



Measurement of RF Emissions from a Homelink4 Transceiver

For : Gentex Corporation
600 N. Centennial Street
Zeeland, MI 49464

P.O. No. : 257340
Date Tested : May 20 through June 1, 2009
Test Personnel : Richard King
Specification : FCC "Code of Federal Regulations" Title 47
: Part15, Subpart B for Receivers
: Industry Canada RSS-310
: Industry Canada RSS-GEN

Richard E. King
Test Report By :
Richard King

Raymond J. Klouda
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Registered Professional
Engineer of Illinois - 44894

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THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE
WRITTEN APPROVAL OF ELITE ELECTRONIC ENGINEERING INCORPORATED.



REVISION HISTORY

Revision	Date	Description
—	June 3, 2009	Initial release



Measurement of RF Emissions from a Transceiver, Part No. Homelink4

1 INTRODUCTION

1.1 Scope of Tests

This report presents the results of the RF emissions measurements performed on a Transceiver, model Homelink4, Serial No. none assigned, (hereinafter referred to as the test item). The test item was manufactured and submitted for testing by Gentex Corporation located in Zeeland, MI.

The test item is a super-heterodyne scanning type receiver designed to scan through the following frequencies: 288MHz, 310MHz, 340MHz, 365MHz, 390MHz, 418MHz. It has an internal antenna.

1.2 Purpose

The test series was performed to determine if the test item meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers and Industry Canada RSS-GEN Table 2 and RSS-310 Table 2. Testing was performed in accordance with ANSI C63.4-2003.

1.3 Deviations, Additions and Exclusions

There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.5 Laboratory Conditions

The temperature at the time of the test was 23.3°C and the relative humidity was 30%.

2 APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart B for Receivers, dated 1 October 2008
- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- Industry Canada RSS-310, Issue 2, June 2007, "Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category II Equipment"
- Industry Canada RSS-GEN, Issue 2, June 2007, "Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment"

3 TEST ITEM SET-UP AND OPERATION

3.1 General Description

The test item is a Transceiver, Model No. Homelink4. A block diagram of the test item set-up is shown as Figure 1.

3.1.1 Power Input

The test item obtained 12VDC from an external DC power supply. The test item is typically power with 12VDC from an automotive battery.

3.1.2 Peripheral Equipment

The test item does not require peripheral equipment.

3.1.3 Interconnect Cables

The following interconnect cables were submitted with the test item:

Item	Description
Power harness	1 meter long two lead input power harness.

3.1.4 Grounding

The test item was grounded only through the third wire of its input power cord.

3.1.5 Frequency of Test Item

The test item was equipped with a super-heterodyne scanning type receiver that tuned to either 288MHz, 310MHz, 340MHz, 365MHz, 390MHz, or 418MHz. The test item utilized one local oscillator 10.7MHz below the tuned frequency. In accordance with 47 CFR 15.33, since the highest frequency generated or used by the test item is below 500MHz, radiated emissions measurements were made up to 2GHz.

3.2 Operational Mode

For all tests the test item and all peripheral equipment were placed on an 80cm high non-conductive stand. The test item and all peripheral equipment were energized.

Two samples were submitted for testing. One sample was programmed to scan through all of the receiver frequencies (normal operation). A second unit was programmed so that it could receive separately at a low, mid, and high channel (288MHz, 310MHz, and 418MHz).

3.3 Test Item Modifications

No modifications were required for compliance to the FCC 15B requirements for receivers.

No modifications were required for compliance to the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109 for receivers and Industry Canada RSS-GEN Table 2 and RSS-310 Table 2 requirements for receivers.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All radiated emissions tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

4.2 Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

Conducted and radiated emission measurements were performed with a spectrum analyzer. This receiver allows measurements with the bandwidths and detector functions specified by the FCC. The receiver bandwidth was

120kHz for the 30MHz to 1000MHz radiated emissions data and 1MHz for the 1000MHz to 2000MHz radiated emissions data.

4.3 Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4 Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty for these tests is presented below:

Conducted Emission Measurements			
Combined Standard Uncertainty		1.07	-1.07
Expanded Uncertainty (95% confidence)		2.1	-2.1

Radiated Emission Measurements			
Combined Standard Uncertainty		2.26	-2.18
Expanded Uncertainty (95% confidence)		4.5	-4.4

5 TEST PROCEDURES

5.1 Powerline Conducted Emissions

5.1.1 Requirements

Since the test item is powered with 12VDC from an automotive battery, no conducted emissions measurements are required.

5.2 Radiated Measurements

5.2.1 Requirements

All emanations from a receiver shall be below the levels shown on the following table:

RADIATION LIMITS FOR A RECEIVER

Frequency MHz	Distance between Test Item And Antenna in Meters	Field Strength uV/m	Field Strength dBuV/m
30-88	3	100	40
88-216	3	150	43.5
216-960	3	200	46
Above 960	3	500	54

Note: The tighter limit shall apply at the edge between the two frequency bands.

5.2.2 Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls

and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Since a quasi-peak detector and an average detector require long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the test item were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector.

The broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the test item with respect to the antenna. The frequency range from 1GHz to 2GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the test item with respect to the antenna. The maximum levels for each antenna polarization were plotted.

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

- 1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.
- 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
 - a) The test item was rotated so that all of its sides were exposed to the receiving antenna.
 - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
 - d) For hand-held or body-worn devices, the test item was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

5.2.3 Results

The preliminary plots, with the receiver scanning through the frequencies, are presented on pages 13 through 16. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on pages 29 and 30. As can be seen from the data, all emissions measured from the test item were within the specification limits.

The preliminary plots, with the test item set to receive at 288MHz, 310MHz and 418MHz are presented on pages 17 through 28. The plots are presented for a reference only, and are not used to determine compliance. The final radiated levels are presented on pages 31 through 39. As can be seen from the data, all emissions measured from the test item were within the specification limits.

6 OTHER TEST CONDITIONS

6.1 Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated.

6.2 Disposition of the Test Item

The test item and all associated equipment were returned to Gentex Corporation upon completion of the tests.

7 CONCLUSIONS

It was determined that Gentex Corporation Transceiver, Part No. Homelink4, Serial No. none assigned, did fully meet the conducted radio interference requirements of Section 15.107 and the radiated interference requirements of Section 15.109 of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B for Receivers and the Industry Canada conducted radio interference requirements of RSS-GEN Table 2 and the radiated interference requirements of RSS-310 Table 2.

8 CERTIFICATION

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the test item at the test date. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

9 EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APK2	PREAMPLIFIER	AGILENT TECHNOLOGIES	8449B	3008A01595	1-26.5GHZ	4/6/2009	4/6/2010
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
GRE0	SIGNAL GENERATOR	AGILENT TECHNOLOGIES	E4438C	MY42083127	250KHZ-6GHZ	1/12/2009	1/12/2010
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2054	0.03-2GHZ	9/2/2008	9/2/2009
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	10/25/2008	10/25/2009
PHAO	MAGNETIC FIELD PROBE	ELECTRO-METRICS	EM-6882	134	22-230MHZ	NOTE 1	
RAC0	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	2449A01117	100HZ-22GHZ	8/21/2008	8/21/2009
RACE	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01194	20HZ-2GHZ	8/20/2008	8/20/2009
RAF1	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00271	0.01-1000MHZ	2/27/2008	8/27/2009
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	1/23/2009	1/23/2010
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	1/23/2009	1/23/2010
RBA1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100146	20HZ-26.5GHZ	9/10/2008	9/10/2009
SBA1	DC POWER SUPPLY	APLAB	ZS3205	99071032	0-32VDC;0-5A	NOTE 1	
XZG2	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01751	---	N/A	

I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

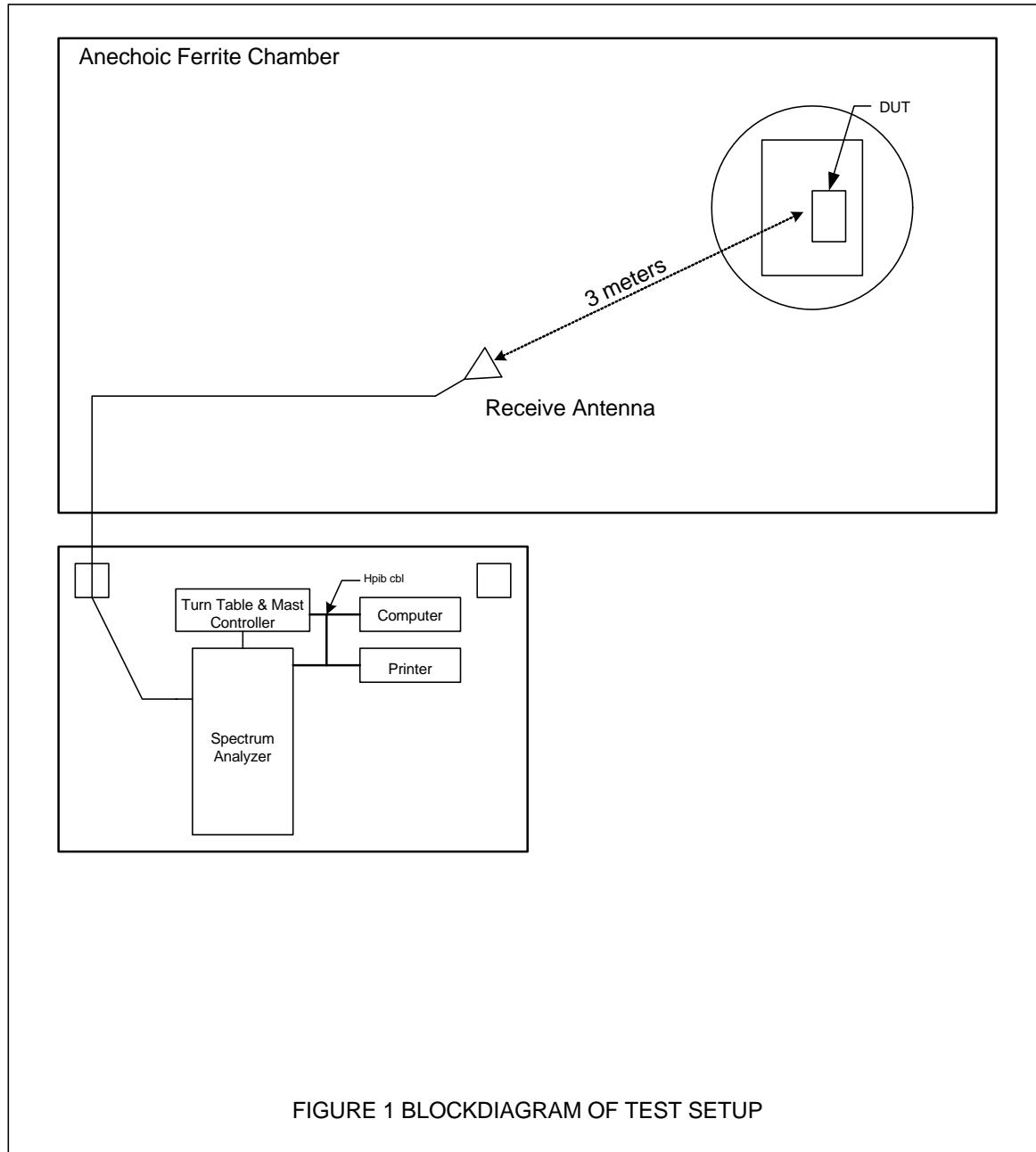
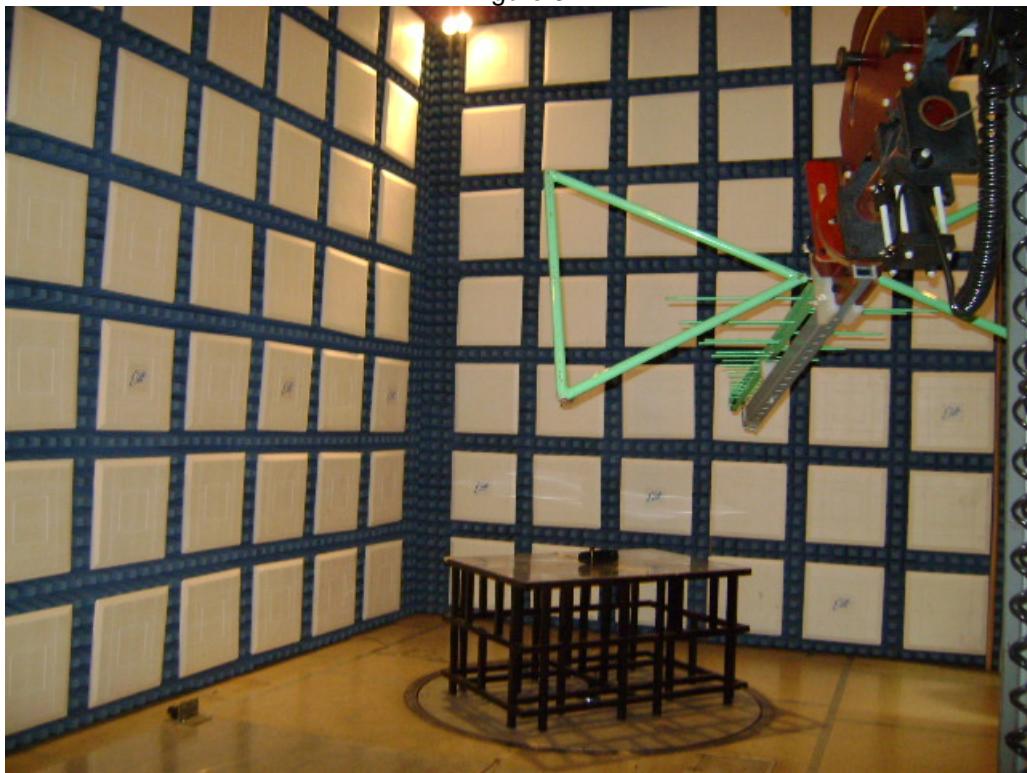
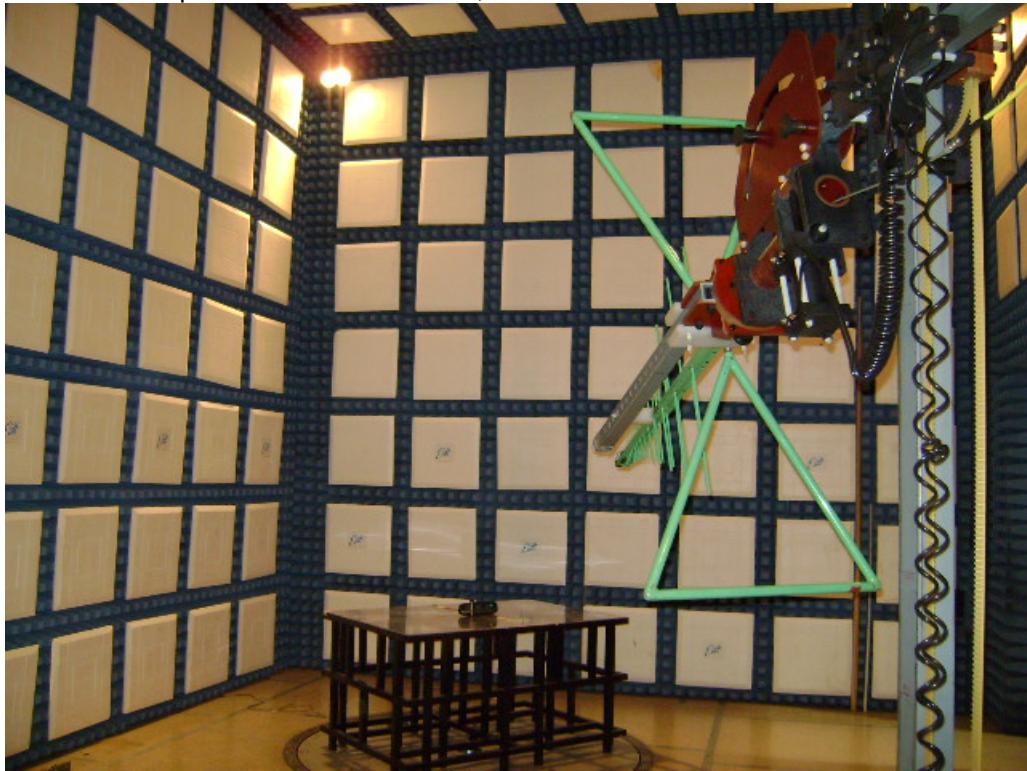


Figure 3

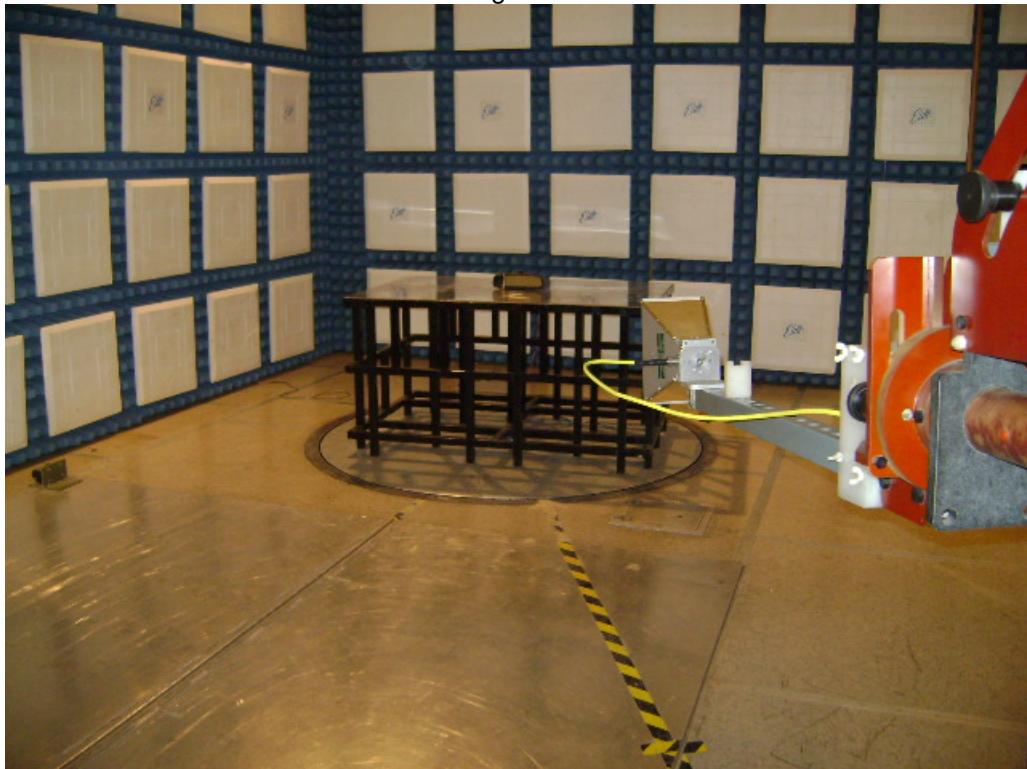


Test Set-up for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization



Test Set-up for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization

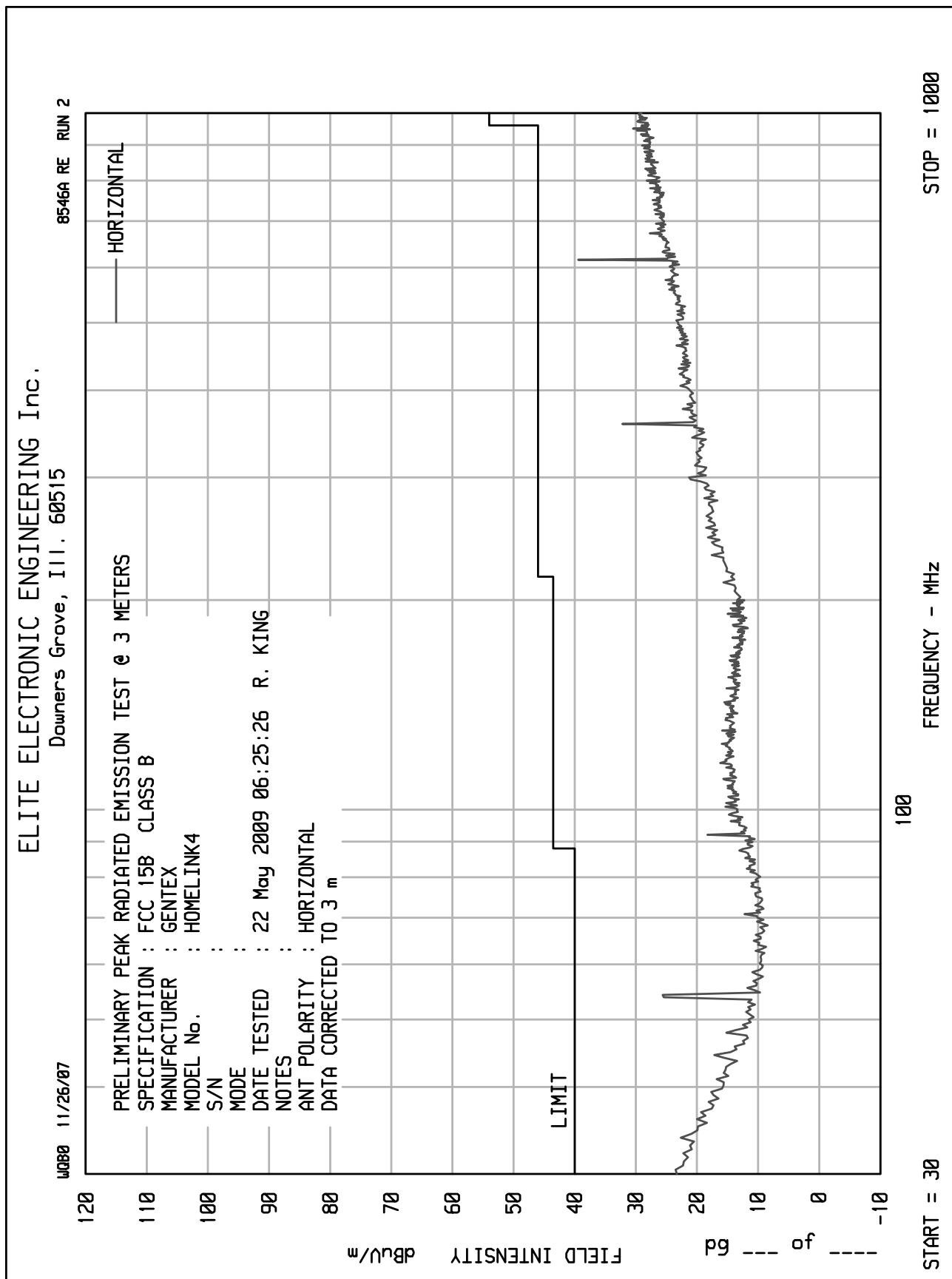
Figure 4



Test Set-up for Radiated Emissions, 1GHz to 2GHz – Horizontal Polarization



Test Set-up for Radiated Emissions, 1GHz to 2GHz – Vertical Polarization

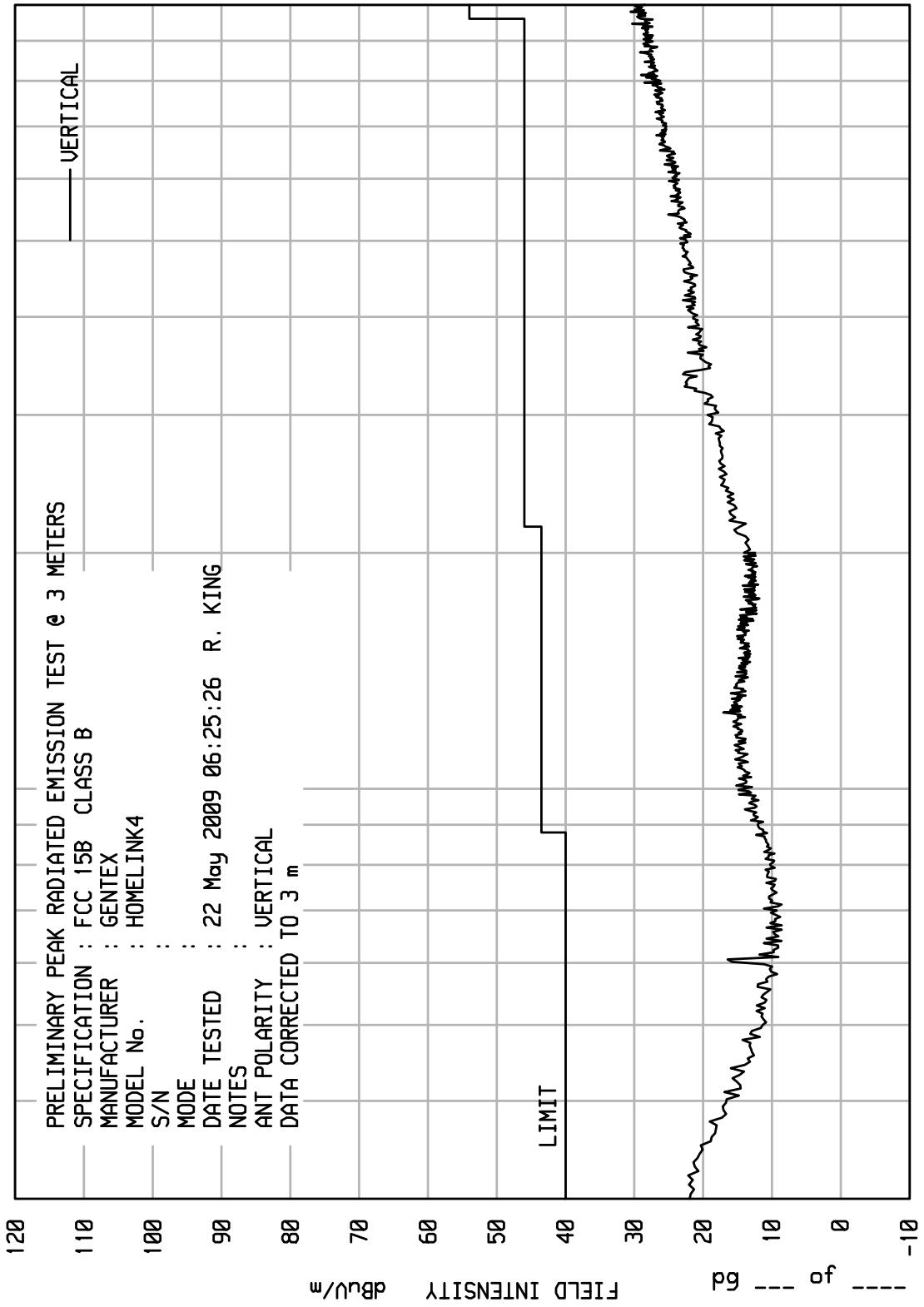


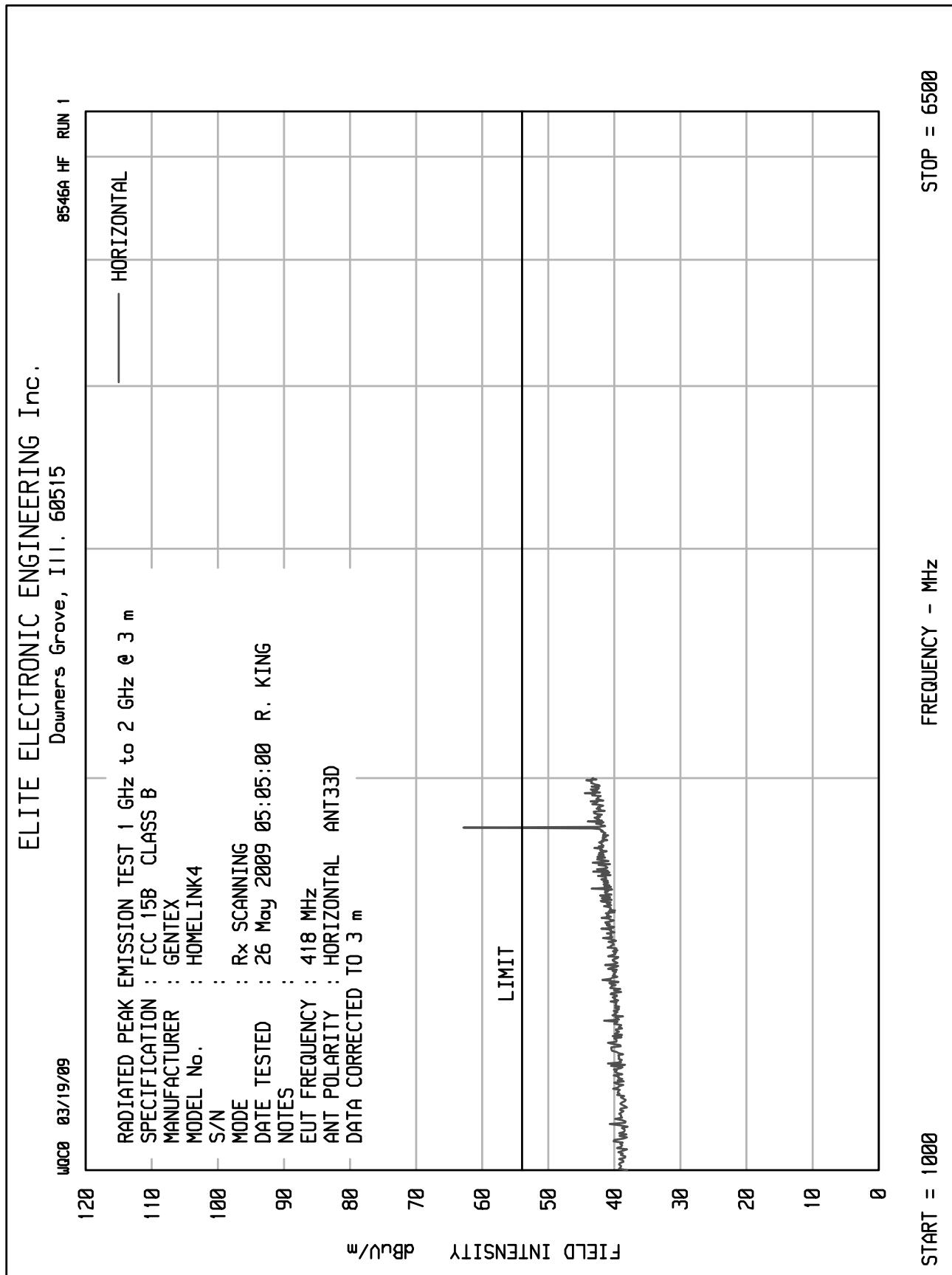
ELITE ELECTRONIC ENGINEERING Inc.

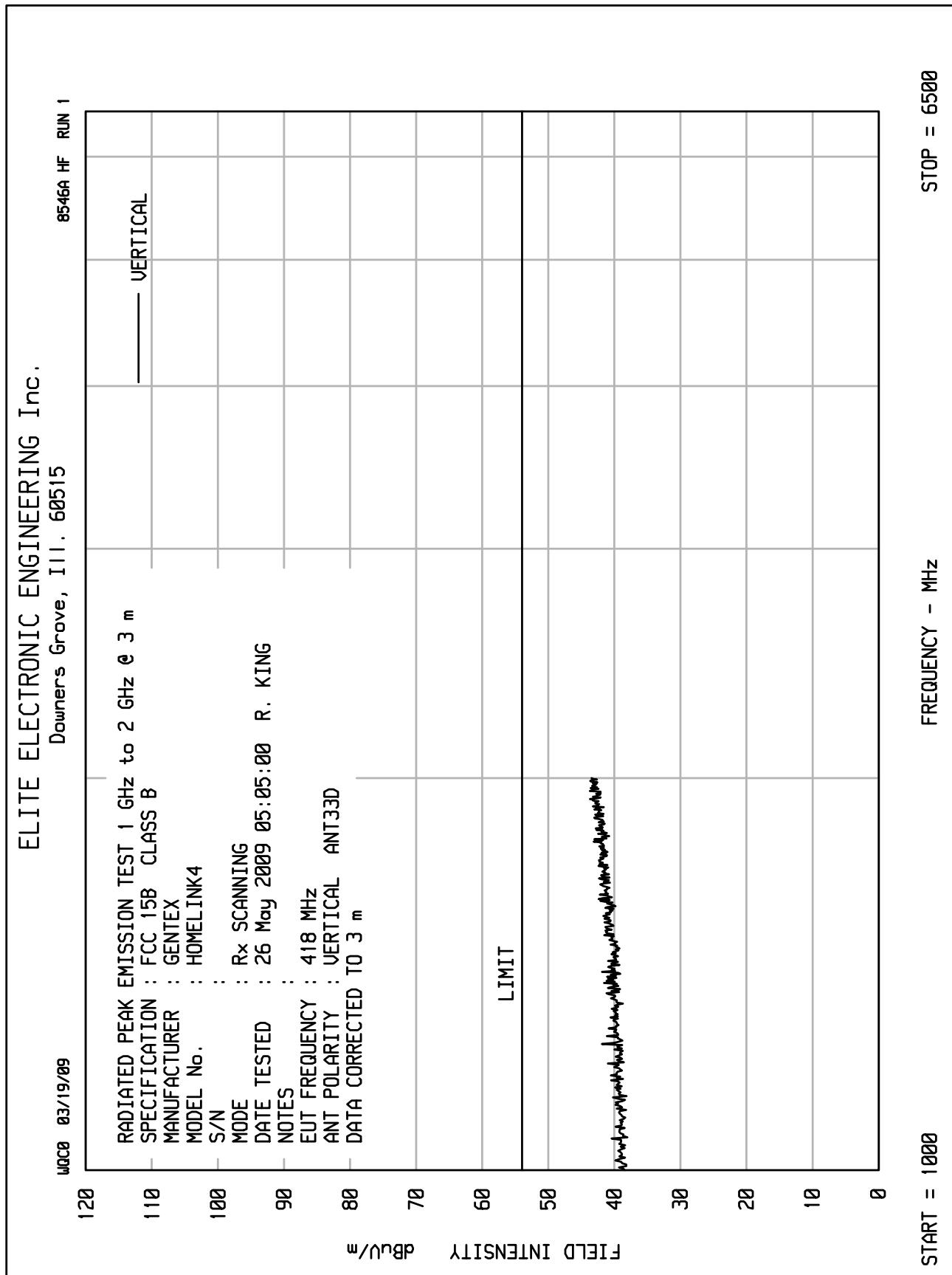
Downers Grove, Ill. 60515

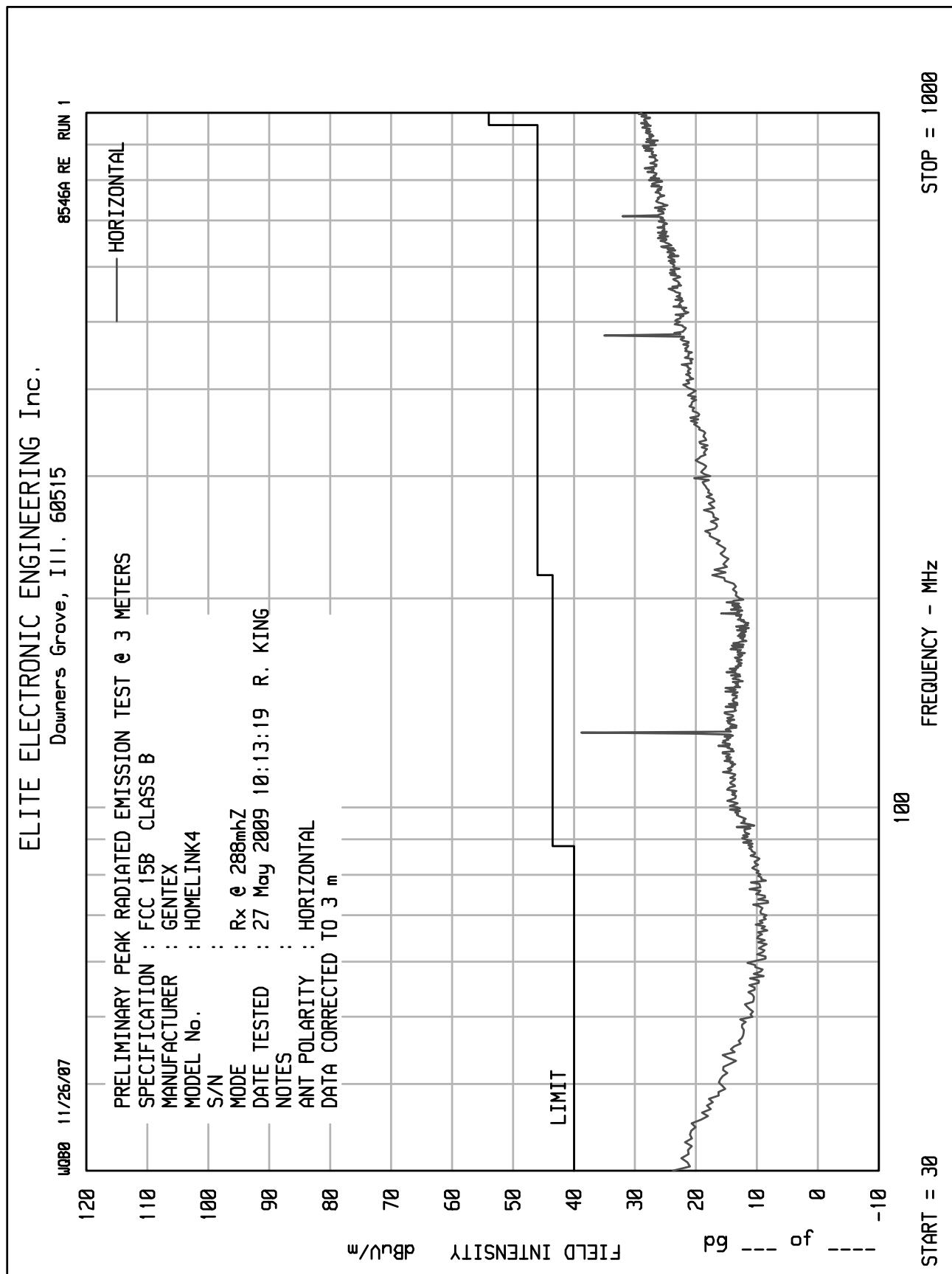
11/26/07

8546A RE RUN 2









ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

Work 11/26/07

8546A RE RUN 1

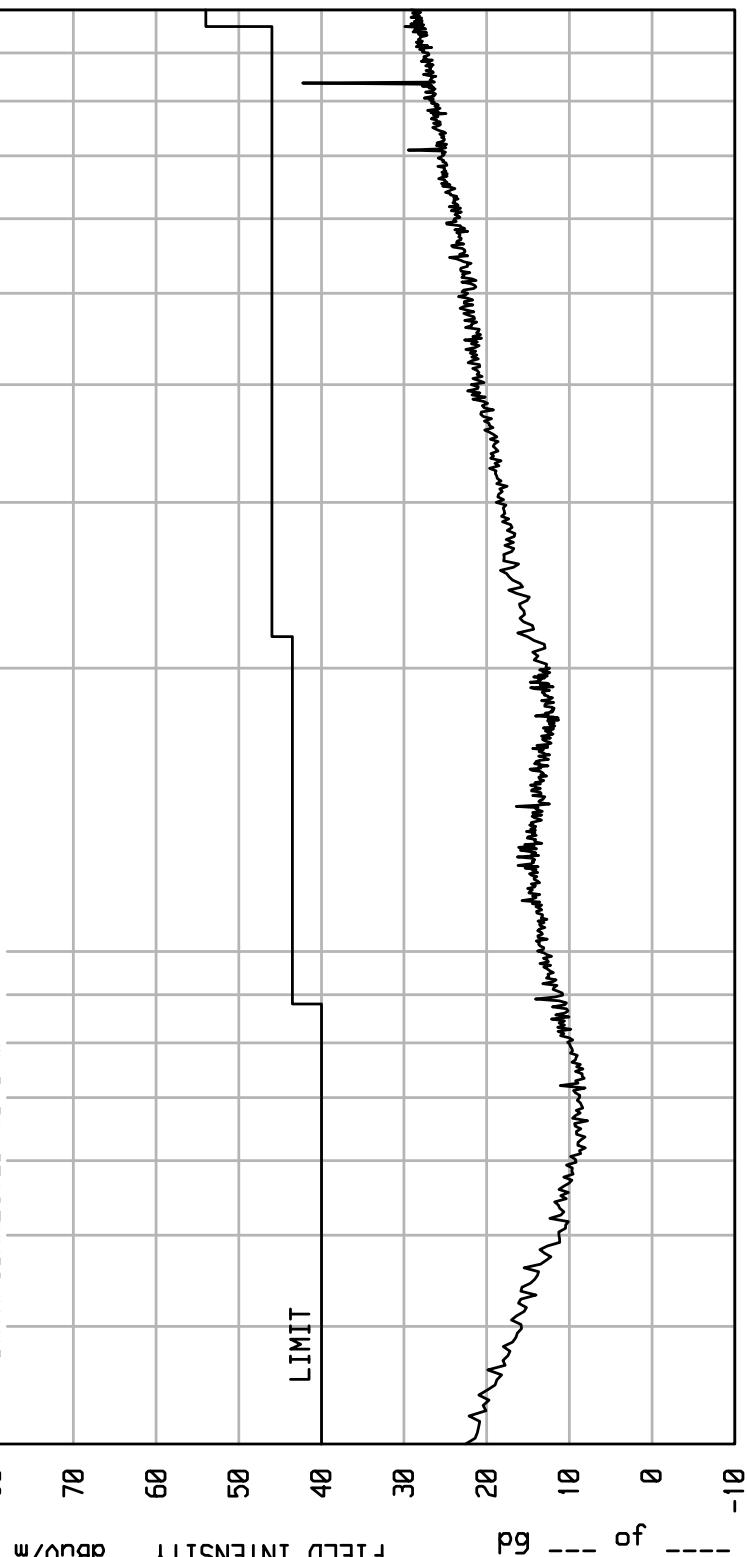
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS

SPECIFICATION :	FCC 15B CLASS B
MANUFACTURER :	GENTEX
MODEL No. :	HOMELINK4

S/N	MODE	Rx @ 288MHz
	DATE TESTED	27 May 2009 10:13:19
	NOTES	R. KING

ANT POLARITY	VERTICAL
DATA CORRECTED TO	3 m

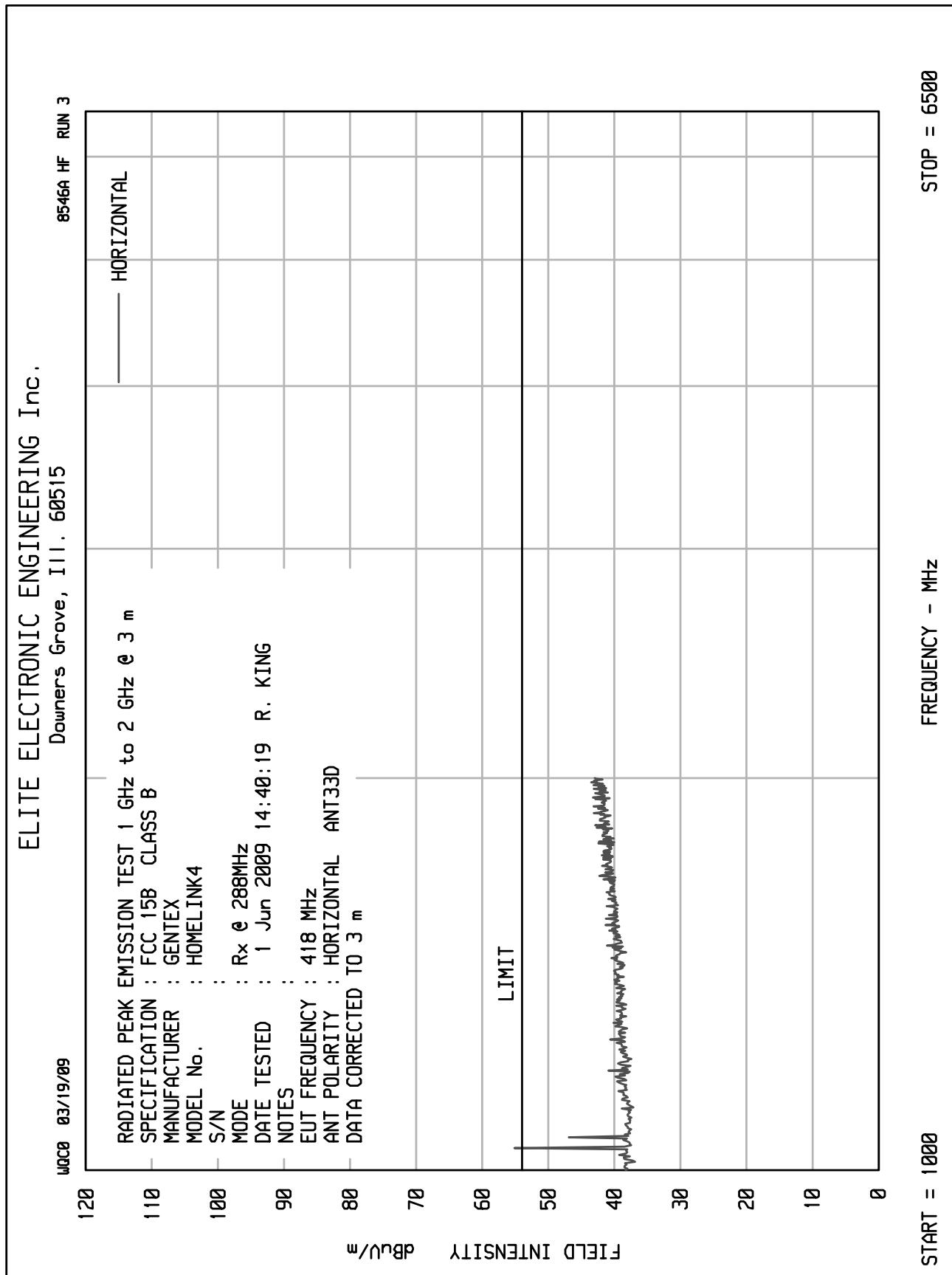
FIELD INTENSITY dBuV/m

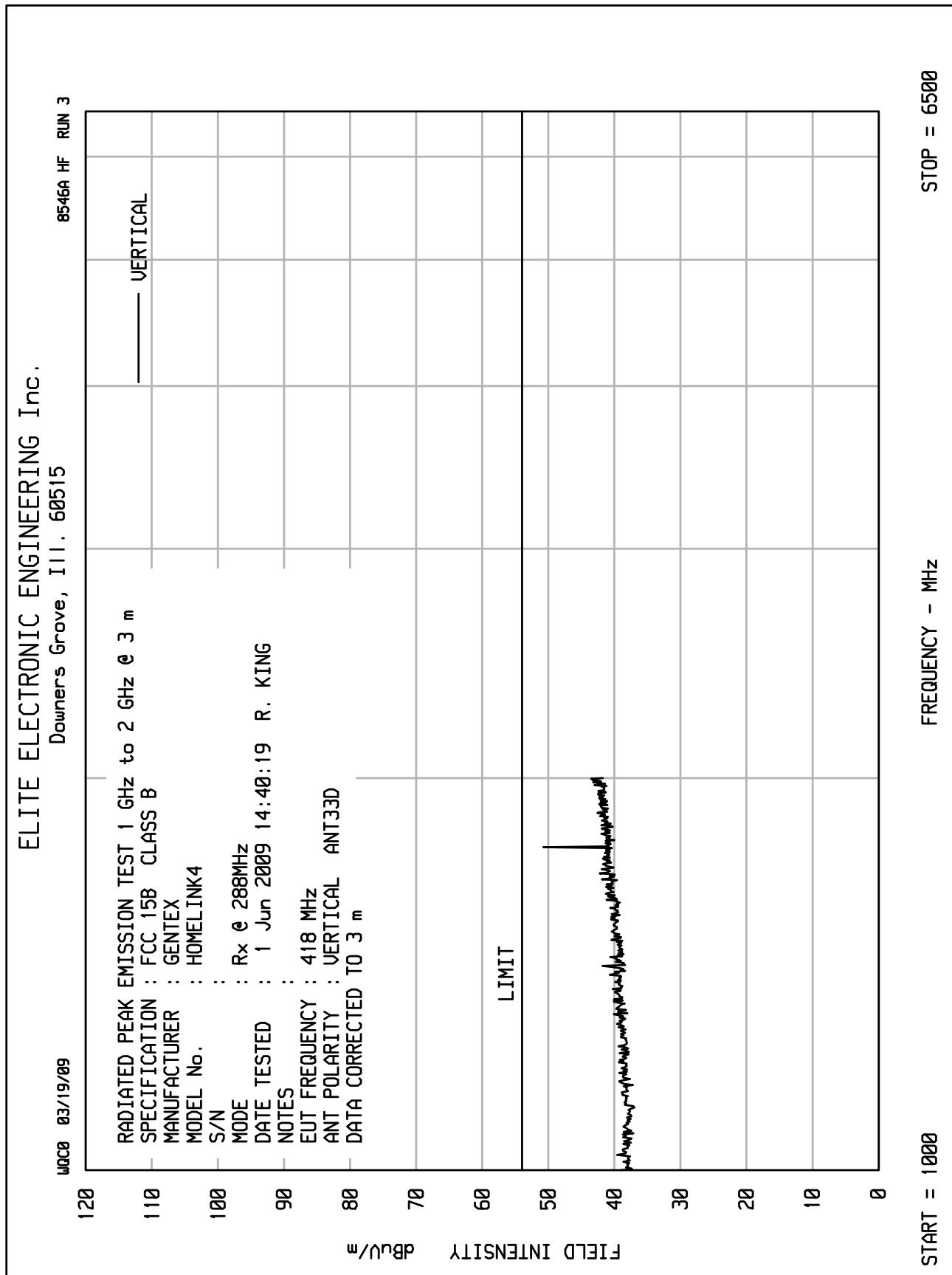


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100 FREQUENCY - MHz

STOP = 1000



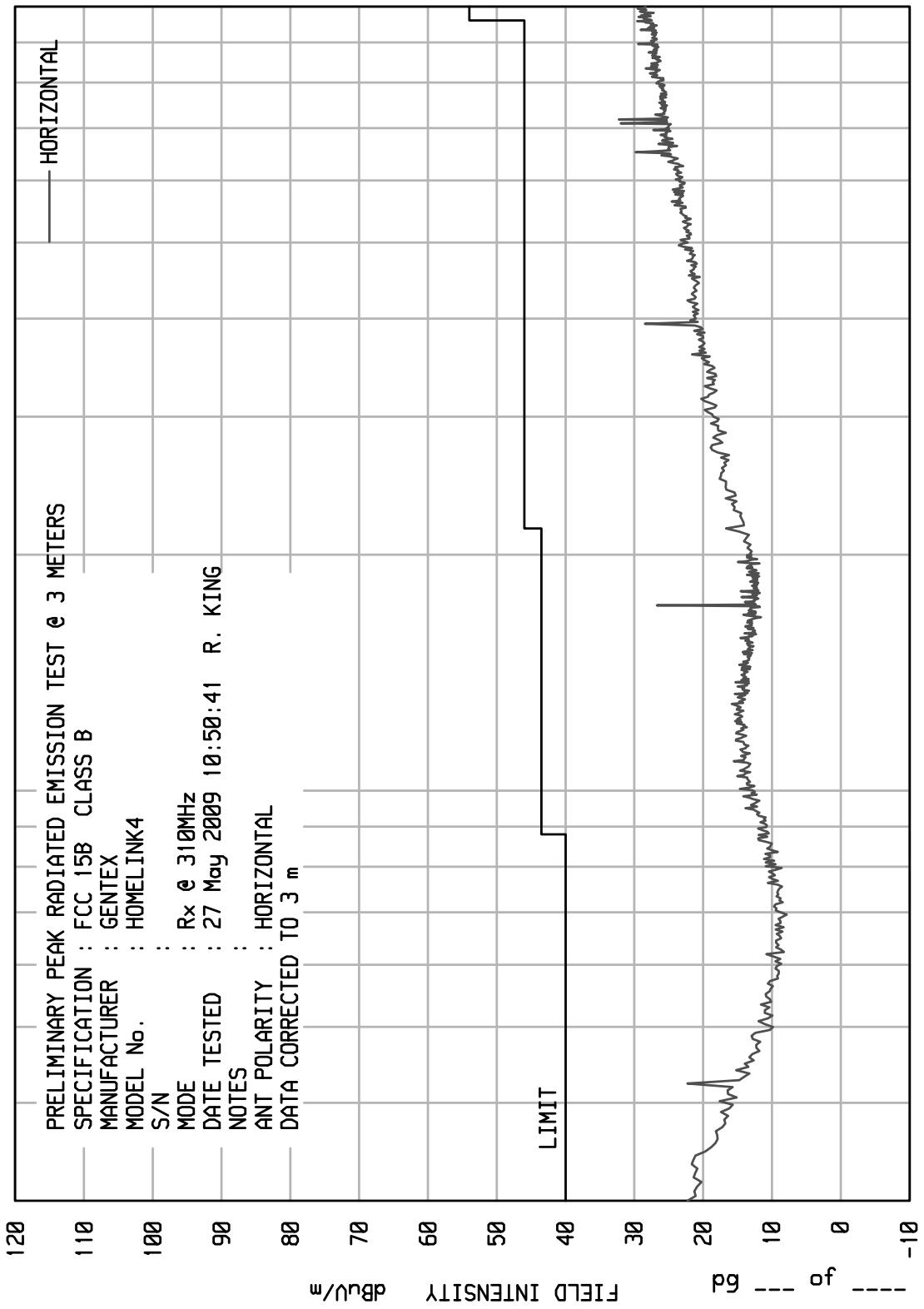


ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

Work 11/26/07

8546A RE RUN 2



ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

Work 11/26/07

8546A RE RUN 2

PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS

SPECIFICATION	: FCC 15B CLASS B
MANUFACTURER	: GENTEX
MODEL No.	: HOMELINK4

S/N	: Rx @ 310MHz
-----	---------------

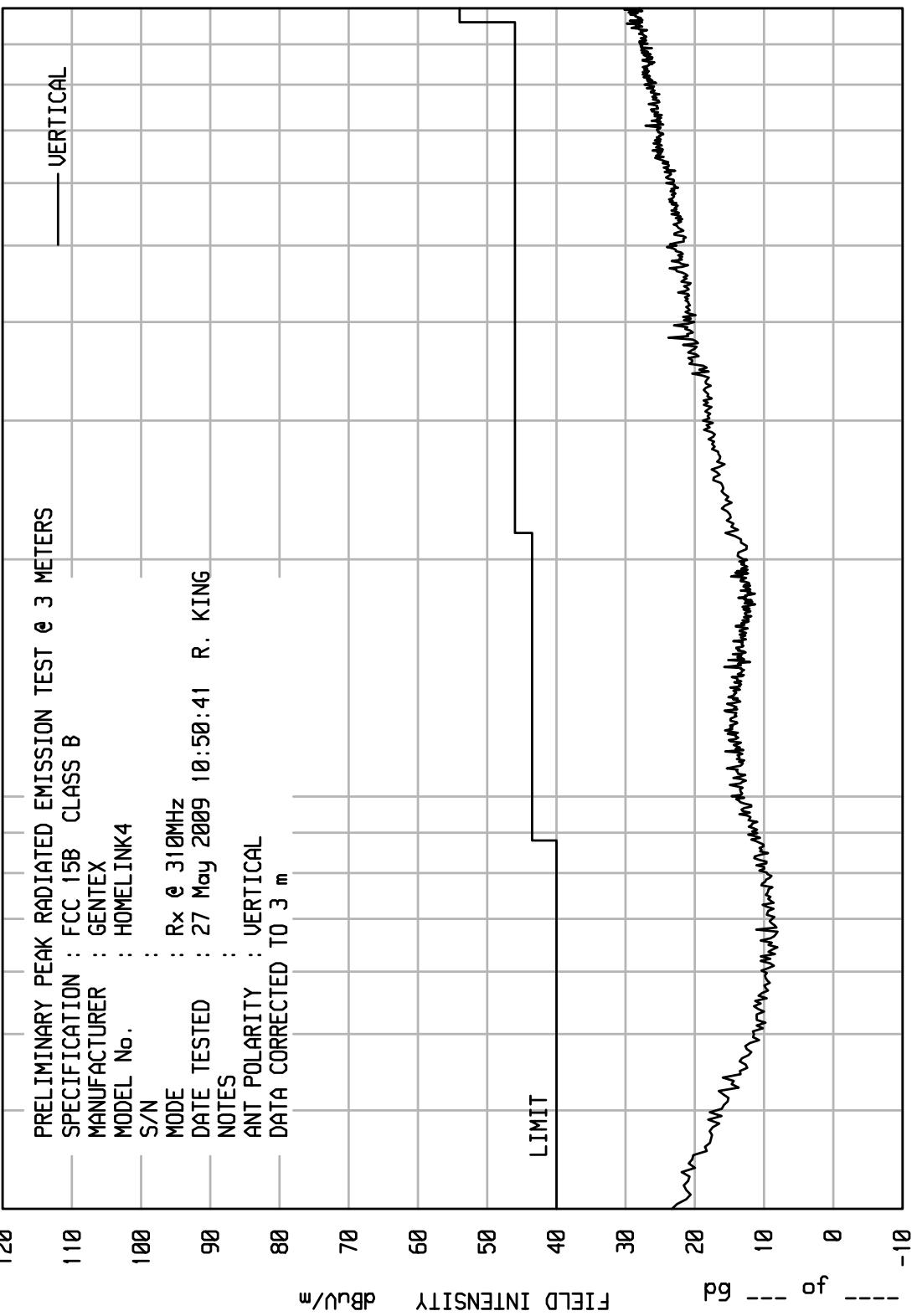
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DATE TESTED	: R. KING
-------------	-----------

NOTES	
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ANT POLARITY	: VERTICAL
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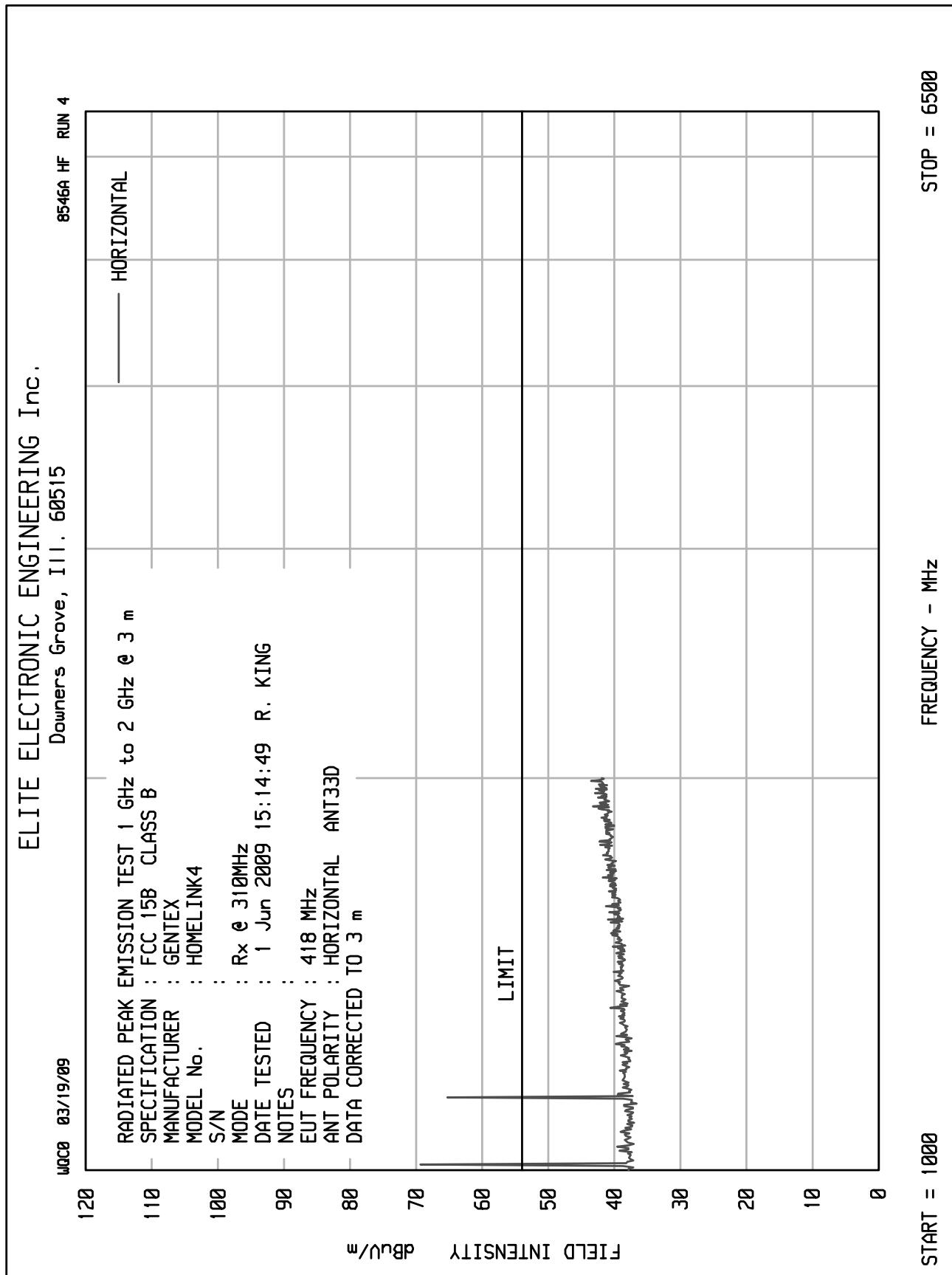
DATA CORRECTED TO 3 m	
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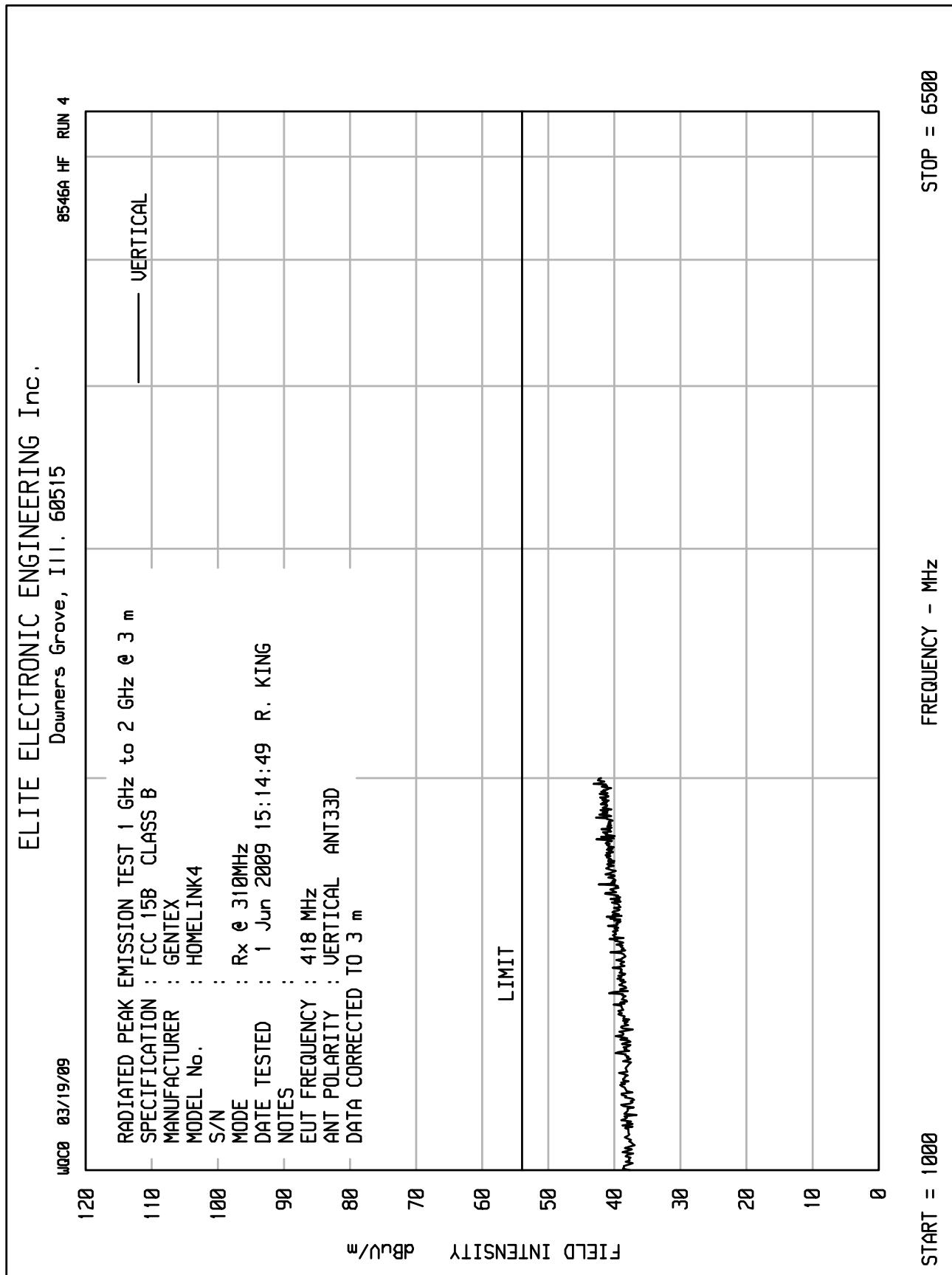


START = 30

100 FREQUENCY - MHz

STOP = 1000





ELITE ELECTRONIC ENGINEERING Inc.

Downers Grove, Ill. 60515

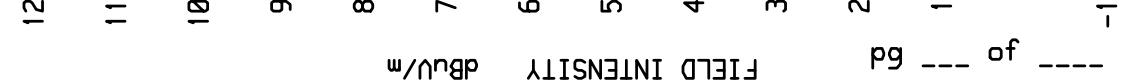
11/26/07

8546A RE RUN 3

PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS

SPECIFICATION	: FCC 15B CLASS B
MANUFACTURER	: GENTEX
MODEL No.	: HOMELINK4

S/N	: Rx @ 418MHz
MODE	: 27 May 2009 11:25:29
DATE TESTED	: R. KING
NOTES	
ANT POLARITY	: VERTICAL
DATA CORRECTED TO 3 m	



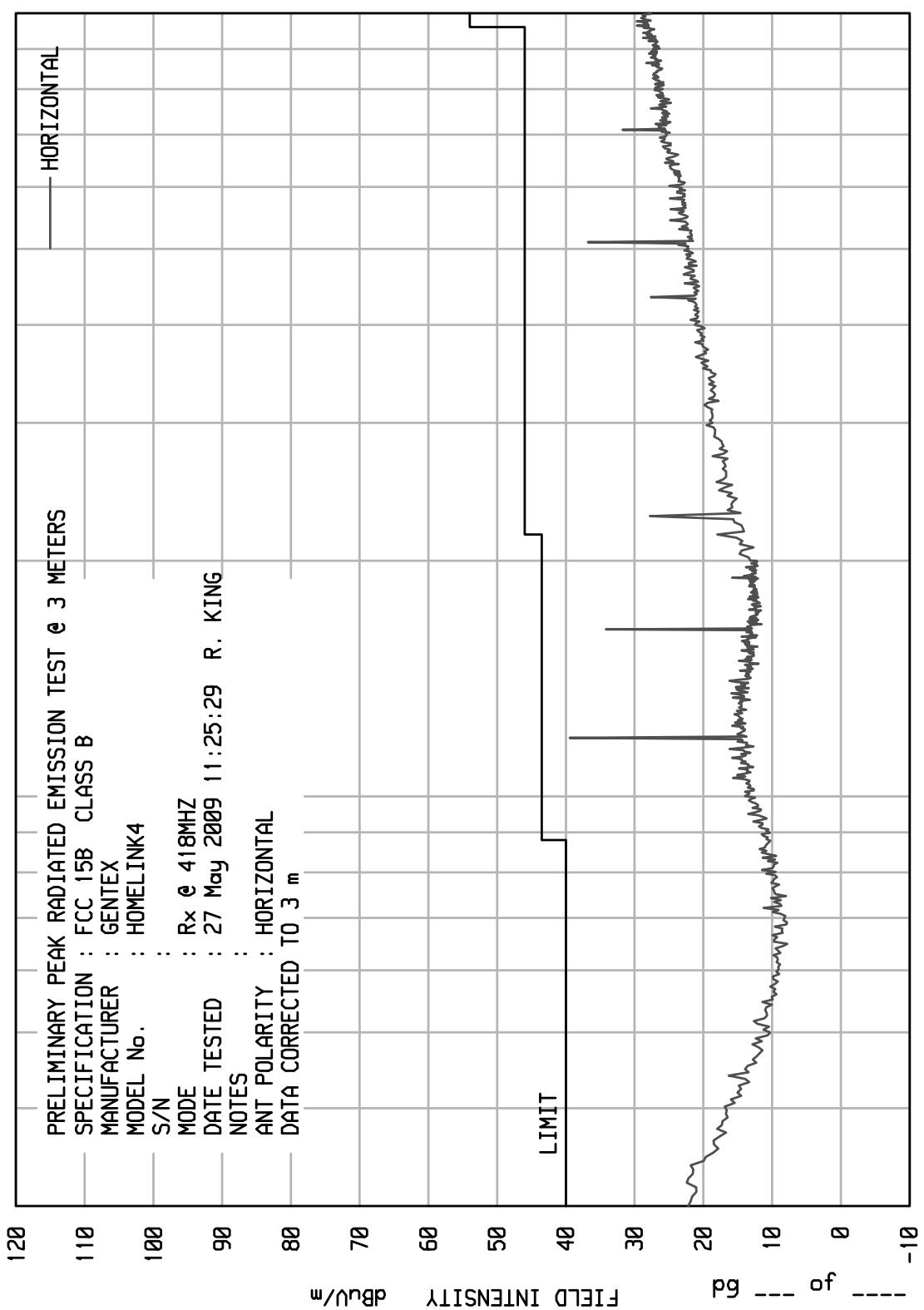
ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515

Date 11/26/07

8546A RE RUN 3

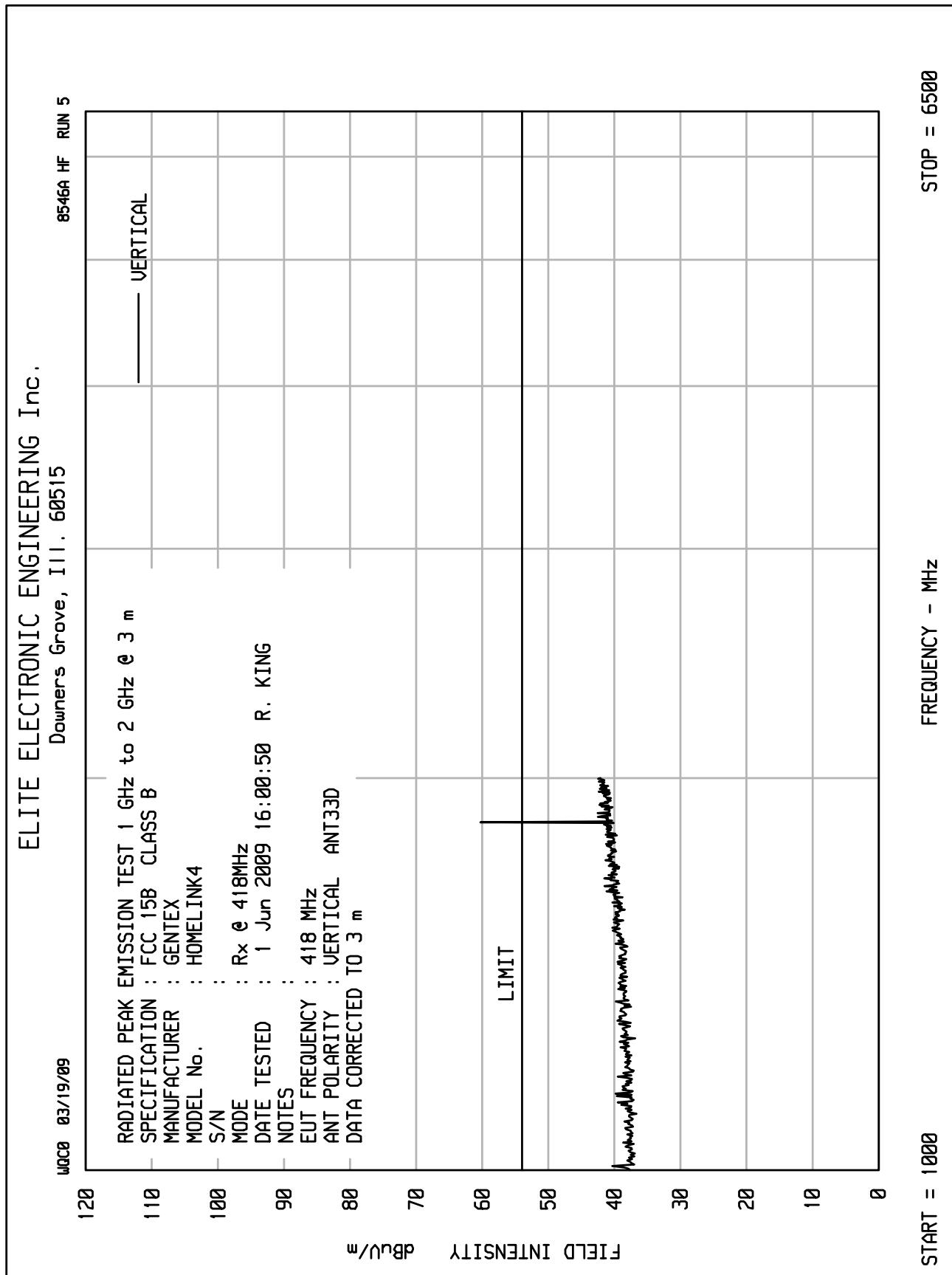
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS

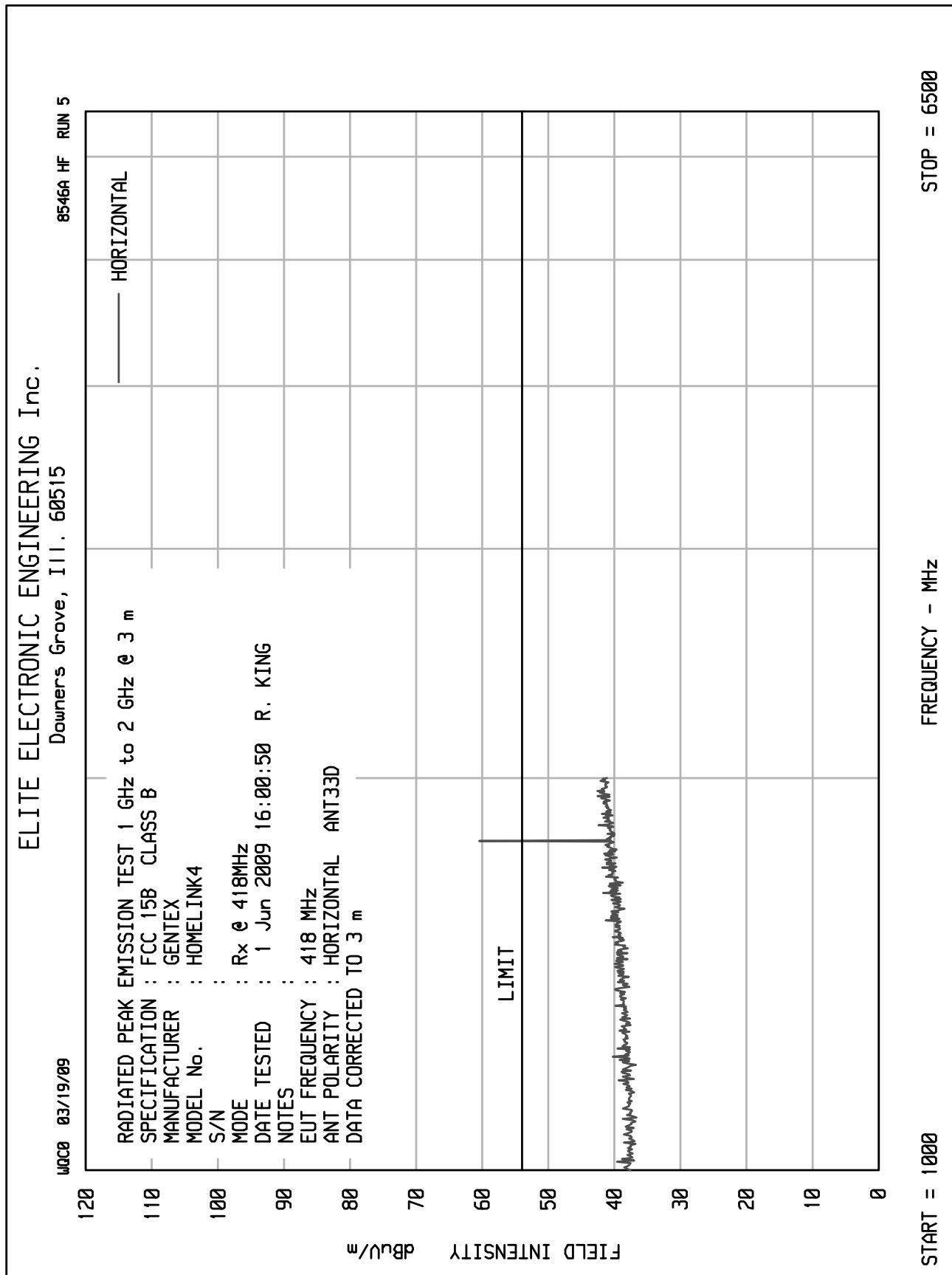
SPECIFICATION :	FCC 15B CLASS B
MANUFACTURER :	GENTEX
MODEL No. :	HOMELINK4
S/N	Rx @ 418MHz
MODE	27 May 2009 11:25:29
DATE TESTED	R. KING
NOTES	
ANT POLARITY	HORIZONTAL
DATA CORRECTED TO 3 m	



START = 30

STOP = 1000





ETR No.
DATA SHEET8546A
TEST NO. 2

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE :

NOTES :

TEST DATE : 22 May 2009 06:25:26

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
55.09	-5.2	7.7	.7	0.0	0.0	3.2	40.0	180	340	H
92.35	-6.9	9.6	1.0	0.0	0.0	3.7	43.5	0	120	H
118.11	-6.8	12.2	1.0	0.0	0.0	6.3	43.5	90	200	H
124.53	-7.1	12.5	1.0	0.0	0.0	6.4	43.5	180	120	V
149.04	-7.4	11.3	1.0	0.0	0.0	4.9	43.5	0	340	H
170.74	-6.7	10.2	1.0	0.0	0.0	4.5	43.5	0	340	V
250.10	-5.9	13.1	1.3	0.0	0.0	8.5	46.0	90	200	H
355.02	-4.7	15.5	1.5	0.0	0.0	12.3	46.0	225	340	H
467.32	-5.7	17.4	1.7	0.0	0.0	13.5	46.0	135	200	H
584.94	-6.6	19.4	2.0	0.0	0.0	14.8	46.0	-0	200	H
610.19	-6.5	19.5	2.0	0.0	0.0	15.1	46.0	270	120	H
798.54	-5.9	21.4	2.5	0.0	0.0	18.0	46.0	180	120	V
868.78	-6.2	22.2	2.5	0.0	0.0	18.5	46.0	225	120	V
957.11	-5.4	22.8	2.5	0.0	0.0	19.9	46.0	45	200	H

Checked BY *Richard E. King* :

Richard E. King



ETR NO.

DATA SHEET

HF TEST NO. 1

RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx SCANNING

NOTES :

TEST DATE : 26 May 2009 05:05:00

EUT FREQUENCY : 418 MHz

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

ANTENNA : ANT33D

FREQUENCY MHz	Avg READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG LIMIT dBuV/m	PASS/ FAIL	AZ deg	ANT HT cm	POLAR
1084.61	8.7	25.2	2.6	0.0	36.5	54.0		270	340	H
1249.65	-2.5	25.6	2.8	0.0	25.9	54.0		-0	340	V
1418.51	-2.0	25.9	3.0	0.0	26.8	54.0		225	200	H
1529.23	-2.1	26.2	3.1	0.0	27.2	54.0		225	200	H
1626.71	-2.3	26.6	3.2	0.0	27.6	54.0		315	200	H
1720.71	-2.2	27.1	3.3	0.0	28.2	54.0		45	340	H
1851.02	-2.2	27.6	3.4	0.0	28.8	54.0		135	340	H
1938.53	8.6	28.0	3.5	0.0	40.0	54.0		225	120	H

Checked BY *Richard E. King* :

Richard E. King

ETR No.
DATA SHEET8546A
TEST NO. 1

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 288mhz

NOTES :

TEST DATE : 27 May 2009 10:13:19

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
31.96	-6.6	19.0	.5	0.0	0.0	12.9	40.0	-0	200	H
54.64	-5.3	7.9	.7	0.0	0.0	3.3	40.0	315	200	V
86.59	-7.0	8.7	.9	0.0	0.0	2.7	40.0	135	120	V
111.65	-7.0	11.9	1.0	0.0	0.0	5.8	43.5	90	340	V
126.79	-7.3	12.4	1.0	0.0	0.0	6.1	43.5	225	120	H
146.79	-7.3	11.4	1.0	0.0	0.0	5.1	43.5	-0	200	H
169.26	-6.8	10.3	1.0	0.0	0.0	4.5	43.5	90	120	H
216.43	-3.0	10.9	1.1	0.0	0.0	9.0	43.5	90	120	H
359.81	-5.2	15.6	1.5	0.0	0.0	11.9	46.0	90	120	H
451.92	-5.7	17.2	1.7	0.0	0.0	13.2	46.0	315	200	V
485.09	-5.7	17.9	1.7	0.0	0.0	14.0	46.0	315	340	H
687.91	-5.5	20.3	2.2	0.0	0.0	17.0	46.0	45	120	H
705.95	8.3	20.4	2.3	0.0	0.0	31.0	46.0	180	120	H
836.51	-6.1	22.0	2.5	0.0	0.0	18.4	46.0	135	120	V
955.92	-5.4	22.8	2.5	0.0	0.0	19.8	46.0	180	340	V

Checked BY *Richard E. King* :

Richard E. King



ETR NO.

DATA SHEET

HF TEST NO. 3

RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 288MHz

NOTES :

TEST DATE : 1 Jun 2009 14:40:19

EUT FREQUENCY : 418 MHz

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

ANTENNA : ANT33D

FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG dBuV/m	PASS/ LIMIT	AZ deg	ANT HT cm	POLAR
1054.96	8.4	25.1	2.6	0.0	36.1	54.0	270	120		H
1185.12	-2.4	25.4	2.7	0.0	25.7	54.0	224	120		H
1380.62	-2.6	25.8	3.0	0.0	26.2	54.0	270	120		V
1427.04	-2.4	25.9	3.0	0.0	26.5	54.0	90	340		V
1520.99	8.2	26.1	3.1	0.0	37.4	54.0	180	120		H
1778.47	-2.5	27.3	3.3	0.0	28.2	54.0	315	120		V
1918.71	-2.4	27.9	3.4	0.0	28.9	54.0	0	200		H
1970.01	8.0	28.1	3.5	0.0	39.6	54.0	0	120		H

Checked BY RICHARD E. KING :Richard E. King

ETR No.
DATA SHEET8546A
TEST NO. 2

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 310MHz

NOTES :

TEST DATE : 27 May 2009 10:50:41

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR
54.11	-5.2	8.0	.7	0.0	0.0	3.5	40.0	135	200	H
88.63	-6.9	8.9	.9	0.0	0.0	3.0	40.0	180	340	H
111.65	-6.8	11.9	1.0	0.0	0.0	6.0	43.5	45	120	V
131.14	-7.3	12.2	1.0	0.0	0.0	5.8	43.5	225	120	H
144.91	-7.4	11.5	1.0	0.0	0.0	5.2	43.5	90	200	V
173.68	-6.9	10.0	1.0	0.0	0.0	4.2	43.5	135	120	H
210.40	-5.3	10.7	1.1	0.0	0.0	6.5	43.5	90	120	H
357.65	-5.2	15.5	1.5	0.0	0.0	11.9	46.0	270	340	H
400.33	-5.5	16.6	1.5	0.0	0.0	12.6	46.0	315	120	H
568.28	-6.5	19.3	1.9	0.0	0.0	14.7	46.0	46	200	H
647.24	-5.9	20.3	2.1	0.0	0.0	16.5	46.0	180	120	H
717.16	-5.8	20.6	2.3	0.0	0.0	17.1	46.0	225	120	H
896.65	-5.8	22.4	2.5	0.0	0.0	19.1	46.0	135	200	H
957.60	-5.4	22.8	2.5	0.0	0.0	19.9	46.0	45	200	V

Checked BY *Richard E. King* :

Richard E. King



ETR No.

DATA SHEET

HF TEST NO. 4

RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 310MHz

NOTES :

TEST DATE : 1 Jun 2009 15:14:49

EUT FREQUENCY : 418 MHz

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

ANTENNA : ANT33D

FREQUENCY MHz	Avg READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG dBuV/m	PASS/ LIMIT FAIL	AZ deg	ANT HT cm	POLAR
1026.34	-2.6	25.1	2.5	0.0	25.0	54.0		180	340	H
1148.16	-2.7	25.3	2.7	0.0	25.4	54.0		135	200	H
1640.67	7.8	26.7	3.2	0.0	37.7	54.0		45	340	V
1789.19	-2.9	27.4	3.3	0.0	27.8	54.0		45	200	V
1846.80	-3.2	27.6	3.4	0.0	27.8	54.0		-0	120	V
1883.51	-2.9	27.7	3.4	0.0	28.3	54.0		180	120	V
1905.94	-2.6	27.8	3.4	0.0	28.6	54.0		0	200	H
1911.66	-2.6	27.9	3.4	0.0	28.7	54.0		45	340	H
1925.55	-2.9	27.9	3.4	0.0	28.4	54.0		135	120	H
1934.42	-2.7	27.9	3.5	0.0	28.7	54.0		225	120	V
1947.26	8.0	28.0	3.5	0.0	39.4	54.0		0	340	H
1975.84	8.1	28.1	3.5	0.0	39.7	54.0		90	120	H
2002.66	-2.7	0.0	0.0	0.0	-2.7	54.0		315	200	V

Checked BY *Richard E. King* :

Richard E. King

ETR NO.
DATA SHEET8546A
TEST NO. 3

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 418MHZ

NOTES :

TEST DATE : 27 May 2009 11:25:29

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY MHz	QP READING dBuV	ANT FAC dB	CBL FAC dB	EXT ATTN dB	DIST FAC dB	TOTAL dBuV/m	QP LIMIT dBuV/m	AZ deg	ANT HT cm	POLAR HT
53.93	-5.3	8.0	.7	0.0	0.0	3.4	40.0	225	120	V
85.78	-6.9	8.6	.9	0.0	0.0	2.6	40.0	90	200	H
117.77	-6.9	12.2	1.0	0.0	0.0	6.3	43.5	90	120	H
125.29	-7.3	12.5	1.0	0.0	0.0	6.1	43.5	135	340	V
162.02	-6.5	10.6	1.0	0.0	0.0	5.1	43.5	0	340	H
180.82	-6.9	10.1	1.0	0.0	0.0	4.2	43.5	270	340	V
222.81	-4.2	11.0	1.1	0.0	0.0	7.9	46.0	135	120	H
367.31	-5.3	15.7	1.5	0.0	0.0	11.9	46.0	135	120	H
430.51	-5.5	17.2	1.6	0.0	0.0	13.3	46.0	180	120	H
509.71	-6.5	18.4	1.8	0.0	0.0	13.7	46.0	90	340	H
685.51	-5.4	20.3	2.2	0.0	0.0	17.1	46.0	270	120	H
706.09	8.2	20.4	2.3	0.0	0.0	30.9	46.0	181	120	H
868.26	-6.0	22.2	2.5	0.0	0.0	18.7	46.0	225	200	H
939.38	-5.4	22.6	2.5	0.0	0.0	19.7	46.0	90	340	V

Checked BY *Richard E. King* :

Richard E. King



ETR NO.

DATA SHEET

HF TEST NO. 5

RADIATED AVG EMISSION MEASUREMENTS >=1000 MHz in a 3 m ANECHOIC ROOM

SPECIFICATION : FCC 15B CLASS B

MANUFACTURER : GENTEX

MODEL NO. : HOMELINK4

SERIAL NO. :

TEST MODE : Rx @ 418MHz

NOTES :

TEST DATE : 1 Jun 2009 16:00:50

EUT FREQUENCY : 418 MHz

TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

ANTENNA : ANT33D

FREQUENCY MHz	AVG READING dBuV	ANT FAC dB	CBL FAC dB	DIST FAC dB	TOTAL dBuV/m	AVG dBuV/m	PASS/ LIMIT FAIL	AZ deg	ANT HT cm	POLAR
1016.58	-3.1	25.0	2.5	0.0	24.5	54.0		0	120	V
1229.64	7.5	25.5	2.8	0.0	35.8	54.0		0	340	H
1401.84	7.9	25.8	3.0	0.0	36.7	54.0		135	120	H
1521.19	-3.0	26.1	3.1	0.0	26.2	54.0		315	200	V
1643.87	-3.0	26.7	3.2	0.0	26.9	54.0		90	120	H
1799.68	-2.8	27.4	3.3	0.0	27.9	54.0		270	120	H
1852.01	-2.8	27.6	3.4	0.0	28.2	54.0		45	120	V
1942.41	-2.9	28.0	3.5	0.0	28.6	54.0		45	200	H

Checked BY *Richard E. King* :

Richard E. King

DATA PAGE

MANUFACTURER : Gentex Corporation
 MODEL : Homelink4
 S/N : None Assigned
 SPECIFICATION : FCC-15B Radiated Emissions
 DATE : June 1, 2009
 NOTES : Tuned @ 288MHz
 : TEST DISTANCE IS 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 30M	Margin (dB)
277.3	H	4.2	*	1.3	13.8	19.3	9.2	200	-26.7
277.3	V	4.6	*	1.3	13.8	19.7	9.6	200	-26.3
554.6	H	3.2	*	1.9	19.3	24.4	16.6	200	-21.6
554.6	V	3.3	*	1.9	19.3	24.5	16.8	200	-21.5
831.9	H	5.7	*	2.3	22.2	30.2	32.3	200	-15.8
831.9	V	5.9	*	2.3	22.2	30.4	33.1	200	-15.6
1109.2	H	12.7	*	2.6	24.6	39.9	99.1	500	-14.1
1109.2	V	12.9	*	2.6	24.6	40.1	101.5	500	-13.9
1386.5	H	13.2	*	3.0	25.8	42.0	126.5	500	-11.9
1386.5	V	13.4	*	3.0	25.8	42.2	129.4	500	-11.7
1663.8	H	13.8	*	3.3	27.3	44.4	165.7	500	-9.6
1663.8	V	14.0	*	3.3	27.3	44.6	169.6	500	-9.4
1941.1	H	14.5	*	3.6	29.7	47.8	244.5	500	-6.2
1941.1	V	14.8	*	3.6	29.7	48.1	253.1	500	-5.9

 Checked BY *Richard E. King* :

 Richard E. King



DATA PAGE

MAMANUFACTURER : Gentex Corporation
MODEL : Homelink4
S/N : None Assigned
SPECIFICATION : FCC-15B Radiated Emissions
DATE : June 1, 2009
NOTES : Tuned @ 310MHz
: TEST DISTANCE IS 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 30M	Margin (dB)
299.3	H	4.4	*	1.3	14.3	20.0	10.0	200	-26.0
299.3	V	4.7	*	1.3	14.3	20.3	10.4	200	-25.7
598.6	H	3.8	*	2.0	19.8	25.6	19.0	200	-20.4
598.6	V	4.1	*	2.0	19.8	25.9	19.7	200	-20.1
897.9	H	6.3	*	2.4	22.8	31.5	37.4	200	-14.6
897.9	V	6.4	*	2.4	22.8	31.6	37.9	200	-14.5
1197.2	H	13.7	*	2.8	24.7	41.2	114.4	500	-12.8
1197.2	V	13.8	*	2.8	24.7	41.3	115.7	500	-12.7
1496.5	H	13.5	*	3.1	26.2	42.9	139.1	500	-11.1
1496.5	V	13.6	*	3.1	26.2	43.0	140.7	500	-11.0
1795.8	H	14.7	*	3.4	29.0	47.1	227.4	500	-6.8
1795.8	V	14.5	*	3.4	29.0	46.9	222.3	500	-7.0

Checked BY *Richard E. King* :

Richard E. King

DATA PAGE

MAMANUFACTURER : Gentex Corporation
MODEL : Homelink4
S/N : None Assigned
SPECIFICATION : FCC-15B Radiated Emissions
DATE : June 1, 2009
NOTES : Tuned @ 418MHz
: TEST DISTANCE IS 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 30M	Margin (dB)
407.3	H	4.2	*	1.6	17.2	23.0	14.1	200	-23.0
407.3	V	4.5	*	1.6	17.2	23.3	14.6	200	-22.7
814.6	H	3.6	*	2.3	22.0	27.9	24.8	200	-18.1
814.6	V	3.5	*	2.3	22.0	27.8	24.5	200	-18.2
1221.9	H	13.2	*	2.8	24.9	40.9	110.9	500	-13.1
1221.9	V	13.6	*	2.8	24.9	41.3	116.2	500	-12.7
1629.2	H	13.4	*	3.3	27.1	43.8	154.5	500	-10.2
1629.2	V	13.6	*	3.3	27.1	44.0	158.1	500	-10.0

Checked BY

