EXHIBIT 5

TECHNICAL TEST REPORT

FCC PART 15 SUBPART C
AND
FCC PART 18 SUBPART C
TEST REPORT
for

EV BATTERY CHARGER

Model: WM7200

Prepared for:

GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES
3050 WEST LOMITA BOULEVARD
TORRANCE, CALIFORNIA 90509-2923

Prepared by: _____

KYLE FUJIMOTO

Approved by: _____

SCOTT McCUTCHAN

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: AUGUST 6, 1998

	REPORT BODY	APPENDICES		TOTAL
		A	*B*	
PAGES	35	7	7	**49**

TABLE OF CONTENTS

LIST OF APPENDICES

APPENDIX	TITLE
A	Test Setup Diagrams and Photos
B	Antenna and Effective Gain Factors

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Plot Map And Layout of Test Site

GENERAL REPORT SUMMARY

This electromagnetic emission and immunity test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full.

The immunity data included in this report are not covered by NVLAP accreditation. This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested:	EV Battery Charger Model: WM7200 S/N: N/A
Modifications:	The EUT was not modified in order to meet the specifications.
Manufacturer:	General Motors Advanced Technology Vehicles 3050 Lomita Boulevard Torrance, California 90509-2923
Test Date:	August 5, 1998
Test Deviations:	The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Power Transfer Test -- Radiated Emissions 10 kHz to 400 MHz	Complies with the relevant requirements of FCC Title 47, Part 18, Subpart C, section 18.305
2	Charger RF Communications – Transmitter Test – Fundamental and Harmonics 10 kHz to 9.16 GHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.249
3	Charger RF Communications – Transmitter Test – Radiated Spurious Emissions 10 kHz – 1000 MHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart B
4	Charger RF Communications – Transmitter Test – Conducted Emissions 450 kHz – 30 MHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, Section 15.207
5	Receiver Test – Radiated Emissions 10 kHz to 1000 MHz	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart B

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the EV Battery Charger Model: WM7200. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the EV Battery Charger, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47. Part 15 Subpart B; sections 15.207 and 15.249 of Subpart C; and Part 18, Title 47, Subpart C.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI/EMC tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

General Motors Advanced Technology Vehicles

Stuart Moriwaki	MTS Systems, Systems Engineering
Michael E. Steele	Sr. Systems Engineer, Systems Engineering

Compatible Electronics, Inc.

Kyle Fujimoto	Test Engineer
Scott McCutchan	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on July 9, 1998

2.5 Disposition of the Test Sample

The test sample was returned to General Motors Advanced Technology Vehicles on July 9, 1998.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

HP	Hewlett Packard	RF	Radio Frequency
P/N	Part Number	EMI	Electromagnetic Interference
LISN	Line Impedance Stabilization Network	S/N	Serial Number
ITE	Information Technology Equipment	EUT	EV Battery Charger

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Part 15 1997	FCC Rules - Radio frequency devices (including digital devices).
FCC Title 47, Part 18 1997	FCC Rules – Industrial, Scientific, and Medical Equipment
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

4.1.1 Operating Conditions of the EUT

4.1.1.1 Radiated Emissions – 10 kHz to 400 MHz
Power Transfer Test
Part 18, Title 47, Subpart C

Specifics of the EUT and Peripherals Tested

Two different charge ports were tested.

GEN 1 setup: The EV Battery Charger Model: WM7200 (EUT) was connected to the charge port via its charge paddle. The charge port was also hardwired to a resistive load box. During this test, the power transfer and RF communications were active. The accessories were powered on. During the initial scan, the EUT was tested at one amp current at the load, and at full power. The cables were moved to maximize the emissions. The final radiated data was taken at full power, which was the worst case scenario. The cables were bundled and routed as shown in the photographs in Appendix A.

GEN 2 setup: The EV Battery Charger Model: WM7200 (EUT) was connected to the charge port via its charge paddle. The charge port was also hardwired to a resistive load box and a Gen 2 power electronics bay. The Gen 2 Power electronics bay was also hard wired to a 12 volt battery and resistive load box. During this test, the power transfer and RF communications were active. The accessories were powered on. During the initial scan, the EUT was tested at one amp current at the load, and at full power. The cables were moved to maximize the emissions. The final radiated data was taken at full power, which was the worst case scenario. The cables were bundled and routed as shown in the photographs in Appendix A.

4.1.1.2 **Radiated Emissions, Harmonics and Spurious – 10 kHz to 9.15 GHz**
Charger RF Communications – Transmitter and Receiver Test
Part 15, Title 47, Subpart C, section 15.249

Specifics of the EUT and Peripherals Tested

Spurious Emissions: The EV Battery Charger Model: WM7200 (EUT) was placed on the wooden table and tested in two orthogonal axis. The EUT was connected to the charge port via its charge paddle. The charge port was also hardwired to a resistive load box. During this test, the power transfer was disabled and the accessories were powered off. During the initial scan for spurious emissions, the EUT was tested with the RF communications transmitter active only and with the RF communications receiver active only. The cables were moved to maximize the emissions. The final spurious radiated data was taken with the RF communications transmitter active only, which was the worst case scenario. The cables were bundled and routed as shown in the photographs in Appendix A.

Harmonics: The EV Battery Charger Model: WM7200 (EUT) was placed on the wooden table and tested in two orthogonal axis. The EUT was connected to the charge port via its charge paddle. The charge port was also hardwired to a resistive load box. During this test, the power transfer was disabled and the accessories were powered off. The RF communications transmitter was active, continuously transmitting. The cables were moved to maximize the emissions. The final harmonics data was taken in this mode of operation. The cables were bundled and routed as shown in the photographs in Appendix A.

4.1.1.3 **Conducted Emissions – 450 kHz to 30 MHz**
Charger RF Communications – Transmitter Test
Part 15, Title 47, Subpart C, section 15.207

Specifics of the EUT and Peripherals Tested

The EV Battery Charger Model: WM7200 (EUT) was placed on the wooden table and tested in two orthogonal axis. The EUT was connected to the charge port via its charge paddle. The charge port was also hardwired to a resistive load box. During this test, the power transfer was disabled, leaving only the RF communications link active. The accessories were powered off. The cables were moved to maximize the emissions. The final radiated data was taken in this mode of operation. The cables were bundled and routed as shown in the photographs in Appendix A.

4.2 Cable Construction and Termination

GEN 1 SETUP AND ALL OTHER TESTS

Cable 1

This is a 5 foot braid and foil shielded cable connecting the EUT to the charge paddle. It is hard wired at each end.

Cable 2

This is a 5 foot braid shielded cable connecting the charge port to the Resistive load box. It has a D-9 pin metallic connector at the Resistive load box end and is hard wired into the charge port.

Cable 3

This is a 4 foot unshielded cable connecting the charge port to the Resistive load box. It is hard wired at each end.

GEN 2 SETUP FOR POWER TRANSFER TEST ONLY

Cable 1

This is a 5 foot braid and foil shielded cable connecting the EUT to the charge paddle. It is hard wired at each end.

Cable 2

This is a 5 foot braid shielded cable connecting the charge port to the Resistive load box. It has a D-9 pin metallic connector at the Resistive load box end and is hard wired into the charge port.

Cable 3

This is a 5 foot unshielded cable connecting the charge port to the Gen 2 power electronics bay. It is hard wired at each end.

Cable 4

This is a 3 foot unshielded cable connecting the Gen 2 power electronics bay to the 12 volt battery. It is hard wired at each end.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
EV BATTERY CHARGER	GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES	WM7200	N/A	NZM0603TR
RESISTIVE LOAD BOX	GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES	N/A	N/A	N/A
CHARGE PORT	GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES	GEN 1	N/A	N/A
CHARGE PORT (GEN 2 SETUP ONLY)	GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES	GEN 2	N/A	N/A
12 VOLT BATTERY (GEN 2 SETUP ONLY)	AC DELCO	N/A	N/A	N/A
GEN 2 POWER ELECTRONICS BAY (GEN 2 SETUP ONLY)	GENERAL MOTORS ADVANCED TECHNOLOGY VEHICLES	N/A	N/A	N/A

5.2 Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Spectrum Analyzer	Hewlett Packard	8566B	3701A22262	December 9, 1997	1 Year
Preamplifier	Com Power	PA-102	1017	February 16, 1998	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650A	3303A01688	June 23, 1998	1 Year
RF Attenuator	Com-Power	A-410	1602	November 25, 1997	1 Year
LISN	Com Power	LI-200	1764	January 3, 1998	1 Year
LISN	Com Power	LI-200	1771	January 3, 1998	1 Year
LISN	Com Power	LI-200	1775	January 3, 1998	1 Year
LISN	Com Power	LI-200	1780	January 3, 1998	1 Year
Biconical Antenna	Com Power	AB-100	1548	March 24, 1998	1 Year
Log Periodic Antenna	Com Power	AL-100	1117	December 11, 1997	1 Year
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	HP98561A	2522A05178	N/A	N/A
Printer	Hewlett Packard	2225A	2723500869	N/A	N/A
Plotter	Hewlett Packard	7440A	8726K38417	N/A	N/A
Microwave Amplifier	Com-Power	PA-122	001	March 31, 1998	1 Year
Horn Antenna	Antenna Research	DRG-118/A	1053	December 8, 1995	N/A
Loop Antenna	Com-Power	AL-130	25309	February 5, 1998	1 Year

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

For all tests, the EUT was mounted on a 1.0 by 1.5 by 0.8 meter high non-conductive table, which was placed on the ground plane.

The EUT was grounded only to the safety ground in its power cord.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 Emissions Tests

7.1.1 Conducted Emissions Test

The HP 8566B spectrum analyzer was used as a measuring meter along with the HP 85650A quasi-peak adapter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak detector was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the spectrum analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the HP 8566B spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 1992. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequencies ranges of 0.45 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the HP 9000/300 in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave.

SECTION 7.1.1.1

CONDUCTED EMISSIONS DATA SHEETS FOR THE EUT

MEASUREMENT NOTES:

GM ADVANCED TECH. VEHICLE
EV BATTERY CHARGER
MODEL: WM7200
FCC C - BLACK LEAD - 5 AUG 1998 15:10:08

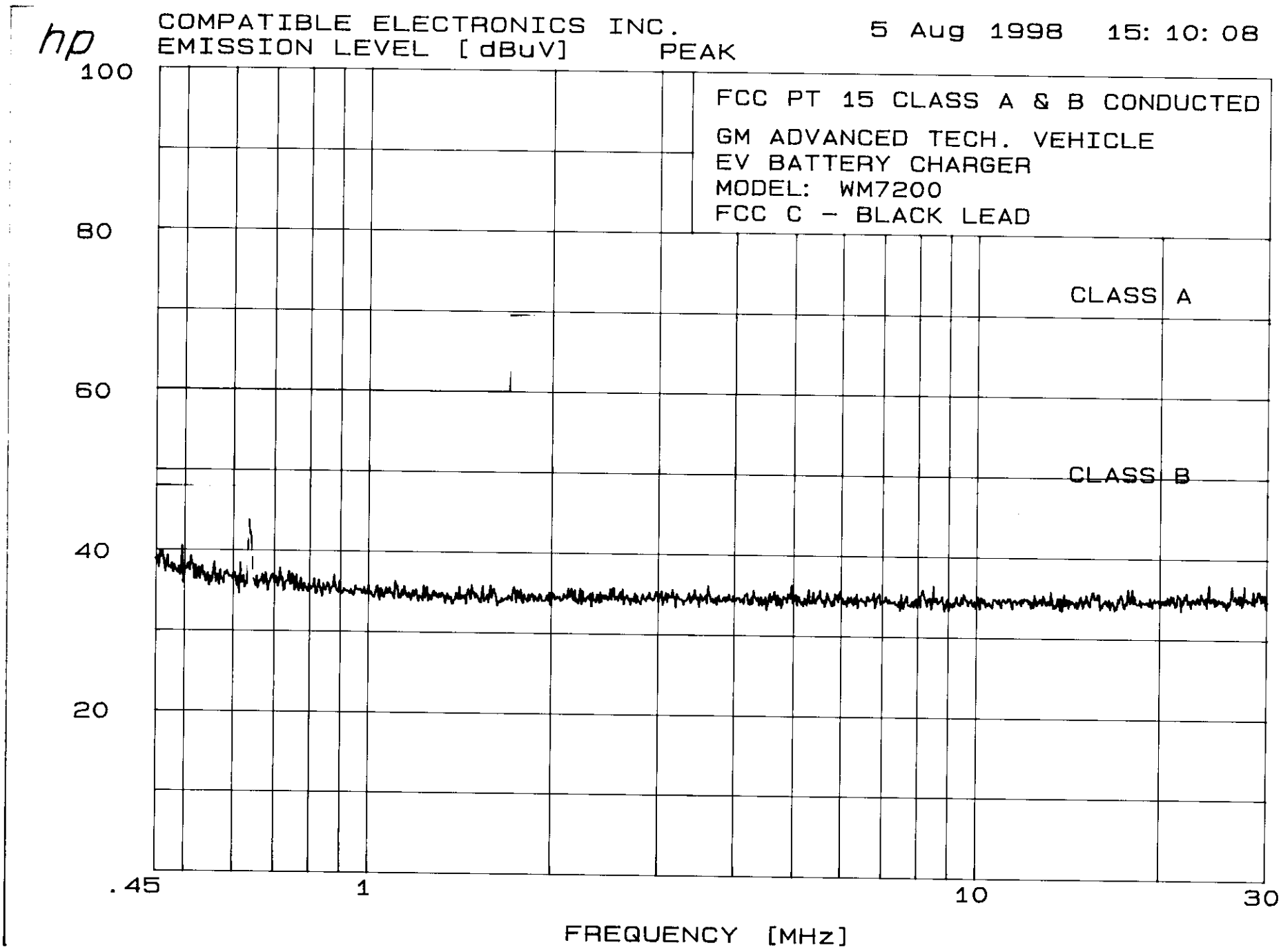
---

12 highest Peaks above -50 dB of Limit Line #2
peak criteria = .1 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	.5401	43.8	-4.2
2	.4977	40.5	-7.5
3	.4576	39.9	-8.1
4	.4615	39.9	-8.1
5	.4713	39.3	-8.7
6	.5147	39.2	-8.8
7	.4538	39.1	-8.9
8	.5621	38.5	-9.5
9	.619	38.4	-9.6
10	.4792	38.3	-9.7
11	.5104	38.3	-9.7
12	.4833	38.1	-9.9

MEASUREMENT NOTES:

TEST ENGINEER: Kyle Fujimoto
KYLE FUJIMOTO


hp
COMPATIBLE ELECTRONICS INC.
EMISSION LEVEL [dBuV]
PEAK
5 Aug 1998 15: 10: 08
FCC PT 15 CLASS A & B CONDUCTED
GM ADVANCED TECH. VEHICLE
EV BATTERY CHARGER
MODEL: WM7200
FCC C - BLACK LEAD
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

PAGE 168

MEASUREMENT NOTES:

GM ADVANCED TECH. VEHICLE
EV BATTERY CHARGER
MODEL: WM7200
FCC C - WHITE LEAD - 5 AUG 1998 15:22:34

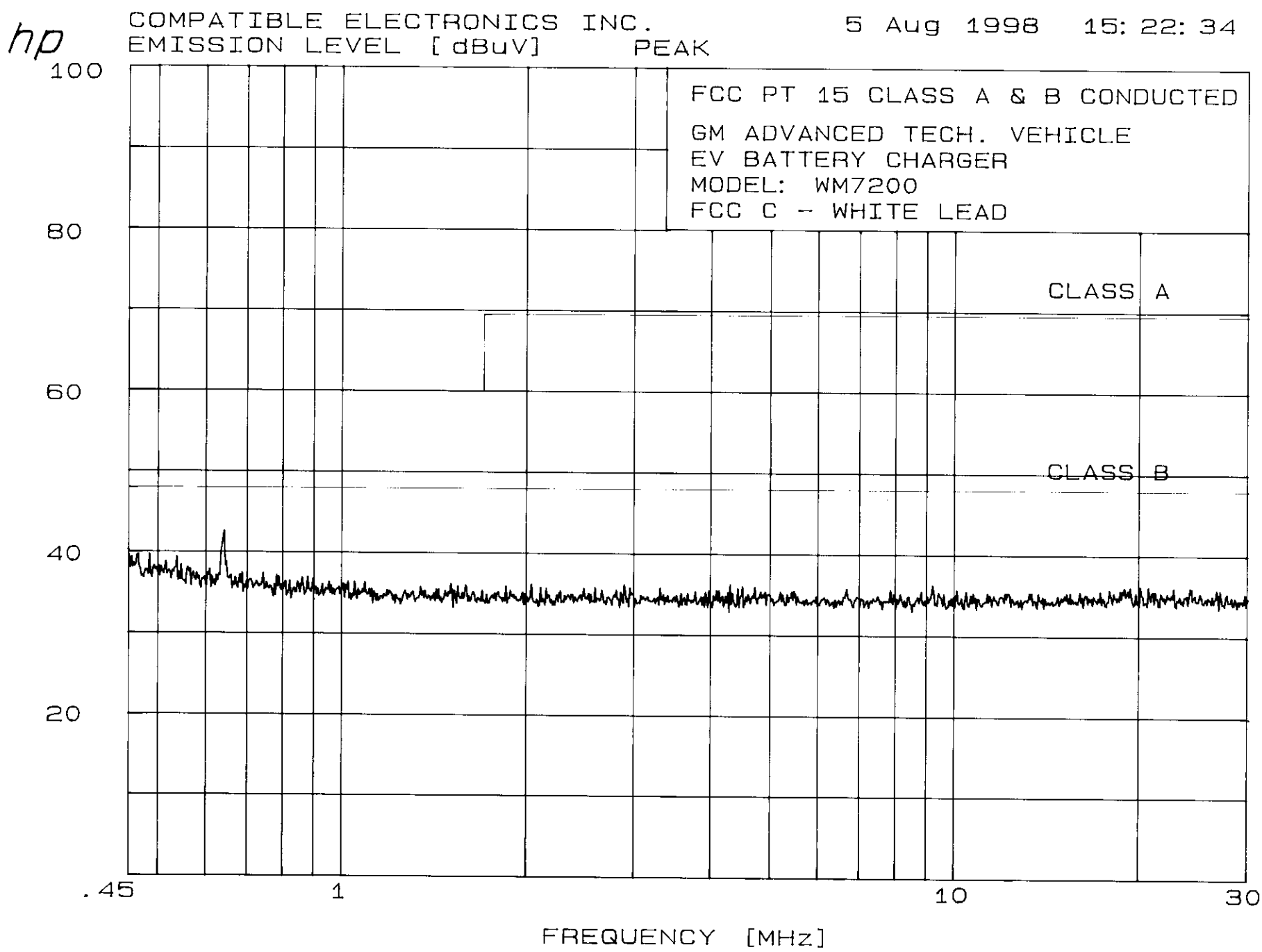
---

12 highest Peaks above -50 dB of Limit Line #2
peak criteria = .1 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	.6155	42.6	-5.4
2	.1673	39.7	-8.3
3	.1873	39.7	-8.3
4	.1557	39.4	-8.6
5	.539	39.4	-8.6
6	.5169	38.8	-9.2
7	.651	38.8	-9.2
8	.1595	38.6	-9.4
9	.5481	38.4	-9.6
10	.1956	38.3	-9.7
11	.504	38.3	-9.7
12	.5082	38.2	-9.8

MEASUREMENT NOTES:

TEST ENGINEER: Kyle Fujimoto
KYLE FUJIMOTO


hp
COMPATIBLE ELECTRONICS INC.
EMISSION LEVEL [dBuV]
PEAK
5 Aug 1998 15:22:34
FCC PT 15 CLASS A & B CONDUCTED
GM ADVANCED TECH. VEHICLE
EV BATTERY CHARGER
MODEL: WM7200
FCC C - WHITE LEAD
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

PAGE 16 D

SECTION 7.1.2.1

RADIATED EMISSIONS DATA FOR THE POWER TRANSFER TESTS

7.1.2 Radiated Emissions Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz – 1 GHz, and the Com Power Microwave Amplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 9.26 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data for all of Part 15. For Part 18, the EUT was tested at a 3 meter test distance from 30 MHz – 400 MHz and at 10 meters from 10 kHz – 30 MHz to obtain final test data.

RADIATED EMISSIONS

COMPANY NAME: GM ADVANCED TECH. VEHICLE **DATE:** 8-5-98

EUT: GV BATTERY CHARGER **EUT S/N:**

EUT MODEL: WM7200 - GEN 1 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC PART 18 **CLASS:** 18.305 **TEST DISTANCE:** [redacted] 10M **LAB:** D

ANTENNA: ■ LOOP ☐ BICONICAL ☐ LOG ☐ HORN **POLARIZATION:** ☐ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F

NOTES: DISTANCE FACTOR = $LOG\left(\frac{300}{10}\right) \times 20 = 29.5$ dB

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	DISTANCE FACTOR
3.376	27.2	-	1.0	0	10.8	-	8.5	-15.0	23.5	29.5
24.67	18.9	-	1.0	180	10.3	-	-0.3	-23.8	23.5	29.5

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN - DISTANCE FACTOR

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

RADIATED EMISSIONS

COMPANY NAME: GM Advanced Tech. Vehicle **DATE:** 8-5-98

EUT: EV Battery Charger **EUT S/N:**

EUT MODEL: WM 7200 - Gen 1 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC Part 18 **CLASS:** 18.305 **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ■ BICONICAL ■ LOG ☐ HORN **POLARIZATION:** ☐ VERT ■ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** Kyle F.

NOTES: Distance Factor = $\text{Log}\left(\frac{300}{3}\right) \times 20 = 40\text{dB}$

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	Distance Factor
40.49	61.0	-	1.0	180	11.5	38.5	-6.0	-29.5	23.5	40.0
85.95	47.2	-	1.0	180	8.7	37.6	-21.7	-45.2	23.5	40.0
91.99	47.2	-	1.0	180	8.8	37.6	-21.6	-45.1	23.5	40.0

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN - Distance Factor

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM Advanced Tech. Vehicle **DATE:** 8-5-98

EUT: EV Battery Charger **EUT S/N:**

EUT MODEL: WM7200 - Gen 1 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC Part 18 **CLASS:** 18305 **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ■ BICONICAL ■ LOG ☐ HORN **POLARIZATION:** ■ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** Kyle F.

NOTES: Distance Factor = $\text{Log}\left(\frac{300}{3}\right) \times 20 = 40\,dB$

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	Distance Factor
36.25	64.7	-	1.0	180	12.1	38.5	-1.7	-25.2	23.5	40.0
74.26	44.9	-	1.0	180	9.4	37.8	-23.5	-47.0	23.5	40.0
146.22	43.8	-	1.0	180	13.4	37.5	-20.3	-43.8	23.5	40.0

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN – Distance Factor

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM ADVANCED TECH. VEHICLE **DATE:** 8-5-98

EUT: EV BATTERY CHARGER **EUT S/N:**

EUT MODEL: WM7200 - GEN 2 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC PART 18 **CLASS:** 18.305 **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ■ BICONICAL ■ LOG ☐ HORN **POLARIZATION:** ■ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F.

NOTES: DISTANCE FACTOR = $\left(\frac{300}{3}\right)$ LOG X 20 = 40dB

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	DISTANCE FACTOR
36.07	63.6	-	1.0	180	12.2	38.5	-2.7	-26.2	23.5	40.0
37.03	58.5	-	1.0	180	11.7	38.5	-8.3	-31.8	23.5	40.0
71.95	50.1	-	1.0	180	8.8	37.6	-18.7	-42.2	23.5	40.0
114.08	49.5	-	1.0	180	10.6	37.8	-17.7	-41.2	23.5	40.0

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN - DISTANCE FACTOR

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM Advanced Tech. Vehicle **DATE:** 8-5-98

EUT: EV Battery Charger **EUT S/N:**

EUT MODEL: WM7200 - Gen 2 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC Part 18 **CLASS:** 18.305 **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ■ BICONICAL ■ LOG ☐ HORN **POLARIZATION:** ☐ VERT ■ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** Kyle F

NOTES: Distance Factor = $\left(\frac{300}{3}\right)$ Log X 20 = 40dB

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	Distance Factor
35.82	58.6	-	3.0	180	12.2	38.5	-7.7	-31.2	23.5	40.0
40.84	58.6	-	3.0	180	11.5	38.5	-8.4	-31.9	23.5	40.0
91.99	51.3	-	3.0	180	8.8	37.6	-17.5	-4.1	23.5	40.0
103.38	59.4	-	3.0	180	9.9	37.7	-8.4	-31.9	23.5	40.0
106.48	58.7	-	3.0	180	10.1	37.7	-8.9	-32.4	23.5	40.0
113.44	58.3	-	3.0	180	10.5	37.8	-9.0	-32.5	23.5	40.0
210.87	50.6	-	3.0	180	16.1	37.5	-10.8	-34.3	23.5	40.0

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN - Distance Factor

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM ADVANCED TECH. VEHICLE **DATE:** 8-5-98

EUT: EV BATTERY CHARGER **EUT S/N:**

EUT MODEL: WM7200 - GEN 2 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC PART 18 **CLASS:** 18.305 **TEST DISTANCE:** 10M **LAB:** D

ANTENNA: ■ LOOP ☐ BICONICAL ☐ LOG ☐ HORN **POLARIZATION:** ☐ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** Kyle F.

NOTES: DISTANCE FACTOR = LOG $\left(\frac{300}{10}\right)$ X 20 = 29.5dB

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)	DISTANCE FACTOR
3.373	28.9	–	1.0	0	10.1	–	10.2	-13.3	23.5	29.5
24.67	24.8	~	1.0	180	10.3	~	5.6	-17.9	23.5	29.5

* CORRECTED READING = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN - DISTANCE FACTOR

** DELTA = CORRECTED READING - SPECIFICATION LIMIT

SECTION 7.1.2.2

RADIATED EMISSIONS DATA FOR THE TRANSMITTER

Test location: Compatible Electronics
Customer : GM ADVANCED TECH. VEHICLE Date : 8/ 5/1998
Manufacturer : GM ADVANCED TECH. VEHICLE Time : 11:53
EUT name : EV BATTERY CHARGER Model: WM7200
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor(20*log(test/spec)) : 0.00
Test Mode :
TEMPERATURE 80 DEGREES F.
RELATIVE HUMIDITY 55%
TEST ENGINEER: KYLE FUJIMOTO

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	limit = L dBuV/m	Delta R-L dB
1V	48.05	48.20	0.58	11.50	39.00	21.28	40.00	-18.72
2V	64.05	44.00	0.70	10.34	38.78	16.26	40.00	-23.74
3V	64.02	44.20	0.70	10.34	38.78	16.46	40.00	-23.54
4V	80.02	44.70	0.70	8.80	38.30	15.90	40.00	-24.10
5V	120.08	45.70	0.98	10.90	38.90	18.68	43.50	-24.82
6V	200.07	40.00	1.40	15.80	39.00	18.20	43.50	-25.30
7V	292.04	36.30	1.77	20.66	38.63	20.10	46.00	-25.90
8V	429.09	43.50	2.12	15.87	38.33	23.16	46.00	-22.84
9V	452.21	40.20	2.21	16.20	38.22	20.40	46.00	-25.60

Test location: Compatible Electronics
Customer : GM ADVANCED TECH. VEHICLE
Manufacturer : GM ADVANCED TECH. VEHICLE
EUT name : EV BATTERY CHARGER
Specification: Fcc_B Test distance: 3.0 mtrs
Distance correction factor(20*log(test/spec))
Test Mode :
TEMPERATURE 80 DEGREES F.
RELATIVE HUMIDITY 55%
TEST ENGINEER: KYLE FUJIMOTO

Date : 8/ 5/1998
Time : 12.16
Model: WM7200
Lab: D
: 0.00

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	limit = L dBuV/m	Delta R-L dB
1H	48.12	46.20	0.58	11.50	39.00	19.28	40.00	-20.72
2H	63.92	46.40	0.70	10.35	38.78	18.66	40.00	-21.34
3H	80.05	43.80	0.70	8.80	38.30	15.00	40.00	-25.00
4H	120.11	47.90	0.98	10.91	38.90	20.88	43.50	-22.62
5H	200.06	46.70	1.40	15.80	39.00	24.90	43.50	-18.60
6H	292.05	34.40	1.77	20.66	38.63	18.20	46.00	-27.80
7H	348.15	43.10	1.90	15.12	38.89	21.23	46.00	-24.77
8H	452.06	39.50	2.21	16.20	38.22	19.70	46.00	-26.30

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM Advanced Tech. Vehicle **DATE:** 8-5-98

EUT: EV Battery Charger **EUT S/N:**

EUT MODEL: WM7200 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC 15.249 **CLASS:** **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ☐ BICONICAL ■ LOG ■ HORN **POLARIZATION:** ■ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** Kyle F.

NOTES: 6% Duty Cycle (maximum) = 24.4 dB Drop

Frequency (GHz)	Peak Reading (dBuV)	Average Reading (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)
.915	95.1	-	3.0	0	20.1	4.2	37.4	82.0	-12.0	94.0
1.830	42.7	18.3	2.0	0	26.7	4.8	33.1	16.7	-37.3	54.0

* **CORRECTED READING** = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

PAGE 2 of 2

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM ADVANCED TECH. VEHICLE **DATE:** 8-5-98

EUT: EV BATTERY CHARGER **EUT S/N:**

EUT MODEL: WM7200 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC 15.249 **CLASS:** **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ☐ LOOP ☐ BICONICAL ■ LOG ■ HORN **POLARIZATION:** ☐ VERT ■ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F.

NOTES: 6% DUTY CYCLE (MAXIMUM) = 24.4dB DROP

Frequency (GHz)	Peak Reading (dBuV)	Average Reading (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)
.915	100.5	-	2.0	0	20.1	4.2	37.4	87.4	-6.6	94.0
1.830	43.0	18.6	1.5	0	26.7	4.8	33.1	17.0	-37.0	54.0
		PEAK LEVEL COMPLIES W/ AVE LIMIT								
			43 + 26.7 + 4.8 - 33.1 = 41.4 < 54							

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = CORRECTED READING - SPECIFICATION LIMIT

COMPATIBLE ELECTRONICS

RADIATED EMISSIONS

COMPANY NAME: GM ADVANCED TECH. VEHICLE **DATE:** 8-5-98

EUT: EV BATTERY CHARGER **EUT S/N:**

EUT MODEL: WM7200 **LOCATION:** ■ BREA ☐ SILVERADO ☐ AGOURA

SPECIFICATION: FCC 15.249 **CLASS:** **TEST DISTANCE:** 3M **LAB:** D

ANTENNA: ■ LOOP ☐ BICONICAL ☐ LOG ☐ HORN **POLARIZATION:** ☐ VERT ☐ HORIZ

■ QUALIFICATION ☐ ENGINEERING ☐ MFG. AUDIT **ENGINEER:** KYLE F.

NOTES:

Frequency (MHz)	Peak Reading (dBuV)	Quasi-Peak (dBuV)	Antenna Height (meters)	Azimuth (degrees)	Antenna Factor (dB)	Effective Gain (dB)	* Corrected Reading (dBuV)	Delta ** (dB)	Spec Limit (dBuV)
			NO	EMISSIONS		FOUND	FROM		
			10KHZ - 30MHZ			FOR THE	TRANSMITTER		

* **CORRECTED READING** = METER READING + ANTENNA FACTOR - EFFECTIVE GAIN

** **DELTA** = CORRECTED READING - SPECIFICATION LIMIT

8. CONCLUSIONS

The EV Battery Charger Model: WM7200 meets all of the specification limits defined by FCC Title 47, Part 15, Subpart B; section 15.207 and 15.249 of Subpart C; and Part 18, Title 47, Subpart C.

APPENDIX A

TEST SETUP DIAGRAMS AND PHOTOS

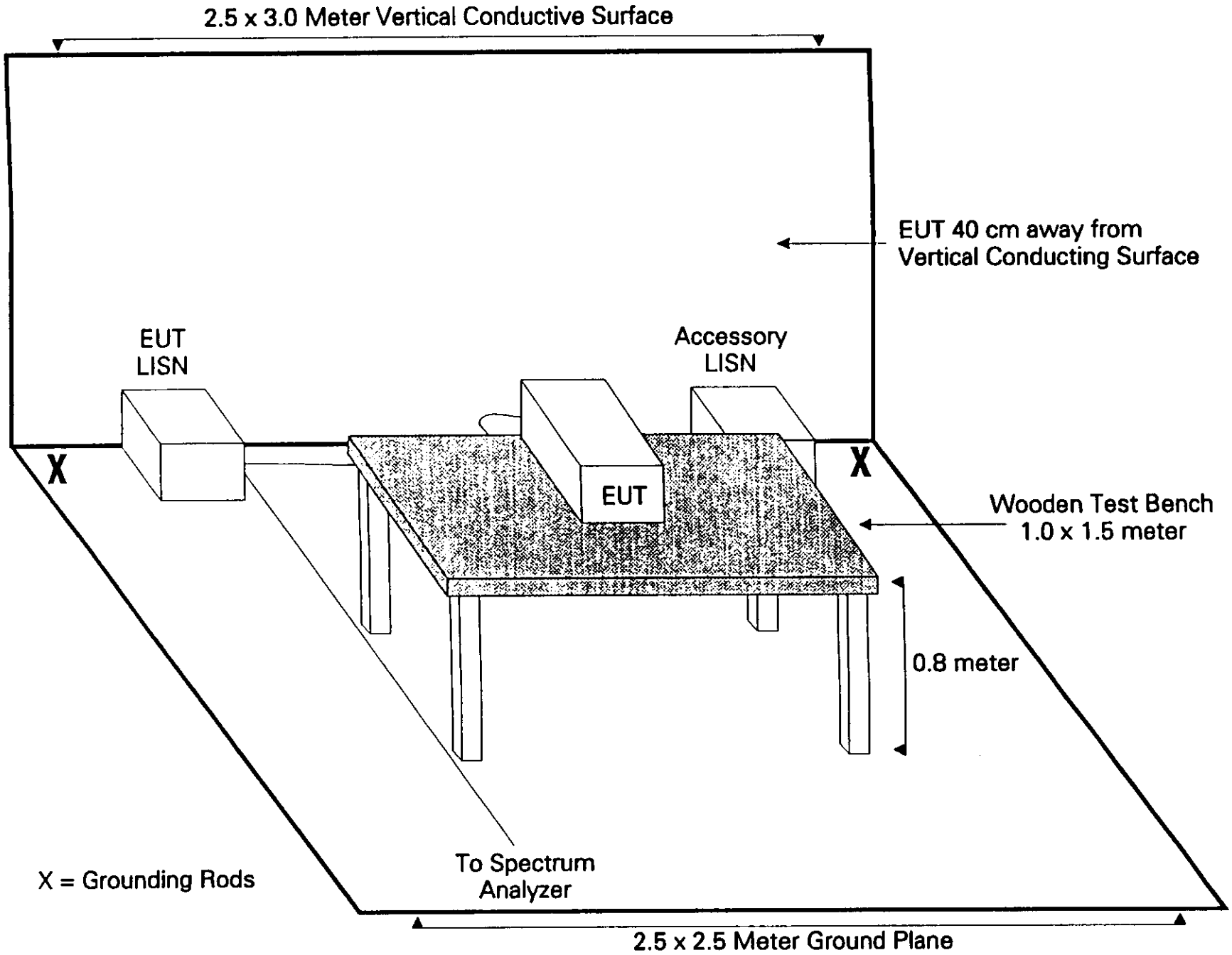


FIGURE 1 - CONDUCTED EMISSIONS TEST SETUP SITE D

COMPATIBLE ELECTRONICS

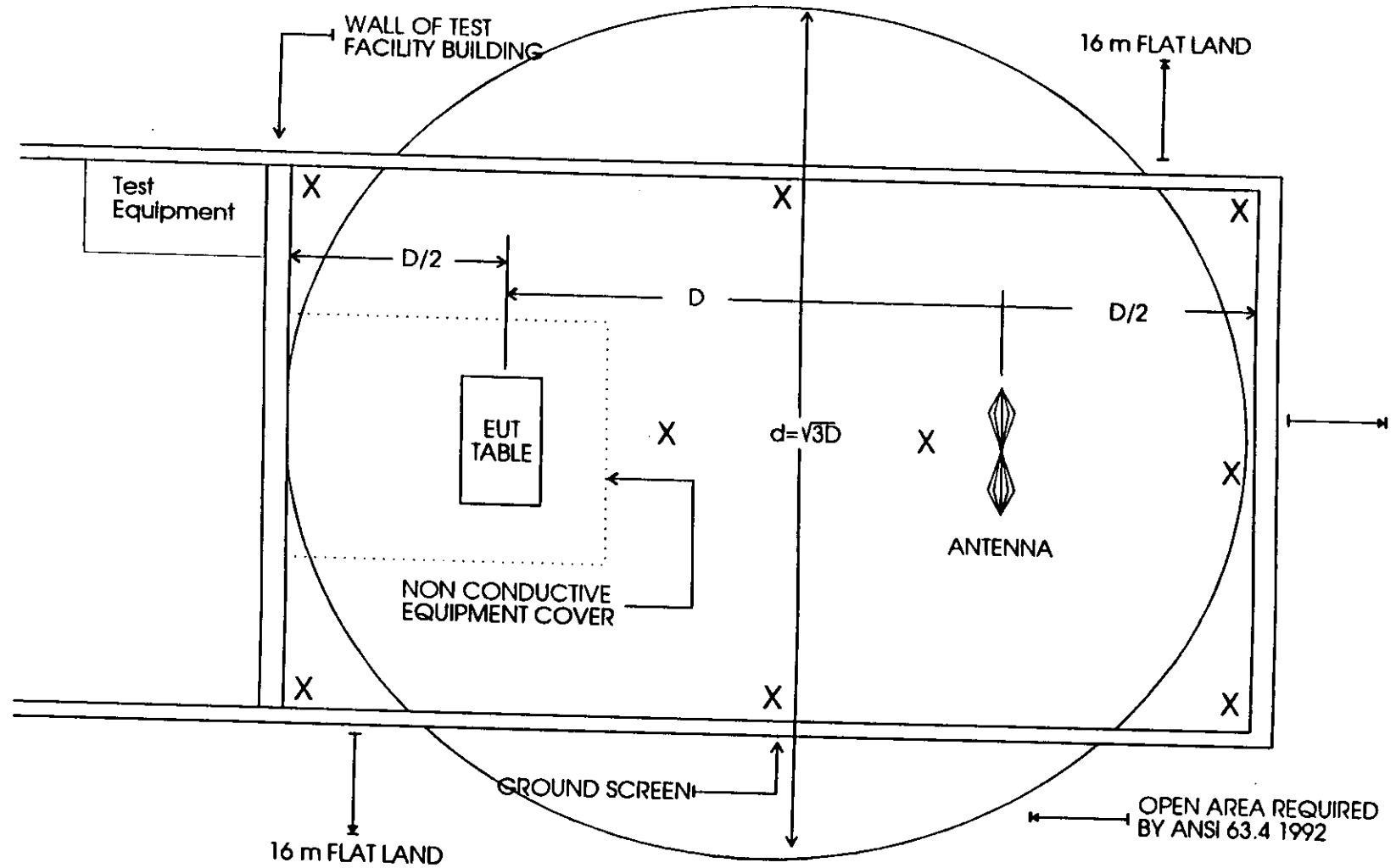


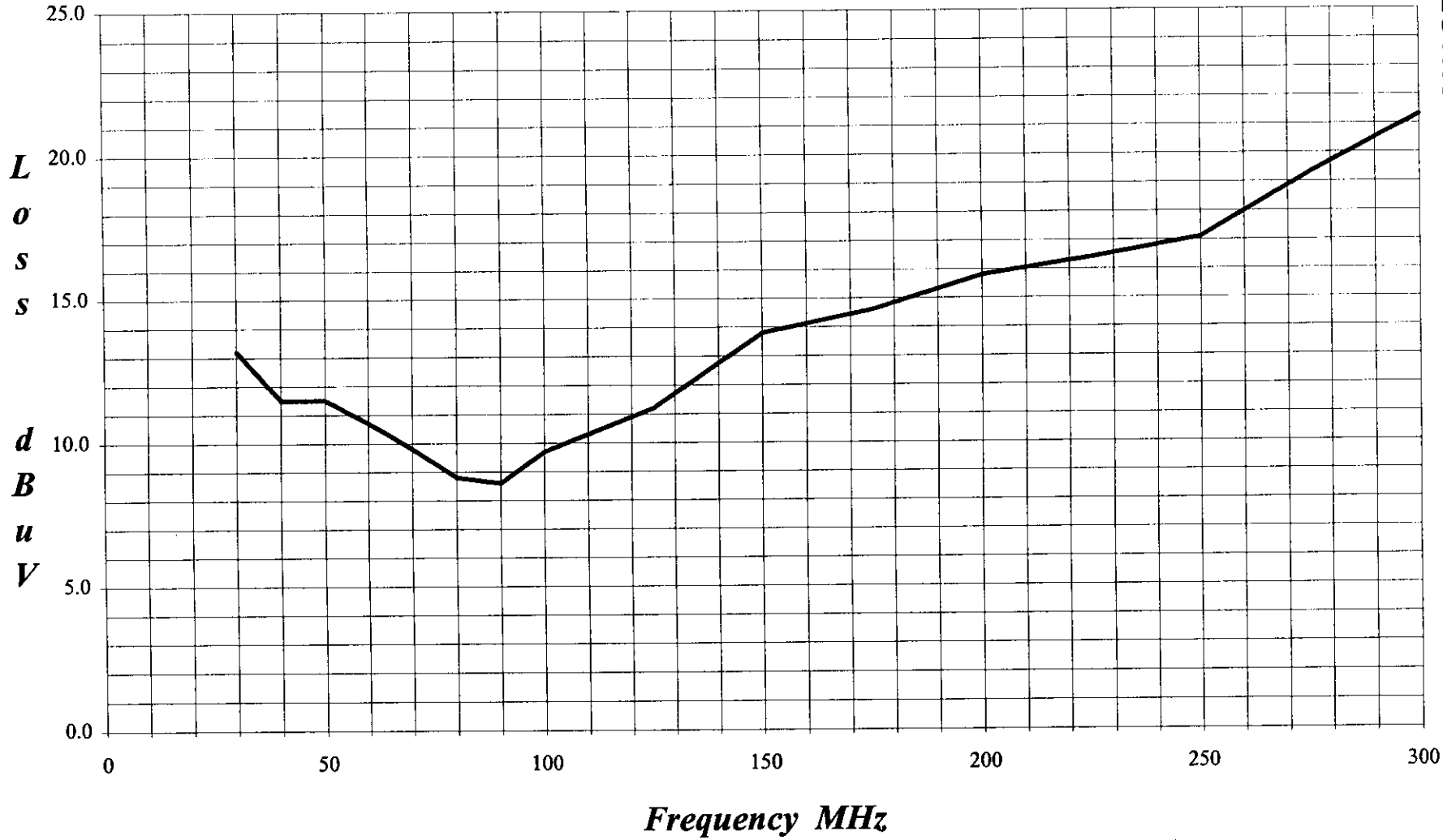
Figure 2: Plot Map and Layout of Test Site "D"

APPENDIX B

ANTENNA FACTORS AND EFFECTIVE GAIN FACTORS

RP-1

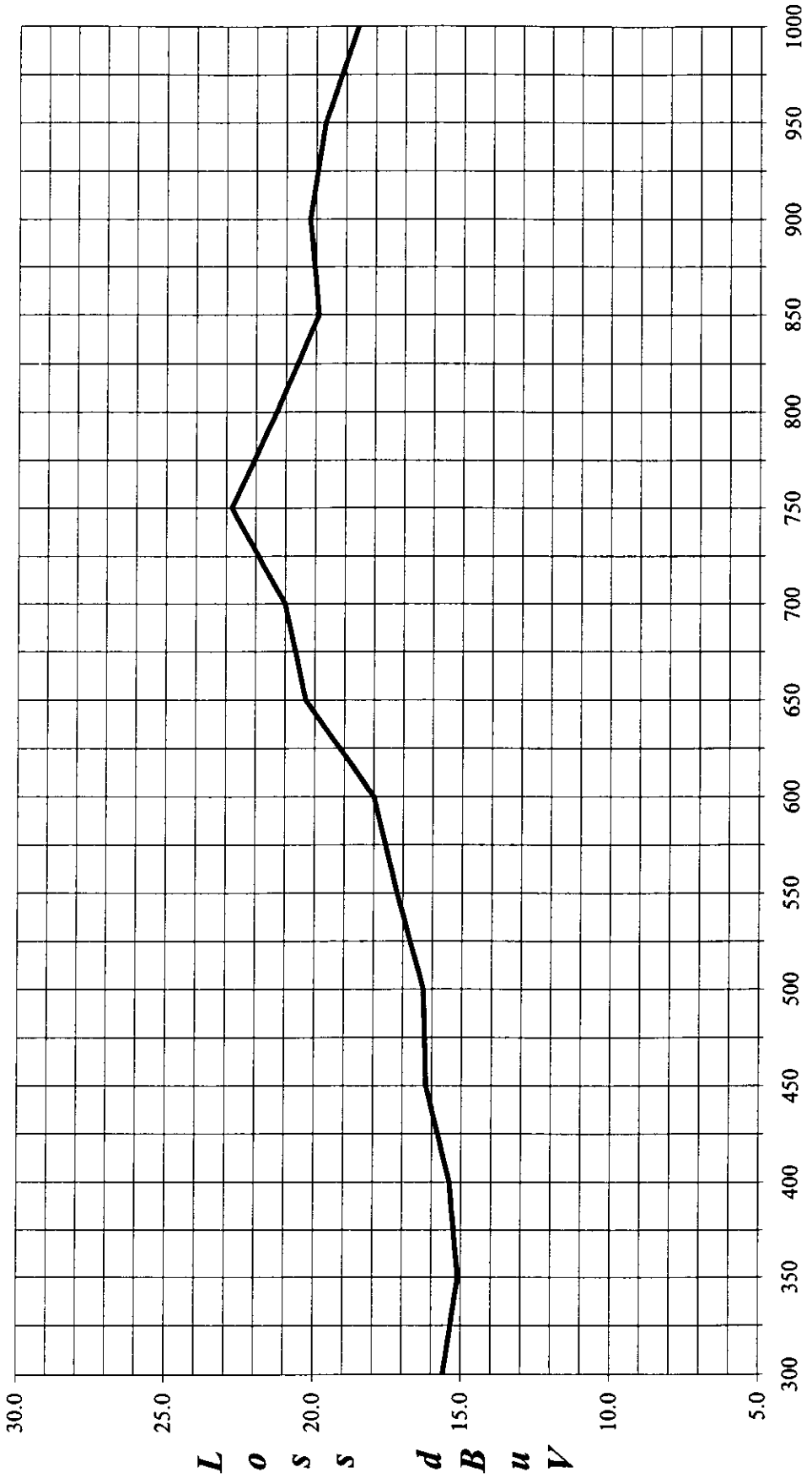
LAB "D" BICONICAL ANTENNA AB-100 S/N 01548



COMPATIBLE ELECTRONICS

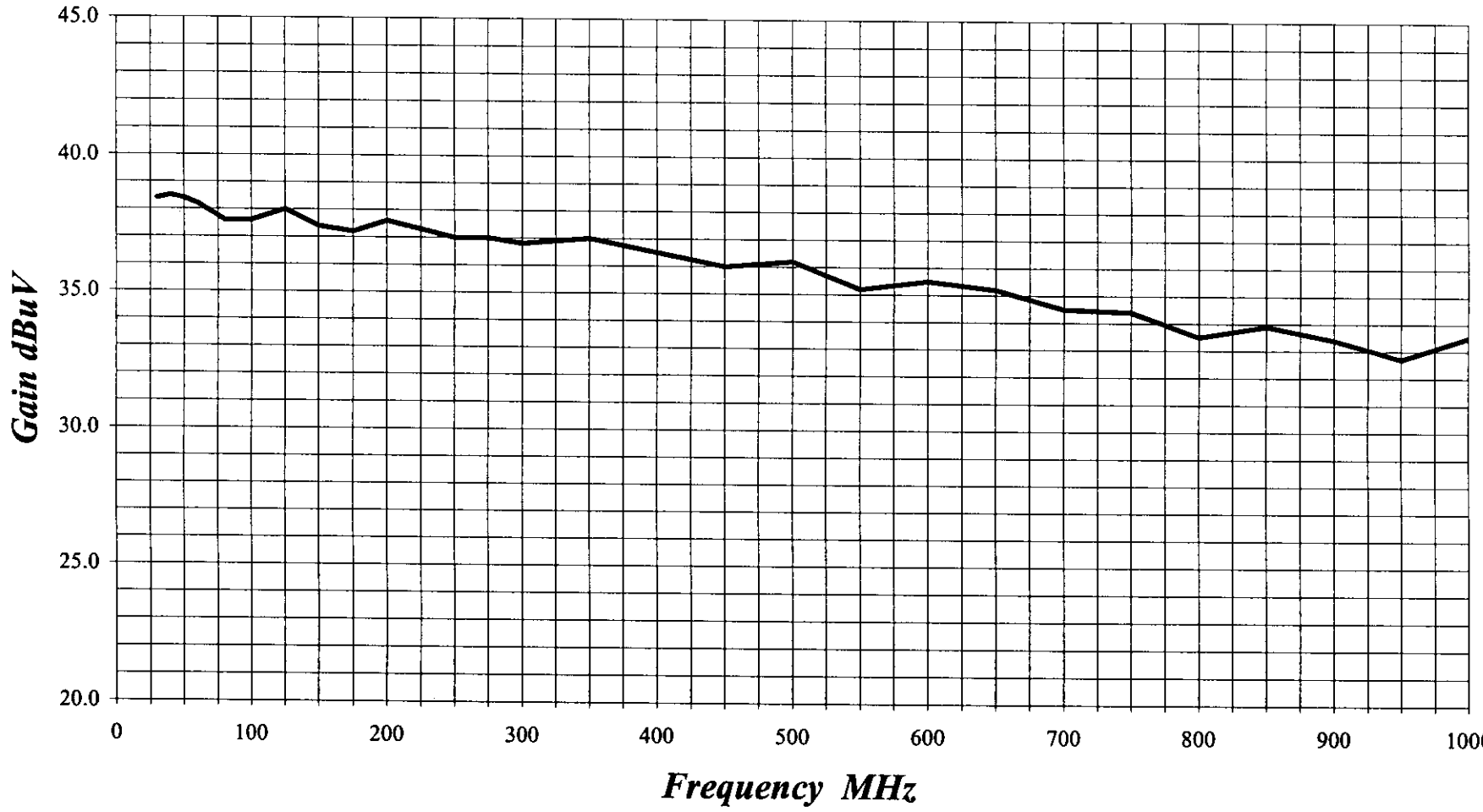
Cal: 12/11/97

LAB "D" LOG PERIODIC ANTENNA AL-100 S/N 01117



RP-1

PREAMPLIFIER EFFECTIVE GAIN AT 3 METERS PA-102 S/N: 1017



COMPATIBLE ELECTRONICS

COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 001

CALIBRATION DATE: MARCH 31, 1998

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	33.0	8.0	31.4
1.1	33.0	8.5	30.5
1.2	32.9	9.0	31.4
1.3	32.9	9.5	32.6
1.4	32.8	10.0	33.1
1.5	32.7	10.5	32.1
1.6	33.0	11.0	31.0
1.7	33.0	11.5	31.0
1.8	33.1	12.0	30.9
1.9	32.9	12.5	30.9
2.0	33.1	13.0	30.4
2.5	32.7	13.5	31.0
3.0	32.4	14.0	29.3
3.5	32.1	14.5	28.5
4.0	31.8	15.0	27.6
4.5	31.5	15.5	27.6
5.0	31.6	16.0	27.3
5.5	32.0	16.5	29.3
6.0	31.6	17.0	30.4
6.5	32.0	17.5	31.1
7.0	31.4	18.0	29.7
7.5	32.0	18.5	29.3

ANTENNA RESEARCH ASSOCIATES, INC.
11317 Frederick Avenue, Beltsville, MD 20705

E-FIELD ANTENNA FACTOR CALIBRATION

E(dB V/m) = Vo(dB V) + AFE(dB/m)

Model number : DRG-118/A

Frequency GHz	AFE dB/m	Gain dBi
1	22.3	8.0
2	26.7	9.5
3	29.7	10.1
4	29.5	12.8
5	32.3	12.0
6	32.4	13.4
7	36.1	11.0
8	37.4	10.9
9	36.8	12.5
10	39.5	10.7
11	39.6	11.5
12	39.8	12.0
13	39.7	12.8
14	41.8	11.3
15	41.9	11.9
16	38.1	16.3
17	41.0	13.9
18	46.5	8.9

Serial number : 1053
Job number : 96-092
Remarks : 3 meter calibration
Standards : LPD-118/A, TE-1000

Temperature : 72° F
Humidity : 56 %
Traceability : A01887
Date : December 08, 1995

Calibrated By

Com-Power Corporation

(714) 587-9800

Antenna Calibration

Antenna Type:	Loop Antenna
Model:	AL-130
Serial Number:	25309
Calibration Date:	2/5/98

Frequency MHz	Magnetic (dB/m)	Electric dB/m
0.01	-40.5	11.0
0.02	-41.6	9.9
0.03	-40.0	11.5
0.04	-40.3	11.2
0.05	-41.6	9.9
0.06	-41.1	10.4
0.07	-41.3	10.2
0.08	-41.6	9.9
0.09	-41.7	9.8
0.1	-41.8	9.7
0.2	-44.0	7.5
0.3	-41.6	9.9
0.4	-41.7	9.8
0.5	-41.7	9.8
0.6	-41.5	10.0
0.7	-41.5	10.0
0.8	-41.6	9.9
0.9	-41.6	9.9
1	-41.1	10.4
2	-40.7	10.8
3	-40.7	10.8
4	-40.9	10.6
5	-40.1	11.4
6	-40.0	11.5
7	-40.3	11.2
8	-39.8	11.7
9	-38.8	12.7
10	-40.8	10.7
12	-41.4	10.1
14	-41.4	10.1
15	-40.9	10.6
16	-40.8	10.7
18	-41.5	10.0
20	-41.5	10.0
25	-41.2	10.3
30	-41.4	10.1

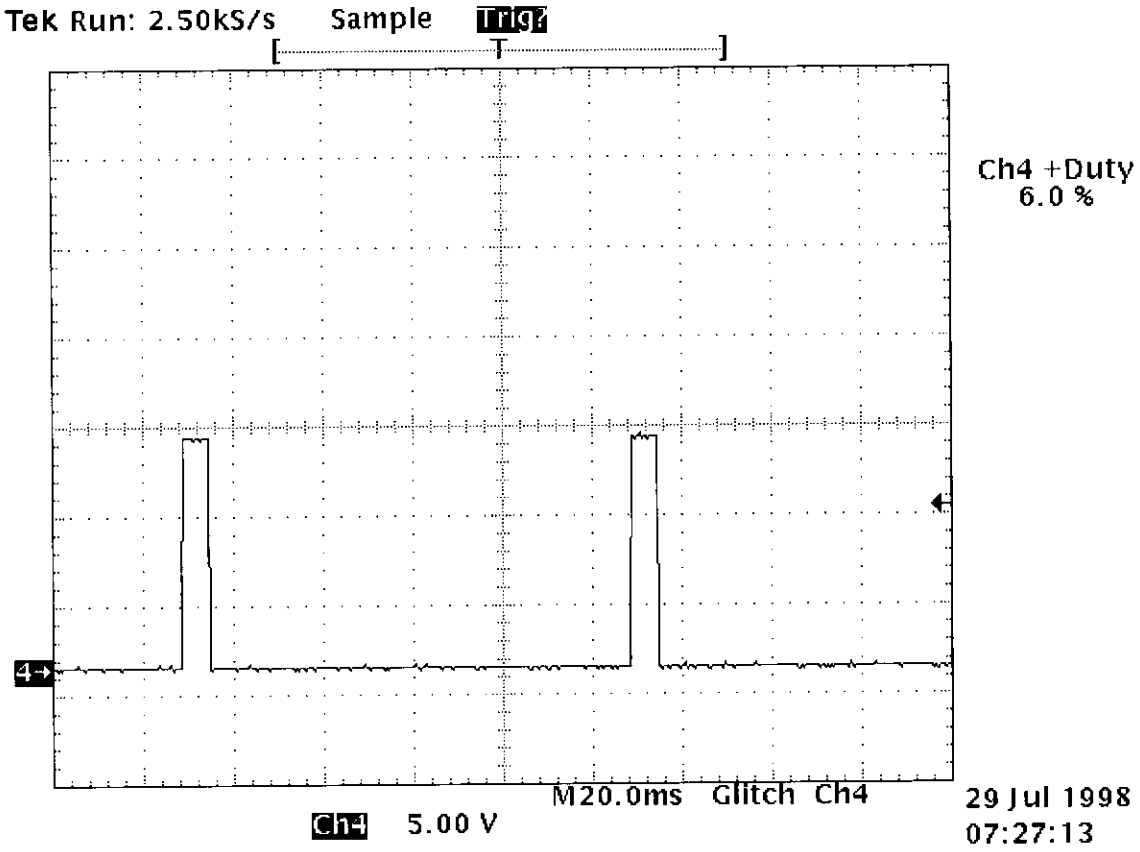
Trans. Antenna Height	2 meter
Receiving Antenna Height	2 meter

EXHIBIT 6

PHOTOGRAPHS

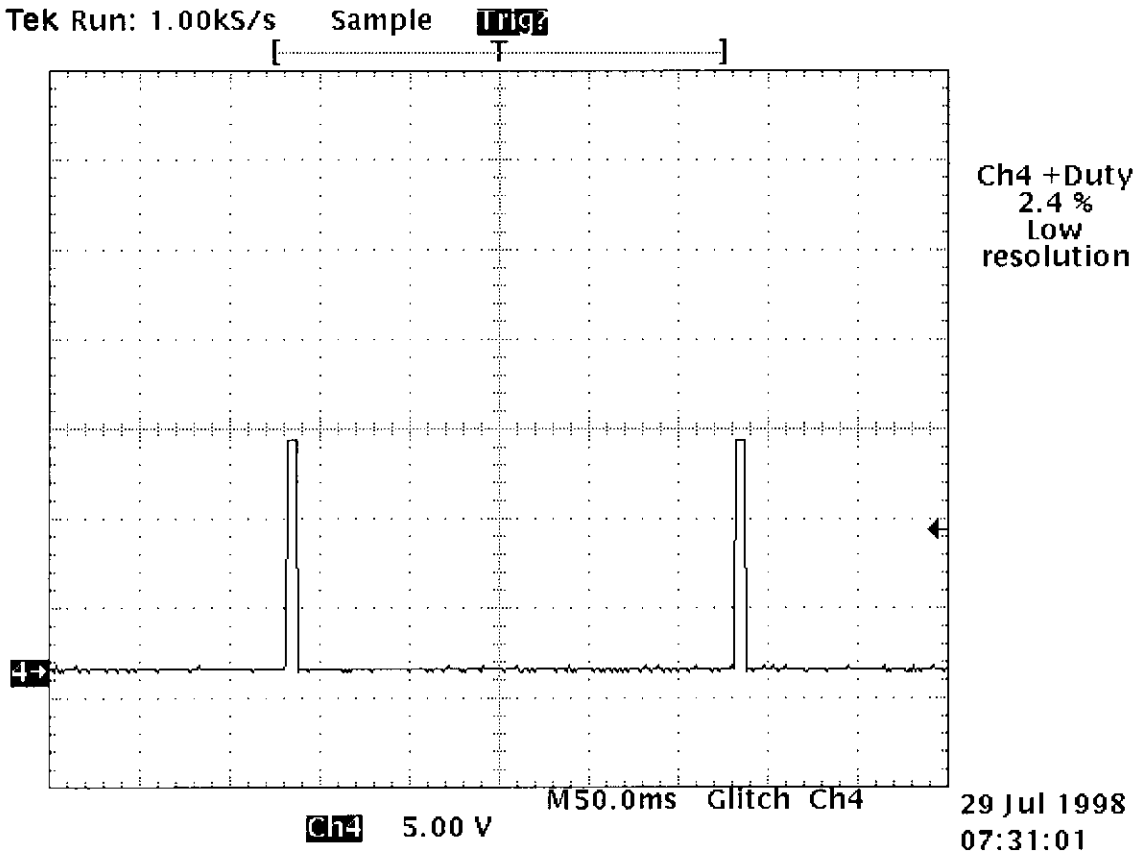
EXHIBIT 7

SCHEMATICS, BLOCK DIAGRAMS, AND DUTY CYCLE INFORMATION



Message Sent to the Electric Vehicle

Scope trace illustrating the duty cycle (6.0%) of a typical message generated within the WM7200 electric vehicle battery charger. The duty cycle of this waveform will vary slightly depending on the length of the message. During normal operation, messages are continually being sent back and forth on the communications bus resulting in increased bus activity.



Message Received from the Electric Vehicle

Scope trace illustrating the duty cycle (2.4%) of a typical message being received from the electric vehicle. The duty cycle of this waveform will vary slightly depending on the length of the message. During normal operation, messages are continually being sent back and forth on the communications bus resulting in increased bus activity.