & 4.5GHz see STE peaks to 8000c/s. At 4.5GHz STE-D counts at 1000c/s.
4.5GHz	1:56:30 PM	20:56:30	Half amplitude. STE-D det 0 counts at ~100c/s
5GHz	2:01:10 PM	21:01:10	Between 4.5 and 5GHz STE sees up to 1000c/s. At 5GHz, background.
5.5GHz	2:06:10 PM	21:06:20	Between 5&5.5GHz STE rates peak at 800c/s. At 5.5GHz, at background.
5.5GHz, 40V/m	2:09:10 AM	21:09:20	STE-U rates to 700C/s, STE-D rates to 100c/s.
5.7GHz	2:13:15 PM	21:13:20	Between 5.5 and 5.7GHz, STE rates to 800c/s. At 5.7GHz STE-U counting 800c/s.
5.7GHz	2:15:30 PM	21:15:40	Half amplitude. STE to background. Back up and scanning at 2:17:20
5.9GHz	2:20:00 PM	21:20:00	Between 5.7 and 5.9GHz, STE counts to 800c/s. At 5.9GHz, background levels.
5.9GHz, 20V/m	2:20:40 PM	21:20:40	Background. No pause - start scanning
6GHz	2:21:30 PM	21:21:35	One STE-U glitch to 500c/s between 5.9 and 6GHz. Background at 6GHz.
Power off source to rotate antenna at 2:23:40			
4GHz, Vert, Mod, 20V/m	2:30:15 PM	21:30:20	STE-U to 800c/s, STE-D quiet. Short pause.
4.5GHz	2:34:10 PM	21:34:15	STE counts to 1000c/s between 4&4.5GHz. STE-D at 1KHz at 4.5GHz
4.5GHz	2:36:10 PM	21:36:15	Half amplitude. STE-D det 0 still at 1000c/s.
4.5GHz	2:37:30 PM	21:37:30	Quarter amplitude. STE quiet. Return to full amplitude, continue scanning at 2:38:40
5GHz	2:42:20 PM	21:42:30	Between 4.5 and 5GHz STE sees up to 1000c/s.
5GHz	2:44:20 PM	21:44:25	Half Amplitude. STE to background. Back up and scanning at 2:46:00

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
5.5GHz	2:49:00 PM	21:49:10	Between 5&5.5GHz STE rates peak at 1000c/s. At 5.5GHz, STE-D counts ~100c/s.
5.5GHz, 40V/m	2:52:00 PM	21:52:10	STE-D counts at 1Kc/s. Short pause
5.7GHz	2:53:45 PM	21:53:50	STE-U, STE-D count to 1000c/s between 5.5 and 5.7GHz.
5.7GHz	2:55:50 PM	21:56:00	Half amplitude. STE-U to background. STE-D counts at up to 1000c/s.
5.7GHz	2:57:20 PM	21:57:20	Quarter amplituide. STE-D still counts at 1000c/s.
5.7GHz	2:58:20 PM	21:58:25	1/8 amplitude. Background. Back up and scanning at 15:00
5.9GHz	3:01:20 PM	22:01:20	STE-U, STE-D count to 1000c/s between 5.7 and 5.9GHz.
5.9GHz, back to 20V/m	3:02:50 PM	22:03:10	Some channels drop, still counting ~800c/s STE-U, 500c/s, STE-D
6GHz	3:05:00 PM	22:05:00	Between 5.9 and 6GHz, STE counts to 700c/s. SIT counts 2500c/m for 1 sample. At 6GHz, STE-U counts at 700c/s, STE-D quiet.
6GHz	3:07:20 PM	22:07:30	Half amplitude. STE to background.
Signal off to switch antennas, 3:08			
6GHz, horiz., Mod, 20V/m	3:19:40 PM	22:19:40	Quiet. Short pause
6.5GHz	3:22:40 PM	22:22:40	Quiet.
7GHz	3:26:50 PM	22:27:00	Quiet
7.5GHz	3:30:50 PM	22:31:00	Quiet
8GHz	3:34:40 AM	22:34:45	Quiet
Signal off to rotate antenna to veritical at 3:36:40			
6GHz, vert., Mod, 20V/m	3:41:05 PM	22:41:10	STE-D counts 800c/s
6.5GHz	3:43:40 PM	22:43:50	STE peak counts 500c/s between 6 & 6.5GHz. At 6.5GHz, STE near background (~15c/s)
7GHz	3:51:40 PM	22:51:40	Between 6.5 and 7GHz, STE counts to 700c/s. At 7GHz, near background (25c/s, STE-D)
7.5GHz	3:55:40 PM	22:55:50	Between 7&7.5GHz, STE-D counts to 200c/s. Quiet at 7.5GHz
8GHz	3:59:40 PM	22:59:50	Between 7.5 and 8GHz, STE-D rates to 600c/s. At 8GHz quiet.
Signal off to change antennas at 4:03			
8GHz Horiz., Mod, 20V/m, SEP end.	4:18:00 PM	23:18:00	Quiet. Short pause.
8.4GHz, 20V/m	4:20:00 PM	23:20:00	Quiet
8.4GHz, 40V/m	4:21:20 PM	23:21:20	Quiet
8.5GHz, 40V/m	4:24:50 PM	23:24:55	Quiet
8.5GHz, 20V/m	4:27:45 PM	23:27:50	Quiet, Short pause.
9GHz	4:29:40 PM	23:29:50	Quiet
9.5GHz	4:34:10 PM	23:34:15	Quiet
10GHz	4:38:40 PM	23:38:50	Quiet
10.5GHz	4:43:30 PM	23:43:30	Quiet
11GHz	4:46:35 PM	23:46:40	Quiet
11.5GHz	4:49:40 PM	23:49:40	Quiet
12GHz	4:52:50 PM	23:53:00	Quiet
Power off signal to change antenna orientation at 16:55			

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
8GHz Vert., Mod, 20V/m, SEP end.	4:58:50 PM	23:59:00	Quiet. Short pause.
8.4GHz, 20V/m	5:00:20 PM	0:00:30	Quiet. Short pause
8.4GHz, 40V/m	5:01:30 PM	0:01:30	Quiet
8.5GHz, 40V/m	5:04:00 PM	0:04:10	STE-D det 2 counts ~20c/s. Not significant.
8.5GHz, 20V/m	5:06:20 PM	0:06:20	Quiet. Short pause.
9GHz	5:08:30 PM	0:08:40	Small glitches in STE-D up to 500c/s between 8.5 and 9GHz. At 9GHz, STE_D det 3 up to 10c/s.
9.5GHz	5:12:00 PM	0:12:00	Small glitch in STE-D to 40c/s between 9 and 9.5GHz. SEPT sees a few counts, not sgnificant. Quiet at 9.5GHz.
10GHz	5:14:40 PM	0:14:50	Quiet
10.5GHz	5:17:40 PM	0:17:40	Quiet
11GHz	5:21:00 PM	0:21:00	See one glitch in STE-D to 500c/s between 10.5 and 11GHz. Quiet at 11GHz.
11.5GHz	5:24:00 PM	0:24:00	Quiet
12GHz	5:26:40 PM	0:26:40	Quiet
Shut off signal to change antenna to point directly at SWEA/STE-D/MAG/IDPU at 5:28:40. Stay in vertical antenna orientation.			
8.4GHz, Vert, Mod, 40V/m	5:32:40 PM	0:32:50	STE-D det 1 sees ~5-10c/s, not significant.
8.5GHz, 40V/m	5:35:10 PM	0:35:10	STE-D det 2 up to 1000c/s. STE-D det 1 up to 250c/s.
8.5GHz, 20V/m	5:38:00 PM	0:38:00	STE-U quiet. STE-D det 2 counts 80c/s.
Shut off signal to change antenna to point directly at STE-U & boom connectors at 5:40:00. Stay in vertical antenna orientation.			
8.4GHz, Vert, Mod, 40V/m	5:42:15 PM	0:42:20	Quiet
8.5GHz, 40V/m	5:44:40 PM	0:44:50	Small glitch on STE-U between 8.4 and 8.5, to 200c/s. At 8.5GHz, STE-U det 0 counts ~5c/s, not significant.
Shut off for the night at 17:48			
2004-11-1	Still pointed at STE-U		
8.5GHz, Vert, AM Mod, 40V/m	8:43:10 AM	16:43:20	STE-U counts up to 800c/s, mostly det 0. STE-D det 1 sees ~10c/s
8.5GHz	8:45:25 AM	16:45:30	Close STE-U door. See noise in STE-U spectra, though peaks FWM still looks OK.
8.5GHz	8:49:10 AM	16:49:30	Half amplitude. STE is quiet.
8.5GHz	8:50:10 AM	16:50:20	Full amplitude.
8.5GHz	8:52:30 AM		STE-U door open
8.439GHz	8:56:00 AM	16:56:20	As close as we can get to the transmit frequency. STE-U counts ~20c/s in det 2,3
8.439GHz	~9AM		Source off. STE noise drops out
8.439GHz	9:09:30 AM	17:09:50	FM 480KHz modulation. STE sees nothing. See side lobes around central peak on spectrum analyzer, spaceed at 480KHz; first pair down 3dB
	9:15:30 AM	17:15:50	Source off.
8.4GHz, 40V/m, 480KHz FM, vert	9:49:30 AM	17:49:50	STE quiet, short pause
8.5GHz	9:51:40 AM	17:51:50	Scan slowly from 8.4 to 8.5GHz. STE sees nothing. Power off to re-point antenna
Antenna pointed at SWEA/STE-D			
8.4GHz, 40V/m, 480KHz FM, vert	9:53:20 AM	17:53:40	STE quiet, short pause
8.5GHz	9:54:50 AM	17:55:00	Scan slowly from 8.4 to 8.5GHz. STE sees nothing. Power off source to rotate SEP, IDPU

Frequency	GSE PDT Pause Start Time	SOH packet UTC Start Time	Notes
Rotate SEP, IDPU. Point antenna at SEP.			
8.4GHz, 40V/m, AM mod, vert	10:15:10 AM	18:15:20	Short pause. STE quiet.
8.5GHz	10:17:20 AM	18:17:30	During scan, see some noise in STE-U and STE-D to 500c/s. At 8.5GHz STE quiet.
Power off source to rotate antenna at 10:19:40			
8.4GHz, 40V/m, AM mod, horiz.	10:22:10 AM	18:22:20	Short pause
8.5GHz	10:24:00 AM	18:24:10	During scan, see some noise in STE-U and STE-D to 700c/s. At 8.5GHz STE quiet.
Power off source to change antennas at 10:26:20			
12GHz, AM Mod, 20V/m, Horiz.	11:02:30 AM	19:02:40	Quiet. Short pause
12.5GHz	11:06:45 AM	19:07:00	Quiet
13GHz	11:12:10 AM	19:12:30	Quiet
13.5GHz	11:18:30 AM	19:18:50	Quiet
14GHz	11:24:50 AM	19:25:10	Quiet
14.5GHz	11:29:30 AM	19:29:40	Quiet
15GHz	11:33:30 AM	19:33:45	Quiet. Signal Off at 11:36 to change antenna polarization
12GHz, AM Mod, 20V/m, Vert.	11:41:00 AM	19:41:15	Quiet. Short pause
12.5GHz	11:43:10 AM	19:43:30	Quiet
13GHz	11:47:00 AM	19:47:20	Quiet
13.5GHz	11:52:40 AM	19:52:50	STE-D det 3 counts 700Hz
13.5GHz	11:57:05 AM	19:57:20	Half amplitude. STE quiet. Long Pause. Back up at 12:42
14GHz	12:43:30 PM	19:43:40	STE-D counts to 200c/s, one peak between 13.5&14. Quiet at 14GHz
14.5GHz	12:46:50 PM	20:47:10	Quiet
15GHz	12:50:10 PM	20:50:20	Quiet
Power off source, done at 12:52:40			

Table 13-3. Overview of RS03 and RS103 Swept Frequency Test Results

<table>
<tr><th rowspan="2">Frequency Range</th><th colspan="3">RS03 Requirement</th><th rowspan="2">Frequency Range</th><th colspan="3">RS103 Requirement</th></tr>
<tr><th>Volts/Meter</th><th>Modulation</th><th>Pass/ Fail</th><th>Volts/Meter</th><th>Modulation</th><th>Pass/ Fail</th></tr>
<tr><td>10 kHz-1 GHz</td><td>20</td><td>CW</td><td>Pass</td><td>100 kHz-1 GHz</td><td rowspan="2">200</td><td rowspan="4">1 kHz SW</td><td>Fail (1)</td></tr>
<tr><td>1 – 2 GHz</td><td>100</td><td rowspan="2">1 kHz SW</td><td>Pass</td><td>1 - 2 GHz</td><td>Pass</td></tr>
<tr><td>2 -10 GHz</td><td>300</td><td>Pass</td><td>2 -10 GHz</td><td rowspan="2">285</td><td rowspan="2">Pass</td></tr>
<tr><td>10 -18 GHz</td><td>100</td><td rowspan="2">1 kHz 10%</td><td>Pass</td><td>10 – 18 GHz</td></tr>
<tr><td>18 - 40 GHz</td><td>20</td><td>Pass</td><td>18 - 40 GHz</td><td>200</td><td>1 kHz 10%</td><td>Pass</td></tr>
</table>

(1) See Table 16-3.

Table 13-4. Overview of Dwell frequency and Slow Sweep RS103 Test Results

<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="3">Required Test Field</th><th rowspan="2">Pass/ Fail</th><th rowspan="2">Frequency (MHz)</th><th colspan="3">Required Test Field</th><th rowspan="2">Pass /Fail</th></tr>
<tr><th>Volts/ Meter</th><th>Modulatio n</th><th>Pulse Width (us)</th><th>Volts/ Meter</th><th>Modulation</th><th>Pulse Width (us)</th></tr>
<tr><td>162</td><td>285</td><td rowspan="10">1 kHz</td><td>260</td><td>Pass</td><td>2,950</td><td rowspan="8">285</td><td>1 kHz</td><td>200</td><td>Pass</td></tr>
<tr><td>416.5</td><td>200</td><td>500</td><td>Pass</td><td>3,050</td><td>1 kHz</td><td>500</td><td>Pass</td></tr>
<tr><td>422</td><td>285</td><td>100</td><td>Pass</td><td>5400</td><td>640</td><td>10</td><td>Pass</td></tr>
<tr><td>425</td><td rowspan="2">200</td><td rowspan="2">500</td><td>Pass</td><td>5625</td><td>640</td><td>1</td><td>Pass</td></tr>
<tr><td>445</td><td>Pass</td><td>5664</td><td>100</td><td>10</td><td>Pass</td></tr>
<tr><td>1,320</td><td rowspan="5">285</td><td>565</td><td>Pass</td><td>5680</td><td>160</td><td>1</td><td>Pass</td></tr>
<tr><td>2,205.5</td><td rowspan="4">500</td><td>Pass</td><td>5690</td><td rowspan="4">1 kHz</td><td>500</td><td>Pass</td></tr>
<tr><td>2,215.5</td><td>Pass</td><td>5755</td><td>500</td><td>Pass</td></tr>
<tr><td>2,255.5</td><td>Pass</td><td>20.2–20.3 GHz</td><td rowspan="2">200</td><td>50</td><td>Pass</td></tr>
<tr><td>2,287</td><td>Pass</td><td>21.1-21.2 GHz</td><td>50</td><td>Pass</td></tr>
</table>

Table 13-5. GMD Stereo Impact RS103 Responses at the Failure Frequencies

<table>
<tr><th>Frequency</th><th>Threshold of Failure (Volts/Meter)</th><th>Requirement (Volts/Meter)</th><th>Modulation Frequency</th><th>Pulse Width</th><th>EUT Response</th></tr>
<tr><td>443</td><td>180</td><td>200</td><td rowspan="3">1 kHz</td><td rowspan="3">500 us</td><td rowspan="3">GMD Stereo Impact Stopped Tracking</td></tr>
<tr><td>450</td><td>190</td><td>200</td></tr>
<tr><td>460</td><td>199</td><td>200</td></tr>
</table>

Table 13-6. RS03 Test Equipment Calibration Record

Test Instrumentation	Manufacturer/Model Number	Serial Number	Calibration Due
Spectrum Analyzer	HP 8566B	2332A02754	16 June 2006
Signal Generator (30 MHz - 18 GHz)	HP 8350A	2024A60138	25 Apr 2005
Signal Generator Plug-in	HP 83592A	2125A00228	25 Apr 2005
20 dB Attenuator	Weinschel 33-20-34	AL0886	15 Nov 2005
Directional Coupler (10 kHz-1 GHz)	HP 778D	15044	12 Oct 2005
Directional Coupler (1 GHz - 18 GHz)	HP 11691D	1210A01384	12 Nov 2004
Power Amplifier (250 kHz-100 MHz)	IFI M402	1078-2064	NCR
Power Amplifier (100 MHz-1 GHz)	Amp Res 200W1000M7	12646	NCR
Power Amplifier (1 GHz - 2 GHz)	Hughes 8929H09	226	NCR
Power Amplifier (2 GHz - 4 GHz)	Hughes 8020H01	300	NCR
Power Amplifier (4 GHz - 8 GHz)	Hughes 8020H02	220	NCR
Power Amplifier (8 GHz-12.4 GHz)	Hughes 8020H03	231	NCR
Biconical Antenna (30 MHz-200 MHz)	EMCO 3109	2231	NCR
Double Ridged Horn Antenna (200 MHz – 1 GHz)	AH Systems SAS 570	2940	13 Aug 2005
L-Band Horn Antenna (1 GHz - 2 GHz)	Polarad CA-L	171	NCR
S-Band Horn Antenna (2 GHz - 4 GHz)	Polarad CA-S	169	NCR
Standard Gain Horn (4 GHz - 6 GHz)	Scientific Atlanta 12-3.9	677	NCR
Standard Gain Horn (6 GHz - 8 GHz)	Scientific Atlanta 12-5.8	063	NCR
Standard Gain Horn (8 GHz - 12.4 GHz)	Scientific Atlanta 12-8.2	267	NCR
Heliax Coaxial Cable (12 ft)	Andrews Type 84147	N/A	3 Jan 2005
30 dB Attenuator	HP 8498A	1801A04849	24 Mar 2005
Test Field Monitors			
E-Field Monitor (10 kHz – 1 GHz)	AR 1000	60553	04 Dec 2005
E-Field Monitor (10 kHz – 1 GHz)	AR FP1000	60415	04 Dec 2005
Double Ridged Horn Antenna (1-18 GHz)	EMCO 3115	9304-4057	06 Oct 2005
NCR = No Calibration Required			

EUT: STEREO IMPACT S/N: FM1 Date : 28,29 Oct & 01 Nov 2004
Stereo Engr: Dave Curtis Test Engr: Chris Cowdell