



Measurement of RF Interference from a Model RCRF-01 Transceiver

For : Responsive Innovations
Akron, OH

P.O. No. : 1037

Date Received: May 16, 2005

Date Tested : May 16, 2005 through May 20, 2005

Test Personnel: Mark E. Longinotti

Specification : FCC "Code of Federal Regulations" Title 47

Part 15, Subpart B and

Subpart C, Section 15.249 for Intentional Radiators

Operating within the 2400-2483.5MHz band

Test Report By : *MARK E. LONGINOTTI*
Mark E. Longinotti

Witnessed By : Kevin G. Adkins
Responsive Innovations

Approved By : *Raymond J. Klouda*
Raymond J. Klouda
Registered Professional Engineer of
Illinois - 44894

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Measurement of RF Emissions from a Transceiver RCRF-01

1.0 INTRODUCTION:

1.1 Description of Test Item - This document represents the results of the series of radio interference measurements performed on a model Transceiver, Part No. RCRF-01, Serial No. None Assigned, (hereinafter referred to as the test item). The test item was designed to transmit and receive in the 2400 MHz through 2483.5 Band using an internal antenna. The test item was manufactured and submitted for testing by Responsive Innovations located in Akron, OH.

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, and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 2400-2483.5MHz band. Testing was performed in accordance with ANSI C63.4-2001.

1.3 Deviations, Additions and Exclusions - There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 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, dated 1 October 2004
- ANSI C63.4-2001, "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"

1.5 Subcontractor 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.

1.6 Laboratory Conditions The temperature at the time of the test was 21C and the relative humidity was 35%.

2.0 TEST ITEM SET-UP AND OPERATION:

The test item is a Transceiver, Part No.RCRF-01. A block diagram of the test item set-up is shown as Figure 1.

2.1 Power Input - The test item obtained 3VDC power from internal batteries.

2.2 Grounding - The test item was ungrounded during the tests.

2.3 Peripheral Equipment - No peripheral equipment was submitted with the test item.

2.4 Interconnect Cables - No interconnect cables were submitted with the test item.

2.5 Operational Mode - For radiated emissions tests, the test item was placed on an 80cm high non-conductive stand. Radiated emissions tests were performed separately with the test item transmitting at 2401MHz, 2441MHz, and 2482MHz.

2.6 Test Item Modifications - 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, and Subpart C, Sections 15.207 and 15.249 requirements.

3.0 TEST EQUIPMENT:

3.1 Test Equipment List - A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

3.2 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).

3.3 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 budgets were based on guidelines in "ISO Guide to the Expression of Uncertainty in Measurements" and NAMAS NIS81 "The Treatment of Uncertainty in EMC Measurements".

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

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 Powerline Conducted Emissions

4.1.1 Requirements - No conducted emissions tests were required on the test item because it was powered with 3VDC internal batteries.

4.2 Duty Cycle Factor Measurements:

4.2.1 Procedures: The duty cycle factor is used to convert peak detected readings to average readings. This factor is computed from the time domain trace of the pulse modulation signal.

With the transmitter set up to transmit for maximum pulse density, the time domain trace is displayed on the spectrum analyzer. This trace is obtained by tuning center frequency to the transmitter frequency and then setting a zero span width with 2msec/div. The amplitude settings are adjusted so that the on/off transitions clear the 4th division from the bottom of the display. The markers are set at the beginning and end of a word period. If the word period is less than 100msec, the display is set to show at least one word. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period. The duty cycle is then computed as the (On-time/ word period) where the word period = (On-time + Off-time).

4.2.2 Results: Plots of the duty cycle at 2401MHz, 2441MHz, and 2482MHz are shown on data pages 12 through 14. The duty cycle factor was computed to be -40dB at 2401MHz and 2441MHz. The duty cycle factor was computed to be -33.98dB at 2482MHz.

4.3 Radiated Measurements

4.3.1 Requirements - Per 15.101(b), receivers operating above 960MHz are exempt from complying with the radiated emissions requirements of 15.109. Therefore no radiated emissions tests were performed with the test item operating in the receive mode.

The test item must comply with the requirements of FCC "Code of Federal Regulations Title 47", Part 15, Subpart C, Section 15.205 et seq.

Paragraph 15.249 has the following radiated emission limits:

Fundamental Frequency MHz	Field Intensity uV/m @ 3 meters	Field Strength Harmonics and Spurious @ 3 meters
2400-2483.5	50,000	500

The field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20 dB under any condition of modulation.

4.3.2 Procedures - Radiated emissions 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 item. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 18GHz was investigated using a peak detector function. The data was then processed by the computer to calculate equivalent field intensity.

The final radiated emission tests were then manually performed over the frequency range of 30MHz to 25GHz. A broadband double ridged waveguide antenna was used as the pick-up device for all frequencies above 1GHz. All significant broadband and narrowband signals were measured and recorded. The peak detected levels were converted to average levels using a duty cycle factor which was computed from the pulse train.

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

- (1) The test item was 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 item was rotated through three orthogonal axes to determine which orientation produces the highest emission relative to the limit.

4.3.3 Results - The preliminary plots, with the test item transmitting at 2401MHz through 2482MHz, are presented on data pages 15 through 20. The plots are presented for a reference only, and are not used to determine compliance.

The final radiated levels, with the test item transmitting at 2401MHz through 2482MHz, are presented on data pages 21 through 26. As can be seen from the data, all emissions measured from the test item were within the specification limits. The emissions level closest to the limit (worst case) occurred at 2839MHz. The emissions level at this frequency was 0.3dB within the limit. See data page 26 for details. Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figure 2.

4.4 Band Edge Compliance

4.4.1 Requirement - In accordance with paragraph 15.249(d), emissions outside of the specified frequency bands shall be below the general radiated emissions limits of 15.209. Therefore the radiated emissions at the band edges (2400MHz and 2483.5MHz) must meet the general limits of 15.209.

4.4.2 Procedures - For radiated emissions at the band edges, the “marker-delta” method described in Public Notice DA 00-705 was used.

The test item was placed on an 80cm high non-conductive stand. The unit was set to transmit continuously. A broadband measuring antenna was placed at a test distance of 3 meters from the test item. Initially radiated emissions were performed at the lowest transmit frequency and the highest transmit frequency using a 1MHz bandwidth. Next, the band edge emissions were plotted using a peak detector and a 30kHz bandwidth. The “max-hold” function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer’s display was plotted using a “screen-dump” utility. The “delta” limit was applied to this plot to determine compliance at the band edge.

4.4.3 Results - Pages 27 through 28 show the radiated band-edge compliance results using the marker-delta method. As can be seen from these plots, the emissions at the band-edge are within the general limits.

5.0 CONCLUSIONS:

It was determined that the Responsive Innovations Transceiver, Part No. RCRF-01, Serial No. None Assigned, did fully meet the conducted and radiated emission requirements of the FCC "Code of Federal



Regulations" Title 47, Part 15, Subpart B, Sections 15.107 and 15.109, and Subpart C, Sections 15.207 and 15.249 for Intentional Radiators Operating within the 2400-2483.5MHz band, when tested per ANSI C63.4-2001.

6.0 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.

7.0 ENDORSEMENT DISCLAIMER:

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



TABLE I: TEST EQUIPMENT LIST

ELITE ELECTRONIC ENG. INC.								Page: 1
Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
Equipment Type: ACCESSORIES, MISCELLANEOUS								
XOB1	ADAPTER	HEWLETT PACKARD	K281C	10422	18-26.5GHZ		NOTE 1	
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---		N/A	
Equipment Type: AMPLIFIERS								
APK3	PREAMPLIFIER	AGILENT TECHNOLOGIES	8449B	3008A01593	1-26.5GHZ	06/03/05	12	06/03/06
Equipment Type: ANTENNAS								
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ		NOTE 1	
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	07/12/04	12	07/12/05
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	09/05/04	12	09/05/05
Equipment Type: RECEIVERS								
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/09/05	12	02/09/06
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	02/09/05	12	02/09/06
RAF5	QUASIPeak ADAPTOR W/ RECEIVER	HEWLETT PACKARD	85650A	2043A00151	0.01-1000MHZ	01/31/05	12	01/31/06
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	09/20/04	12	09/20/05

Cal. Interval: Listed in Months 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.

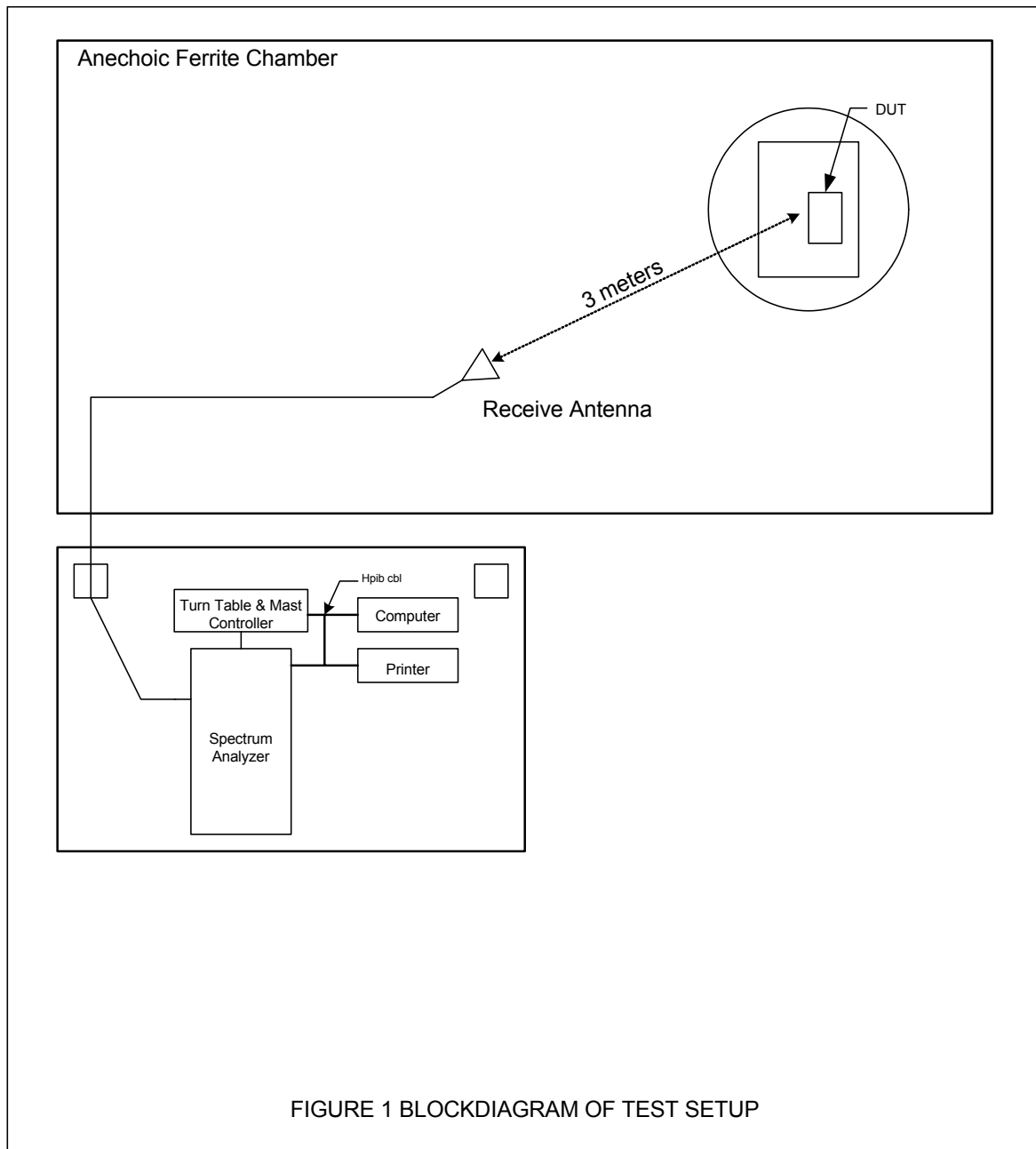
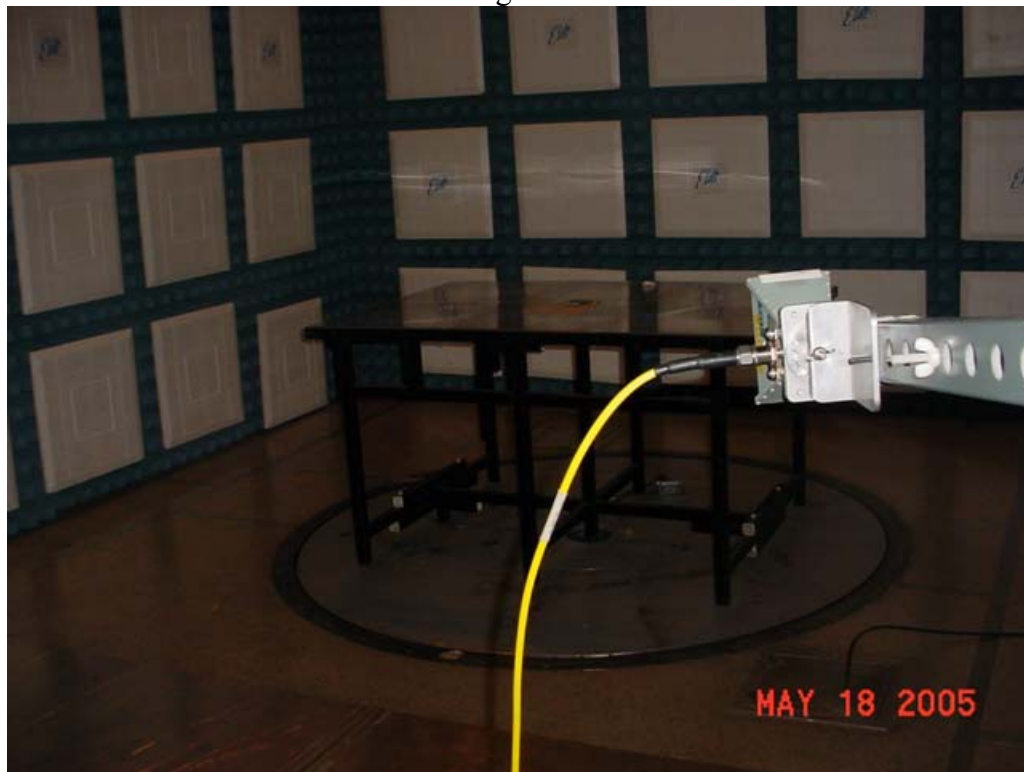


Figure 2



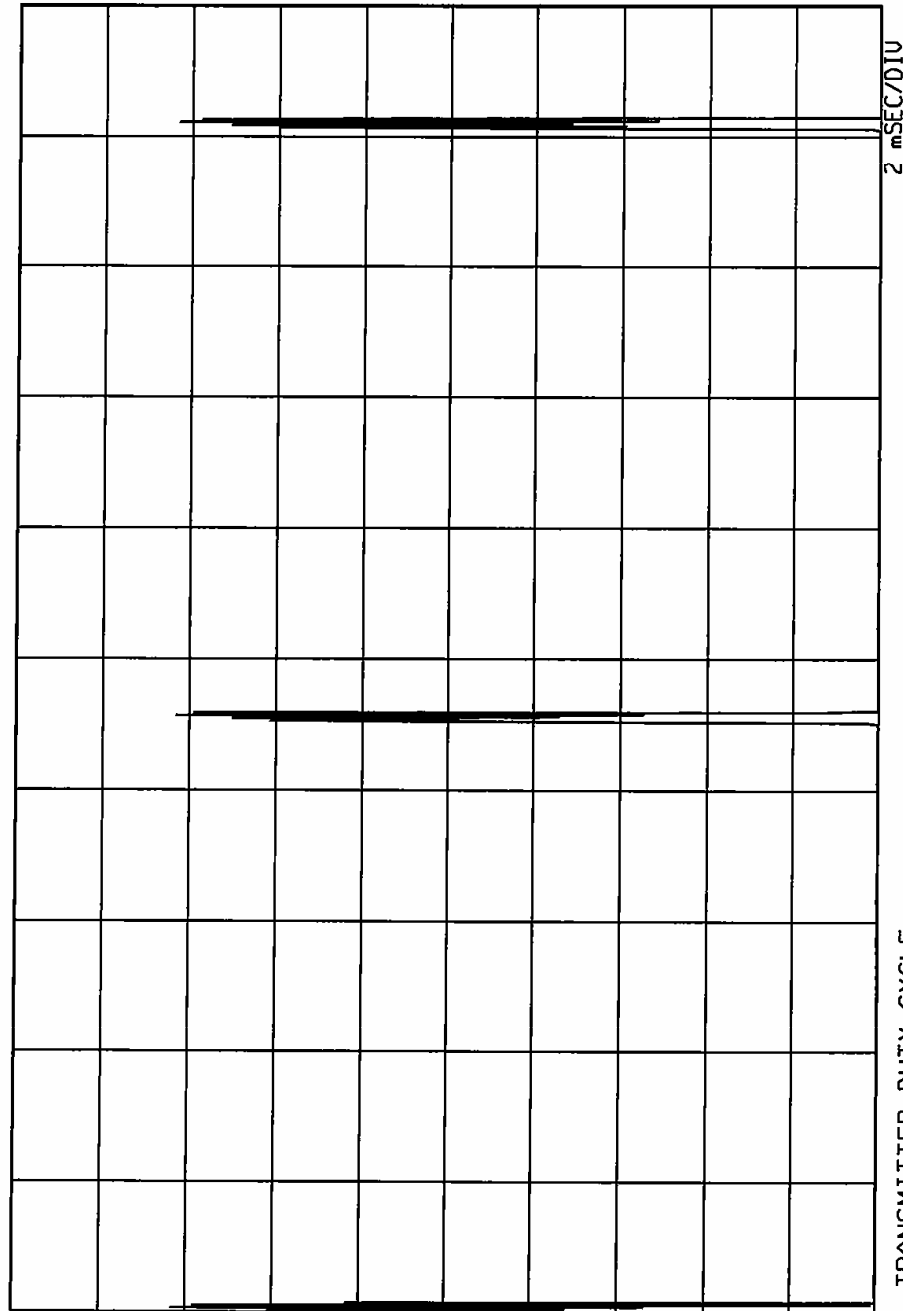
Test Set-up for Radiated Emissions – Horizontal Polarization



Test Set-up for Radiated Emissions – Vertical Polarization



ELITE ELECTRONIC ENGINEERING Co.
Downers Grove, IL 60515

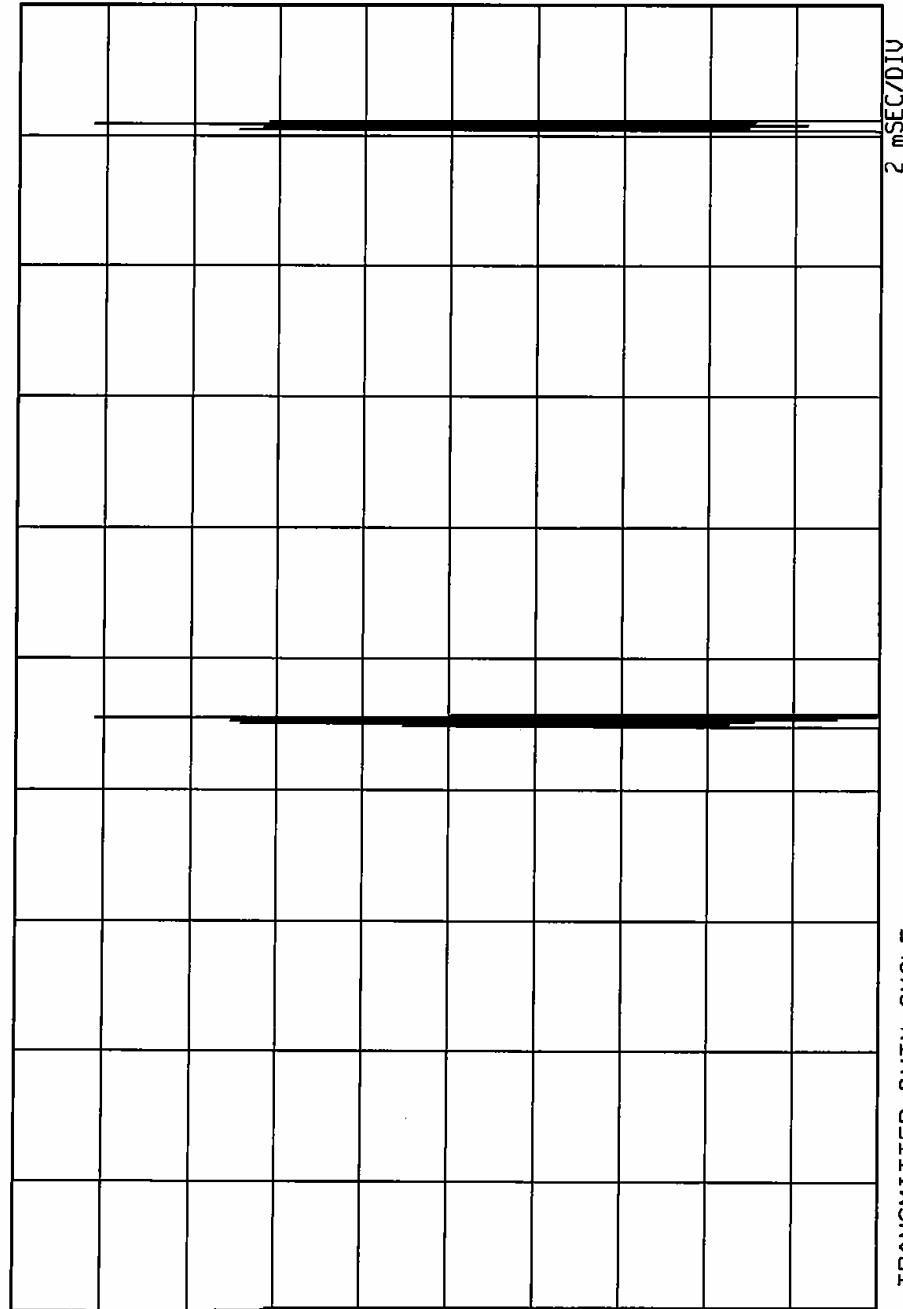


TRANSMITTER DUTY CYCLE
FREQUENCY: 2401.874 MHz
ON TIME : .12 mSEC
OFF TIME : 8.971 mSEC
DUTY CYCLE = .01 or -40 dB
COMPUTED OVER 1 DATA WORD

MANUFACTURER : AVID TECHNOLOGIES
MODEL : RCRF-01
S/N :
TEST DATE : 16 May 2005
NOTES : Tx @ 2401MHz



ELITE ELECTRONIC ENGINEERING Co.
Downers Grove, IL 60515

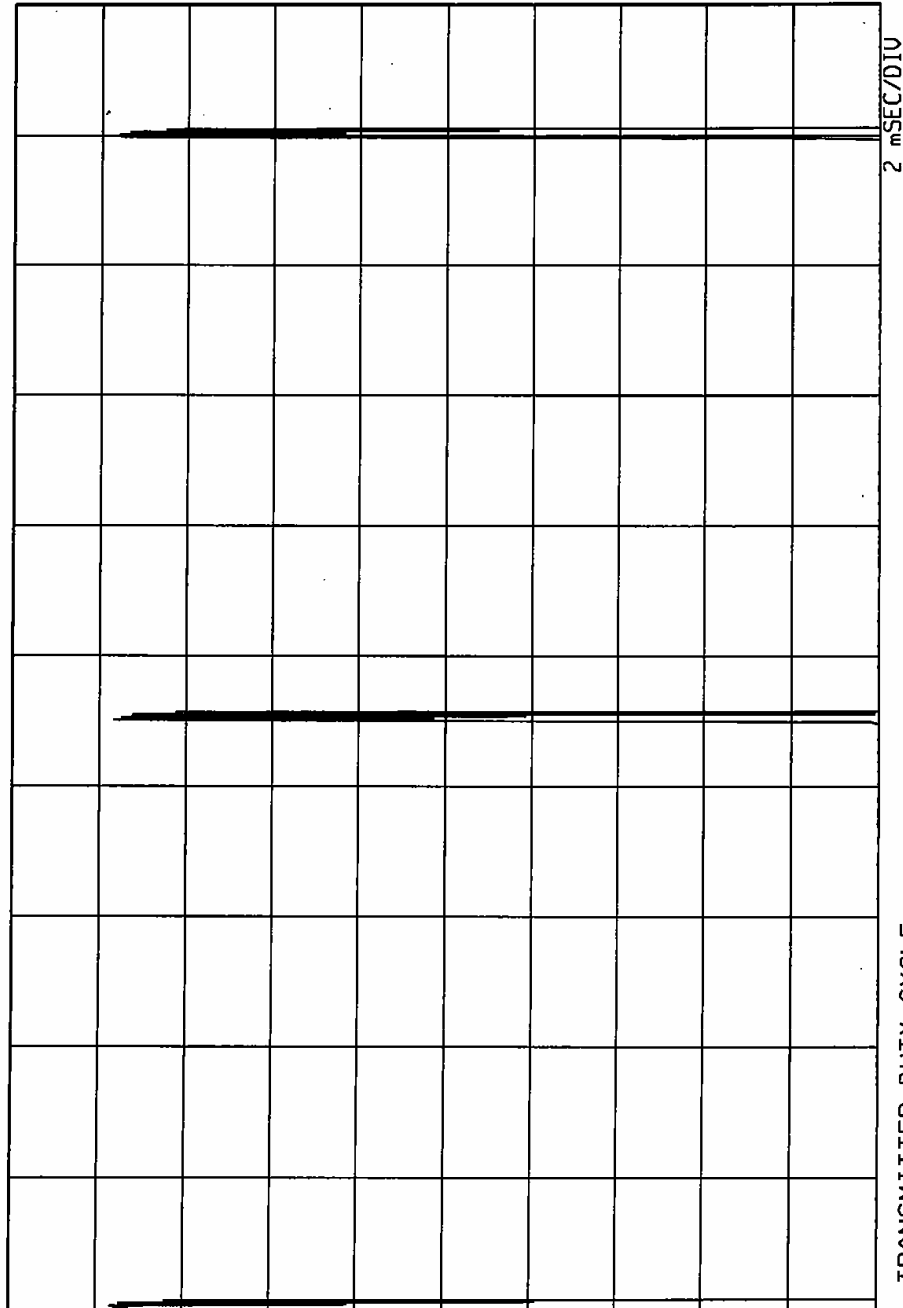


TRANSMITTER DUTY CYCLE
FREQUENCY: 2440.834 MHz
ON TIME : .12 mSEC
OFF TIME : 9.011 mSEC
DUTY CYCLE = .01 or -40 dB
COMPUTED OVER 1 DATA WORD

MANUFACTURER : AVID TECHNOLOGIES
MODEL : RCRF-01
S/N :
TEST DATE : 16 May 2005
NOTES : Tx @ 2441MHz

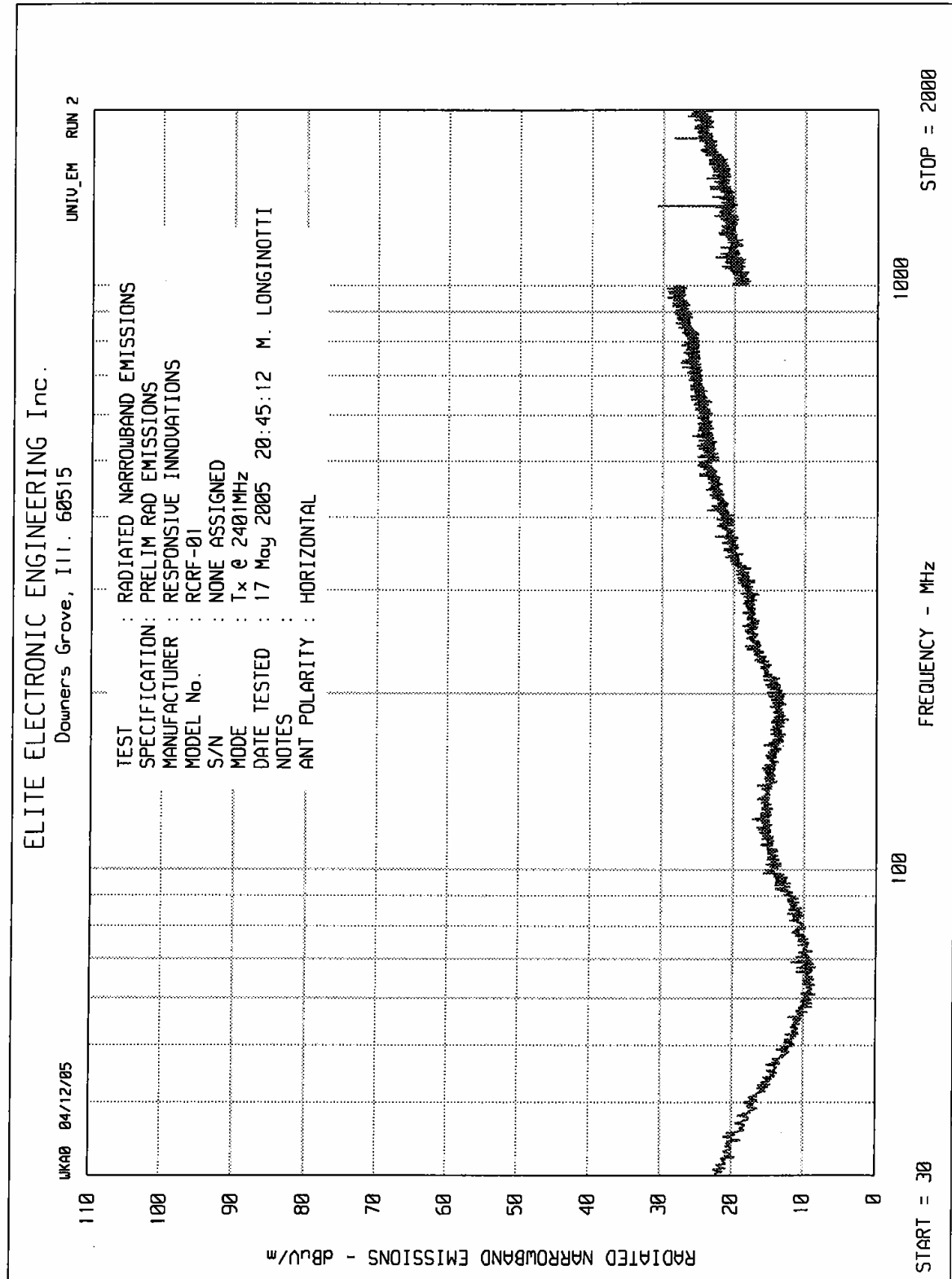


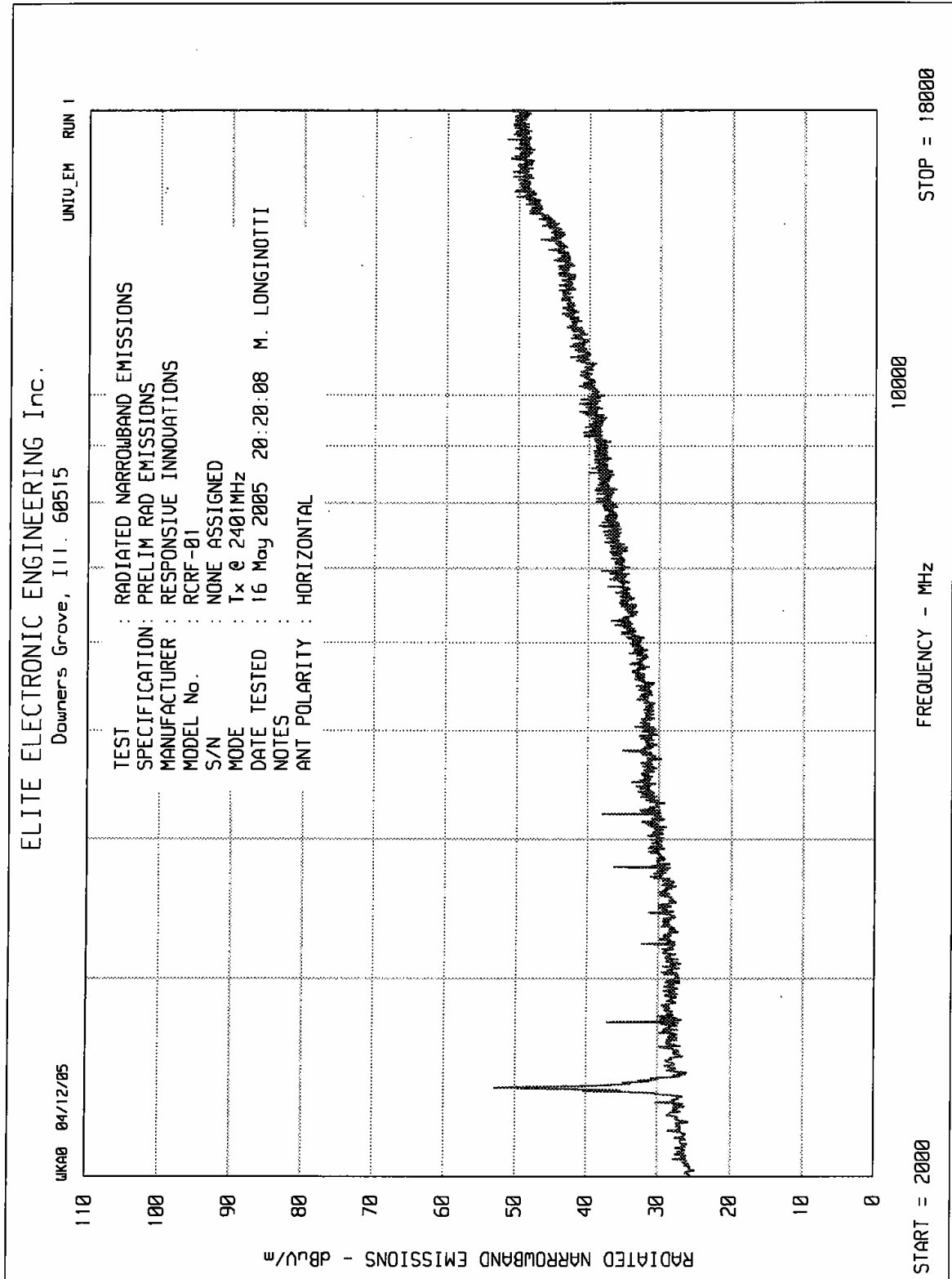
ELITE ELECTRONIC ENGINEERING Co.
Downers Grove, IL 60515

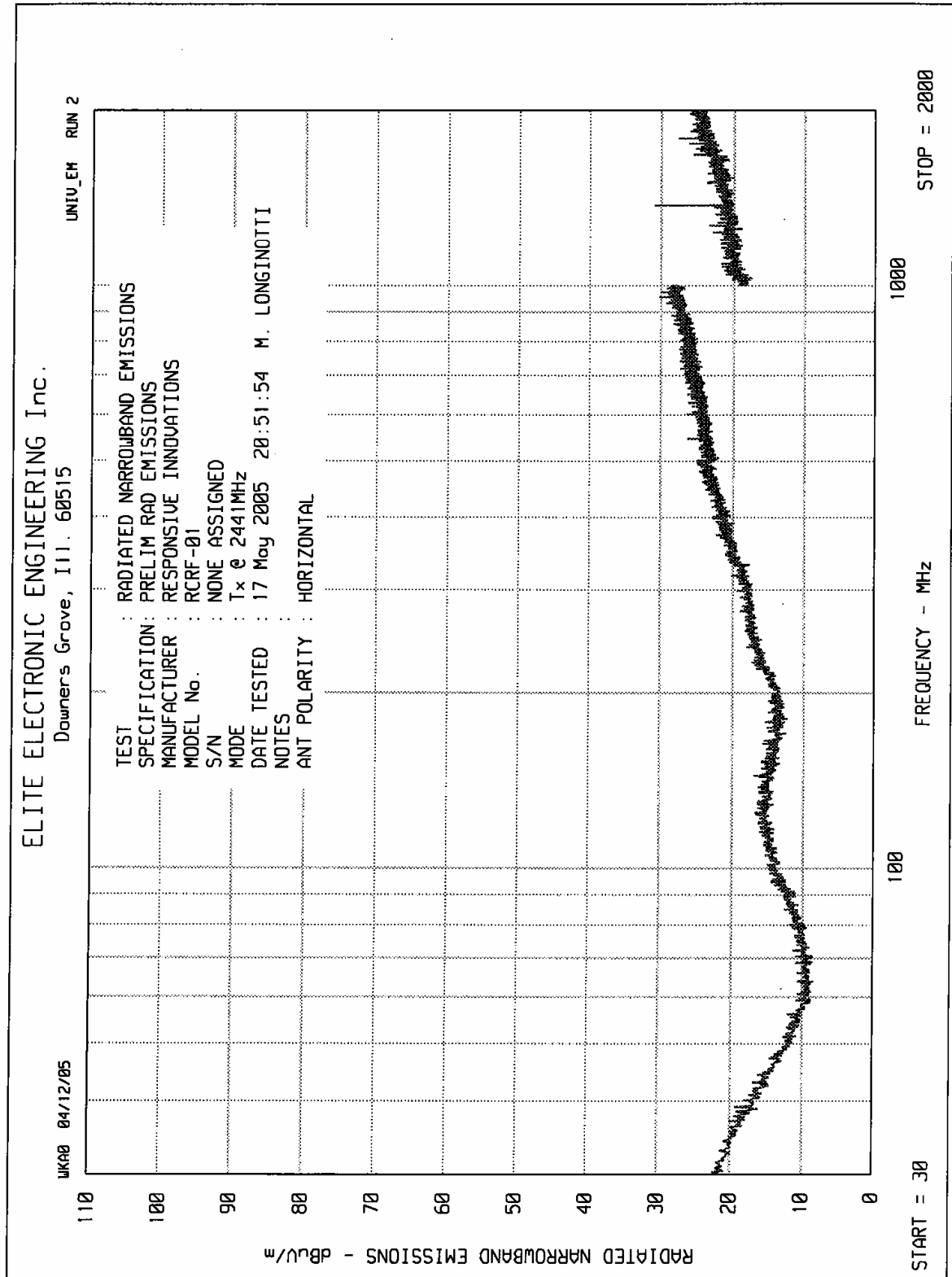


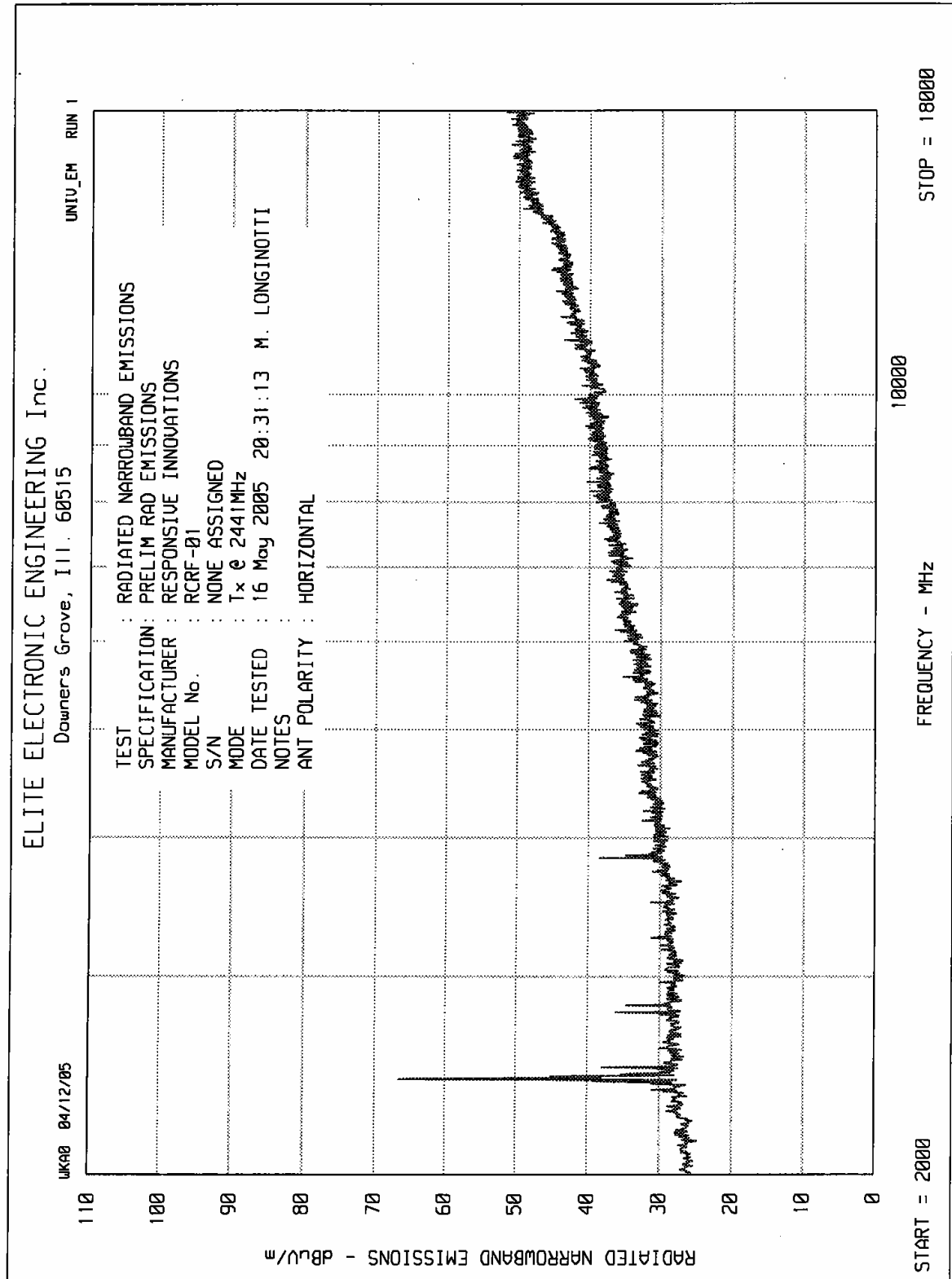
TRANSMITTER DUTY CYCLE
FREQUENCY: 2481.901 MHz
ON TIME : .14 mSEC
OFF TIME : 8.831 mSEC
DUTY CYCLE = .02 or -33.98 dB
COMPUTED OVER 1 DATA WORD

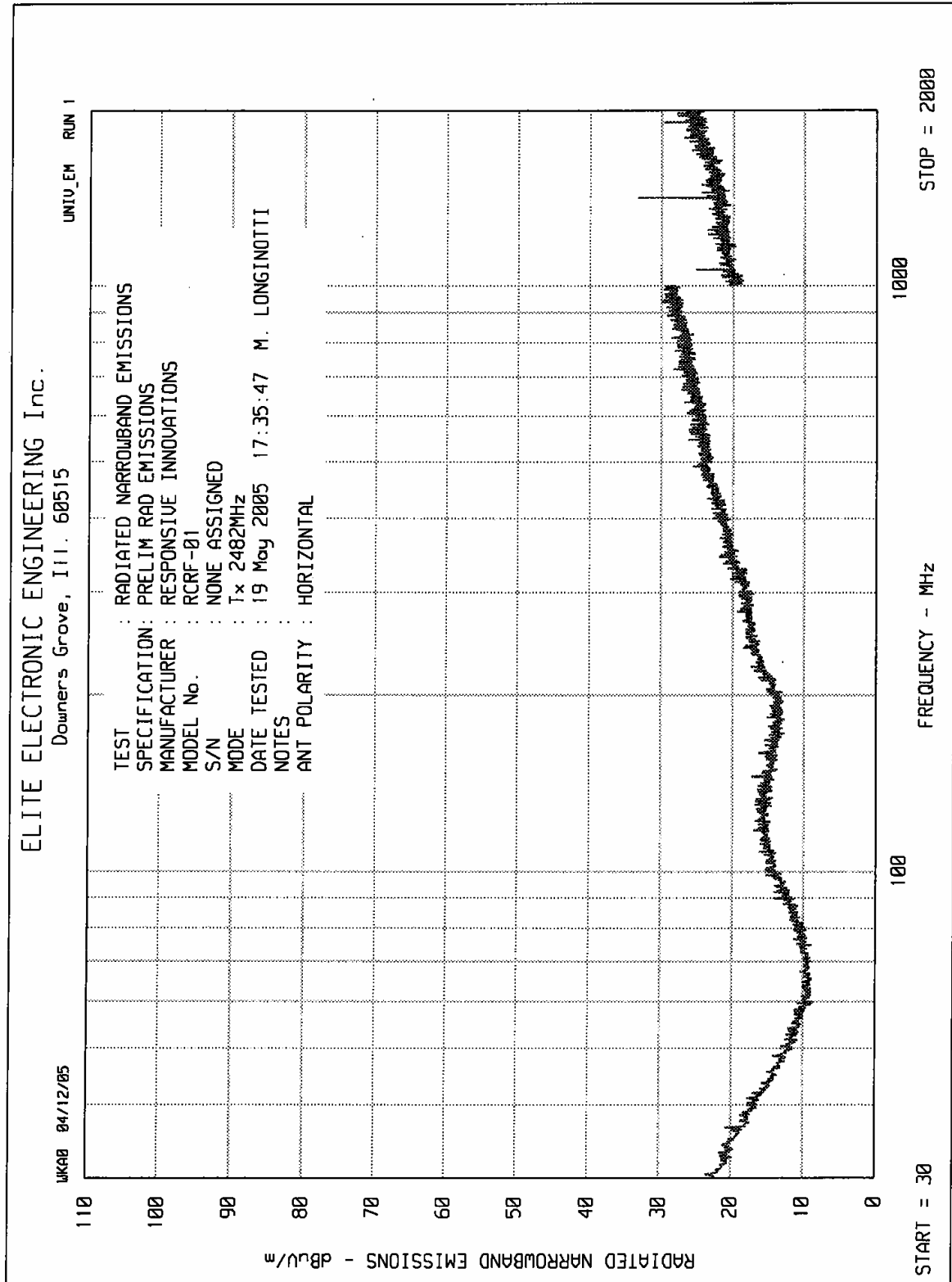
MANUFACTURER : RESPONSIVE INNOVATIONS
MODEL : RCRF-01
S/N : NONE ASSIGNED
TEST DATE : 19 May 2005
NOTES : Tx @ 2482MHz

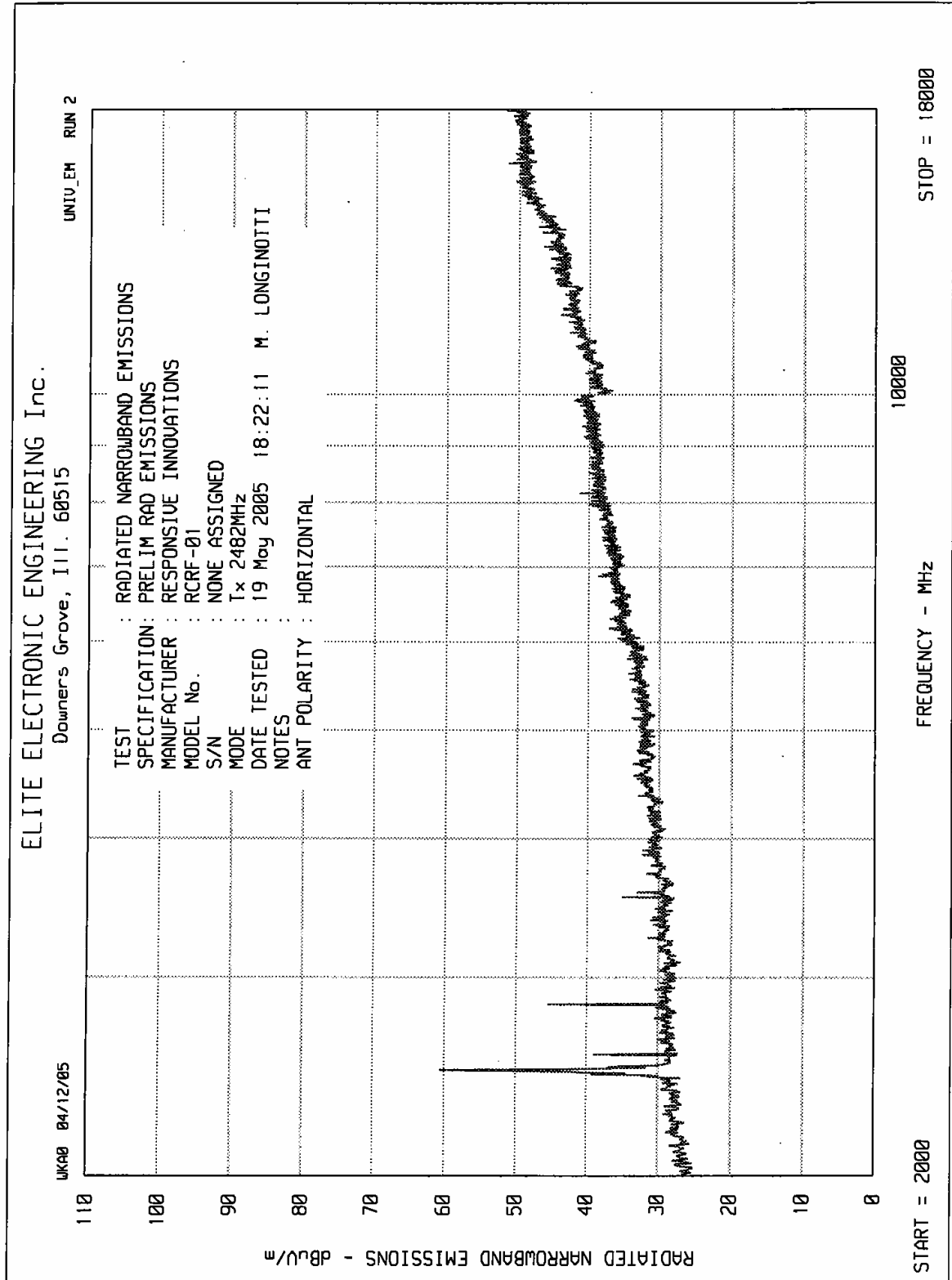














MANUFACTURER : Responsive Innovations
MODEL NO. : RCRF-01
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249, Radiated Emissions
MODE : Transmit @ 2401MHz
TEST DATE : May 16 through 19, 2005
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamp Gain dB	Distance Correctio n Factor dB	Peak Total dBuV/m	Peak Limit dBuV/m
2401	H	71.6		31.1	3.5			106.2	114
	V	62.9		31.1	3.5			97.5	114
4802	H	60		35.1	4.9	-34.6		65.4	74
	V	56.7		35.1	4.9	-34.6		62.1	74
7203	H	44.6	AMBIENT	38.2	1.8	-34.5		50.1	74
	V	45.9	AMBIENT	38.2	1.8	-34.5		51.4	74
9604	H	46.8		39.5	2.1	-34.9		53.5	74
	V	50.3		39.5	2.1	-34.9		57	74
12005	H	41.9	AMBIENT	41.4	2.4	-34.4	-9.5	41.8	74
	V	44.8	AMBIENT	41.4	2.4	-34.4	-9.5	44.7	74
14406	H	43.1	AMBIENT	43.5	2.7	-33.3	-9.5	46.5	74
	V	43	AMBIENT	43.5	2.7	-33.3	-9.5	46.4	74
16807	H	44	AMBIENT	44.6	2.9	-33.6	-9.5	48.4	74
	V	44.2	AMBIENT	44.6	2.9	-33.6	-9.5	48.6	74
19208	H	30.6	AMBIENT	40.3		-31.1	-9.5	30.3	74
	V	30	AMBIENT	40.3		-31.1	-9.5	29.7	74
21609	H	38.8	AMBIENT	40.6		-31.9	-9.5	38	74
	V	38.7	AMBIENT	40.6		-31.9	-9.5	37.9	74
24010	H	37.4	AMBIENT	40.6		-29.6	-9.5	38.9	74
	V	37.7	AMBIENT	40.6		-29.6	-9.5	39.2	74

* - Above 18GHz, Cable Loss is included with the preamp gain

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamp Gain + Distance Correction

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Responsive Innovations
MODEL NO. : RCRF-01
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249, Radiated Emissions
MODE : Transmit @ 2401MHz
TEST DATE : May 16 through 19, 2005
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamplifier Gain dB	Distance Correction Factor dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Limit dBuV/m
2401	H	71.6		31.1	3.5			-40	66.2	94
	V	62.9		31.1	3.5			-40	57.5	94
4802	H	60		35.1	4.9	-34.6		-40	25.4	54
	V	56.7		35.1	4.9	-34.6		-40	22.1	54
7203	H	44.6	AMBIENT	38.2	1.8	-34.5			50.1	54
	V	45.9	AMBIENT	38.2	1.8	-34.5			51.4	54
9604	H	46.8		39.5	2.1	-34.9		-40	13.5	54
	V	50.3		39.5	2.1	-34.9		-40	17	54
12005	H	41.9	AMBIENT	41.4	2.4	-34.4	-9.5		41.8	54
	V	44.8	AMBIENT	41.4	2.4	-34.4	-9.5		44.7	54
14406	H	43.1	AMBIENT	43.5	2.7	-33.3	-9.5		46.5	54
	V	43	AMBIENT	43.5	2.7	-33.3	-9.5		46.4	54
16807	H	44	AMBIENT	44.6	2.9	-33.6	-9.5		48.4	54
	V	44.2	AMBIENT	44.6	2.9	-33.6	-9.5		48.6	54
19208	H	30.6	AMBIENT	40.3		-31.1	-9.5		30.3	54
	V	30	AMBIENT	40.3		-31.1	-9.5		29.7	54
21609	H	38.8	AMBIENT	40.6		-31.9	-9.5		38	54
	V	38.7	AMBIENT	40.6		-31.9	-9.5		37.9	54
24010	H	37.4	AMBIENT	40.6		-29.6	-9.5		38.9	54
	V	37.7	AMBIENT	40.6		-29.6	-9.5		39.2	54
1373	H	40.8#	AMBIENT	26.5	2.5	-33.5			36.3	54
	V	40.6#	AMBIENT	26.5	2.5	-33.5			36.1	54
1790	H	39.7#	AMBIENT	28	2.8	-33.7			36.8	54
	V	39.7#	AMBIENT	28	2.8	-33.7			36.8	54
2747	H	42.9#	AMBIENT	31.5	3.8	-33.4			44.8	54
	V	51.4#		31.5	3.8	-33.4			53.3	54

* - Above 18GHz, Cable Loss is included with the preamp gain

- Average detector used

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamplifier Gain + Distance
Correction Factor + Duty Cycle Correction Factor



Checked By : MARK E. LONGINOTTI



MANUFACTURER : Responsive Innovations
MODEL NO. : RCRF-01
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249, Radiated Emissions
MODE : Transmit @ 2441MHz
TEST DATE : May 16 through 19, 2005
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamp Gain dB	Distance Correctio n Factor dB	Peak Total dBuV/m	Peak Limit dBuV/m
2441	H	67.8		31.2	3.5			102.5	114
	V	62.1		31.2	3.5			96.8	114
4882	H	53.7		35.1	5	-34.5		59.3	74
	V	55.4		35.1	5	-34.5		61	74
7323	H	47.8		38.3	1.9	-34.5		53.5	74
	V	52.9		38.3	1.9	-34.5		58.6	74
9764	H	48.2		39.7	2.1	-34.9		55.1	74
	V	54.4		39.7	2.1	-34.9		61.3	74
12205	H	46.2		41.5	2.4	-34.6	-9.5	46	74
	V	47.8		41.5	2.4	-34.6	-9.5	47.6	74
14646	H	42.7	AMBIENT	44	2.8	-33.3	-9.5	46.7	74
	V	43	AMBIENT	44	2.8	-33.3	-9.5	47	74
17087	H	42.1	AMBIENT	44.6	3	-33.4	-9.5	46.8	74
	V	42.5	AMBIENT	44.6	3	-33.4	-9.5	47.2	74
19528	H	35.3	AMBIENT	40.3	0	-31.6	-9.5	34.5	74
	V	35	AMBIENT	40.3	0	-31.6	-9.5	34.2	74
21969	H	37.5	AMBIENT	40.6	0	-28.5	-9.5	40.1	74
	V	37.9	AMBIENT	40.6	0	-28.5	-9.5	40.5	74
24410	H	40.3	AMBIENT	40.6	0	-27.8	-9.5	43.6	74
	V	39.8	AMBIENT	40.6	0	-27.8	-9.5	43.1	74

* - Above 18GHz, Cable Loss is included with the preamp gain

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamp Gain + Distance Correction

Checked By : MARK E. LONGINOTTI

MANUFACTURER : Responsive Innovations
 MODEL NO. : RCRF-01
 SERIAL NO. : None Assigned
 TEST SPECIFICATION : FCC 15.249, Radiated Emissions
 MODE : Transmit @ 2441MHz
 TEST DATE : May 16 through 19, 2005
 TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamplifier Gain dB	Distance Correction Factor dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Limit dBuV/m
2441	H	67.8		31.2	3.5			-40	62.5	94
	V	62.1		31.2	3.5			-40	56.8	94
4882	H	53.7		35.1	5	-34.5		-40	19.3	54
	V	55.4		35.1	5	-34.5		-40	21	54
7323	H	47.8		38.3	1.9	-34.5		-40	13.5	54
	V	52.9		38.3	1.9	-34.5		-40	18.6	54
9764	H	48.2		39.7	2.1	-34.9		-40	15.1	54
	V	54.4		39.7	2.1	-34.9		-40	21.3	54
12205	H	46.2		41.5	2.4	-34.6	-9.5	-40	6	54
	V	47.8		41.5	2.4	-34.6	-9.5	-40	7.6	54
14646	H	42.7	AMBIENT	44	2.8	-33.3	-9.5		46.7	54
	V	43	AMBIENT	44	2.8	-33.3	-9.5		47	54
17087	H	42.1	AMBIENT	44.6	3	-33.4	-9.5		46.8	54
	V	42.5	AMBIENT	44.6	3	-33.4	-9.5		47.2	54
19528	H	35.3	AMBIENT	40.3	0	-31.6	-9.5		34.5	54
	V	35	AMBIENT	40.3	0	-31.6	-9.5		34.2	54
21969	H	37.5	AMBIENT	40.6	0	-28.5	-9.5		40.1	54
	V	37.9	AMBIENT	40.6	0	-28.5	-9.5		40.5	54
24410	H	40.3	AMBIENT	40.6	0	-27.8	-9.5		43.6	54
	V	39.8	AMBIENT	40.6	0	-27.8	-9.5		43.1	54
1398	H	46#		26.6	2.5	-33.5			41.6	54
1398	V	40.3#	AMBIENT	26.6	2.5	-33.5			35.9	54

* - Above 18GHz, Cable Loss is included with the preamp gain

- Average Detector used

V – Vertical

H – Horizontal

Average Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamplifier Gain + Distance
 Correction Factor + Duty Cycle Correction Factor



Checked By : MARK E. LONGINOTTI



MANUFACTURER : Responsive Innovations
MODEL NO. : RCRF-01
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249, Radiated Emissions
MODE : Transmit @ 2482MHz
TEST DATE : May 16 through 19, 2005
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamp Gain dB	Distance Correctio n Factor dB	Peak Total dBuV/m	Peak Limit dBuV/m
2482	H	68.9		31.2	3.5			103.6	114
	V	62.9		31.2	3.5			97.6	114
4964	H	55.6		35.2	5	-34.4		61.4	74
	V	50		35.2	5	-34.4		55.8	74
7446	H	50.3		38.3	1.9	-34.6		55.9	74
	V	51.8		38.3	1.9	-34.6		57.4	74
9928	H	44.4	AMBIENT	39.9	2.1	-34.8		51.6	74
	V	48.5		39.9	2.1	-34.8		55.7	74
12410	H	43.3		41.5	2.5	-33.9	-9.5	43.9	74
	V	47.8		41.5	2.5	-33.9	-9.5	48.4	74
14892	H	42.1	AMBIENT	44.6	2.8	-33.6	-9.5	46.4	74
	V	42.4	AMBIENT	44.6	2.8	-33.6	-9.5	46.7	74
17374	H	42.9	AMBIENT	44.6	3	-33.3	-9.5	47.7	74
	V	42.7	AMBIENT	44.6	3	-33.3	-9.5	47.5	74
19856	H	34.4	AMBIENT	40.4	0	-31.3	-9.5	34	74
	V	33.4	AMBIENT	40.4	0	-31.3	-9.5	33	74
22338	H	40.7	AMBIENT	40.6	0	-29.1	-9.5	42.7	74
	V	40.6	AMBIENT	40.6	0	-29.1	-9.5	42.6	74
24820	H	39.8	AMBIENT	40.6	0	-27.9	-9.5	43	74
	V	40.6	AMBIENT	40.6	0	-27.9	-9.5	43.8	74

* - Above 18GHz, Cable Loss is included with the preamp gain

V – Vertical

H – Horizontal

Peak Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamp Gain + Distance Correction

Checked By : MARK E. LONGINOTTI



MANUFACTURER : Responsive Innovations
MODEL NO. : RCRF-01
SERIAL NO. : None Assigned
TEST SPECIFICATION : FCC 15.249, Radiated Emissions
MODE : Transmit @ 2482MHz
TEST DATE : May 16 through 19, 2005
TEST DISTANCE : 3 meters

Frequency MHz	Antenna Polarity	Peak Meter Reading dBuV	Ambient	Antenna Factor dB	Cable Loss* dB	Preamp Gain dB	Distance Correction Factor dB	Duty Cycle Corr. Factor dB	Average Total dBuV/m	Average Limit dBuV/m
2482	H	68.9		31.2	3.5			-34	69.6	94
	V	62.9		31.2	3.5			-34	63.6	94
4964	H	55.6		35.2	5	-34.4		-34	27.4	54
	V	50		35.2	5	-34.4		-34	21.8	54
7446	H	50.3		38.3	1.9	-34.6		-34	21.9	54
	V	51.8		38.3	1.9	-34.6		-34	23.4	54
9928	H	44.4	AMBIENT	39.9	2.1	-34.8			51.6	54
	V	48.5		39.9	2.1	-34.8		-34	21.7	54
12410	H	43.3		41.5	2.5	-33.9	-9.5	-34	9.9	54
	V	47.8		41.5	2.5	-33.9	-9.5	-34	14.4	54
14892	H	42.1	AMBIENT	44.6	2.8	-33.6	-9.5		46.4	54
	V	42.4	AMBIENT	44.6	2.8	-33.6	-9.5		46.7	54
17374	H	42.9	AMBIENT	44.6	3	-33.3	-9.5		47.7	54
	V	42.7	AMBIENT	44.6	3	-33.3	-9.5		47.5	54
19856	H	34.4	AMBIENT	40.4	0	-31.3	-9.5		34	54
	V	33.4	AMBIENT	40.4	0	-31.3	-9.5		33	54
22338	H	40.7	AMBIENT	40.6	0	-29.1	-9.5		42.7	54
	V	40.6	AMBIENT	40.6	0	-29.1	-9.5		42.6	54
24820	H	39.8	AMBIENT	40.6	0	-27.9	-9.5		43	54
	V	40.6	AMBIENT	40.6	0	-27.9	-9.5		43.8	54
1420	H	48#		26.5	2.5	-33.5			43.5	54
	V	39.9#	AMBIENT	26.5	2.5	-33.5			35.4	54
2839	H	51.4#		31.8	3.9	-33.4			53.7	54
	V	38.1#	AMBIENT	31.8	3.9	-33.4			40.4	54

* - Above 18GHz, Cable Loss is included with the preamp gain

- Average detector used

V – Vertical

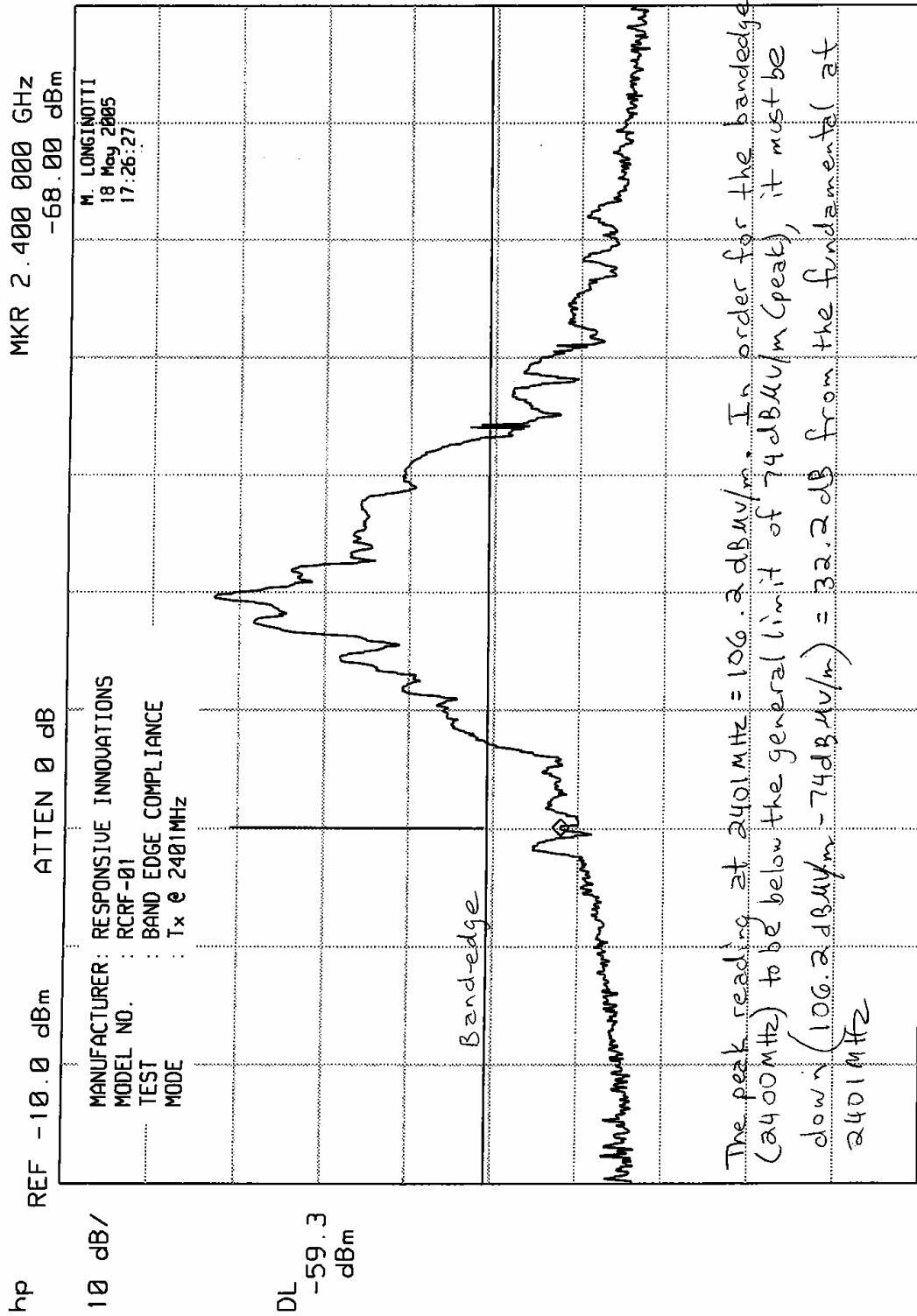
H – Horizontal

Average Total = Peak Meter Reading + Antenna Factor + Cable Loss + Preamp Gain + Distance
Correction Factor + Duty Cycle Correction Factor



Checked By : MARK E. LONGINOTTI

ELITE ELECTRONIC ENGINEERING Inc.



CENTER 2.401 00 GHz RES BW 30 kHz(i) SPAN 5.00 MHz
 VBW 1 MHz SWP 37.5 msec

ELITE ELECTRONIC ENGINEERING INC.

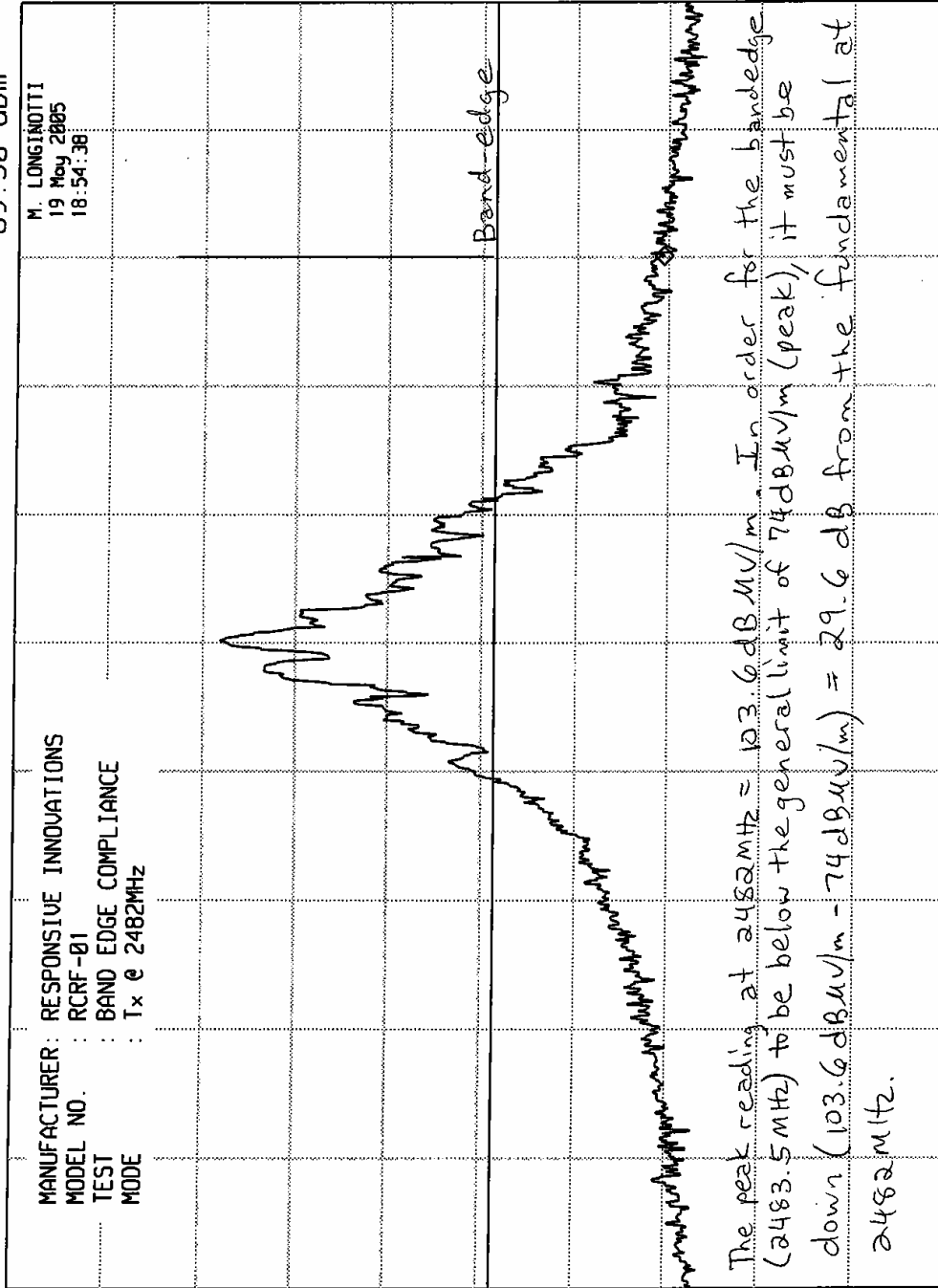
hp REF 0.0 dBm ATTN 10 dB MKR 2.483 500 GHz
-69.50 dBm

MANUFACTURER: RESPONSIVE INNOVATIONS
MODEL NO.: RCRF-01
TEST: BAND EDGE COMPLIANCE
MODE: Tx @ 2482MHz

M. LONGINOTTI
19 May 2005
18:54:38

10 dB/

DL -51.4
dBm



CENTER 2.482 00 GHz
RES BW 30 kHz(i) SPAN 5.00 MHz
VBW 300 kHz SWP 37.5 msec