SUMMARY OF RESULTS

The SuperTel Technologies 900 MHZ Spread Spectrum Digital Cordless Phone, EnGenius SN-900 Ultra, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15 Subpart C.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15 Subpart C. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Comprises of a base station that is powered by an AC wall adapter and a handset that is powered by a Ni-Cad battery pack.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ±4dB measurement uncertainty.

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device:

Phone Base
Manuf: SuperTel
Model: Engenius SN-900 Ultra
Serial: 76B00222
FCC ID: Pending

REPORT OF MEASUREMENTS

The following Tables 1 and 2 report the highest emissions levels recorded during the tests performed on the 900 MHZ Spread Spectrum Digital Cordless Phone, EnGenius SN-900 Ultra. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Six Highest Radiated Emission Levels - Vertical Polarity Orientation

FREQUENCY MHz	METER READING DBμV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
5566.795	30.2	35.4	-32.9	12.4		45.2	54.0	-8.8	VA
7320.136	30.0	37.0	-34.2	16.3		49.1	54.0	-4.9	VA
7422.157	29.8	37.3	-34.0	15.7		48.8	54.0	-5.2	VA
8119.737	26.1	38.2	-33.8	16.2		46.7	54.0	-7.3	VA
8235.165	29.4	37.8	-33.7	16.2		49.7	54.0	-4.3	VA
8349.883	28.6	37.4	-33.7	16.8		49.1	54.0	-4.9	VA

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247/15.209
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The system is configured according to ANSI C63.4. The phone is manually switched between channel 1, 71, and 141 and is constantly transmitting. The EUT is orientated in the vertical polarity. The temperature is 72 degrees F and humidity 58%. The antenna on this system is antenna #1.

Table 2: Six Highest Radiated Emission Levels - Side & Back Orientation									
FREQUENCY MHz	METER READING dBμV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBμV/m	SPEC LIMIT dBμV/m	MARGIN dB	NOTES
5566.763	29.8	35.4	-32.9	12.5		44.8	54.0	-9.2	HA
7320.147	30.2	37.0	-34.2	16.3		49.3	54.0	-4.7	HA
7422.237	29.2	37.3	-34.0	15.7		48.2	54.0	-5.8	HA
8118.997	26.3	38.2	-33.8	16.2		46.9	54.0	-7.1	HA
8235.165	28.6	37.8	-33.7	16.2		48.9	54.0	-5.1	HA
8349.883	28.1	37.4	-33.7	16.8		48.6	54.0	-5.4	HA

Test Method: ANSI C63.4 1992
Spec Limit : FCC 15.247 & 15.209
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

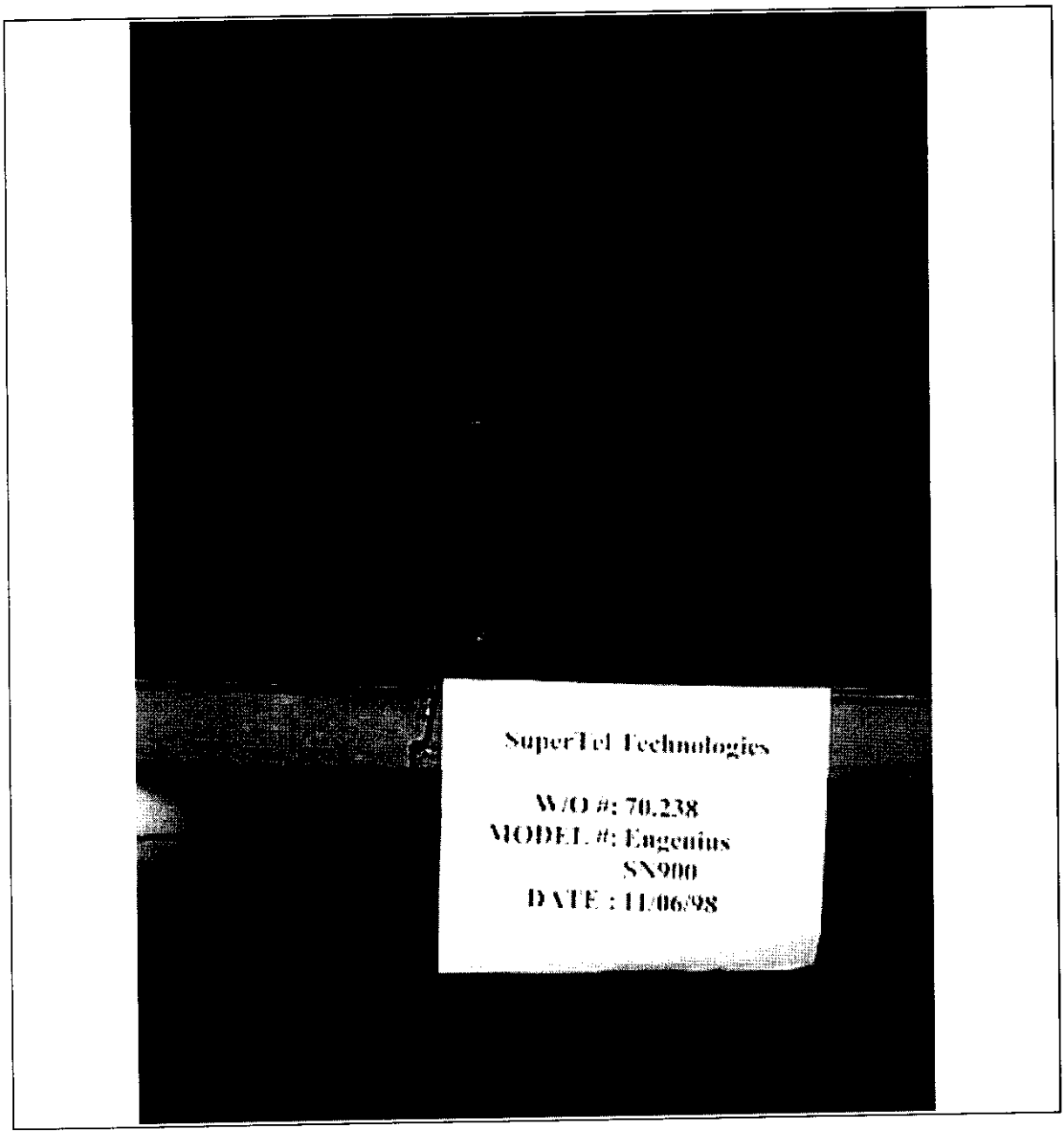
COMMENTS: The system is configured according to ANSI C63.4. The phone is manually switched between channel 1, 71, and 141 and is constantly transmitting. The EUT is orientated on its side and back. The temperature is 72 degrees F and humidity 58%. The antenna on this system is antenna #1.

TABLE A

LIST OF TEST EQUIPMENT

1. Spectrum Analyzer, Hewlett Packard, Model No. 8593EM, S/N 362A00159.
2. Preamp, Hewlett Packard, Model No. 83017A, S/N 3123A00321.
3. Horn Antenna, EMCO, Model No. 3115, S/N .3413.
4. Waveguide (CKC#2271).
5. Waveguide (CKC#2272).
6. Waveguide (CKC#2273).
7. Waveguide (CKC#2274).

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

APPENDIX B

MEASUREMENT DATA SHEETS

Test Location: CKC LABORATORIES INC. • 22105 Wilson River Hwy, Site A • Tillamook, Oregon 97141 • (800) 500-4EMC

Customer: **SuperTel**
Specification: **FCC15.247 & 15.209**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel
Model: EnGenius SN900 Ultra
S/N: 78B17543

Date: Nov-06-98
Time: 16:42
Sequence#: 1

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel	EnGenius SN900 Ultra	78B17543

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel	Engenius SN-900 Ultra	76B00222

Test Conditions / Notes:

The system is configured according to ANSI C63.4. The phone is manually switched between channel 1, 71, and 141 and is constantly transmitting. The EUT is orientated in the vertical polarity. The temperature is 72 degrees F and humidity 58%. The antenna on this system is antenna #1.

Measurement Data: Sorted by Margin — Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn 3.95 dB	Cable 3.95 dB	Cbl-2 5.85G dB	26.5 dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8235.165	29.4	+37.8	+2.1	+14.1	-33.7	+0.0	49.7	54.0	-4.3	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 71										
^	8235.161	39.0	+37.8	+2.1	+14.1	-33.7	+0.0	59.3	54.0	+5.3	Vert
			+0.0	+0.0	+0.0						
	Channel 71										
3	8349.883	28.6	+37.4	+2.2	+14.6	-33.7	+0.0	49.1	54.0	-4.9	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 141										
^	8349.880	39.6	+37.4	+2.2	+14.6	-33.7	+0.0	60.1	54.0	+6.1	Vert
			+0.0	+0.0	+0.0						
	Channel 141										
5	7320.136	30.0	+37.0	+3.0	+13.2	-34.2	+0.0	49.1	54.0	-4.9	Vert
	Average		+0.0	+0.0	+0.1						
	Channel 71										
^	7320.147	41.8	+37.0	+3.0	+13.2	-34.2	+0.0	60.9	54.0	+6.9	Vert
			+0.0	+0.0	+0.1						
	Channel 71										
7	7422.157	29.8	+37.3	+2.5	+13.2	-34.0	+0.0	48.8	54.0	-5.2	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 141										

^	7422.195	43.2	+37.3	+2.5	+13.2	-34.0	+0.0	62.2	54.0	+8.2	Vert
			+0.0	+0.0	+0.0						
	Channel 141										
9	8119.737	26.1	+38.2	+1.9	+14.3	-33.8	+0.0	46.7	54.0	-7.3	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 1										
^	8119.788	35.8	+38.2	+1.9	+14.3	-33.8	+0.0	56.4	54.0	+2.4	Vert
			+0.0	+0.0	+0.0						
	Channel 1										
11	5566.795	30.2	+35.4	+1.1	+11.2	-32.9	+0.0	45.2	54.0	-8.8	Vert
	Average		+0.0	+0.0	+0.2						
	Channel 141										
^	5566.765	39.2	+35.4	+1.1	+11.2	-32.9	+0.0	54.2	54.0	+0.2	Vert
			+0.0	+0.0	+0.2						
	Channel 141										
13	915.100	137.9	+24.7	+0.5	+4.0	-40.1	+0.0	127.0	137.0	-10.0	Vert
			+0.0	+0.0	+0.0						
	Channel 71										
14	902.093	137.8	+24.7	+0.4	+3.9	-40.1	+0.0	126.7	137.0	-10.3	Vert
			+0.0	+0.0	+0.0						
	Channel 1										
15	5490.173	27.4	+35.2	+1.3	+11.1	-32.9	+0.0	42.3	54.0	-11.7	Vert
	Average		+0.0	+0.0	+0.2						
	Channel 71										
^	5490.157	37.3	+35.2	+1.3	+11.1	-32.9	+0.0	52.2	54.0	-1.8	Vert
			+0.0	+0.0	+0.2						
	Channel 71										
17	927.729	135.8	+24.7	+0.5	+4.0	-40.0	+0.0	125.0	137.0	-12.0	Vert
			+0.0	+0.0	+0.0						
	Channel 141										
18	3608.480	29.0	+33.0	+1.2	+9.4	-32.6	+0.0	40.6	54.0	-13.4	Vert
	Average		+0.6	+0.0	+0.0						
	Channel 1										
^	3608.488	38.9	+33.0	+1.2	+9.4	-32.6	+0.0	50.5	54.0	-3.5	Vert
			+0.6	+0.0	+0.0						
	Channel 1										
20	3711.284	29.2	+33.2	+1.4	+9.7	-33.7	+0.0	39.8	54.0	-14.2	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 141										
^	3711.295	39.5	+33.2	+1.4	+9.7	-33.7	+0.0	50.2	54.0	-3.8	Vert
			+0.0	+0.0	+0.0						
	Channel 141										
22	5412.608	24.2	+35.2	+1.5	+11.0	-33.2	+0.0	38.7	54.0	-15.3	Vert
	Average		+0.0	+0.1	+0.0						
	Channel 1										
^	5412.620	34.5	+35.2	+1.5	+11.0	-33.2	+0.0	49.0	54.0	-5.0	Vert
			+0.0	+0.1	+0.0						
	Channel 1										
24	2783.346	31.1	+31.6	+1.2	+7.4	-34.3	+0.0	37.0	54.0	-17.0	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 141										

^	2783.315	42.5	+31.6	+1.2	+7.4	-34.3	+0.0	48.4	54.0	-5.6	Vert
			+0.0	+0.0	+0.0						
	Channel 141										
26	2706.473	31.0	+31.5	+1.1	+7.1	-34.8	+0.0	36.1	54.0	-17.9	Vert
	Average		+0.2	+0.0	+0.0						
	Channel 1										
^	2706.408	36.6	+31.5	+1.1	+7.1	-34.8	+0.0	41.7	54.0	-12.3	Vert
			+0.2	+0.0	+0.0						
	Channel 1										
28	2744.915	29.7	+31.5	+1.1	+7.2	-34.8	+0.0	34.3	54.0	-19.7	Vert
	Average		-0.4	+0.0	+0.0						
	Channel 71										
^	2744.917	39.5	+31.5	+1.1	+7.2	-34.8	+0.0	44.1	54.0	-9.9	Vert
			-0.4	+0.0	+0.0						
	Channel 71										
30	6405.107	53.3	+36.2	+1.9	+12.2	-34.2	+0.0	72.3	107.0	-34.7	Vert
			+0.0	+0.0	+2.9						
	Channel 71										
31	6314.600	54.5	+36.2	+2.0	+12.0	-34.4	+0.0	72.1	107.0	-34.9	Vert
			+0.0	+0.0	+1.8						
	Channel 1										
32	6494.280	42.1	+36.1	+2.2	+12.6	-33.2	+0.0	64.7	107.0	-42.3	Vert
			+0.0	+0.0	+4.9						
	Channel 141										
33	7216.864	29.1	+36.7	+3.4	+13.4	-34.0	+0.0	48.6	107.0	-58.4	Vert
	Average		+0.0	+0.0	+0.0						
	Channel 1										
^	7216.808	38.5	+36.7	+3.4	+13.4	-34.0	+0.0	58.0	107.0	-49.0	Vert
			+0.0	+0.0	+0.0						
	Channel 1										

Test Location: CKC LABORATORIES INC. • 22105 Wilson River Hwy, Site A • Tillamook, Oregon 97141 • (800) 500-4EMC

Customer: **SuperTel**
Specification: **FCC15.247 & 15.209**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel
Model: EnGenius SN900 Ultra
S/N: 78B17543

Date: Nov-06-98
Time: 16:42
Sequence#: 1

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel	EnGenius SN900 Ultra	78B17543

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel	Engenius SN-900 Ultra	76B00222

Test Conditions / Notes:

The system is configured according to ANSI C63.4. The phone is manually switched between channel 1, 71, and 141 and is constantly transmitting. The EUT is orientated on its side and back. The temperature is 72 degrees F and humidity 58%. The antenna on this system is antenna #1.

Measurement Data: Sorted by Margin — Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Cbl-2 5.85G dB	26.5 dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	7320.147	30.2	+37.0	+3.0	+13.2	-34.2	+0.0	49.3	54.0	-4.7	Horiz
	Average				+0.1						
	Channel 71										
2	8235.165	28.6	+37.8	+2.1	+14.1	-33.7	+0.0	48.9	54.0	-5.1	Horiz
	Average				+0.0						
	Channel 71										
3	8349.883	28.1	+37.4	+2.2	+14.6	-33.7	+0.0	48.6	54.0	-5.4	Horiz
	Average				+0.0						
	Channel 141										
4	7422.237	29.2	+37.3	+2.5	+13.2	-34.0	+0.0	48.2	54.0	-5.8	Horiz
	Average				+0.0						
	Channel 141										
5	8118.997	26.3	+38.2	+1.9	+14.3	-33.8	+0.0	46.9	54.0	-7.1	Horiz
	Average				+0.0						
	Channel 1										

6	5566.763	29.8	+35.4	+1.1	+11.2	-32.9	+0.0	44.8	54.0	-9.2	Horiz
	Average				+0.2						
	Channel 141										
7	902.102	137.3	+24.7	+0.4	+3.9	-40.1	+0.0	126.2	137.0	-10.8	Horiz
					+0.0						
	Channel 1										
8	915.110	136.8	+24.7	+0.5	+4.0	-40.1	+0.0	125.9	137.0	-11.1	Horiz
					+0.0						
	Channel 71										
9	927.732	135.7	+24.7	+0.5	+4.0	-40.0	+0.0	124.9	137.0	-12.1	Horiz
					+0.0						
	Channel 141										

SN-900U Handset Antenna Connector

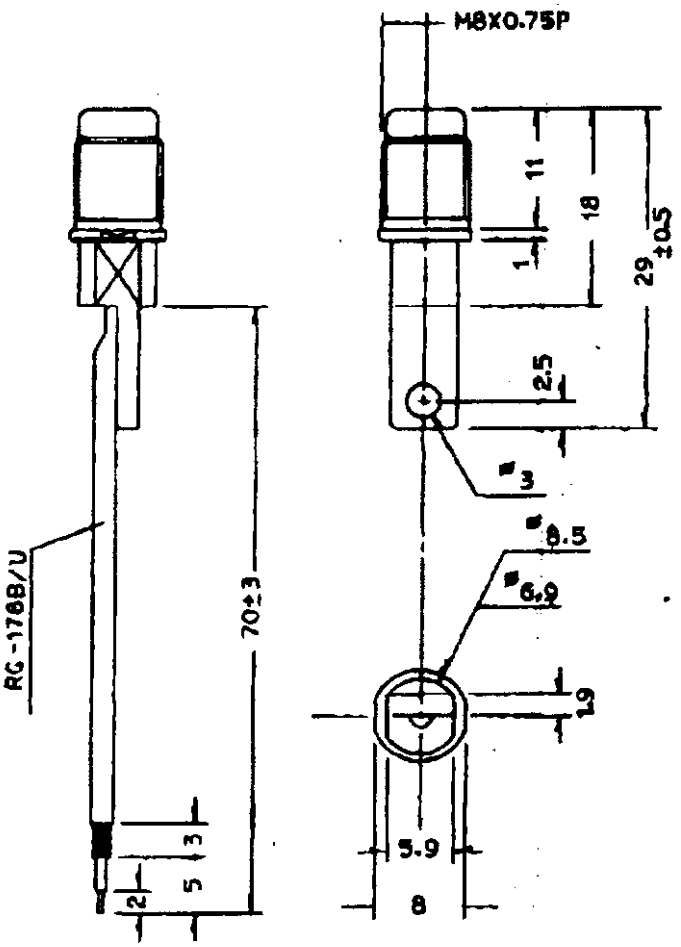


FIG. 1 APPEARANCE/DIMENSION

SN-900U Handset Antenna

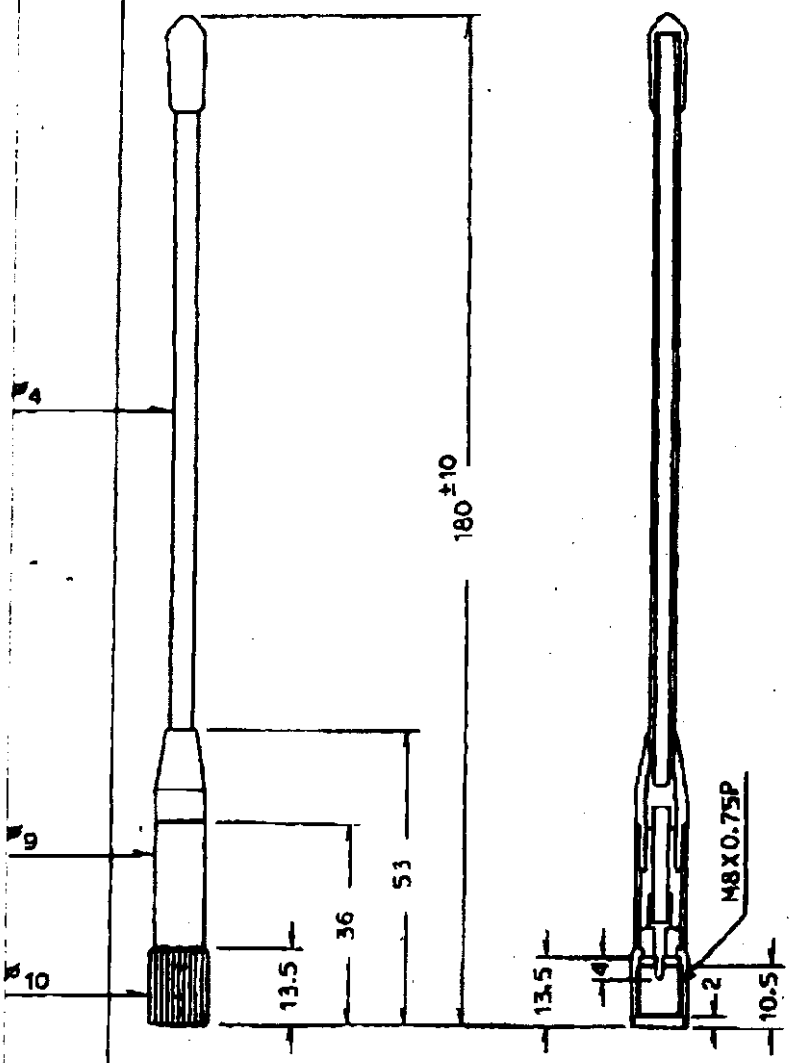


FIG. 1 APPEARANCE/DIMENSION

SN-900U Base Antenna Connector

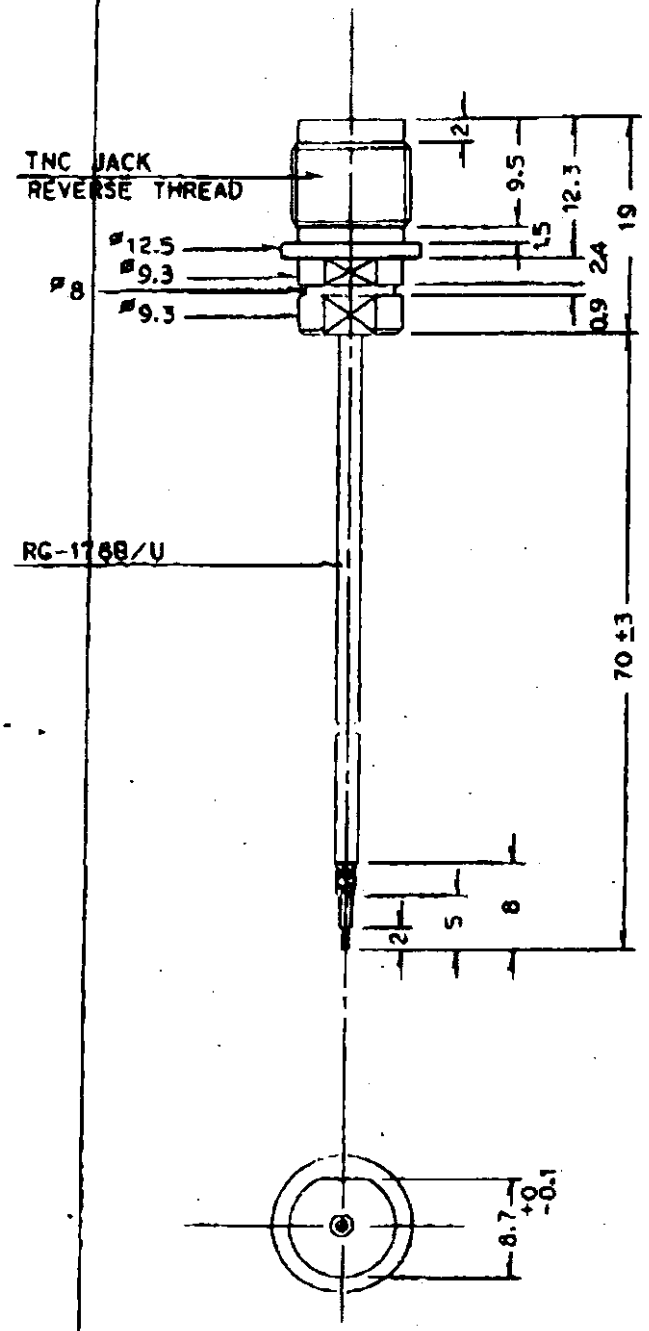


FIG. 1 APPEARANCE / DIMENSION

ITS Intertek Testing Services

Specific Absorption Rate (SAR) Evaluation

Performed on the

900 MHz FHSS Cordless Phone
Model: SN-900 Ultra
for
SuperTel Technologies, Inc.

FCC rule part 2.1093

Date of Test: October 8, 1998

Job #: J98028763a

Total No. of Pages Contained in this Report: 16 + data pages

The results contained in this report were derived from measurements performed on the identified test samples. Any implied performance of other samples on this report is dependent on the representative of the samples tested.

NVLAP®

FCC SAR and ANSI C63.4-1992, Rev. 6/97

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

STT
SuperTel Technologies, Inc.

8660 154th Avenue NE
Redmond, WA 98052
Telephone: (425) 556-1830
Fax: (425) 556-5988

October 21, 1998

Joe Dichoso
Applications processing Branch
FCC Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21048
Telephone: (301) 725-1585 ext. 214
FAX: (301) 344-2050

Dear Joe:

Enclosed you will find an SAR report for our SN-900U handset (FCC ID: NNA-SN-900U) as requested by Mr. Kwok Chan. The test was performed by C.K. Li at Intertek Testing Services.

Sincerely,

Thomas D. Moran

Thomas Moran
Senior Staff Engineer
SuperTel Technologies
Telephone: (425) 556-1830

VERIFICATION OF COMPLIANCE
Report No. J98028763a

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment tested hereon for use under the rules and regulations listed below

Equipment Under Test (EUT):	900 MHz FHSS Cordless Phone
Trade Name:	EnGenius
Model No.:	SN-900 Ultra
Serial No.:	76B00164
FCC ID:	NNA-SN-900U
Applicant:	SuperTel Technologies, Inc.
Contact:	Mr. Tom Moran
Address:	8660 154th Ave. NE Redmond, , WA 98052
Tel. number:	(425) 556-1830
Fax. number:	(425) 556-5988
Applicable Regulation:	FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletin 65
Exposure Class:	General Population/Uncontrolled Exposure
Test Site Location:	Intertek Testing Services 1365 Adams Court Menlo Park, CA 94025, USA
Date of Test:	October 8, 1998

Based on the test results, the tested sample was found to be in compliance with the FCC requirements for Human Exposure to Radiofrequency Emissions.

We attest to the accuracy of this report:

C. K. Li
Engineering Manager

Intertek Testing Services NA Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.worldlab.com

Table of Contents

1.0 INTRODUCTION

This measurement report is designed to show compliance with the FCC part 2.1093, ET Docket 96-326 Rules for mobile and portable devices. The test procedures, as described in American National Standards Institute C95.1-1992[1] and FCC OET Bulletin 65-1997[2], were employed. A description of the product and operating configuration, the various provisions of the rules, the methods for determining compliance, and a detailed summary of the results are included within this test report.

2.0 DESCRIPTION OF EQUIPMENT

Equipment	900 MHz FHSS Cordless Phone (Handset unit)		
Trade Name	EnGenius	Model No.	SN-900 Ultra
FCC ID	NNA-SN-900U	S/N No.	76B00164
Category	Portable	RF Exposure	Uncontrolled Environment
Frequency Band (uplink)	902-928 MHz	System	Frequency Hopping Spread Spectrum

EUT Antenna Description			
Type	Dipole	Configuration	Fixed, changeable.
Dimensions	185 (L), 3.9 (ϕ) mm	Gain	2.2 dBi
Location	Left Top		

A pre-production version of the sample was provided by SuperTel Technologies, Inc. and received on October 8, 1998 in good working condition.

3.0 TEST SUMMARY

The maximum spatial peak SAR value averaged over 1g of tissue found in all tested configurations was:

Measurement Summary					
SAR_{1g} (mW/g)	Measured Antenna Output Power (mWatt)	Antenna	Usage	FCC Limits (mW/g)	Results
0.155	307 mW @ 915 MHz	Dipole	Right-hand	1.6	Pass*

** worst case uncertainty not included*

4.0 SYSTEM TEST CONFIGURATION

4.1 Support Equipment

None. Handset was tested as an Standalone unit.

4.2 Block Diagram of Test Setup

Handset was tested as an Standalone unit. Please refer to the section 5 for the setup photos.

4.3 Test Position

The EUT was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C95.1 (1992) and Supplement C of OET 65 (1998). The EUT was placed in the intended use position, i.e. CENELEC 80° position. This position is defined by a reference plane and a line. The reference plane of the head is given by three points, the auditory canal opening of both ears and center of the closed mouth. The reference line of the EUT is defined by the line which connects the center of the ear piece with the center of the bottom of the case and lies on the surface of the case facing the phantom. The reference line of the EUT lies in the reference plane of the head. The center of the ear piece of the EUT is place at the entry of the auditory canal. The angle between the reference line of the phone and the line connecting both auditory canal openings is 80°. Please refer to figure 1 below for the position details:

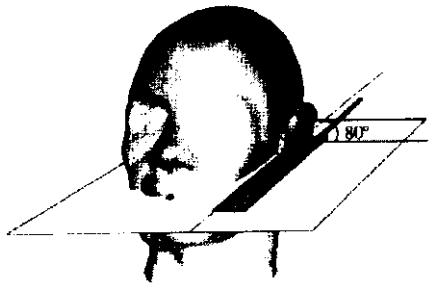


Figure 1: Intended use position

4.4 Test Condition

During tests, the worst case data (max. RF coupling) was determined with following conditions:

EUT Antenna	Fixed	Orientation	N/A
Usage	Right -Hand	Distance between antenna axis at the joint and the liquid surface:	16.44 mm
Simulating human hand	Not Used	EUT Battery	Fully Charged
Power output	Maximum		

The spatial peak SAR values were accessed for lowest, middle and highest operating channels defined by the manufacturer. Channel hopping was turned off during tests.

Antenna port power measurement was performed, with the HP 435A power meter, before and after the SAR tests to ensure that the EUT operated at the highest power level.

4.5 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by SuperTel Technologies, Inc. prior to compliance testing):

No modifications were made to the EUT by Intertek Testing Services.

4.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

5.0 SAR EVALUATION

5.1 SAR Limits

The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

EXPOSURE (General Population/Uncontrolled Exposure environment)	**SAR (W/kg)**
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

5.3 System Verification

Prior to the assessment, the system was verified to the ±5% of the specifications by using the system validation kit. The validation was performed at 900 MHz.

Validation kit	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)
D900V2, S/N #: 013	3.92	3.89

5.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

a. SAR was measured at a fixed location above the ear point and used as a reference value for the assessing the power drop.

b. The SAR distribution at the exposed side of the head was measured at a distance of 4.3 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   I) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   ii) The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

   iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

d. Re-measurement of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

5.5 Test Results

The results on the following page(s) were obtained when the device was tested in the condition described in this report. Detail measurement data and plots which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Trade Name:	EnGenius	**Model No.:**	SN-900 Ultra
Serial No.:	76B00164	**Test Engineer:**	C. K. Li

TEST CONDITIONS			
Ambient Temperature	21.7 °C	Relative Humidity	54 %
Test Signal Source	Actual transmission	Signal Modulation	FSK
Output Power Before SAR Test	320mW (902 MHz) 307mW (915 MHz) 313mW (928 MHz)	Output Power After SAR Test	No change as compare to those before test
Test Duration (per test)	18 Min.	Number of Battery Change	Changed for every test

Left-Hand Usage				
Channel	Operating Mode	Tx Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
902 MHz	Actual trans-mission Mode	41.25% (1.65 mS ON, 2.35 mS Off) [c]	Dipole Antenna	0.126
915 MHz			Dipole Antenna	0.125
928 MHz			Dipole Antenna	0.115

Right-Hand Usage				
Channel	Operating Mode	Tx Duty Cycle ratio	Antenna Position	Measured SAR_{1g} (mW/g)
902 MHz	Actual trans-mission Mode	41.25% (1.65 mS ON, 2.35 mS Off) [c]	Dipole Antenna	0.139
915 MHz			Dipole Antenna	***0.144***
928 MHz			Dipole Antenna	0.136

Note: a) Worst case data were reported
b) No Duty cycle factor included during SAR tests
c) Maximum setting, factory set and user unadjustable.

During test, SAR "hot spot" was found near the vertical wall of the phantom (top of the head). To ensure that SAR data is within the FCC limit inside the whole volume of the phantom, additional measurements were made along the vertical wall (Top side of head) of the phantom (Figure A):

Measurement 1.: With the probe moving along the bottom of the phantom, location (point A) with maximum SAR (0.1549 mw/g) was found. SAR data was then recorded every 10mm when the probe was moved up vertically at.

Measurement 2.: With the probe moved as close to the vertical wall as possible along the antenna, SAR data was recorded every 10mm when the probe was moved up vertically.

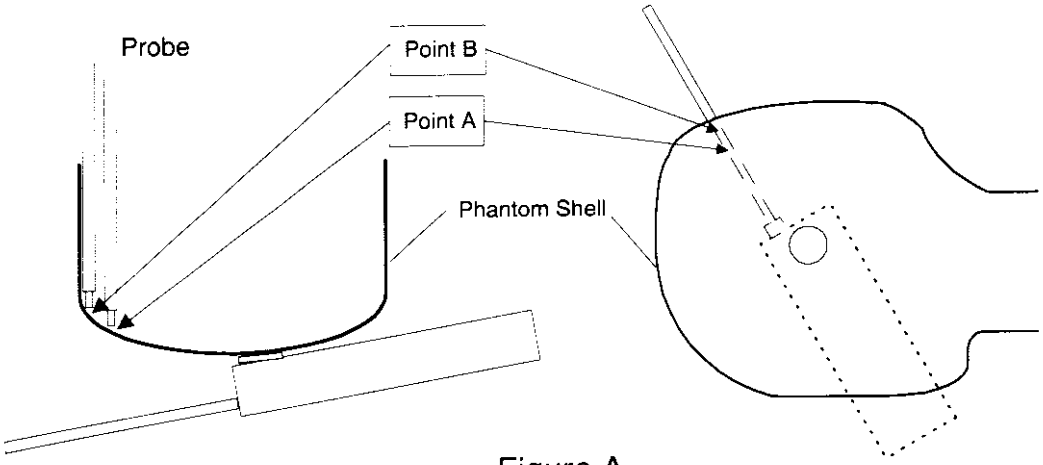
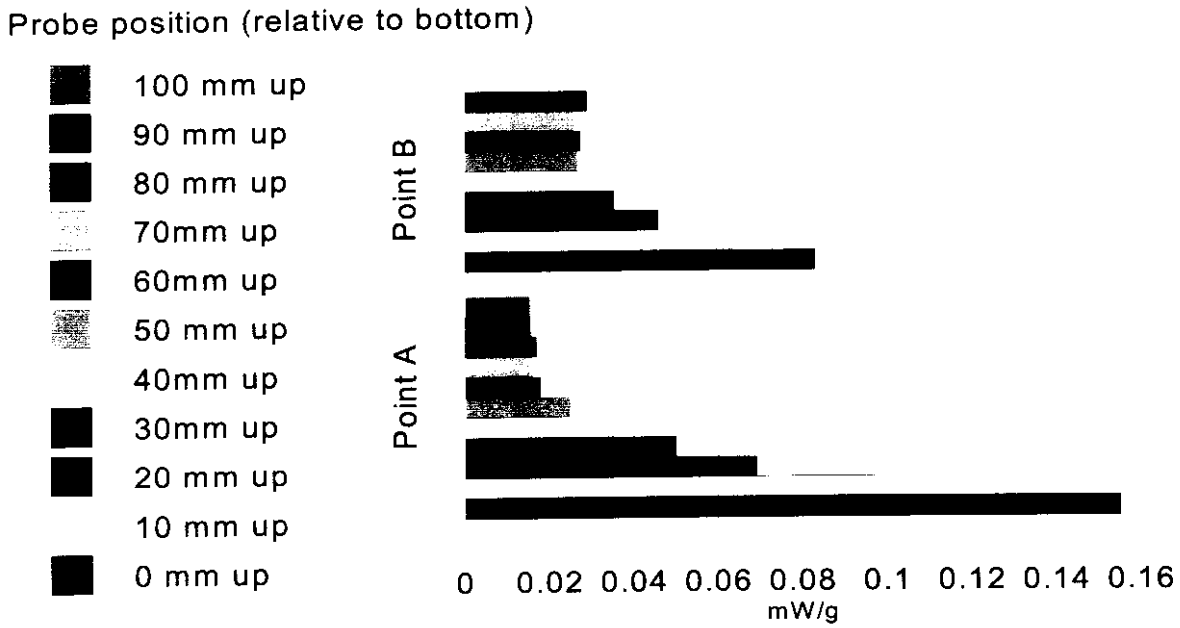


Figure A

Supplementary SAR measurements



Probe position (relative to bottom)	SAR (mW/g)	
	Point A	Point B
0 mm up	0.155	0.083
10 mm up	0.097	0.0637
20 mm up	0.069	0.0459
30 mm up	0.05	0.0354
40 mm up	0.035	0.02916
50 mm up	0.025	0.0268
60 mm up	0.0178	0.0274
70 mm up	0.0159	0.0258
80 mm up	0.0169	0.029
90 mm up	0.0155	-- air --
100 mm up	0.0154	-- air --

6.0 TEST EQUIPMENT

6.1 Equipment List

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system which is package optimized for dosimetric evaluation of mobile radios [3]. The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	**SPECIFICATIONS**	**S/N #**	**CAL. DATE**
Robot	**Stäubli RX60L** Repeatability: ± 0.025mm Accuracy: 0.806×10^{-3} degree Number of Axes: 6	597412-01	N/A
E-Field Probe	**ET3DV5** Frequency Range: 10 MHz to 6 GHz Linearity: ± 0.2 dB Directivity: ± 0.1 dB in brain tissue	1333	01/14/98
Data Acquisition	**DAE3** Measurement Range: 1µV to >200mV Input offset Voltage: < 1µV (with auto zero) Input Resistance: 200 MΩ	317	N/A
Phantom	**Generic Twin V3.0** Type: Generic Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.1 mm Capacity: 20 liter Ear spacer: ≈ 4 mm (between EUT ear piece and tissue simulating liquid)	N/A	N/A
Simulated Tissue	**Mixture** Please see section 6.2 for details	N/A	01/29/98
Power Meter	**HP** 435A w/ 8481H sensor Frequency Range: 100kHz to 18 GHz Power Range: 300µW to 3W	1312A01255	01/26/98

6.2 Brain Tissue Simulating Liquid

Ingredient	Frequency (900 MHz)
Water	40.3 %
Sugar	56.0 %
Salt	2.5 %
HEC	1.0 %
Bactericide	0.2 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	ε_r *	σ *(mho/m)	ρ **(kg/m^3)
900	40.2 ± 5%	0.85 ± 10%	1000

* *worst case uncertainty of the HP 85070A dielectric probe kit*

** *worst case assumption*

6.3 E-Field Probe Calibration

Probes were calibrated by the manufacturer in the TEM cell ifi 110. To ensure consistency, a strict protocol was followed. The conversion factor (ConF) between this calibration and the measurement in the tissue simulation solution was performed by comparison with temperature measurement and computer simulations. Probe calibration factors are included in Appendix C.

6.4 Measurement Uncertainty

The total uncertainty for the evaluation of the spatial peak SAR values averaged over a cube of 1 g tissue mass has been assessed for this system to be less than ±20% [4]. This uncertainty includes probe, calibration, positioning and evaluation errors as well as errors in assessing the correct dielectric parameters for the brain simulating liquid, etc.

UNCERTAINTY BUDGET	
Source of Uncertainty	**Uncertainty (±%)**
Field Measurement Isotropy error in tissue-simulating liquid: <±0.2dB Frequency response: <±0.1dB Linearity: <±0.2dB Data acquisition and evaluation: <±0.05dB Probe calibration: <±10% ELF and RF disturbance: <±10μW/g	***13***
Spatial Peak Evaluation Extrapolation and interpolation error, and position error: <±0.1dB Integration and maximum search routine: <±0.1dB Inaccuracies in cube's shape:<±0.2dB	***7***
Tissue Calibration HP85070 dielectric probe	***10***
Total (rss)	**17.8**

6.5 Measurement Traceability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards..

7.0 WARNING LABEL INFORMATION - USA

Not Applicable

8.0 REFERENCES

[1] ANSI, *ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 Ghz*, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C. 20554, 1997

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetic evaluation of mobile communications equipment with know precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp.645-652, May 1997.

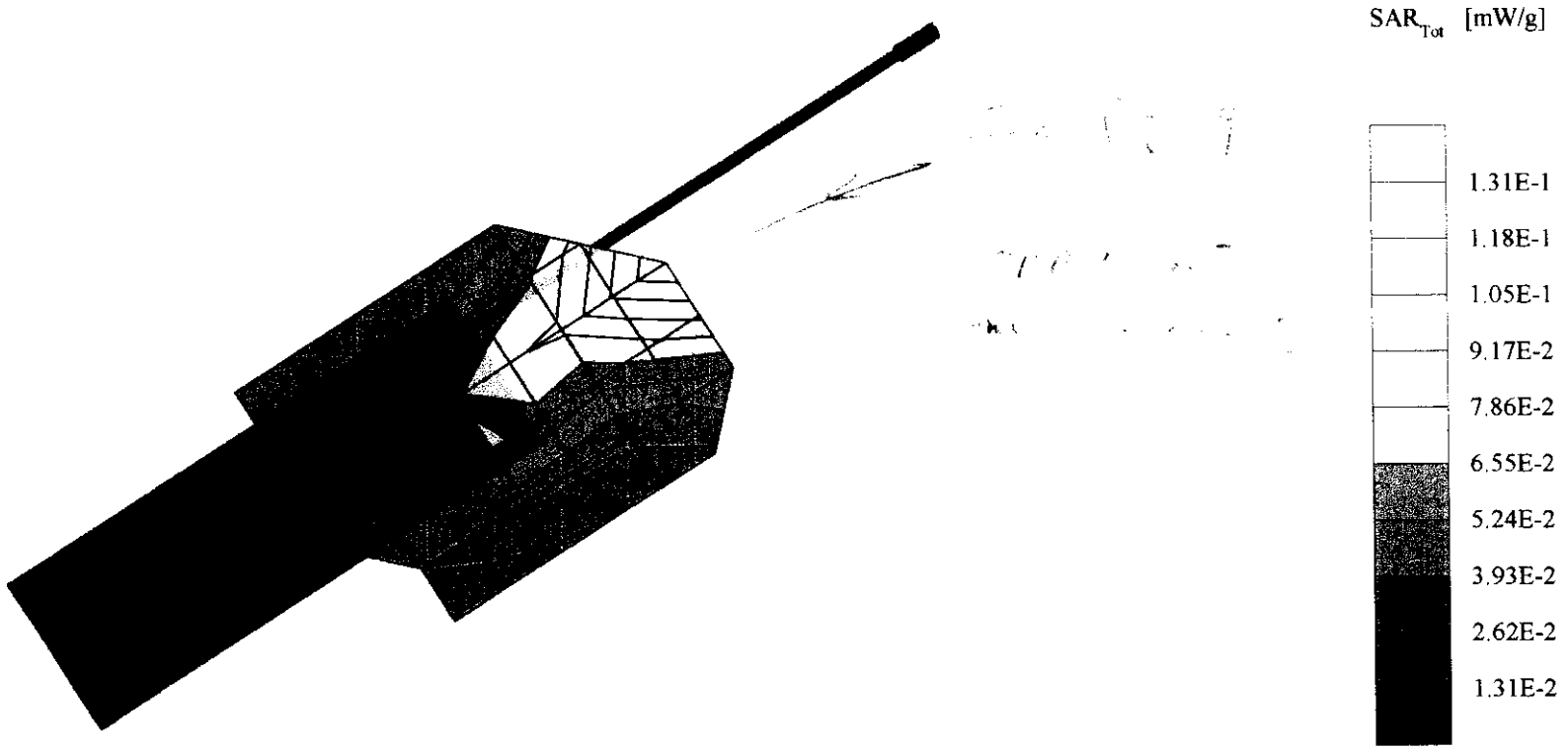
APPENDIX A - SAR Evaluation Data

Please note that the graphical visualization of the phone position onto the SAR distribution gives only limited information on the current distribution of the device, since the curvature of the head results in graphical distortion. Full information can only be obtained either by H-field scans in free space or SAR evaluation with a flat phantom.

Powerdrift is the measurement of power drift of the device over one complete SAR scan.

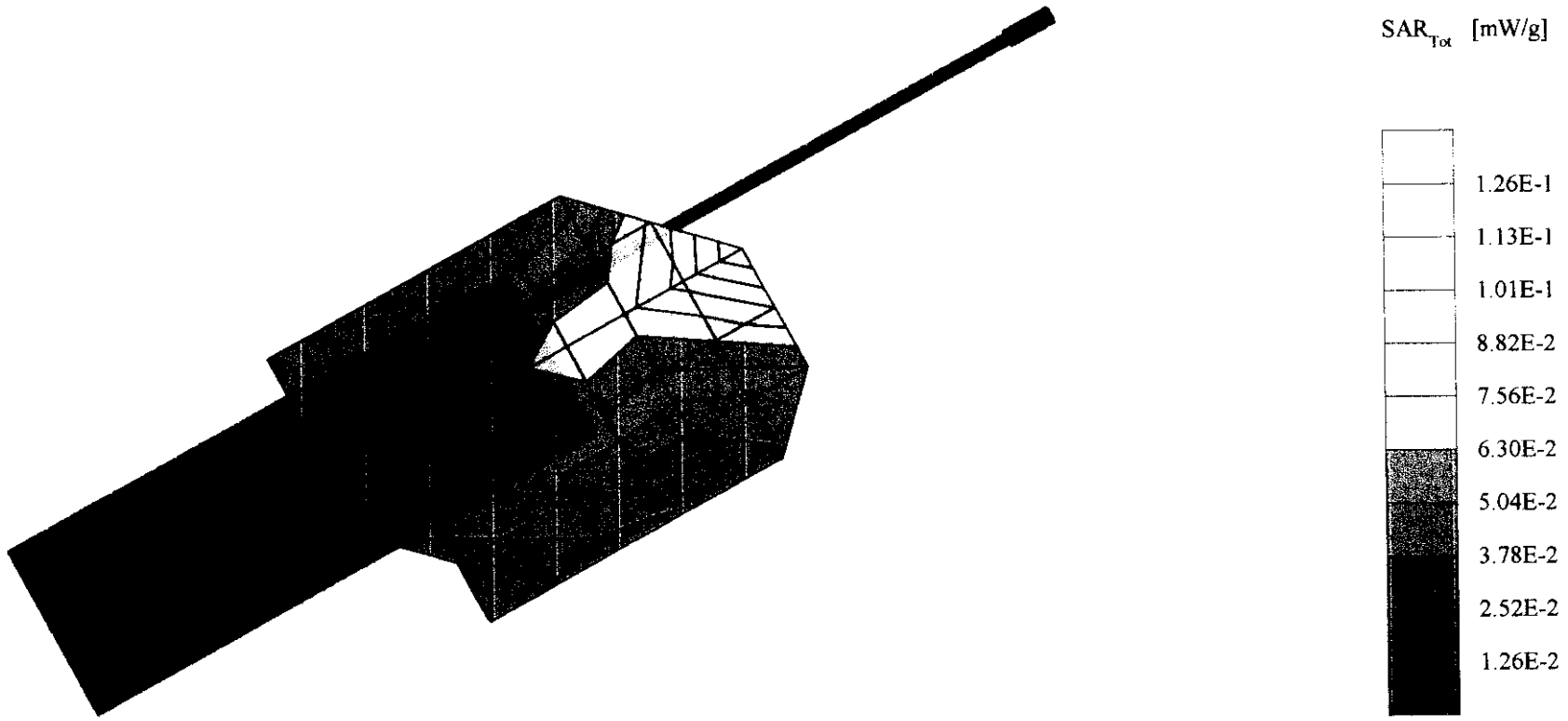
EnGenius_L-ant

Phantom: Generic Twin; Section: Left Hand; Position: (80°,65°); Frequency: 902 [MHz]
Probe: ET3DV5-Brian - SN1333; ConvF(5.94,5.94,5.94); Crest Factor: 1.0; Brain 900 MHz:σ = 0.85 [mho/m] ε_r = 40.2 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.126 [mW/g], SAR (10g): 0.0921 [mW/g]; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.01 dB,



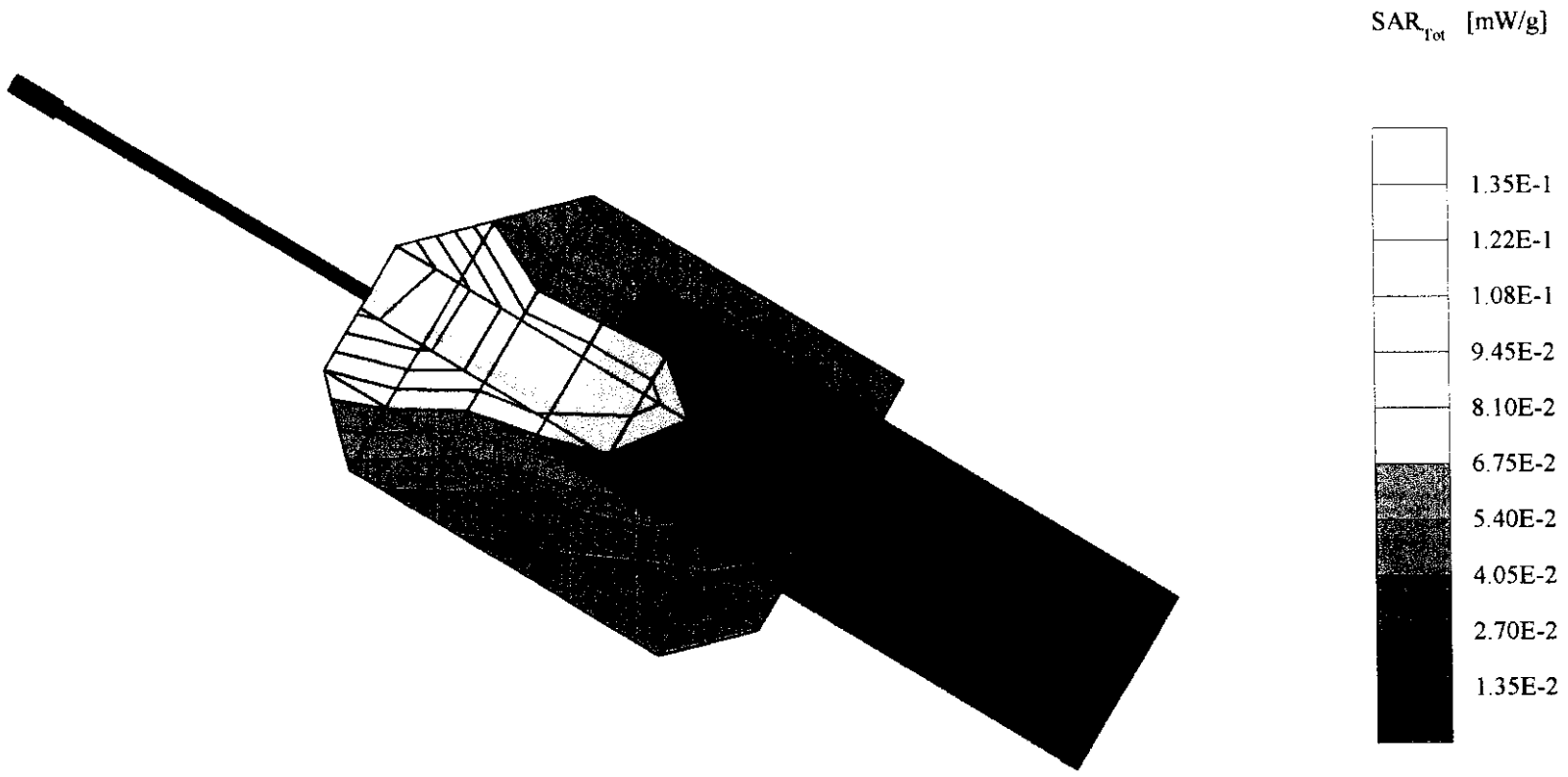
EnGenius_L-ant

Phantom: Generic Twin; Section: Left Hand; Position: (80°,65°); Frequency: 928 [MHz]
Probe: ET3DV5-Brian - SN1333; ConvF(5.94,5.94,5.94); Crest Factor: 1.0; Brain 900 MHz:σ = 0.85 [mho/m] ε_r = 40.2 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.115 [mW/g], SAR (10g): 0.0828 [mW/g]; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.19 dB, Max power o/p, no duty cycle adjustment



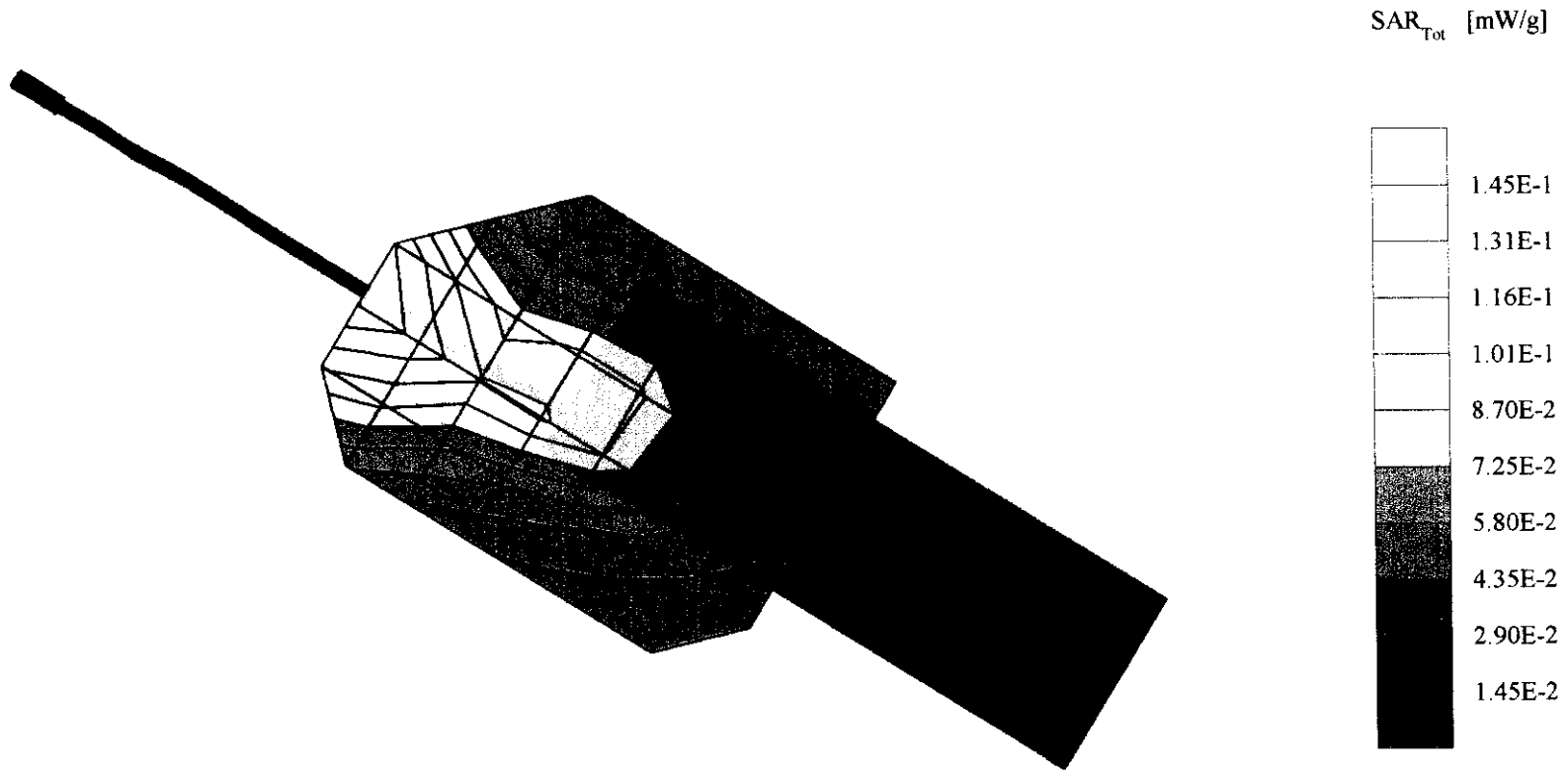
EnGenius_L-ant

Phantom: Generic Twin; Section: Right Hand - Ext; Position: (80°,65°); Frequency: 902 [MHz]
Probe: ET3DV5-Brian - SN1333; ConvF(5.94,5.94,5.94); Crest Factor: 1.0; Brain 900 MHz:σ = 0.85 [mho/m] ε_r = 40.2 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.139 [mW/g], SAR (10g): 0.104 [mW/g]; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.05 dB, Max power o/p



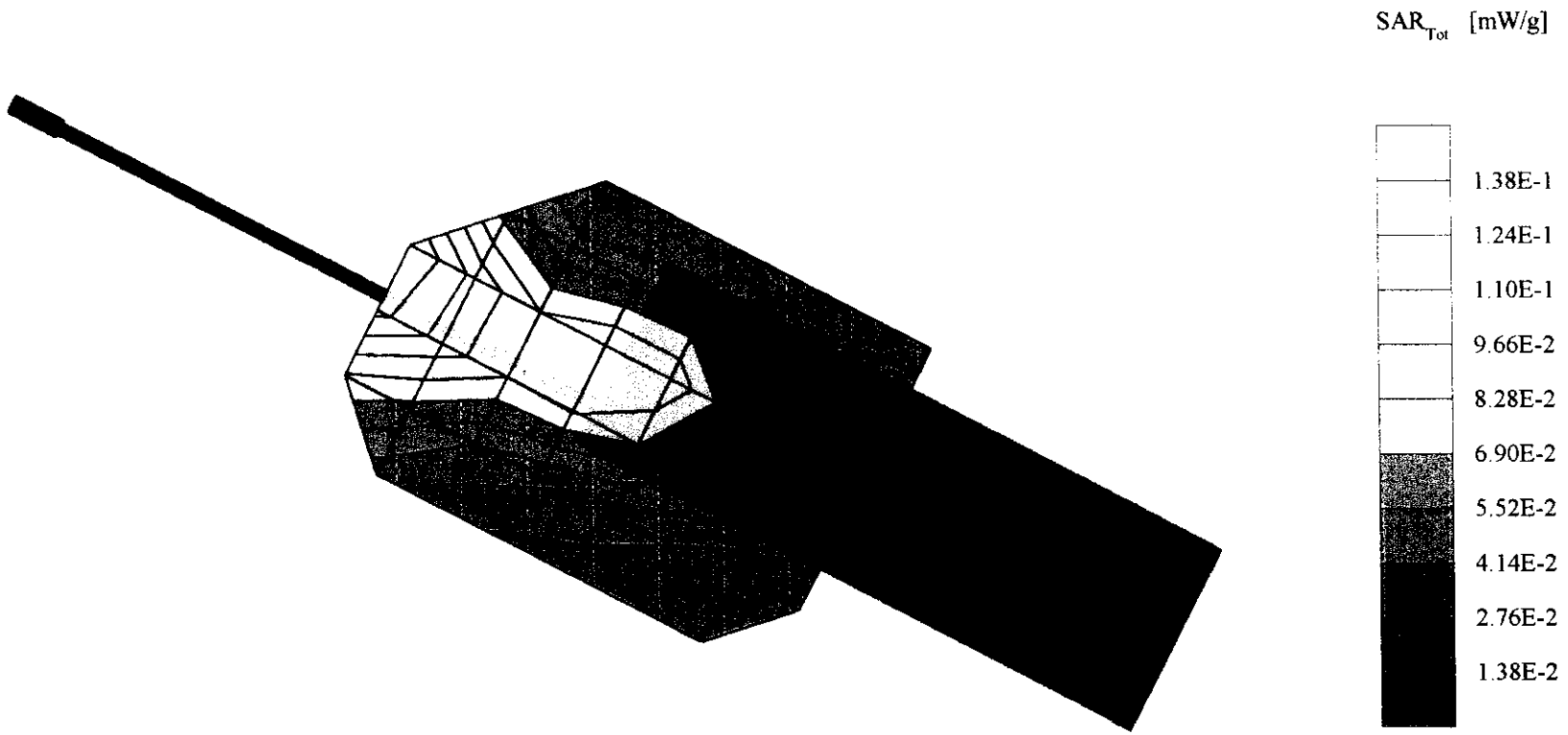
EnGenius_L-ant

Phantom: Generic Twin; Section: Right Hand - Ext; Position: (80°,65°); Frequency: 915 [MHz]
Probe: ET3DV5-Brian - SN1333; ConvF(5.94,5.94,5.94); Crest Factor: 1.0; Brain 900 MHz:σ = 0.85 [mho/m] ε_r = 40.2 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.144 [mW/g], SAR (10g): 0.112 [mW/g] * Max outside; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
, Max power o/p



EnGenius_L-ant

Phantom: Generic Twin; Section: Right Hand - Ext; Position: (80°,65°); Frequency: 928 [MHz]
Probe: ET3DV5-Brian - SN1333; ConvF(5.94,5.94,5.94); Crest Factor: 1.0; Brain 900 MHz:σ = 0.85 [mho/m] ε_r = 40.2 ρ = 1.00 [g/cm^3]
Cube 5x5x7; SAR (1g): 0.136 [mW/g], SAR (10g): 0.101 [mW/g]; (Worst-case extrapolation)
Course:Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.36 dB, Max power o/p



APPENDIX B - Antenna Specifications

Not Available.

APPENDIX C - E-Field Probe Calibration Data

ET3DV5 SN:1333

DASY3 - Parameters of Probe: ET3DV5 SN:1333

Sensitivity in Free Space

NormX	**2.32**	$\mu V/(V/m)^2$
NormY	**2.3**	$\mu V/(V/m)^2$
NormZ	**2.28**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**102**	mV
DCP Y	**102**	mV
DCP Z	**102**	mV

Sensitivity in Tissue Simulating Liquid

450 MHz	ConvF X	**6.33**	extrapolated	ε_r = 48 ± 5% σ = 0.50 ± 10% mho/m (brain tissue simulating liquid)
	ConvF Y	**6.33**	extrapolated	
	ConvF Z	**6.33**	extrapolated	
900 MHz	ConvF X	**5.94**	± 10%	ε_r = 42.5 ± 5% σ = 0.85 ± 10% mho/m (brain tissue simulating liquid)
	ConvF Y	**5.94**	± 10%	
	ConvF Z	**5.94**	± 10%	
1500 MHz	ConvF X	**5.43**	interpolated	ε_r = 41 ± 5% σ = 1.32 ± 10% mho/m (brain tissue simulating liquid)
	ConvF Y	**5.43**	interpolated	
	ConvF Z	**5.43**	interpolated	
1800 MHz	ConvF X	**5.17**	± 10%	ε_r = 41 ± 5% σ = 1.71 ± 10% mho/m (brain tissue simulating liquid)
	ConvF Y	**5.17**	± 10%	
	ConvF Z	**5.17**	± 10%	

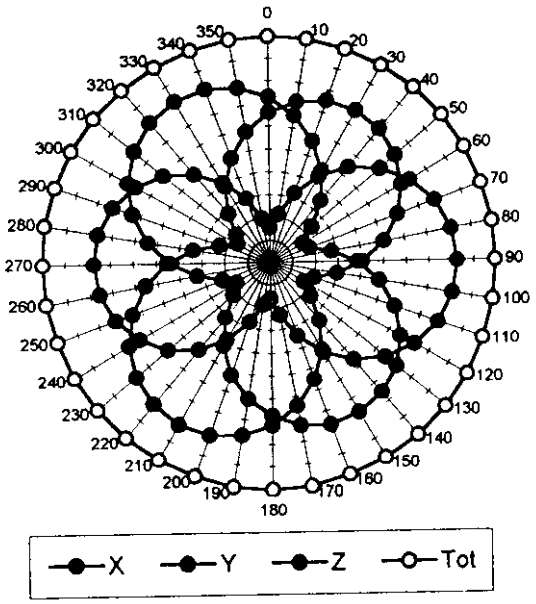
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Surface to Probe Tip	**1.8 ± 0.2**	mm

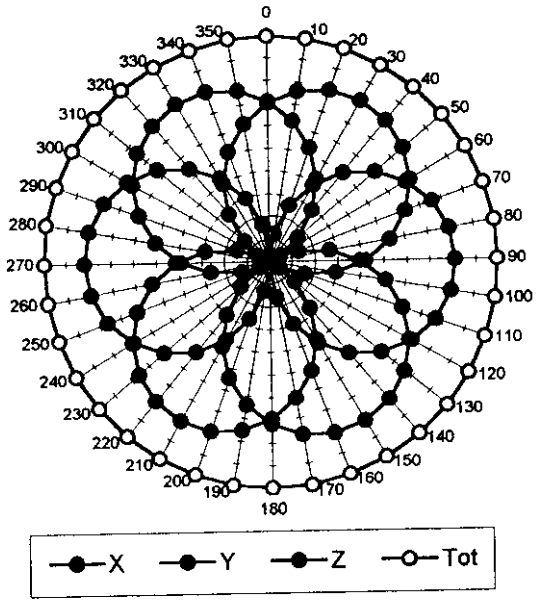
ET3DV5 SN:1333

Receiving Pattern (ϕ), θ = 0°

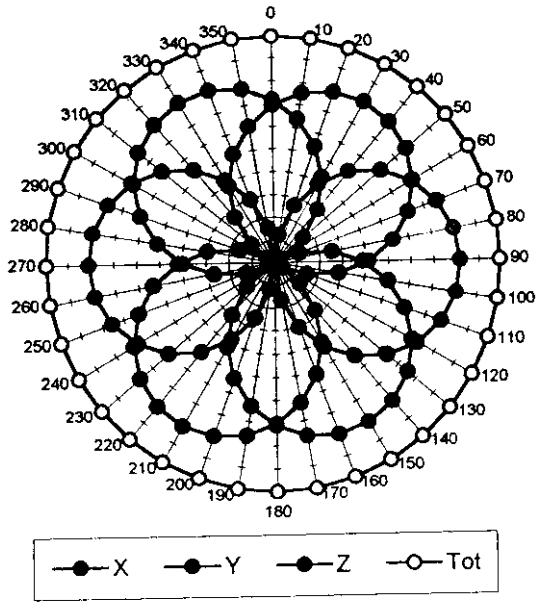
f = 30 MHz, TEM cell ifi110



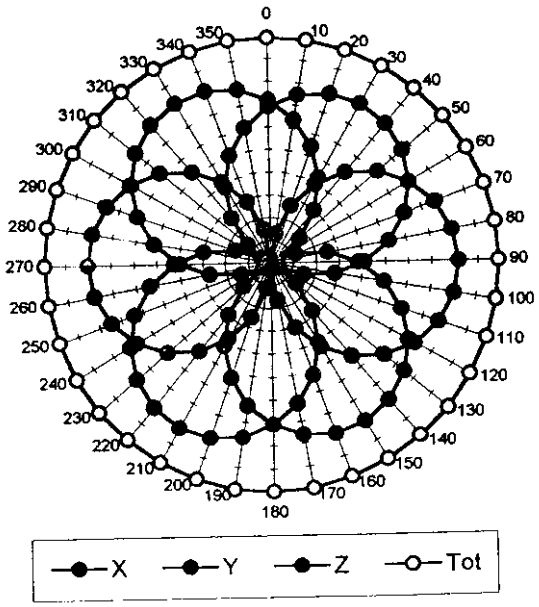
f = 100 MHz, TEM cell ifi110



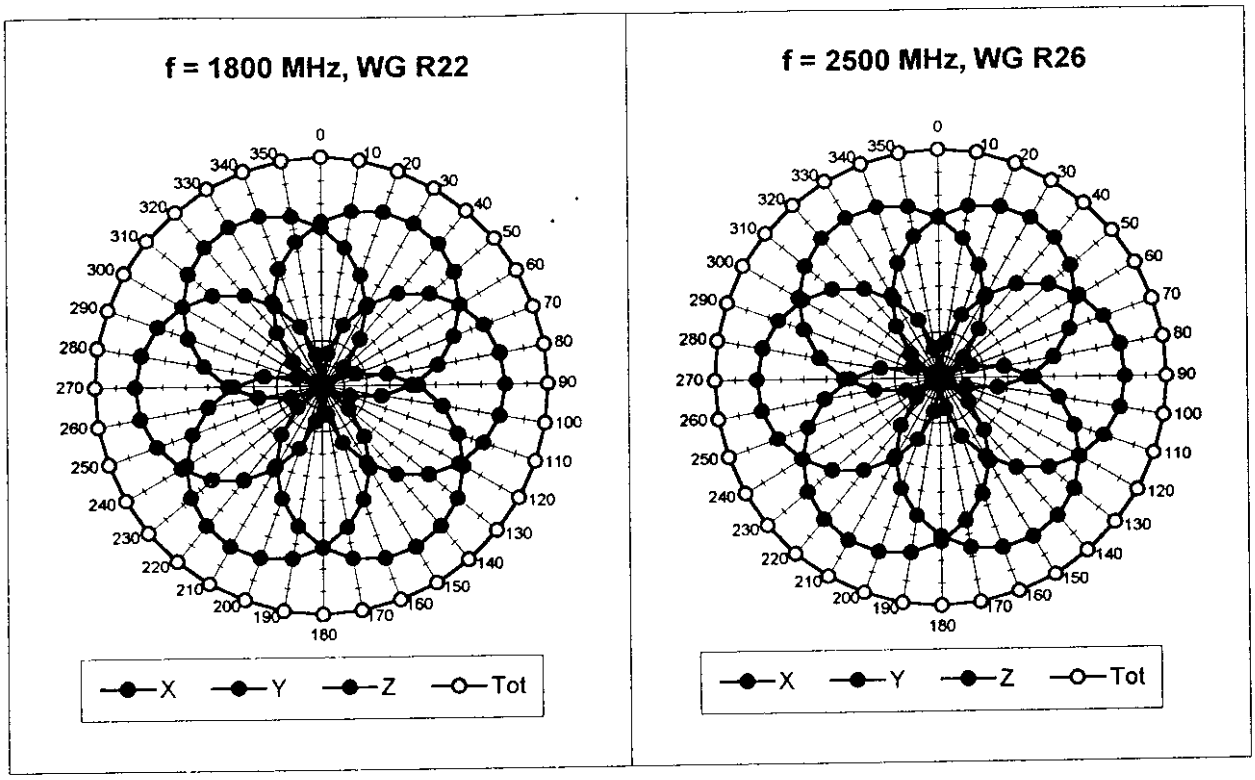
f = 300 MHz, TEM cell ifi110



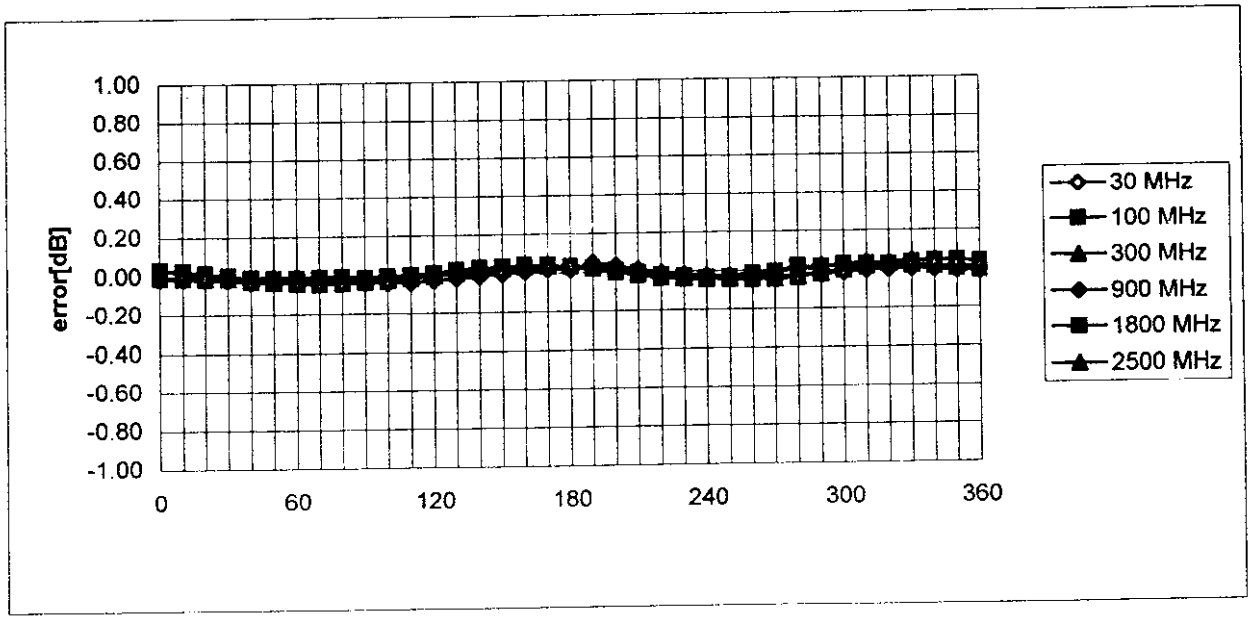
f = 900 MHz, TEM cell ifi110



ET3DV5 SN:1333



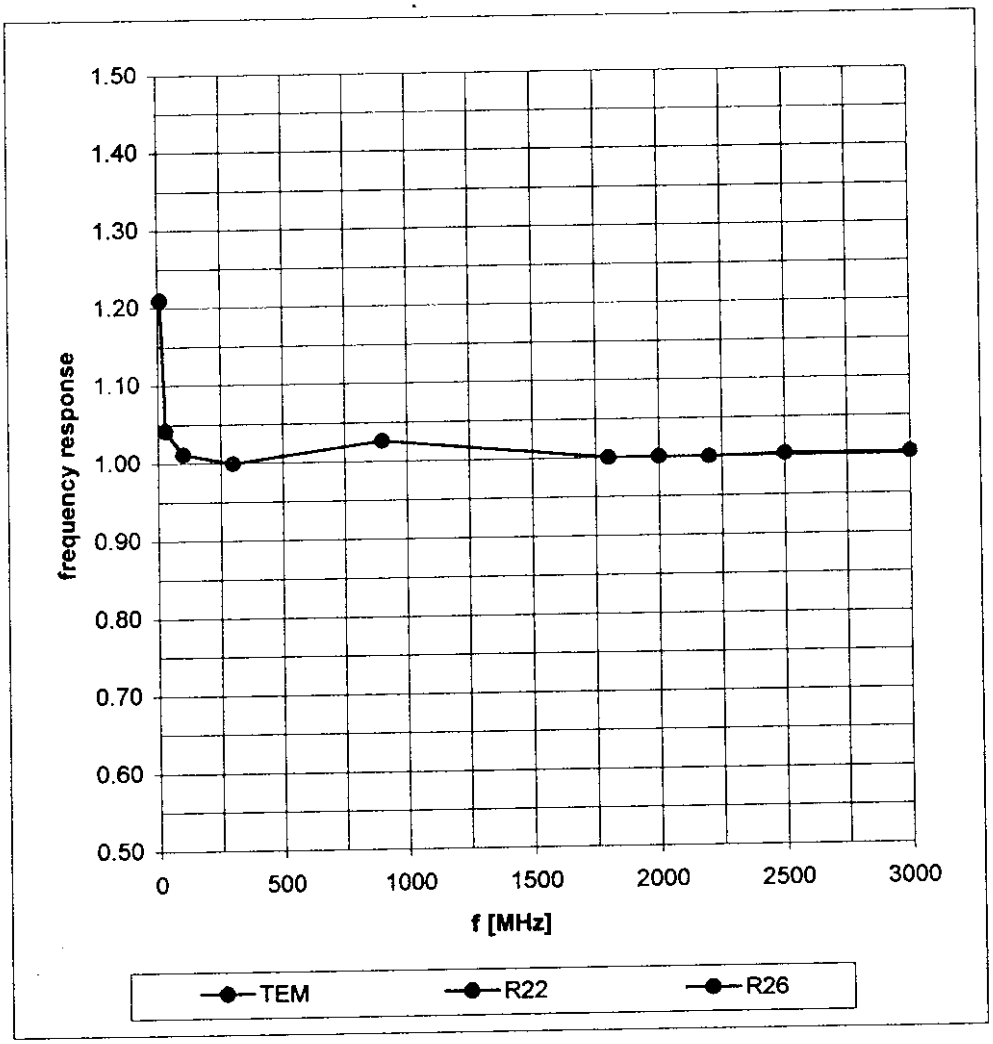
Isotropy Error (ϕ), θ = 0°



ET3DV5 SN:1333

Frequency Response of E-Field

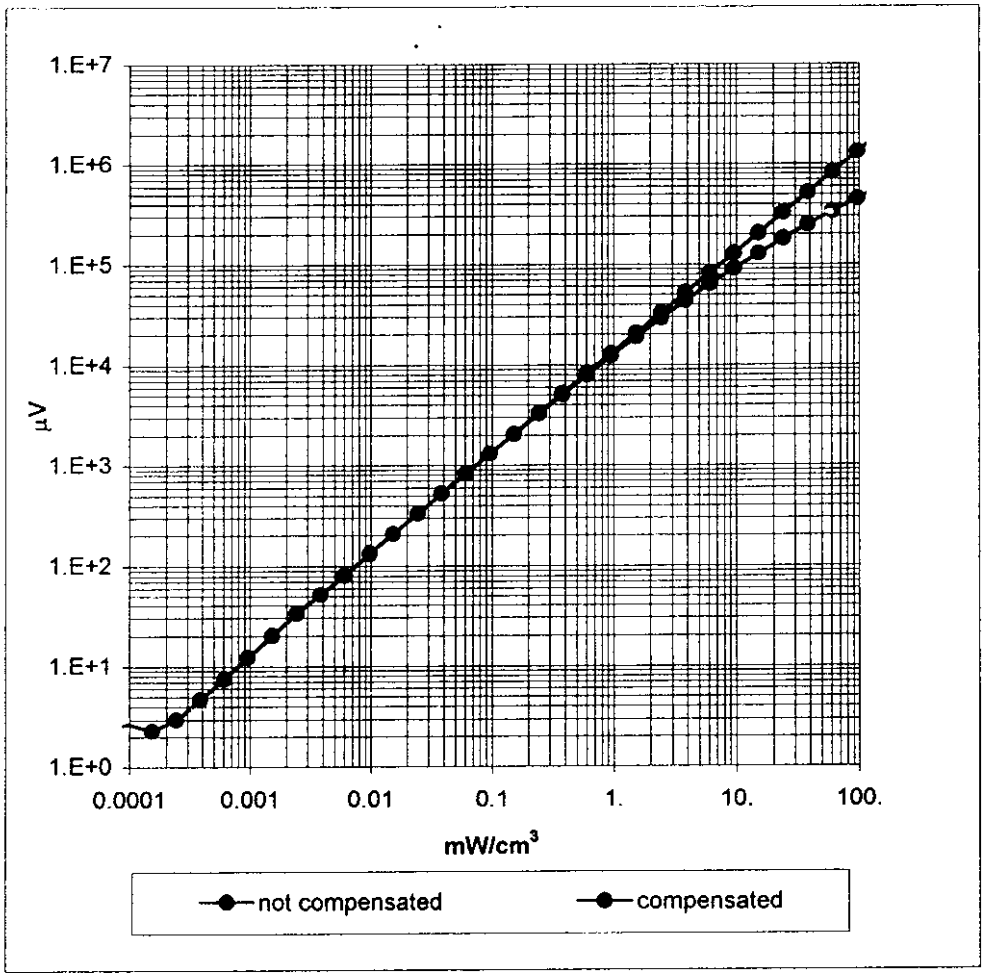
(TEM-Cell:ifi110, Waveguide R22, R26)

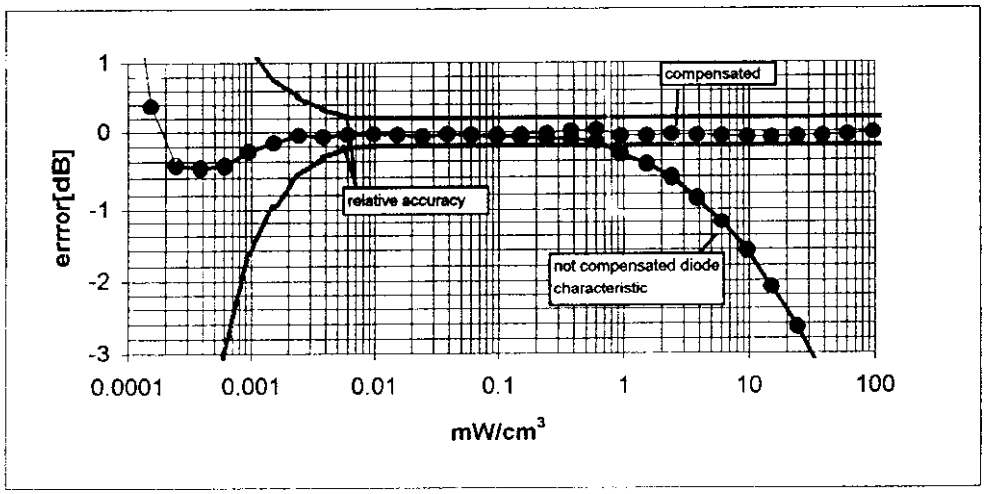


ET3DV5 SN:1333

Dynamic Range f(SAR_{brain})

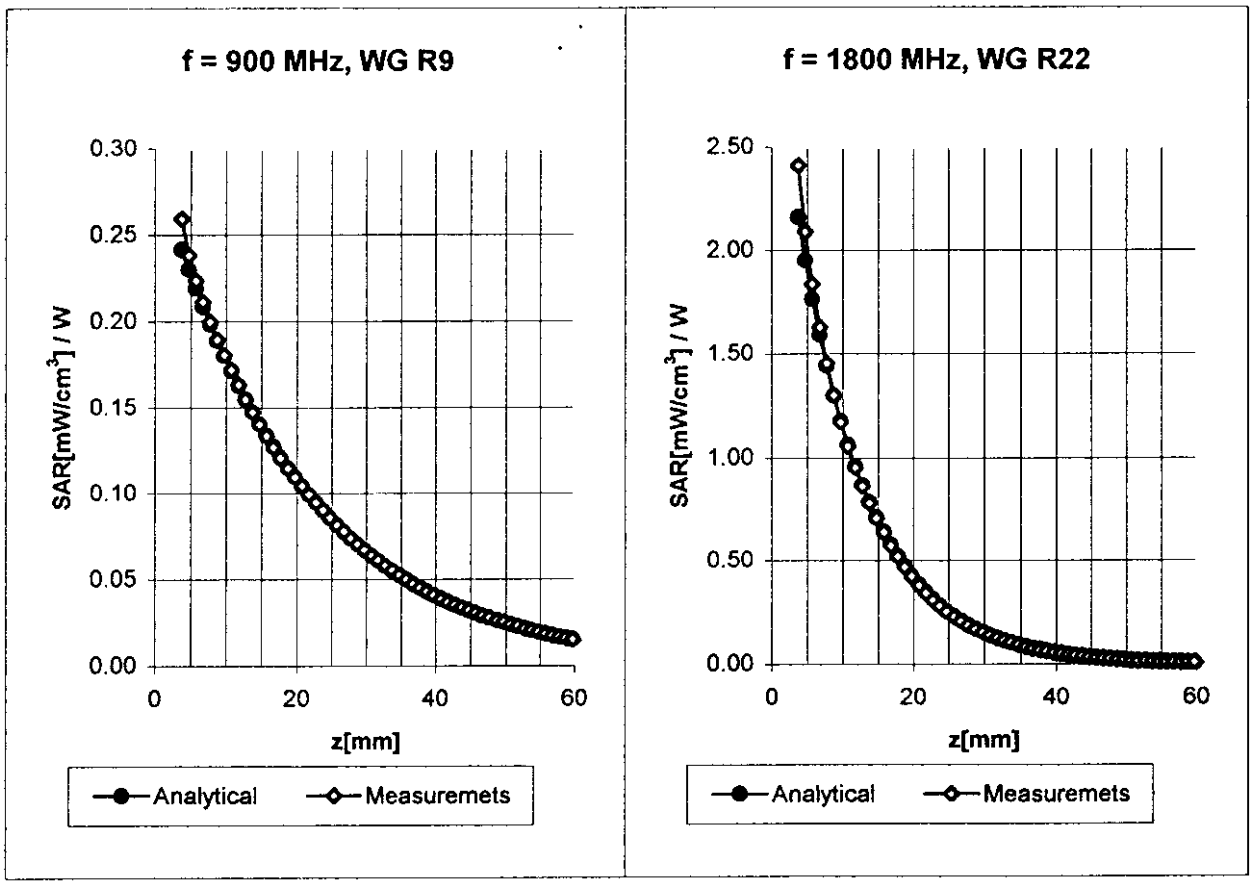
(TEM-Cell:ifi110)





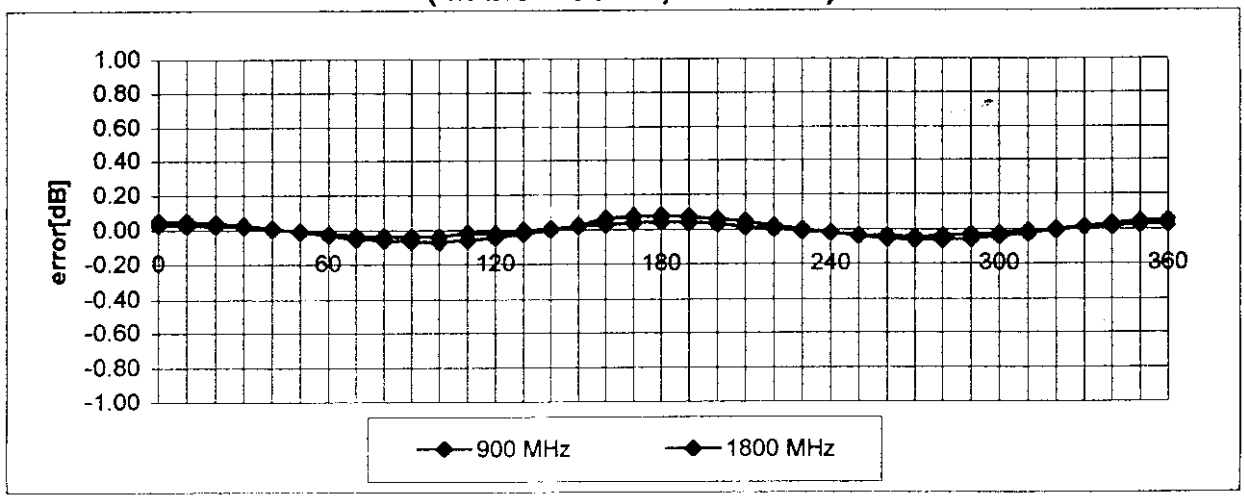
ET3DV5 SN:1333

Conversion Factor Assessment



Receiving Pattern (ϕ)

(in brain tissue, z = 5 mm)



REPORT OF MEASUREMENTS

The following Tables 1 and 2 report the highest emissions levels recorded during the tests performed on the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
938.482	53.2	23.5	-27.4	7.5		56.8	85.5	-28.7	V
1804.568	57.2	26.5	-39.4	2.1		56.4	84.4	-38.0	H
2706.635	19.6	29.1	0.0	2.6		51.3	54.0	-2.7	HA
3608.682	19.1	31.5	0.0	3.1		53.7	54.0	-0.3	HA
6315.965	60.4	34.7	-38.6	4.3		70.8	84.4	-23.6	V
8120.530	46.7	36.2	-38.0	5.0		49.9	54.0	-4.1	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247/15.209/15.205
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The table above was configured from a combination of the following test conditions:

- The EUT was laying on its back side on the table. The device was configured according to ANSI C63.4. The handset was tested with the channels stopped at low, middle and high, respectively.
- The EUT was laying on its right side on the table. The device was configured according to ANSI C63.4. The handset was tested with the channels stopped at low, middle and high, respectively.
- The EUT was standing vertically on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.
- The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was tested with the channels stopped at low, middle and high, respectively.

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FCC ID: NNA-SN-9004

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900
S/N: none

Date: Apr-02-98
Time: 09:54
Sequence#: 3

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was laying on its back side on the table. The device was configured according to ANSI C63.4. The handset was tested with the channels stopped at low, middle and high, respectively.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.3	+36.2	+5.0	-38.0		+0.0	49.5	54.0	-4.5	Horiz
2	2706.805	46.2	+29.1	+2.6	-39.6		+0.0	38.3	54.0	-15.7	Horiz
3	2706.803	45.5	+29.1	+2.6	-39.6		+0.0	37.6	54.0	-16.4	Vert
4	6315.965	60.3	+34.7	+4.3	-38.6		+0.0	60.7	84.7	-24.0	Horiz
5	6316.008	59.1	+34.7	+4.3	-38.6		+0.0	59.5	84.7	-25.2	Vert
6	1804.568	58.3	+26.5	+2.1	-39.4		+0.0	47.5	84.7	-37.2	Vert
7	1804.528	56.8	+26.5	+2.1	-39.4		+0.0	46.0	84.7	-38.7	Horiz
8	902.268	104.7	+23.2	+1.4	-41.9		+0.0	87.4	137.0	-49.6	Horiz

Fundamental

5473A CLOUDS REST • MARIPOSA, CALIFORNIA 95338 • (209) 966-5240 • FAX (209) 966-4257

FCC ID: NNA-SN-900U

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900
S/N: none

Date: Apr-02-98
Time: 09:54
Sequence#: 2

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was laying on its right side on the table. The device was configured according to ANSI C63.4. The handset was was tested with the channels stopped at low, middle and high, respectively.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.5	+36.2	+5.0	-38.0		+0.0	49.7	54.0	-4.3	Horiz
2	2706.805	46.2	+29.1	+2.6	-39.6		+0.0	38.3	54.0	-15.7	Horiz
3	2706.803	45.1	+29.1	+2.6	-39.6		+0.0	37.2	54.0	-16.8	Vert
4	6315.965	60.1	+34.7	+4.3	-38.6		+0.0	60.5	83.9	-23.4	Horiz
5	6316.008	59.7	+34.7	+4.3	-38.6		+0.0	60.1	83.9	-23.8	Vert
6	1804.568	58.3	+26.5	+2.1	-39.4		+0.0	47.5	83.9	-36.4	Vert
7	1804.528	56.1	+26.5	+2.1	-39.4		+0.0	45.3	83.9	-38.6	Horiz
8	902.268	103.9	+23.2	+1.4	-41.9		+0.0	86.6	137.0	-50.4	Horiz
	Fundamental										

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FCC ID: NNA-SN-900U

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer:	**SuperTel Technologies**	Date:	Apr-02-98
Specification:	**FCC15.247/15.209/15.205**	Time:	09:54
Test Type:	**Maximized Emissions**	Sequence#:	1
Equipment:	**Phone Handset**		
Manufacturer:	SuperTel Technologies	Tested By:	Steve Behm
Model:	Engenius SN-900		
S/N:	none		

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was standing vertically on the table. The device was configured according to ANSI C63.4. The handset was tested with the channels stopped at low, middle and high, respectively.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.7	+36.2	+5.0	-38.0		+0.0	49.9	54.0	-4.1	Vert
2	6315.965	60.4	+34.7	+4.3	-38.6		+0.0	70.8	84.4	-23.6	Vert
3	6316.008	59.4	+34.7	+4.3	-38.6		+0.0	69.8	84.4	-24.6	Horiz
4	2706.805	46.7	+29.1	+2.6	-39.6		+0.0	38.8	54.0	-15.2	Vert
5	2706.803	45.9	+29.1	+2.6	-39.6		+0.0	38.0	54.0	-16.0	Horiz
6	1804.568	57.2	+26.5	+2.1	-39.4		+0.0	56.4	84.4	-38.0	Horiz
7	1804.528	56.1	+26.5	+2.1	-39.4		+0.0	55.3	84.4	-39.1	Vert
8	902.268	104.4	+23.2	+1.4	-41.9		+0.0	97.1	137.0	-49.9	Vert

Fundamental

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FCC ID: NNA-SN-900U

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer:	**SuperTel Technologies**	Date:	May-12-98
Specification:	**FCC15.247/15.209/15.205**	Time:	17:38
Test Type:	**Maximized Emissions**	Sequence#:	3
Equipment:	**Phone base**		
Manufacturer:	**SuperTel Technologies**	Tested By:	Steve Behm
Model:	Engenius SN-900		
S/N:	none		

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone base*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone handset	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was tested with the channels stopped at low, middle and high, respectively.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp-A dB	dB	Log A dB	Cable dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	938.482	53.2	-27.4		+23.5	+7.5	+0.0	56.8	85.5	-28.7	Vert
2	891.471	52.1	-27.6		+22.9	+7.3	+0.0	54.7	85.5	-30.8	Vert

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Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer:	**SuperTel Technologies**	Date:	May-12-98
Specification:	**FCC15.247/15.209/15.205**	Time:	17:37
Test Type:	**Maximized Emissions**	Sequence#:	3
Equipment:	**Phone base**		
Manufacturer:	**SuperTel Technologies**	Tested By:	Steve Behm
Model:	Engenius SN-900		
S/N:	none		

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone base*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone handset	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was tested with the channels stopped at low, middle and high, respectively.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	3608.682 Average	19.1	+31.5	+3.1			+0.0	53.7	54.0	-0.3	Horiz
2	3608.758 Average	18.9	+31.5	+3.1			+0.0	53.5	54.0	-0.5	Vert
3	2706.635 Average	19.6	+29.1	+2.6			+0.0	51.3	54.0	-2.7	Horiz
4	2706.424 Average	19.6	+29.1	+2.6			+0.0	51.3	54.0	-2.7	Vert
5	902.165 Fundamental	80.9	+23.2	+1.4			+0.0	105.5	137.0	-31.5	Vert
6	1804.190 Average	20.7	+26.5	+2.1			+0.0	49.3	85.5	-36.2	Vert
7	1804.499 Average	20.0	+26.5	+2.1			+0.0	48.6	85.5	-36.9	Horiz

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STT

SuperTel Technologies, Inc.
8660 154th Avenue NE
August 14, 1998

Monica Lopez
CKC Laboratory Reports Dept.
Fax: (209) 966-4257

Dear Ms. Lopez:

Thank you again for forwarding the second inquiry dated 8/10/98 from Mr. Joe Dichoso of the FCC regarding our EnGenius SN-900 Ultra FCC Part 15 application for certification. Please find our response to the numbered questions below.

A great deal of care has been taken to ensure compliance with FCC rules and regulations throughout the entire development process. In addition, before our device was sent to CKC for formal Part 15 testing on 4/1/98, we had performed three pre-certification tests at additional expense at CKC's Redmond, WA facility. We sincerely hope that all remaining issues can be resolved soon.

Best Regards,

J. C. Chen, Ph.D.
President
Tel: (425) 556-1834
Fax: (425) 556-5988

1) QUESTION: "With regard to the RF safety compliance Table 1 Page 22 of OET bulletin 62 is more appropriate for your device. ... The RF safety compliance will be reviewed by Kwok Chan. Please contact him if you have any questions or concerns."

ANSWER:

We have contacted Mr. Kwok Chan. However, he simply referred us to the document Mr. Dichoso quoted above, Table 1 Page 22 of OET 62. Further attempts to contact FCC for clarification regarding the SAR regulation and some of the wording in the table have been unsuccessful.

A Zilog document is attached which shows that the TX duration for both handset and base is 1.65 ms out of each 4 ms TDD frame, for a duty cycle of 41.25%. This is a hardwired Zilog chipset feature not changeable by us. Many manufacturers are currently using this chipset.

With 29.8 dBm peak output power and 41.25% duty cycle, the average output power would be 394 mW. Table 1 of the OET document states: "Warning instructions and warning labels may be used to limit the exposure duration and/or conditions to ensure compliance. However, if the manufacturers believe that such warning instructions and labels will not be effective in keeping persons at the specified distances necessary to ensure compliance, it may be necessary to demonstrate compliance with respect to SAR limits; especially when the output is greater than 400-500 mW EIRP."

Our device has taken the following measures that can minimize human exposure to radio energy:

1. Power control, on both the base station and the handset, minimum output power = 1 mW.
2. Idle mode: neither the base nor the handset is transmitting when there is no activity.
3. Our design spec is 28 dBm. We intentionally backed off from the 30dBm limit to improve power amplifier reliability. Before we sent the unit out to CKC for formal testing, we checked internally on four of our spectrum analyzers (HP89441A, HP8563E, HP8561E, HP8594E), the output power measured 28 dBm (631 mW) on all four. When the CKC test result showed higher than expected output, we were told that ±2dB tolerance could be expected from most spectrum analyzers.

To further demonstrate compliance, we are willing to add warning instructions in the users' manual, as stated in Table 1 of the OET document.

3) QUESTION: "Indicate whether or not the system always starts on the same channel whenever it begins to transmit"

ANSWER: No, the starting frequency is randomly selected from a hopping table.

4) QUESTION: "The technical description sent on August 4, 1998 indicates that the channel separation is 182 kHz. The 20 dB bandwidth plots show that the 20 dB bandwidth is greater than 200 kHz. ... Please correct/explain accordingly."

ANSWER:

We have found a discrepancy between the Zilog (and our internal) spectrum occupancy plots and the CKC plots. The reason was resolution bandwidth.

Attached please find Zilog plots of spectrum at 902, 915, and 927 MHz (Figures 1-3) using 10 kHz resolution BW, which show 20 dB bandwidth of about 150 kHz. Using 30 kHz resolution bandwidth, all of the plots would have exceeded 182 kHz as illustrated in Figure 4, also provided by Zilog.

To prevent further delay, we would like to propose using FCC's preferred 30 kHz resolution bandwidth and comply with the rules under 30 kHz resolution bandwidth. In the meantime, we will relay this information back to Zilog.

A software modification will enable us to comply with the rule is because, if you review the frequency hopping table provided in my 7/30/98 message, we only use odd numbered channels. There are 142 "nominal" channels, evenly distributed over 902-928 MHz, and indexed from 0 to 141. The hopping sequence is generated by plugging X,

X = 1 3 7 15 31 63 62 61 58 53 42 21 43 22 44 25 51 38 13 27 55 46 29 59 54 45 26 52 41 18 36 9 19 39 14 28 56 49 34 5 11 23 47 30 60 57 50 37 10 20 40 17 35 6 12 24 48 33 2 4 8 16 32

into the following formula:

$$Freq(X) = 902.12144 + (2 \times X + 1) \times .1820444 \text{ MHz}$$

Because of the 2X+1 operation, only odd number channels would be used. What needed to be modified is the spare hopping table used for frequency adaptation when encountering interference (explained by Zilog in the 07/30/98 fax). Originally, all of the remaining 142 – 63 = 79 channels are candidates for adaptation. Now we shall limit only odd number channels be selected. There will be a total of 71 – 63 = 8 such spare channels.

By doing this we essentially evenly divide the 902-928 MHz band into 71 channels, instead of 142, and the channel spacing becomes 364 kHz. We may take some hit in BER performance, but we believe 8 spare channel should be sufficient in most cases.

The detailed timing for a typical ZPhone base and handset is shown in the following tables and figures.

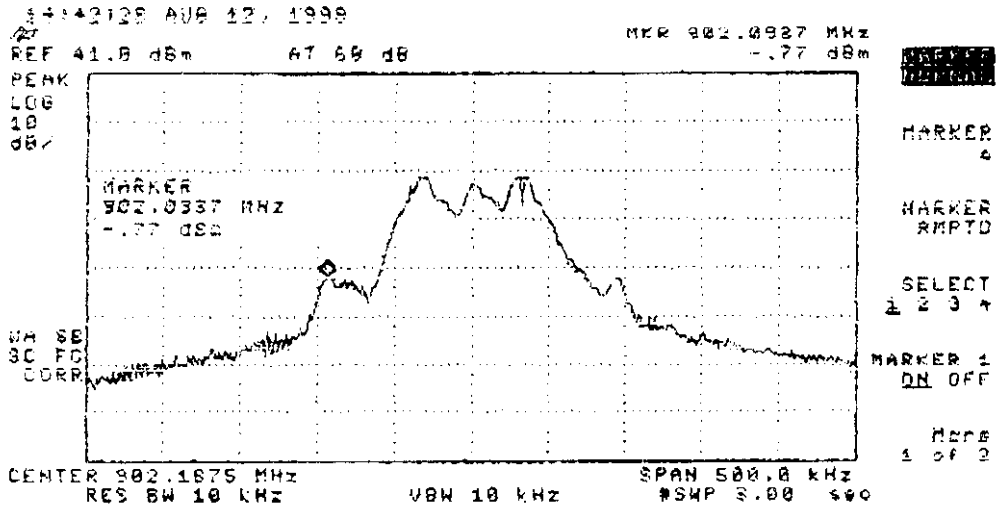
Timing Interval values for Handset

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
T1	Wake/sleep timer wake time	12.0	12.1		ms
T2	TDD frame time		4.00		ms
T3	Waking frame PLL word 1 delay		3.2		ms
T4	Waking frame extra SYLE pulse delay			3.5	ms
T5	Waking frame PLL word 2 delay		3.8		ms
T6	PLL word duration	2.5		4	us
T7	Frame start to receiver on delay		600		us
T8	RF receiver on time			1.60	ms
T9	Received signal duration			1.54	ms
T10	Receive/transmit signal separation		150		us
T11	RF transmitter on time			1.65	ms
T12	Transmit signal duration			1.59	ms

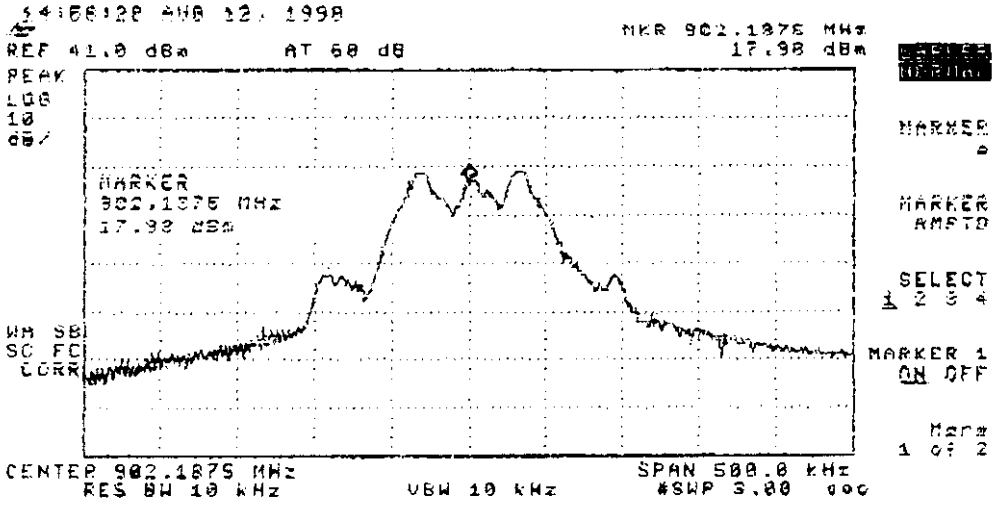
Timing Interval Values for Base Station

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
T1	TDD frame time		4.00		ms
T2	PLL word duration	2.5		4	us
T3	Frame start to transmit start delay		600		us
T4	RF transmitter on time			1.60	ms
T5	Transmitted signal duration			1.54	ms
T6	Transmit/receive signal separation		150		us
T7	RF receiver on time			1.65	ms
T8	Received signal duration			1.59	ms

$$\text{TX Duty Cycle} = \frac{1.65 \text{ ms}}{4 \text{ ms}} = 0.4125$$


14:42:39 AUG 12, 1998
MKR 902.0837 MHz
REF 41.8 dBm
AT 60 dB
-.77 dBm
PEAK
LOG
10
dB/
MARKER
902.0837 MHz
-.77 dBm
MARKER
MARKER
RMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
Marg
1 of 2
WA SB
SC FC
CORR
CENTER 902.1875 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00 sec

CH Ø


14:56:28 AUG 12, 1998
MKR 902.1875 MHz
REF 41.0 dBm
AT 60 dB
17.98 dBm
PEAK
LOG
10
dB/
MARKER
902.1875 MHz
17.98 dBm
MARKER
MARKER
RMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
Marg
1 of 2
WA SB
SC FC
CORR
CENTER 902.1875 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00 sec

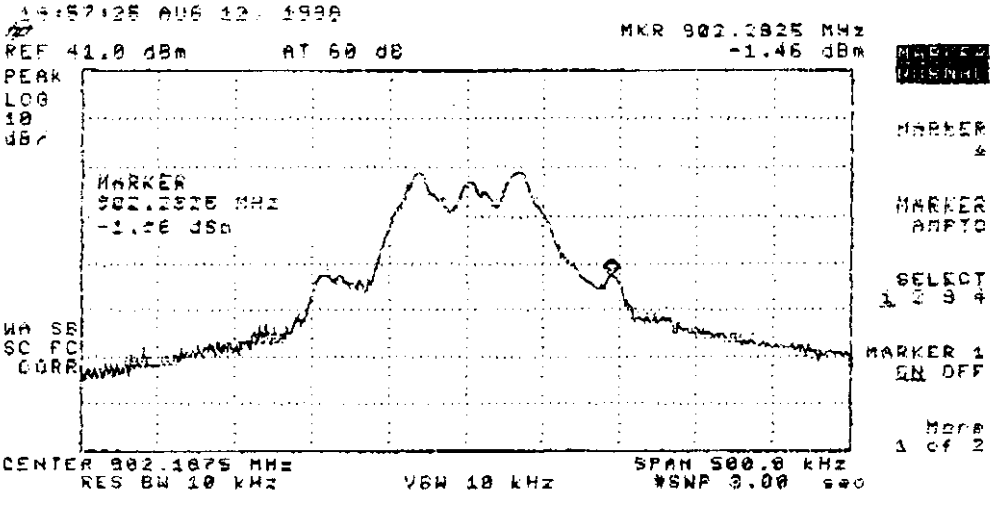
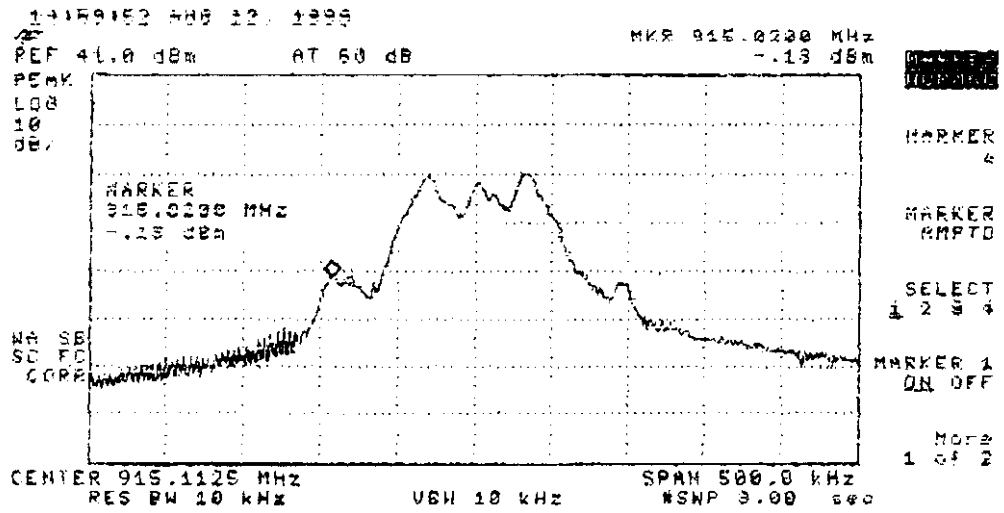
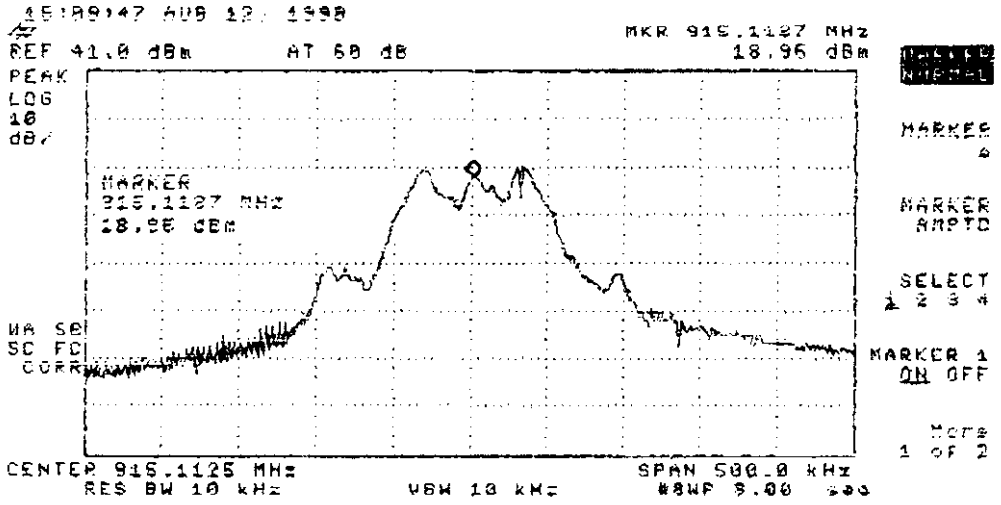

14:57:25 AUG 12, 1998
MKR 902.2825 MHz
REF 41.0 dBm
AT 60 dB
-1.46 dBm
PEAK
LOG
10
dB/
MARKER
902.2825 MHz
-1.46 dBm
MARKER
MARKER
RMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
Marg
1 of 2
WA SB
SC FC
CORR
CENTER 902.1875 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00 sec

Fig. 1


MKR 915.0200 MHz
-.13 dBm
REF 41.0 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
915.0200 MHz
-.13 dBm
MARKER
MARKER
MKRTO
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00

CH 71


MKR 915.1127 MHz
18.95 dBm
REF 41.0 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
915.1127 MHz
18.95 dBm
MARKER
MARKER
MKRTO
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00

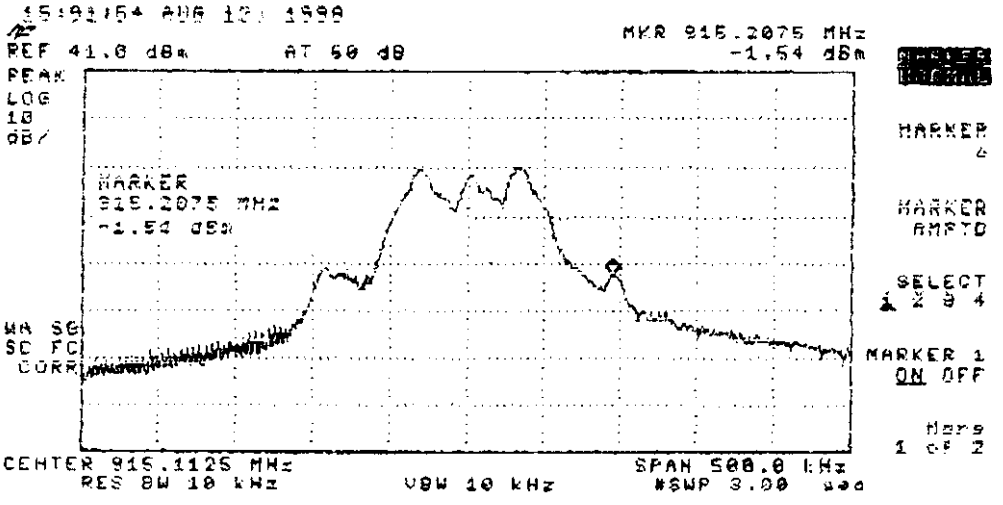
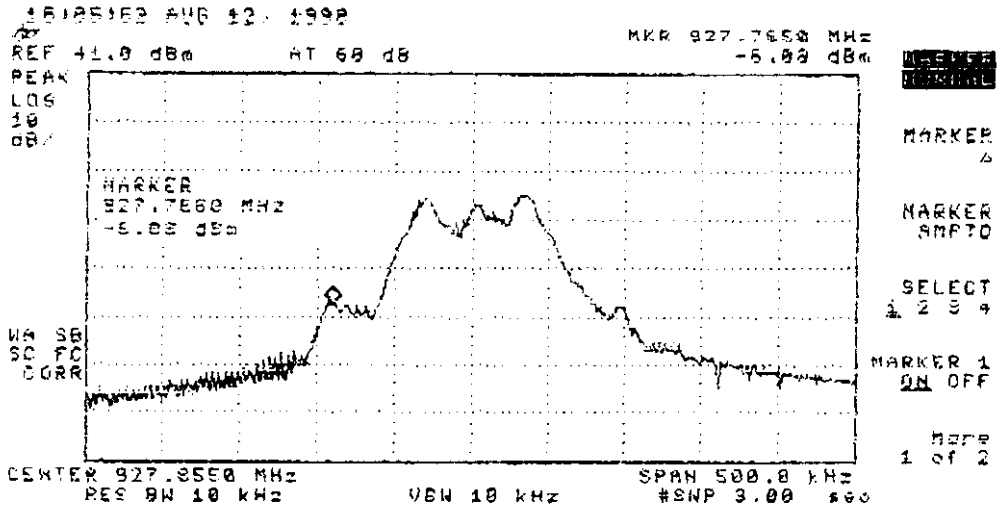
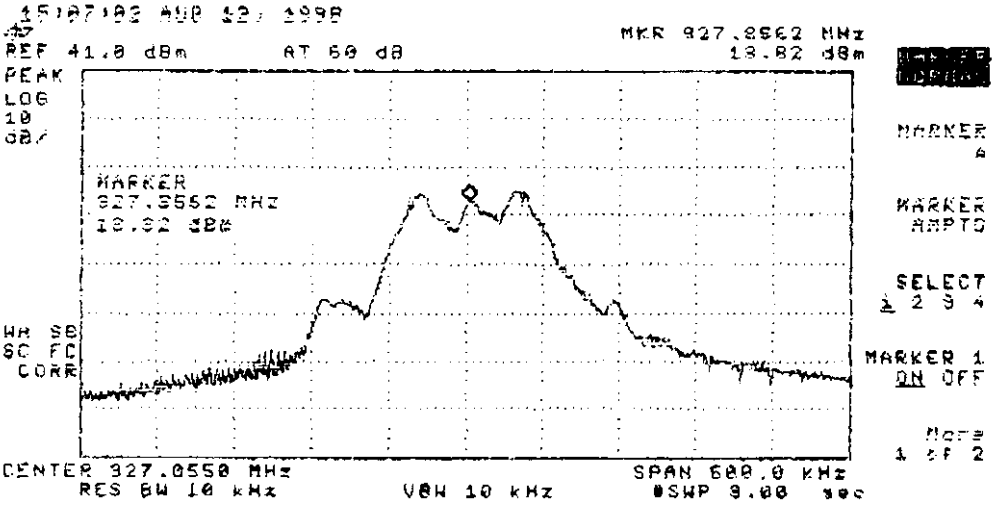

MKR 915.2075 MHz
-1.54 dBm
REF 41.0 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
915.2075 MHz
-1.54 dBm
MARKER
MARKER
MKRTO
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00

Fig. 2


15:05:52 AUG 12, 1998
REF 41.0 dBm
AT 60 dB
MKR 927.7550 MHz
-5.00 dBm
PEAK
LOG
10
dB/
MARKER
927.7550 MHz
-5.00 dBm
WR SB
SC FC
CORR
MARKER
MARKER AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 927.8550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz
#SWP 3.00 sec

CH 1 2 4 1


15:07:02 AUG 12, 1998
REF 41.0 dBm
AT 60 dB
MKR 927.8562 MHz
18.82 dBm
PEAK
LOG
10
dB/
MARKER
927.8562 MHz
18.82 dBm
WR SB
SC FC
CORR
MARKER
MARKER AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 927.0550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 600.0 kHz
#SWP 9.00 sec

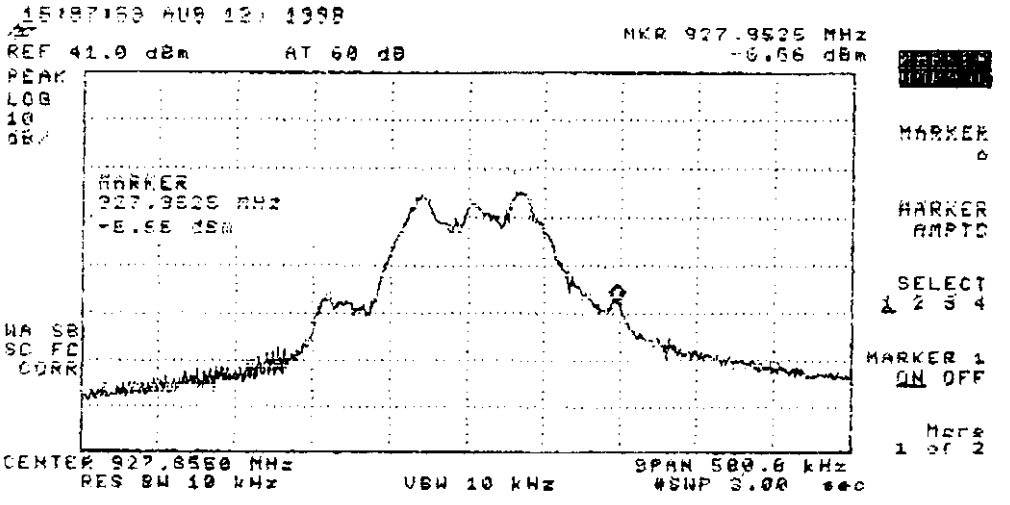
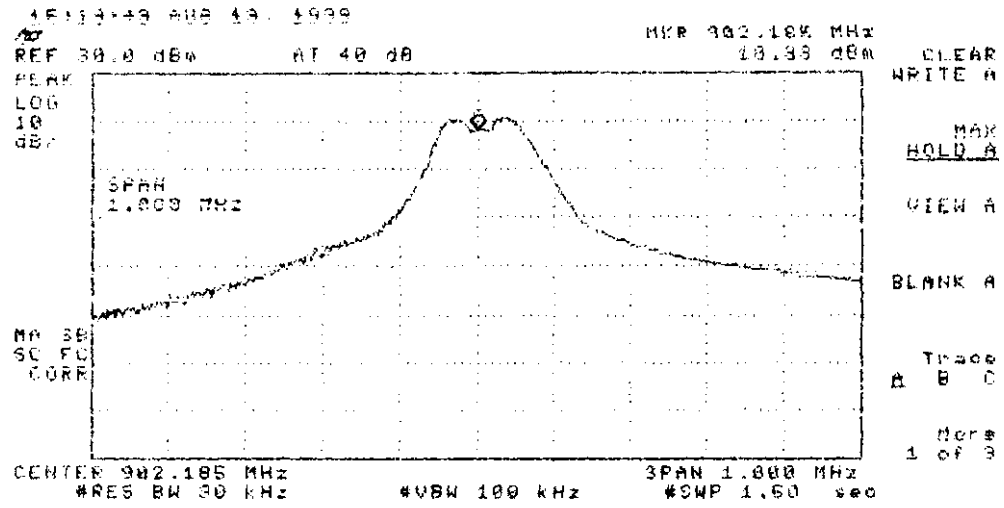
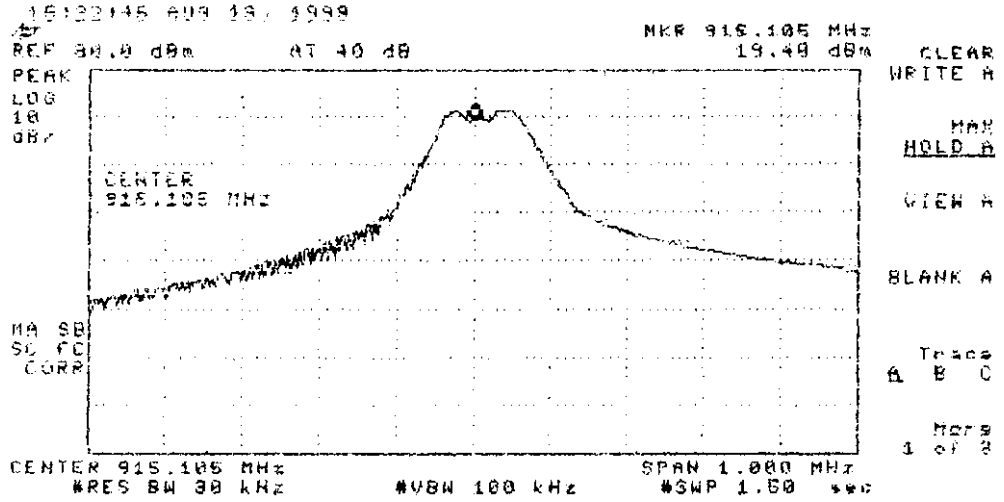

15:07:50 AUG 12, 1998
REF 41.0 dBm
AT 60 dB
MKR 927.9525 MHz
-6.66 dBm
PEAK
LOG
10
dB/
MARKER
927.9525 MHz
-6.66 dBm
WR SB
SC FC
CORR
MARKER
MARKER AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 2
CENTER 927.8550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.6 kHz
#SWP 3.00 sec

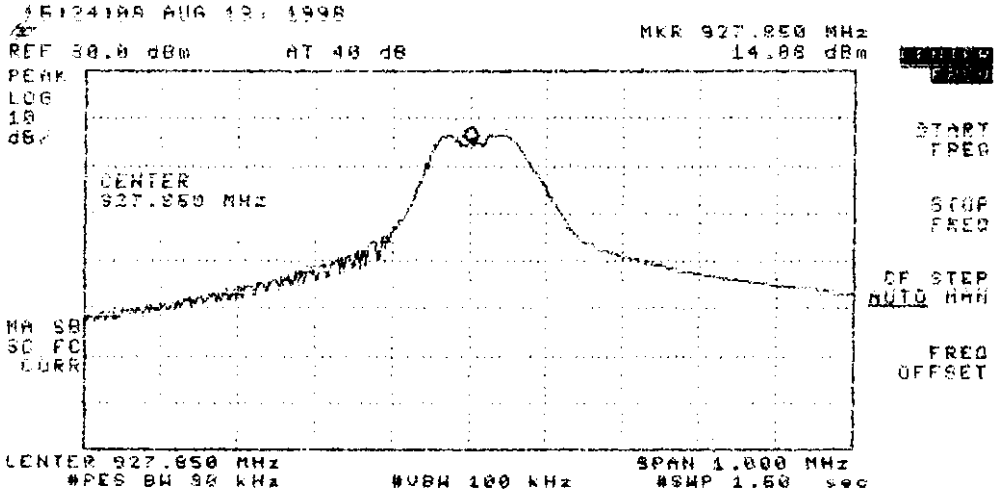
Fig. 3



CH 0



CH 21



CH 141

TOTAL P.02

Fig. 4

The detailed timing for a typical ZPhone base and handset is shown in the following tables and figures.

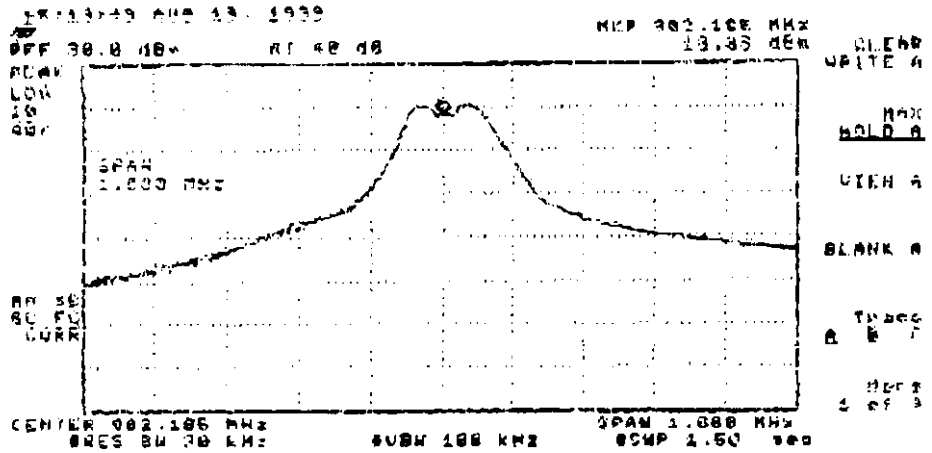
Timing Interval values for Handset

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
T1	Wake/sleep timer wake time	12.0	12.1		ms
T2	TDD frame time		4.00		ms
T3	Waking frame PLL word 1 delay		3.2		ms
T4	Waking frame extra SYLE pulse delay			3.5	ms
T5	Waking frame PLL word 2 delay		3.8		ms
T6	PLL word duration	2.5		4	us
T7	Frame start to receiver on delay		600		us
T8	RF receiver on time			1.60	ms
T9	Received signal duration			1.54	ms
T10	Receive/transmit signal separation		150		us
T11	RF transmitter on time			1.65	ms
T12	Transmit signal duration			1.59	ms

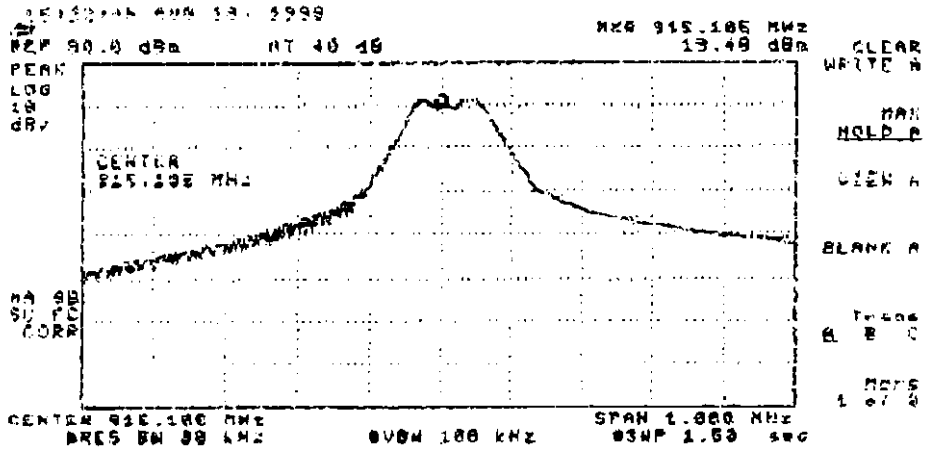
Timing Interval Values for Base Station

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
T1	TDD frame time		4.00		ms
T2	PLL word duration	2.5		4	us
T3	Frame start to transmit start delay		600		us
T4	RF transmitter on time			1.60	ms
T5	Transmitted signal duration			1.54	ms
T6	Transmit/receive signal separation		150		us
T7	RF receiver on time			1.65	ms
T8	Received signal duration			1.59	ms

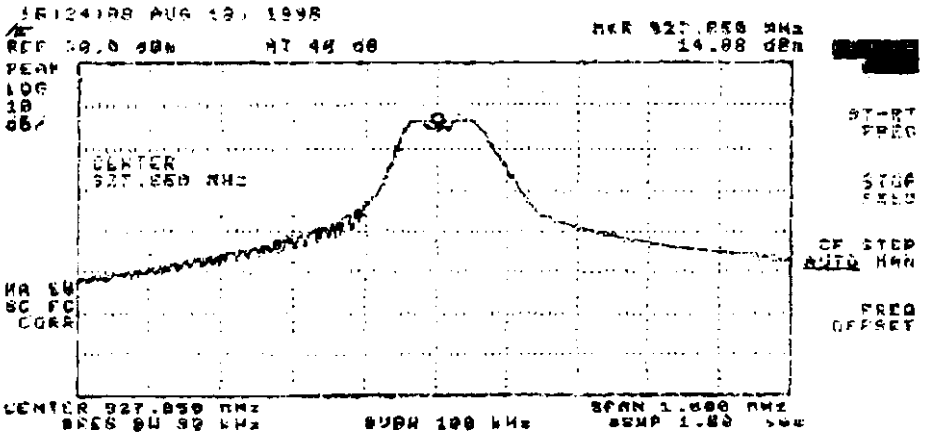
$$\text{Tx Duty Cycle} = \frac{1.65\ \text{ms}}{4\ \text{ms}} = 0.4125$$



CH 0



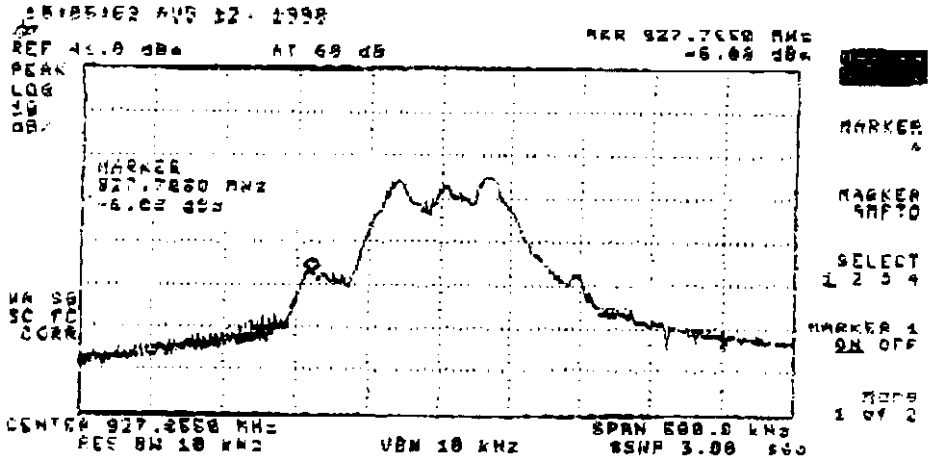
CH 21



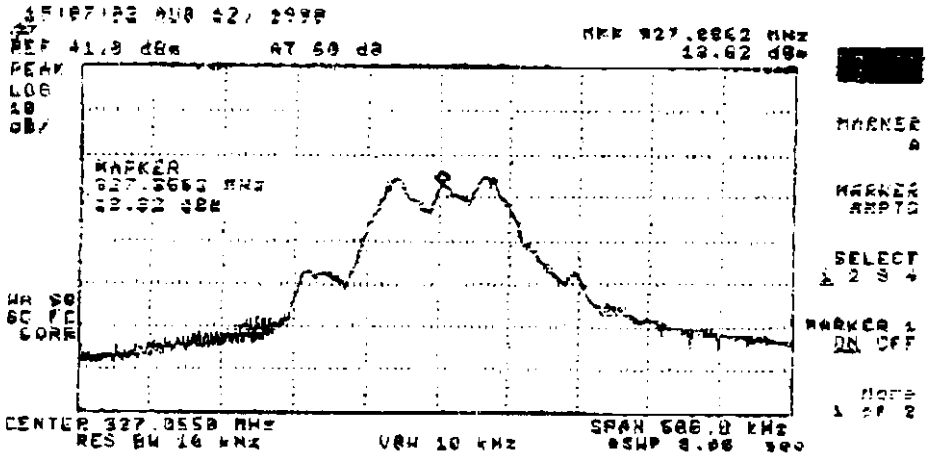
CH 141

TOTAL P.02

Fig. 4


REF 41.8 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
927.7850 MHz
-6.62 dBm
MKR 927.7550 MHz
-6.62 dBm
MARKER
A
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
MKRS
1 OF 2
MA SB
SC FC
CORR
CENTER 927.8550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 600.0 kHz
#SWP 3.00 sec

CH 1 #1


REF 41.8 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
927.8662 MHz
12.62 dBm
MKR 927.8662 MHz
12.62 dBm
MARKER
A
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
MKRS
1 OF 2
MA SB
SC FC
CORR
CENTER 927.8550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 600.0 kHz
#SWP 3.00 sec

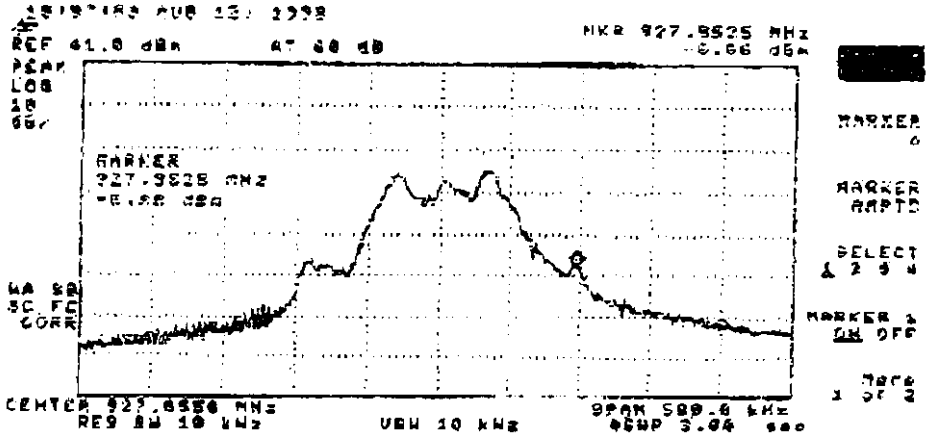
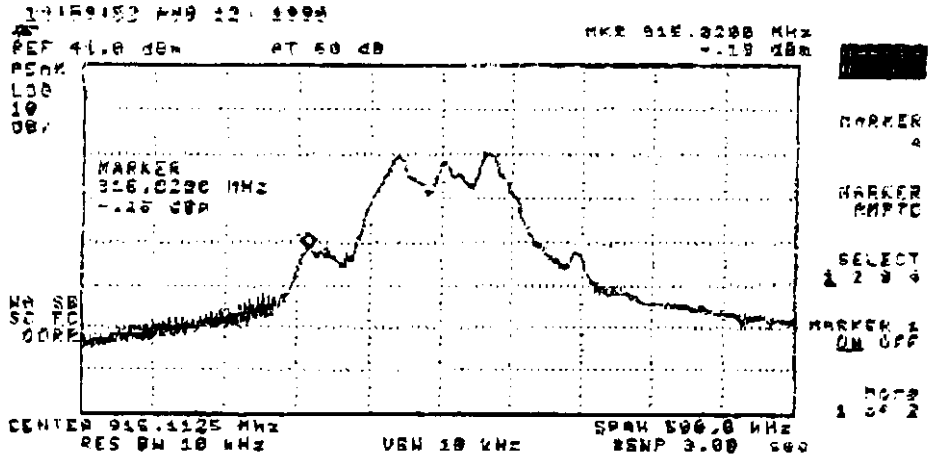
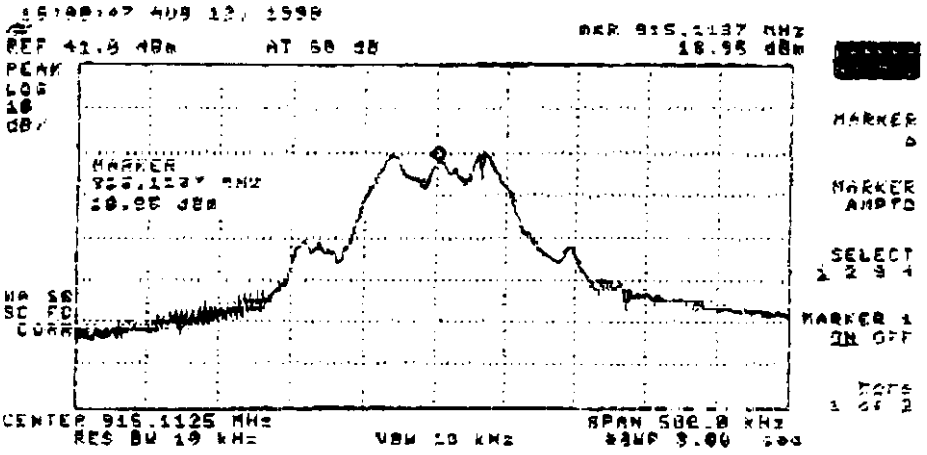

REF 41.8 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
927.8525 MHz
-6.66 dBm
MKR 927.8525 MHz
-6.66 dBm
MARKER
A
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
MKRS
1 OF 2
MA SB
SC FC
CORR
CENTER 927.8550 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 589.6 kHz
#SWP 3.04 sec

Fig. 3


REF 41.8 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
916.0200 MHz
MKR 915.3200 MHz
MARKER
MARKER AMPTD
SELECT
MARKER 1
ON OFF
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

CH 71


REF 41.8 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
MKR 915.1137 MHz
18.95 dBm
MARKER AMPTD
SELECT
MARKER 1
ON OFF
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

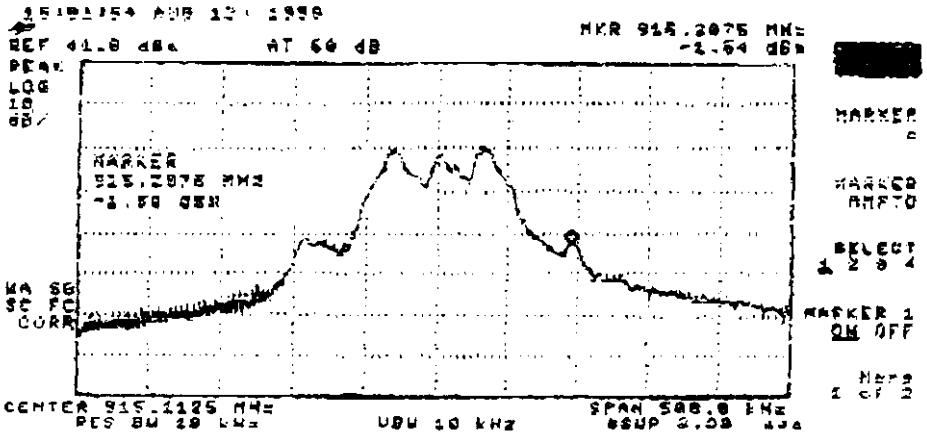
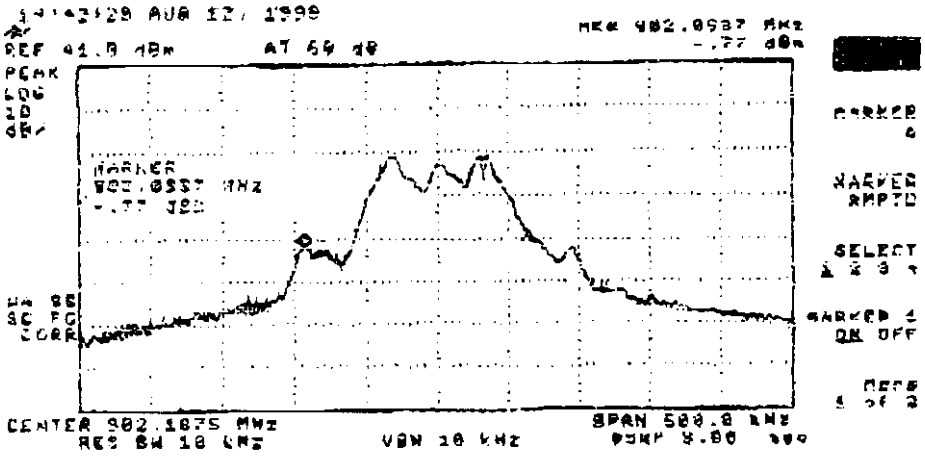
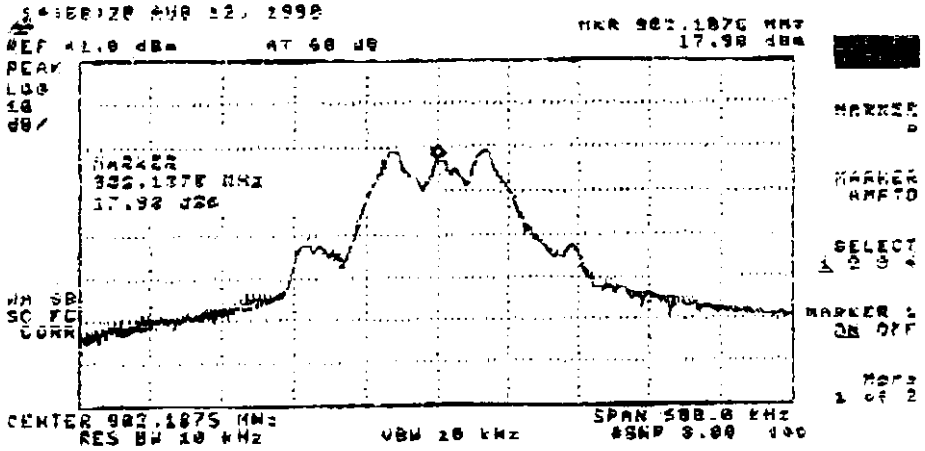

REF 41.8 dBm
AT 50 dB
PEAK
LOG
10
dB/
MARKER
915.2075 MHz
MKR 915.2075 MHz
MARKER AMPTD
SELECT
MARKER 1
ON OFF
CENTER 915.1125 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

Fig. 2


REF 41.8 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
902.0937 MHz
-1.77 dBm
MARKER
AMPTD
SELECT
MARKER 1
ON OFF
CENTER 902.1875 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

CH Ø


REF 41.0 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
902.1375 MHz
17.98 dBm
MARKER
AMPTD
SELECT
MARKER 1
ON OFF
CENTER 902.1875 MHz
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

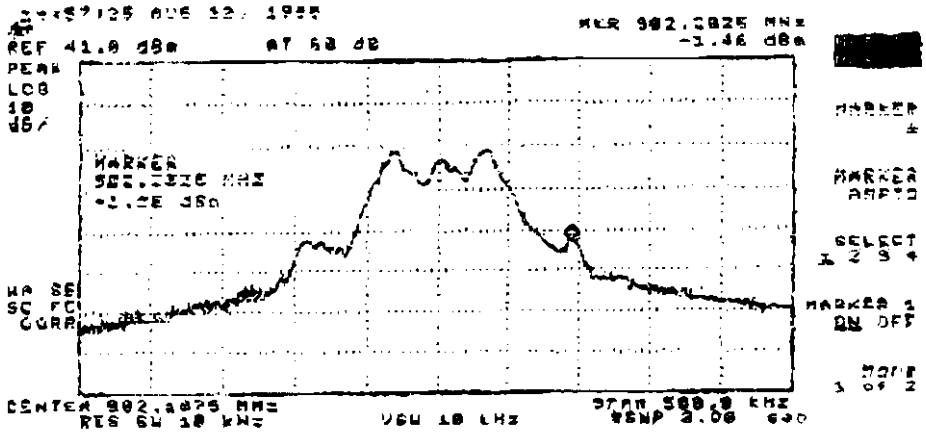

REF 41.0 dBm
AT 60 dB
PEAK
LOG
10
dB/
MARKER
902.2825 MHz
-1.46 dBm
MARKER
AMPTD
SELECT
MARKER 1
ON OFF
RES BW 10 kHz
VBW 10 kHz
SPAN 500.0 kHz

Fig. 1

SECTION 3
RF EXPOSURE COMPLIANCE FOR SPREAD SPECTRUM TRANSMITTERS

For spread spectrum transmitters operating under 47 CFR §15.247, it is specified in 47 CFR §15.247(b)(4) that these devices must operate in a manner that ensures the public is not exposed to RF energy levels in excess of the Commission's guidelines.[14] These devices are categorically excluded from routine environmental evaluation because they generally operate at relatively low power levels where there is a high likelihood of compliance with the RF exposure standards. For some low power devices, it may be necessary to ensure compliance with the RF exposure limits by using a combination of simple procedures such as installation and operating instructions, warning instructions and/or warning labels on the device to ensure that the device will not expose nearby persons above the applicable MPE limits (See Reference [9]). In most cases, the "worst case" distance at which an MPE limit is met for mobile devices can be estimated according to the field strength or power density produced by an isotropic source with radiated power equivalent to that transmitted by the device as discussed in OET Bulletin 65.

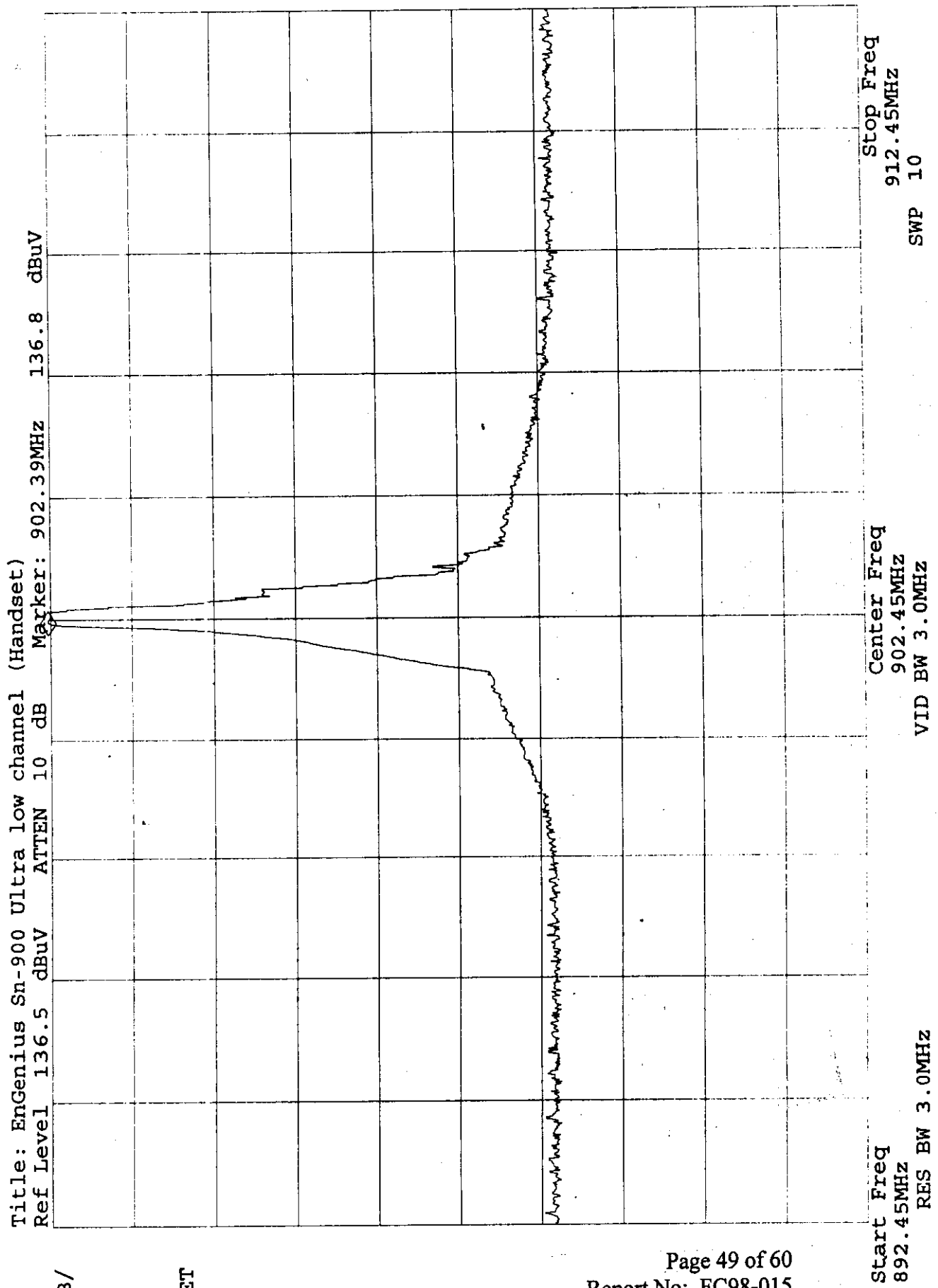
If a transmitter is designed to operate next to the body of its user or at close proximity to persons, an RF evaluation may be requested according to 47 CFR §1.1307(c) and (d). These types of evaluations are typically limited to transmitters that are intended to operate in very close proximity to the body, using 0.5 watt of output power or more with a high signal transmitting duty factor, and which do not incorporate obvious effective means of alerting users to the potential for RF exposure. When RF evaluation is requested, the procedures described in this supplement for evaluating mobile and portable devices with respect to MPE or SAR limits may be used.

For purposes of determining RF exposure, the transmission protocols used by certain spread spectrum transmitters may qualify the device for source-based time averaging. The applicable duty factor may be determined according to the RF output power "on" and "off" time durations, either as a signal with a repeatable duty cycle or by establishing a worst case duty factor using power off durations identified by the transmission protocol. Duty factors related to device usage, frequency hopping or other similar transmission conditions are normally not acceptable as source-based, time averaging factors for RF evaluations.

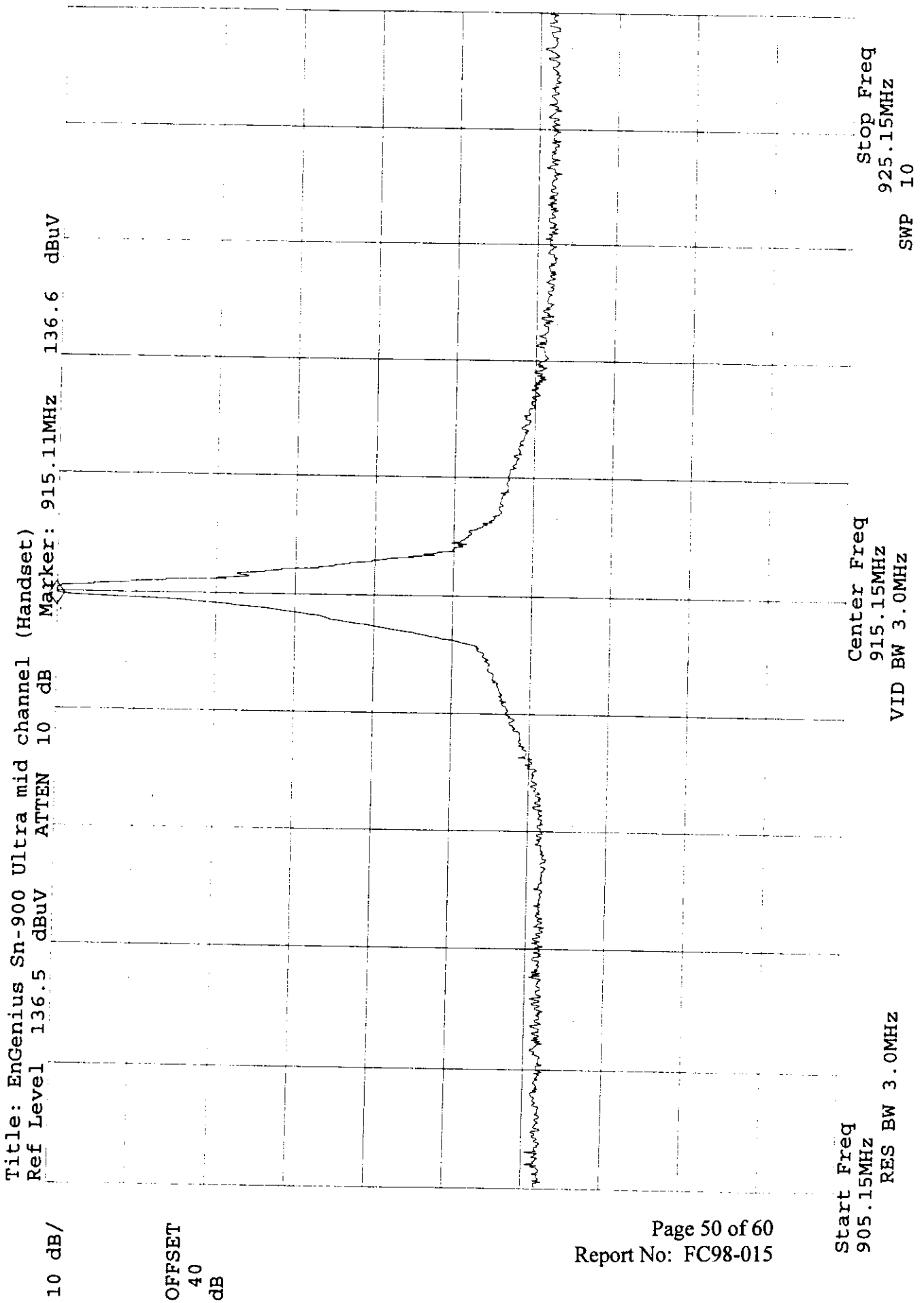
---

[14] See *Report and Order*, in ET Docket 96-8, FCC 97-114, Amendment of Parts 2 and 15 of Commission's Rules Regarding Spread Spectrum Transmitter.

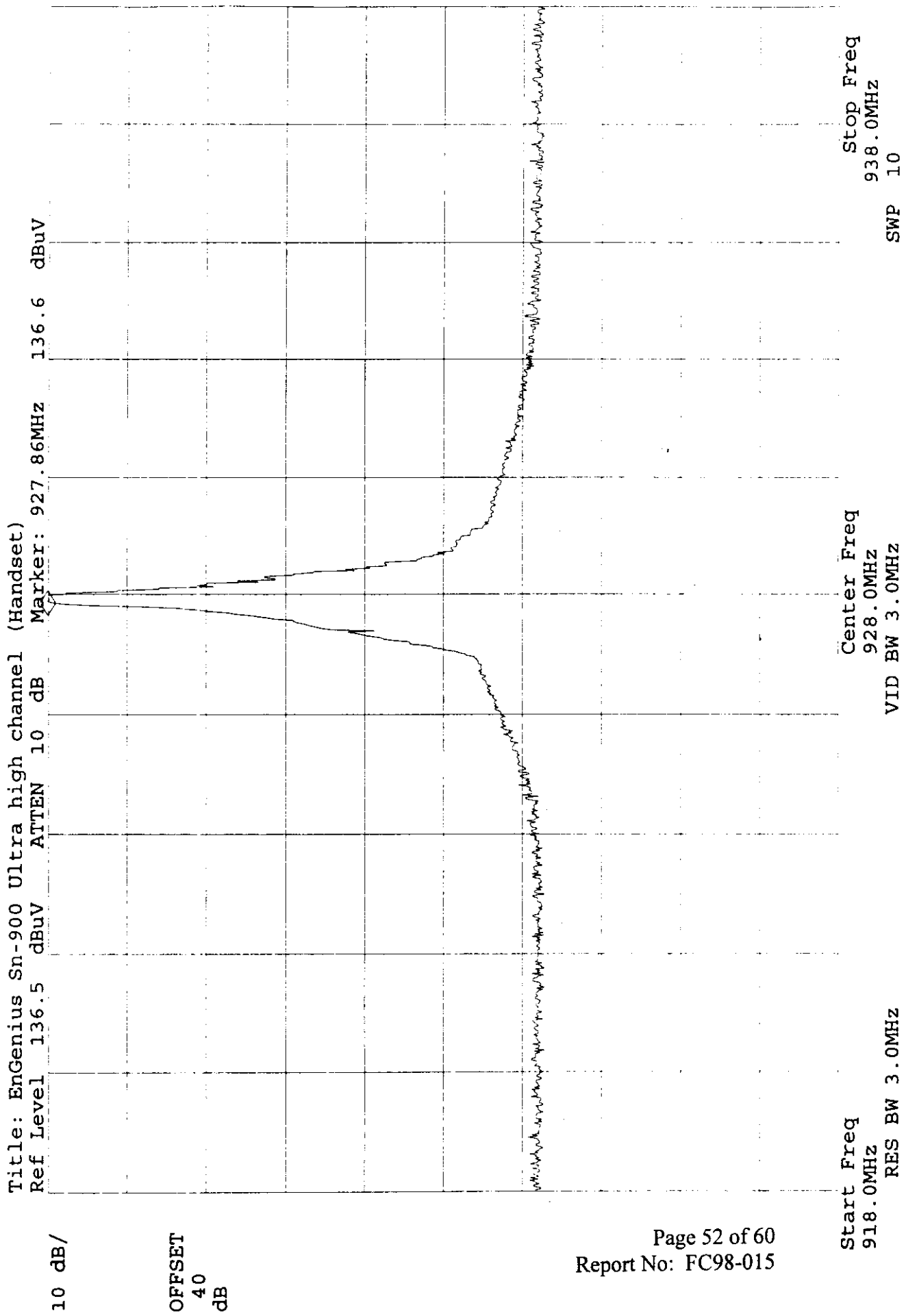
FCC Part 15.247(b) RF Power Output Plot (Handset)



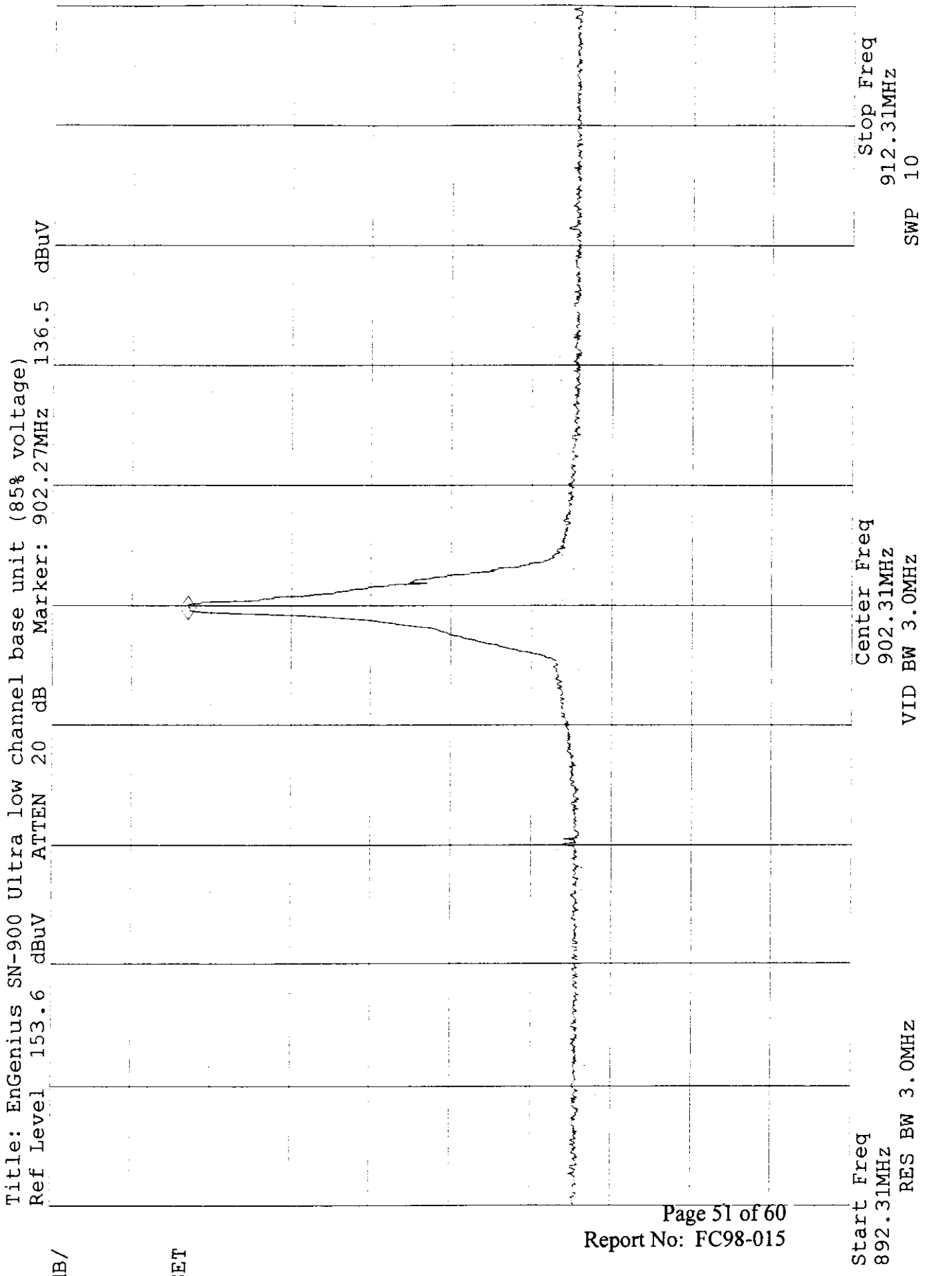
FCC Part 15.247(b) RF Power Output Plot (Handset)



FCC Part 15.247(b) RF Power Output Plot (Handset)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



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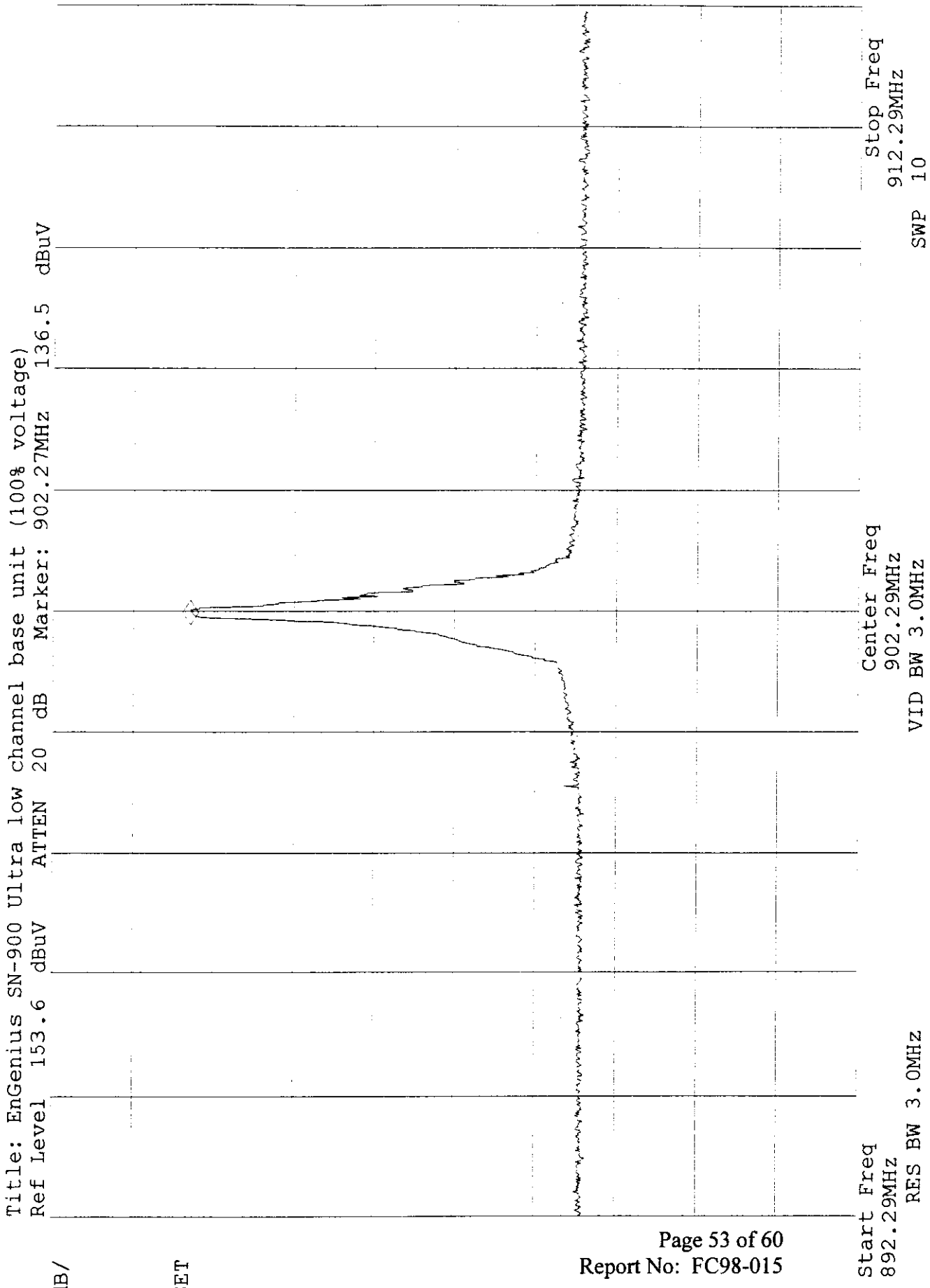

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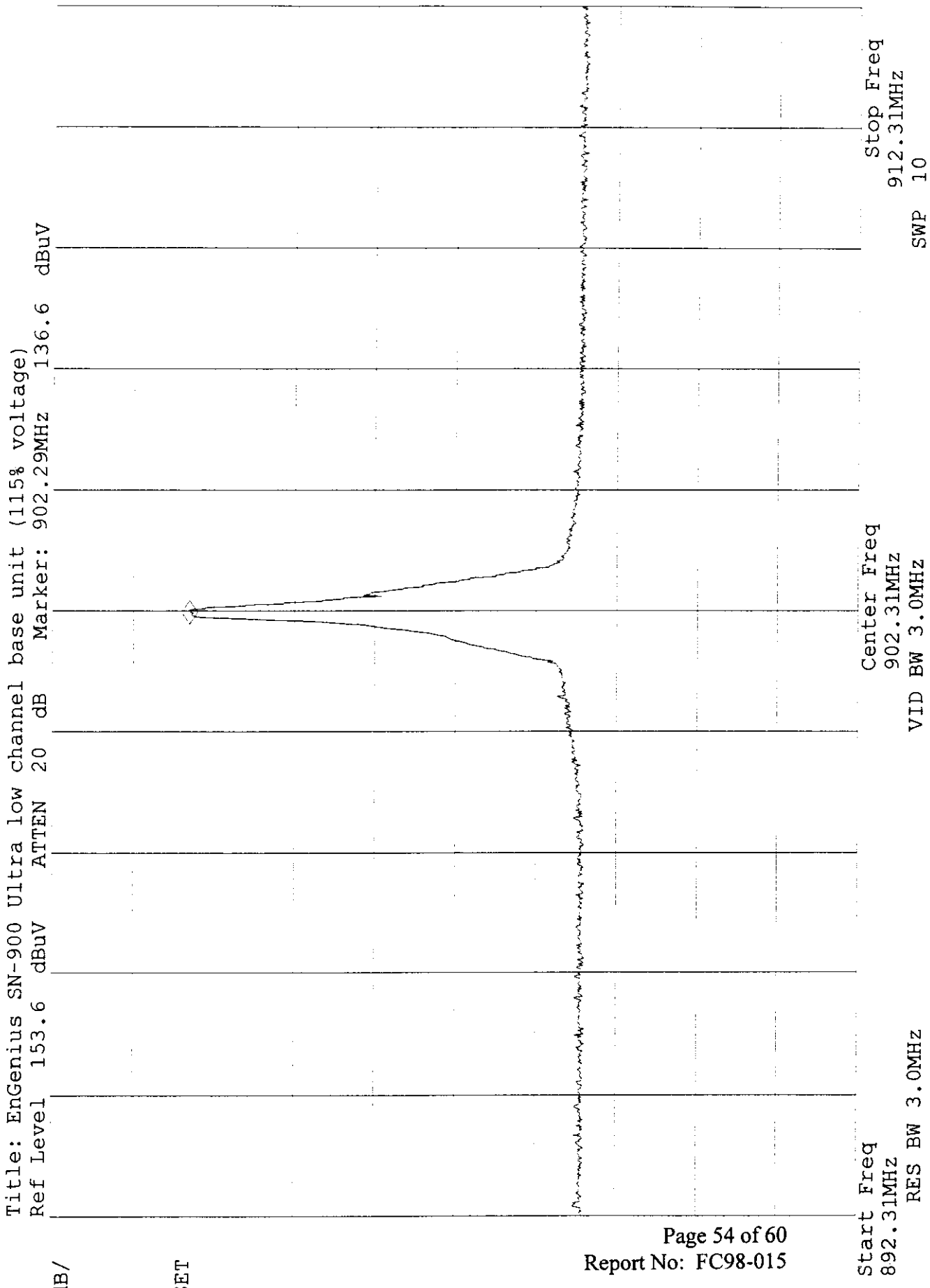
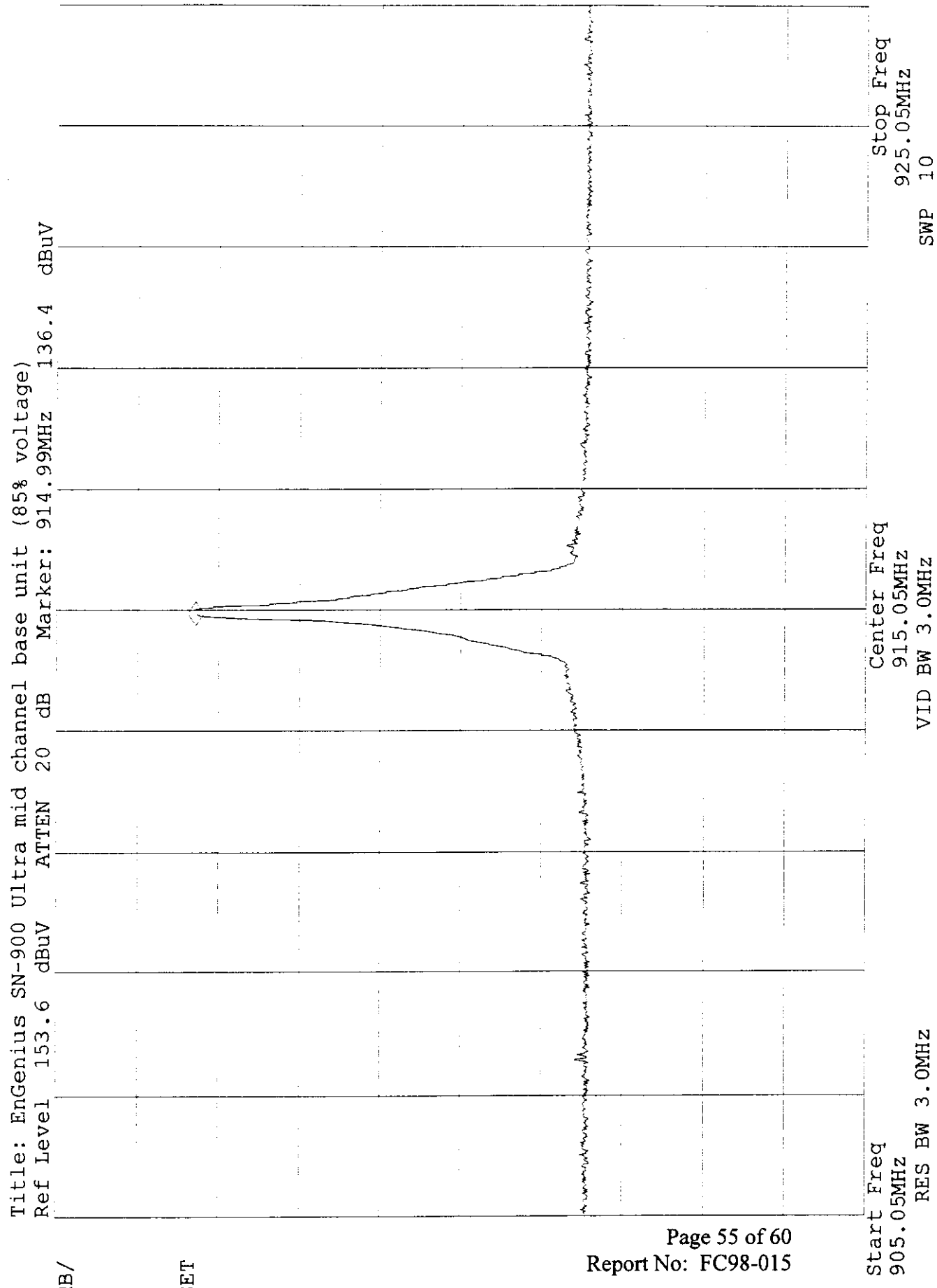
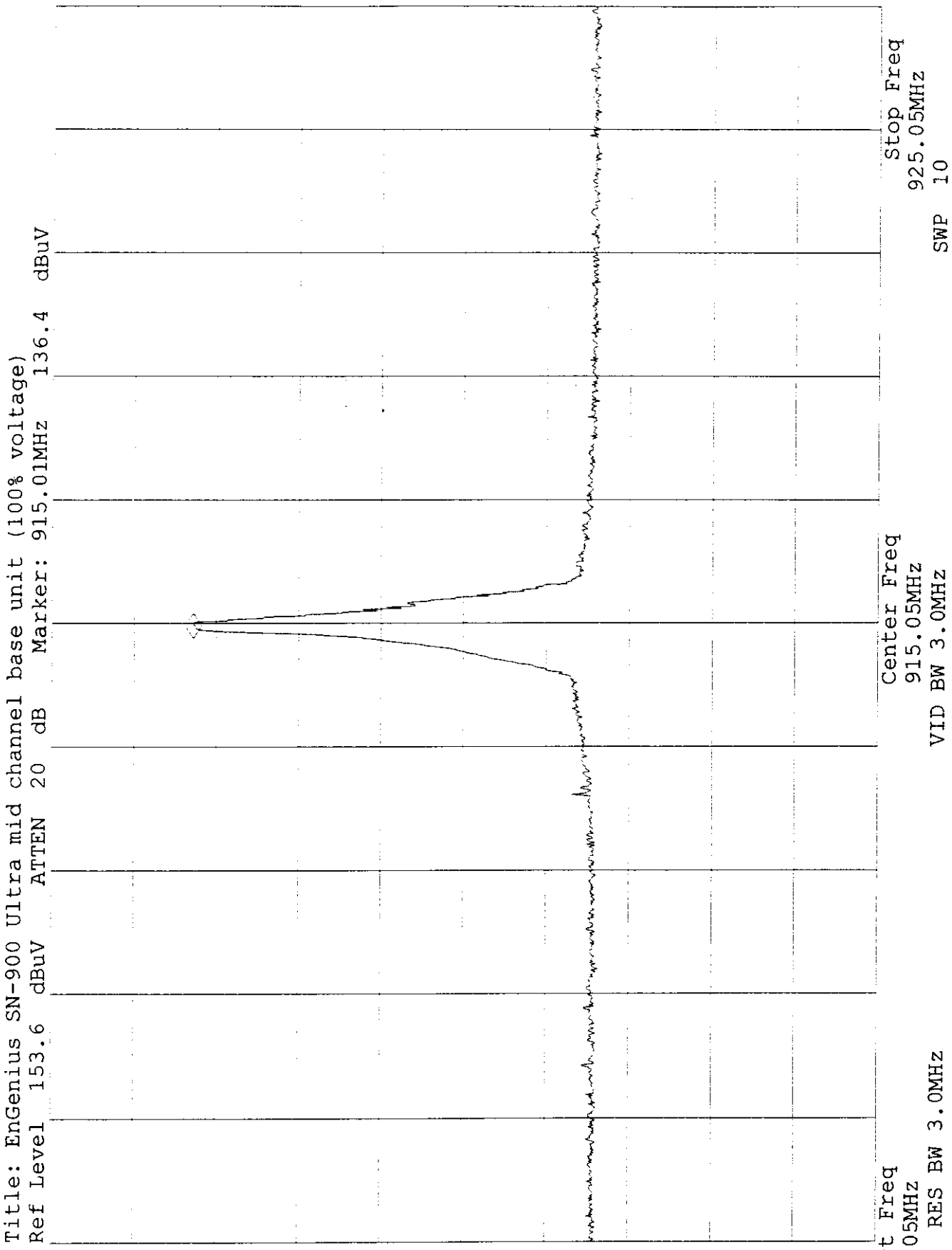


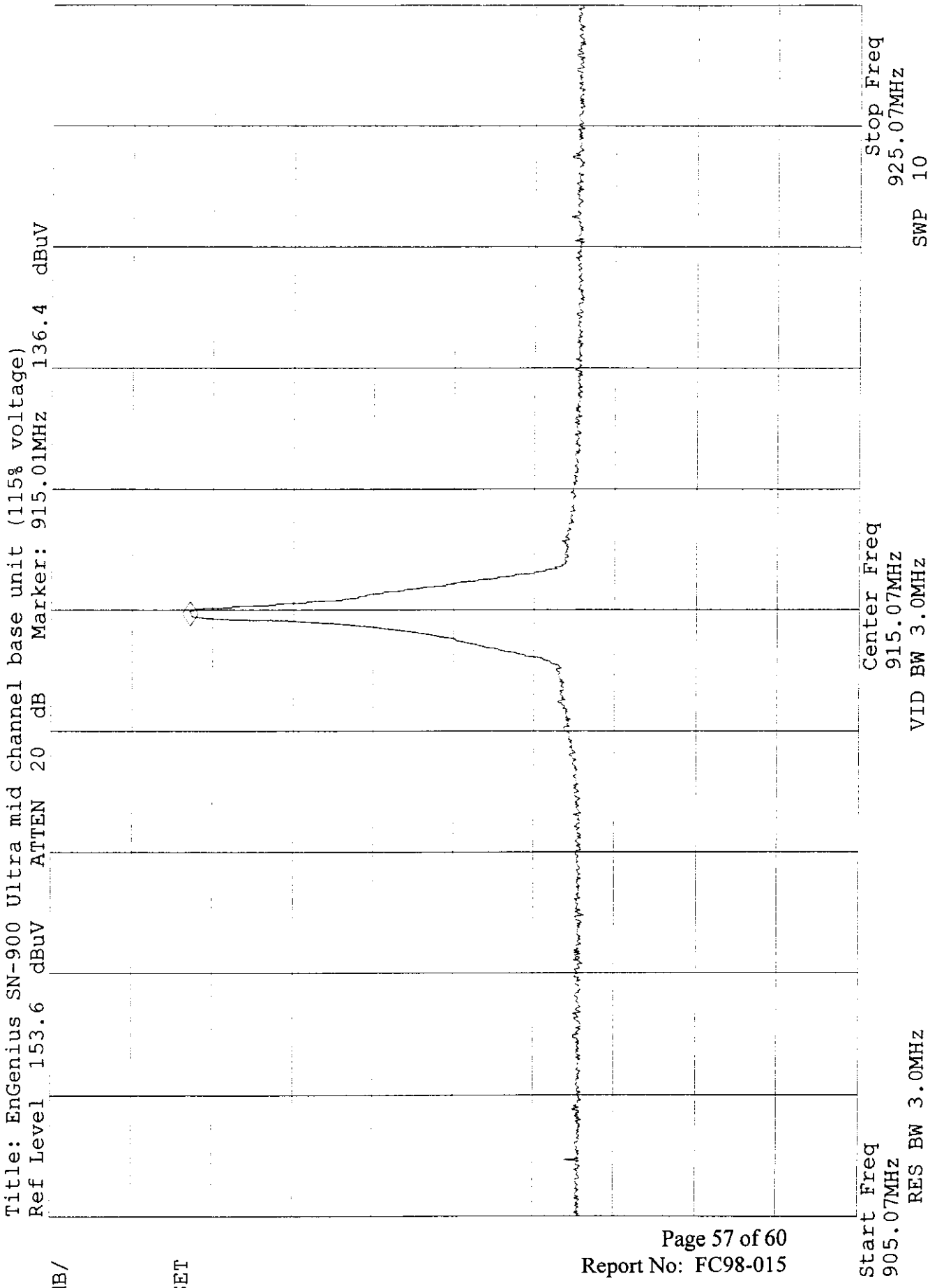
FCC Part 15.247(b) RF Power Output Plot (Base Unit)



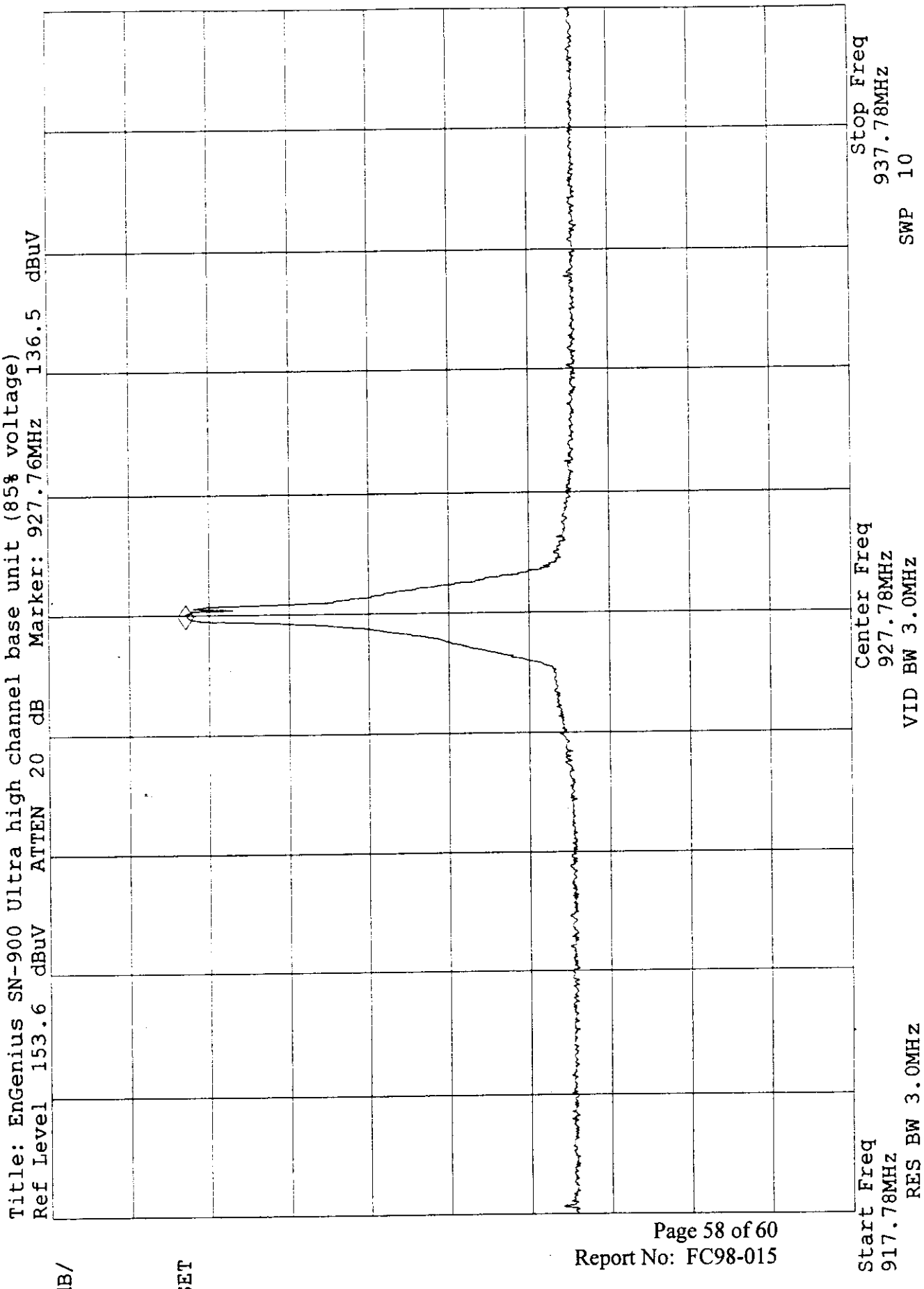
FCC Part 15.247(b) RF Power Output Plot (Base Unit)



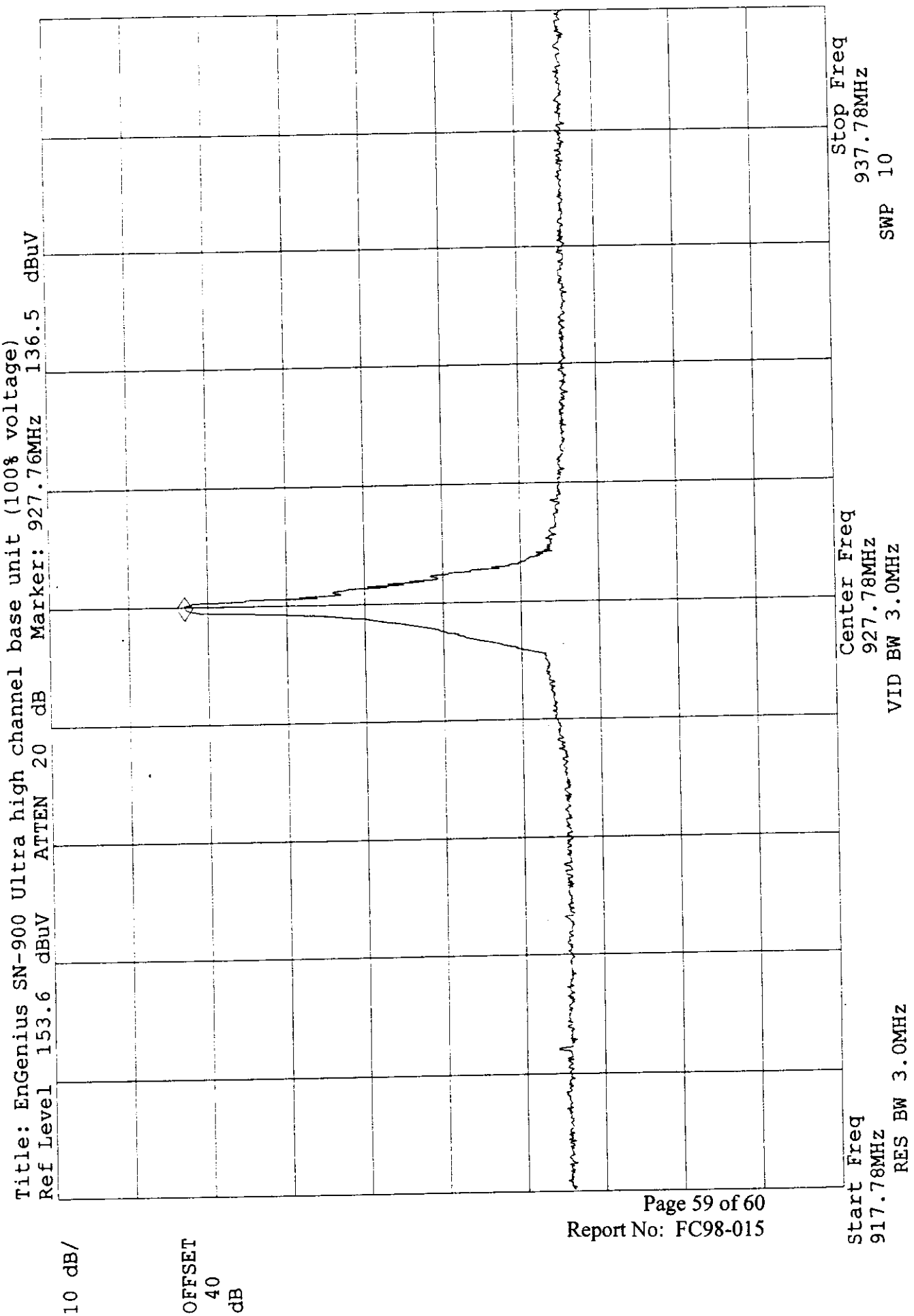
FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)

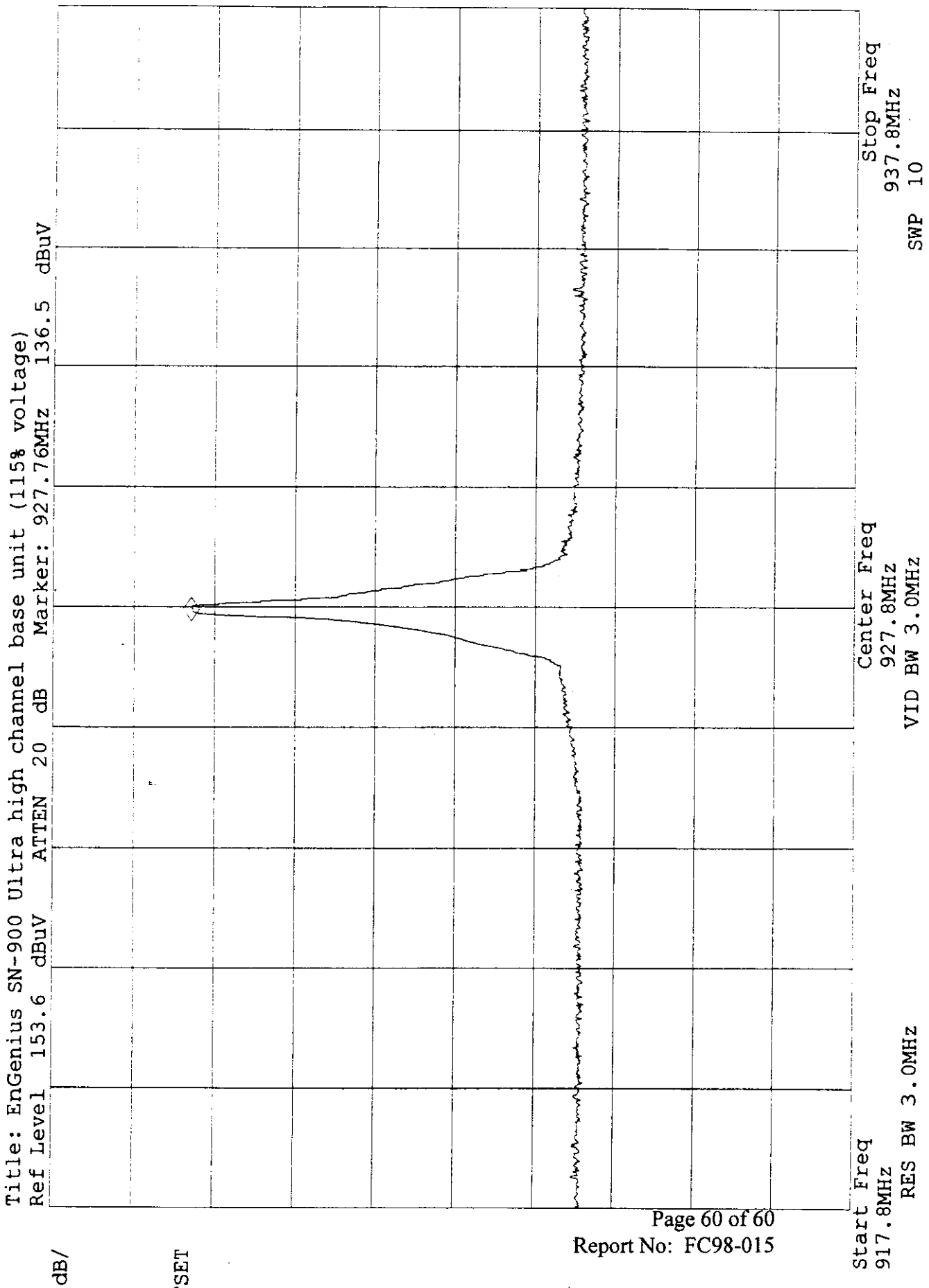


EXHIBIT D

CKC TEST REPORT

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ACCREDITED

CERTIFICATION TEST REPORT

FOR THE

900 MHZ SPREAD SPECTRUM DIGITAL CORDLESS PHONE, ENGENIUS SN-900 ULTRA

FCC PART 15 SUBPART C

COMPLIANCE

DATE OF ISSUE: MAY 12, 1998

PREPARED FOR:

SuperTel Technologies
8660 154th Ave NE
Redmond, WA 98052

P.O. No: STT-E98271

W.O. No: 68589

Report No: **FC98-015**

Date of test: April 2, 1998

PREPARED BY:

Monika Lopez
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

APPROVED BY:

Dennis Ward
Director of Laboratories
CKC Laboratories

DOCUMENTATION CONTROL:

Tracy Phillips

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	April 2, 1998
PURPOSE OF TEST:	To demonstrate the compliance of the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra, with the requirements for FCC Part 15, Subpart C devices.
MANUFACTURER:	SuperTel Technologies 8660 154th Ave NE Redmond, WA 98052
REPRESENTATIVE:	Derek Jasnoch
TEST LOCATION:	CKC Laboratories, Inc. 22105 Wilson River Hwy Tillamook, OR 97141
TEST PERSONNEL:	Steve Behm
TEST METHOD:	ANSI C63.4 1992
FREQUENCY RANGE TESTED:	9 kHz – 9280 MHz

EQUIPMENT UNDER TEST:

Phone Base

Manuf:	SuperTel Technologies
Model:	Engenius SN-900
Serial:	20590000
FCC ID:	Pending

Phone Handset

Manuf:	SuperTel Technologies
Model:	Engenius SN-900
Serial:	20690000
FCC ID:	Pending

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SUMMARY OF RESULTS

The SuperTel Technologies 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra, was tested in accordance with ANSI C63.4 1992 for compliance with FCC Part 15 Subpart C.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 15 Subpart C. The results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Comprises of a base station that is powered by an AC wall adapter and a handset that is powered by a Ni-Cad battery pack.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ±4dB measurement uncertainty.

PERIPHERAL DEVICES

The EUT was tested with the following peripheral devices:

Phone Handset
Manuf: SuperTel Technologies
Model: Engenius SN-900
Serial: 20690000
FCC ID: Pending

Phone Base
Manuf: SuperTel Technologies
Model: Engenius SN-900
Serial: 20590000
FCC ID: Pending

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REPORT OF MEASUREMENTS

The following Tables 1 and 2 report the highest emissions levels recorded during the tests performed on the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
938.482	53.2	23.5	-27.4	7.5		56.8	85.5	-28.7	V
1804.568	57.2	26.5	-39.4	2.1		56.4	84.4	-38.0	H
2706.635	19.6	29.1	0.0	2.6		51.3	54.0	-2.7	HA
3608.682	19.1	31.5	0.0	3.1		53.7	54.0	-0.3	HA
6315.965	60.4	34.7	-38.6	4.3		70.8	84.4	-23.6	V
8120.530	46.7	36.2	-38.0	5.0		49.9	54.0	-4.1	V

Test Method: ANSI C63.4 1992
Spec Limit : FCC Part 15.247/15.209/15.205
Test Distance: 3 Meters

NOTES:
H = Horizontal Polarization
V = Vertical Polarization
N = No Polarization
D = Dipole Reading
Q = Quasi Peak Reading
A = Average Reading

COMMENTS: The table above was configured from a combination of the following test conditions:

- The EUT was laying on its back side on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.
- The EUT was laying on its right side on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.
- The EUT was standing vertically on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.
- The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was frequency hopping between the low, middle, and high channels.

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Table 2: Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Lisn dB	dB	dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.615308	25.7	0.0				25.7	48.0	-22.3	W
0.747252	26.1	0.0				26.1	48.0	-21.9	W
1.169528	26.0	0.0				26.0	48.0	-22.0	W
13.150010	25.6	0.0				25.6	48.0	-22.4	W
13.824840	26.0	0.0				26.0	48.0	-22.0	B
27.596770	31.7	0.0				31.7	48.0	-16.3	B

Test Method: ANSI C63.4 1992
Spec Limit : FCC Class B
Test Distance: No Distance

NOTES: Q = Quasi Peak Reading
A = Average Reading
B = Black Lead
W = White Lead

COMMENTS: Unit was setup according to ANSI C63.4 and was being exercised using the Intercom button.

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TABLE A

LIST OF TEST EQUIPMENT

1. EMI Receiver System, Hewlett Packard, Model No. 8574A, S/N 3010A01076. Calibration date: November 25, 1997. Calibration due date: November 25, 1998.

2. Preamp, Hewlett Packard, Model No. 8447D, S/N 2727A05392. Calibration date: June 11, 1997. Calibration due date: June 11, 1998.

3. Biconical Antenna, A & H Systems, Model No. SAS-200/540, S/N 359. Calibration date: May 12, 1997. Calibration due date: May 12, 1998.

4. Log Periodic Antenna, A & H Systems, Model No. SAS200/510, S/N 464. Calibration date: August 26, 1997. Calibration due date: August 26, 1998.

5. LISN, Chase, Model No. SW147LY, S/N 1516. Calibration date: January 14, 1998. Calibration due date: January 14, 1999.

6. LISN (3 phase), Solar, Model No. 50uH, S/N T-MOOK1-2. Calibration date: January 15, 1998. Calibration due date: January 15, 1999.

7. Tillamook A site calibration date: November 18, 1997. Tillamook A site calibration due date: November 18, 1998.

8. Test software, EMI Test 2.86.

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EUT SETUP

The equipment under test (EUT) and the peripherals listed were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Tables 1 for radiated emissions and Table 2 for conducted emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating table 1 meter above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

I/O cables were connected to the EUT and peripherals in the manner required for normal operation of the system. Excess cabling was bundled in the center in a serpentine fashion using 30-40 centimeter lengths.

During conducted emissions testing, the EUT was located 80 centimeters above the conducting ground plane on the same nonconducting table as was used for radiated testing. The metal plane was grounded to the earth through the green wire safety ground. Power to the EUT was provided via 3 meters of shielded power cable from a filter grounded to the metal plane to a LISN. The LISN was also grounded to the plane and attached to the LISN was a 4 ganged grounded outlet whose source was also shielded and 60 cm in length. All other objects were kept a minimum of 1 meter away from the EUT during the conducted test.

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TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect both the radiated and conducted emissions data for the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra. For radiated measurements below 30 MHz, the mag loop antenna was used. For frequencies from 30 to 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. For frequencies above 1000 MHz, the horn antenna was used. All antennas were located at a distance of 3 meters from the edge of the EUT. Conducted emissions tests required the use of the FCC type LISN's.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, a reference level of 100 dBμV and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBμV, and a vertical scale of 10 dB per division.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	9 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	9280 MHz	1 MHz

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SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1 and 2 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in Table 1 or Table 2. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP 85650A Quasi-Peak Adapter for the HP 8568B Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

When the frequencies exceed 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

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TEST METHODS

The radiated and conducted emissions data of the 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC Part 15, Subpart C emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode with the I/O cables and line cords facing the antenna. The frequency range of 9 kHz – 30 MHz was then scanned with the mag loop antenna. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned with the biconical antenna in the same manner, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. The horn antenna was used to scan for frequencies above 1000 MHz. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with its I/O and power cables facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the peripherals and cables. Maximizing of the cables was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cables were being moved and rearranged on the EUT table for maximum emissions. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

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Conducted Emissions Testing

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

Tables 1 and 2 show the corrected values of the six highest readings obtained for the SuperTel Technologies 900 MHz Spread Spectrum Digital Cordless Phone, Engenius SN-900 Ultra.

Frequency Stability Measurements

In accordance with Part 15.31(e), measurements of the variation of the input power was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Power Output

Frequency Range: 902-928 MHz

The RF conducted test, was measured using a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation. The resolution bandwidth was adjusted to greater than the 6 dB bandwidth of the emissions.

Frequency	Measurement in dBm	Measurement in mW
902 MHz	29.8	955

Power Output (mW) = inv log [(dBuV –107)/10)]
=[(136.8 dBuV-107)/10]
=29.8/10
Power Output = 955 mW

The limit used was determined by the method stated in FCC Part 15.247(b).

Occupied Bandwidth

In accordance with FCC 15.247 (a)(1)(ii), the maximum 20 dB bandwidth of the hopping channel did not exceed 1 MHz.

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SAMPLE CALCULATIONS

The basic spectrum analyzer reading was converted using correction factors as shown in the six highest emissions readings in Tables 1 and 2. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula:

Meter reading (dBμV)
+ Antenna Factor (dB)
+ Cable Loss (dB)
- Distance Correction (dB)
- Pre-amplifier Gain (dB)

= Corrected Reading(dBμV/m)

This reading was then compared to the applicable specification limit to determine compliance. For conducted emissions, no correction factors were needed when 50 μH LISN's were used.

A typical data sheet will display the following in column format:

#	Freq MHz	Rdng dBuV	Cable	Amp.	Bicon	Horn	Log	Dist	Corr dBuV/m	Spec	Margin	Polar

means reading number
Freq MHz is the frequency in MHz of the obtained reading.
Rdng dBuV is the reading obtained on the spectrum analyzer in dBμV.
Amp. is short for the preamplifier factor or gain in dB.
Bicon is the biconical antenna factor in dB.
Log is the log periodic antenna factor in dB.
Horn is the horn antenna factor in dB.
Cable is the cable loss in dB of the coaxial cable on the OATS.
Dist is the distance factor (in dB). It is used when testing at a different test distance than the one stated in the spec.
Corr dBμV/m is the corrected reading which is now in dBμV/m (field strength).
Spec is the specification limit (dB) stated in the agency's regulations.
Margin is the closeness to the specified limit in dB; + is over and - is under the limit.
Polar is the Polarity of the antenna with respect to earth.

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APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

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INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	**N/A**
CRT was displaying:	**N/A**
Power Supply Manufacturer:	
Power Supply Part Number:	
AC Line Filter Manufacturer:	**N/A**
AC Line Filter Part Number:	**N/A**
Line voltage used during testing:	**110V AC**

I/O PORTS	
Type	#
Telephone line jack	2
Antenna port	1

CRYSTAL OSCILLATORS	
Type	Freq In MHz
Up-converter	49.946
System clock	16.384
Codec clock	3.579545

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Base-station base band board	SN-900B1-0.02	16.384, 3.579545	6	Base Station
Base-station keypad and LED board	SN-900B2-0.02	N/A	2	Base Station
Hand-set base band board 1	SN-525FHH1-0.02	N/A	4	Handset
Hand-set base band board 2	SN-525FHH2-0.02A	16.384, 3.579545	6	Handset
RF Module		49.946	6	Base Station and Handset

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APPENDIX B

MEASUREMENT DATA SHEETS

5473A CLOUDS REST • MARIPOSA, CALIFORNIA 95338 • (209) 966-5240 • FAX (209) 966-4257

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900
S/N: none

Date: Apr-02-98
Time: 09:54
Sequence#: 3

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was laying on its back side on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.3	+36.2	+5.0	-38.0		+0.0	49.5	54.0	-4.5	Horiz
2	2706.805	46.2	+29.1	+2.6	-39.6		+0.0	38.3	54.0	-15.7	Horiz
3	2706.803	45.5	+29.1	+2.6	-39.6		+0.0	37.6	54.0	-16.4	Vert
4	6315.965	60.3	+34.7	+4.3	-38.6		+0.0	60.7	84.7	-24.0	Horiz
5	6316.008	59.1	+34.7	+4.3	-38.6		+0.0	59.5	84.7	-25.2	Vert
6	1804.568	58.3	+26.5	+2.1	-39.4		+0.0	47.5	84.7	-37.2	Vert
7	1804.528	56.8	+26.5	+2.1	-39.4		+0.0	46.0	84.7	-38.7	Horiz
8	902.268	104.7	+23.2	+1.4	-41.9		+0.0	87.4	137.0	-49.6	Horiz

Fundamental

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Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer:	**SuperTel Technologies**	Date:	Apr-02-98
Specification:	**FCC15.247/15.209/15.205**	Time:	09:54
Test Type:	**Maximized Emissions**	Sequence#:	2
Equipment:	**Phone Handset**		
Manufacturer:	SuperTel Technologies	Tested By:	Steve Behm
Model:	Engenius SN-900		
S/N:	none		

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was laying on its right side on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.5	+36.2	+5.0	-38.0		+0.0	49.7	54.0	-4.3	Horiz
2	2706.805	46.2	+29.1	+2.6	-39.6		+0.0	38.3	54.0	-15.7	Horiz
3	2706.803	45.1	+29.1	+2.6	-39.6		+0.0	37.2	54.0	-16.8	Vert
4	6315.965	60.1	+34.7	+4.3	-38.6		+0.0	60.5	83.9	-23.4	Horiz
5	6316.008	59.7	+34.7	+4.3	-38.6		+0.0	60.1	83.9	-23.8	Vert
6	1804.568	58.3	+26.5	+2.1	-39.4		+0.0	47.5	83.9	-36.4	Vert
7	1804.528	56.1	+26.5	+2.1	-39.4		+0.0	45.3	83.9	-38.6	Horiz
8	902.268	103.9	+23.2	+1.4	-41.9		+0.0	86.6	137.0	-50.4	Horiz

Fundamental

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Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone Handset**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900
S/N: none

Date: Apr-02-98
Time: 09:54
Sequence#: 1

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Handset*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was standing vertically on the table. The device was configured according to ANSI C63.4. The handset was frequency hopping between low, middle and high channels.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	Hi Fr dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	8120.530	46.7	+36.2	+5.0	-38.0		+0.0	49.9	54.0	-4.1	Vert
2	6315.965	60.4	+34.7	+4.3	-38.6		+0.0	70.8	84.4	-23.6	Vert
3	6316.008	59.4	+34.7	+4.3	-38.6		+0.0	69.8	84.4	-24.6	Horiz
4	2706.805	46.7	+29.1	+2.6	-39.6		+0.0	38.8	54.0	-15.2	Vert
5	2706.803	45.9	+29.1	+2.6	-39.6		+0.0	38.0	54.0	-16.0	Horiz
6	1804.568	57.2	+26.5	+2.1	-39.4		+0.0	56.4	84.4	-38.0	Horiz
7	1804.528	56.1	+26.5	+2.1	-39.4		+0.0	55.3	84.4	-39.1	Vert
8	902.268	104.4	+23.2	+1.4	-41.9		+0.0	97.1	137.0	-49.9	Vert

Fundamental

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Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone base**
Manufacturer: **SuperTel Technologies**
Model: Engenius SN-900
S/N: none

Date: May-12-98
Time: 17:38
Sequence#: 3
Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone base*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone handset	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was frequency hopping between the low, middle, and high channels.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp-A dB	dB	Log A dB	Cable dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	938.482	53.2	-27.4		+23.5	+7.5	+0.0	56.8	85.5	-28.7	Vert
2	891.471	52.1	-27.6		+22.9	+7.3	+0.0	54.7	85.5	-30.8	Vert

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Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or. 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC15.247/15.209/15.205**
Test Type: **Maximized Emissions**
Equipment: **Phone base**
Manufacturer: **SuperTel Technologies**
Model: Engenius SN-900
S/N: none

Date: May-12-98
Time: 17:37
Sequence#: 3

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone base*	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
Phone handset	SuperTel Technologies	Engenius SN-900	none

Test Conditions / Notes:

The EUT was placed on the table top. The EUT was configured in accordance with ANSI C63.4. The base unit was frequency hopping between the low, middle, and high channels.

Measurement Data: Sorted by Margin Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn dB	Cable dB	dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	3608.682	19.1	+31.5	+3.1			+0.0	53.7	54.0	-0.3	Horiz
	Average										
2	3608.758	18.9	+31.5	+3.1			+0.0	53.5	54.0	-0.5	Vert
	Average										
3	2706.635	19.6	+29.1	+2.6			+0.0	51.3	54.0	-2.7	Horiz
	Average										
4	2706.424	19.6	+29.1	+2.6			+0.0	51.3	54.0	-2.7	Vert
	Average										
5	902.165	80.9	+23.2	+1.4			+0.0	105.5	137.0	-31.5	Vert
	Fundamental										
6	1804.190	20.7	+26.5	+2.1			+0.0	49.3	85.5	-36.2	Vert
	Average										
7	1804.499	20.0	+26.5	+2.1			+0.0	48.6	85.5	-36.9	Horiz
	Average										

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Test Location: CKC LABORATORIES INC. • 22105 Wilson River Hwy, Site A • Tillamook, Oregon 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC B COND**
Test Type: **Conducted Emissions**
Equipment: **Phone Base unit**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900 Ultra
S/N: none

Date: Apr-02-98
Time: 14:39
Sequence#: 5

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

The base unit was setup according to ANSI C63.4. The unit is frequency hopping between low, middle, and high channels.

Measurement Data: Sorted by Margin Test Lead: Black

#	Freq	Rdng dBµV	dB	dB	dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	27.597M	31.7					+0.0	31.7	48.0	-16.3	Black
2	13.825M	26.0					+0.0	26.0	48.0	-22.0	Black
3	2.254M	25.5					+0.0	25.5	48.0	-22.5	Black
4	681.280k	25.5					+0.0	25.5	48.0	-22.5	Black
5	2.771M	25.4					+0.0	25.4	48.0	-22.6	Black
6	11.881M	25.3					+0.0	25.3	48.0	-22.7	Black
7	5.919M	25.3					+0.0	25.3	48.0	-22.7	Black
8	2.599M	25.3					+0.0	25.3	48.0	-22.7	Black
9	12.893M	25.2					+0.0	25.2	48.0	-22.8	Black
10	9.330M	25.2					+0.0	25.2	48.0	-22.8	Black
11	9.147M	25.2					+0.0	25.2	48.0	-22.8	Black

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12	3.664M	25.2	+0.0	25.2	48.0	-22.8	Black
13	3.294M	25.2	+0.0	25.2	48.0	-22.8	Black
14	9.051M	25.1	+0.0	25.1	48.0	-22.9	Black
15	4.791M	25.1	+0.0	25.1	48.0	-22.9	Black
16	2.554M	25.1	+0.0	25.1	48.0	-22.9	Black
17	8.606M	25.0	+0.0	25.0	48.0	-23.0	Black
18	1.856M	25.0	+0.0	25.0	48.0	-23.0	Black
19	1.337M	25.0	+0.0	25.0	48.0	-23.0	Black
20	1.227M	25.0	+0.0	25.0	48.0	-23.0	Black
21	8.204M	24.9	+0.0	24.9	48.0	-23.1	Black
22	3.811M	24.9	+0.0	24.9	48.0	-23.1	Black
23	1.411M	24.9	+0.0	24.9	48.0	-23.1	Black
24	1.371M	24.9	+0.0	24.9	48.0	-23.1	Black
25	1.158M	24.9	+0.0	24.9	48.0	-23.1	Black
26	1.447M	24.8	+0.0	24.8	48.0	-23.2	Black
27	1.087M	24.8	+0.0	24.8	48.0	-23.2	Black
28	795.024k	24.8	+0.0	24.8	48.0	-23.2	Black
29	746.493k	24.8	+0.0	24.8	48.0	-23.2	Black
30	566.777k	24.8	+0.0	24.8	48.0	-23.2	Black

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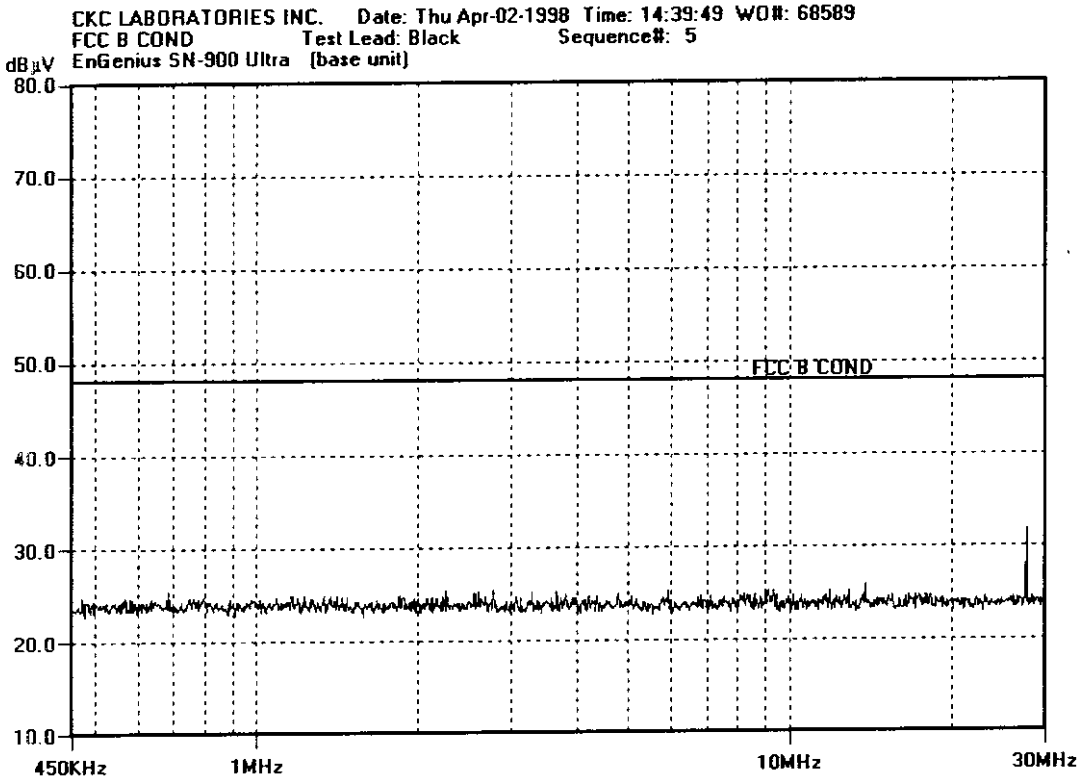

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Test Location: CKC LABORATORIES INC. • 22105 Wilson River Hwy, Site A • Tillamook, Oregon 97141 • (800) 500-4EMC

Customer: **SuperTel Technologies**
Specification: **FCC B COND**
Test Type: **Conducted Emissions**
Equipment: **Phone Base unit**
Manufacturer: SuperTel Technologies
Model: Engenius SN-900 Ultra
S/N: none

Date: Apr-02-98
Time: 15:08
Sequence#: 6

Tested By: Steve Behm

Equipment Under Test **(* = EUT):**

Function	Manufacturer	Model #	S/N
Phone Base	SuperTel Technologies	Engenius SN-900	none

Support Devices:

Function	Manufacturer	Model #	S/N
None			

Test Conditions / Notes:

Unit was setup according to ANSI C63.4 and was being exercised using the Intercom button.

Measurement Data: Sorted by Margin Test Lead: White

#	Freq	Rdng dBµV	dB	dB	dB	dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar
1	747.252k	26.1					+0.0	26.1	48.0	-21.9	White
2	1.170M	26.0					+0.0	26.0	48.0	-22.0	White
3	615.308k	25.7					+0.0	25.7	48.0	-22.3	White
4	13.150M	25.6					+0.0	25.6	48.0	-22.4	White
5	8.047M	25.3					+0.0	25.3	48.0	-22.7	White
6	798.816k	25.3					+0.0	25.3	48.0	-22.7	White
7	29.539M	25.2					+0.0	25.2	48.0	-22.8	White
8	7.057M	25.2					+0.0	25.2	48.0	-22.8	White
9	3.332M	25.2					+0.0	25.2	48.0	-22.8	White
10	1.199M	25.2					+0.0	25.2	48.0	-22.8	White
11	24.783M	25.1					+0.0	25.1	48.0	-22.9	White

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12	14.901M	25.1	+0.0	25.1	48.0	-22.9	White
13	18.457M	25.0	+0.0	25.0	48.0	-23.0	White
14	3.901M	25.0	+0.0	25.0	48.0	-23.0	White
15	3.858M	25.0	+0.0	25.0	48.0	-23.0	White
16	2.553M	25.0	+0.0	25.0	48.0	-23.0	White
17	1.091M	25.0	+0.0	25.0	48.0	-23.0	White
18	29.925M	24.9	+0.0	24.9	48.0	-23.1	White
19	24.608M	24.9	+0.0	24.9	48.0	-23.1	White
20	19.528M	24.9	+0.0	24.9	48.0	-23.1	White
21	4.597M	24.9	+0.0	24.9	48.0	-23.1	White
22	1.244M	24.9	+0.0	24.9	48.0	-23.1	White
23	481.848k	24.9	+0.0	24.9	48.0	-23.1	White
24	470.095k	24.9	+0.0	24.9	48.0	-23.1	White
25	454.550k	24.9	+0.0	24.9	48.0	-23.1	White
26	5.132M	24.8	+0.0	24.8	48.0	-23.2	White
27	2.684M	24.8	+0.0	24.8	48.0	-23.2	White
28	1.530M	24.8	+0.0	24.8	48.0	-23.2	White
29	599.384k	24.8	+0.0	24.8	48.0	-23.2	White
30	502.702k	24.8	+0.0	24.8	48.0	-23.2	White

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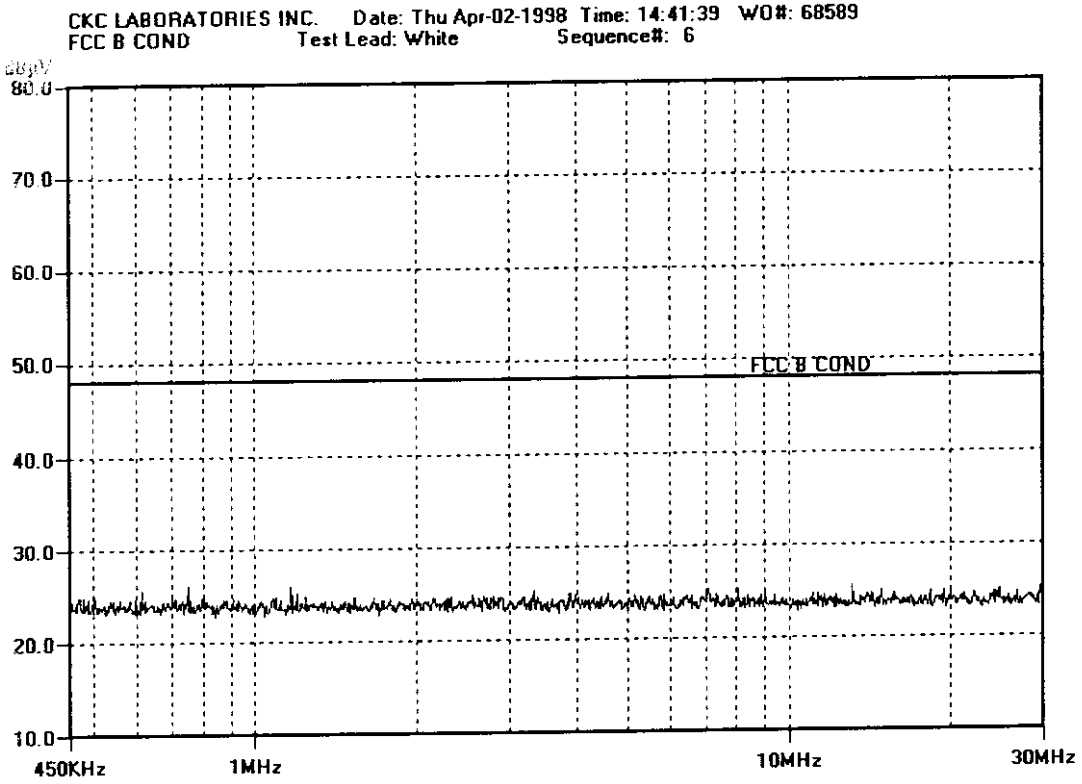

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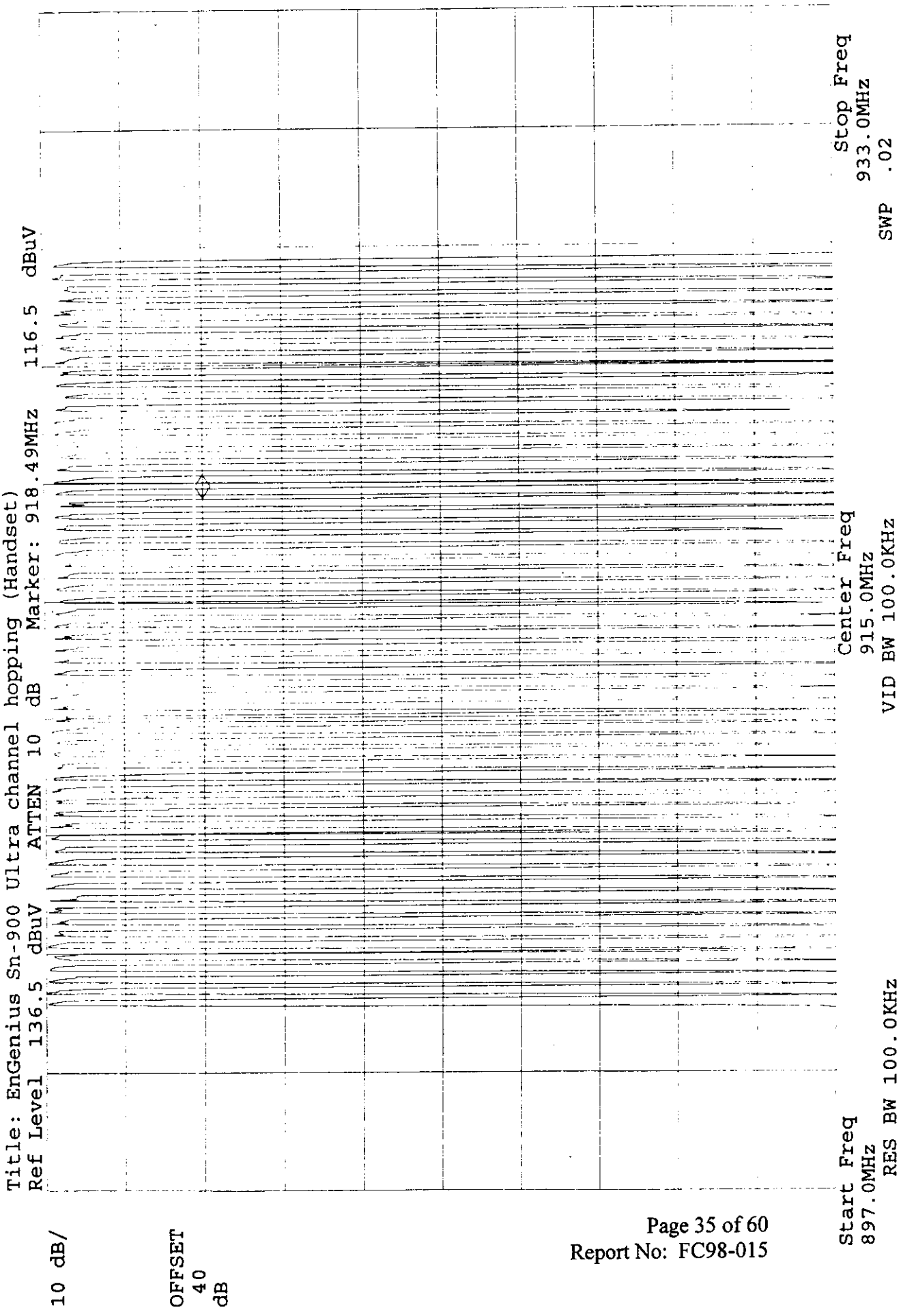
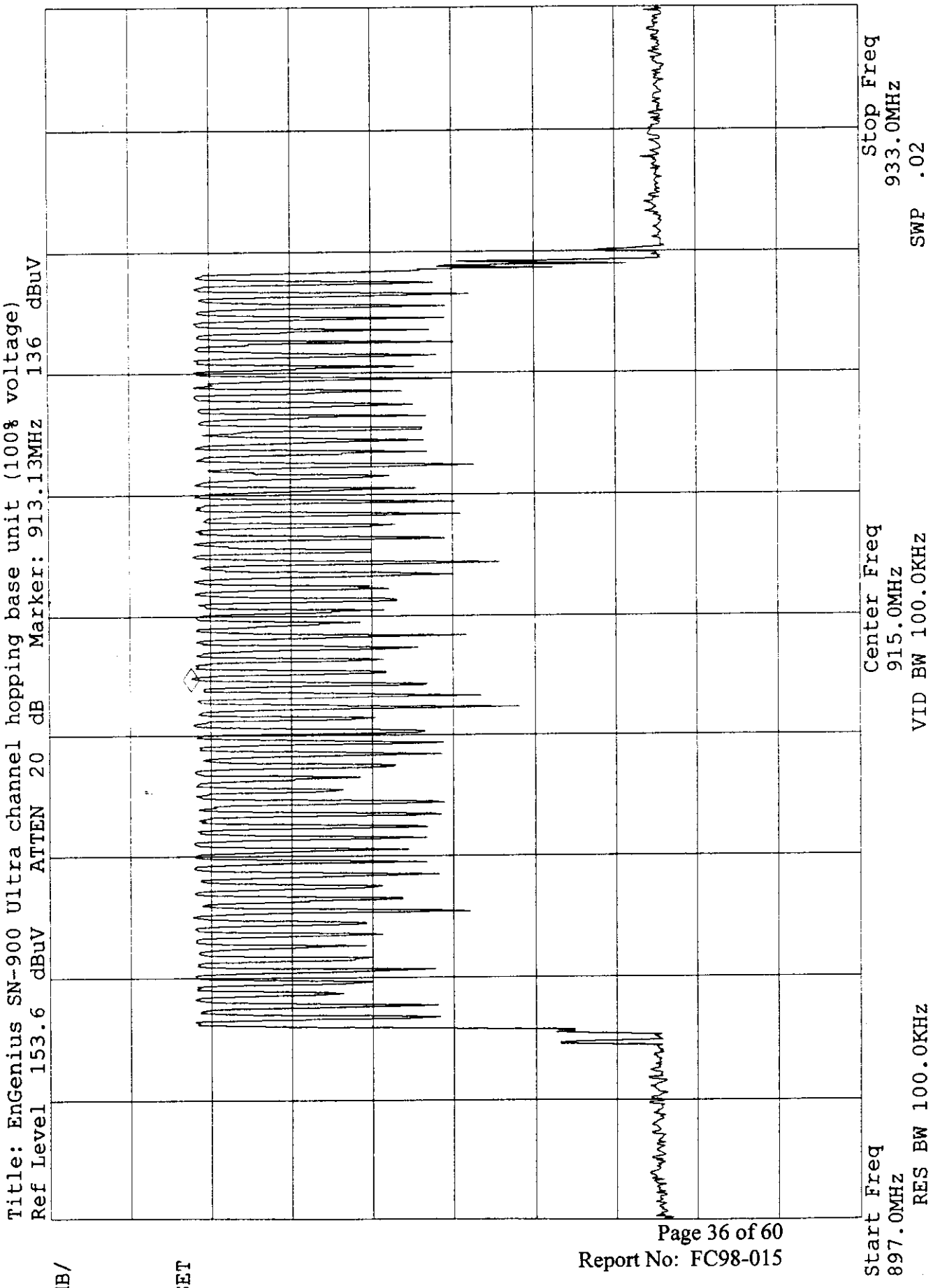
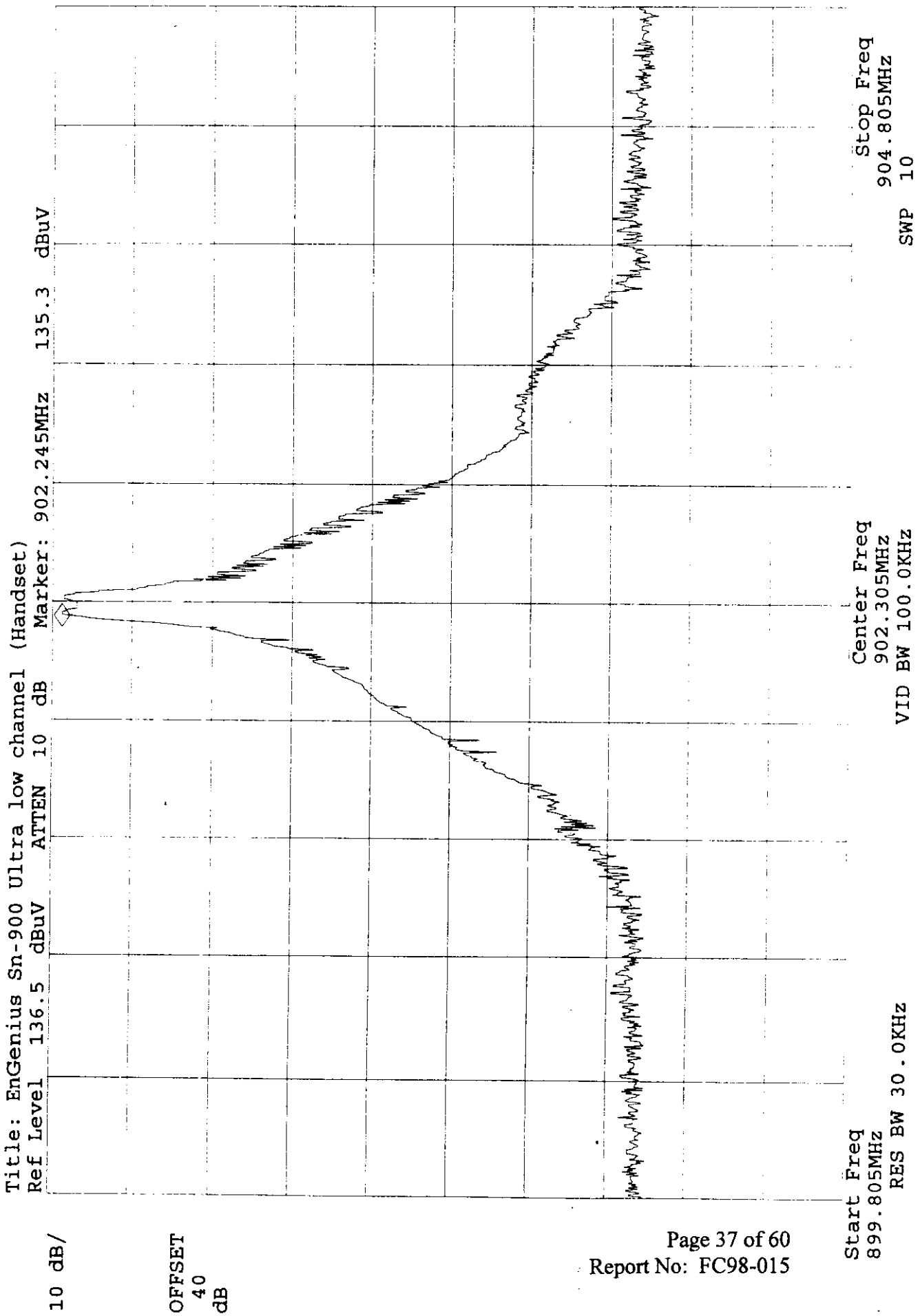
Frequency Hopping Plot (Handset)



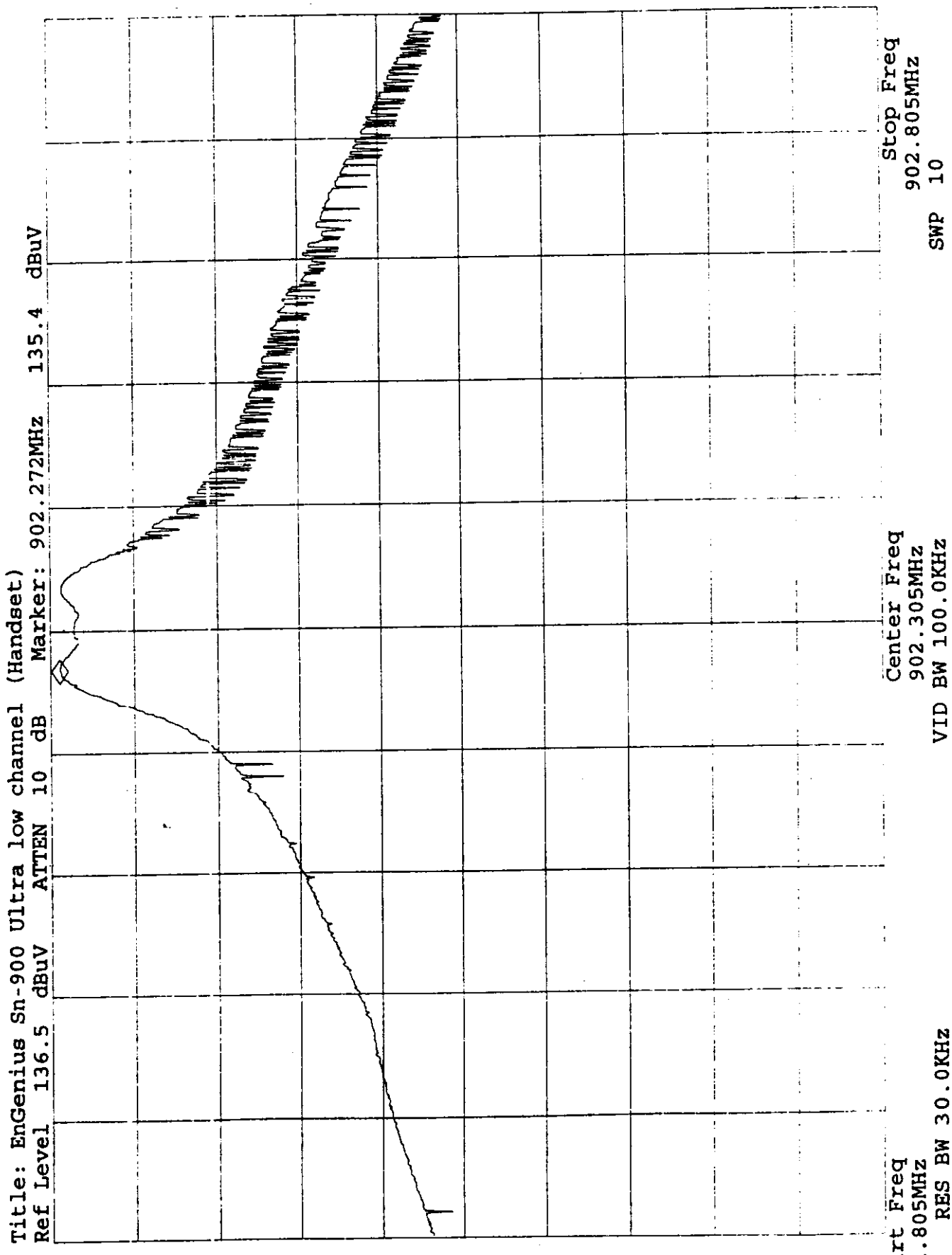
Frequency Hopping Plot (Base Unit)



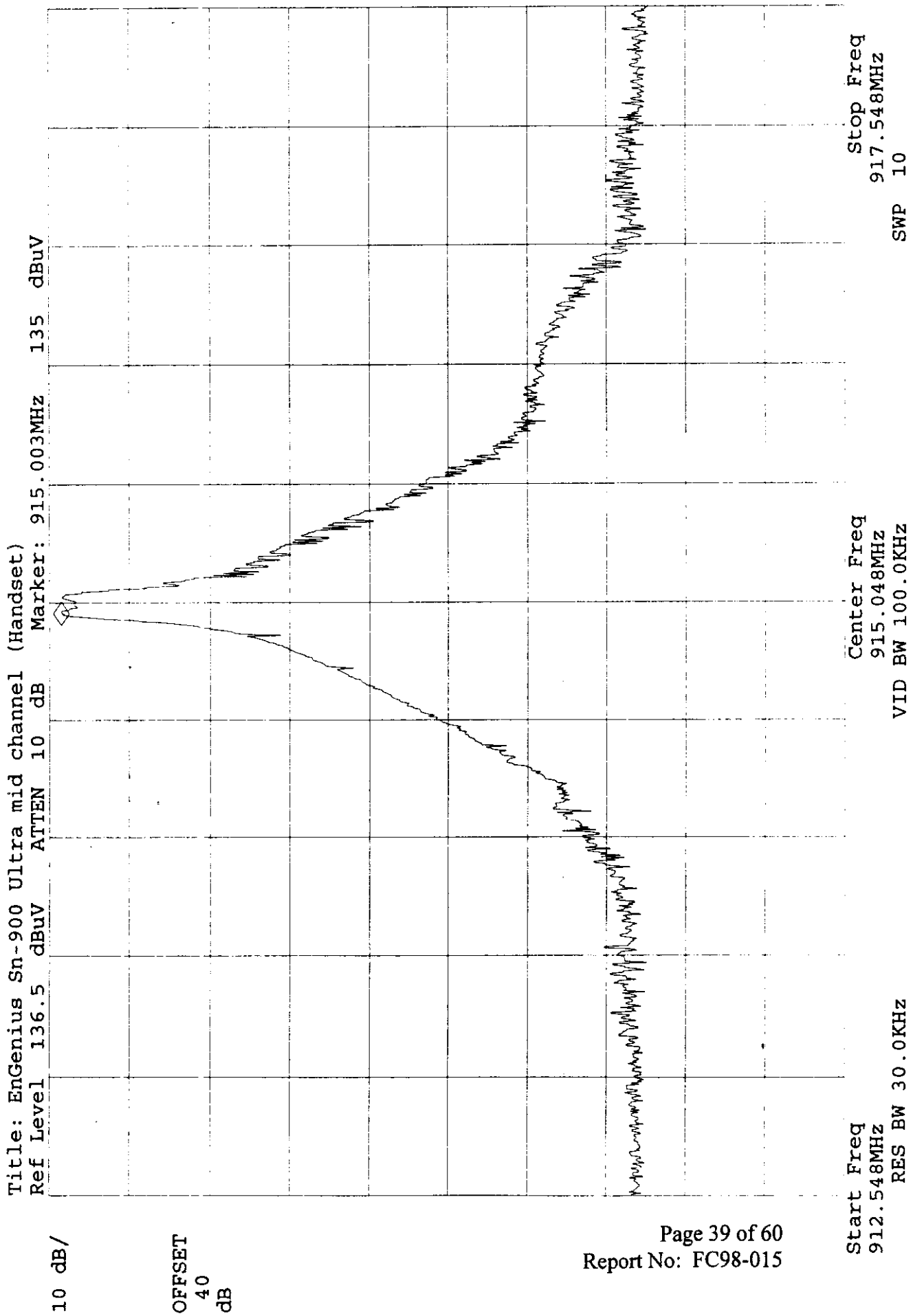
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



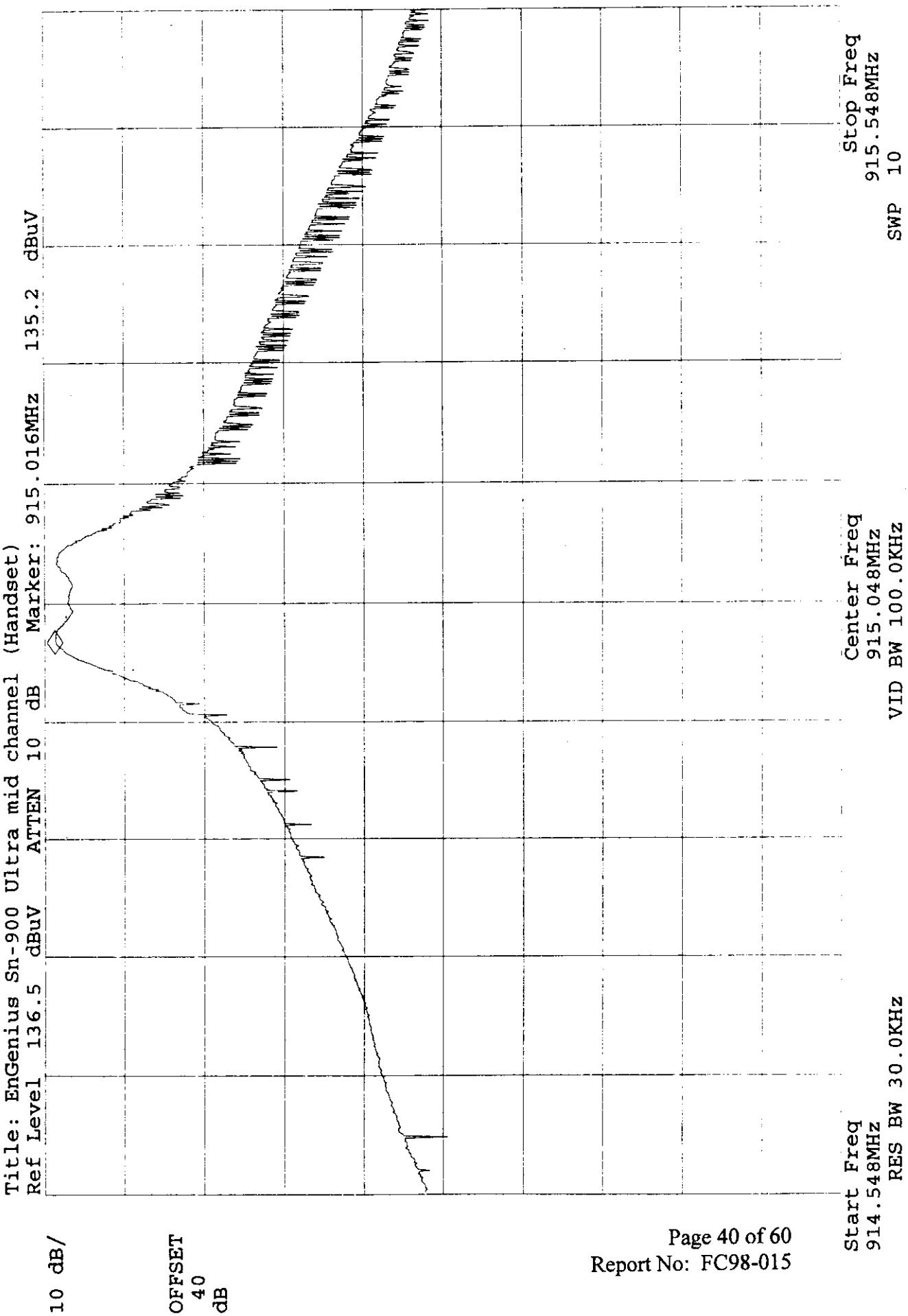
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



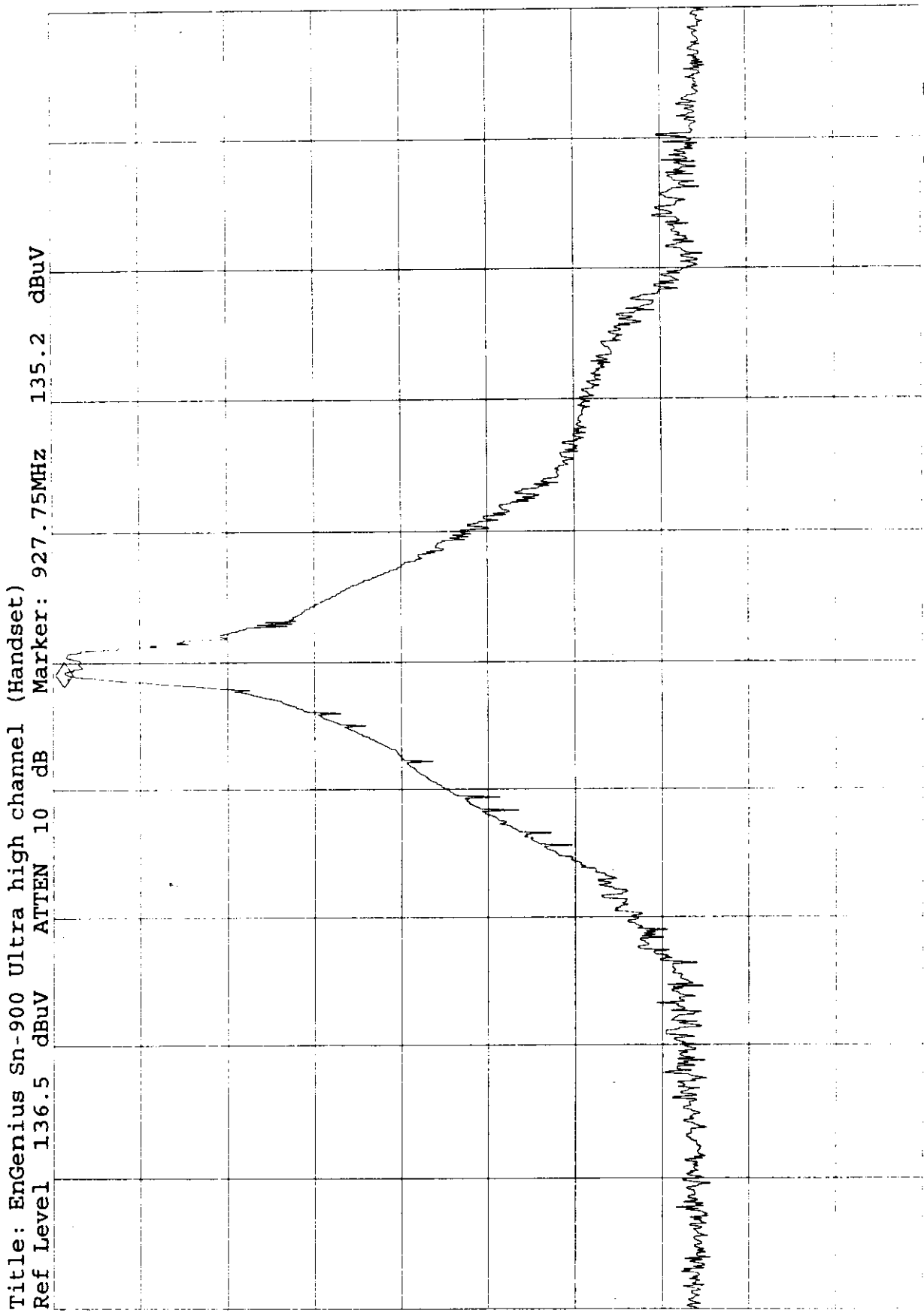
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



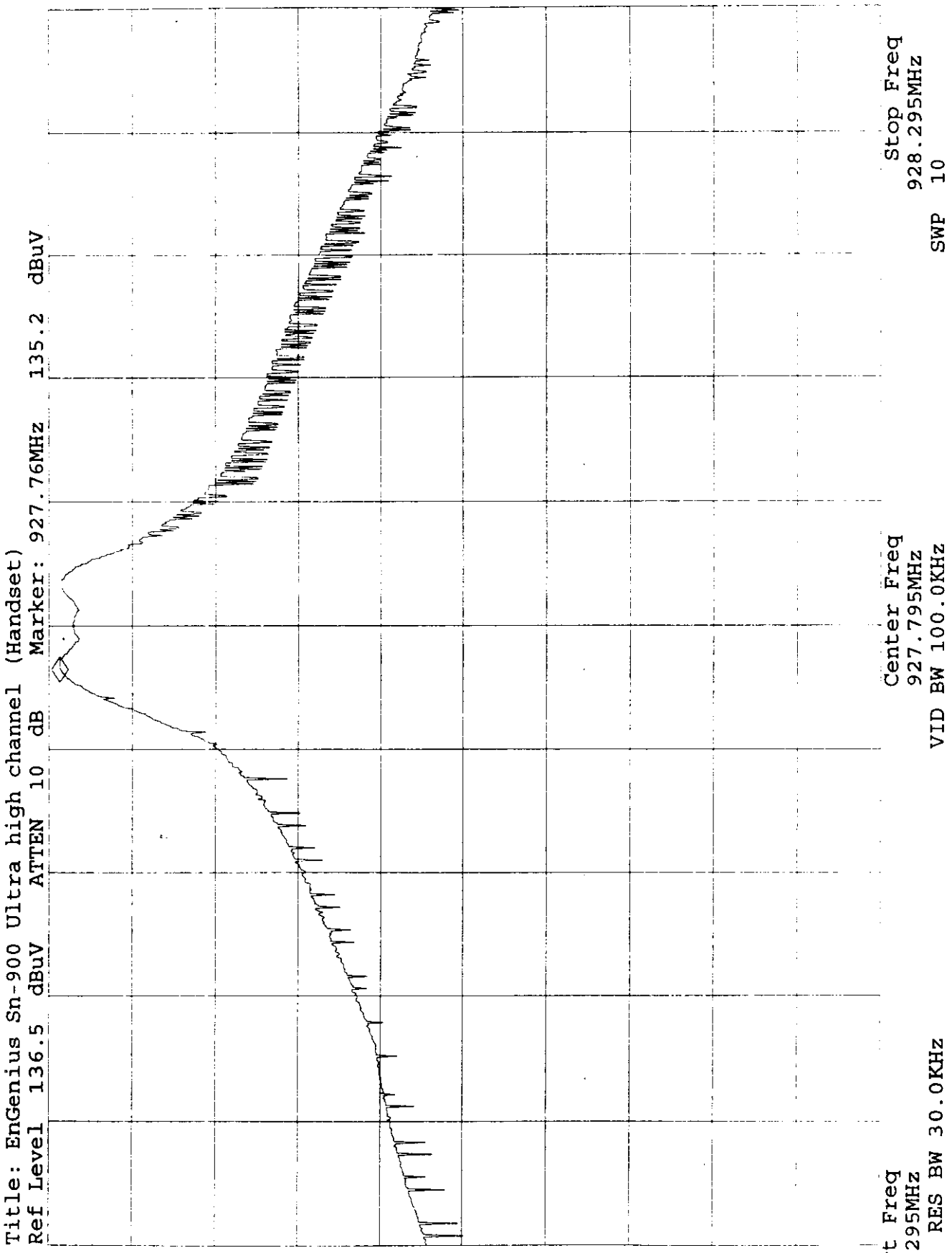
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



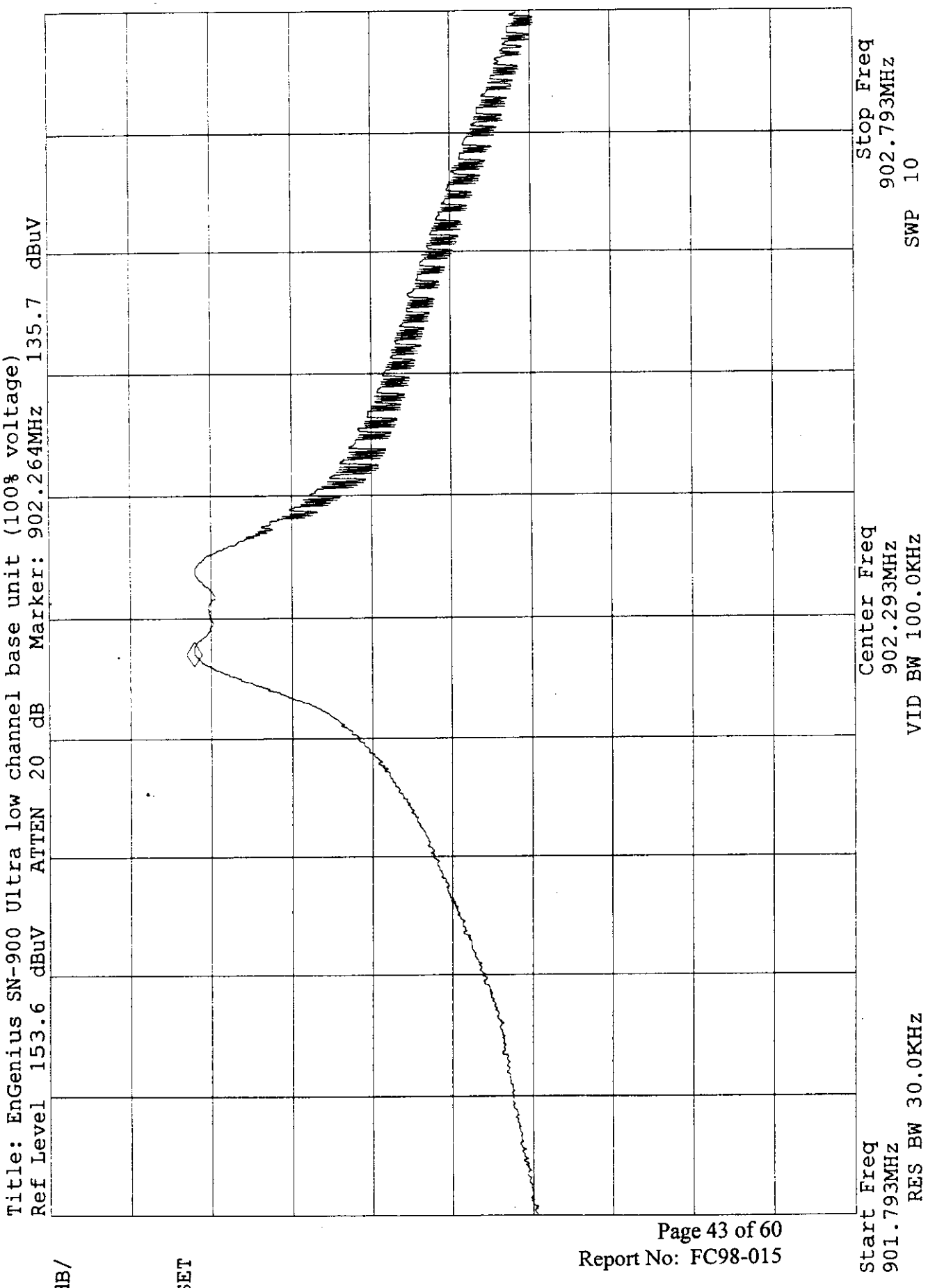
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



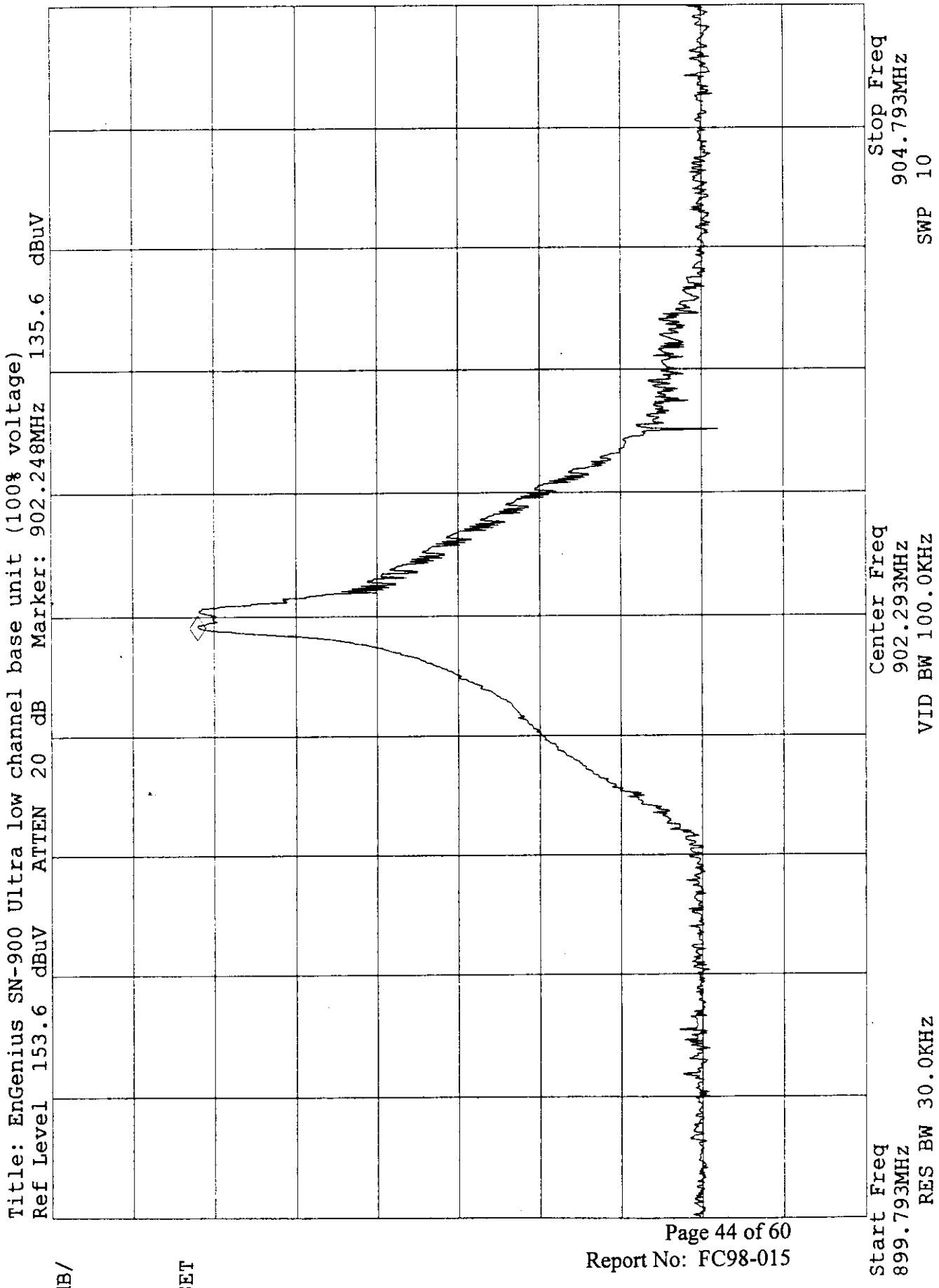
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Handset)



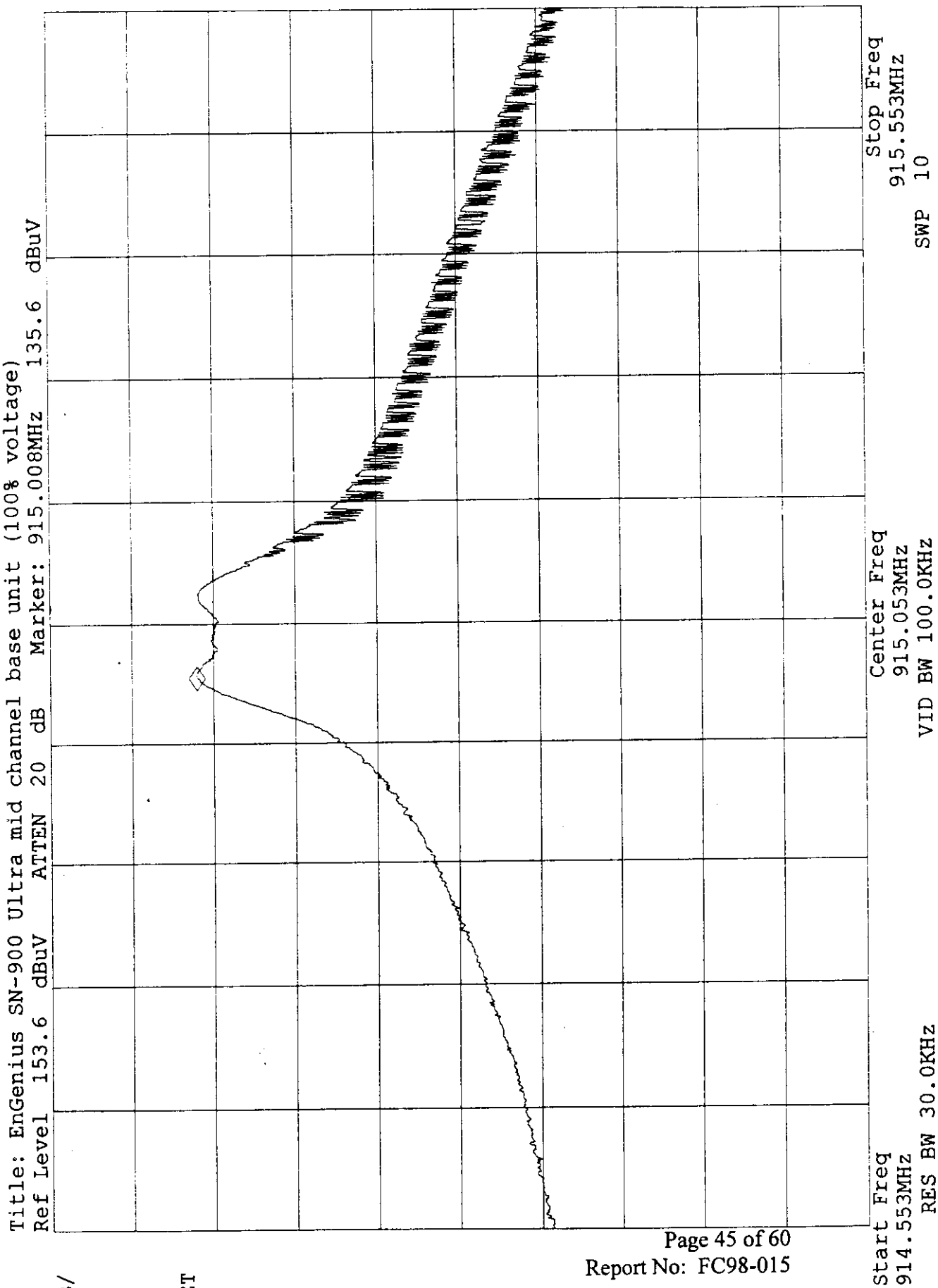
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



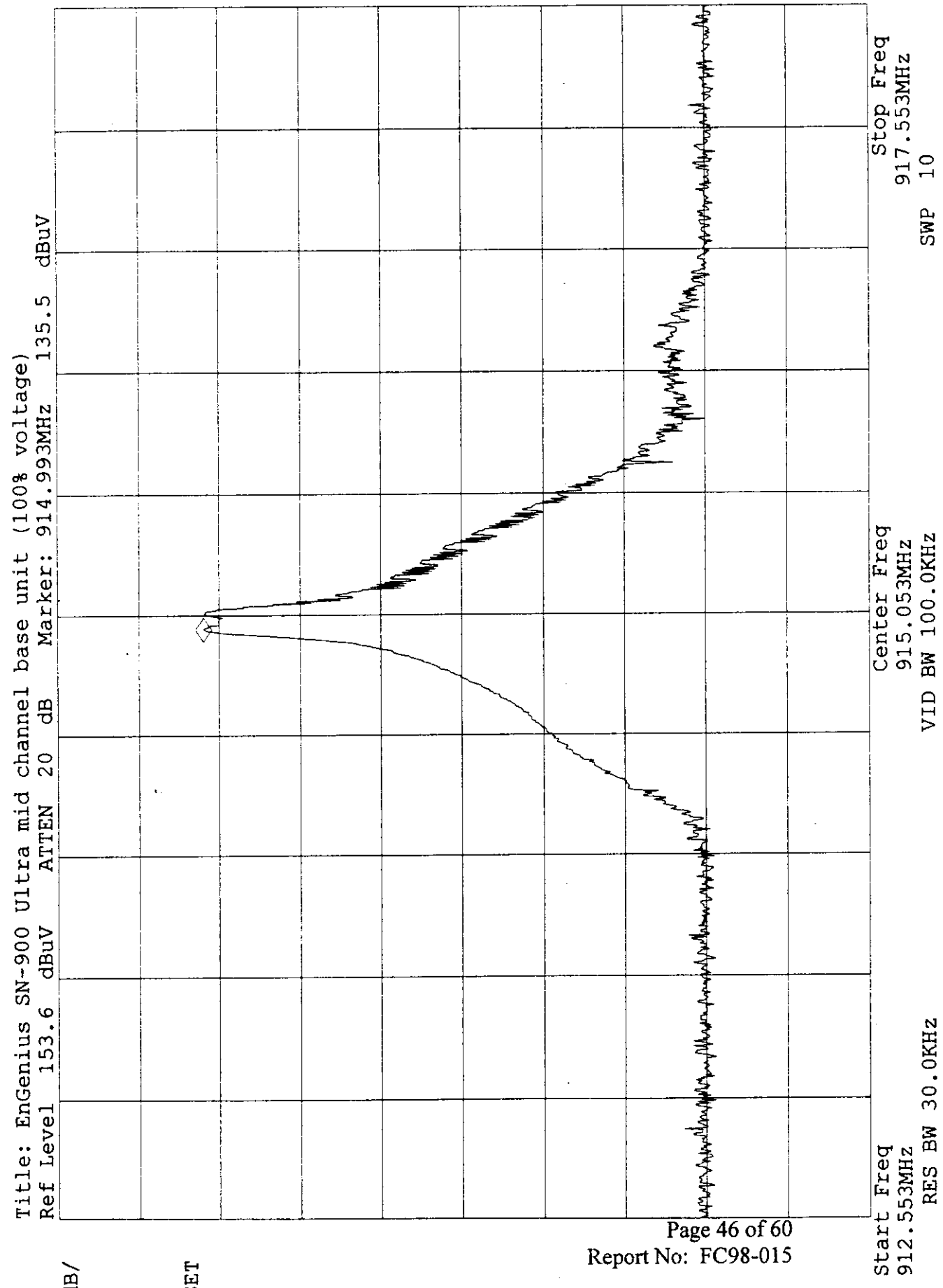
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



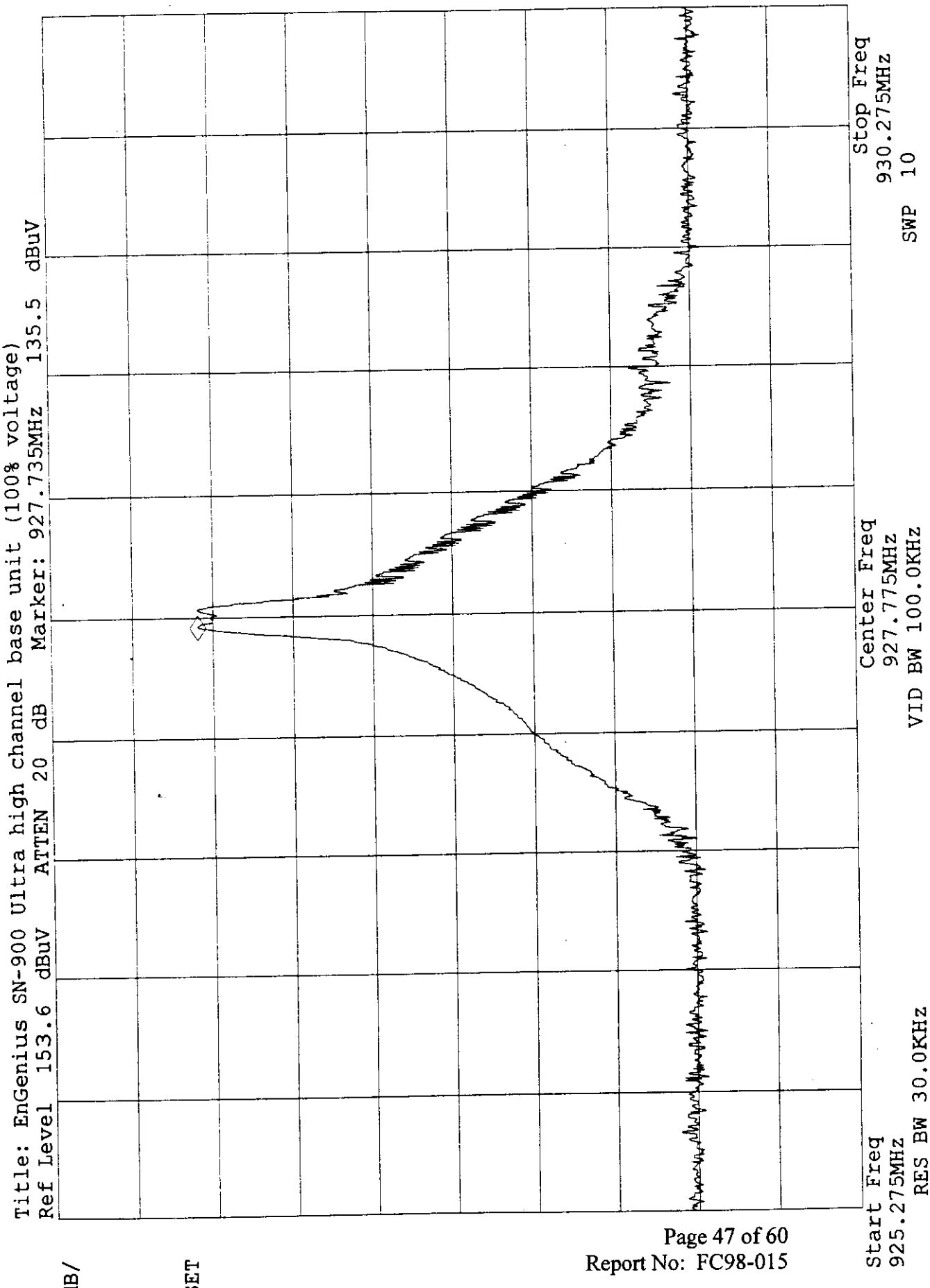
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



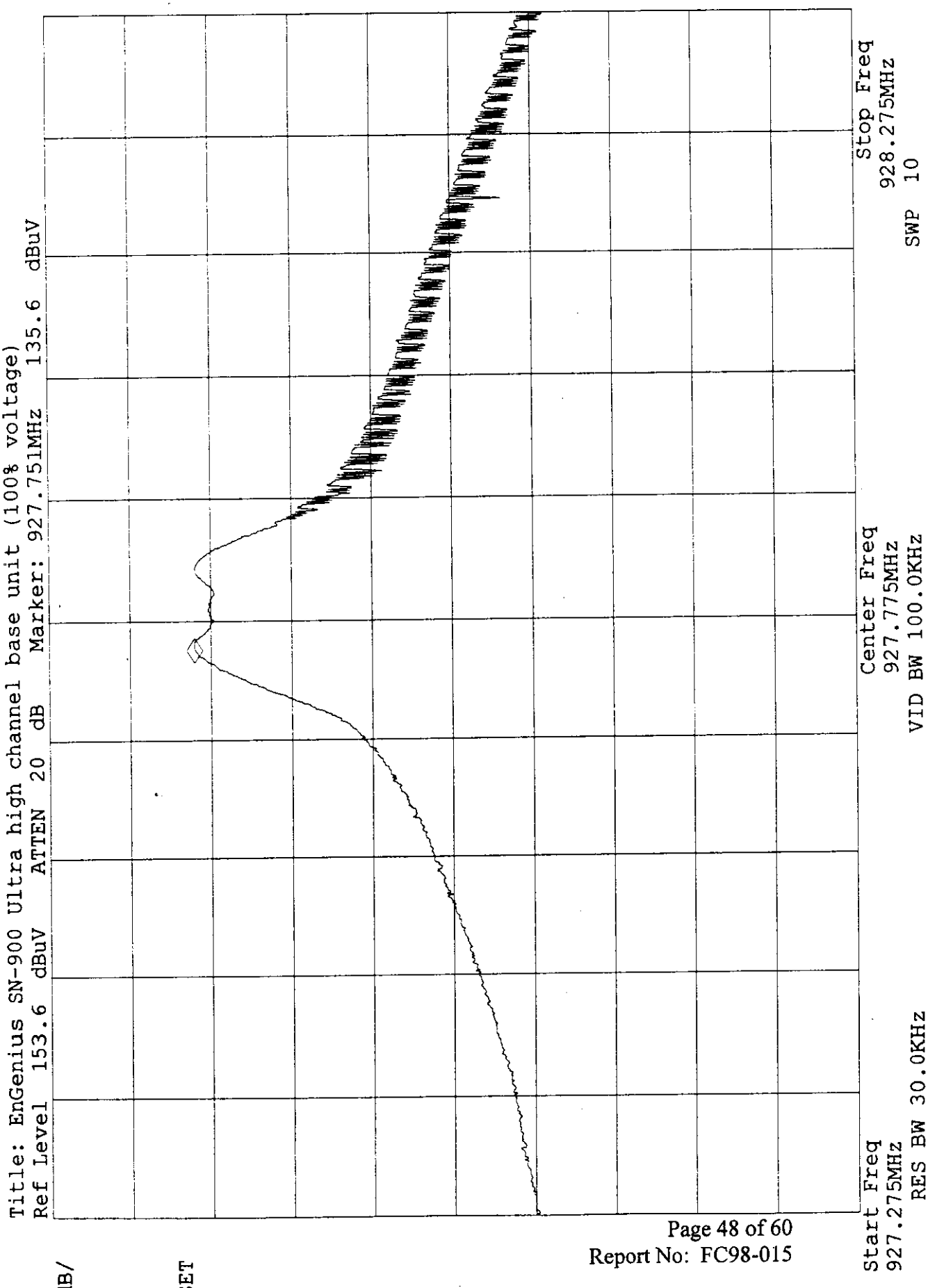
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



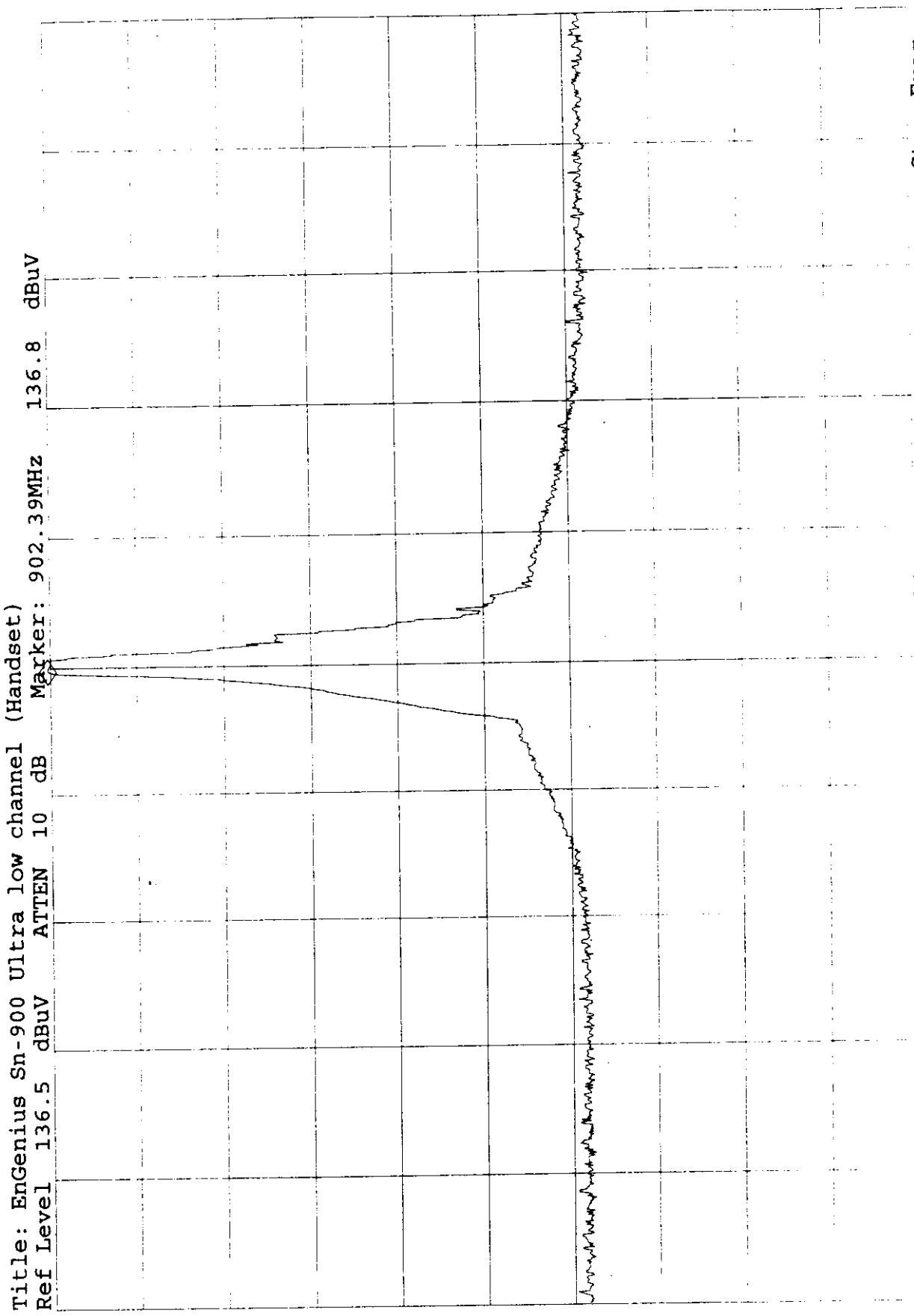
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



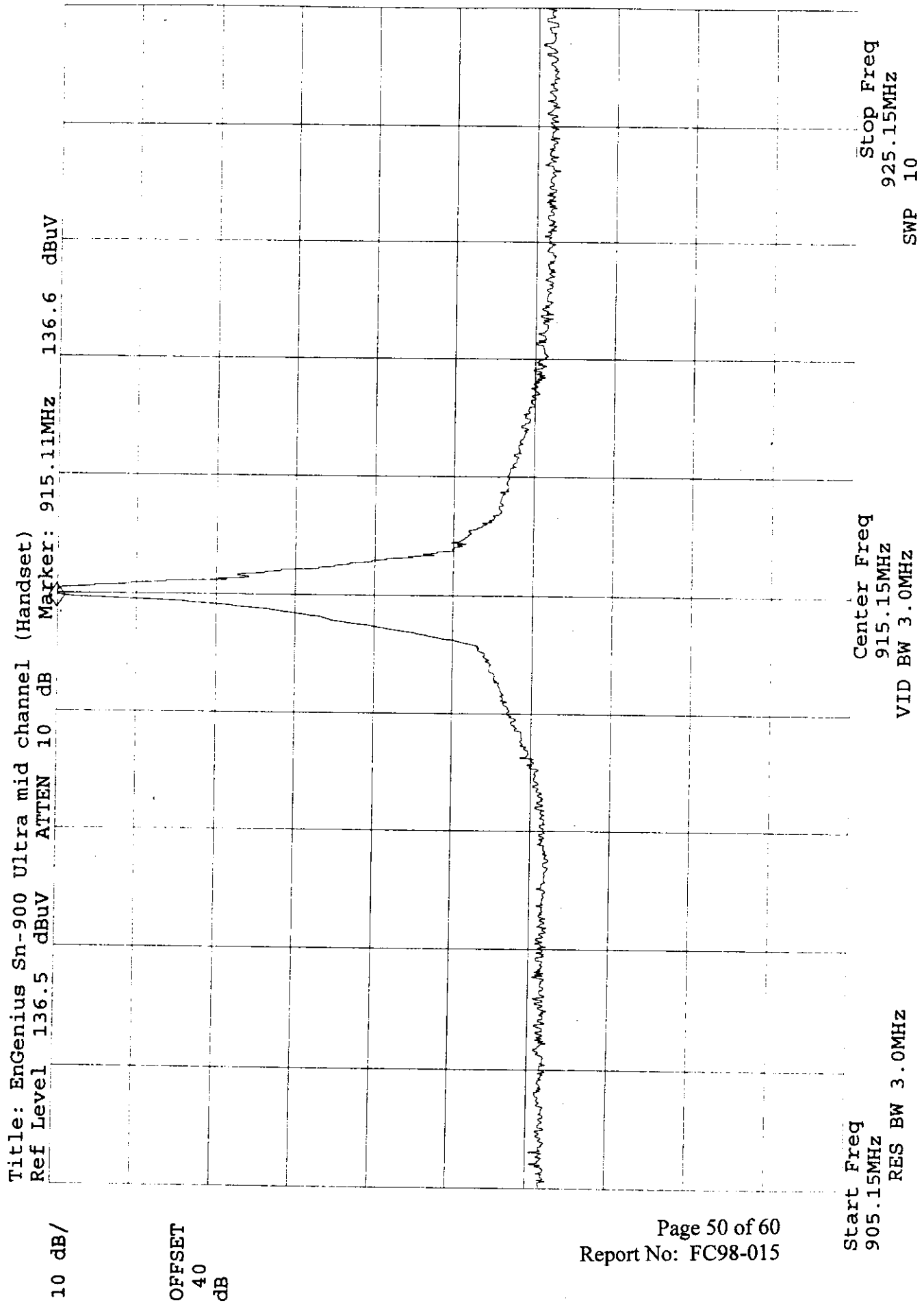
FCC Part 15.247(a)(1)(i)Occupied Bandwidth Plot (Base Unit)



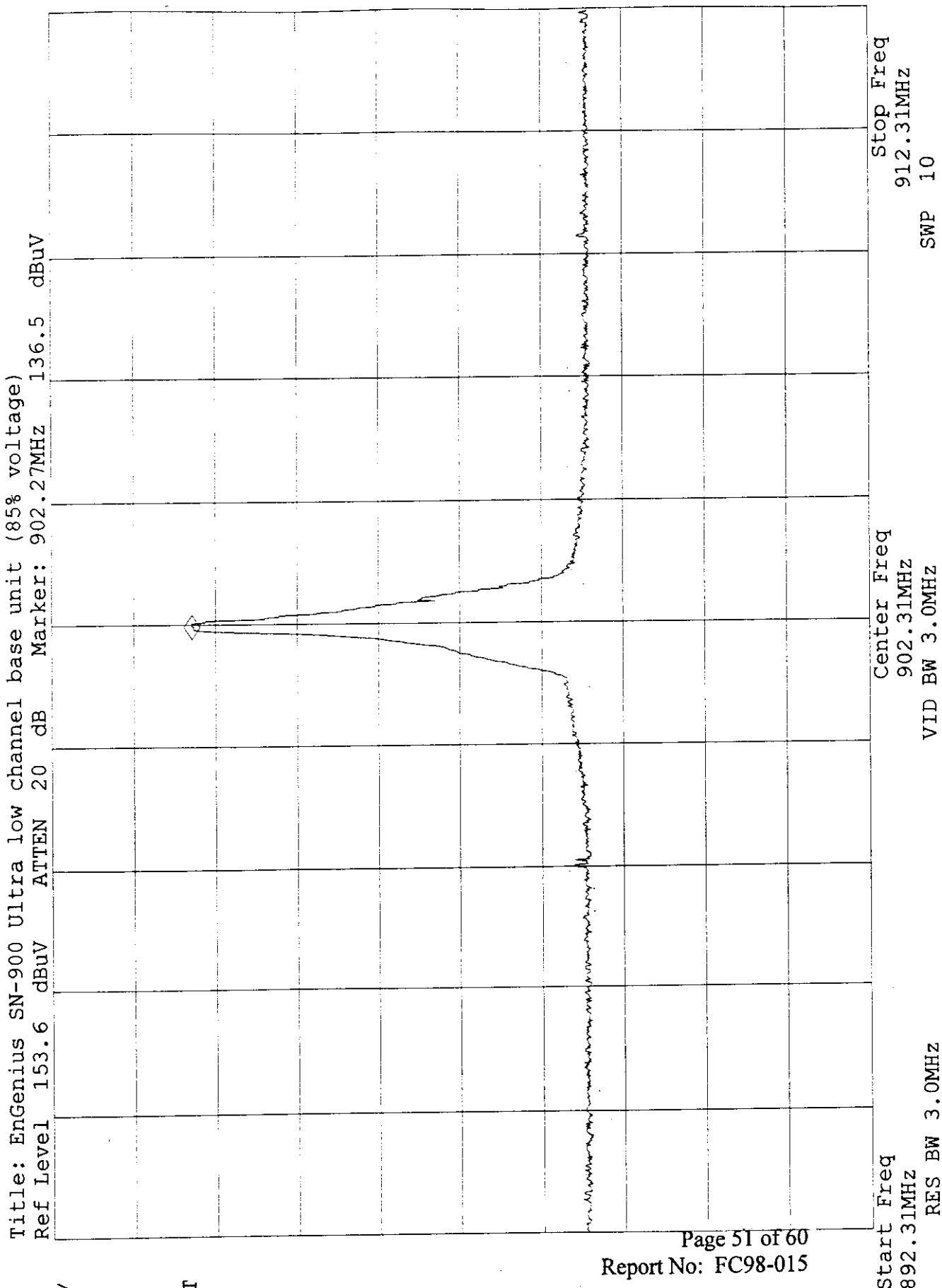
FCC Part 15.247(b) RF Power Output Plot (Handset)



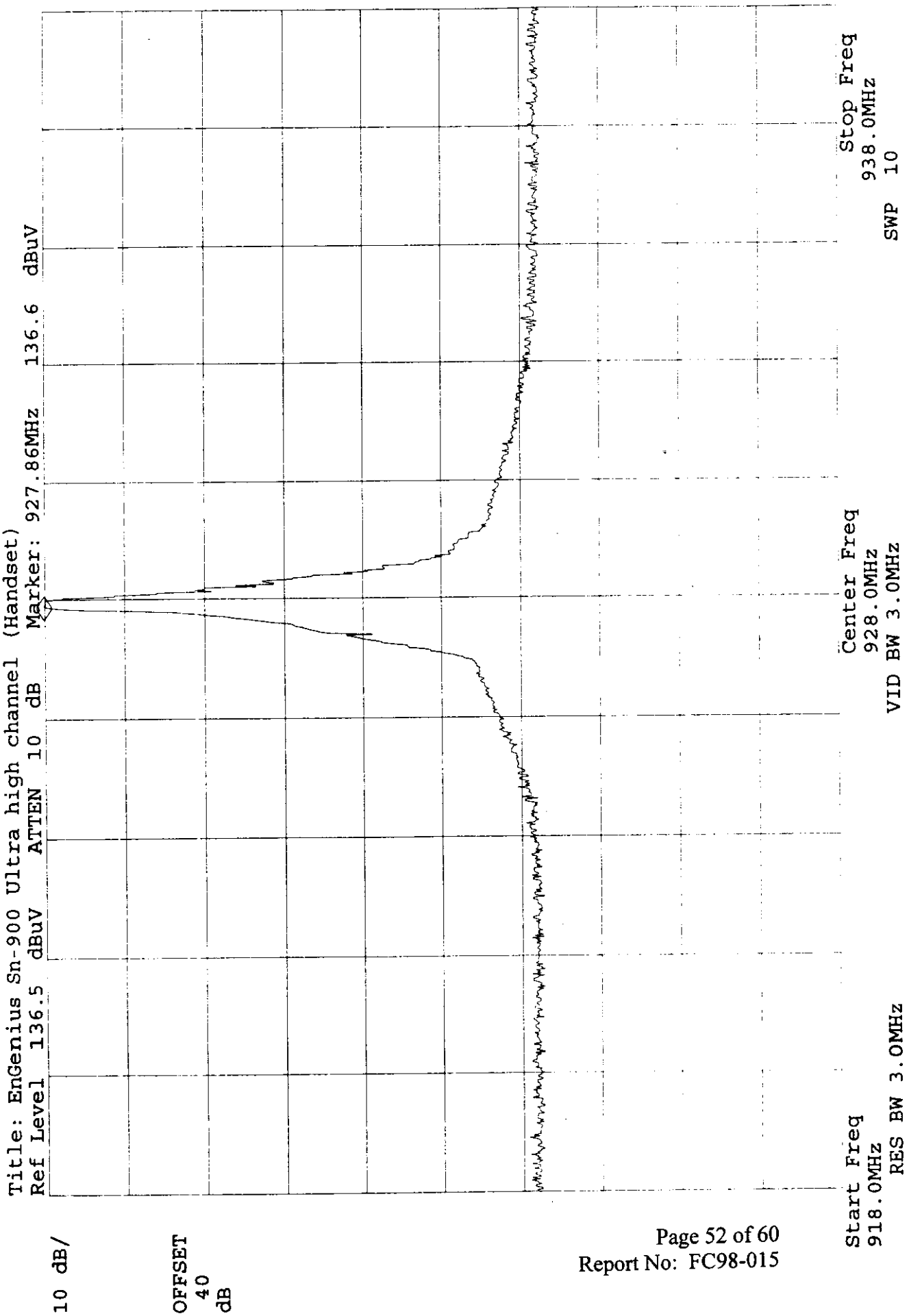
FCC Part 15.247(b) RF Power Output Plot (Handset)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Handset)



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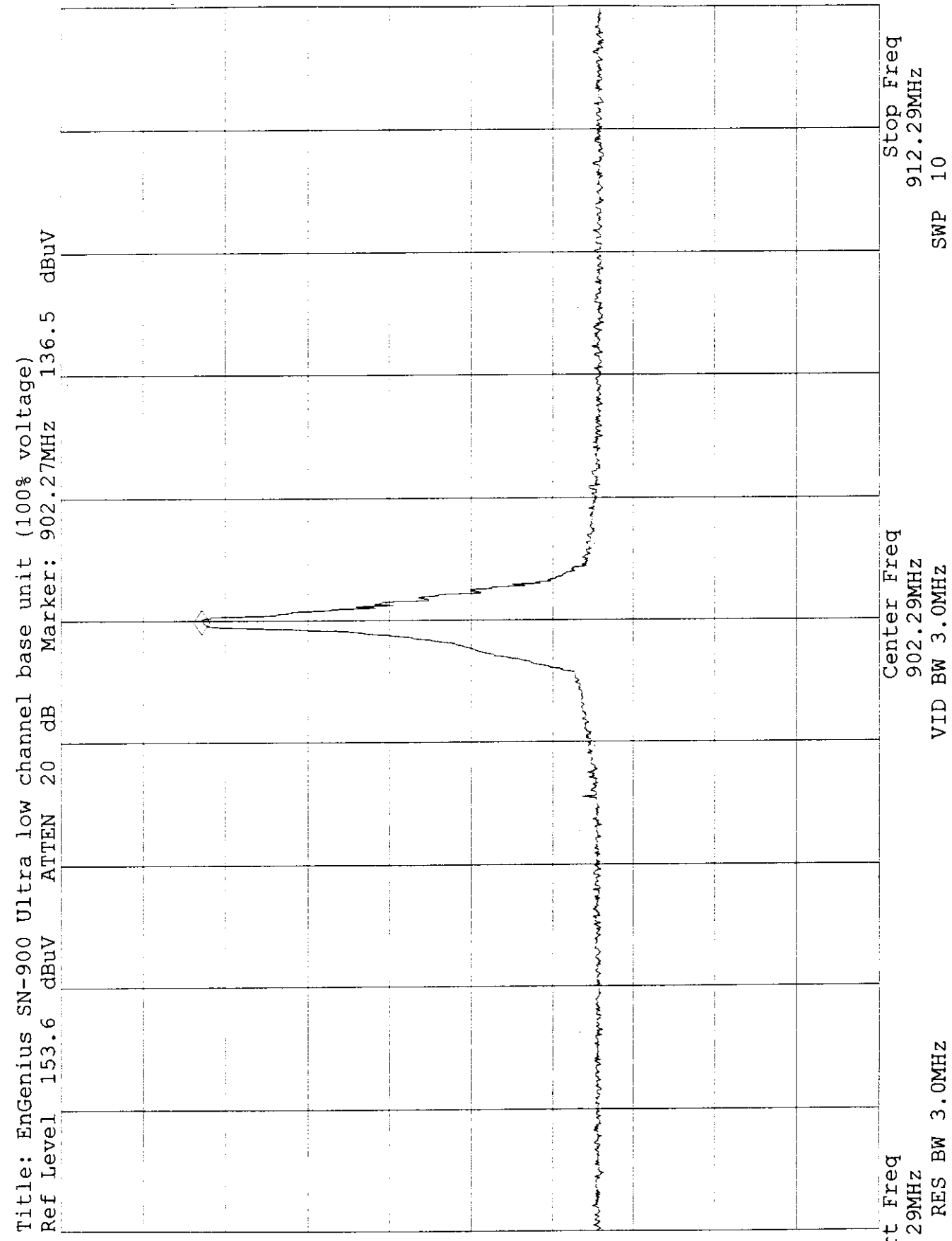
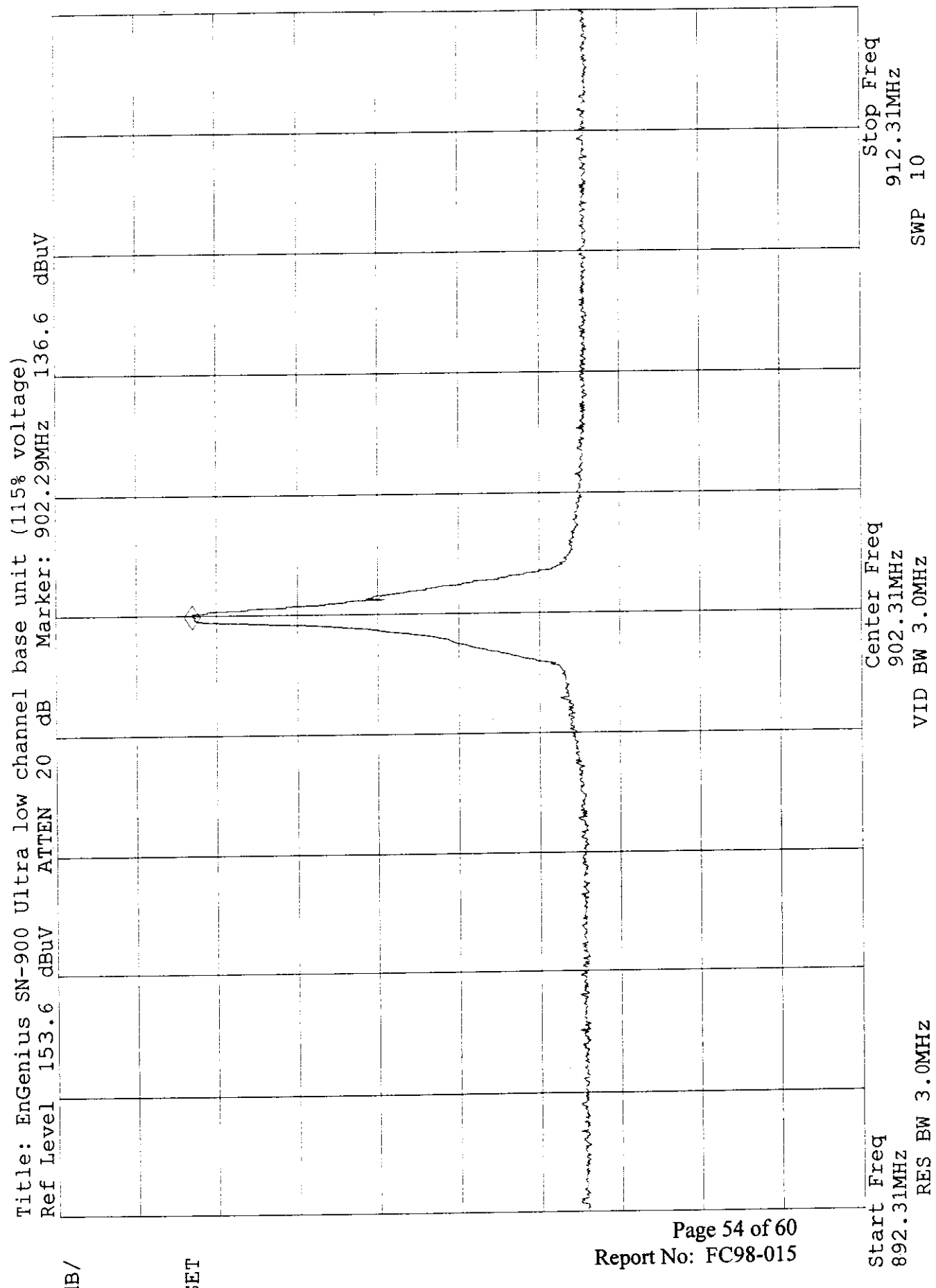
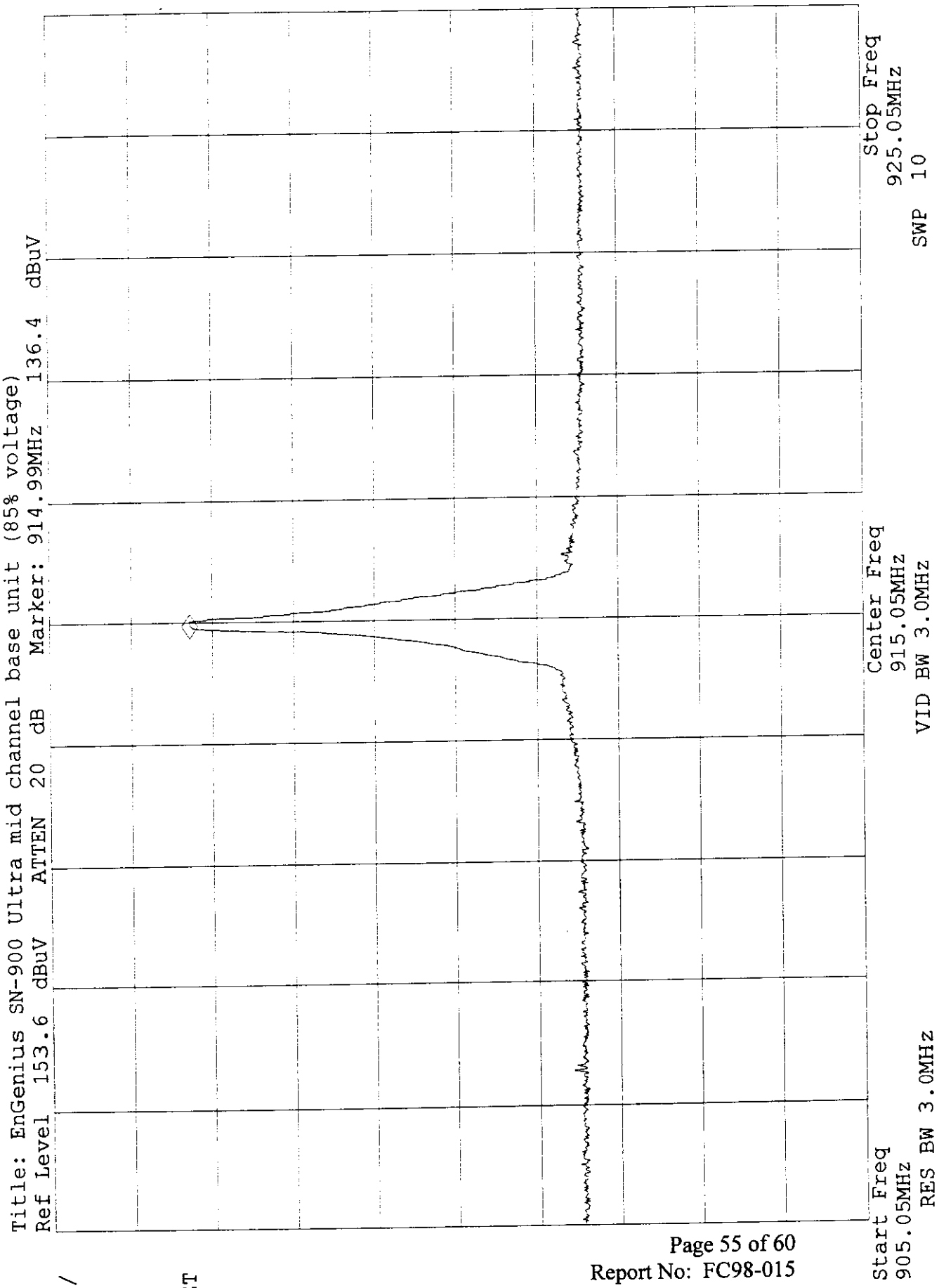


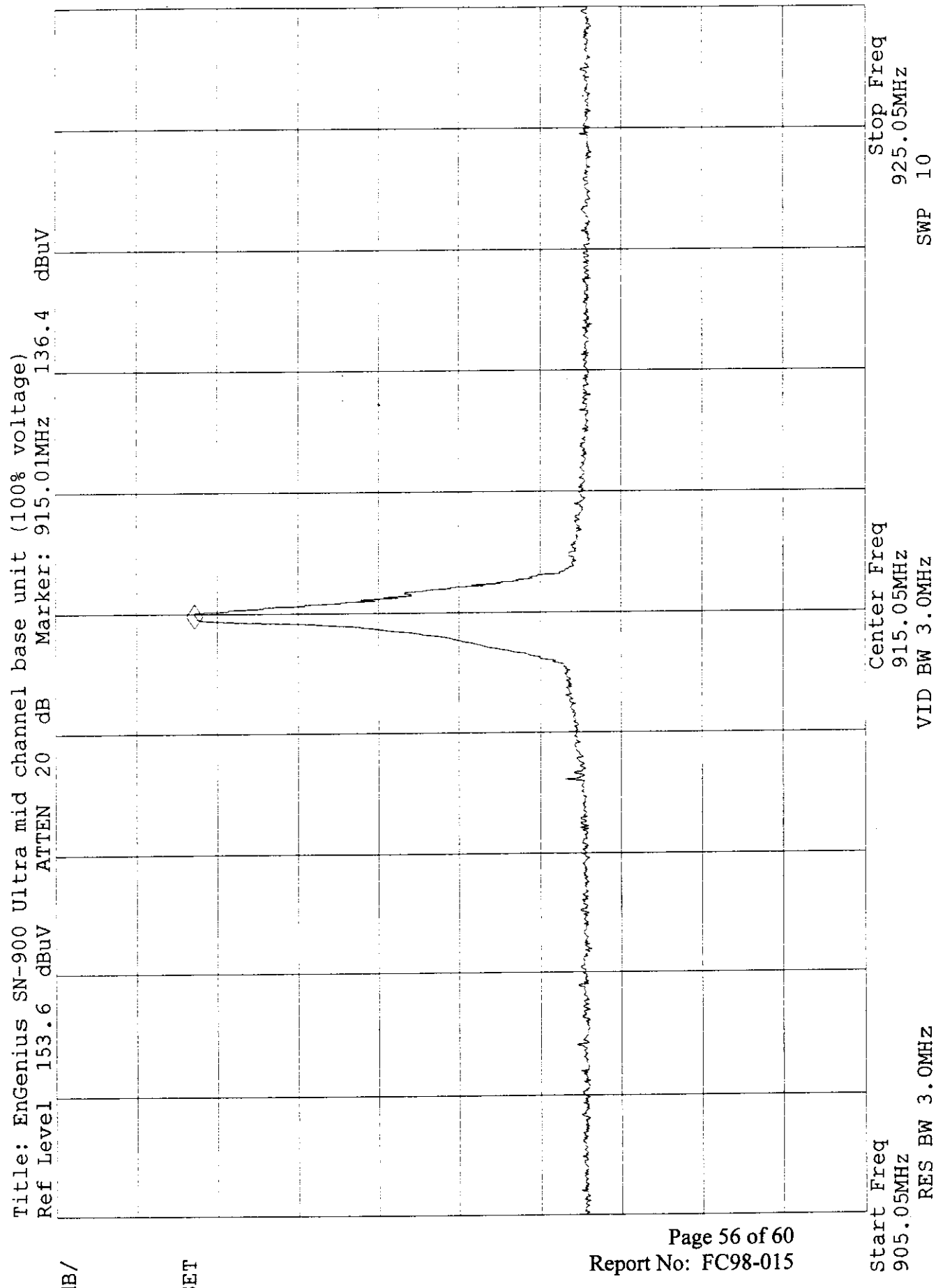
FCC Part 15.247(b) RF Power Output Plot (Base Unit)



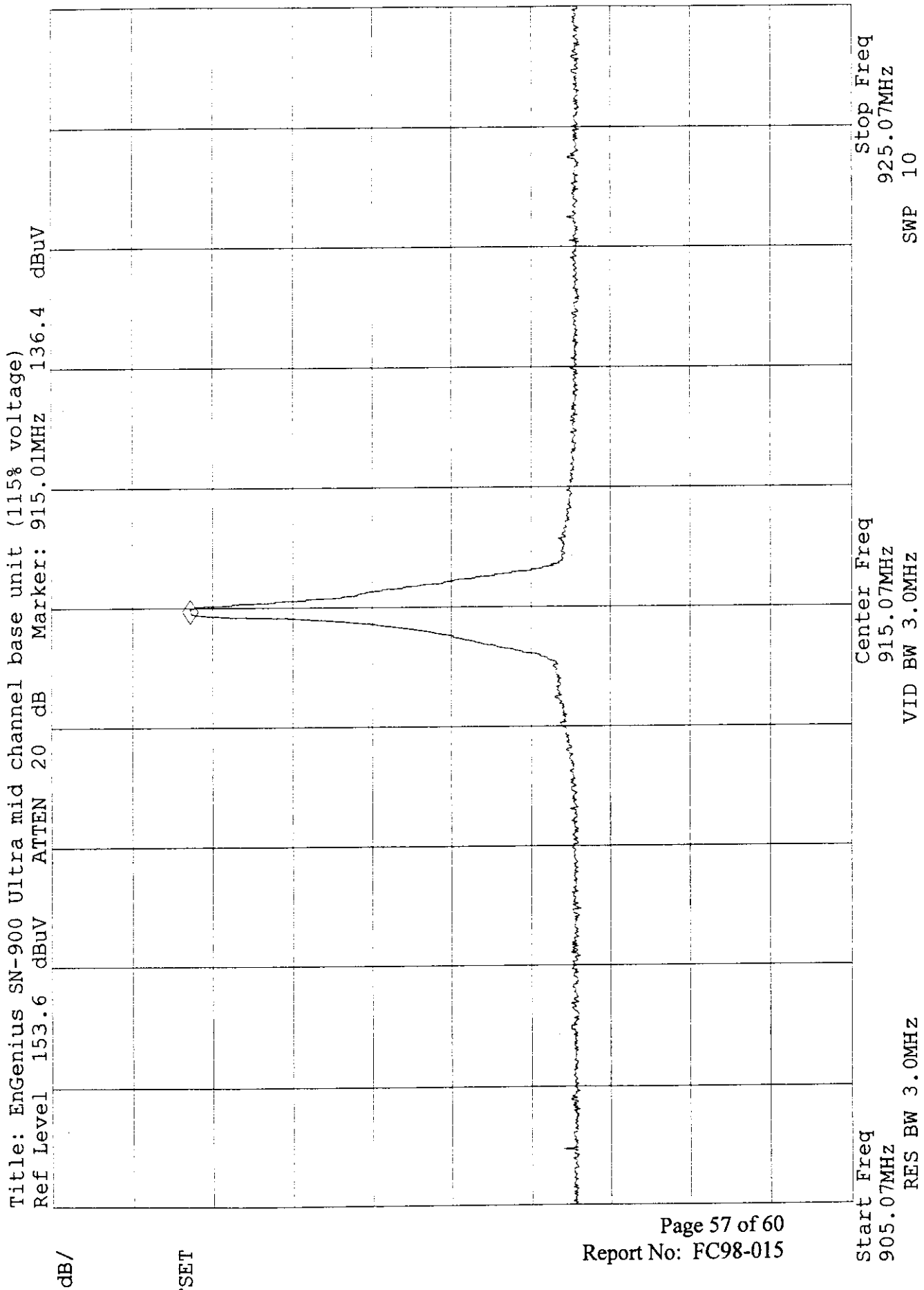
FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



FCC Part 15.247(b) RF Power Output Plot (Base Unit)



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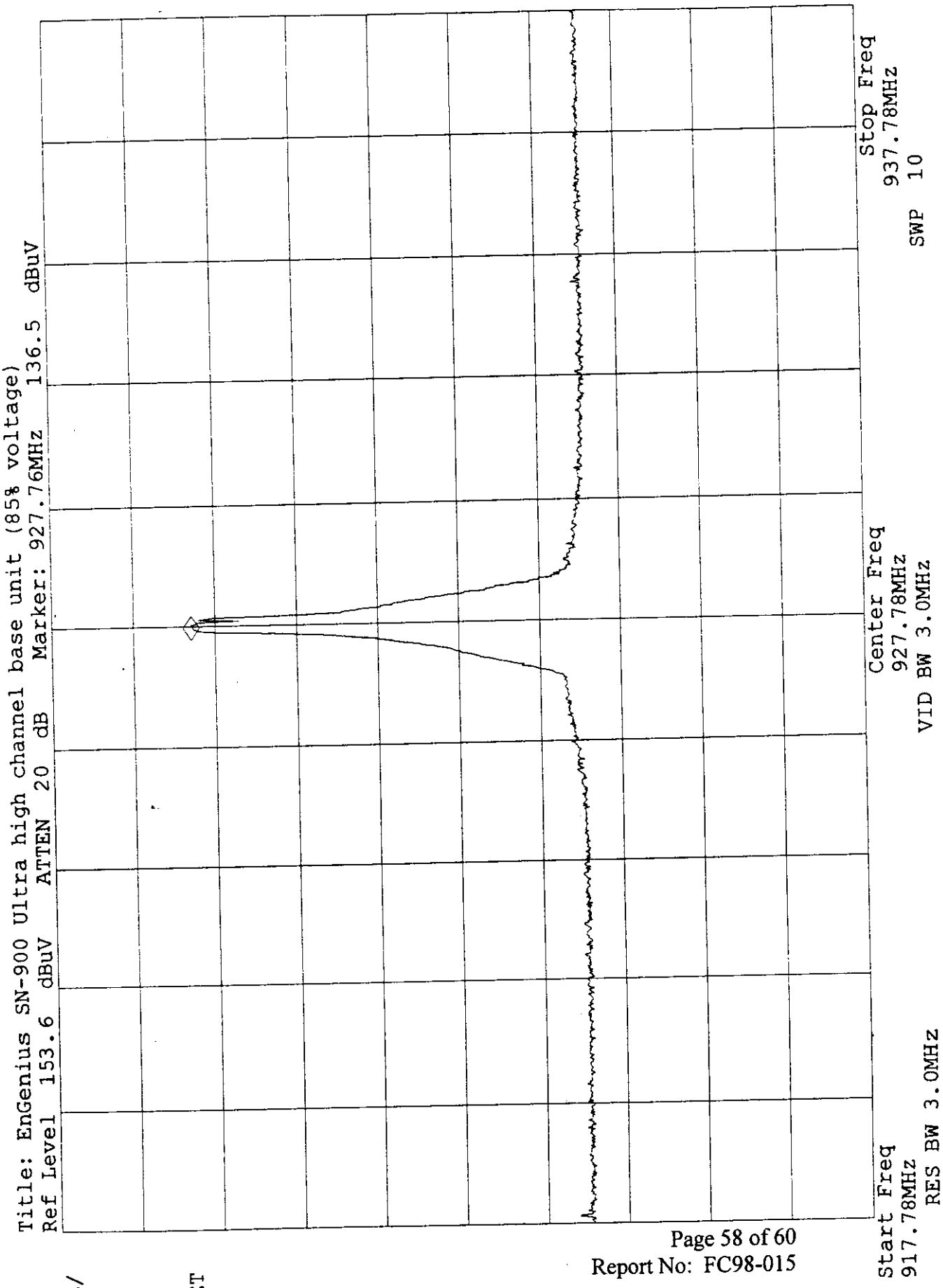

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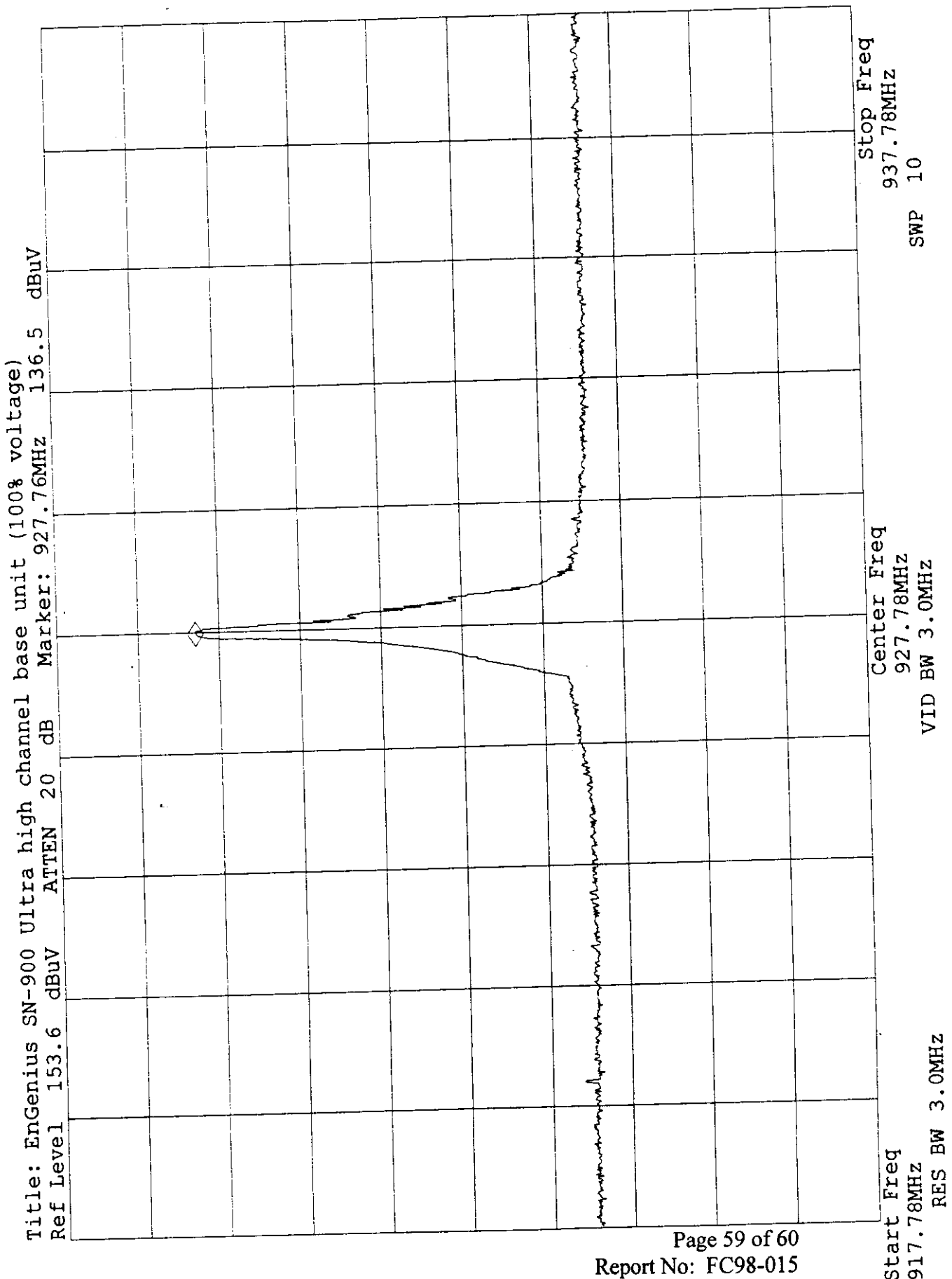

FCC Part 15.247(b) RF Power Output Plot (Base Unit)