Measurement of RF Interference from two Model TMS9000 Torque Measurement Systems Transmitters

For	:	Honeywell Sensing and Control 2520 S. Walnut Road, B1-582 Freeport, IL 61032
P.O. No.	:	5115649
Date Tested	:	June 4 through June 18, 2009
Test Personnel	:	Richard King
Specification	:	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C
	:	Industry Canada RSS-210
	:	Industry Canada RSS-GEN

Test Report By : Richard E. King

Richard King

Approved By : Raymond J Klouda

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REVISION HISTORY

Revision	Date	Description
—	6/18/2009	Initial release

Measurement of RF Emissions from two TMS9000 Torque Measurement Systems

1 INTRODUCTION

1.1 Scope of Tests

This document represents the results of the series of radio interference measurements performed on two model TMS9000 Torque Measurement Systems, Serial Nos. (Large Unit) 94015-4k and (Small Unit) 94012-250, (hereinafter referred to as the test items). The test items were designed to transmit at approximately 6.78MHz using a non-contact telemetry antenna. The test items were manufactured and submitted for testing by Honeywell Sensing and Control located in Freeport, IL.

1.2 Purpose

The test series was performed to determine if the test items meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.223. 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°C and the relative humidity was 44%.

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-210, Issue 6, September 2005, “Spectrum Management and Telecommunications Radio Standards Specification, Low-power License-exempt radio communication devices (All Frequency Bands): Category I Equipment”
- Industry Canada RSS-GEN, Issue 1, September 2005, “Spectrum Management and Telecommunications Radio Standards Specification, General Requirements and Information for the Certification of radio communication equipment”

3 TEST ITEMS SET-UP AND OPERATION

3.1 General Description

The test items are Torque Measurement Systems, Model No. TMS9000, serial numbers large Unit 94015-4k and small unit 94012-250. A block diagram of the test items set-up is shown as Figure 1.

3.1.1 Power Input

The test items obtained 12VDC power through 2 each 90cm long leads from the output of a Sunpower AC Adaptor, M/N: EA10201. The Sunpower AC Adaptor was powered with 115V, 60Hz via a 1.8meter long 2 wire power cord. For conducted emissions tests, each 115V, 60Hz lead of the AC Adaptor was connected through a line impedance stabilization network (LISN). The network complies with the requirements of Paragraph 4.1.2 of ANSI C63.4-2003.

3.1.2 Peripheral Equipment

There was no peripheral equipment submitted with the test items.

3.1.3 Interconnect Cables

The following interconnect cables were submitted with the test items:

Item	Description
J6 – Frequency Output	2 meter long, Unshielded, terminated with a 100k ohm resistor
J5 – Voltage Output	2 meter long, Unshielded, terminated with a 2k ohm resistor
RF Cable	17.5 meter long coax from RF out to CMX
RS232 Cable	1.35 meter long, terminated with a 330 ohm resistor.

3.1.4 Grounding

Since only two wires were used to provide the input power, the test items were ungrounded during the tests. The third primary input terminal of the transformer was not used.

3.2 Operational Mode

For all tests the test items were placed on an 80cm high non-conductive stand. The test items were energized which started them transmitting.

3.3 Test items Modifications

No modifications were performed on the test items to meet the requirements of FCC 15C or Industry Canada.

4 TEST FACILITY AND TEST INSTRUMENTATION

4.1 Shielded Enclosure

All 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.

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).

5 TEST PROCEDURES

5.1 Powerline Conducted Emissions

5.1.1 Requirements

All radio frequency voltages on the power lines for any frequency or frequencies of an intentional radiator shall not exceed the limits in the following table:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

5.1.2 Procedures

The interference on each power lead was measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. The meter terminal of the LISN not under test was terminated with 50 ohms. Measurements were first made over the entire frequency range from 150 kHz through 30MHz with a peak detector and the results were automatically plotted. The data thus obtained was then searched by the computer for the highest levels. Quasi-peak measurements were automatically performed at the frequencies selected from the highest peak measurements, and the results printed.

5.1.3 Results

For the Large unit 94015-4K, the plots of the peak preliminary conducted voltage levels on each power line with the transmitter transmitting into the antenna are presented on pages 17 and 18. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 19 and 20.

For the Small unit 94012-250, the plots of the peak preliminary conducted voltage levels on each power line with the transmitter transmitting into the antenna are presented on pages 21 and 22. The conducted limit for intentional radiators is shown as a reference. The final quasi-peak results are presented on pages 23 and 24.

5.2 Bandwidth Measurements

5.2.1 Requirement

In accordance with paragraph 15.223, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this section, bandwidth is determined at the points 6 dB down from the modulated carrier.

In accordance with paragraph A2.5 6.765-6.795 MHz, of RSS 210 The field strength of any emission shall not exceed the following limits:

1) 15.5 millivolts/m (84 dBµV/m) at 30 m, inside the allocated band.
2) 334 microvolts/m (50.5 dBµV/m) at 30 m, outside the allocated band up to Fc ±150 kHz.
3) 106 microvolts/m (40.5 dBµV/m) at 30 m, between Fc ±150 kHz and Fc ±450 kHz.
4) Field strength limits of section 5.3.1 for frequencies outside Fc ±450 kHz, except for harmonics which shall not exceed 316 microvolts/m at 30 m where Fc = 6.78 MHz.

5.2.2 Procedures

The test items were placed on an 80cm high non-conductive stand. The unit was set to transmit continuously. With an antenna positioned nearby, bandwidth emissions were displayed on the spectrum analyzer. The resolution bandwidth was set to 10 kHz and span was set to 31 kHz. The frequency spectrum near the fundamental was plotted.

The span was then set to 2 MHz and the frequency spectrum near the fundamental was plotted.

5.2.3 Results

The plot of the emissions near the fundamental frequency is presented on pages 39 through 42. As can be seen

from these data pages, the bandwidth for both the transmitters were less than 10% of the center frequency, the field strength limits of the fundamentals are 15uV/m at 30 meters. The data also shows that both transmitters meet the emission mask requirements of RSS 210. The 99% bandwidth measurement was 33.5kHz for the large unit 94015-4k and 32.8kHz and for the small unit 94012-250.

5.3 Radiated Measurements

5.3.1 Requirements

The field strength of any emission within the band 1.705–10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this section, bandwidth is determined at the points 6 dB down from the modulated carrier. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in §15.35(b) for limiting peak emissions apply.

The field strength of emissions outside of the band 1.705–10.0 MHz shall not exceed the general radiated emission limits shown below:

Frequency MHz	Distance between Test items And Antenna in Meters	Field Strength uV/m	Field Strength dBuV/m
1.705–30.0	30	30	29.5
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.

In accordance with paragraph A2.5 6.765-6.795 MHz, of RSS 210 The field strength of any emission shall not exceed the following limits:

1) 15.5 millivolts/m (84 dBµV/m) at 30 m, inside the allocated band.
2) 334 microvolts/m (50.5 dBµV/m) at 30 m, outside the allocated band up to Fc ±150 kHz.
3) 106 microvolts/m (40.5 dBµV/m) at 30 m, between Fc ±150 kHz and Fc ±450 kHz.
4) Field strength limits of section 5.3.1 for frequencies outside Fc ±450 kHz, except for harmonics which shall not exceed 316 microvolts/m at 30 m where Fc = 6.78 MHz.

5.3.2 Procedures

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. 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.

A preliminary radiated emissions test was performed to determine the emission characteristics of the test items. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test items. The entire frequency range from 6MHz to 1GHz was investigated using a peak detector function. The data was then processed by the computer to calculate equivalent field intensity.

The final open field emission tests were then manually performed over the frequency range of 6MHz to 100MHz. Between 6MHz and 30MHz, a loop antenna was used as the pick-up device. Above 30MHz, a bilog antenna was used as the pick-up device. All significant broadband and narrowband signals were measured and recorded.

Since the test distance below 30MHz was reduced from 30 meters to 3 meters, a correction factor was applied to the measurements. Radiation at the fundamental was measured at several distances and the levels plotted. A straight line was drawn through these points and the slope (which is the propagation loss constant) was calculated. Measurements and calculations are shown in Figures 5 and 6. The factors to correct levels at 3 meters to levels at 30 meters are shown on the data pages.

To ensure that maximum or worst case, emission levels were measured, the following steps were taken:

1) The test items were rotated so that all of its sides were exposed to the receiving antenna.
2) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
3) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
4) For hand-held or body-worn devices, the test items were rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

5.3.3 Results

For the Large unit 94015-4K, the plots of the peak preliminary with the test item transmitting at 6.78MHz, are presented on pages 25 through 28. The plots are presented for a reference only, and are not used to determine compliance.

The final open area radiated levels, with the large unit 94015-4k transmitting at 6.78MHz, are presented on pages 33 through 35. As can be seen from the data, the emissions measured from the test items did not exceed the specification limits. See pages these data pages for details.

For the Small unit 94012-250, the plots of the peak preliminary with the test item transmitting at 6.78MHz, are presented on pages 29 through 32. The plots are presented for a reference only, and are not used to determine compliance.

The final open area radiated levels, with the small unit 94012-250 transmitting at 6.78MHz, are presented on pages 36 through 38. As can be seen from the data, the emissions measured from the test items did not exceed the specification limits. See pages these data pages for details.

Photographs of the test configuration which yielded the highest or worst case radiated emission levels are shown on Figure 3 and 4.

5.4 Frequency Stability

5.4.1 Requirements

In accordance with paragraph A2.5 6.765-6.795 MHz, of RSS 210 Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

5.4.2 Procedures

The test item was then placed in a humidity temperature chamber.

1) The nominal frequency was measured at +20ºC.
2) The temperature chamber was then set to -30ºC.
3) Once the temperature chamber had reached -30ºC, the test item was allowed to soak for 30 minutes.

4) After soaking at -30ºC for thirty minutes, the test item was turned on and set to transmit and the transmit frequency was measured and recorded.
5) Steps (1) through (4) were repeated with the temperature chamber was set to +50ºC.
6) The test item was then removed from the temperature chamber and allowed to adjust to nominal room temperature.
7) The supply voltage was checked and adjusted to the nominal level 120VAC. The test item was turned on and set to transmit. The transmit frequency was measured and recorded at ambient temperature.
8) The supply voltage was then varied to +/-15% of its nominal level 120VAC. The test item was turned on and set to transmit. The transmit frequency was measured and recorded at ambient temperature.
9) Steps (1) through (8) were repeated on the small unit 94012-250.

5.4.3 Results

The frequency stability measurements are presented on pages 43 and 44. As can be seen from the data, the fundamental emissions stayed within the authorized bands of operation.

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 items

The test items and all associated equipment were returned to Honeywell Sensing and Control upon completion of the tests.

7 CONCLUSIONS

It was determined that the Honeywell Sensing and Control Torque Measurement Systems, Part No. TMS9000, Serial No. (Large Unit) 94015-4k and (Small Unit) 94012-250, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.205 et seq. for Intentional Radiators, when tested per ANSI C63.4-2003.

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 items at the test date. Any electrical or mechanical modification made to the test items 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
APK4	PREAMPLIFIER OPT H02	HEWLETT PACKARD	8449B	3008A00329	1-26.5GHZ	4/6/2009	4/6/2010
CDX0	COMPUTER	ELITE	WORKSTATIO N	---	---	N/A	
CMA1	Controllers	EMCO	2090	9701-1213	---	N/A	
ETDC	Temperature Controller	Thermotron	2800	753726	Programmable	Note 1	
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---	N/A	
MDA0	MULTIMETER (R. KING)	FLUKE CORPORATION	26	72120781	I;VDC;VAC;R	2/17/2009	2/17/2010
MFC0	MICROWAVE FREQ. COUNTER	HEWLETT PACKARD	5343A	2133A00591	10HZ-26GHZ	5/30/2008	5/30/2009
NLS1	24" ACTIVE LOOP ANTENNA	EMCO	6502	8903-2329	0.01-30MHZ	4/28/2009	4/28/2010
NTA1	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL6112	2054	0.03-2GHZ	9/2/2008	9/2/2009
PHA0	MAGNETIC FIELD PROBE	ELECTRO-METRICS	EM-6882	134	22-230MHZ	NOTE 1	
PLA5	462D/70A LISN	CEMEC, INC.	462D/70A	06	0.01-400MHZ	6/1/2009	6/1/2010
PLL8	50UH LISN 462D	ELITE ELECTRONIC ENG	462D/70A	009	0.01-400MHZ	4/8/2009	4/8/2010
RACA	RF PRESELECTOR	HEWLETT PACKARD	85685A	2926A00980	20HZ-2GHZ	2/20/2009	2/20/2010
RAEC	SPECTRUM ANALYZER	HEWLETT PACKARD	8566B	3014A06690	100HZ-22GHZ	2/20/2009	2/20/2010
RAF5	QUASIPEAK ADAPTOR	HEWLETT PACKARD	85650A	2043A00151	0.01-1000MHZ	2/20/2009	2/20/2010
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
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/11/2009	3/11/2010
T1E8	10DB 25W ATTENUATOR	WEINSCHEL	46-10-34	BH7996	DC-18GHZ	12/4/2008	12/4/2009
XLQJ	5W, 50 OHM TERMINATION	JFW INDUSTRIES	50T-052	56	DC-2GHZ	8/29/2008	8/29/2009
XZG4	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2223A01683	---	N/A	

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.

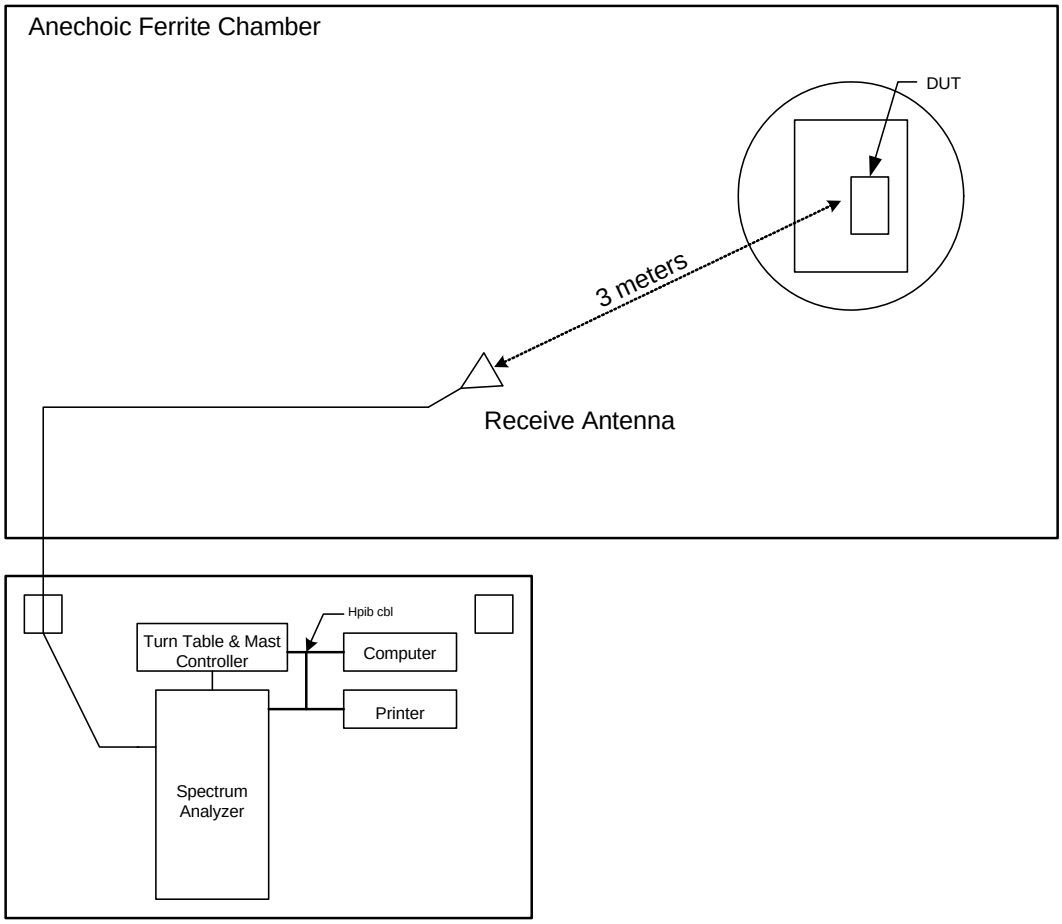
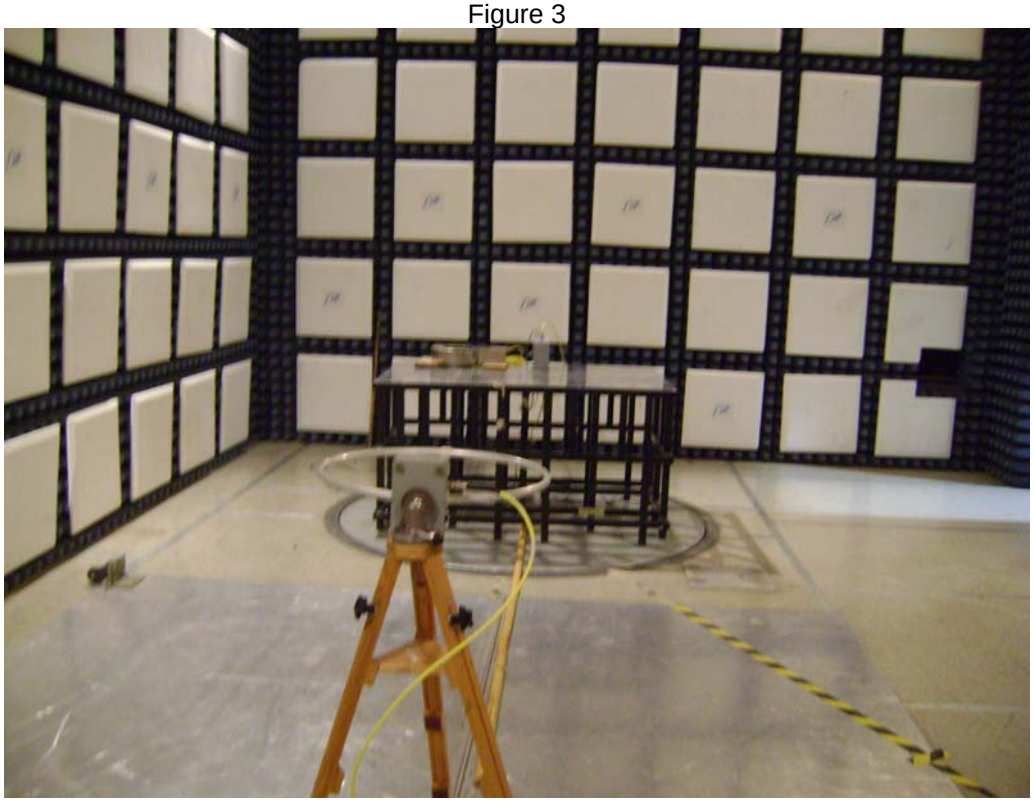


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

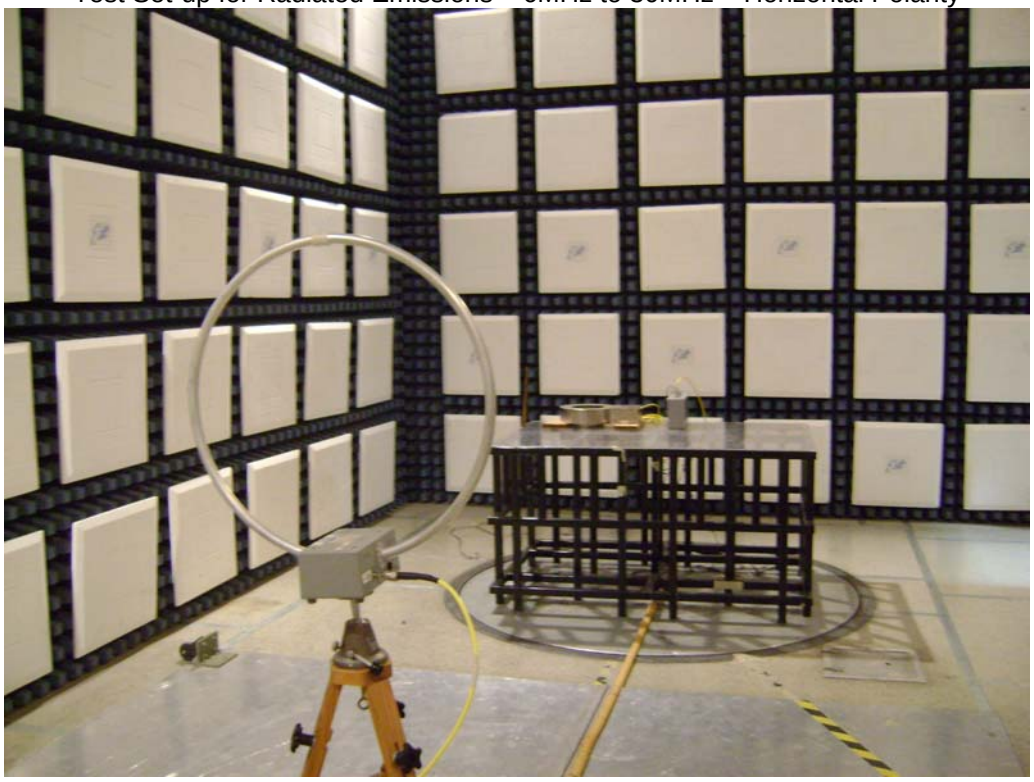
Figure 2

Test Set-up for Conducted Emissions

Figure 3

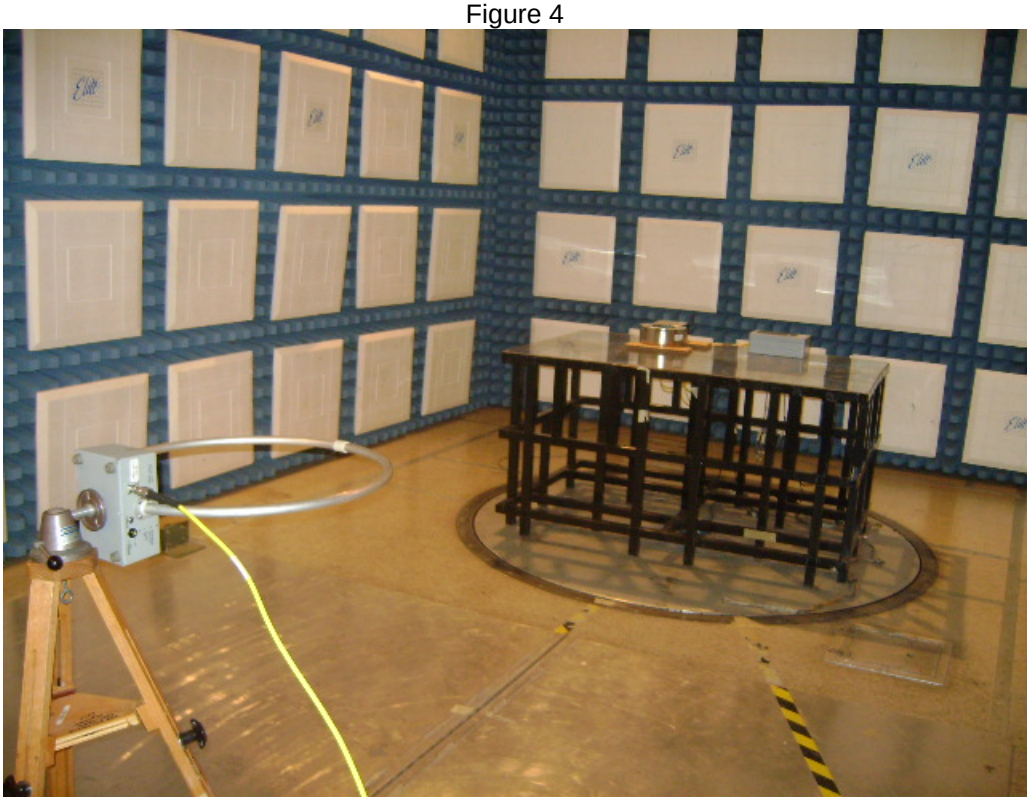


Test Set-up for Radiated Emissions – 6MHz to 30MHz – Horizontal Polarity

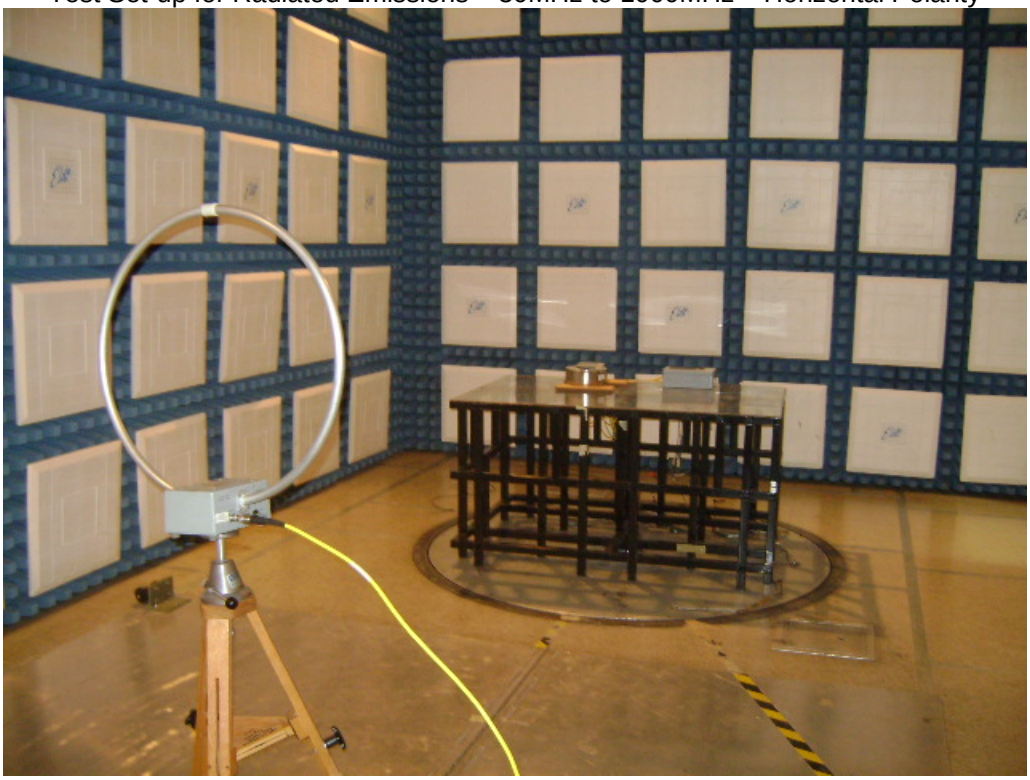


Test Set-up for Radiated Emissions – 6MHz to 30MHz – Vertical Polarity

Figure 4



Test Set-up for Radiated Emissions – 30MHz to 1000MHz – Horizontal Polarity

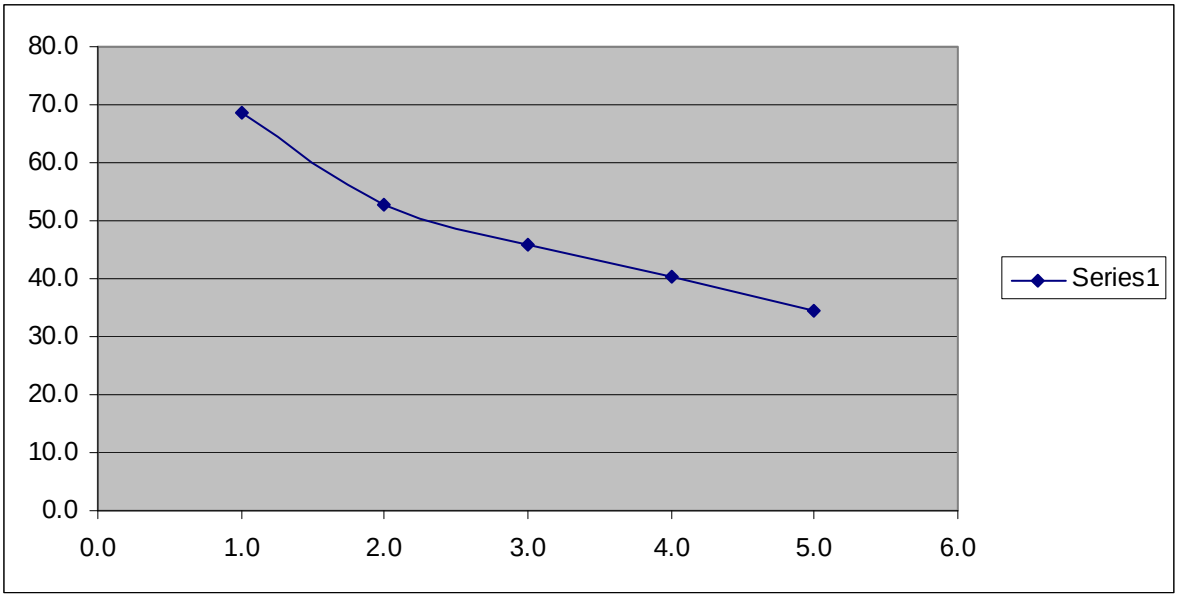


Test Set-up for Radiated Emissions – 30MHz to 1000MHz – Vertical Polarity

Figure 5: PROPAGATION LOSS MEASUREMENTS AND CALCULATIONS FOR THE LARGE UNIT 94015-4k

A. MEASUREMENTS

TEST DISTANCE (meters)	METER READING (dBuV)
1	68.5
2	52.6
3	45.8
4	40.2
5	34.6



B. CALCULATIONS:

PROPAGATION LOSS = 20 * LOG (Dm/Dl)^N

WHERE : Dm = DISTANCE OF MEASUREMENT
: Dl = LIMIT DISTANCE
: N = SLOPE OF THE LINE

SOLVING FOR N USING READINGS AT 2 METERS AND 5 METERS:

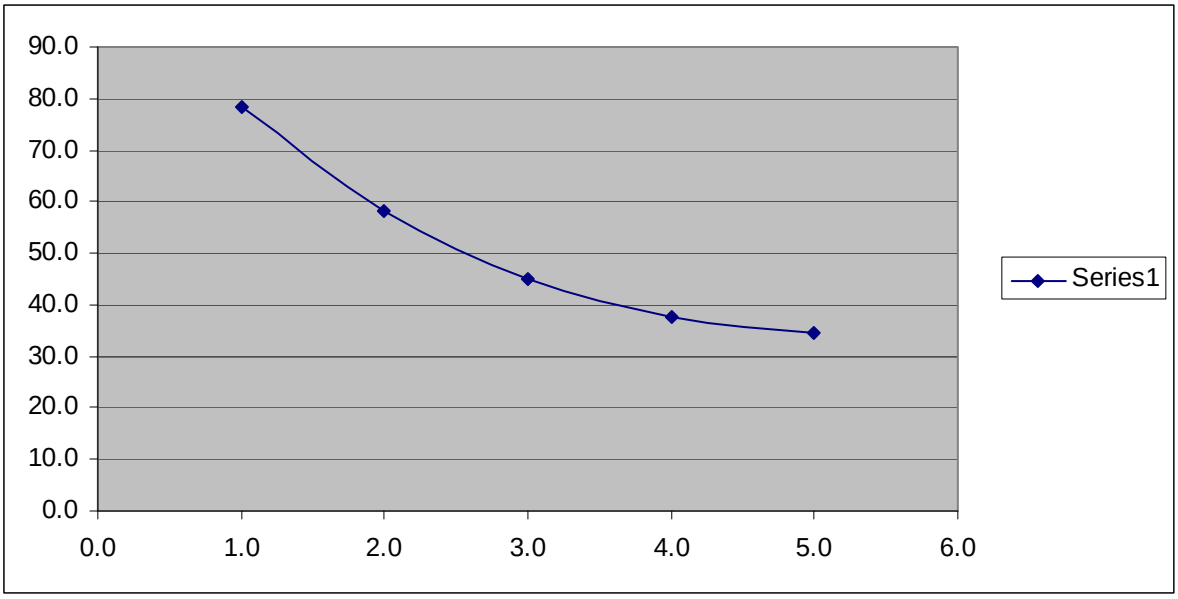
N = (dBV2 – dBV1)/(20*LOG(D2/D1))
N = (34.6 – 52.6)/(20 * LOG(5/2))
N = -2.0

FOR N= -2.0
PROPAGATION LOSS = -40.0dB TO CONVERT FROM 3 M TO 30 M

Figure 6: PROPAGATION LOSS MEASUREMENTS AND CALCULATIONS FOR THE SMALL UNIT 94012-250

A. MEASUREMENTS

TEST DISTANCE (meters)	METER READING (dBuV)
1	78.4
2	58.0
3	45.1
4	37.6
5	34.6

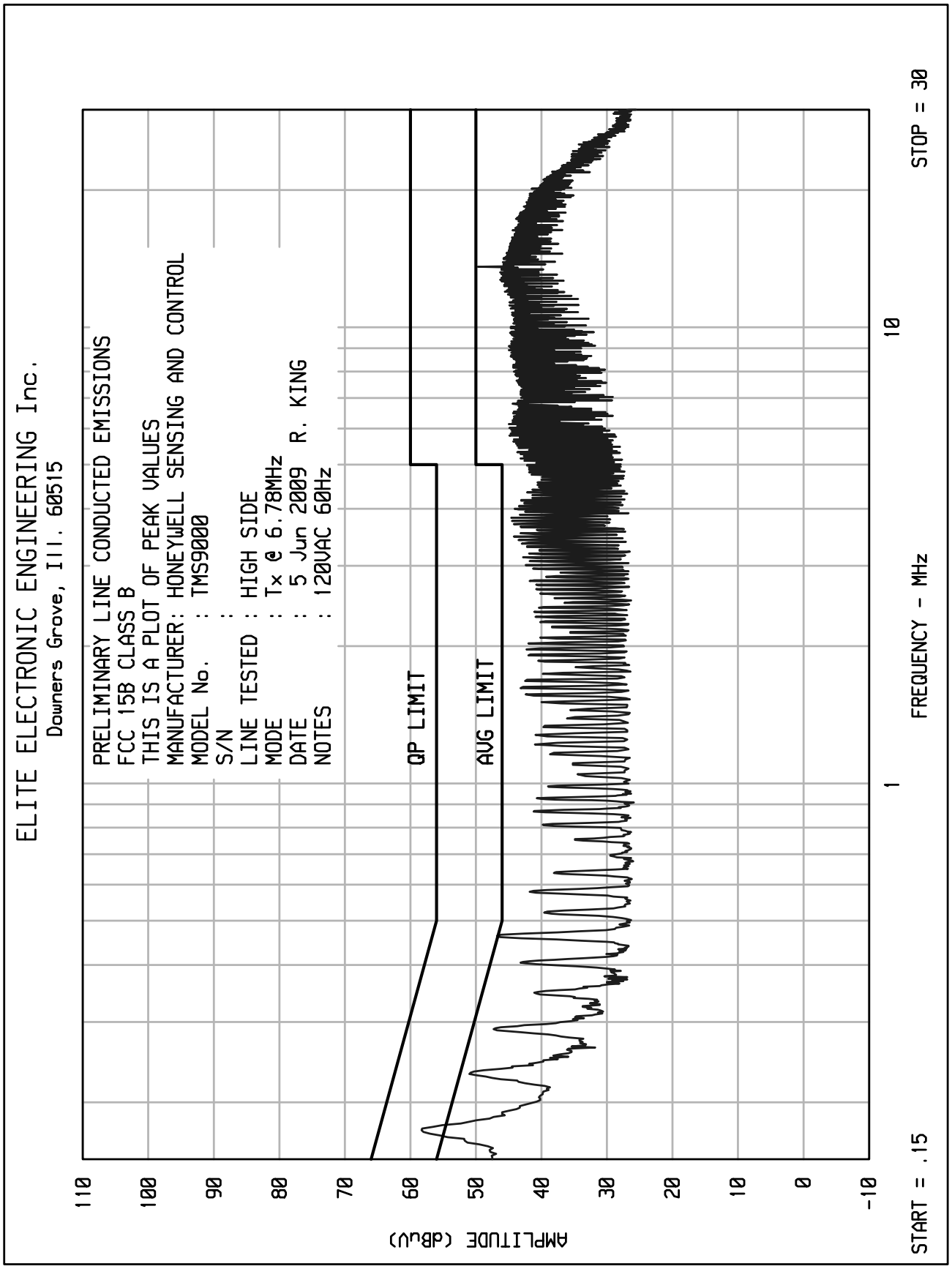


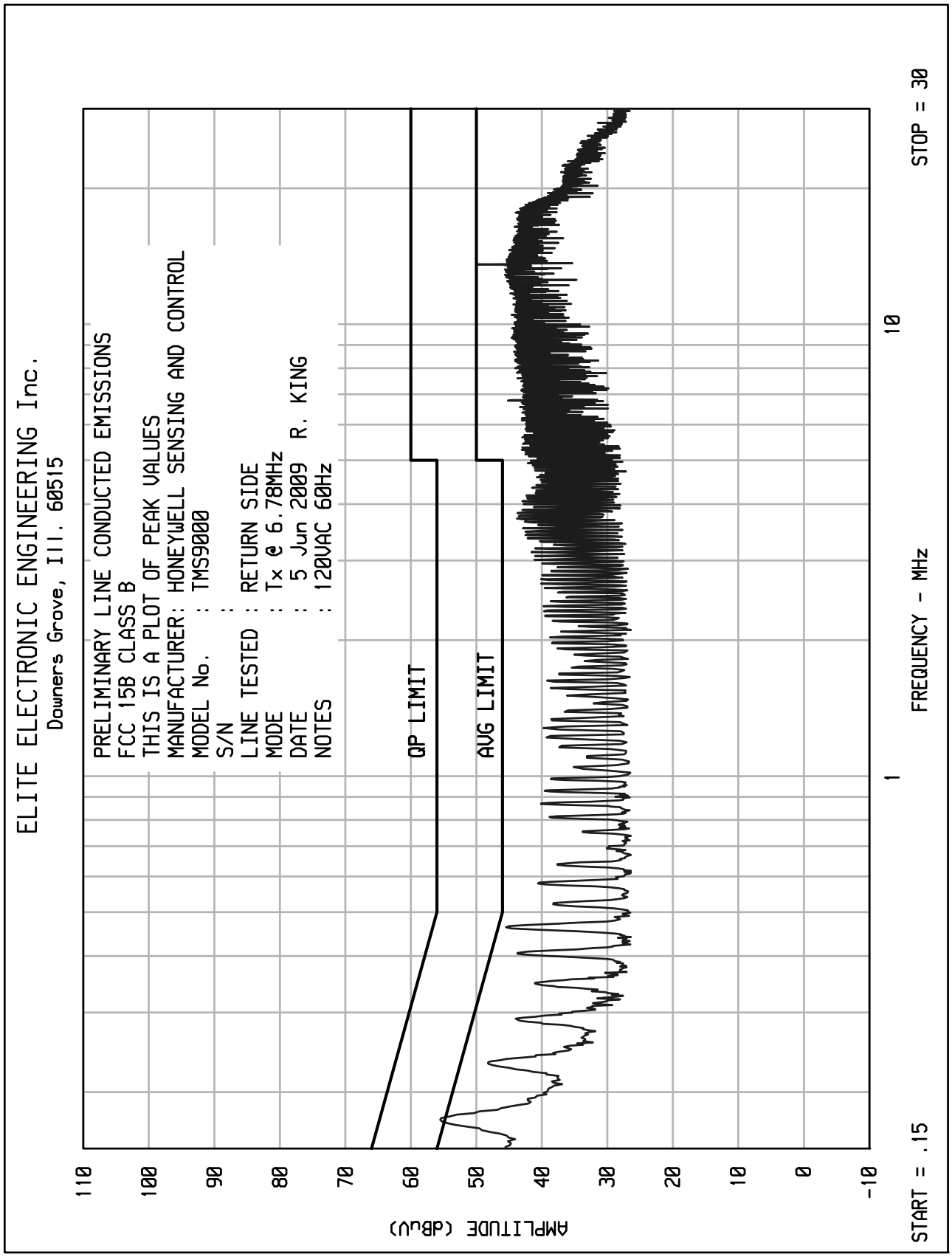
B. CALCULATIONS:

PROPAGATION LOSS = 20 * LOG (Dm/Dl)^N
WHERE : Dm = DISTANCE OF MEASUREMENT
: Dl = LIMIT DISTANCE
: N = SLOPE OF THE LINE

SOLVING FOR N USING READINGS AT 2 METERS AND 5 METERS:
N = (dBV2 – dBV1)/(20*LOG(D2/D1))
N = (34.6 – 45.1)/(20 * LOG(5/3))
N = -2.0

FOR N= -2.0
PROPAGATION LOSS = -40.0dB TO CONVERT FROM 3 M TO 30 M


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
FCC 15B CLASS B
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
S/N : :
LINE TESTED : HIGH SIDE
MODE : Tx @ 6.78MHz
DATE : 5 Jun 2009 R. KING
NOTES : 120VAC 60Hz
QP LIMIT
AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
FCC 15B CLASS B
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
S/N : :
LINE TESTED : RETURN SIDE
MODE : Tx @ 6.78MHz
DATE : 5 Jun 2009 R. KING
NOTES : 120VAC 60Hz
QP LIMIT
AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL : TMS9000
S/N : Large Unit 94015-4k
SPECIFICATION : FCC 15B CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : HIGH SIDE
MODE : Tx @ 6.78MHz
DATE : 5 Jun 2009
NOTES : 120VAC 60Hz
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.175	56.7	64.7	44.7	54.7	*
.291	45.1	60.5		50.5	
.407	41.5	57.7		47.7	
.465	45.7	56.6		46.6	
.811	38.3	56.0		46.0	
.869	39.8	56.0		46.0	
1.563	41.0	56.0		46.0	
1.621	41.9	56.0		46.0	
1.679	41.3	56.0		46.0	
2.026	40.5	56.0		46.0	
2.777	39.3	56.0		46.0	
3.760	43.2	56.0		46.0	
3.818	43.2	56.0		46.0	
4.049	42.3	56.0		46.0	
5.785	43.5	60.0		50.0	
5.958	43.7	60.0		50.0	
6.131	43.6	60.0		50.0	
6.305	43.1	60.0		50.0	
8.617	43.5	60.0		50.0	
8.907	43.7	60.0		50.0	
9.947	43.2	60.0		50.0	
10.005	43.4	60.0		50.0	
11.162	43.0	60.0		50.0	
12.723	45.0	60.0		50.0	
13.562	49.0	60.0		50.0	
15.035	43.2	60.0		50.0	
15.094	43.4	60.0		50.0	
17.291	41.5	60.0		50.0	
17.753	41.0	60.0		50.0	
18.389	40.3	60.0		50.0	
20.123	38.6	60.0		50.0	
20.587	38.0	60.0		50.0	
21.916	35.9	60.0		50.0	
23.360	32.7	60.0		50.0	
26.772	27.4	60.0		50.0	

Checked BY Richard E. King :

Richard E. King

* QP EXCEEDS AVG LIMIT, SEE DATA

ELITE ELECTRONIC ENGINEERING CO.

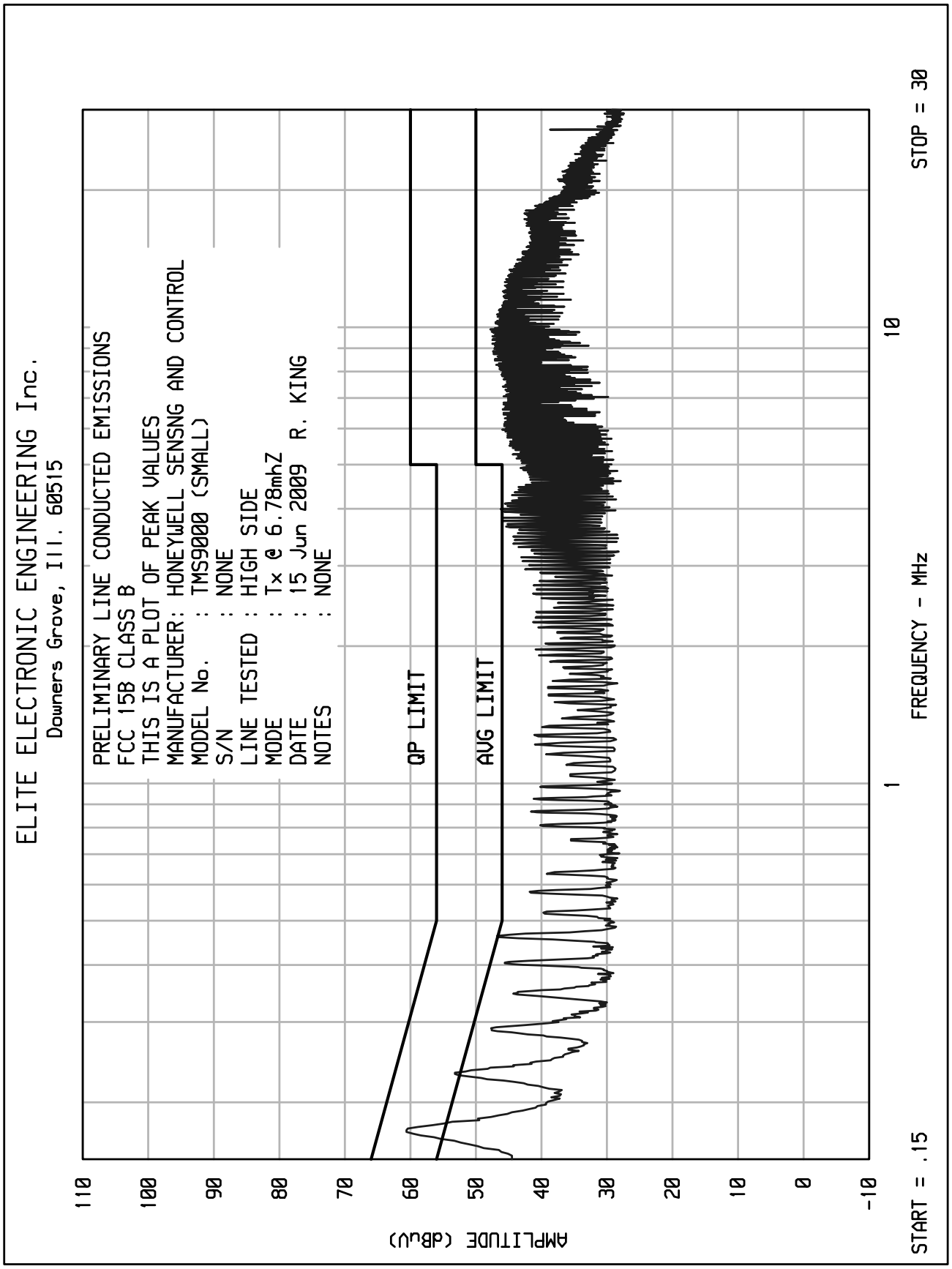
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL : TMS9000
S/N : Large Unit 94015-4k
SPECIFICATION : FCC 15B CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : RETURN SIDE
MODE : Tx @ 6.78MHz
DATE : 5 Jun 2009
NOTES : 120VAC 60Hz
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

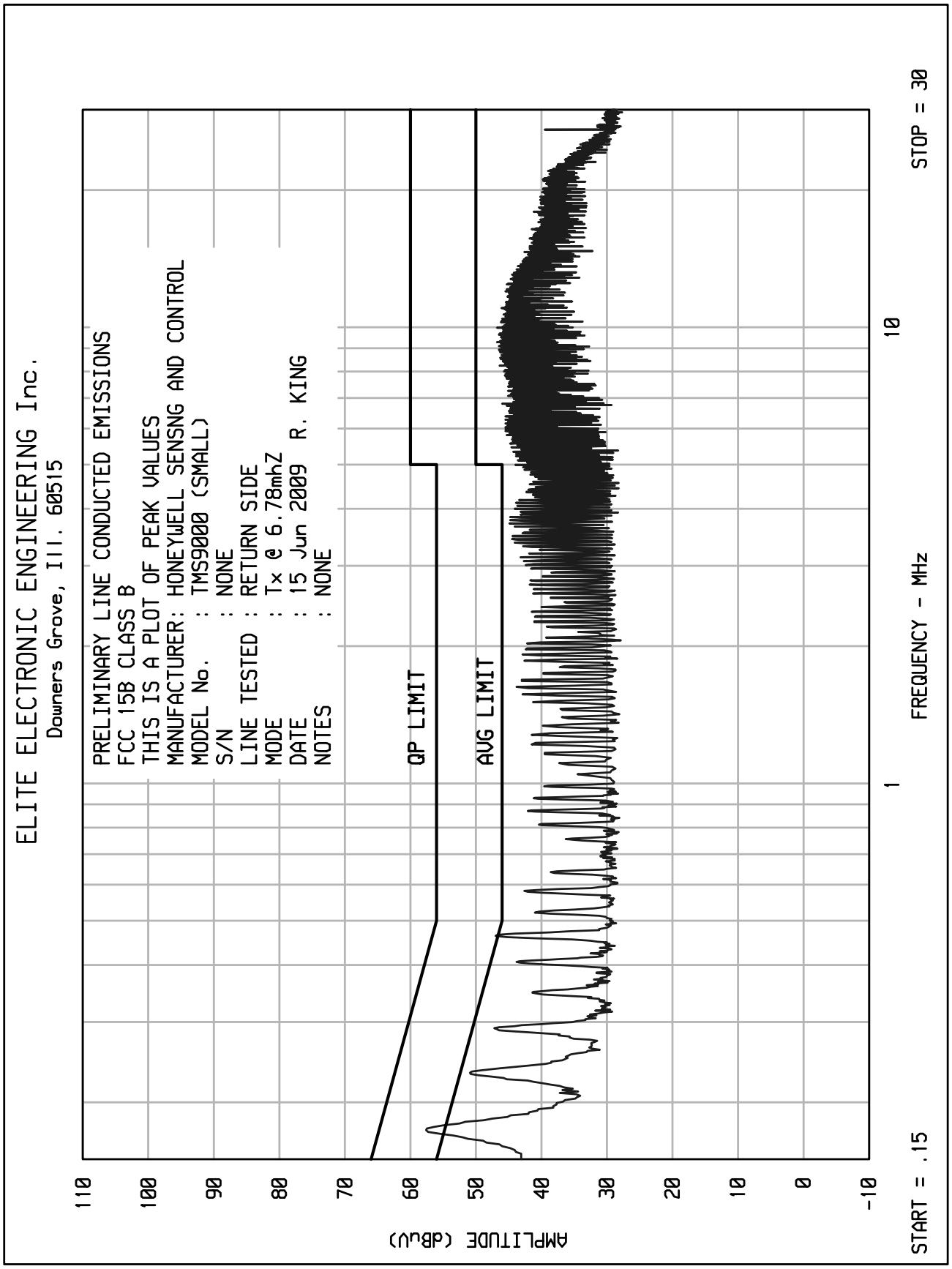
FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.176	55.8	64.7	44.8	54.7	*
.291	42.5	60.5		50.5	
.407	42.6	57.7		47.7	
.465	45.3	56.6		46.6	
.812	37.4	56.0		46.0	
.870	39.3	56.0		46.0	
1.276	39.0	56.0		46.0	
2.318	39.0	56.0		46.0	
2.665	39.0	56.0		46.0	
2.956	39.0	56.0		46.0	
3.708	43.4	56.0		46.0	
3.823	43.4	56.0		46.0	
4.055	42.5	56.0		46.0	
5.272	42.5	60.0		50.0	
5.677	41.7	60.0		50.0	
6.720	42.4	60.0		50.0	
6.779	45.8	60.0		50.0	
7.995	43.2	60.0		50.0	
8.749	43.6	60.0		50.0	
9.329	44.3	60.0		50.0	
10.488	43.5	60.0		50.0	
11.646	44.3	60.0		50.0	
12.863	45.1	60.0		50.0	
13.560	51.8	60.0	49.5	50.0	*
15.354	43.2	60.0		50.0	
15.587	43.4	60.0		50.0	
17.556	42.8	60.0		50.0	
17.672	42.6	60.0		50.0	
18.368	41.1	60.0		50.0	
20.107	35.3	60.0		50.0	
20.630	35.3	60.0		50.0	
21.730	34.8	60.0		50.0	
23.700	31.9	60.0		50.0	
26.948	27.8	60.0		50.0	

Checked BY Richard E. King :

Richard E. King

* QP EXCEEDS AVG LIMIT, SEE DATA


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
FCC 15B CLASS B
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: HONEYWELL SENSNG AND CONTROL
MODEL No. : TMS9000 (SMALL)
S/N : NONE
LINE TESTED : HIGH SIDE
MODE : Tx @ 6.78mhZ
DATE : 15 Jun 2009 R. KING
NOTES : NONE
QP LIMIT
AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = .15
1
10
STOP = 30
FREQUENCY - MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
PRELIMINARY LINE CONDUCTED EMISSIONS
FCC 15B CLASS B
THIS IS A PLOT OF PEAK VALUES
MANUFACTURER: HONEYWELL SENSNG AND CONTROL
MODEL No. : TMS9000 (SMALL)
S/N : NONE
LINE TESTED : RETURN SIDE
MODE : Tx @ 6.78mhZ
DATE : 15 Jun 2009 R. KING
NOTES : NONE
QP LIMIT
AVG LIMIT
AMPLITUDE (dBuV)
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = .15
1
10
STOP = 30
FREQUENCY - MHz

ELITE ELECTRONIC ENGINEERING CO.

MANUFACTURER : HONEYWELL SENSNG AND CONTROL
MODEL : TMS9000 (SMALL)
S/N : NONE
SPECIFICATION : FCC 15B CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : HIGH SIDE
MODE : Tx @ 6.78mhZ
DATE : 15 Jun 2009
NOTES : NONE
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.176	58.4	64.7	45.3	54.7	*
.292	45.0	60.5		50.5	
.408	43.7	57.7		47.7	
.466	45.5	56.6		46.6	
.813	38.1	56.0		46.0	
.871	39.8	56.0		46.0	
1.276	39.6	56.0		46.0	
2.260	39.3	56.0		46.0	
2.954	39.4	56.0		46.0	
3.996	44.1	56.0		46.0	
4.113	43.8	56.0		46.0	
5.734	42.5	60.0		50.0	
5.965	44.3	60.0		50.0	
6.601	44.1	60.0		50.0	
7.470	44.6	60.0		50.0	
8.454	45.7	60.0		50.0	
9.611	46.6	60.0		50.0	
9.901	46.2	60.0		50.0	
10.191	45.4	60.0		50.0	
10.538	45.2	60.0		50.0	
11.985	44.8	60.0		50.0	
12.564	43.8	60.0		50.0	
13.374	43.0	60.0		50.0	
15.052	40.2	60.0		50.0	
15.516	39.8	60.0		50.0	
17.253	39.9	60.0		50.0	
17.831	39.9	60.0		50.0	
18.467	38.3	60.0		50.0	
21.072	33.6	60.0		50.0	
22.578	32.3	60.0		50.0	
27.123	37.5	60.0		50.0	

Checked BY Richard E. King :

Richard E. King

* QP EXCEEDS AVG LIMIT, SEE DATA

ELITE ELECTRONIC ENGINEERING CO.

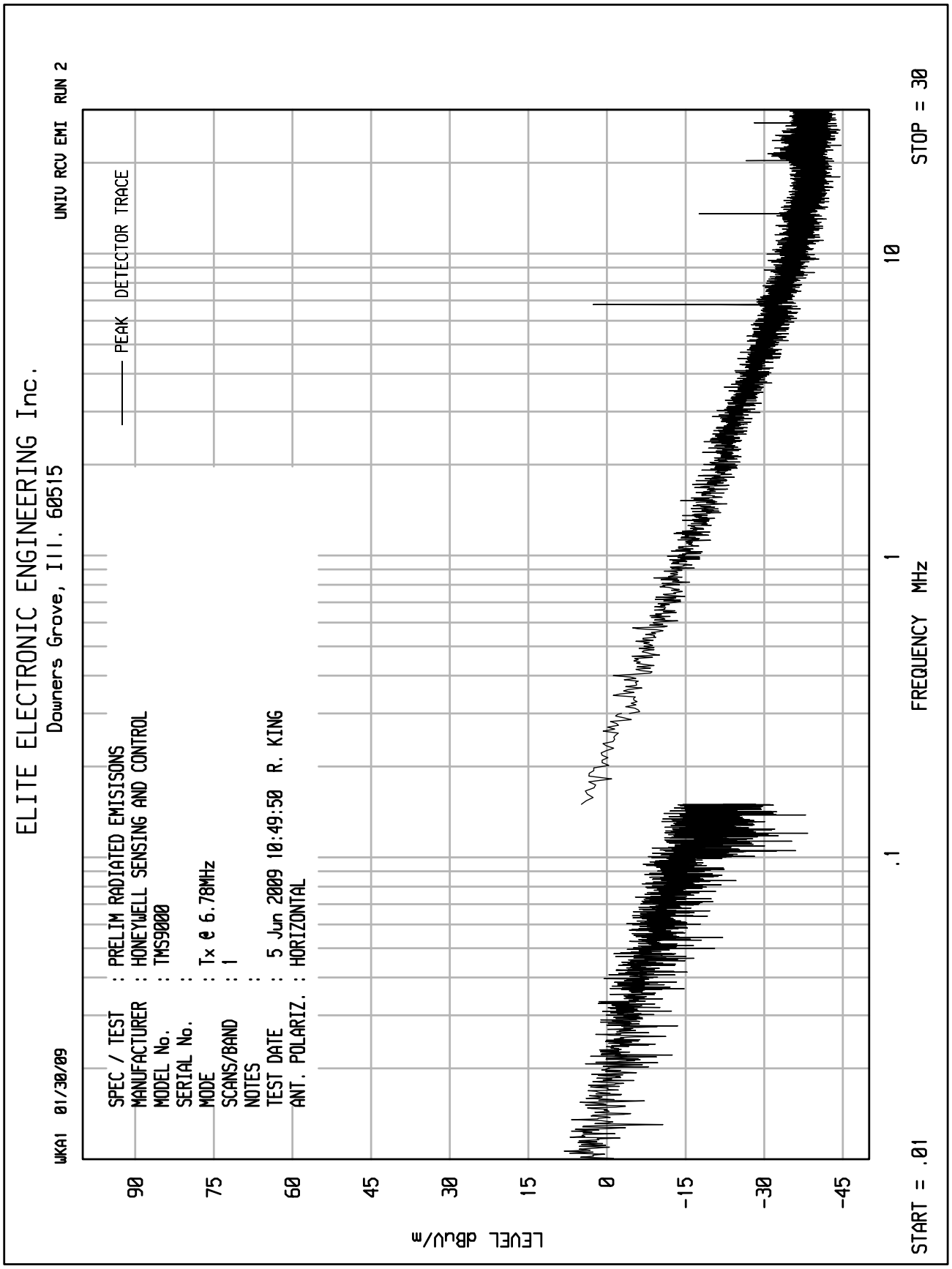
MANUFACTURER : HONEYWELL SENSNG AND CONTROL
MODEL : TMS9000 (SMALL)
S/N : NONE
SPECIFICATION : FCC 15B CLASS B
TEST : LINE CONDUCTED EMISSIONS
LINE TESTED : RETURN SIDE
MODE : Tx @ 6.78mhZ
DATE : 15 Jun 2009
NOTES : NONE
RECEIVER : HP 8566 w/ HP85650A QP ADAPTOR
VALUES MEASURED WITH QP DETECTOR USING 9kHz BANDWIDTH

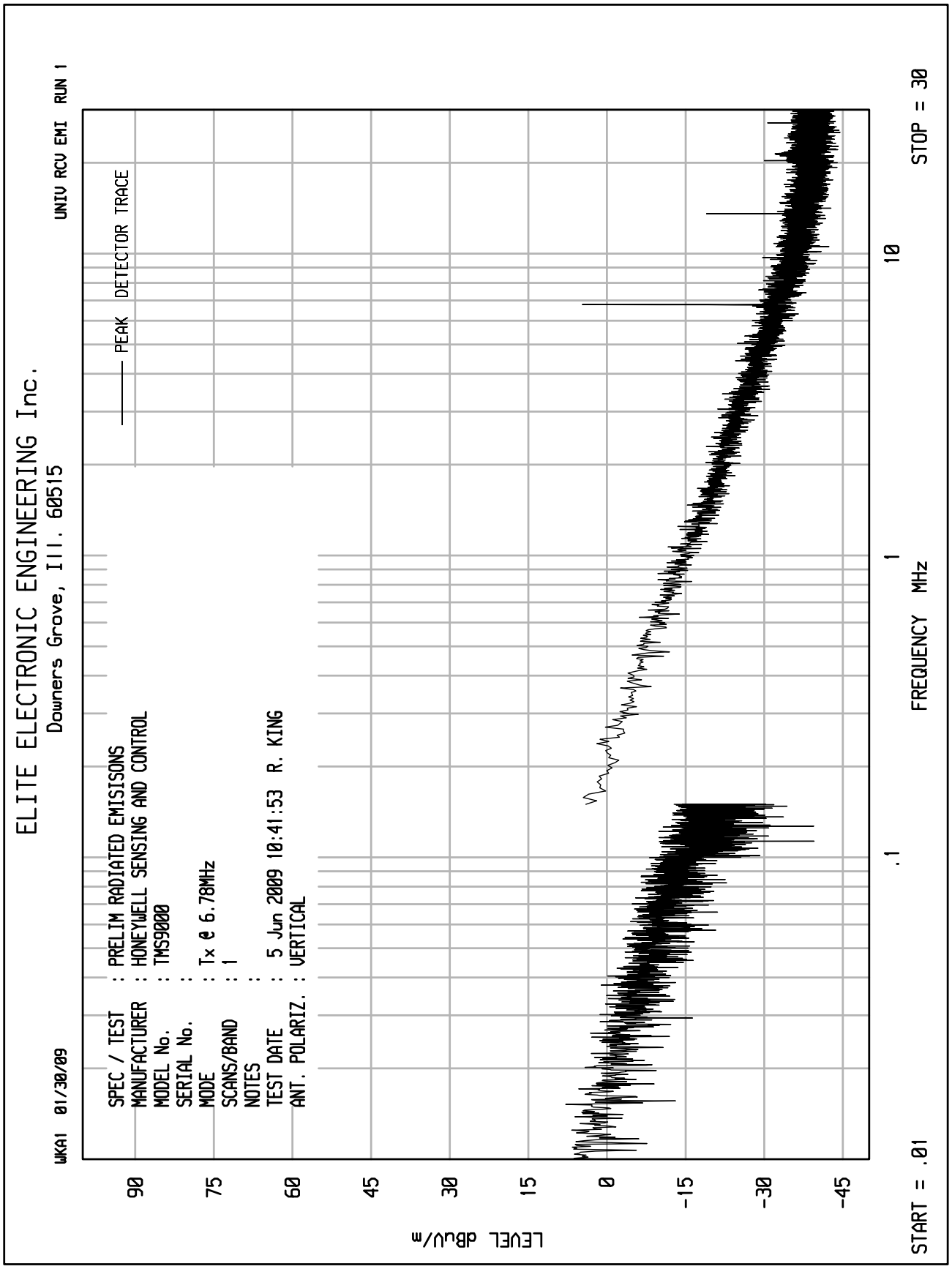
FREQUENCY MHz	METER RDG. dBuV	QP LIMIT dBuV	AVG RDG dBuV	AVG LIMIT dBuV	NOTES
.177	56.1	64.6	44.0	54.6	*
.292	44.9	60.5		50.5	
.408	41.8	57.7		47.7	
.466	45.7	56.6		46.6	
.814	38.4	56.0		46.0	
.872	39.9	56.0		46.0	
1.626	42.2	56.0		46.0	
1.683	41.4	56.0		46.0	
2.379	39.2	56.0		46.0	
2.727	39.5	56.0		46.0	
3.712	43.2	56.0		46.0	
3.771	43.4	56.0		46.0	
4.002	42.5	56.0		46.0	
5.858	44.3	60.0		50.0	
5.916	44.4	60.0		50.0	
6.784	43.8	60.0		50.0	
7.771	44.1	60.0		50.0	
8.235	44.9	60.0		50.0	
8.931	45.6	60.0		50.0	
9.278	45.6	60.0		50.0	
10.264	44.8	60.0		50.0	
10.728	44.9	60.0		50.0	
12.004	43.9	60.0		50.0	
12.641	43.2	60.0		50.0	
13.395	42.3	60.0		50.0	
15.076	39.7	60.0		50.0	
15.192	39.6	60.0		50.0	
17.918	37.6	60.0		50.0	
18.264	37.2	60.0		50.0	
19.019	37.1	60.0		50.0	
20.062	36.9	60.0		50.0	
22.034	35.7	60.0		50.0	
22.555	34.5	60.0		50.0	
27.123	37.9	60.0		50.0	

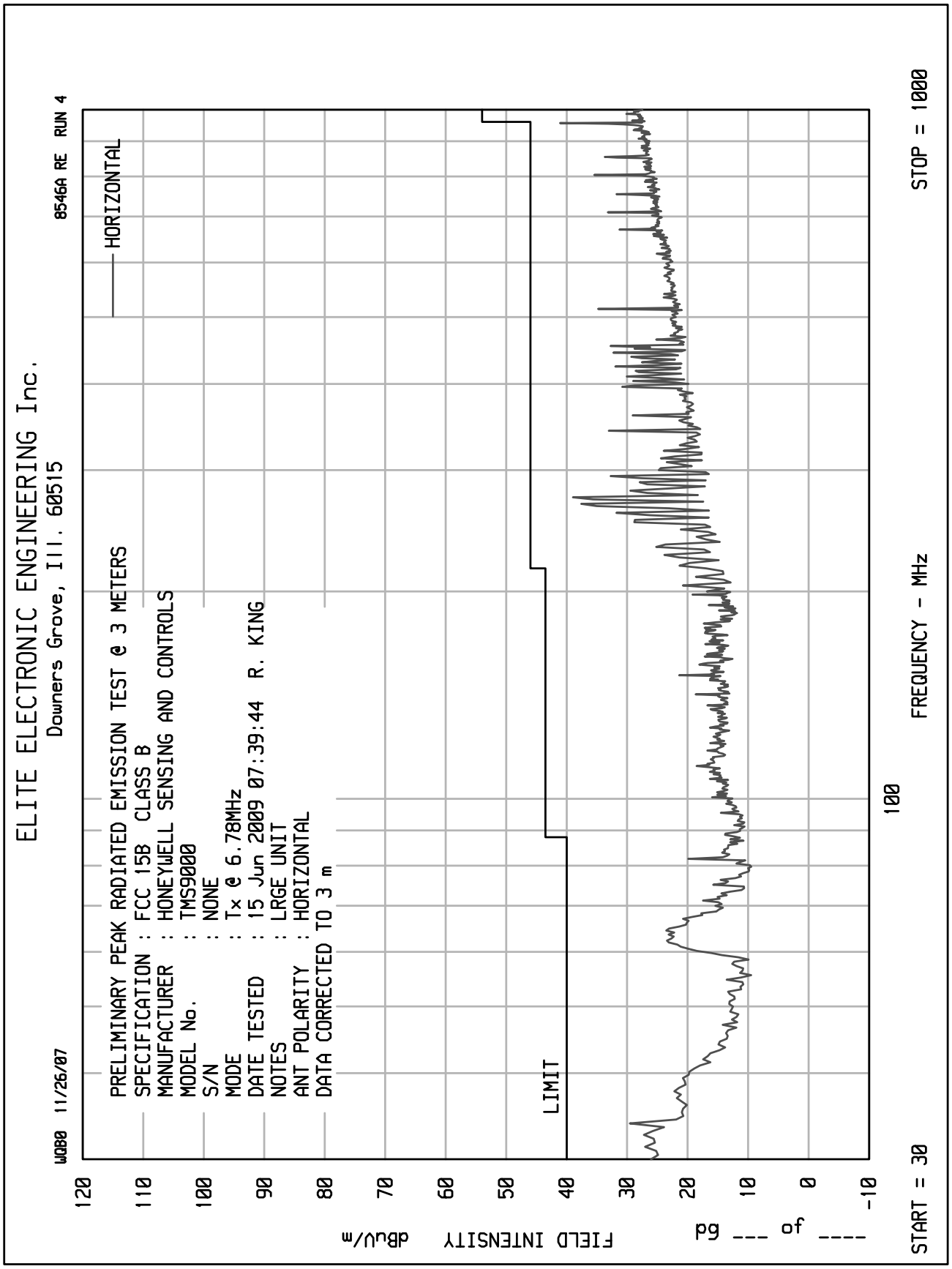
Checked BY Richard E. King :

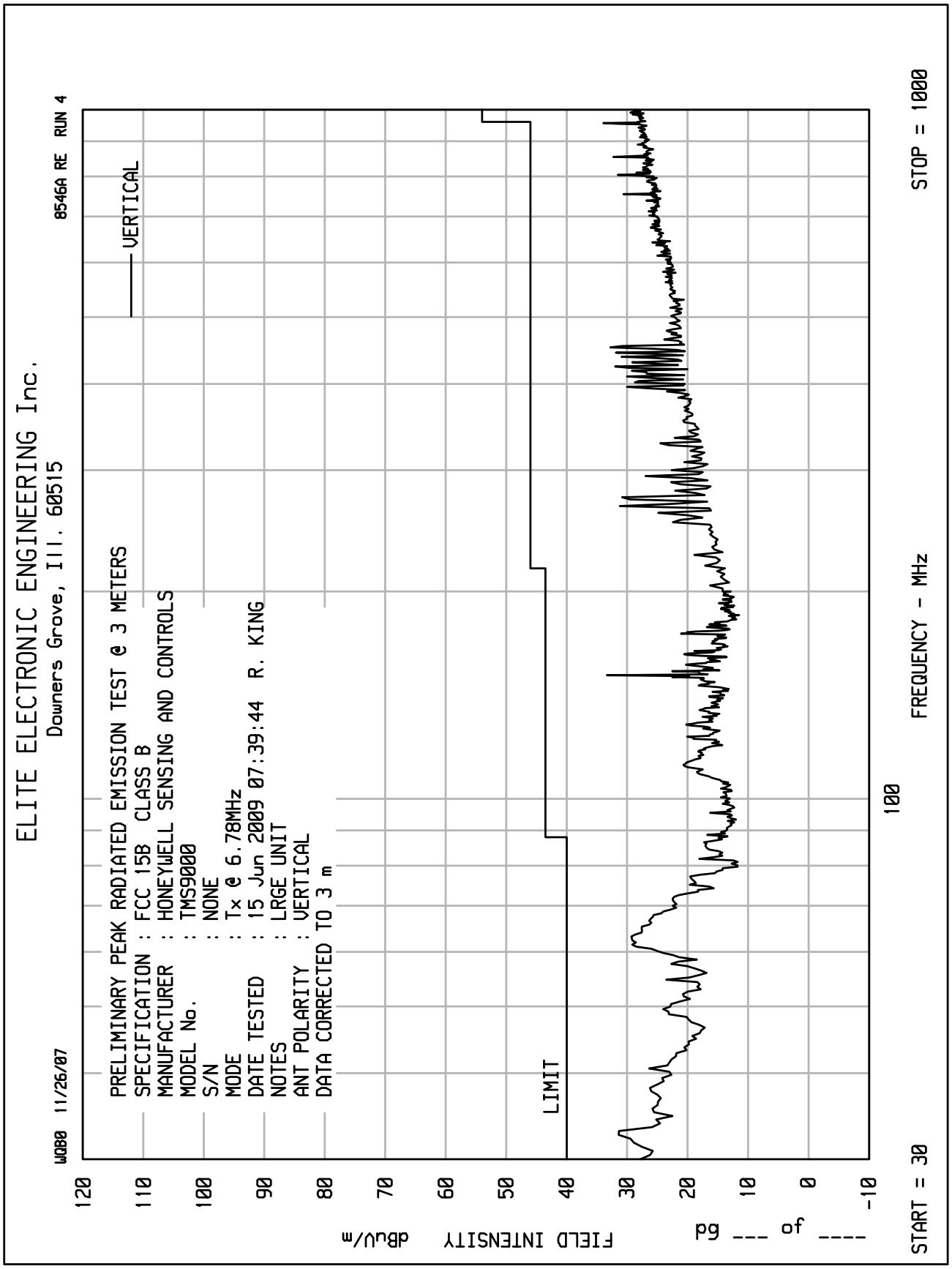
Richard E. King

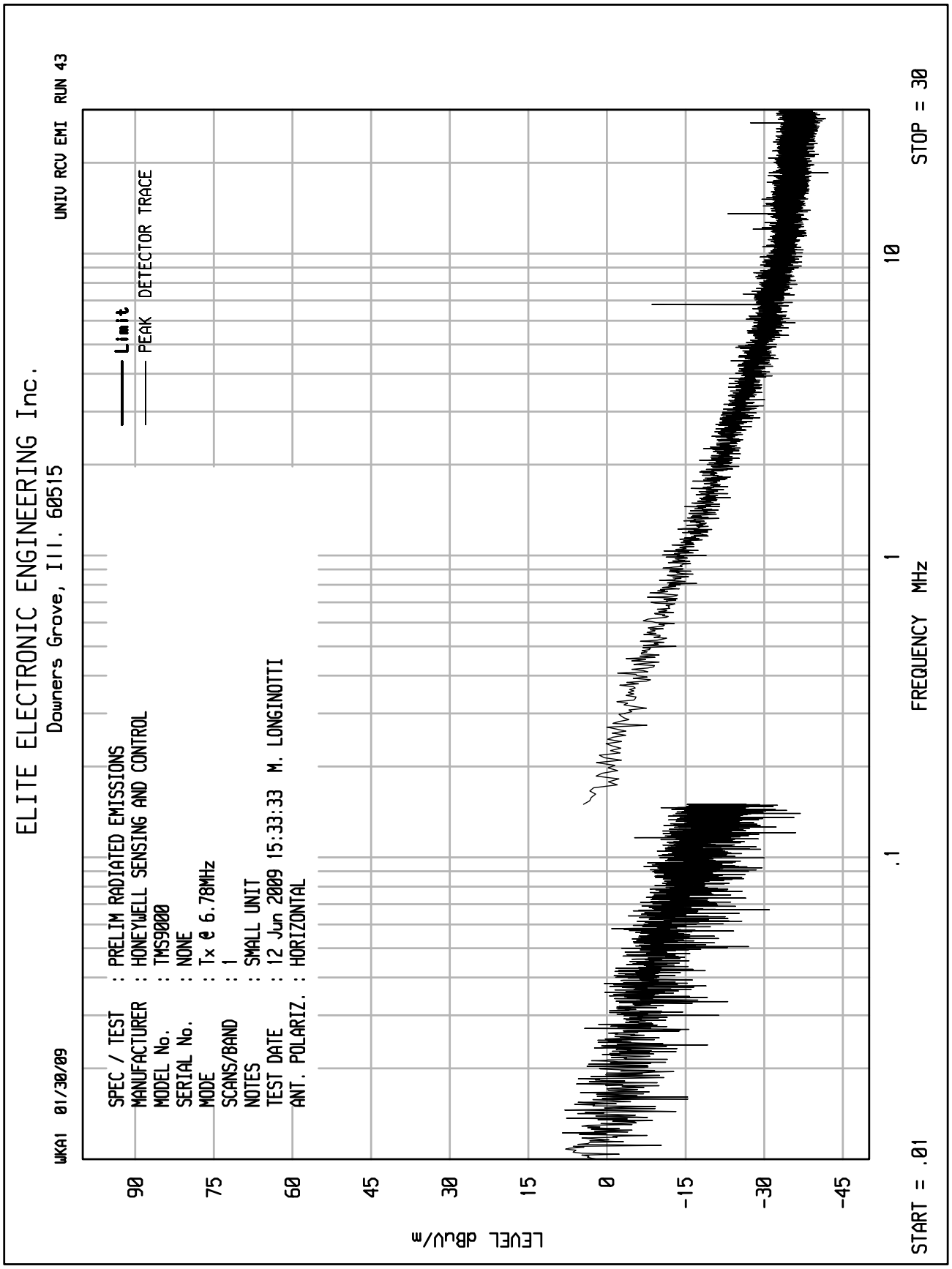
* QP EXCEEDS AVG LIMIT, SEE DATA

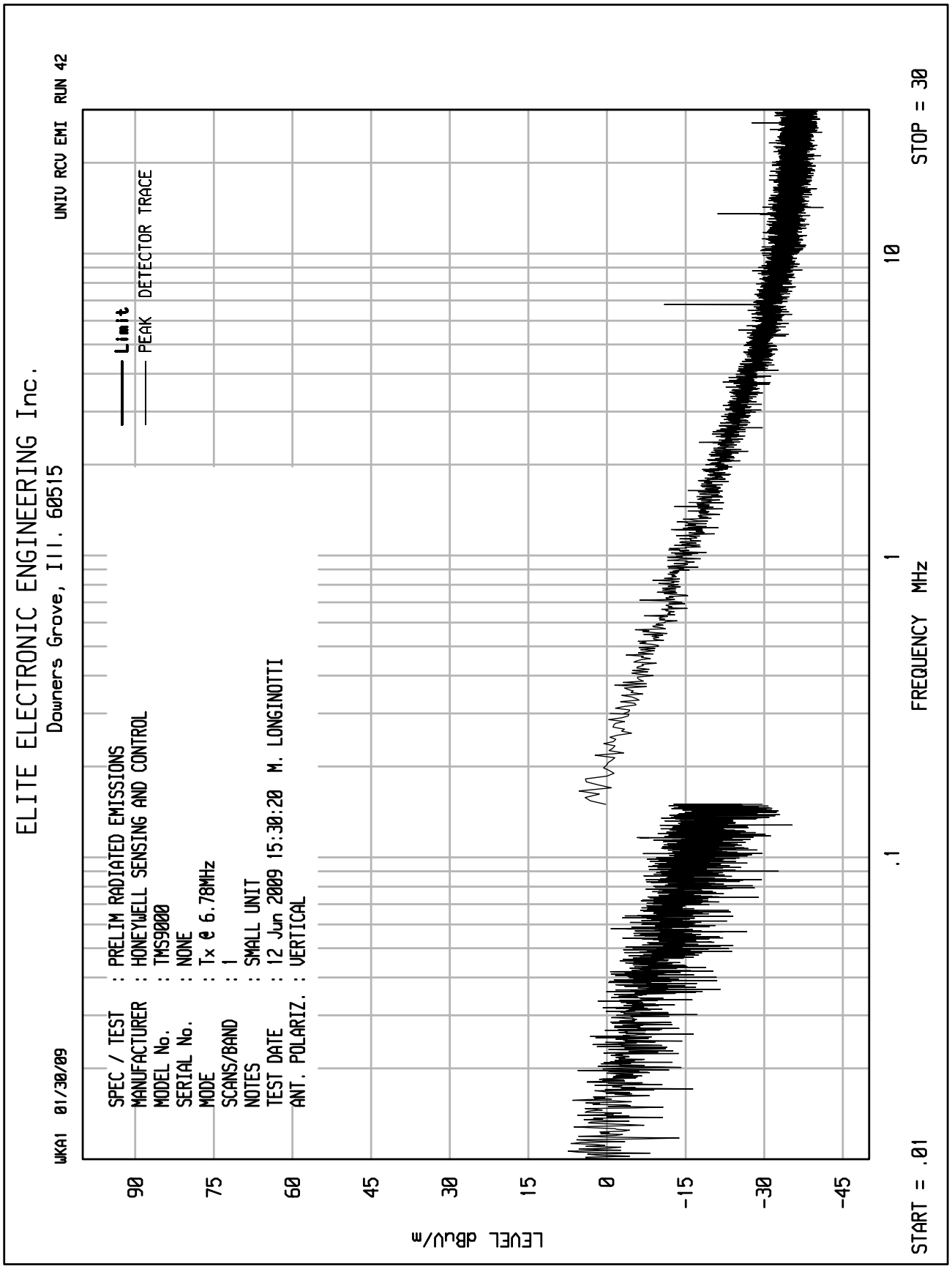

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 01/30/09
SPEC / TEST : PRELIM RADIATED EMISISONS
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
SERIAL No. :
MODE : Tx @ 6.78MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 5 Jun 2009 10:49:50 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
90
75
60
45
30
15
0
-15
-30
-45
START = .01
.1
1
10
STOP = 30
FREQUENCY MHz

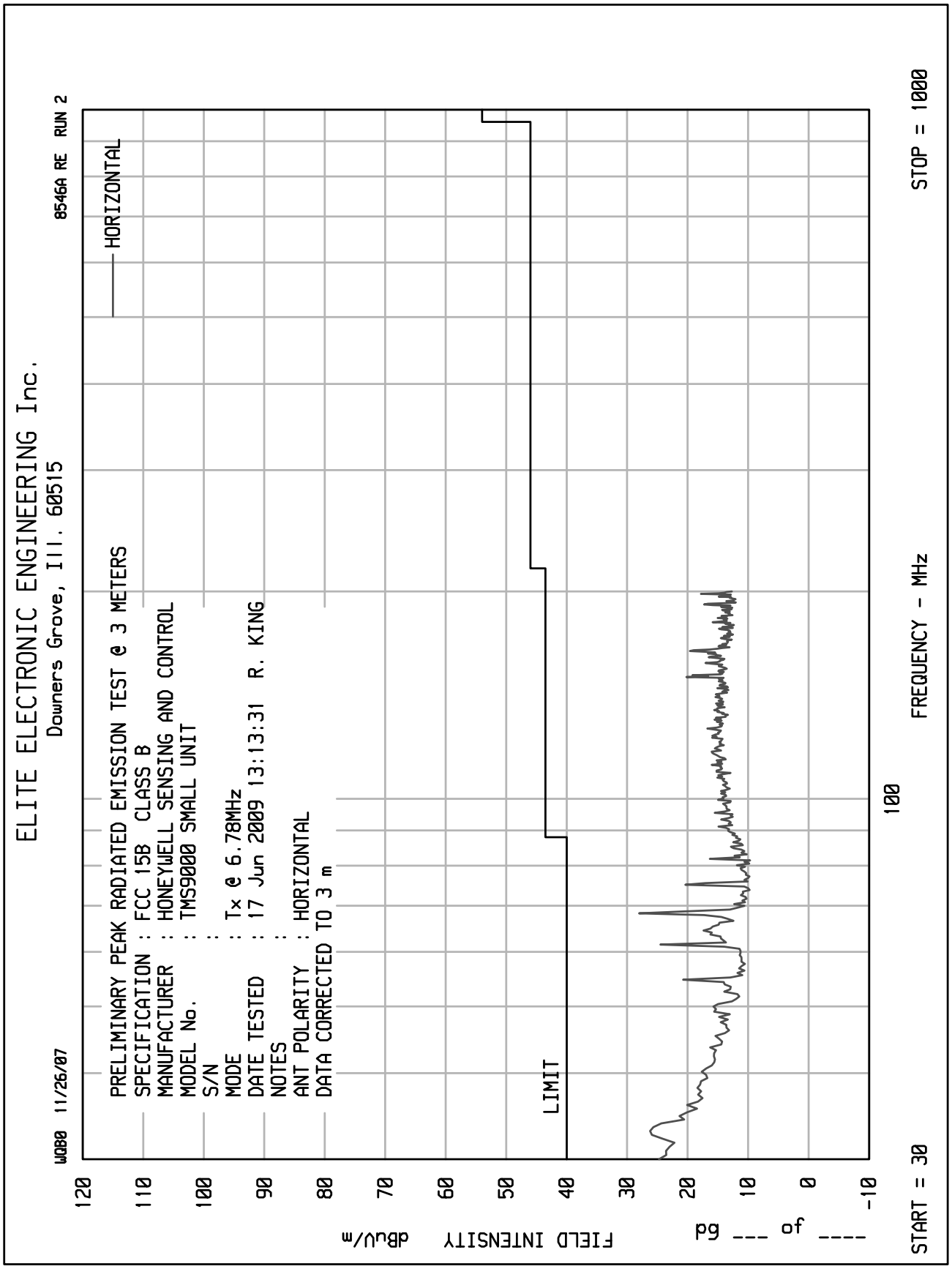

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 01/30/09
SPEC / TEST : PRELIM RADIATED EMISISONS
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
SERIAL No. :
MODE : Tx @ 6.78MHz
SCANS/BAND : 1
NOTES :
TEST DATE : 5 Jun 2009 10:41:53 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
90
75
60
45
30
15
0
-15
-30
-45
START = .01
.1
1
10
STOP = 30
FREQUENCY MHz

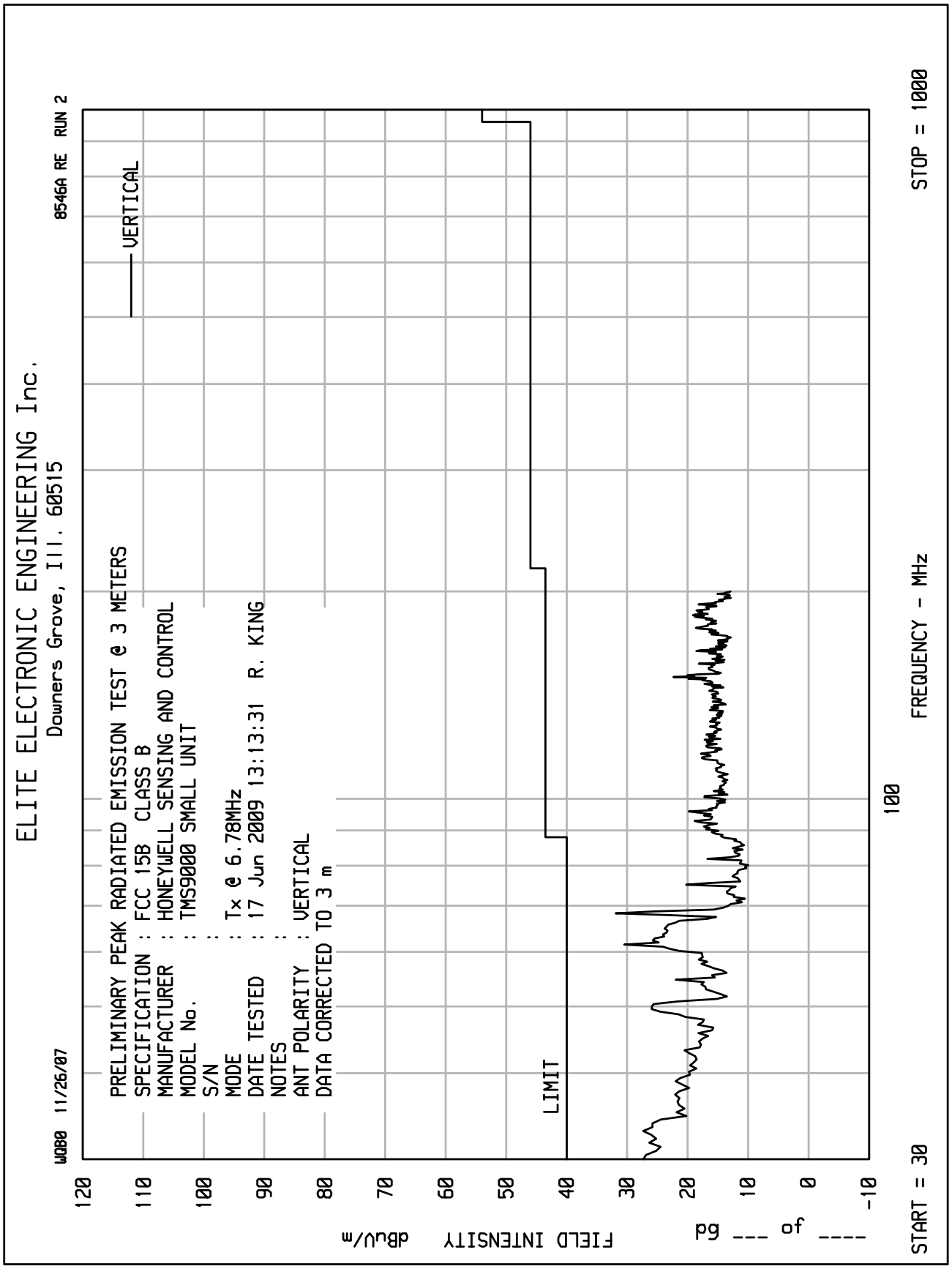

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 4
WQ80 11/26/07
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROLS
MODEL No. : TMS9000
S/N : NONE
MODE : Tx @ 6.78MHz
DATE TESTED : 15 Jun 2009 07:39:44 R. KING
NOTES : LRGE UNIT
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
HORIZONTAL
LIMIT
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = 30
100
FREQUENCY - MHz
STOP = 1000
pg ___ of ____


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 4
WQ80 11/26/07
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROLS
MODEL No. : TMS9000
S/N : NONE
MODE : Tx @ 6.78MHz
DATE TESTED : 15 Jun 2009 07:39:44 R. KING
NOTES : LRGE UNIT
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
VERTICAL
LIMIT
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = 30
100
FREQUENCY - MHz
STOP = 1000
pg --- of ----


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 43
WKA1 01/30/09
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
SERIAL No. : NONE
MODE : Tx @ 6.78MHz
SCANS/BAND : 1
NOTES : SMALL UNIT
TEST DATE : 12 Jun 2009 15:33:33 M. LONGINOTTI
ANT. POLARIZ. : HORIZONTAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
90
75
60
45
30
15
0
-15
-30
-45
START = .01
.1
1
10
STOP = 30
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 42
WKA1 01/30/09
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000
SERIAL No. : NONE
MODE : Tx @ 6.78MHz
SCANS/BAND : 1
NOTES : SMALL UNIT
TEST DATE : 12 Jun 2009 15:30:20 M. LONGINOTTI
ANT. POLARIZ. : VERTICAL
Limit
PEAK DETECTOR TRACE
LEVEL dBuV/m
90
75
60
45
30
15
0
-15
-30
-45
START = .01
.1
1
10
STOP = 30
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 2
WQ80 11/26/07
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000 SMALL UNIT
S/N : :
MODE : Tx @ 6.78MHz
DATE TESTED : 17 Jun 2009 13:13:31 R. KING
NOTES : :
ANT POLARITY : HORIZONTAL
DATA CORRECTED TO 3 m
HORIZONTAL
LIMIT
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = 30
100
FREQUENCY - MHz
STOP = 1000
pg --- of ----


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
8546A RE RUN 2
WQ80 11/26/07
PRELIMINARY PEAK RADIATED EMISSION TEST @ 3 METERS
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL No. : TMS9000 SMALL UNIT
S/N : :
MODE : Tx @ 6.78MHz
DATE TESTED : 17 Jun 2009 13:13:31 R. KING
NOTES : :
ANT POLARITY : VERTICAL
DATA CORRECTED TO 3 m
VERTICAL
LIMIT
FIELD INTENSITY dBuV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
START = 30
100
FREQUENCY - MHz
STOP = 1000
pg --- of ----

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Large Unit 94015-4k
MODE : TRANSMIT @ 6.78MHz
DATE : June 5 through 15, 2009
TEST SPECIFICATION : FCC 15.223 RADIATED EMISSIONS
TEST DISTANCE : 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Dist. Corr. (dB)	Total dBuV/m at 30m/3m	Total uV/m at 30m/3m	Limit uV/m at 30m/3m	Margin (dB)
6.78	H	45.8	0.2	10.7	-40.0	16.7	6.9	15.0	-6.8
6.78	V	43.7	0.2	10.7	-40.0	14.6	5.4	15.0	-8.9
13.56	H	29.4	0.3	10.8	-40.0	0.5	1.1	30.0	-29.0
13.56	V	25.5	0.3	10.8	-40.0	-3.4	0.7	30.0	-32.9
20.34	H	11.0	0.4	10.3	-40.0	-18.3	0.1	30.0	-47.9
20.34	V	25.6	0.4	10.3	-40.0	-3.7	0.7	30.0	-33.3
27.12	H	10.3	0.4	8.9	-40.0	-20.4	0.1	30.0	-49.9
27.12	V	12.8	0.4	8.9	-40.0	-17.9	0.1	30.0	-47.5
33.90	H	4.6	0.5	17.6	0.0	22.7	13.6	100.0	-17.3
33.90	V	4.1	0.5	17.6	0.0	22.2	12.9	100.0	-17.8
40.68	H	2.8	0.5	14.0	0.0	17.3	7.4	100.0	-22.7
40.68	V	7.0	0.5	14.0	0.0	21.5	11.8	100.0	-18.5
47.46	H	4.3	0.5	10.6	0.0	15.4	5.9	100.0	-24.6
47.46	V	12.8	0.5	10.6	0.0	24.0	15.8	100.0	-16.0
54.24	H	6.6	0.7	8.0	0.0	15.4	5.9	100.0	-24.6
54.24	V	16.6	0.7	8.0	0.0	25.4	18.6	100.0	-14.6
61.02	H	8.5	0.7	6.5	0.0	15.7	6.1	100.0	-24.3
61.02	V	19.4	0.7	6.5	0.0	26.7	21.5	100.0	-13.3
67.80	H	7.5	0.7	6.5	0.0	14.6	5.4	100.0	-25.4
67.80	V	7.4	0.7	6.5	0.0	14.5	5.3	100.0	-25.5

All measurements were taken at a 3 meter test distance. The limit below 30MHz is given for a 30 meter test distance. A distance correction factor was used to convert the 3 meter reading to a 30 meter reading.

The fundamental was measured using an average detector. All other measurements were taken using a quasi-peak detector.

Checked BY Richard E. King :

Richard E. King

ETR No. 8546A
DATA SHEET TEST NO. 4

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROLS
MODEL NO. : TMS9000
SERIAL NO. : NONE
TEST MODE : Tx @ 6.78MHz
NOTES : LRGE UNIT
TEST DATE : 15 Jun 2009 07:39:44
TEST DISTANCE : 3 m (DATA EXTRAPOLATED TO 3 m)

FREQUENCY	QP READING	ANT FAC	CBL FAC	EXT ATTN	DIST FAC	TOTAL	QP LIMIT	AZ	ANT HT	POLAR
MHz	dBuV	dB	dB	dB	dB	dBuV/m	dBuV/m	deg	cm	
32.77	9.1	18.4	.5	0.0	0.0	28.0	40.0	90	120	V
62.25	19.3	6.6	.7	0.0	0.0	26.6	40.0	315	120	V
81.36	11.6	7.9	.9	0.0	0.0	20.4	40.0	225	200	H
112.21	3.8	11.9	1.0	0.0	0.0	16.6	43.5	90	120	V
126.69	-.5	12.4	1.0	0.0	0.0	12.9	43.5	90	120	V
150.16	-2.2	11.3	1.0	0.0	0.0	10.1	43.5	-0	120	V
173.41	2.6	10.1	1.0	0.0	0.0	13.7	43.5	45	120	V
257.65	15.5	13.3	1.3	0.0	0.0	30.1	46.0	315	200	H
271.21	24.0	13.5	1.4	0.0	0.0	39.0	46.0	135	120	H
450.00	13.0	17.2	1.6	0.0	0.0	31.8	46.0	315	340	V
510.16	-6.8	18.4	1.8	0.0	0.0	13.5	46.0	225	340	H
666.34	-5.8	20.3	2.2	0.0	0.0	16.7	46.0	225	340	H
713.16	-5.9	20.5	2.3	0.0	0.0	16.9	46.0	90	120	H
799.99	11.1	21.4	2.5	0.0	0.0	35.0	46.0	135	200	H
949.99	3.5	22.7	2.5	0.0	0.0	28.7	46.0	45	120	H

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Large Unit 94015-4k
MODE : TRANSMIT @ 6.78MHz
DATE : June 5 through 15, 2009
TEST SPECIFICATION : IC RSS 210 RADIATED EMISSIONS
TEST DISTANCE : 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Dist. Corr. (dB)	Total dBuV/m at 30m/3m	Total uV/m at 30m/3m	Limit dBuV/m at 30m/3m	Margin dB
6.78	H	45.8	0.2	10.7	-40.0	16.7	6.9	84.0	-67.3
6.78	V	43.7	0.2	10.7	-40.0	14.6	5.4	84.0	-69.4
13.56	H	29.4	0.3	10.8	-40.0	0.5	1.1	50.0	-49.5
13.56	V	25.5	0.3	10.8	-40.0	-3.4	0.7	50.0	-53.4
20.34	H	11.0	0.4	10.3	-40.0	-18.3	0.1	50.0	-68.3
20.34	V	25.6	0.4	10.3	-40.0	-3.7	0.7	50.0	-53.7
27.12	H	10.3	0.4	8.9	-40.0	-20.4	0.1	50.0	-70.4
27.12	V	12.8	0.4	8.9	-40.0	-17.9	0.1	50.0	-67.9
33.90	H	4.6	0.5	17.6	0.0	22.7	13.6	100.0	-77.3
33.90	V	4.1	0.5	17.6	0.0	22.2	12.9	100.0	-77.8
40.68	H	2.8	0.5	14.0	0.0	17.3	7.4	100.0	-22.7
40.68	V	7.0	0.5	14.0	0.0	21.5	11.8	100.0	-18.5
47.46	H	4.3	0.5	10.6	0.0	15.4	5.9	100.0	-24.6
47.46	V	12.8	0.5	10.6	0.0	24.0	15.8	100.0	-16.0
54.24	H	6.6	0.7	8.0	0.0	15.4	5.9	100.0	-24.6
54.24	V	16.6	0.7	8.0	0.0	25.4	18.6	100.0	-14.6
61.02	H	8.5	0.7	6.5	0.0	15.7	6.1	100.0	-24.3
61.02	V	19.4	0.7	6.5	0.0	26.7	21.5	100.0	-13.3
67.80	H	7.5	0.7	6.5	0.0	14.6	5.4	100.0	-25.4
67.80	V	7.4	0.7	6.5	0.0	14.5	5.3	100.0	-25.5

All measurements were taken at a 3 meter test distance. The limit below 30MHz is given for a 30 meter test distance. A distance correction factor was used to convert the 3 meter reading to a 30 meter reading.

The fundamental was measured using an average detector. All other measurements were taken using a quasi-peak detector.

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Small Unit 94012-250
MODE : TRANSMIT @ 6.78MHz
DATE : June 5 through 15, 2009
TEST SPECIFICATION : FCC 15.223 RADIATED EMISSIONS
TEST DISTANCE : 3 METERS

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Dist. Corr. (dB)	Total dBuV/m at 30m/3m	Total uV/m at 30m/3m	Limit uV/m at 30m/3m	Margin (dB)
6.78	H	45.1	0.2	10.7	-40.0	16.0	6.3	15.0	-7.5
6.78	V	38.3	0.2	10.7	-40.0	9.2	2.9	15.0	-14.3
13.56	H	26.8	0.3	10.8	-40.0	-2.1	0.8	30.0	-31.6
13.56	V	26.3	0.3	10.8	-40.0	-2.6	0.7	30.0	-32.2
20.34	H	19.4	0.4	10.3	-40.0	-9.9	0.3	30.0	-39.5
20.34	V	19.0	0.4	10.3	-40.0	-10.3	0.3	30.0	-39.9
27.12	H	23.2	0.4	8.9	-40.0	-7.5	0.4	30.0	-37.1
27.12	V	21.2	0.4	8.9	-40.0	-9.5	0.3	30.0	-39.1
33.90	H	4.7	0.5	17.6	0.0	22.8	13.7	100.0	-17.2
33.90	V	6.8	0.5	17.6	0.0	24.9	17.6	100.0	-15.1
40.68	H	3.0	0.5	14.0	0.0	17.5	7.5	100.0	-22.5
40.68	V	10.0	0.5	14.0	0.0	24.5	16.8	100.0	-15.5
47.46	H	6.3	0.5	10.6	0.0	17.5	7.5	100.0	-22.5
47.46	V	19.3	0.5	10.6	0.0	30.4	33.3	100.0	-9.6
54.24	H	7.6	0.7	8.0	0.0	16.3	6.6	100.0	-23.7
54.24	V	17.9	0.7	8.0	0.0	26.6	21.4	100.0	-13.4
61.02	H	12.0	0.7	6.5	0.0	19.2	9.1	100.0	-20.8
61.02	V	22.5	0.7	6.5	0.0	29.7	30.6	100.0	-10.3
67.80	H	17.7	0.7	6.5	0.0	24.8	17.5	100.0	-15.2
67.80	V	28.5	0.7	6.5	0.0	35.7	60.8	100.0	-4.3

All measurements were taken at a 3 meter test distance. The limit below 30MHz is given for a 30 meter test distance. A distance correction factor was used to convert the 3 meter reading to a 30 meter reading.

The fundamental was measured using an average detector. All other measurements were taken using a quasi-peak detector.

Checked BY Richard E. King :

Richard E. King

ETR No. 8546A
DATA SHEET TEST NO. 2

RADIATED QP EMISSION MEASUREMENTS in a 3 m SEMI-ANECHOIC ROOM
SPECIFICATION : FCC 15B CLASS B
MANUFACTURER : HONEYWELL SENSING AND CONTROL
MODEL NO. : TMS9000 SMALL UNIT
SERIAL NO. :
TEST MODE : Tx @ 6.78MHz
NOTES :
TEST DATE : 17 Jun 2009 13:13:31
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
32.91	2.2	18.4	.5	0.0	0.0	21.2	40.0	315	120	V
67.80	24.7	6.5	.8	0.0	0.0	32.0	40.0	-1	200	V
74.58	9.2	7.1	.8	0.0	0.0	17.1	40.0	315	340	H
113.99	-3.7	12.0	1.0	0.0	0.0	9.2	43.5	180	200	V
122.09	-3.5	12.4	1.0	0.0	0.0	9.9	43.5	180	120	V
149.17	9.4	11.3	1.0	0.0	0.0	21.7	43.5	225	120	V
185.91	.4	10.2	1.0	0.0	0.0	11.6	43.5	45	120	V
189.83	4.3	10.3	1.0	0.0	0.0	15.6	43.5	180	120	V

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Small Unit 94012-250
MODE : TRANSMIT @ 6.78MHz
DATE : June 5 through 15, 2009
TEST SPECIFICATION : IC RSS 210 RADIATED EMISSIONS
TEST DISTANCE : 3 METERS

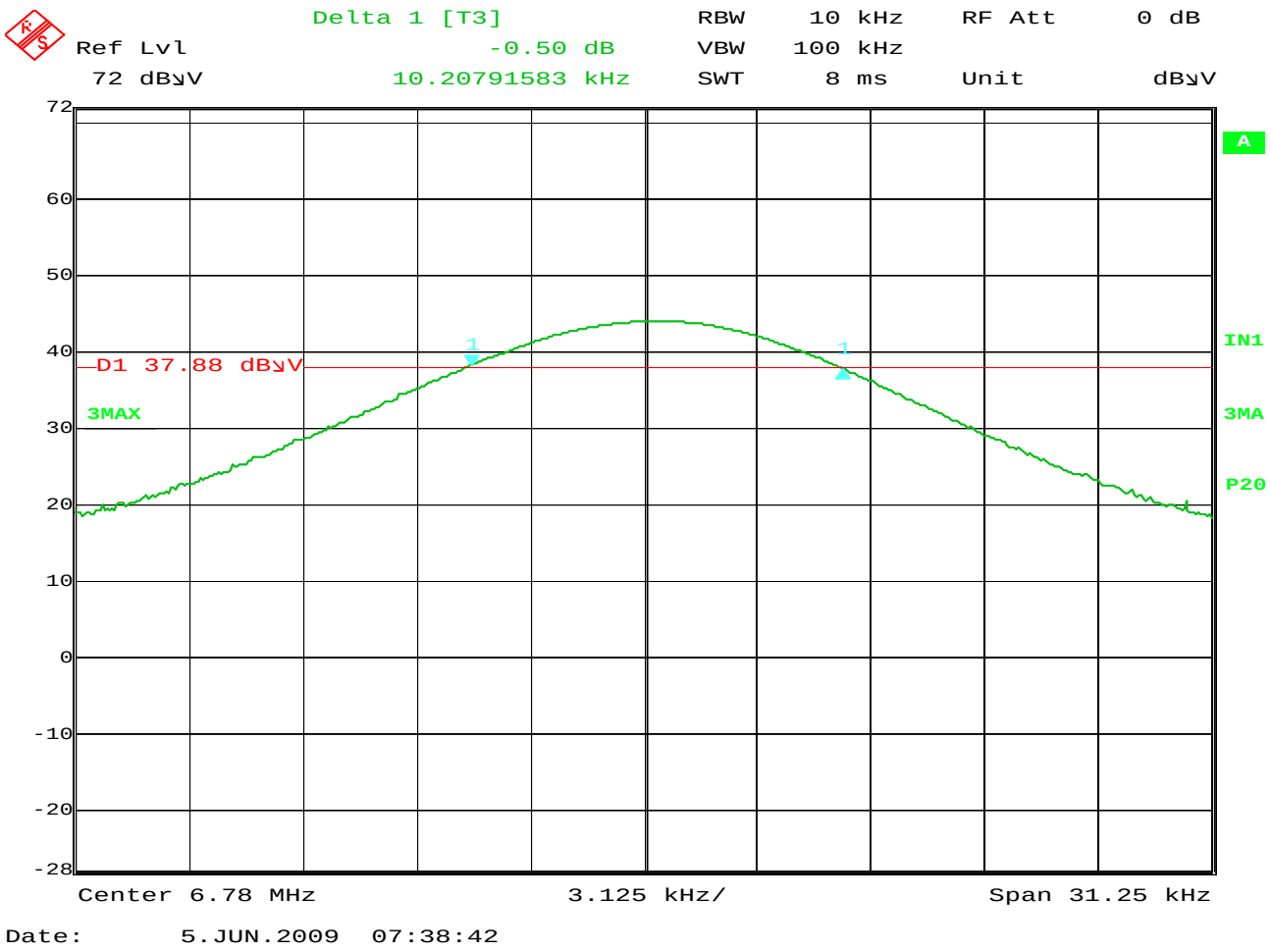
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	CBL Fac (dB)	Ant Fac (dB)	Dist. Corr. (dB)	Total dBuV/m at 30m/3m	Total uV/m at 30m/3m	Limit dBuV/m at 30m/3m	Margin dB
6.78	H	45.1	0.2	10.7	-40.0	16.0	6.3	84.0	-68.0
6.78	V	38.3	0.2	10.7	-40.0	9.2	2.9	84.0	-74.8
13.56	H	26.8	0.3	10.8	-40.0	-2.1	0.8	50.0	-52.1
13.56	V	26.3	0.3	10.8	-40.0	-2.6	0.7	50.0	-52.6
20.34	H	19.4	0.4	10.3	-40.0	-9.9	0.3	50.0	-59.9
20.34	V	19.0	0.4	10.3	-40.0	-10.3	0.3	50.0	-60.3
27.12	H	23.2	0.4	8.9	-40.0	-7.5	0.4	50.0	-57.5
27.12	V	21.2	0.4	8.9	-40.0	-9.5	0.3	50.0	-59.5
33.90	H	4.7	0.5	17.6	0.0	22.8	13.7	100.0	-77.2
33.90	V	6.8	0.5	17.6	0.0	24.9	17.6	100.0	-75.1
40.68	H	3.0	0.5	14.0	0.0	17.5	7.5	100.0	-82.5
40.68	V	10.0	0.5	14.0	0.0	24.5	16.8	100.0	-75.5
47.46	H	6.3	0.5	10.6	0.0	17.5	7.5	100.0	-82.5
47.46	V	19.3	0.5	10.6	0.0	30.4	33.3	100.0	-69.6
54.24	H	7.6	0.7	8.0	0.0	16.3	6.6	100.0	-83.7
54.24	V	17.9	0.7	8.0	0.0	26.6	21.4	100.0	-73.4
61.02	H	12.0	0.7	6.5	0.0	19.2	9.1	100.0	-80.8
61.02	V	22.5	0.7	6.5	0.0	29.7	30.6	100.0	-70.3
67.80	H	17.7	0.7	6.5	0.0	24.8	17.5	100.0	-75.2
67.80	V	28.5	0.7	6.5	0.0	35.7	60.8	100.0	-64.3

All measurements were taken at a 3 meter test distance. The limit below 30MHz is given for a 30 meter test distance. A distance correction factor was used to convert the 3 meter reading to a 30 meter reading.

The fundamental was measured using an average detector. All other measurements were taken using a quasi-peak detector.

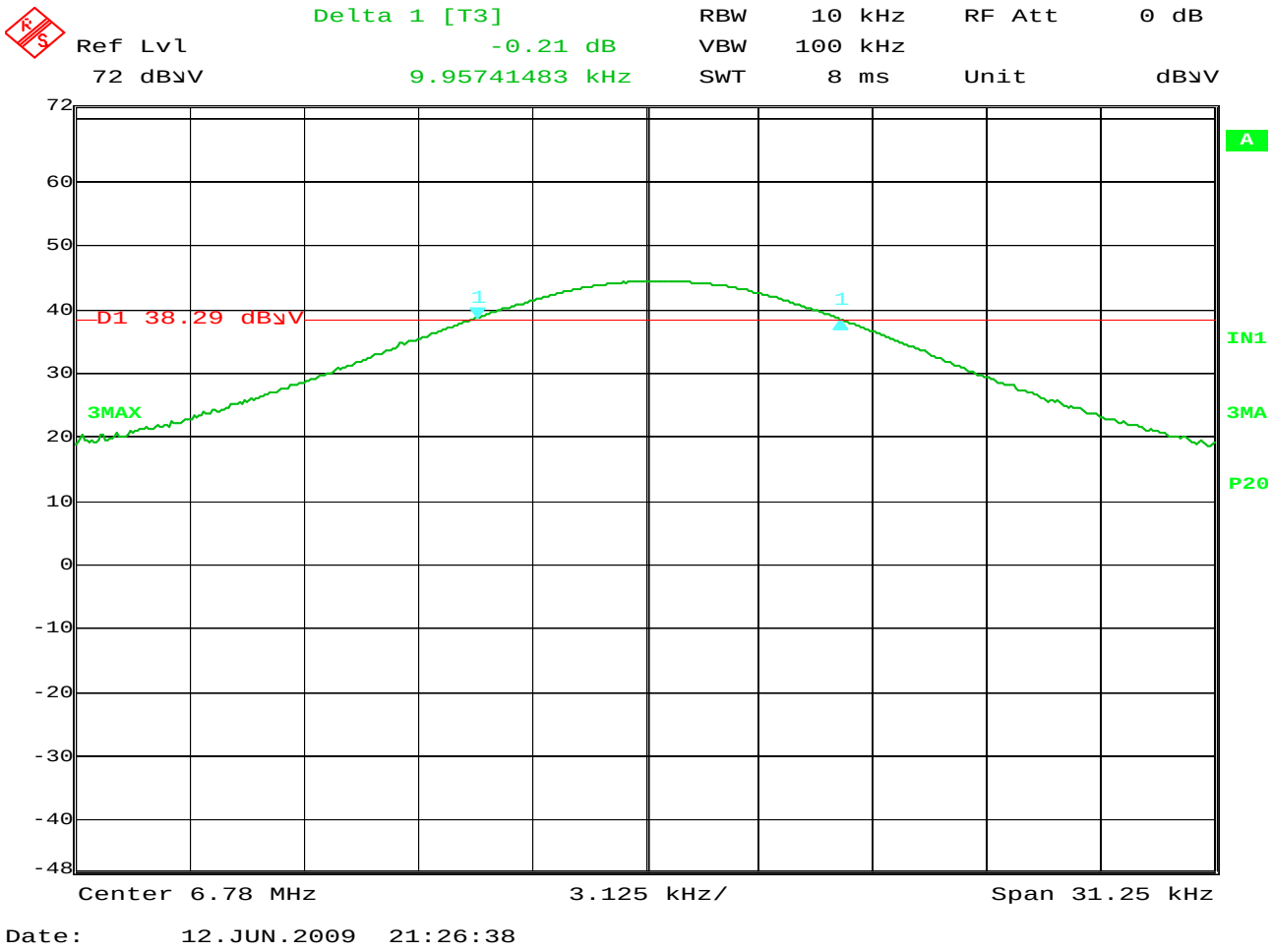
Checked BY Richard E. King :

Richard E. King



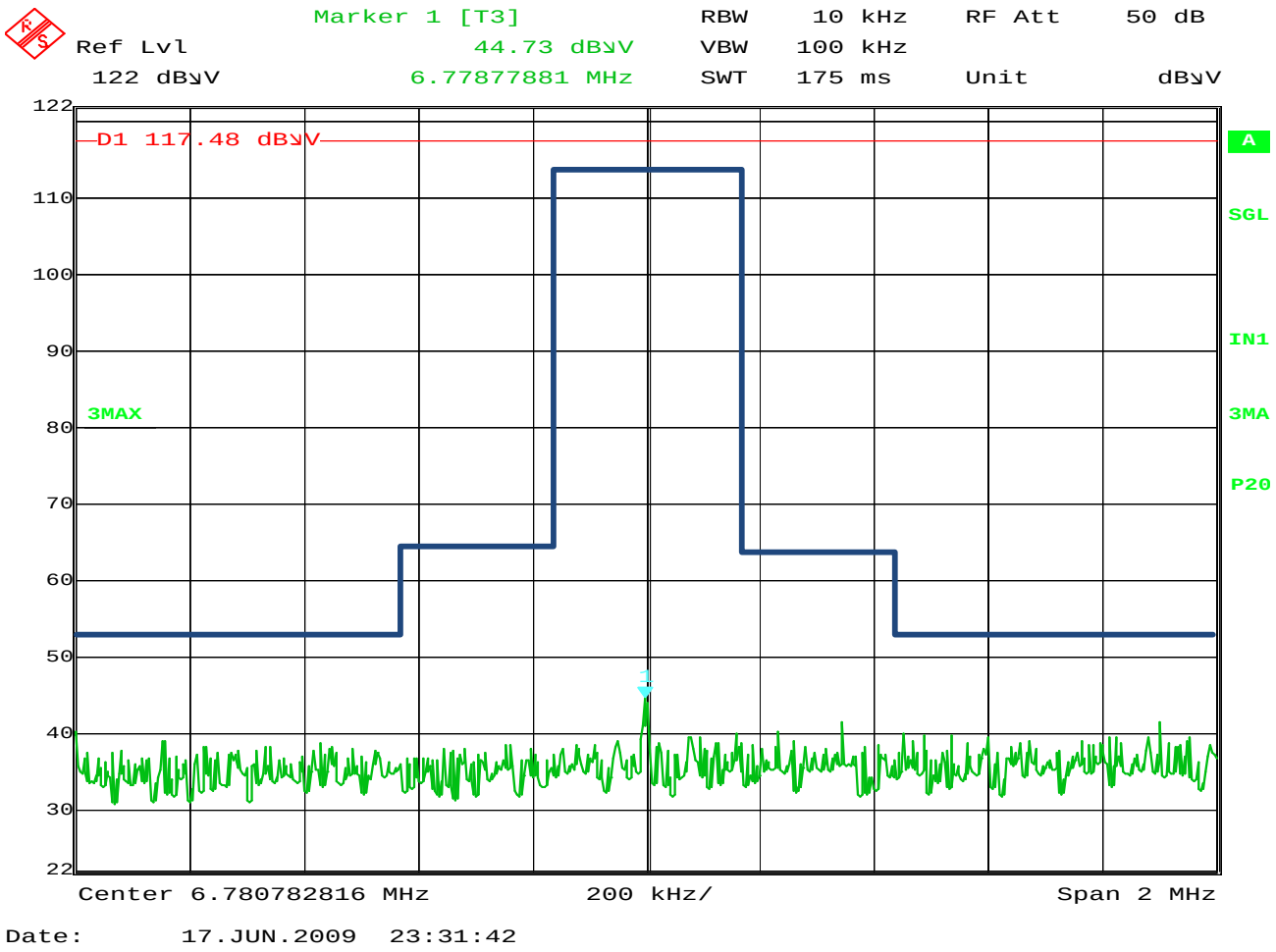
FCC 15.223(a)

MANUFACTURER	: Honeywell Sensing and Control
MODEL NO.	: TMS9000
SERIAL NO.	: Large Unit 94015-4k
MODE	: TRANSMIT @ 6.78MHz
DATE	: June 5 through 18, 2009
TEST PARAMETERS	: Bandwidth Measurement
NOTES	:
EQUIPMENT USED	: RBB0, NLS1



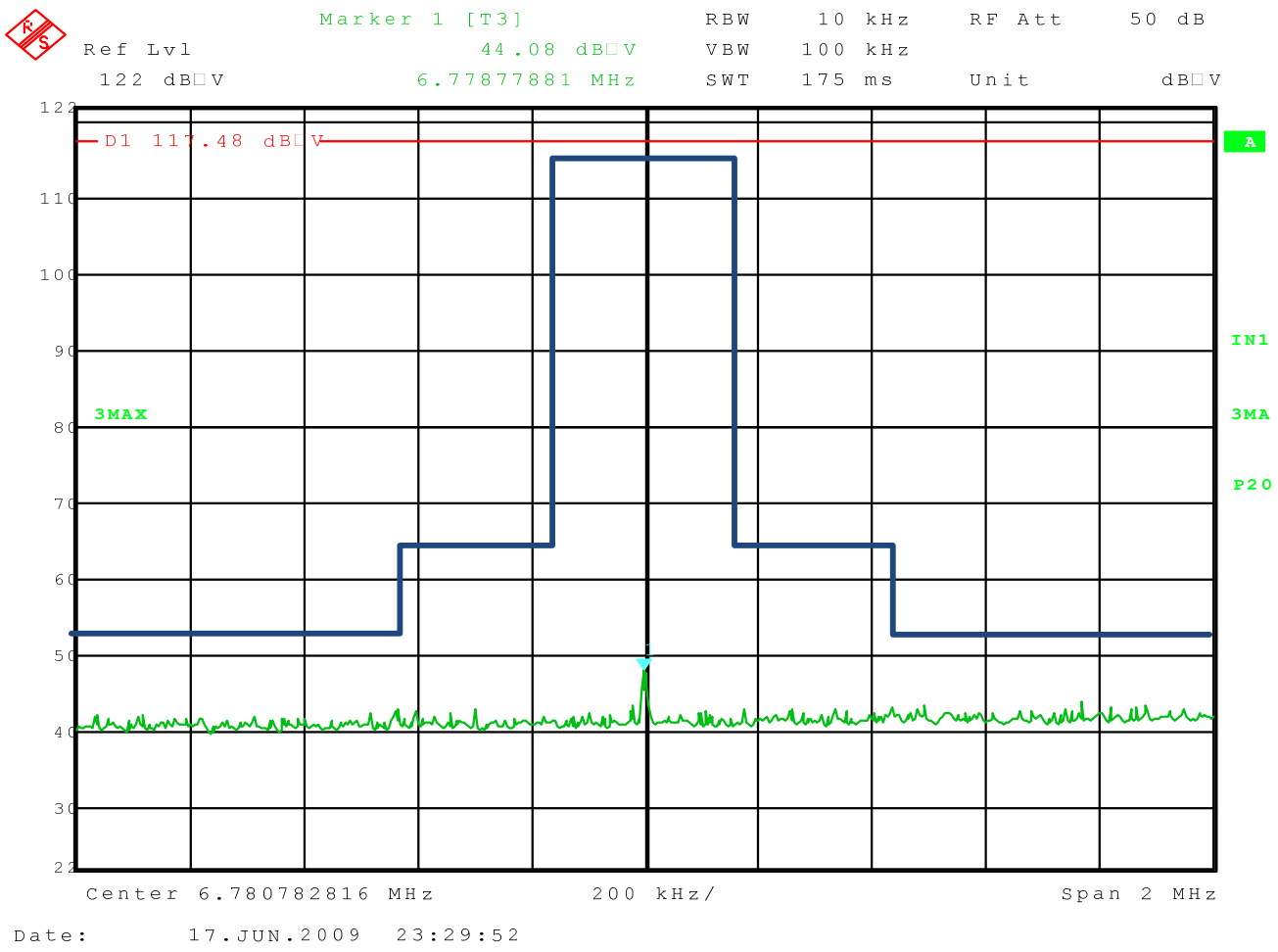
FCC 15.223(a)

MANUFACTURER	: Honeywell Sensing and Control
MODEL NO.	: TMS9000
SERIAL NO.	: Small Unit 94012-250
MODE	: TRANSMIT @ 6.78MHz
DATE	: June 5 through 18, 2009
TEST PARAMETERS	: Bandwidth Measurement
NOTES	:
EQUIPMENT USED	: RBB0, NLS1



IC A2.5 6.765-6.795 MHz, of RSS 210

MANUFACTURER	: Honeywell Sensing and Control
MODEL NO.	: TMS9000
SERIAL NO.	: Large Unit 94015-4k
MODE	: TRANSMIT @ 6.78MHz
DATE	: June 5 through 17, 2009
TEST PARAMETERS	: Bandwidth Measurement
NOTES	:
EQUIPMENT USED	: RBB0, NLS1



IC A2.5 6.765-6.795 MHz, of RSS 210

MANUFACTURER	: Honeywell Sensing and Control
MODEL NO.	: TMS9000
SERIAL NO.	: Small Unit 94012-250
MODE	: TRANSMIT @ 6.78MHz
DATE	: June 5 through 17, 2009
TEST PARAMETERS	: Bandwidth Measurement
NOTES	:
EQUIPMENT USED	: RBB0, NLS1

Data Page

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Large Unit 94015-4k
SPECIFICATION : IC RSS 210 Frequency Stability vs. Temperature
: IC RSS 210 Frequency Stability vs. Voltage
DATE : June 18, 2009
NOTES :

Temperature (degrees)	Nominal frequency (Hz)	Measured Frequency (Hz)	Frequency Change (Hz)	Frequency Limit 100ppm (100Hz)
-30	6780194	6780198	4	100
20	6780194	6780194	0	100
+50	6780194	6780189	5	100

Supply Voltage (VAC)	Nominal frequency (Hz)	Measured Frequency (Hz)	Frequency Change (Hz)	Frequency Limit (Hz)
120	6780194	6780195	1	100
102 (-15%)	6780194	6780194	0	100
138 (+15%)	6780194	6780192	2	100

Checked BY Richard E. King :

Richard E. King

Data Page

MANUFACTURER : Honeywell Sensing and Control
MODEL NO. : TMS9000
SERIAL NO. : Small Unit 94012-250
SPECIFICATION : IC RSS 210 Frequency Stability vs. Temperature
: IC RSS 210 Frequency Stability vs. Voltage
DATE : June 18, 2009
NOTES :

Temperature (degrees)	Nominal frequency (Hz)	Measured Frequency (Hz)	Frequency Change (Hz)	Frequency Limit 100ppm (100Hz)
-30	6780196	6780198	2	100
20	6780196	6780196	0	100
+50	6780196	6780187	9	100

Supply Voltage (VAC)	Nominal frequency (Hz)	Measured Frequency (Hz)	Frequency Change (Hz)	Frequency Limit (Hz)
120	6780196	6780193	3	100
102 (-15%)	6780196	6780196	0	100
138 (+15%)	6780196	6780194	2	100

Checked BY Richard E. King :

Richard E. King