

ELITE ELECTRONIC ENGINEERING INC.
1516 CENTRE CIRCLE
DOWNERS GROVE, ILLINOIS 60515-1082

ELITE PROJECT: 29798 DATES TESTED: April 25 through May 3, 2001

TEST PERSONNEL: Daniel E. Crowder

TEST SPECIFICATION: FCC "Code of Federal Regulations" Title 47 Part
15, Subpart C, Section 15.247 for Frequency
Hopping Spread Spectrum Intentional Radiators
Operating within the 2400-2483.5MHz band

ENGINEERING TEST REPORT NO. 23679

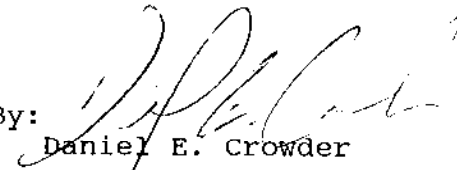
MEASUREMENTS OF RF EMISSIONS

FROM THE MODEL REMOTE SPEAKER MICROPHONE TRANSMITTER


FOR: Motorola
Rolling Meadows, Illinois

PURCHASE ORDER NO.: NP129920

Report By:


Daniel E. Crowder

Approved By:


Raymond J. Klonda
Registered Professional
Engineer of Illinois - 44894

ENGINEERING TEST REPORT NO. 23679

ADMINISTRATIVE DATA AND SUMMARY OF TESTS

DESCRIPTION OF TEST ITEM: Frequency Hopping Spread Spectrum
Transmitter

MODEL NO. : REMOTE SPEAKER MICROPHONE **SERIAL NO.:** None Assigned

FCC ID NO. :

MANUFACTURER: Motorola

APPLICABLE

SPECIFICATION: FCC "Code of Federal Regulations", Title 47, Part 15,
Subpart C, Sec. 15.247

TEST PERFORMED BY: ELITE ELECTRONIC ENGINEERING INC.
Downers Grove, Illinois 60515

DATES TESTED: April 25 through May 3, 2001

PERSONNEL (OPERATORS, OBSERVERS, AND CO-ORDINATORS):

WITNESS: No Motorola personnel were present during the testing.

ELITE ELECTRONIC: Daniel E. Crowder

ELITE JOB NO.: 29798

ABSTRACT: The Remote Speaker Microphone Transmitter meets the requirements of the FCC "Code of Federal Regulations", Title 47, Part 15, Subpart C, Section 15.247 for frequency hopping spread spectrum transmitters. The carrier frequency separation, number of hopping frequencies, time of occupancy (dwell time), 20 dB bandwidth, peak output power, band-edge compliance, and spurious emissions were measured and found to comply with the requirements.

See the test results and data pages for more details.

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ENGINEERING TEST REPORT NO. 23679

MEASUREMENT OF RF EMISSIONS

FROM A REMOTE SPEAKER MICROPHONE TRANSMITTER

1.0 INTRODUCTION:

1.1 DESCRIPTION OF TEST ITEM: This report presents the results of the RF emissions measurements performed for the Remote Speaker Microphone spread spectrum transmitter, (hereinafter referred to as the test item). The tests were performed for Motorola located in Rolling Meadows, Illinois.

The test item is a frequency hopping spread spectrum transceiver used for bluetooth applications. It operates in the frequency band 2400 to 2483.5MHz.

1.2 PURPOSE: The test series was performed to determine if the test item meets the requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for intentional radiators.

1.3 DEVIATIONS, ADDITIONS AND EXCLUSIONS: There were no deviations from the test requirements.

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 (FCC) "Code of Federal Regulations", Title 47, Part 15, dated 1 October 2000

FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000

1.5 SUBCONTRACTOR IDENTIFICATION: This series of tests was performed by the Elite Electronic Engineering Inc., of Downers Grove, Illinois.

2.0 TEST ITEM SETUP AND OPERATION:

For all tests the test item was placed on a 0.8 meter high non-conductive table. The 4.5VDC was supplied to the test item from internal batteries. The test item is supplied with an internal antenna.

Motorola ear-piece was connected to the ear-piece port.

3.0 TEST SITE AND INSTRUMENTATION:

3.1 TEST SITE: All tests were performed at Elite's facility in Downers Grove, Illinois. All tests were performed in a hybrid anechoic/ferrite tile shielded enclosure.

3.2 TEST INSTRUMENTATION: 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.

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 POWER LINE CONDUCTED EMISSIONS:

4.1.1 REQUIREMENT: This requirement does not apply since the test item is battery operated. There are no operation modes where the transmitter can be connected to the AC power public utilities, and therefore, the conducted emissions test are not required.

4.2 CARRIER FREQUENCY SEPARATION:

4.2.1 REQUIREMENTS: Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

4.2.2 PROCEDURES: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to \geq to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When the trace had stabilized after multiple scans. The marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility.

4.2.3 RESULTS: Data page 101 shows the carrier frequency separation. As can be seen from this plot, the separation is 1MHz which is the 20dB bandwidth.

4.3 NUMBER OF HOPPING FREQUENCIES:

4.3.1 REQUIREMENTS: Per section 15.247(a)(1)(ii), frequency hopping systems shall use at least 75 hopping frequencies.

4.3.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to \geq to 1% of the span. The peak detector and 'Max-Hold' function was engaged. The span was set wide enough to capture the entire frequency band of operation.

When the trace had stabilized after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

4.3.3 RESULTS: Data page 102 shows the number of hopping frequencies. As can be seen from this plot, the number of frequencies is 79 which is greater than the minimum required of 75.

4.4 TIME OF OCCUPANCY (DWELL TIME):

4.4.1 REQUIREMENTS: Per section 15.247(a)(1)(ii), the

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average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

4.4.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1 MHz. The peak detector and 'Max-Hold' function was engaged. With the span was to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. Then, the sweep time was expanded to capture the average time between hops. When the trace had stabilized after multiple scans, the time between hops was measured. The analyzer's display was plotted using a 'screen dump' utility.

The dwell time in a 30 second period was then calculated from dwell time per hop divided by time between hops then multiplied by 30 seconds.

4.4.3 RESULTS: Data pages 103 and 104 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by a 424 usec burst every 100 msec in a 30 Second period. This calculated value is equal to 0.13 seconds which is less than the 0.4 seconds allowed.

4.5 20 dB BANDWIDTH:

4.5.1 REQUIREMENTS: Per section 15.247(a)(1)(ii), the maximum 20dB bandwidth of the hopping channel is 1MHz.

4.5.2 PROCEDURE: The test item was setup inside the chamber. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution

bandwidth (RBW) was set to \geq to 1% of the 20 dB BW.

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.

4.5.3 RESULTS: The plots on pages 105 through 107 show that the maximum 20 dB bandwidth was 0.95 MHz. The 20 dB bandwidth was less than the maximum requirement.

4.6 PEAK OUTPUT POWER:

4.6.1 REQUIREMENTS: This requirement applies only to the transmit mode of operation. Per section 15.247(b) the maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.6.2 PROCEDURES: Since the antenna was an integrated antenna the equivalent isotropic radiated power (EIRP) was computed from the radiated field strength measurements at 3 meters.

The spectrum analyzer bandwidth was set to 3 MHz which is greater than the 20dB bandwidth of the transmitter. A double ridged waveguide antenna was positioned 3 meters from the test item. The maximum meter reading was recorded for the vertical and horizontal receiver antenna polarity while rotating the test item through 360 degrees. The EIRP was calculated for the low, middle and high hopping frequencies.

4.6.3 RESULTS: The results are presented on data page 109. The maximum EIRP measured from the transmitter was 4.5 dBm. Therefore, the transmitter meets the De Facto 36 dBm limit. Only one type of

antenna is supplied with the test item.

4.7 BAND-EDGE COMPLIANCE:

4.7.1 REQUIREMENTS: Per section 15.247(c), the emissions at the band-edges must be at least 20dB below the highest level measured within the band. In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz, must meet the general limits of 15.209

4.7.2 PROCEDURE: The same data recorded for the low and high hopping frequencies from the 20 dB bandwidth measurements was used to demonstrate compliance with the 20 dB band-edge requirements.

For the radiated emissions which fall in the restricted band the "marker-delta" method described in Public Notice DA 00-705 was used. Initially radiated measurements were performed at the fundamentals of the highest hopping frequencies using 1 MHz bandwidth. For the measurements the "delta" required to meet the general limit was calculated.

Next, the band-edge emissions were plotted using peak detector and 100 kHz bandwidth. The "delta" limit was applied to this plot to determine compliance at the band-edge.

4.7.3 RESULTS: Data page 108 show the band-edge compliance results using the marker-delta method. As can be seen from this plot, the emissions at the band-edge in the restricted band are within the general limits.

4.8 SPURIOUS EMISSIONS:

4.8.1 REQUIREMENTS: Per section 15.247(c), the spurious emissions in any 100 kHz BW outside the frequency band must be at least 20dB below the highest 100 kHz BW level measured within the

band. In addition, the radiated emissions which fall in the restricted bands must meet the general limits of 15.209.

4.8.2 PROCEDURES: Since the test item was supplied with a permanently attached antenna, the spurious emissions compliance was evaluated against the radiated emissions levels for unrestricted bands as well as the restricted bands.

The radiated tests were performed in a 32ft. x 20ft. x 18ft. hybrid absorber lined semi-anechoic 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. The floor of the chamber is used as the ground plane. The chamber complies with ANSI 63.4 and CISPR 16 requirements for site attenuation.

Preliminary radiated measurements are performed to determine the frequencies where the significant emissions might be found. With the test item at one set position and the measurement antenna at a set height (i.e. without maximizing), the radiated emissions were measured using peak detection with 100 kHz BW. This data was then automatically plotted up through 18 GHz. Frequency range 18 to 24 GHz was checked manually but not plotted.

Next, the harmonic or spurious emissions falling in the restricted bands were measured up through the 10th harmonic. For these measurements, the measurement bandwidths were set to 1 MHz RBW. The analyzer was set to **linear mode** with 10 Hz VBW in order to simulate an average detector. A preamplifier was used to increase the receiver sensitivity.

4.8.3 RESULTS: The preliminary emissions levels were plotted. These plots are presented on Data Pages 110 through 116. This

plot shows that the spurious emissions were at least 20 dB below the level of the fundamental.

The harmonics and any other emissions that fall in the restricted frequency bands were then remeasured manually. This data is shown in the tables on Data Pages 117 through 119. The field intensities levels for the harmonics in the restricted band were within the limit.

A block diagram of the test item orientation position is shown in Figure 1.

5.0 CONCLUSION:

The Motorola Remote Speaker Microphone, complies with the limits imposed by the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for frequency hopping spread spectrum transmitters.

6.0 CERTIFICATION:

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

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.

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TABLE 1: 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							
XZ60	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	3439A02724	---	01/31/00	N/A
Equipment Type: AMPLIFIERS							
APK0	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	3008A00662	1-26.5GHZ	02/15/01 12	02/15/02
Equipment Type: ANTENNAS							
NTA0	BILOG ANTENNA	CHASE EMC LTD.	81LOG CBL611	2057	0.03-2GHZ	05/09/00 12	05/09/01
NW10	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	08/28/00 12	08/28/01
Equipment Type: CONTROLLERS							
CDD2	COMPUTER	HEWLETT PACKARD	D4171A#ABA	US61654645	---		N/A
CMA0	MULTI-DEVICE CONTROLLER	EMCO	2090	9701-1213	---		N/A
Equipment Type: PRINTERS AND PLOTTERS							
HRE2	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061201	---		N/A
Equipment Type: RECEIVERS							
RAC1	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3407A08369	100HZ-22GHZ	01/16/01 12	01/16/02
RACB	RF PRESELECTOR	HEWLETT PACKARD	85685A	3506A01491	20HZ-2GHZ	05/10/00 12	05/10/01
RAF3	QUASIPeak ADAPTER	HEWLETT PACKARD	85650A	3303A01775	0.01-1000MHZ	01/17/01 12	01/17/02
Equipment Type: TEST CHAMBERS (EMI)							
RM17	3M ANECHOIC CHAMBER MEETS	EMC TEST SYSTEM	3M ANECHOIC		30MHZ-18GHZ	03/21/00 12	03/21/01

Cal. Interval: Listed in Months 1/0: 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.

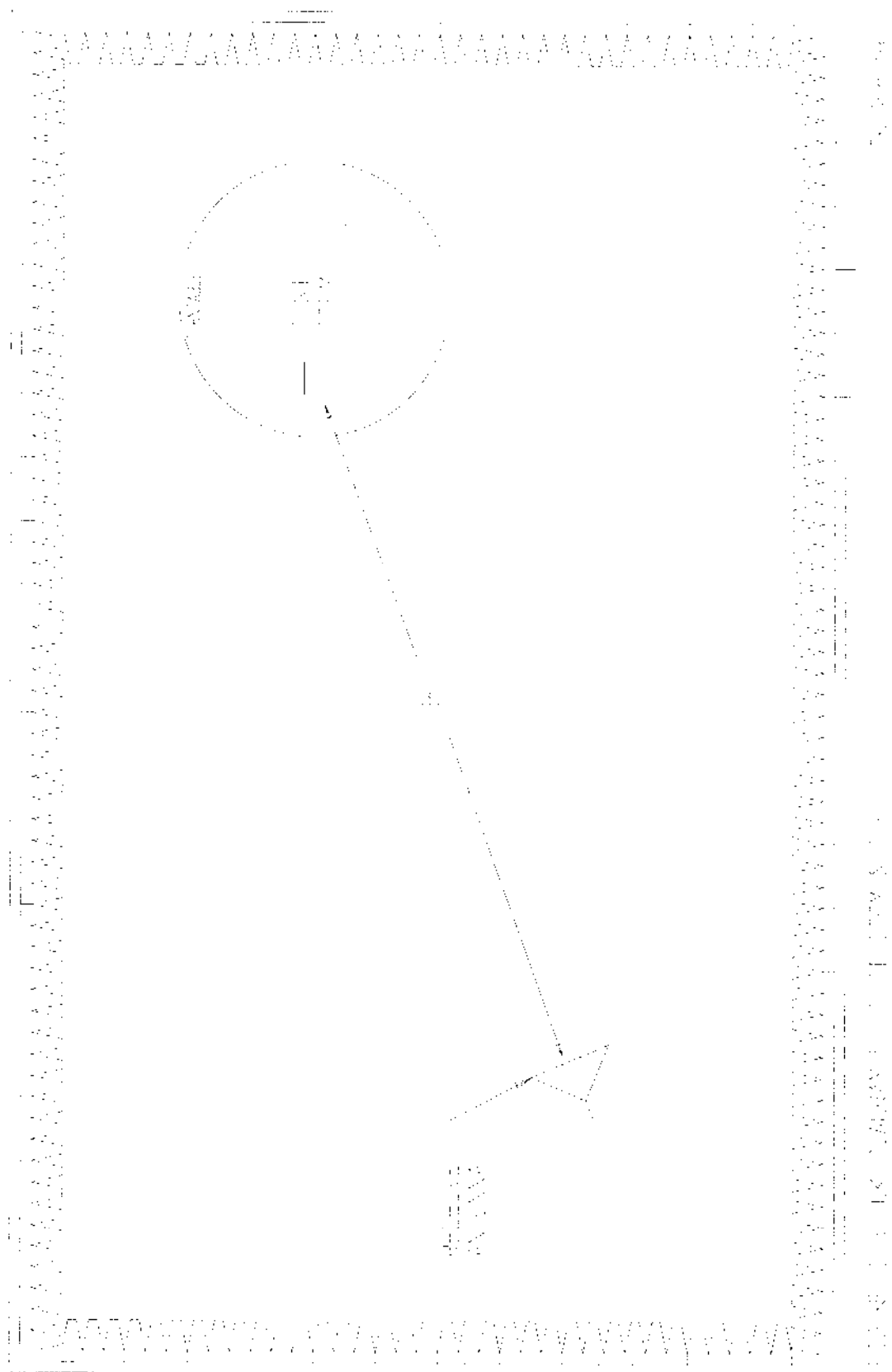




FIGURE 2A TEST SETUP FOR RADIATED EMISSIONS MEASUREMENTS
MAXIMIZED FOR MEASUREMENT OF WORST CASE EMISSIONS
VERTICAL POLARIZATION

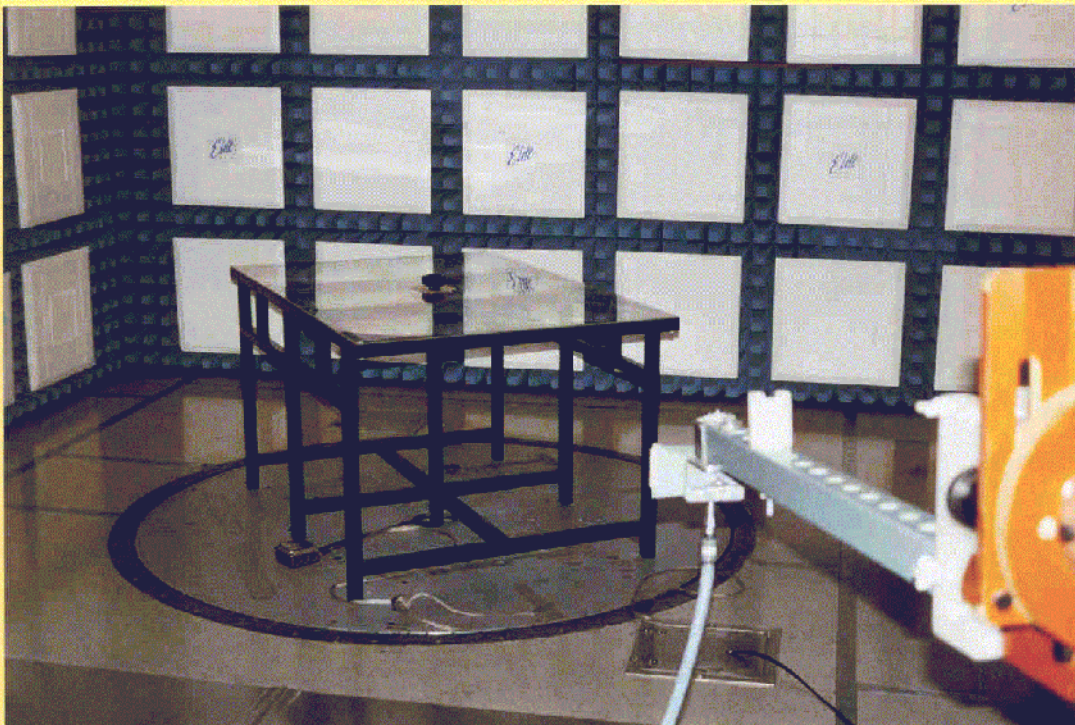


FIGURE 2B TEST SETUP FOR RADIATED EMISSIONS MEASUREMENTS
MAXIMIZED FOR MEASUREMENT OF WORST CASE EMISSIONS
VERTICAL POLARIZATION

ELITE ELECTRONIC ENGINEERING CO

MKR \sim 1.010 MHz
-1.50 dB

hp REF -5.1 dBm

ATTEN 10 dB

10 dB/

MANUFACTURER

MODEL : REMOTE SPEAKER MICROPHONE

SERIAL No. : NONE ASSIGNED

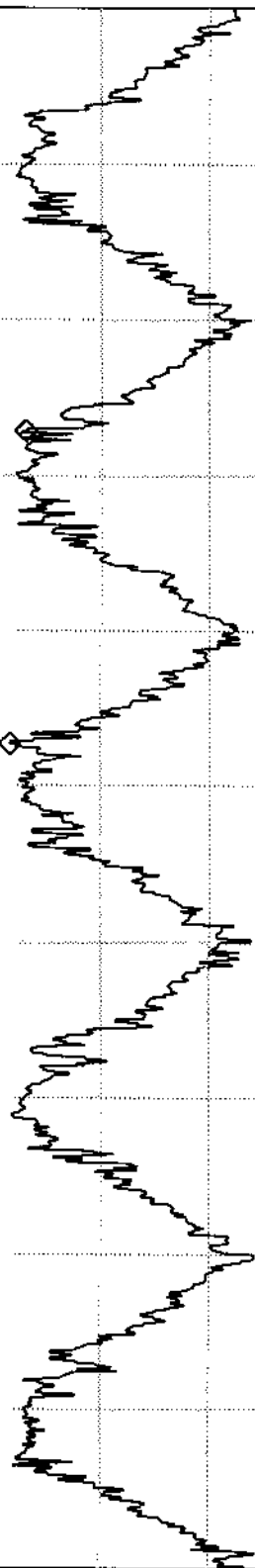
TEST PERFORMED : FCC-15.247 CARRIER FREQ SEPARATION

MODE : NORMAL OPERATION

NOTES : FULL POWER

D. CROWDER
25 Apr 2001
14:31:48

DL -50.9
dBm



Carrier Frequency Separation = 1.0 MHz

SPAN 5.00 MHz
SWP 20.0 msec

VBW 1 MHz

CENTER 2.441 00 GHz
RES BW 100 kHz(i)

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E7R 23674

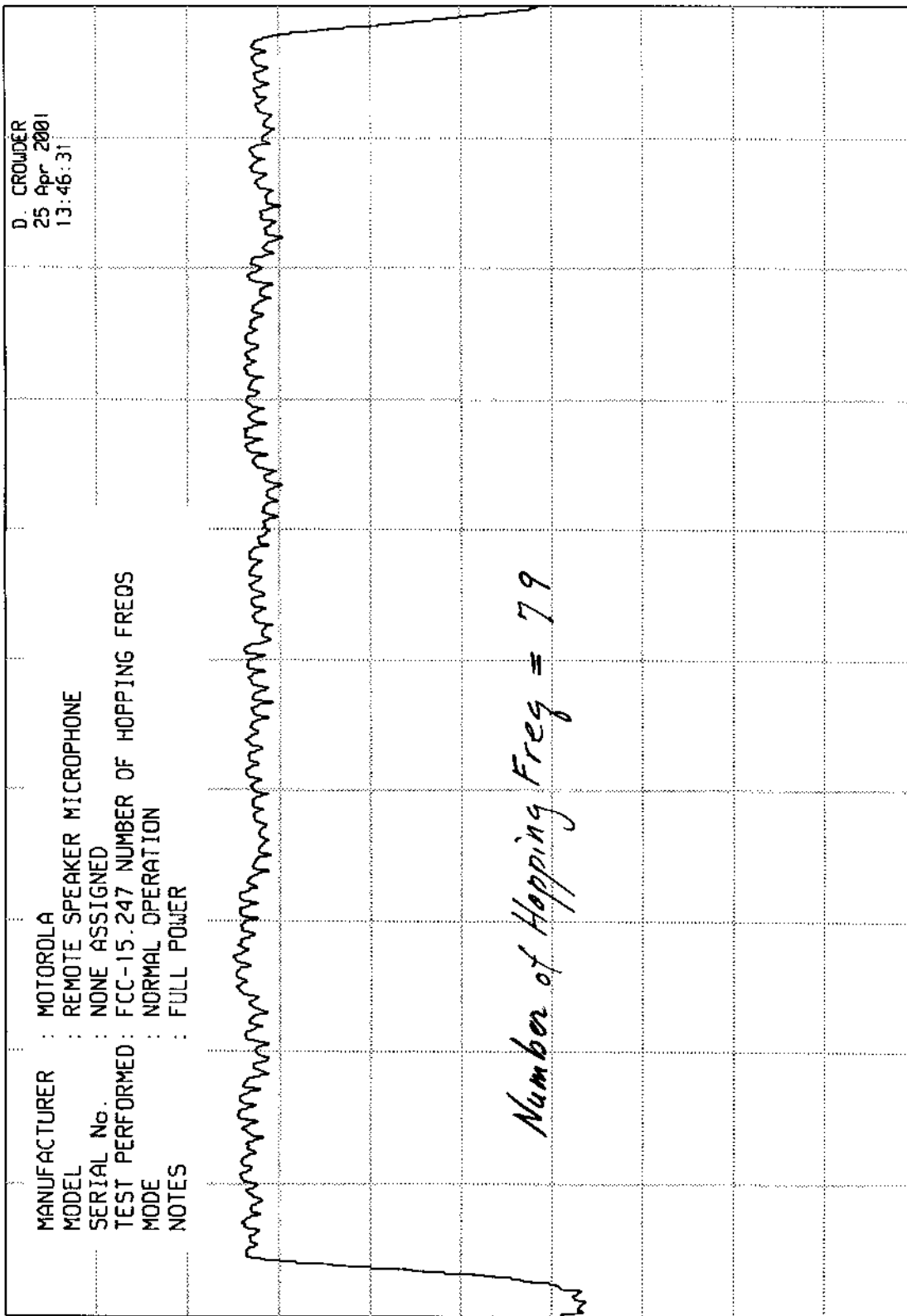
ELITE ELECTRONIC ENGINEERING CO

MKR ^ 13.61 MHz
30.20 dB

hp

REF 5.4 dBm

ATTEN 20 dB



ETR 23679

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CENTER 2.440 4 GHz

RES BW 1 MHz (i)

UBW 3 MHz

SPAN 85.1 MHz

SWP 20.0 msec

ELITE ELECTRONIC ENGINEERING CO

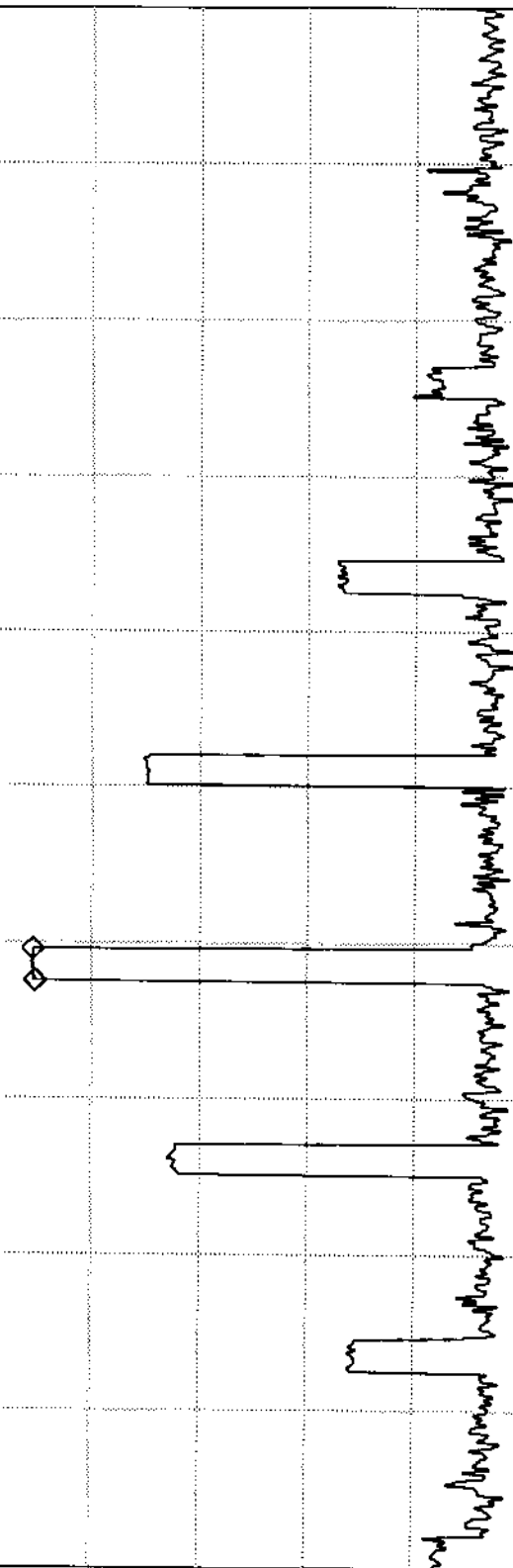
hp REF -5.1 dBm ATTN 10 dB MKR ^ 424.0 usec 0.20 dB

10 dB/

DL -50.9 dBm

MANUFACTURER : MOTOROLA
 MODEL : REMOTE SPEAKER MICROPHONE
 SERIAL No. : NONE ASSIGNED
 TEST PERFORMED : FCC-15.247 DWELL TIME
 MODE : NORMAL OPERATION
 NOTES : FULL POWER

D. CROWDER
 * 25 Apr 2001
 14:47:37



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CENTER 2.441 000 000 GHz RES BW 1 MHz (i) SPAN 0 Hz SWP 20.2 msec VBW 3 MHz

ELITE ELECTRONIC ENGINEERING CO

ETR 23679

hp MKR ^ 100.0 msec
-0.20 dB

REF -5.1 dBm

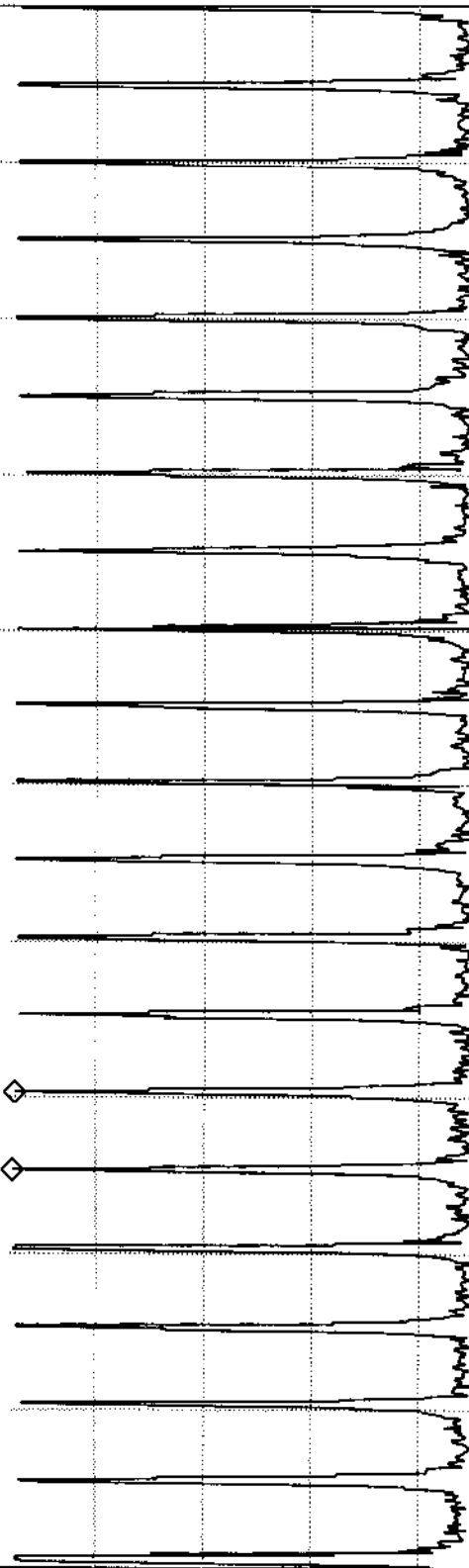
ATTEN 10 dB

10 dB/

MANUFACTURER : MOTOROLA
MODEL : REMOTE SPEAKER MICROPHONE
SERIAL No. : NONE ASSIGNED
TEST PERFORMED : FCC-15.247 Dwell TIME
MODE : NORMAL OPERATION
NOTES : FULL POWER

D. CROWDER
25 Apr 2001
14:49:30

DL -50.9
dBm



average time between hops = 100 msec

dwell time = $\frac{424 \text{ msec/hop} \times 30 \text{ sec}}{100 \text{ msec/hop}} = 0.13 \text{ sec}$

CENTER 2.441 000 000 GHz
RES BW 1 MHz (1)

UBW 3 MHz

SPAN 0 Hz
SWP 2.00 sec

ELITE ELECTRONIC ENGINEERING CO

h_p 10 dB/

REF -13.2 dBm

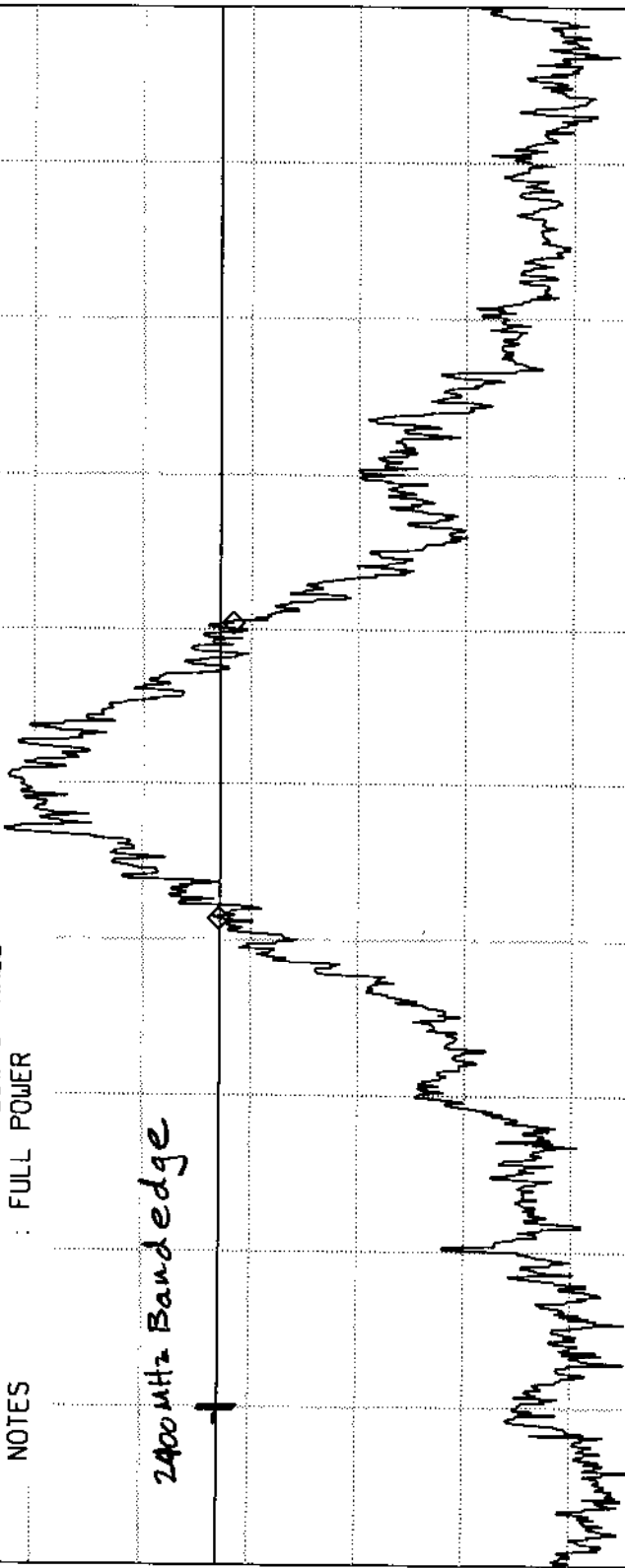
ATTEN 10 dB

DL -50.4 dBm

MANUFACTURER : MOTOROLA
 MODEL : REMOTE SPEAKER MICROPHONE
 SERIAL No. : NONE ASSIGNED
 TEST PERFORMED : FCC-15.247 20 dB BANDWIDTH
 MODE : Tx AT LOW CHANNEL
 NOTES : FULL POWER

D. CROWDER
 25 Apr 2001
 13:14:06

2400MHz Bandedge



SPAN 5.00 MHz
 SWP 375 msec

VBW 100 kHz

CENTER 2.402 00 GHz
 RES BW 10 kHz (1)

ETR 23679

ELITE ELECTRONIC ENGINEERING CO

h_p MKR ^ 910 kHz
-0.20 dB

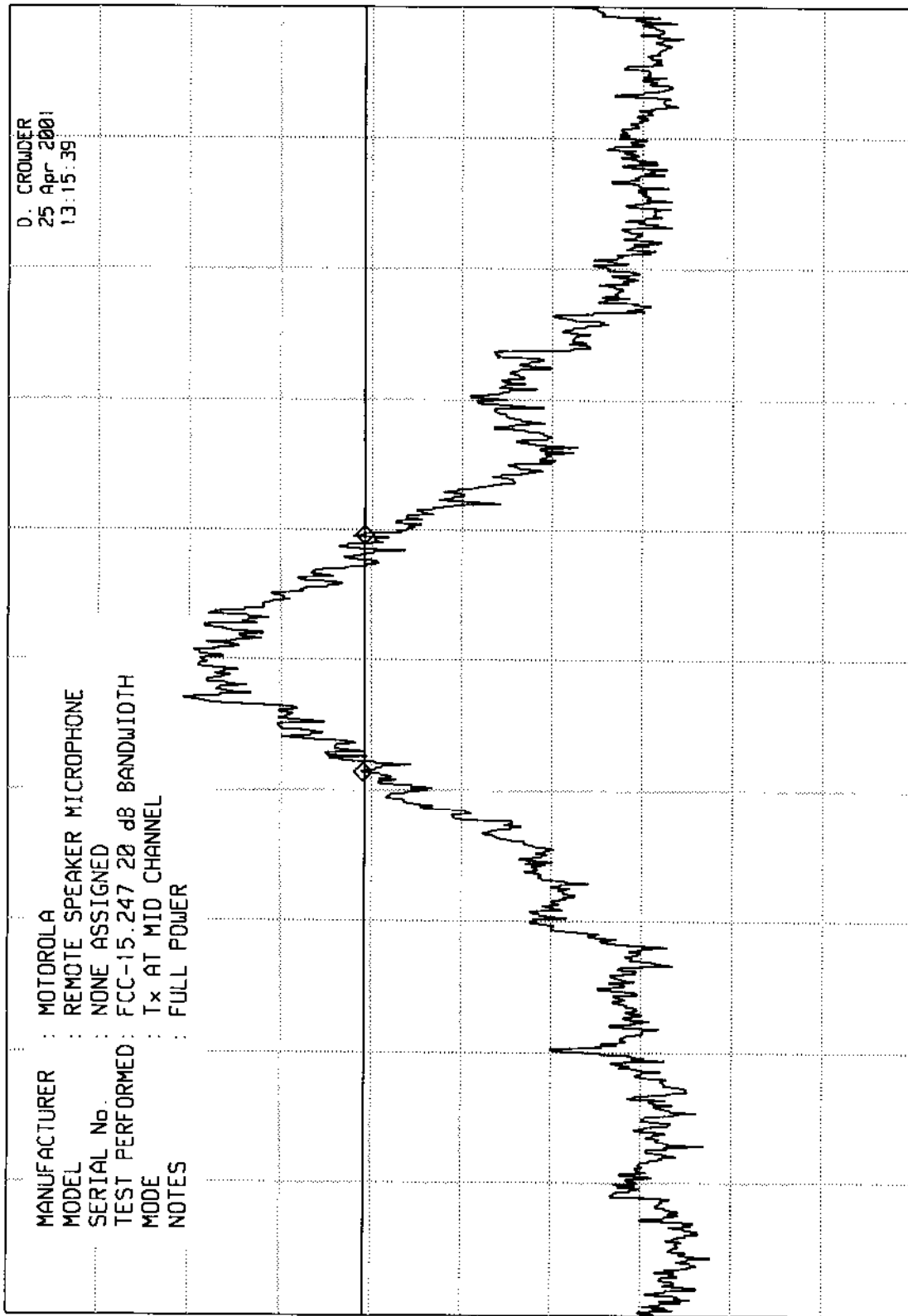
REF -13.2 dBm ATTEN 10 dB

10 dB/

DL -52.5
dBm

MANUFACTURER : MOTOROLA
MODEL : REMOTE SPEAKER MICROPHONE
SERIAL No. : NONE ASSIGNED
TEST PERFORMED : FCC-15.247 20 dB BANDWIDTH
MODE : Tx AT MID CHANNEL
NOTES : FULL POWER

D. CROWDER
25 Apr 2001
13:15:39



SPAN 5.00 MHz
SWP 375 msec

VBW 100 kHz

CENTER 2.441 00 GHz
RES BW 10 kHz(1)

ETR 23679

ELITE ELECTRONIC ENGINEERING CO

h_p MKR ^ 920 kHz
-3.80 dB

REF -13.2 dBm ATTEN 10 dB

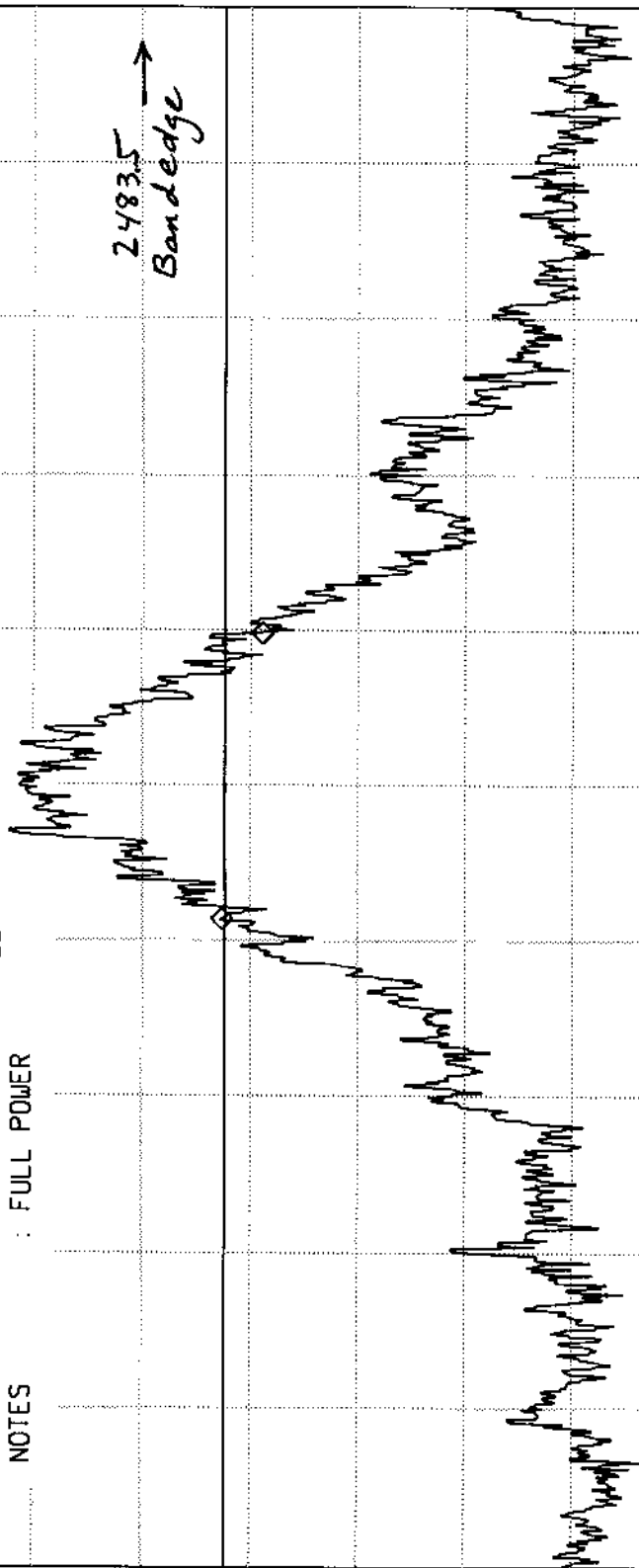
10 dB/

MANUFACTURER : MOTOROLA
MODEL : REMOTE SPEAKER MICROPHONE
SERIAL No. : NONE ASSIGNED
TEST PERFORMED : FCC-15.247 20 dB BANDWIDTH
MODE : Tx AT HIGH CHANNEL
NOTES : FULL POWER

D. CROWDER
25 Apr 2001
13:17:39

DL -50.9
dBm

24835 →
Bandedge



SPAN 5.00 MHz
SWP 375 msec

UBW 100 kHz

CENTER 2.480 00 GHz
RES BW 10 kHz (1)

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ETR 23679



ETR No. 23679
DATA SHEET

PEAK OUTPUT POWER

SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : MOTOROLA
MODEL NO. : REMOTE SPEAKER MODULE
SERIAL NO. : NONE ASSIGNED
NOTES : TRANSMIT AT FULL POWER
TEST DATE : 26 APRIL 2001
TEST DISTANCE : 3m

FREQ. (MHz)	ANT POL	F.I. (dBuV/m)	CONV. F.I. to EIRP	EIRP TOTAL dBm	EIRP TOTAL dBm
2402.0	H	99.0	95.0	4.0	36
	V	99.5	95.0	4.5	36
2441.0	H	98.5	95.0	3.5	36
	V	97.9	95.0	2.9	36
2480.0	H	97.8	95.0	2.8	36
	V	97.7	95.0	2.7	36

CHECKED BY: 

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ELITE ELECTRONIC ENGINEERING CO

MR 2.480 00 GHz
84.70 dBu

hp

REF 97.0 dBu

ATTEN 0 dB

10 dB/

MANUFACTURER

: MOTOROLA

MODEL

: REMOTE SPEAKER MICROPHONE

SERIAL No.

: NONE ASSIGNED

TEST PERFORMED

: FCC 15.247 BAND EDGE COMPLIANCE

MODE

: TUNED TO 2480MHz

NOTES

: MARKER DELTA METHOD

D. CROWDER

3 May 2001

13:14:05

DL

38.7
dBu

ETR 23679

Band-edge Limit

1MHz
Ref val at ~~100kHz~~ BW = 87.3 dBuV/m
General Limit @ 2483.5MHz = 54.0 dBuV/m

Delta
= 33.3 dB at band-edge

CENTER 2.483 5 GHz

RES BW 100 kHz(i)

UBW 1 MHz

SPAN 10.0 MHz

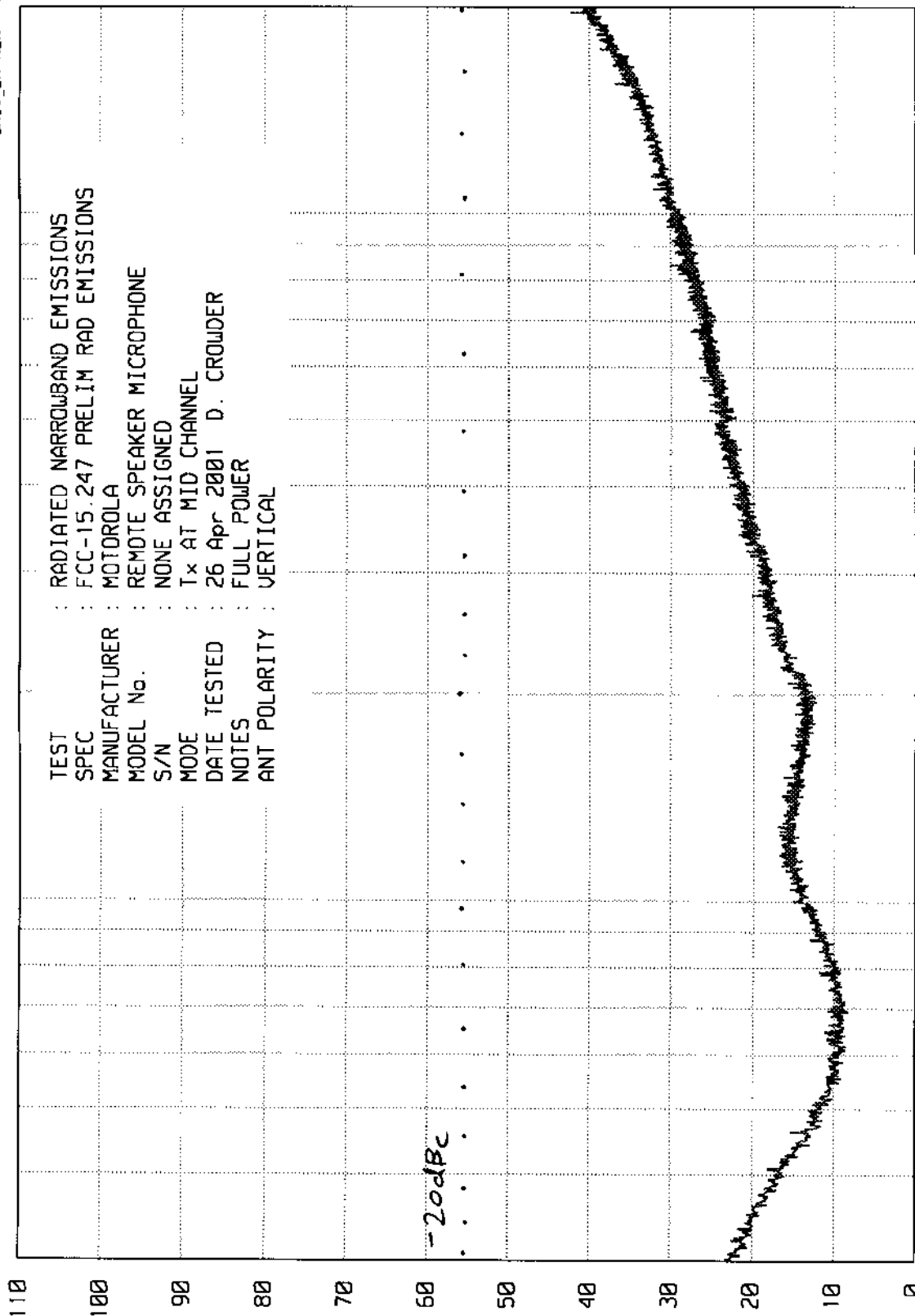
SWP 20.0 msec

5270 02

ELITE ELECTRONIC ENGINEERING Co. Downer's Grove, Ill. 60515

UKR00 01/19/01

UNIT: EH RUN RUN 1



START = 30

FREQUENCY - MHz

STOP = 2000

TEST : RADIATED NARROWBAND EMISSIONS
SPEC : FCC-15.247 PRELIM RAD EMISSIONS
MANUFACTURER : MOTOROLA
MODEL No. : REMOTE SPEAKER MICROPHONE
S/N : NONE ASSIGNED
MODE : 1x AT MID CHANNEL
DATE TESTED : 26 Apr 2001 D. CROWDER
NOTES : FULL POWER
ANT POLARITY : VERTICAL

ETR 23679

RADIATED NARROWBAND EMISSIONS - dBu/m

6230 12

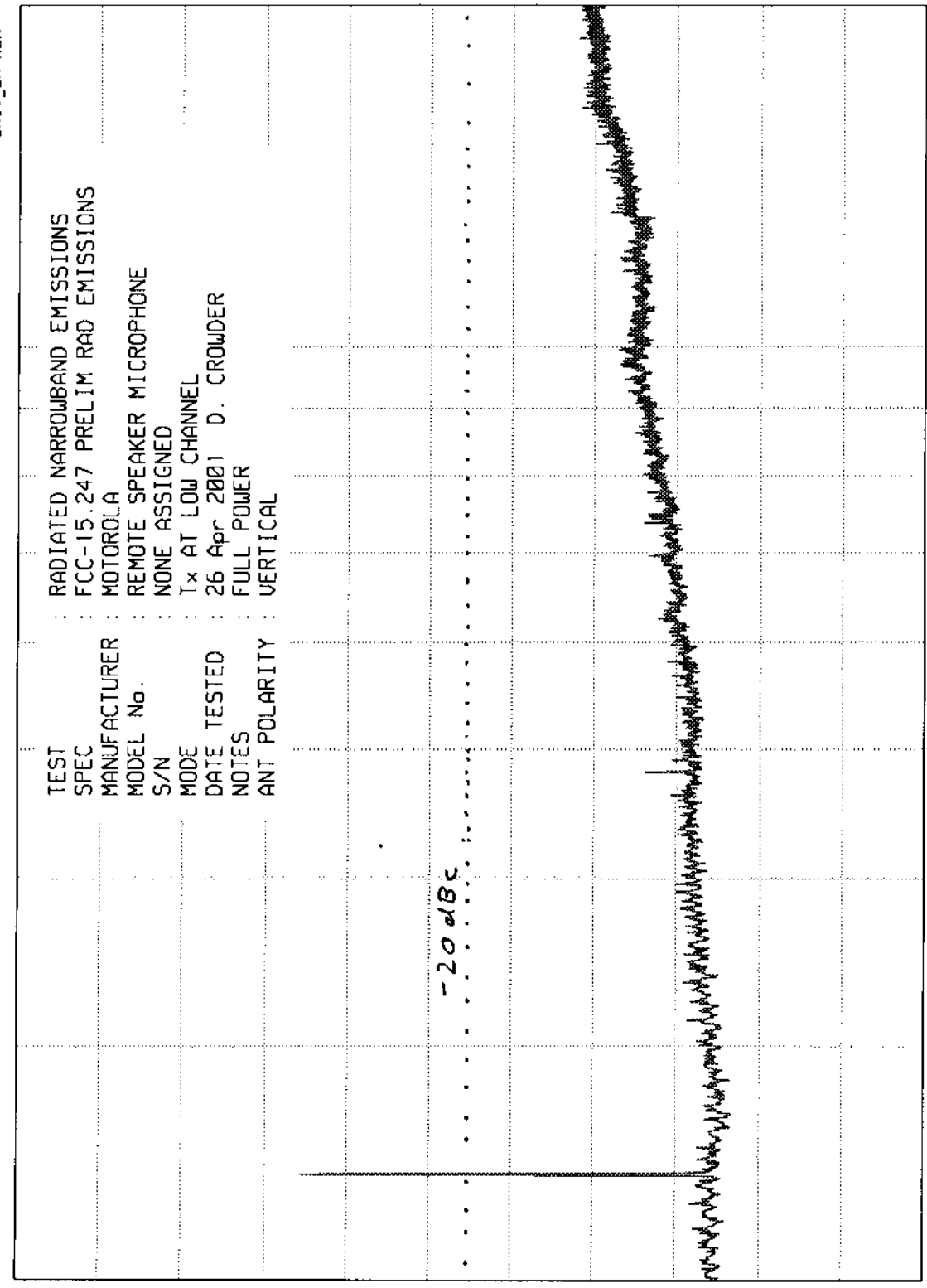
ETR 23679

ELITE ELECTRONIC ENGINEERING Co.
Downers Grove, Ill. 60515

UNITV_EM RUN RUN 1

UKAB 01/19/01

TEST : RADIATED NARROWBAND EMISSIONS
SPEC : FCC-15.247 PRELIM RAD EMISSIONS
MANUFACTURER : MOTOROLA
MODEL No. : REMOTE SPEAKER MICROPHONE
S/N : NONE ASSIGNED
MODE : Tx AT LOW CHANNEL
DATE TESTED : 26 Apr 2001 D. CROWDER
NOTES : FULL POWER
ANT POLARITY : VERTICAL



STOP = 18000

10000

FREQUENCY - MHz

START = 2000

RADIATED NARROWBAND EMISSIONS - dBuV/m

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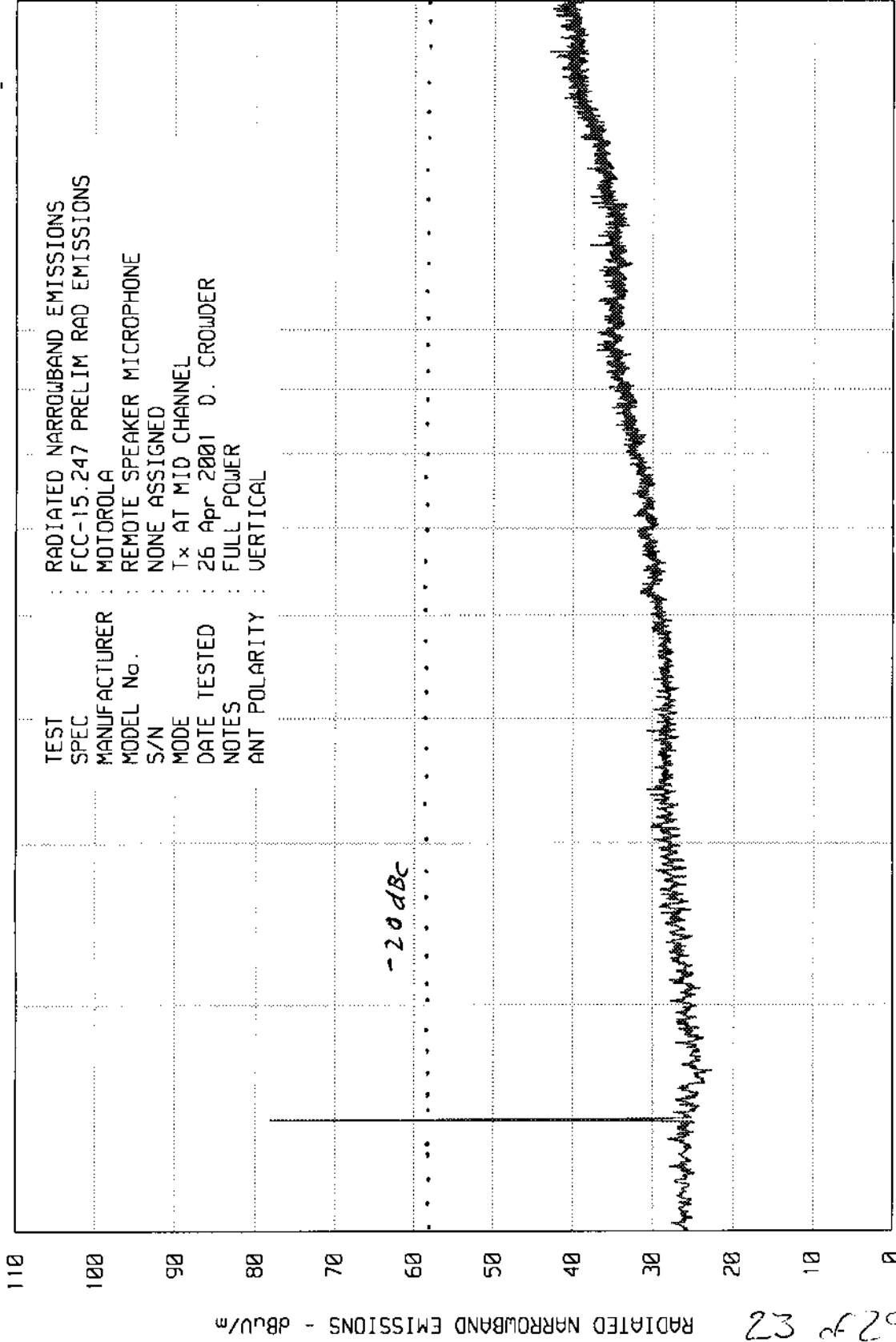
ETR 23679

ELITE ELECTRONIC ENGINEERING Co.

Downers Grove, Ill. 60515

UKA0 01/19/01

UNIT EM RUN RUN 1



STOP = 18000

FREQUENCY - MHz

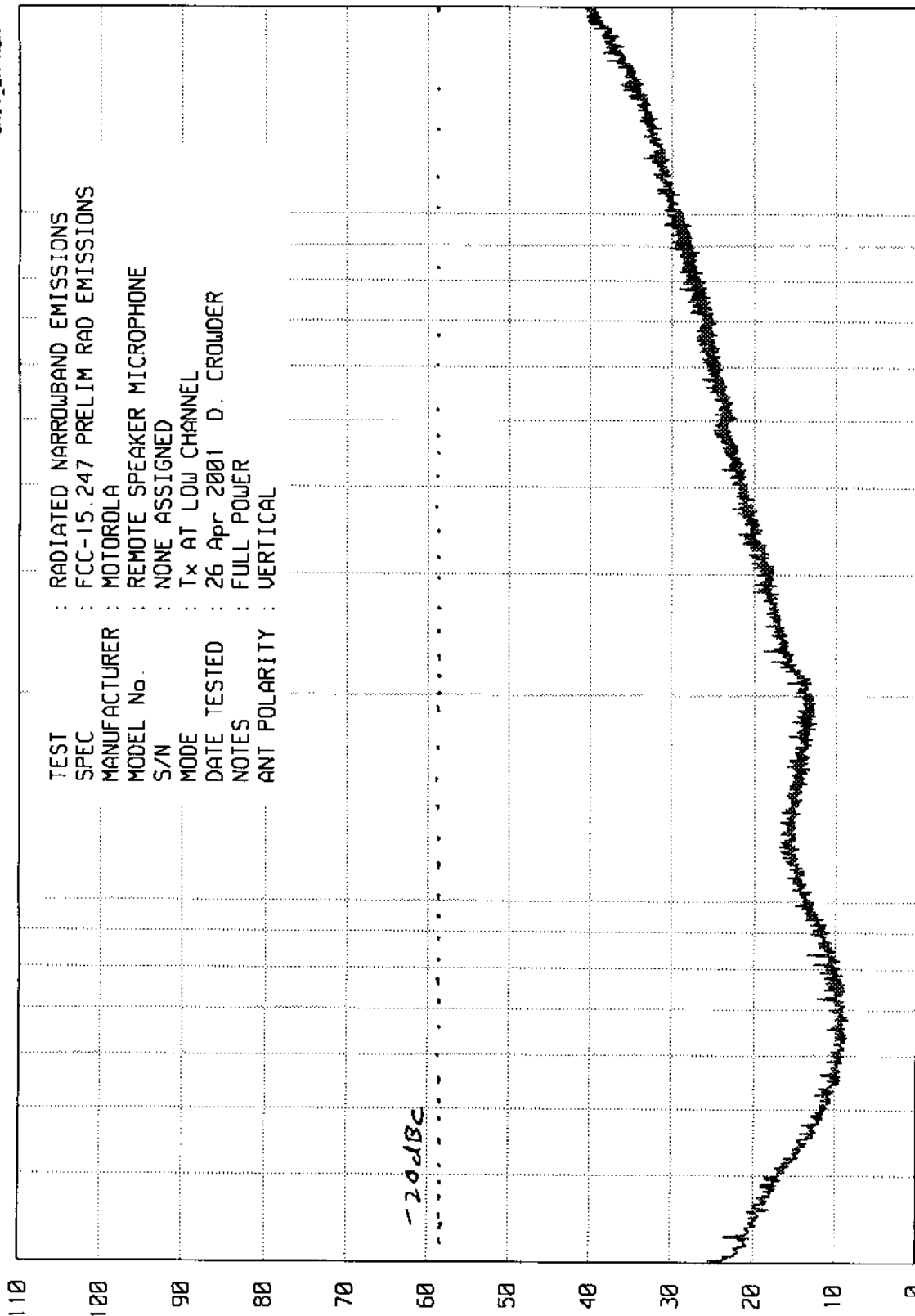
START = 2000

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ELITE ELECTRONIC ENGINEERING Co. Downers Grove, Ill. 60515

UKAB 01/19/81

UNIV_EM RUN RUN 1



START = 30

FREQUENCY - MHz

1000

STOP = 2000

TEST : RADIATED NARROWBAND EMISSIONS
SPEC : FCC-15.247 PRELIM RAD EMISSIONS
MANUFACTURER : MOTOROLA
MODEL No. : REMOTE SPEAKER MICROPHONE
S/N : NONE ASSIGNED
MODE : Tx AT LOW CHANNEL
DATE TESTED : 26 Apr 2001 D. CROWDER
NOTES : FULL POWER
ANT POLARITY : VERTICAL

FTIR 23679

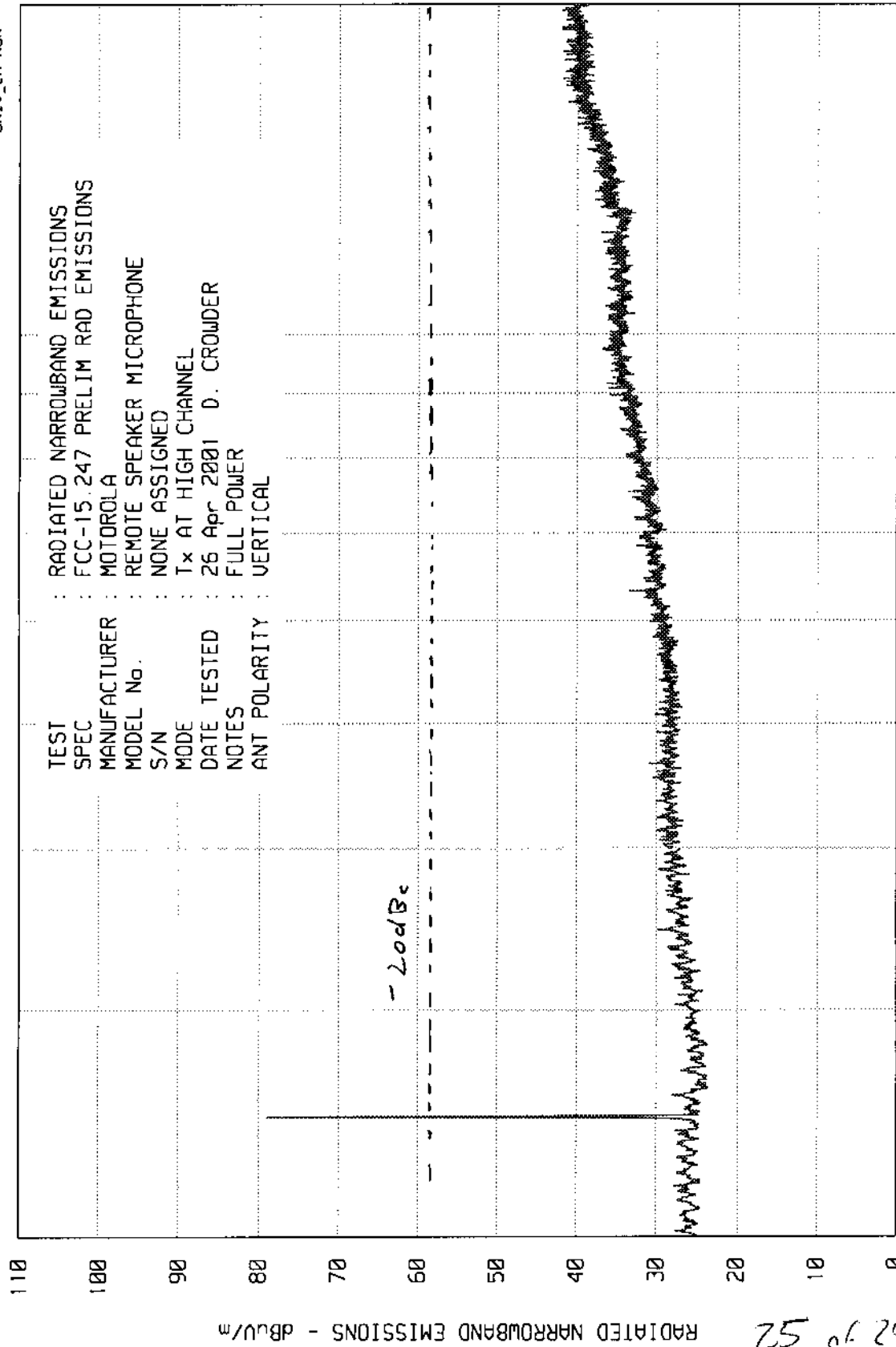
627 74

EE

ELITE ELECTRONIC ENGINEERING Co. Downer's Grove, Ill. 60515

WKA0 01/19/01

UNIT EM RUN RUN 1



START = 2000

FREQUENCY - MHz

10000

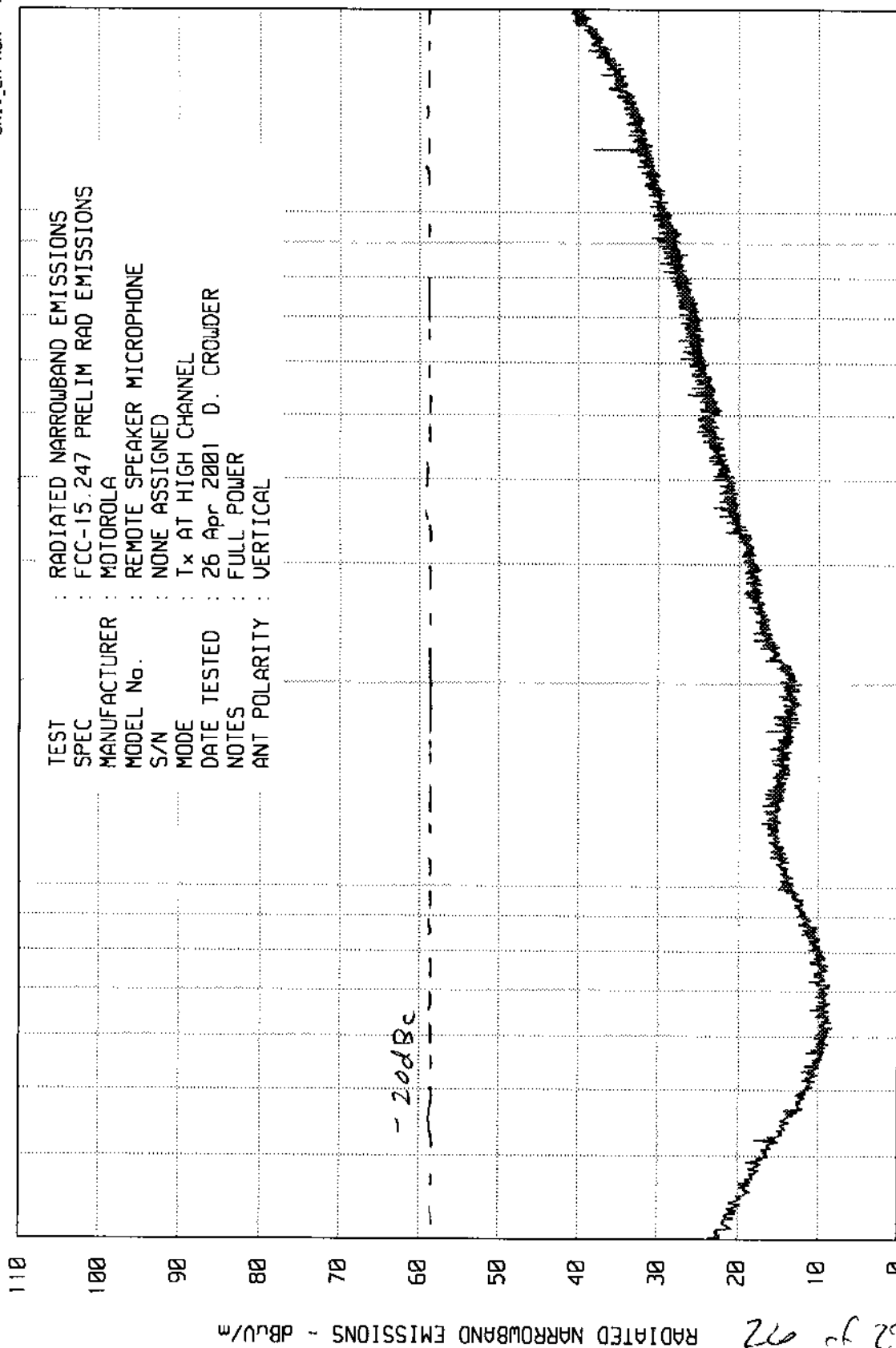
STOP = 18000

ETR 23679

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UKA00 01/19/81

UNIV_EM RUN RUN 1



ETR 23679



ETR No. 23679
DATA SHEET

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM

SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : MOTOROLA
MODEL NO. : REMOTE SPEAKER MODULE
SERIAL NO. : NONE ASSIGNED
NOTES : TRANSMIT AT MID CHANNEL
TEST DATE : 26 APRIL 2001
TEST DISTANCE : 3m

FREQ (MHz)	ANT POL	MTR RDG dBuV	BW RES/VID	ANT FAC dB	CBL FAC dB	PRE AMP dB	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
2441.0	H	102.0	3M/3M	31.8	0.8	36.1	98.5	84139.5	
	V	101.4	3M/3M	31.8	0.8	36.1	97.9	78523.6	
2441.0	H	90.9	1M/10	31.8	0.8	36.1	87.4	23442.3	
	V	90.5	1M/10	31.8	0.8	36.1	87.0	22387.2	
4882.0	H	32.3	1M/10	35.2	1.3	35.2	33.6	47.9	500.0
	V	33.2	1M/10	35.2	1.3	35.2	34.5	53.1	500.0
7323.0	H	29.4 AMB	1M/10	38.0	1.6	35.5	33.5	47.3	500.0
	V	29.1 AMB	1M/10	38.0	1.6	35.5	33.2	45.7	500.0
12205.0	H	27.8 AMB	1M/10	41.4	2.0	34.8	36.4	66.1	500.0
	V	27.0 AMB	1M/10	41.4	2.0	34.8	35.6	60.3	500.0
19528.0	H	12.7 AMB	1M/10	40.3			53.0	446.7	500.0
	V	12.7 AMB	1M/10	40.3			53.0	446.7	500.0

* - Peak level < 20dB above average in all cases.

* - Modulation on but not hopping.

CHECKED BY: 

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ETR No. 23679
DATA SHEET

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM

SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : MOTOROLA
MODEL NO. : REMOTE SPEAKER MODULE
SERIAL NO. : NONE ASSIGNED
NOTES : TRANSMIT AT LOW CHANNEL
TEST DATE : 26 APRIL 2001
TEST DISTANCE : 3m

FREQ (MHz)	ANT POL	MTR RDG dBuV	BW RES/VID	ANT FAC dB	CBL FAC dB	PRE AMP dB	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
2402.0	H	102.5	3M/3M	31.8	0.8	36.1	99.0	89125.1	
	V	103.0	3M/3M	31.8	0.8	36.1	99.5	94406.1	
2402.0	H	92.8	1M/10	31.8	0.8	36.1	89.3	29174.3	
	V	91.9	1M/10	31.8	0.8	36.1	88.4	26302.7	
4804.0	H	30.7	1M/10	35.2	1.3	35.2	32.0	39.8	500.0
	V	34.6	1M/10	35.2	1.3	35.2	35.9	62.4	500.0
12010.0	H	27.5 AMB	1M/10	41.4	2.0	34.8	36.1	63.8	500.0
	V	32.9 AMB	1M/10	41.4	2.0	34.8	41.5	118.9	500.0
19216.0	H	12.7 AMB	1M/10	40.3			53.0	446.7	500.0
	V	12.7 AMB	1M/10	40.3			53.0	446.7	500.0

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* - Modulation on but not hopping.

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ETR No. 23679
DATA SHEET

RADIATED EMISSION MEASUREMENTS IN A 3m ANECHOIC ROOM

SPECIFICATION : FCC-15C (15.247)
MANUFACTURER : MOTOROLA
MODEL NO. : REMOTE SPEAKER MODULE
SERIAL NO. : NONE ASSIGNED
NOTES : TRANSMIT AT HIGH CHANNEL
TEST DATE : 26 APRIL 2001
TEST DISTANCE : 3m

FREQ (MHz)	ANT POL	MTR RDG dBuV	BW RES/VID	ANT FAC dB	CBL FAC dB	PRE AMP dB	TOTAL dBuV/m	TOTAL uV/m	LIMIT uV
2480.0	H	101.3	3M/3M	31.8	0.8	36.1	97.8	77624.7	
	V	101.2	3M/3M	31.8	0.8	36.1	97.7	76736.1	
2480.0	H	90.8	1M/10	31.8	0.8	36.1	87.3	23173.9	
	V	89.8	1M/10	31.8	0.8	36.1	86.3	20653.8	
4960.0	H	31.3	1M/10	35.2	1.3	35.2	32.6	42.7	500.0
	V	30.8	1M/10	35.2	1.3	35.2	32.1	40.3	500.0
7440.0	H	30.1 AMB	1M/10	38.0	1.6	35.5	34.2	51.3	500.0
	V	30.1 AMB	1M/10	38.0	1.6	35.5	34.2	51.3	500.0
12400.0	H	27.2 AMB	1M/10	41.4	2.0	34.8	35.8	61.7	500.0
	V	27.6 AMB	1M/10	41.4	2.0	34.8	36.2	64.6	500.0
19840.0	H	12.7 AMB	1M/10	40.3			53.0	446.7	500.0
	V	12.7 AMB	1M/10	40.3			53.0	446.7	500.0
22320.0	H	12.5 AMB	1M/10	40.4			52.9	441.6	500.0
	V	12.5 AMB	1M/10	40.4			52.9	441.6	500.0

* - Peak level < 20dB above average in all cases.

* - Modulation on but not hopping.

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