

## ***Exhibit C.....Measurement Report***

# ***FCC Part 90 Subpart S***

## ***EMI TEST REPORT***

*of*

E.U.T. : IDEN Car Booster

FCC ID. : LTFCBi

MODEL : ID2000

Working Frequency : 806.0 to 821.0 MHz

*for*

APPLICANT : ORA ELECTRONICS

ADDRESS : 9410 OWENSMOUTH AVENUE, P.O. BOX 4029,  
CHATSWORTH, CA 91313, U.S.A.

Test Performed by

**ELECTRONICS TESTING CENTER, TAIWAN**  
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Report Number : ET87R-05-059

# **TEST REPORT CERTIFICATION**

Applicant : ORA ELECTRONICS  
 9410 OWENSMOUTH AVENUE, P.O. BOX 4029, CHATSWORTH, CA 91313,  
 U.S.A.

Manufacturer : REMOTEK CORPORATION  
 7F-5, NO. 77, HSIN-TAI-WU RD., SECTION 1, SHI-CHIH, TAIPEI, TAIWAN.  
 R.O.C.

Description of EUT :  
 a) Type of EUT : IDEN Car Booster  
 b) Trade Name : REMOTEK  
 c) Model No. : ID2000  
 d) FCC ID : LTFCBi  
 e) Working Frequency : 806.0 to 821.0 MHz  
 f) Power Supply : DC 12V

Regulation Applied : FCC Rules and Regulations Part 90 Subpart S (1996)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and EIA 603, and the energy emitted by the device was found to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note : 1. The results of the testing report relate only to the items tested  
 2. The testing report shall not be reproduced except in full, without the written approval of ETC

Issued Date : Jun. 08, 1998

Test Engineer : K. C. Chen  
 ( K. C. Chen )

Approve & Authorized Signer : Will Yauo  
 Will Yauo, Supervisor  
 EMI Test Site of ELECTRONICS  
 TESTING CENTER, TAIWAN

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## 1. GENERAL INFORMATION

### 1.1 Product Description

- a) Type of EUT : IDEN Car Booster
- b) Trade Name : ORA
- c) Model No. : ID2000
- d) FCC ID : LTFCBi
- e) Working Frequency : 806.0 to 821.0 MHz
- f) Power Supply : DC 12V

### 1.2 Characteristics of Device

This EUT, IDEN Car Booster, is a RF amplifier which can enhance the input signals up to 5 times, and the maximum input power is 0.6 W that will have a maximum output power of 3W (conducted).

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4. Details please see each separate measurement item.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, 5 Lirn, Din Fu Tsun, Lin Kou, Taipei, Taiwan, R.O.C.

This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10 , 1997.

## 2. REQUIREMENTS OF PROVISIONS

### 2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

### 2.2 Frequencies Available

According to section § 90.613 of Part 90, the following frequencies are available :

Mobile Frequencies (MHz)

806 to 821

### 2.3 Requirements for Type Acceptance

The following requirements is according to FCC rules part 2 for type acceptance:

#### (1) RF Output Power

For transmitters other than SSB, ISB and controlled carrier radiotelephone, the power output shall be measured at the RF output terminals with electrical characteristics of the RF load attached.

#### (2) Modulation Characteristics

For Voice Modulated Communication Equipment, a curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.

For equipment that employs modulation limiting, a curve or family of curves showing the percentage of modulation versus the modulation input voltage should be supplied.

#### (3) Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

For radiotelephone transmitters equipped with a device to limit modulation or peak

envelope power shall be modulated as follows:

Other than SSB or ISD transmitters when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

#### **(4) Spurious Emissions at Antenna Terminals**

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

#### **(5) Field Strength of Spurious Emissions**

Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation.

#### **(6) Frequencies Tolerance**

- a) The frequency stability shall be measured with variation of ambient temperature.
- b) The frequency stability shall be measured with variation of primary supply voltage.

### **2.4 Labeling Requirement**

Each equipment for which a type acceptance application is filed on or after May 1, 1981, shall bear an identification plate or label pursuant to § 2.925 (Identification of equipment) and § 2.926 (FCC identifier).

### **2.5 User Information**

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### 3. OUTPUT POWER MEASUREMENT

#### 3.1 Provision Applicable

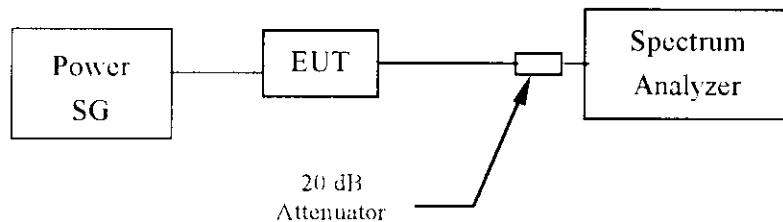
According to § 90.635(d), for mobile stations the maximum output power shall not exceed 100 Watts (20 dBw).

#### 3.2 Measurement Procedure

##### A. Conducted measured

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1 without connection to measurement instrument. Set the power SG at a output level of 28 dBm. Turn on the EUT and connect its antenna terminal to measurement instrument via its associated cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set spectrum analyzer RBW to 120 kHz and VBW to 300 kHz in peak mode, and adjust spectrum analyzer center frequency at the highest amplitude appearing on spectral display. Then set spectrum analyzer frequency span to 0.2 M Hz.
4. Measure the highest amplitude appearing on spectral display and record the level as result data.
5. Repeat above procedures until all frequencies measured were complete.

Figure 1 : Output power measurement configuration



##### B. ERP

1. Reference to procedure of section 7 : FIELD STRENGTH OF EMISSION

### 3.3 Test Data

#### A. Conducted measured

*Please see Annex 1 attached for plotted data.*

Operated mode : Normal Test Date : May. 25, 1998

Temperature : 27 °C Humidity : 67 %

Frequency ( MHz )	SA Reading ( dBm )	Cable Loss ( dB )	Attenuator ( dB )	Result ( dBm )	Output Power ( W )	Limit ( W )
806.00	35.22	0.0	0	35.22	3.33	100
814.00	34.91	0.0	0	34.91	3.10	100
821.00	34.66	0.0	0	34.66	2.92	100

Note :

1. For the cable is associated with this booster, therefore, no cable loss is needed.
2. Attenuation of attenuator is corrected automatically by spectrum analyzer correction function.

#### B. ERP (SG output level is 20 dBm )

Frequency ( MHz )	EUT Reading ( dBuV )	SG Reading ( dBuV )	Cable Loss ( dB )	Result ( dBm )	ERP ( W )	Limit ( W )
806.00	103.7	89.5	-0.5	33.7	2.344	100
814.00	104.5	90.1	-0.5	33.9	2.455	100
821.00	103.6	89.8	-0.5	33.3	2.138	100

### 3.3 Result Calculation

The conducted result is calculated as following equation :

Result = EUT Reading - SG Reading + Cable Loss + Attenuation of Attenuator (if any)

$$W = \log_{10} \left[ \frac{\text{Result(dBm)}}{10} \right] / 1000$$

### 3.4 Output Power Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	Oct. 16, 1998
Pre-selector	Hewlett-Packard	85685A	Oct. 16, 1998
Quasi Peak Detector	Hewlett-Packard	85650A	Oct. 07, 1998
Spectrum Analyzer	Adventest	R3271	Sep. 02, 1998
Power Signal Generator	R&S	SMGL	Nov. 23, 1998
Log periodic Antenna	EMCO	3146	Dec. 11, 1998
Dipole Antenna	EMCO	3121C	Mar. 04, 1999
Attenuator	Narda	766-20	N/A

## 4. MODULATION CHARACTERISTICS

### 4.1 Provisions Applicable

According to § 2.987 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured. And in accordance with § 2.987 (b), for equipment which employs modulation limiting, a curve or family of curves showing the percentage of modulation versus the modulation input voltage should be supplied.

According to § 90.210, transmitters operating in the 806–821 MHz band shall meet the emission mask B or G. See the following descriptions for details :

**Emission Mask B.** For transmitters that are equipped with an audio low-pass filter pursuant to § 90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

- 1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25dB
- 2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35dB.
- 3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

**Emission Mask G.** For transmitters that are not equipped with an audio low-pass filter pursuant to § 90.211(b), the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- 1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but no more than 10 kHz: At least  $83 \log (f_d/5)$  dB;
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log (f_d/6.1)$  dB, or  $50 + 10 \log (P)$  dB, or 70 dB, whichever is the lesser attenuation;
- 3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

### 4.2 Result

For this is just a booster, it can not generate any signals without connecting a AMPS cellular phone, therefore measurement on modulation characteristics is impractical.

## 5. OCCUPIED BANDWIDTH OF EMISSION

### 5.1 Provisions Applicable

According to § 2.989 (e)(3), For radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows :

Other than SSB or ISD transmitters when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

Per § 90.209 (b)(5), transmitters operating in the 806–821 MHz band, the channel spacing and bandwidth is 25 kHz and 20 kHz respectively.

### 5.2 Result

For this device is just a booster, it can not generate any signals without connecting an IDEN system, therefore measurement on emission occupied bandwidth is impractical.

## 6. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### 6.1 Provisions Applicable

According to § 2.991, the radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

According to § 90.210, transmitters operating in the 806-821 MHz band shall meet the emission mask B or G. See the following descriptions for details:

**Emission Mask B.** For transmitters that are equipped with an audio low-pass filter pursuant to § 90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

- 4) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25dB
- 5) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35dB.
- 6) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

**Emission Mask G.** For transmitters that are not equipped with an audio low-pass filter pursuant to § 90.211(b), the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- 4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but no more than 10 kHz: At least  $83 \log (f_d/5)$  dB;
- 5) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log (f_d/6.1)$  dB, or  $50 + 10 \log (P)$  dB, or 70 dB, whichever is the lesser attenuation;

On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

## 6.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1 without connection to measurement instrument. Set the power SG at a output level of 28 dBm. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set resolution bandwidth of spectrum analyzer as follows :
  - a) For any emission frequency below 1 GHz : no less than 120 kHz.
  - b) For any emission frequency over 1 GHz : 1 MHz.
4. Measure the emissions of all frequency bands specified in applicable rules and record the measurement data.
5. Repeat above procedures until all measured frequencies were complete.

## 6.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Adventest	R3271	Sep. 02, 1998
Attenuator	Narda	766-20	N/A

### 6.3 Measurement Data

***Please see Annex 2 attached for plotted data.***

a) Lower Frequency: 806.00 MHz

Operated mode : Input 28 dBm	Test Date : May. 26 , 1998
Temperature : 26 °C	Humidity : 65 %

Unmodulated carrier power is 35.22 dBm , or 3.33 W (Conducted).

The limit of spurious or harmonics is  $35.22 - [43 + 10\log(\text{output power in W})]$ , or -13dBm

Frequency ( MHz )	SA Reading (dBm )	Cable Loss (dB)	Attenuator (dB)	Result ( dBm )	Limit (dBm)	Margin ( dB )
1612.00	-23.7	0.0	corrected	-23.7	-13.0	-10.7
2418.00	-29.2	0.0	corrected	-29.2	-13.0	-16.2
3224.00	--	0.0	corrected	--	-13.0	--
4030.00	--	0.0	corrected	--	-13.0	--
4836.00	--	0.0	corrected	--	-13.0	--
5642.00	--	0.0	corrected	--	-13.0	--
6448.00	--	0.0	corrected	--	-13.0	--
7254.00	--	0.0	corrected	--	-13.0	--
8060.00	--	0.0	corrected	--	-13.0	--

Note:

1. Regarding item of Cable Loss, for the cable is associated with the booster, so there is no cable loss.
2. Remark “--“ means that the emissions level is too weak to be measured. and the background noise of measurement instrument is less than -40 dBm at a frequency span of 1 MHz.

b) Middle Frequency : 814.00 MHz

Operated mode : Input 28 dBm  
Temperature : 26 °CTest Date : May. 26 , 1998  
Humidity : 65 %

Unmodulated carrier power is 34.91 dBm , or 3.1 W (Conducted).

The limit of spurious or harmonics is  $34.91 - [43 + 10 \log(\text{output power in W})]$ , or -13dBm

Frequency ( MHz )	SA Reading ( dBm )	Cable Loss ( dB )	Attenuator ( dB )	Result ( dBm )	Limit ( dBm )	Margin ( dB )
1628.00	-24.4	0.0	corrected	-24.4	-13.0	-11.4
2442.00	-28.2	0.0	corrected	-28.2	-13.0	-15.2
3256.00	--	0.0	corrected	--	-13.0	--
4070.00	--	0.0	corrected	--	-13.0	--
4884.00	--	0.0	corrected	--	-13.0	--
5698.00	--	0.0	corrected	--	-13.0	--
6512.00	--	0.0	corrected	--	-13.0	--
7326.00	--	0.0	corrected	--	-13.0	--
8140.00	--	0.0	corrected	--	-13.0	--

Note:

1. Regarding item of Cable Loss, for the cable is associated with the booster, so there is no cable loss.
2. Remark “ -- ” means that the emission level is too weak to be measured, and the background noise of measurement instrument is less than -40 dBm at a frequency span of 1 MHz.

## c) Higher Frequency : 821.00 MHz

Operated mode : Input 28 dBm  
Temperature : 26 °CTest Date : May. 26 , 1998  
Humidity : 65 %

Unmodulated carrier power is 34.66 dBm , or 2.92 W (Conducted).

The limit of spurious or harmonics is 34.66-[43+10log(output power in W)], or -13dBm

Frequency ( MHz )	SA Reading ( dBm )	Cable Loss ( dB )	Attenuator ( dB )	Result ( dBm )	Limit ( dBm )	Margin ( dB )
1642.00	-24.5	0.0	corrected	-24.5	-13.0	-11.5
2463.00	-26.2	0.0	corrected	-26.2	-13.0	-13.2
3284.00	--	0.0	corrected	--	-13.0	--
4105.00	--	0.0	corrected	--	-13.0	--
4926.00	--	0.0	corrected	--	-13.0	--
5747.00	--	0.0	corrected	--	-13.0	--
6568.00	--	0.0	corrected	--	-13.0	--
7389.00	--	0.0	corrected	--	-13.0	--
8210.00	--	0.0	corrected	--	-13.0	--

## Note:

1. Regarding item of Cable Loss, for the cable is associated with the booster, so there is no cable loss.
2. Remark “--” means that the emission level is too weak to be measured, and the background noise of measurement instrument is less than -40 dBm at a frequency span of 1 MHz.

## 7. FIELD STRENGTH OF EMISSION

### 7.1 Provisions Applicable

According to § 2.993 (b)(3), Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to § 22.917 (e), all out of band emissions shall be attenuated below the unmodulated carrier by at least 43 plus 10 Log(output power in watts) dB and per § 22.917 (f) mobile emissions in base frequency range, the mean power of any emissions appearing in the base station frequency range from mobile transmitters operated in this service shall be attenuated to a level not to exceed -80 dBm at the transmit antenna connector.

### 7.2 Measurement Procedure

1. Setup the configuration per figure 3 and 4 for frequencies measured below and above 1 GHz respectively. And set the power SG at a output level of 28 dBm..
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 100 kHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 °, and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat steps 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.

6. Replace the EUT with a tuned dipole antenna (horn antenna for frequency over 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level and record this level. Rise and lower the search antenna to get the highest value on spectrum analyzer and Record this value for result calculated.
7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

Figure 3 : Frequencies measured below 1 GHz configuration

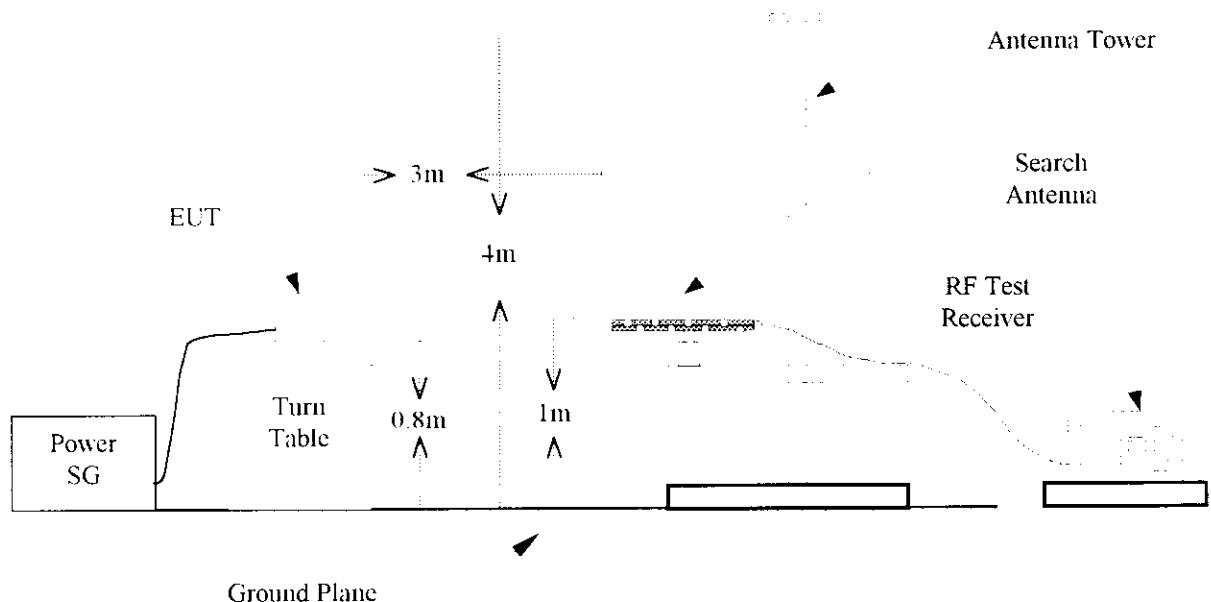
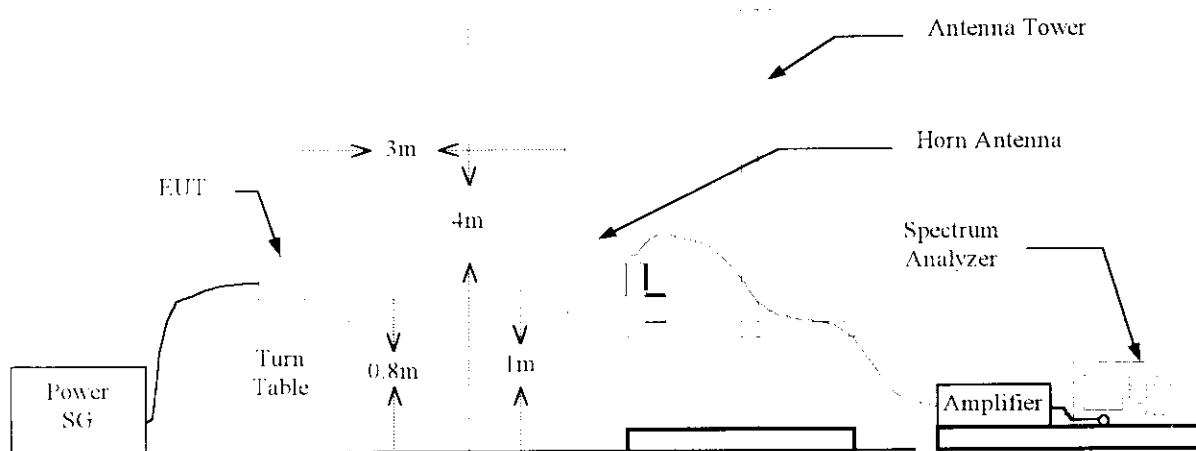


Figure 4 : Frequencies measured above 1 GHz configuration



### 7.3 Measuring Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	Oct. 16, 1998
Pre-selector	Hewlett-Packard	85685A	Oct. 16, 1998
Quasi Peak Detector	Hewlett-Packard	85650A	Oct. 07, 1998
Spectrum Analyzer	Adventest	R3271	Sep. 02, 1998
Power Signal Generator	R&S	SMGL	Nov. 23, 1998
Horn Antenna	EMCO	3115	Apr. 22, 1999
Log periodic Antenna	EMCO	3146	Dec. 11, 1998
Biconical Antenna	EMCO	3110B	Jan. 13, 1999
Dipole Antenna	EMCO	3121C	Mar. 04, 1999

Measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz

## 7.4 Measuring Data

a) 806.00 MHz

Operated mode : Input 28 dBm      Test Date : May 26, 1998  
 Temperature : 26 °C      Humidity : 70 %

Fundamental output power is 33.7 dBm, or 2.344 W (ERP).

The limit of spurious or harmonics is calculated as following :

33.7-[43+10log(carrier output power in W)], or -13dBm

SG output level is 0 dBm

Frequency (MHz)	EUT Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain Corrected	Result (dBm)	Limit (dBm)	Margin (dB)
1612.00	-63.7	-28.2	-1.6	5.8	-31.3	-13.0	-18.3
2418.00	-67.4	-31.9	-1.8	5.3	-32.0	-13.0	-19.0
3224.00	--	--	--	--	--	-13.0	--
4030.00	--	--	--	--	--	-13.0	--
4836.00	--	--	--	--	--	-13.0	--
5642.00	--	--	--	--	--	-13.0	--
6448.00	--	--	--	--	--	-13.0	--
7254.00	--	--	--	--	--	-13.0	--
8060.00	--	--	--	--	--	-13.0	--

Note :

1. Remark "--" means that the emission level is too weak to be detected and background level of measurement instrument is less than -80 dBm.
2. Result calculation is as following :

Result = EUT Reading + SG Reading + Cable Loss + Antenna Gain Corrected

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

b) 814.00 MHz

Operated mode : Input 28 dBm  
 Temperature : 26 °C

Test Date : May 26, 1998  
 Humidity : 70 %

Fundamental output power is 33.9 dBm, or 2.455 W (ERP).

The limit of spurious or harmonics is calculated as following :

$$33.9 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

SG output level is 0 dBm

Frequency (MHz)	EUT Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain Corrected	Result (dBm)	Limit (dBm)	Margin (dB)
1628.00	-64.3	-29.9	-1.4	5.8	-30.0	-13.0	-17.0
2442.00	-66.9	-31.9	-1.8	5.3	-31.5	-13.0	-18.5
3256.00	--	--	--	--	--	-13.0	--
4070.00	--	--	--	--	--	-13.0	--
4884.00	--	--	--	--	--	-13.0	--
5698.00	--	--	--	--	--	-13.0	--
6512.00	--	--	--	--	--	-13.0	--
7326.00	--	--	--	--	--	-13.0	--
8140.00	--	--	--	--	--	-13.0	--

Note :

1. Remark "--" means that the emission level is too weak to be detected.

2. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

c) 821.00 MHz

Operated mode : Input 28 dBm  
 Temperature : 26 °C

Test Date : May 26, 1998  
 Humidity : 70 %

Unmodulated carrier output power is 33.3 dBm, or 2.138 W (ERP).

The limit of spurious or harmonics is calculated as following :

$$33.3 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

SG output level is 0 dBm

Frequency (MHz)	EUT Reading (dBm)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain Corrected	Result (dBm)	Limit (dBm)	Margin (dB)
1642.00	-64.5	-30.5	-1.2	5.8	-29.4	-13.0	-16.4
2463.00	-67.1	-31.9	-1.3	5.3	-31.2	-13.0	-18.2
3284.00	--	--	--	--	--	-13.0	--
4105.00	--	--	--	--	--	-13.0	--
4926.00	--	--	--	--	--	-13.0	--
5747.00	--	--	--	--	--	-13.0	--
6568.00	--	--	--	--	--	-13.0	--
7389.00	--	--	--	--	--	-13.0	--
8210.00	--	--	--	--	--	-13.0	--

Note :

1. Remark "--" means that the emission level is too weak to be detected.

2. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

## 8. FREQUENCY STABILITY MEASUREMENT

### 8.1 Provisions Applicable

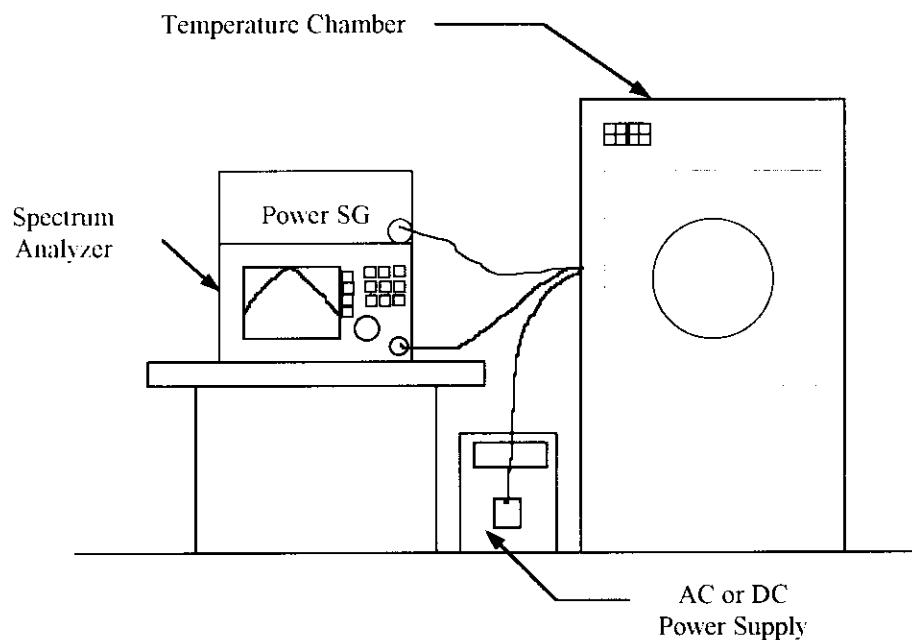
According to § 2.995 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30 °C to +50 °C centigrade, and according to § 2.995 (d), the frequency stability shall be measured with varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment. And per § 2.995 (d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

Operation frequency range in 806 – 821 MHz band, per § 90.213 (a), the minimum frequency stability is 0.00025 percent of the assigned frequency.

### 8.2 Measurement Procedure

1. Setup the configuration per figure 5 for frequencies measured at ambient temperature if it is within 15 °C to 25 °C. Otherwise, an environmental chamber set for a temperature of 20 °C. Supply the EUT with its end point input voltage by a DC power supply.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to 50 °C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency at 2, 5 and 10 minutes after startup with varying input voltage to 85% and 115% of nominal input voltage.
4. Repeat step 2 with a 10 °C decreased per stage until the lowest temperature -30 °C is measured, record all measurement frequencies.

Figure 5 : Frequency stability measurement configuration



### 8.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Adventest	3361	Oct. 01, 1998
Temperature Chamber	ACS	EOS 200T	Dec. 03, 1998

## 8.4 Measurement Data

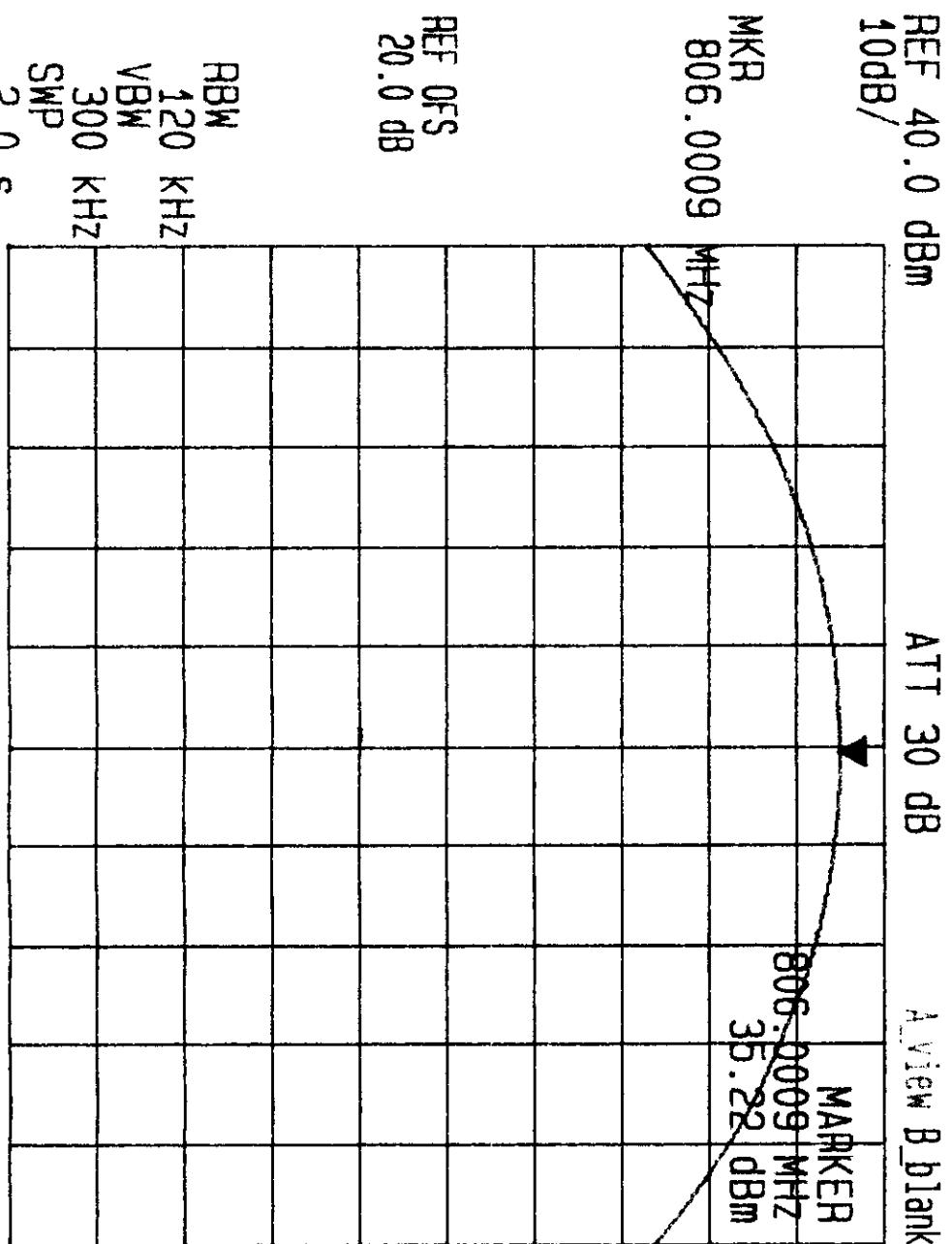
Frequency stability versus environmental temperature and end point supply voltage

Frequency Measured : 806.0092 MHz (Reference Frequency )					
Ambient Temperature( C )	End point supply Voltage(Vdc)	Frequency deviation measured with time elapse (%)			
		2 minute	5 minute	10 minute	Limit
50	6	0.000001	0.000001	0.000001	0.00025
40	6	0.000001	0.000001	0.000002	0.00025
30	6	0.000002	0.000001	0.000002	0.00025
10	6	0.000001	0.000001	0.000002	0.00025
0	6	0.000001	0.000001	0.000001	0.00025
-10	6	0.000001	0.000001	0.000001	0.00025
-20	6	0.000001	0.000001	0.000002	0.00025
-30	6	0.000002	0.000002	0.000002	0.00025

Frequency Measured : 813.9832 MHz (Reference Frequency )					
Ambient Temperature( C )	End point supply Voltage(Vdc)	Frequency deviation measured with time elapse (%)			
		2 minute	5 minute	10 minute	Limit
50	6	0.000002	0.000002	0.000001	0.00025
40	6	0.000001	0.000001	0.000002	0.00025
30	6	0.000001	0.000001	0.000001	0.00025
10	6	0.000001	0.000001	0.000001	0.00025
0	6	0.000001	0.000001	0.000001	0.00025
-10	6	0.000002	0.000002	0.000001	0.00025
-20	6	0.000001	0.000002	0.000002	0.00025
-30	6	0.000002	0.000002	0.000002	0.00025

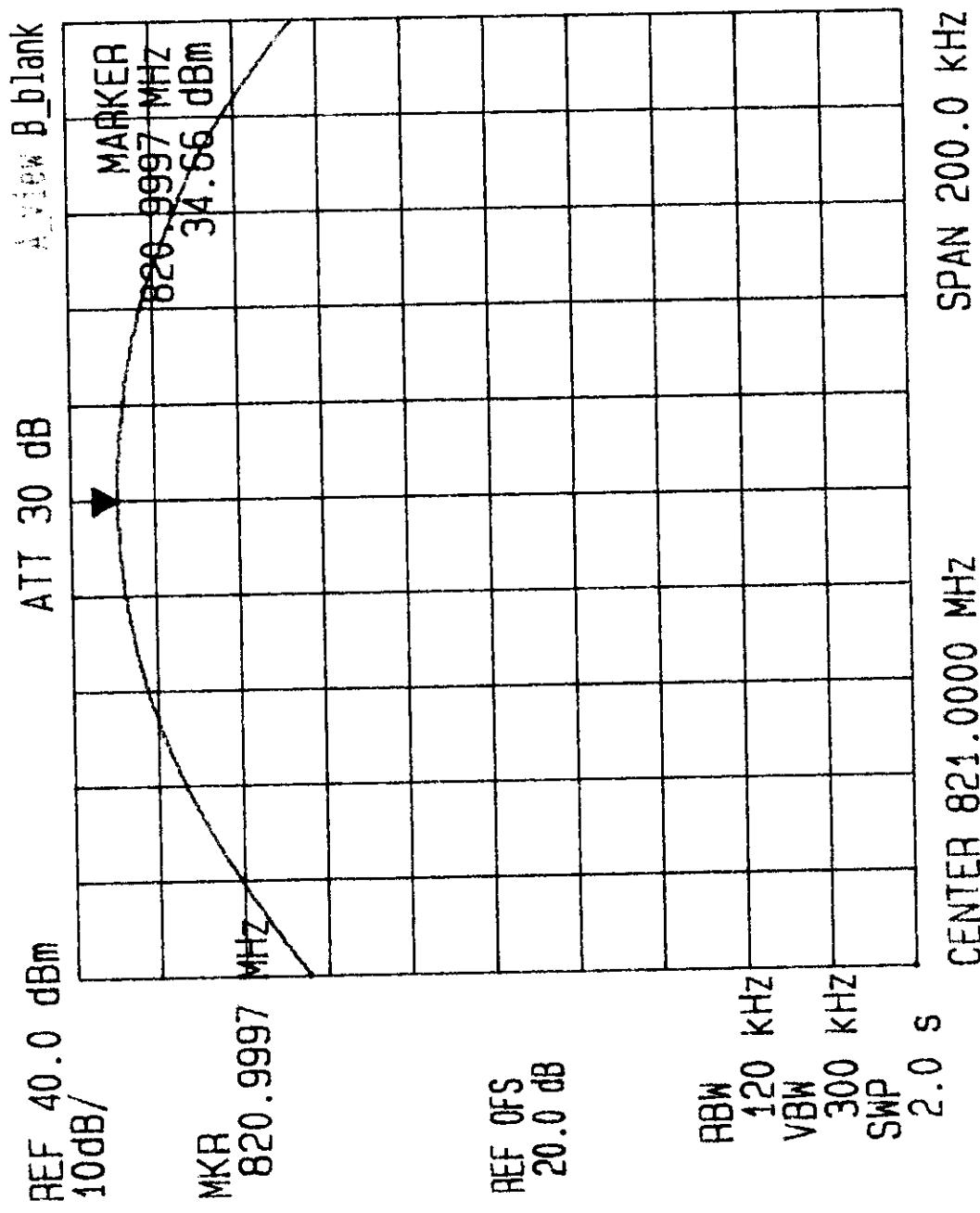
Frequency Measured : 821.0008 MHz (Reference Frequency )						
Ambient Temperature( C )	End point supply Voltage(Vdc)	Frequency deviation measured with time elapse (%)				
		2 minute	5 minute	10 minute	Limit	
50	6	0.000001	0.000001	0.000001	0.00025	
40	6	0.000001	0.000001	0.000001	0.00025	
30	6	0.000001	0.000001	0.000001	0.00025	
10	6	0.000001	0.000001	0.000002	0.00025	
0	6	0.000001	0.000001	0.000001	0.00025	
-10	6	0.000001	0.000002	0.000001	0.00025	
-20	6	0.000001	0.000001	0.000001	0.00025	
-30	6	0.000001	0.000001	0.000001	0.00025	

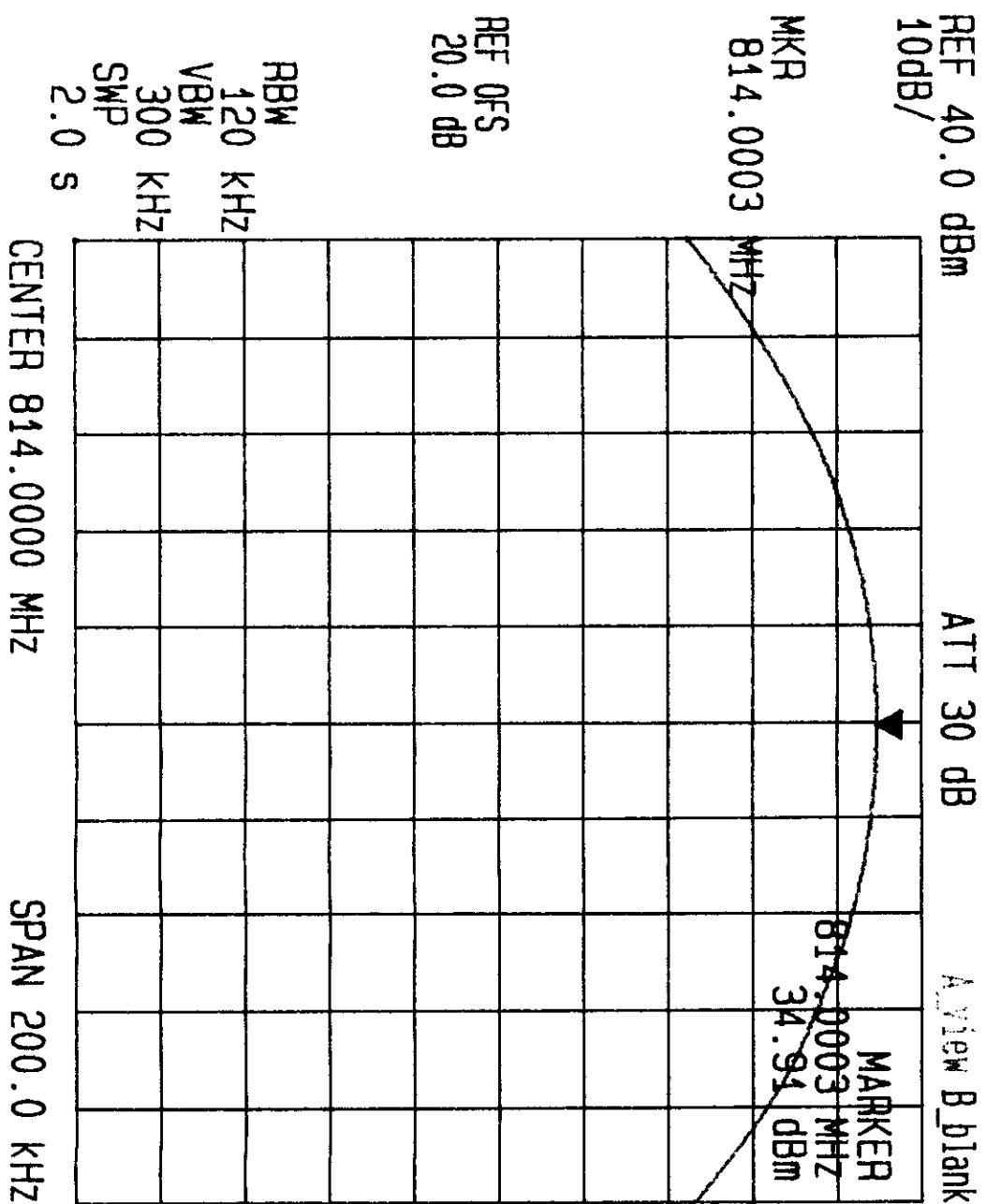
*Annex 1 : Output Peak Power plotted data*



Frequency: 806 MHz

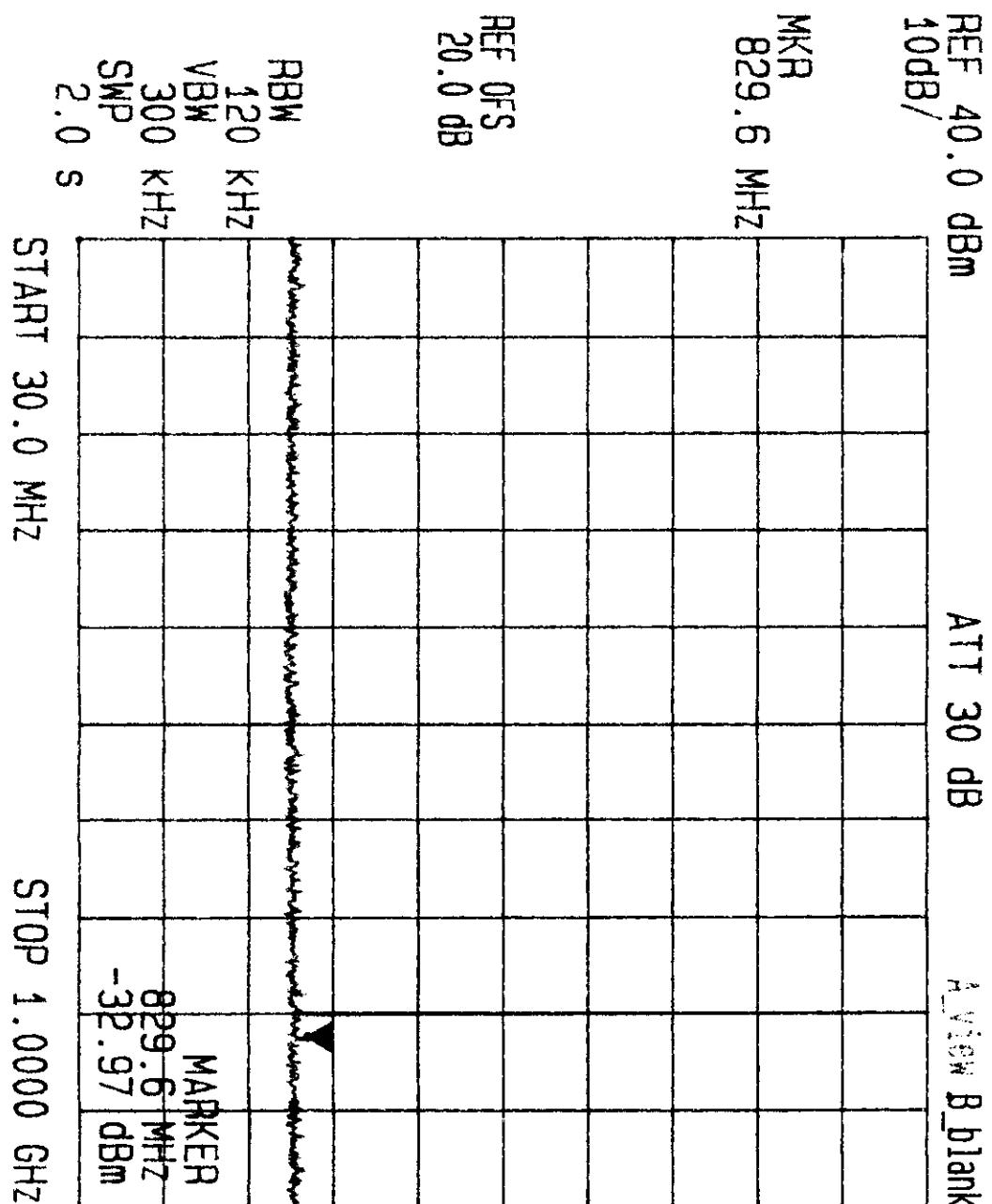
Frequency: 821 MHz

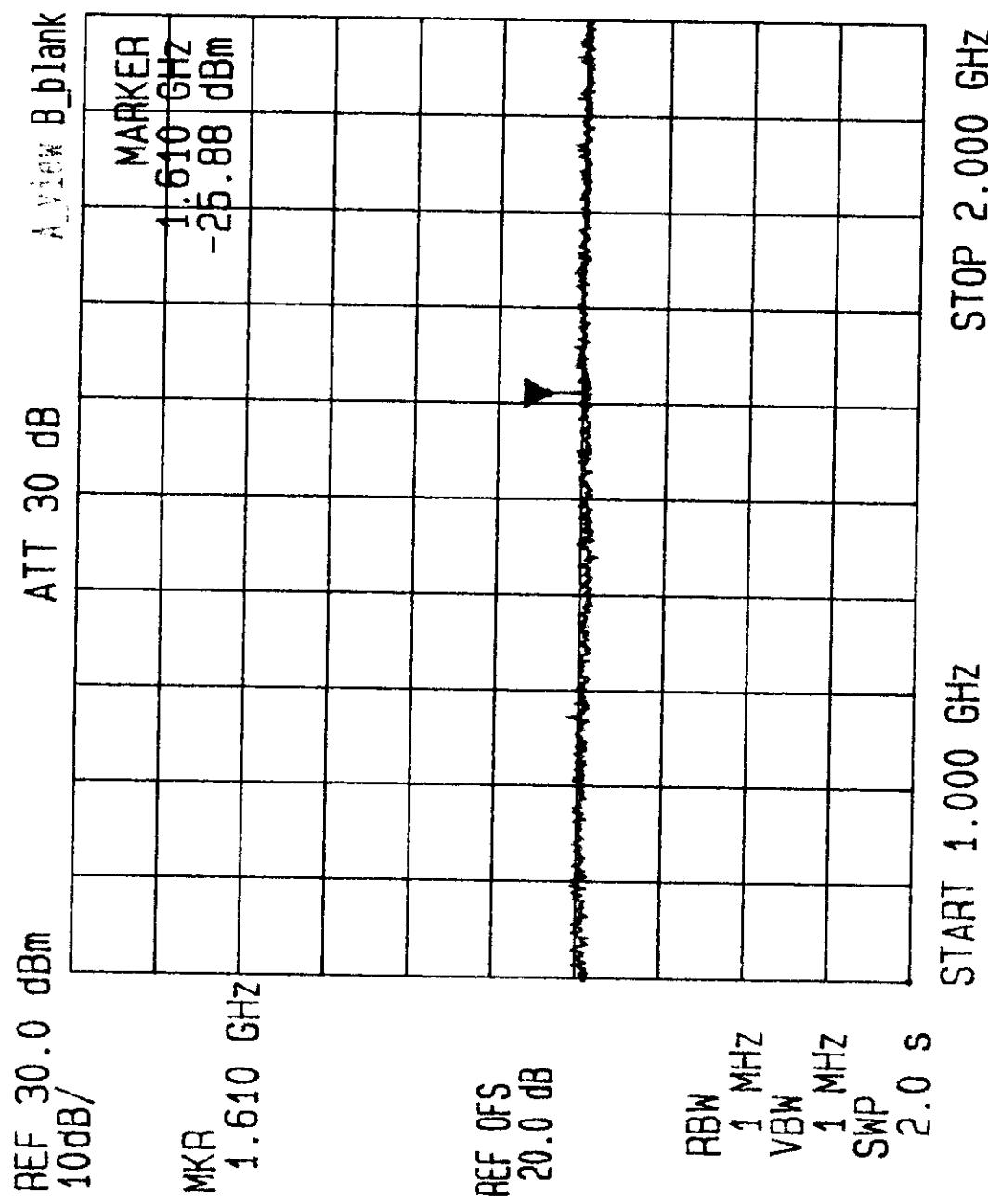


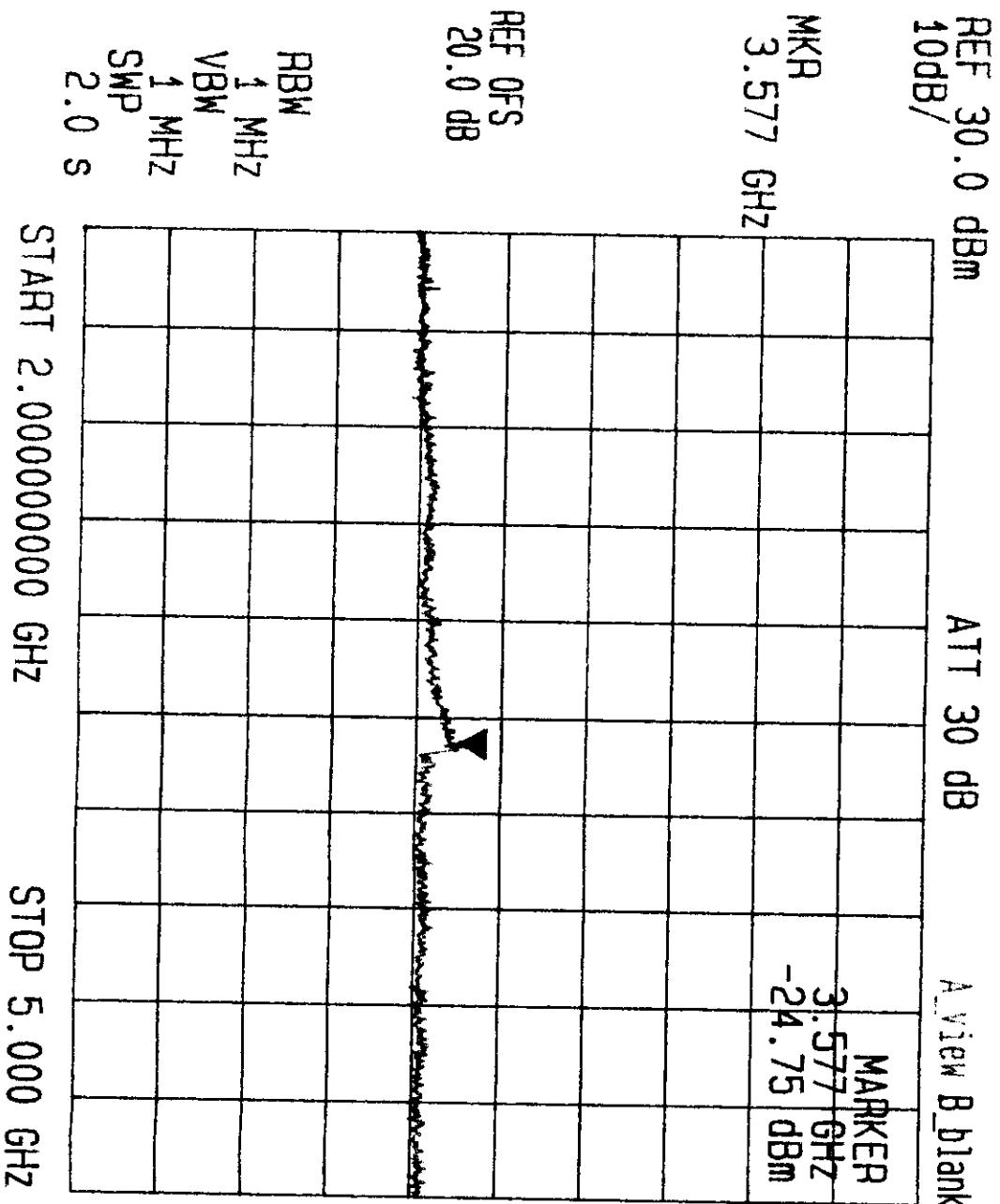


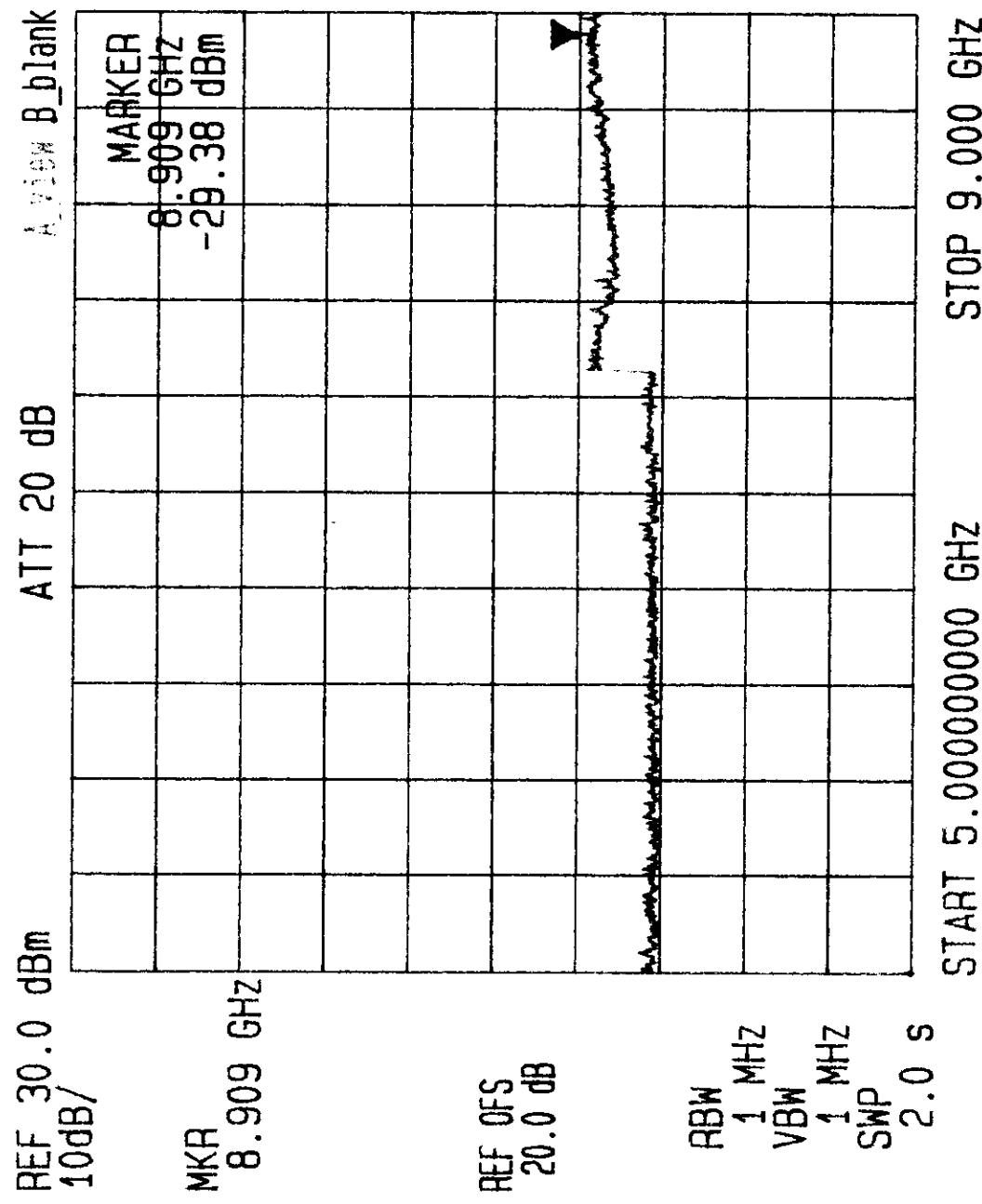
*Annex 2 : Conducted Spurious plotted data*

Frequency: 806 MHz

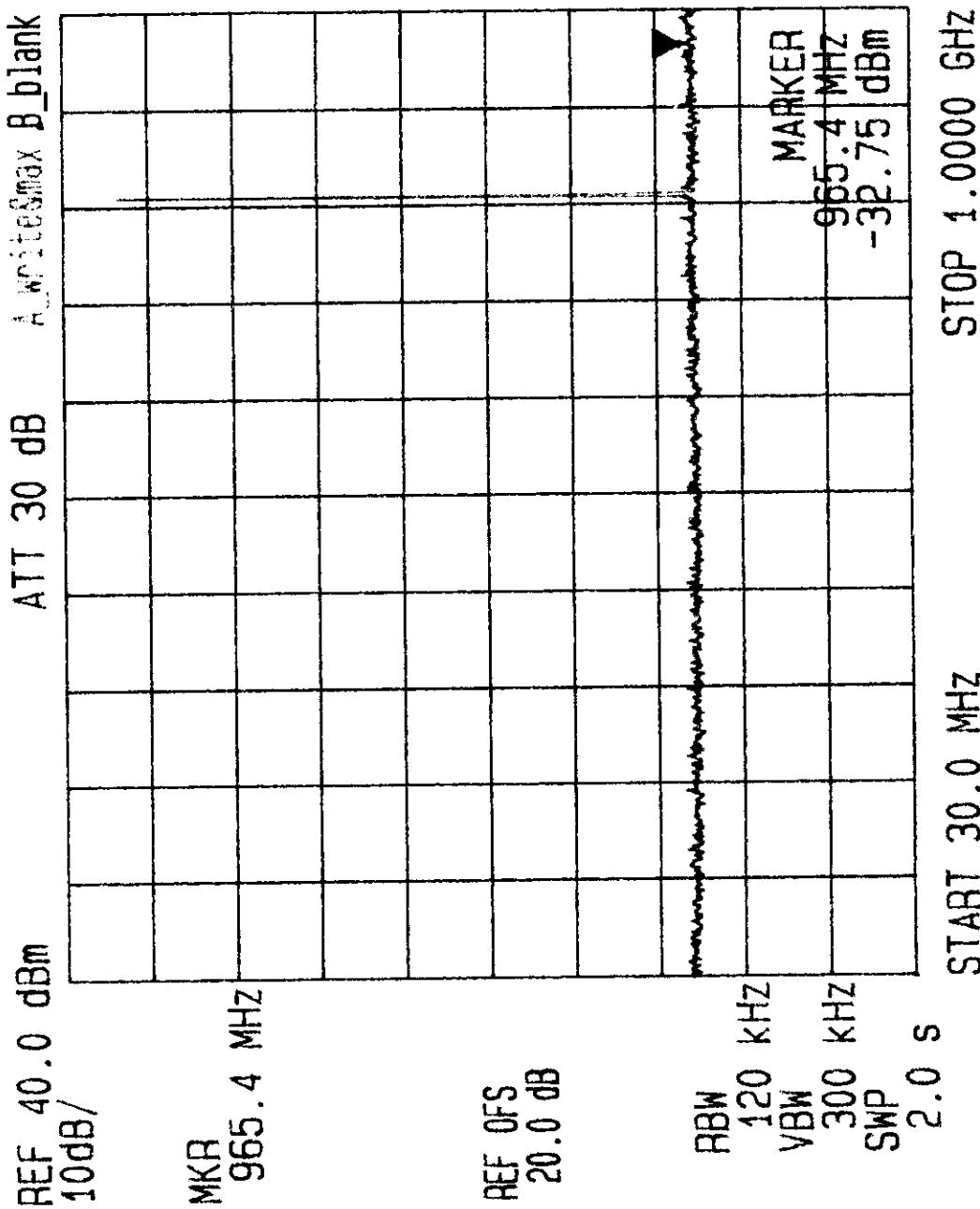


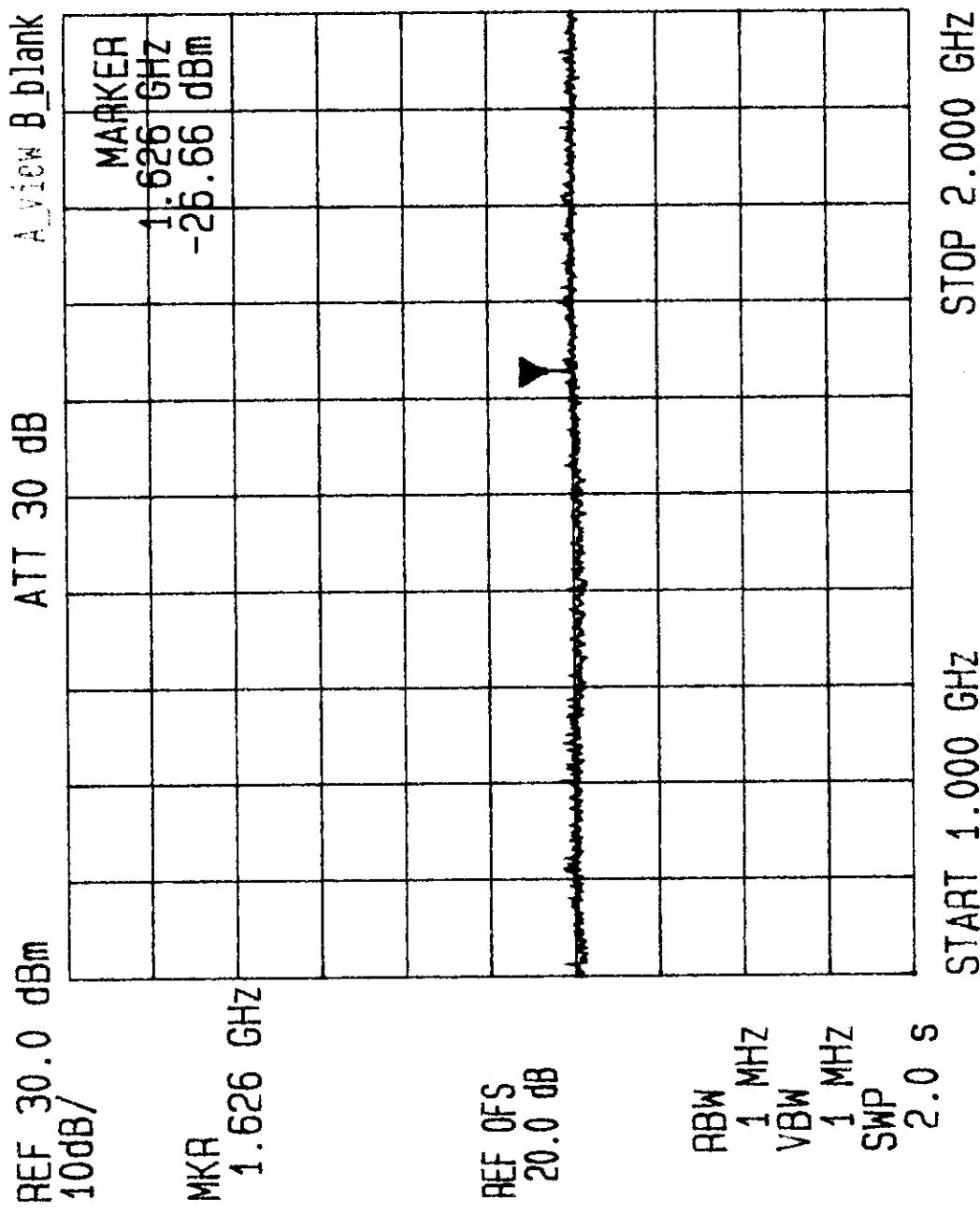


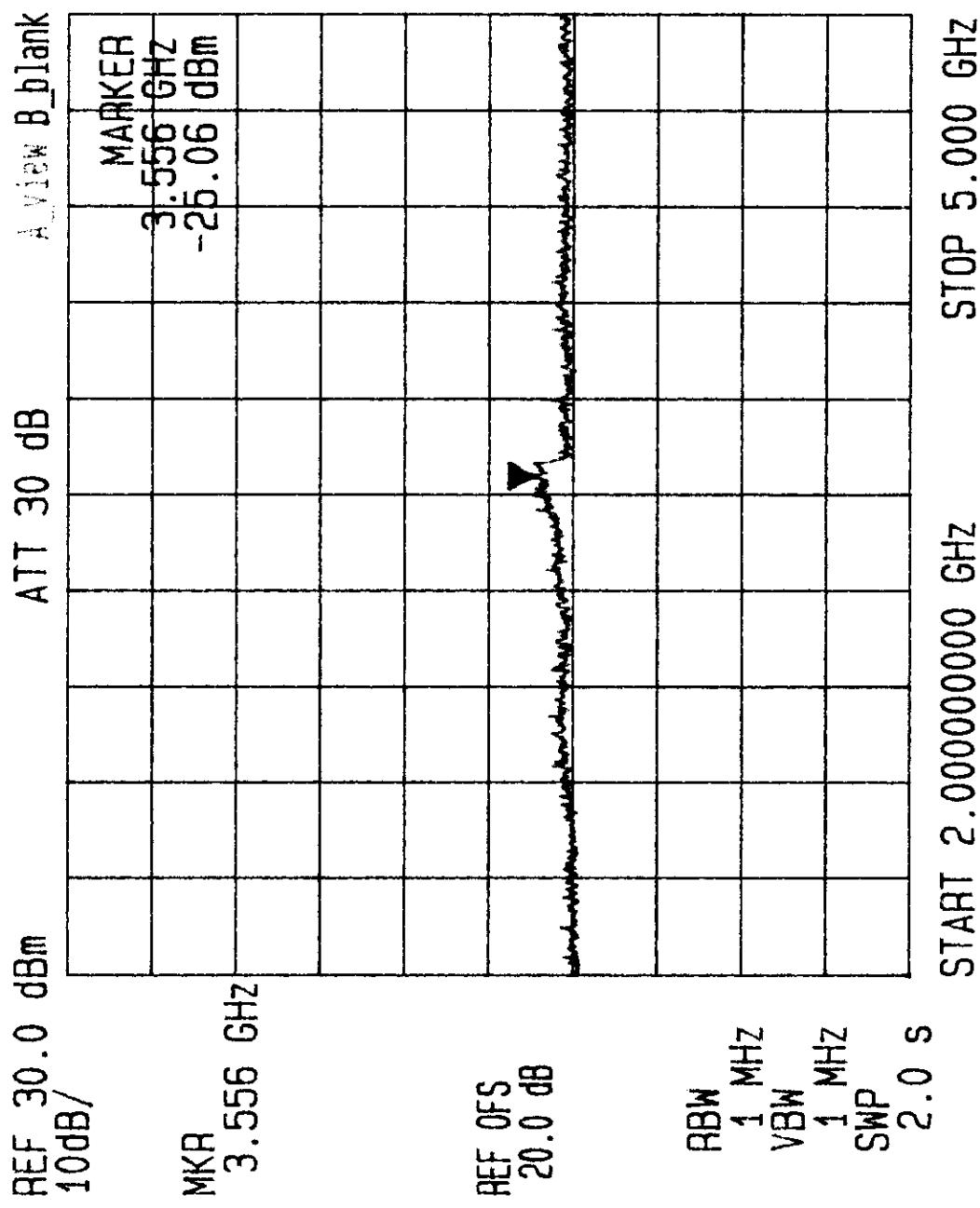


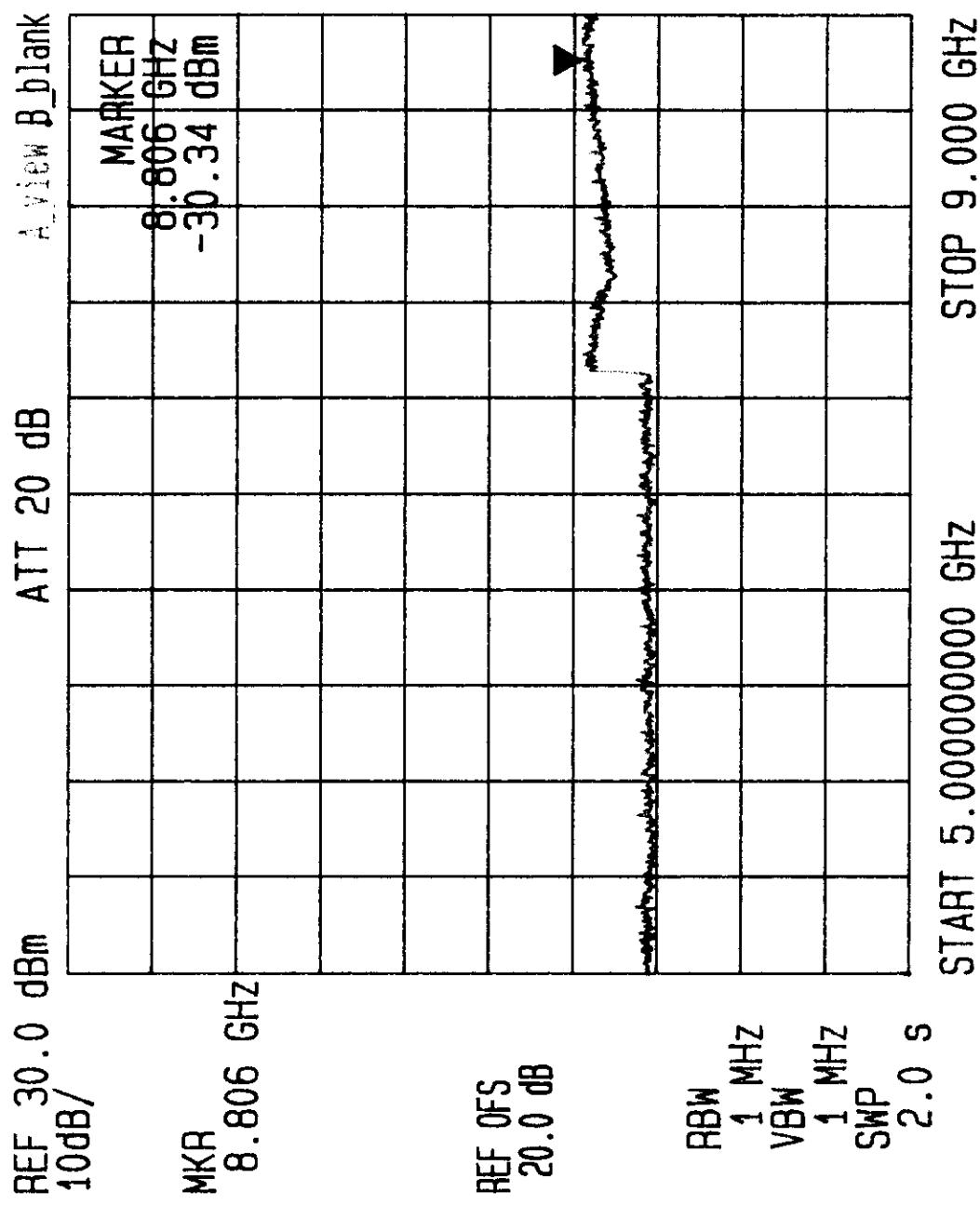


Frequency: 814 MHz

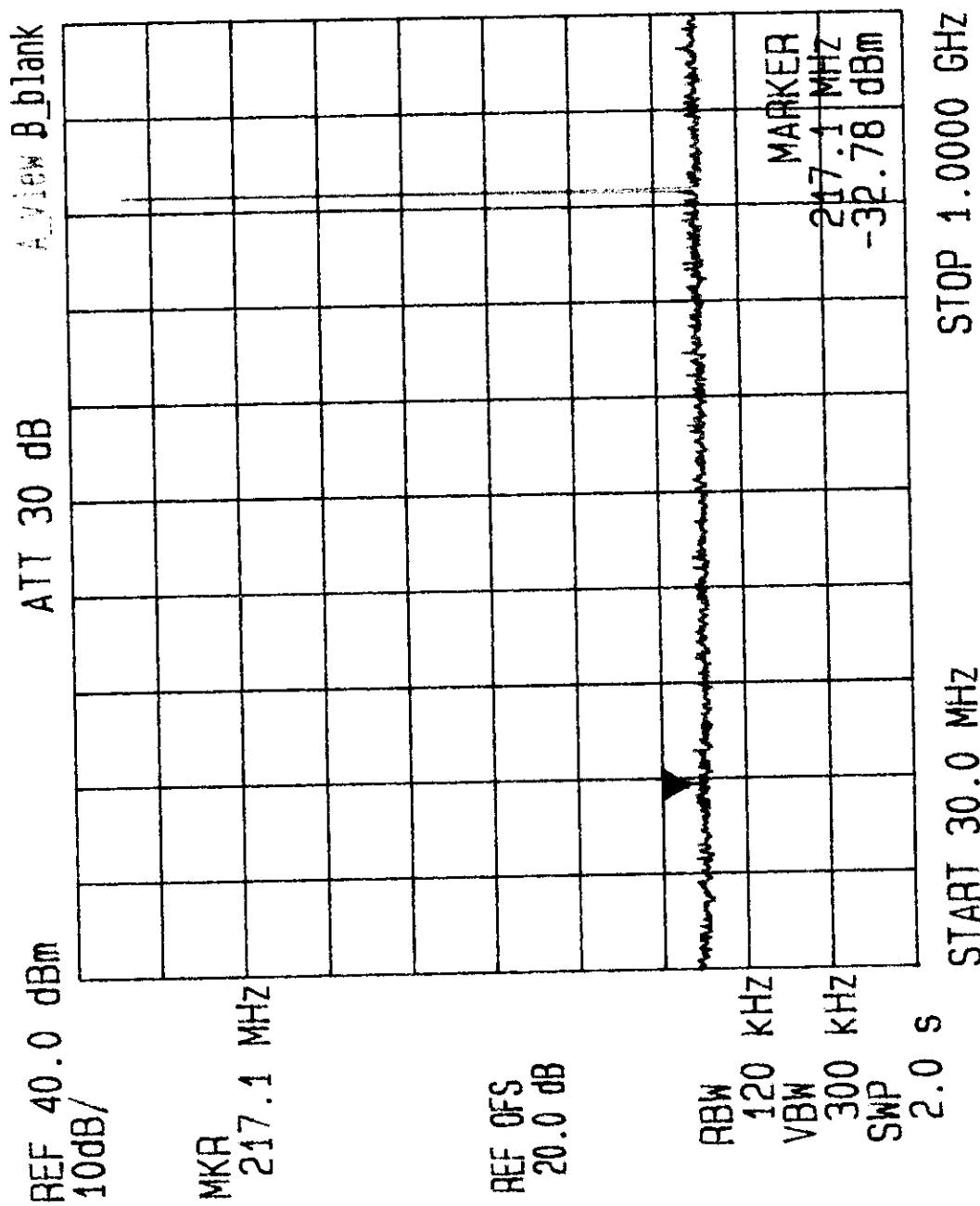








Frequency: 821 MHz



REF 40.0 dBm  
10dB/

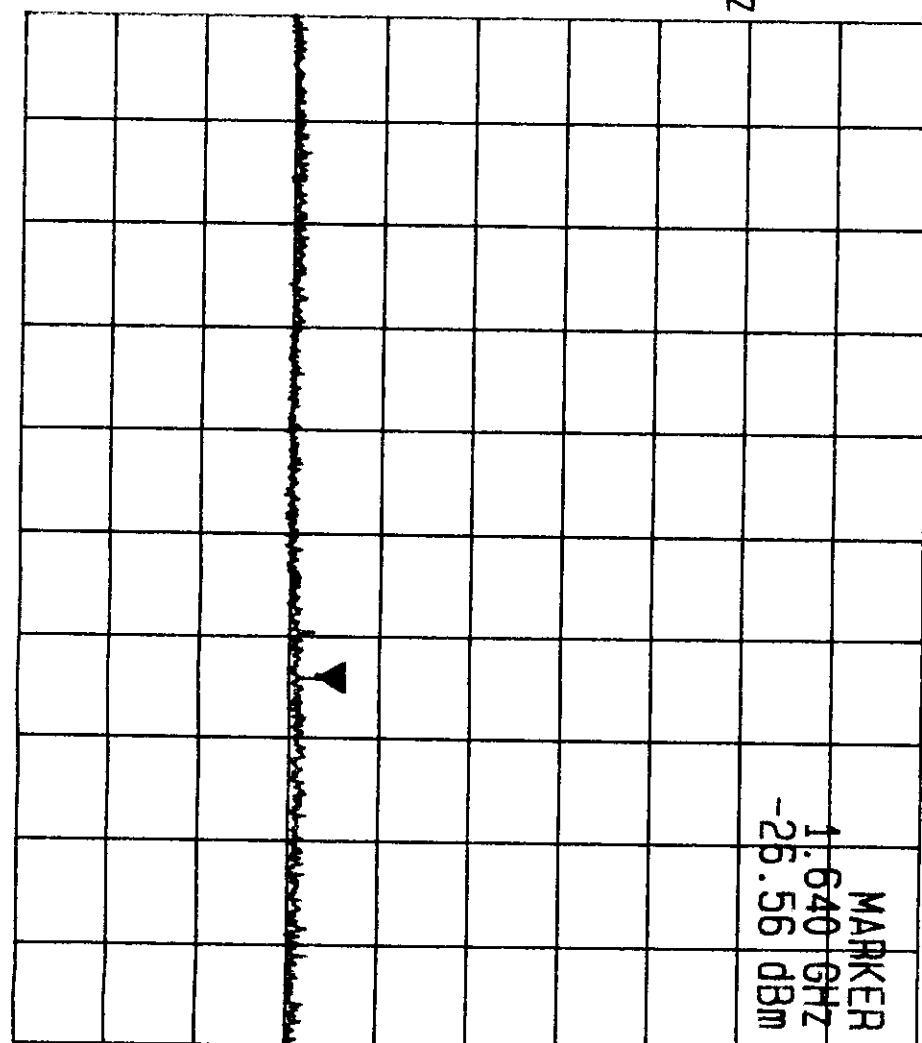
ATT 30 dB

A\_view B\_blank

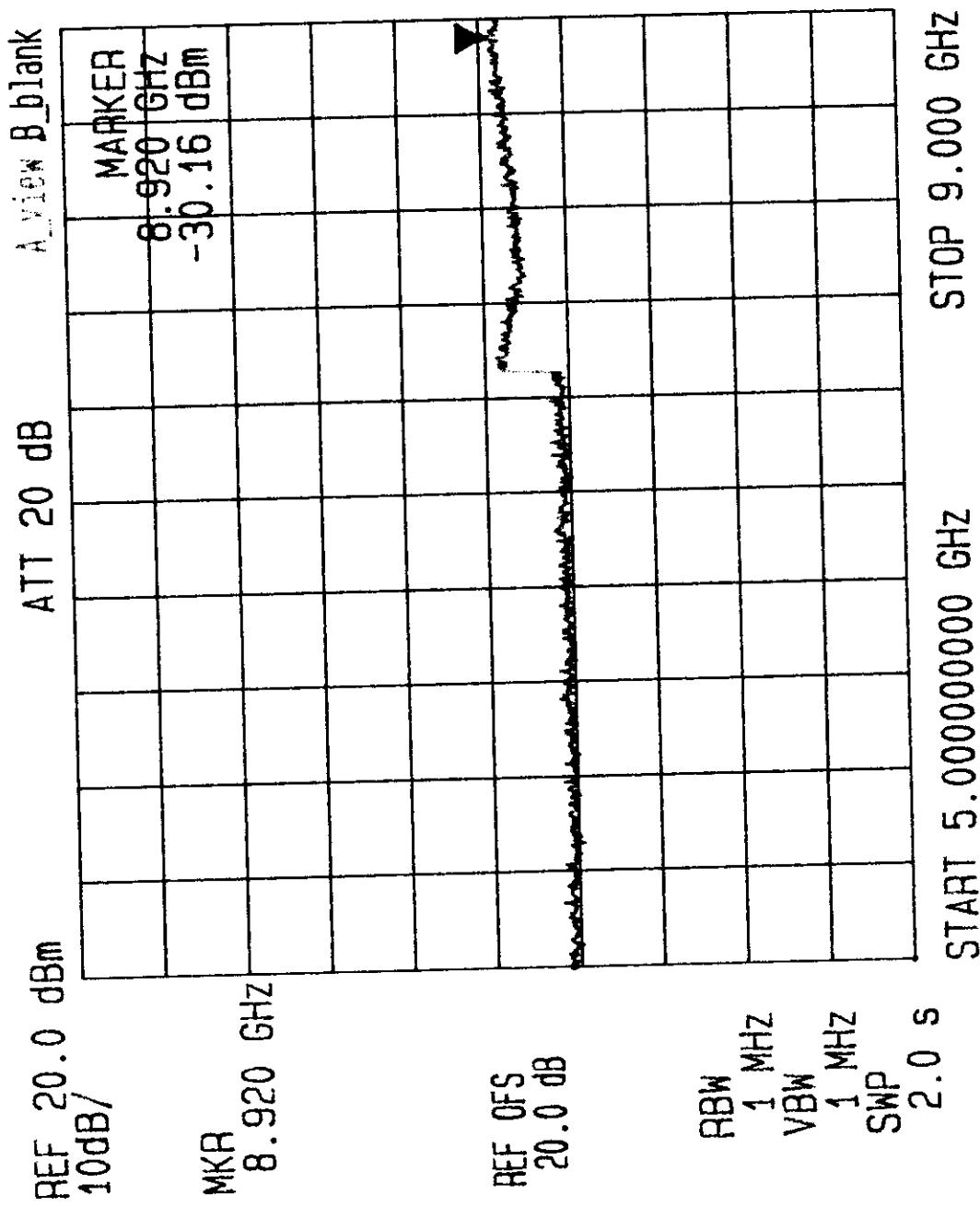
MKR  
1.640 GHz

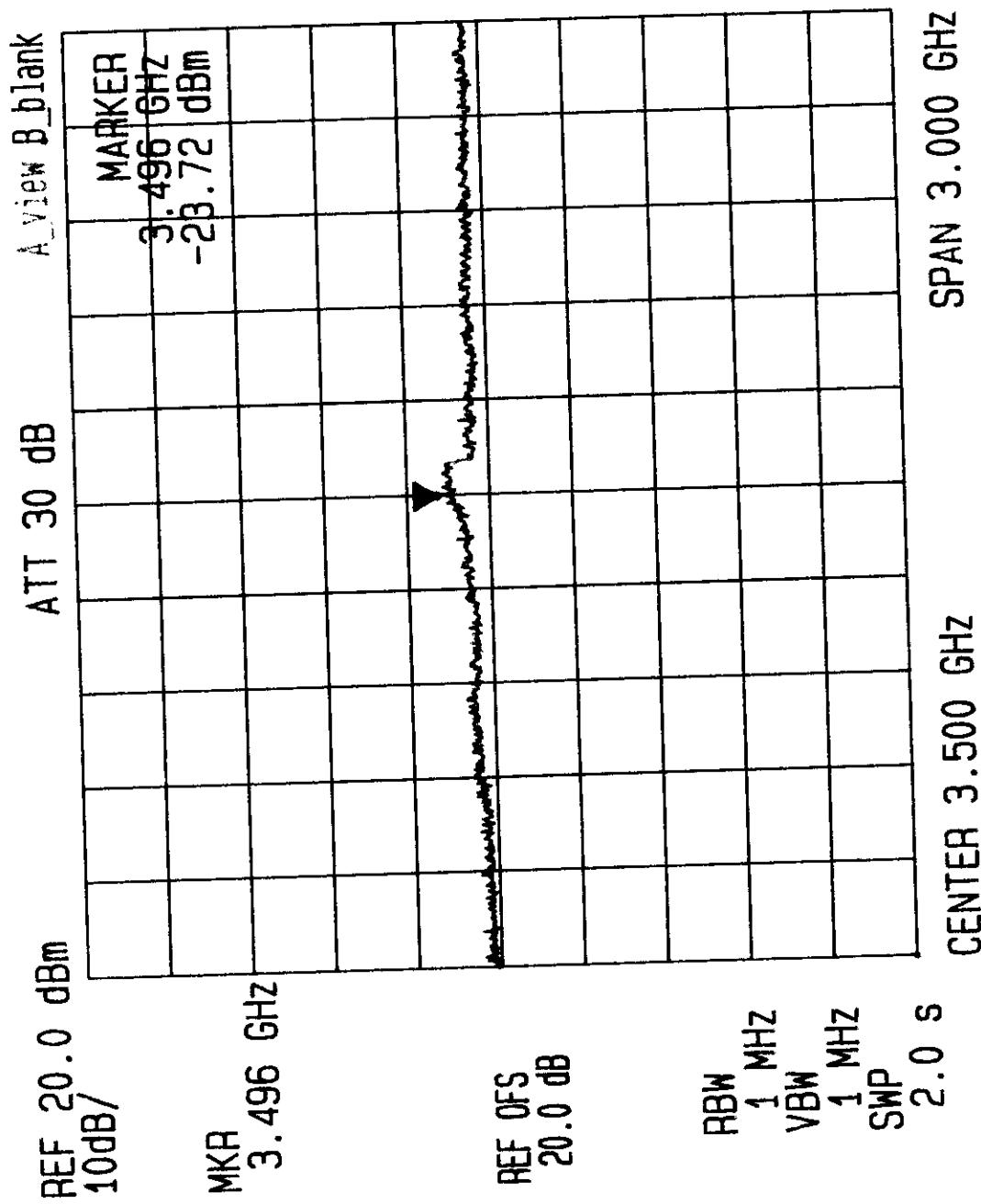
MARKER  
1.640 GHz  
-25.56 dBm

REF OFS  
20.0 dB



RBW  
1 MHz  
VBW  
1 MHz  
SWP  
2.0 s





# ITS Intertek Testing Services

**ORA ELECTRONICS (LTCBII)**

**Evaluation of Compliance with FCC-Specified Guidelines**

**For**

**Human Exposure to Radio Frequency Electromagnetic Fields**

**on the**

**IDEN Booster**

**Date of Test: November 30, 1998**

**LTO# J98033510**

**Total No. of Pages Contained in this Report: 6**

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**FCC 2.1091 and ANSI 95.1-1992**

**i**

**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](http://www.worldlab.com)



**VERIFICATION OF COMPLIANCE**  
**No. J98033510**

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

**Equipment Under Test:**

IDEN Booster  
Not Labelled

**Serial No.:**

**Applicant:**

ORA Electronics  
Mr. Matthew F. Jodziewicz  
9410 Owensmouth Avenue  
P.O. Box 4029  
Chatsworth, California 91313

**Contact:**

**Address:**

**Tel. number:**

818-772-2700

**Fax number:**

818-718-8626

**Applicable Regulation:**

FCC 2.1091 & ANSI C95.1: 1992

**Equipment Class:**

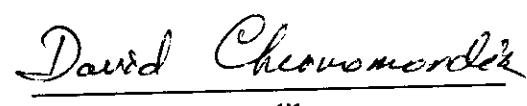
Uncontrolled Environments

**Date of Test:**

November 30, 1998

We attest to the accuracy of this report:

  
Barry Smith  
Test Engineer

  
David Chernomordik  
EMC Site Manager

**Table of Contents**

1.0	<b>Introduction</b> . . . . .	1
2.0	<b>Description of Equipment Under Test</b> . . . . .	1
3.0	<b>Test Summary</b> . . . . .	1
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## 1.0 Introduction

This report is designed to show compliance with the FCC Part 2.1091 Radio frequency radiation exposure evaluation for mobile and unlicensed devices. The test procedures and limits, as described in American National Standards Institute C95.1-1992, 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 Under Test (EUT)

The EUT is a 3 Watts RF amplifier used in the SMR Service in the frequency range from 798 to 831 MHZ.

The amplifier is used with magnetic car antenna with the following specification:

1. Antenna Type: Monopole Omni
2. Frequency Range: 800 - 870 MHz
3. Gain: 0 dBi
4. VSWR: 2.0

## 3.0 Test Summary

The IDEN Booster was tested by Intertek Testing Services as documented herein, and the energy emitted by the EUT was found to be below the recommended levels of Maximum Permissible Exposure for Uncontrolled Environments in FCC 1.1310 (ANSI C95.1:1992).

Therefore, in reference to the limits set forth in FCC 1.1310 use of the equipment is deemed to be safe with respect to human exposure to Radio frequency electromagnetic fields, when used in a normal fashion.

Note:

The IDEN Booster was tested with the antenna having 0 dBi gain and the emitted power density was found 4.8 dB below the limit (at 0.2m distance). Therefore, the Booster can be used with any antenna having the gain less than 4.8 dBi.

#### **4.0 System Test Configuration**

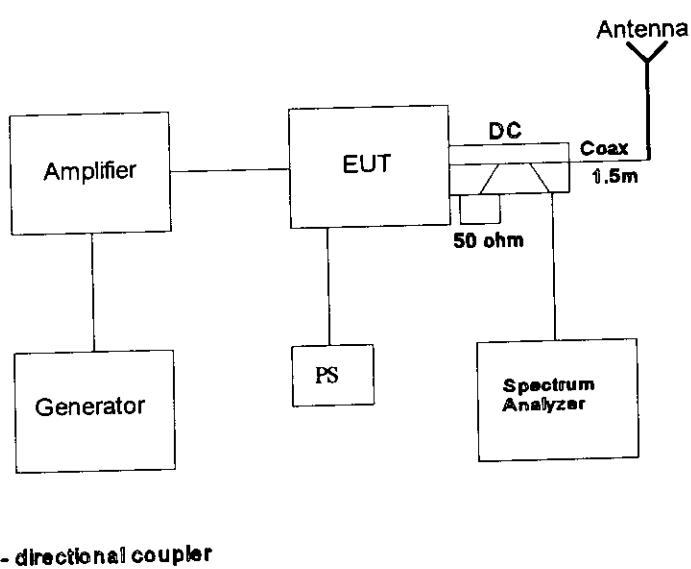
##### **4.1 Support Equipment**

Signal Generator, Antenna Research, PMM 3000

Power Amplifier, IFI, SMX 50

Power Supply, Extech, EP-3003

##### **4.2 Block Diagram of Test Setup**



##### **4.3 Mode of Operation During Test**

Transmitting full power (3 W).

## 5.0 Radiated Emissions

## 5.1 Radiated Emission Limits , FCC 1.1310

The following exposure limits apply to equipment use in Uncontrolled Environments:

**Maximum Permissible Exposure for Uncontrolled Environments**

Frequency Range (MHZ)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) E-field, H-field (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f <sup>2</sup>	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f/1500	30
1500 - 100,000	-	-	1.0	30

\* = Plane-wave equivalent power density.

Dashes "-" are used to indicated that there is no limit under the guideline.

## 5.2 Site Description and List of Test Equipment

All Tests were performed on Open Area Test Site.

Measurement equipment used for radiated emission compliance testing utilized some of the equipment on the following list:

Manufacturer	Equipment	Model Number	Calibration Due
Hewlett Packard	Spectrum Analyzer	8591EM	2/13/99
Holaday	Field Strength Meter	HI-3004EX	2/28/99
Werlatone	Directional Coupler	C3945	3/5/99

### 5.3 Test Procedure

The test was performed at 810 MHZ. The Antenna was placed on a 0.8 m wooden table on Open Site. The Antenna was connected to the EUT's output throw a Directional Coupler. The Spectrum Analyzer was connected to the Directional Coupler and the Generator was adjusted to obtain the Spectrum Analyzer reading of 35 dBm.

The sensor of the field strength meter was moved around the Antenna to obtain the maximum reading of the field strength meter. The measurements were performed at the distance 0.2 m and 0.3 m from the Antenna.

### 5.4 Field Strength Calculation

The field strength was measured directly from the meter. The Power Density (PD in W/m<sup>2</sup>) was calculated using the following formula:

$$PD = E^2 / 120\pi ,$$

where E is Field Strength in V/m

**5.6 Test Data**

The results on the following page(s) were obtained when the device was tested in the condition described in section 4.

Test Distance, m	Maximum Field Strength Reading, V/m	Calculated Power Density, mW/cm <sup>2</sup>	FCC Limit for time-averaging interval of 30 min, mW/cm <sup>2</sup>
0.2	26.0	0.18	0.54
0.3	15.0	0.06	0.54

Judgement: Passed

**ORA ELECTRONICS**

Evaluation of Compliance with FCC-Specified Guidelines

For

Human Exposure to Radio Frequency Electromagnetic Fields

on the

**IDEN Booster**

Date of Test: November 30, 1998

LTO# J98033510

Total No. of Pages Contained in this Report: 6

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FCC 2.1091 and ANSI 95.1-1992

i

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](http://www.worldlab.com)

**VERIFICATION OF COMPLIANCE**  
**No. J98033510**

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

<b>Equipment Under Test:</b>	IDEN Booster
<b>Serial No.:</b>	Not labeled
<b>Applicant:</b>	ORA Electronics
<b>Contact:</b>	Mr. Matthew F. Jodziewicz
<b>Address:</b>	9410 Owensmouth Ave. P.O. Box 4029 Chatsworth, CA 91313
<b>Tel. number:</b>	818-772-2700
<b>Fax number:</b>	818-718-8626
<b>Applicable Regulation:</b>	FCC 2.1091, and ANSI C95.1: 1992
<b>Equipment Class:</b>	Uncontrolled Environments
<b>Date of Test:</b>	November 30, 1998

We attest to the accuracy of this report:

  
Barry Smith  
Test Engineer

  
David Chernomordik  
EMC Site Manager

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5.0	<b>Radiated Emissions</b> . . . . .	3
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5.2	Site Description and List of Test Equipment . . . . .	3
5.3	Test Procedure . . . . .	4
5.4	Field Strength Calculation . . . . .	4
5.5	Configuration Photographs . . . . .	5
5.6	Test Data . . . . .	6

**1.0 Introduction**

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**2.0 Description of Equipment Under Test (EUT)**

The EUT is a 3 Watts RF amplifier used in Cellular Radiotelephone Service in the frequency range from 798 to 831 MHZ.

**3.0 Test Summary**

The IDEN Booster was tested by Inchcape Testing Services as documented herein, and the energy emitted by the EUT was found to be below the recommended levels of Maximum Permissible Exposure for Uncontrolled Environments in FCC 1.1310 (ANSI C95.1:1992).

Therefore, in reference to the limits set forth in FCC 1.1310 use of the equipment is deemed to be safe with respect to human exposure to Radio frequency electromagnetic fields, when used in a normal fashion.

#### **4.0 System Test Configuration**

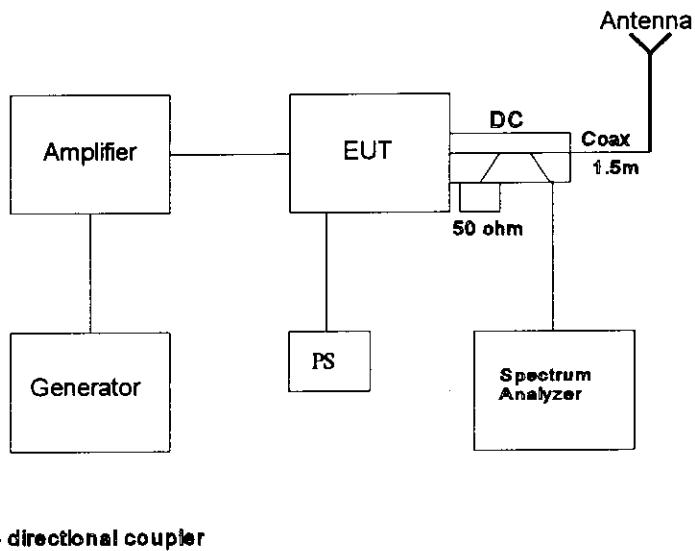
##### **4.1 Support Equipment**

Signal Generator, Antenna Research, PMM 3000

Power Amplifier, IFI, SMX 50

Power Supply, Extech, EP-3003

##### **4.2 Block Diagram of Test Setup**



##### **4.3 Mode of Operation During Test**

Transmitting full power (3 W).

**5.0 Radiated Emissions****5.1 Radiated Emission Limits , FCC 1.1310**

The following exposure limits apply to equipment use in Uncontrolled Environments:

**Maximum Permissible Exposure for Uncontrolled Environments**

Frequency Range (MHZ)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) E-field, H-field (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f <sup>2</sup>	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f/1500	30
1500 - 100,000	-	-	1.0	30

\* = Plane-wave equivalent power density.

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**5.2 Site Description and List of Test Equipment**

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Measurement equipment used for radiated emission compliance testing utilized some of the equipment on the following list:

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Holaday	Field Strength Meter	HI-3004EX	2/28/99
Werlatone	Directional Coupler	C3945	3/5/99

### 5.3 Test Procedure

The test was performed at 810 MHZ. The Antenna was placed on a 0.8 m wooden table on Open Site. The Antenna was connected to the EUT's output throw a Directional Coupler. The Spectrum Analyzer was connected to the Directional Coupler and the Generator was adjusted to obtain the Spectrum Analyzer reading of 35 dBm.

The sensor of the field strength meter was moved around the Antenna to obtain the maximum reading of the field strength meter. The measurements were performed at the distance 0.2 m and 0.3 m from the Antenna.

### 5.4 Field Strength Calculation

The field strength was measured directly from the meter. The Power Density (PD in W/m<sup>2</sup>) was calculated using the following formula:

$$PD = E^2 / 120\pi ,$$

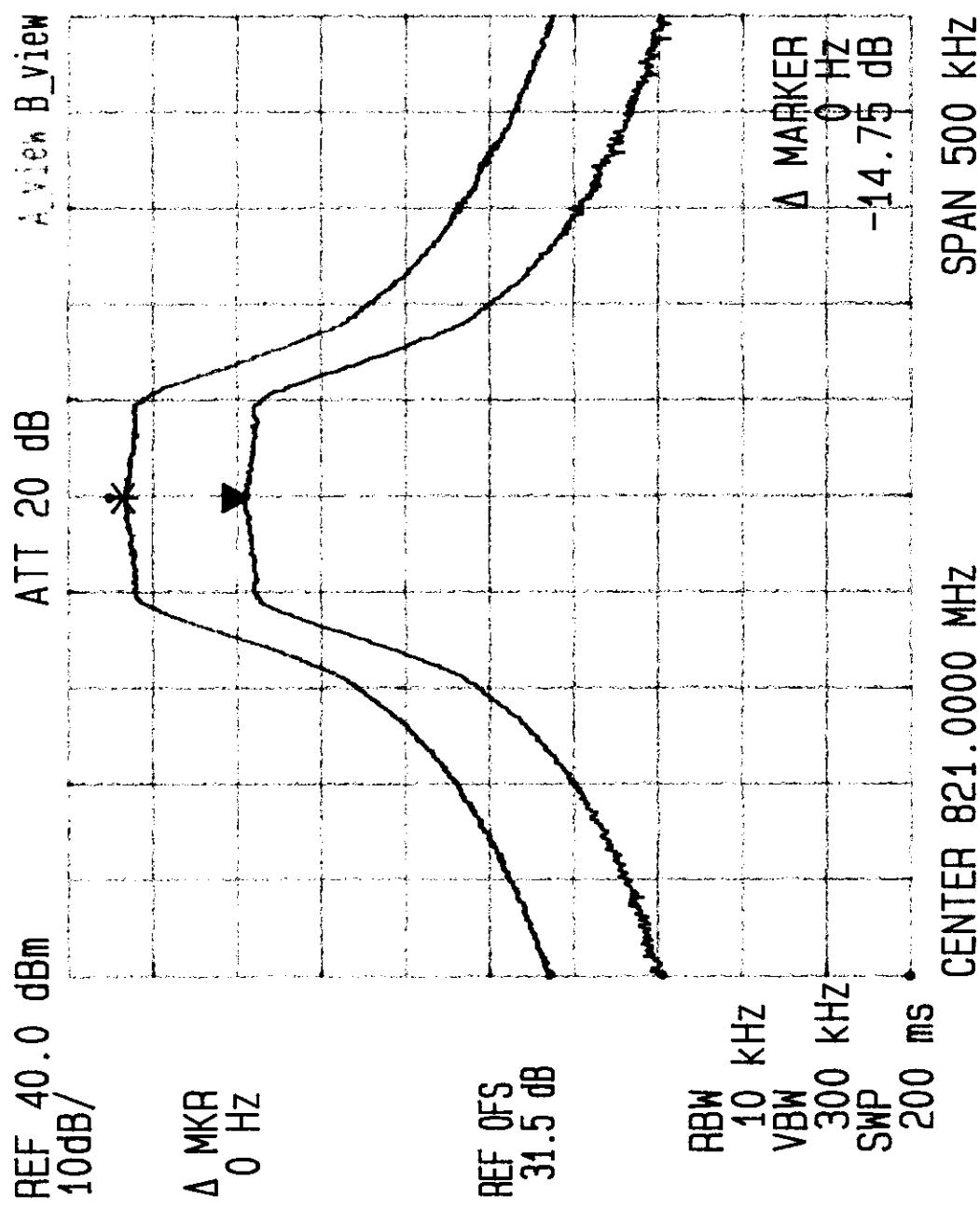
where E is Field Strength in V/m

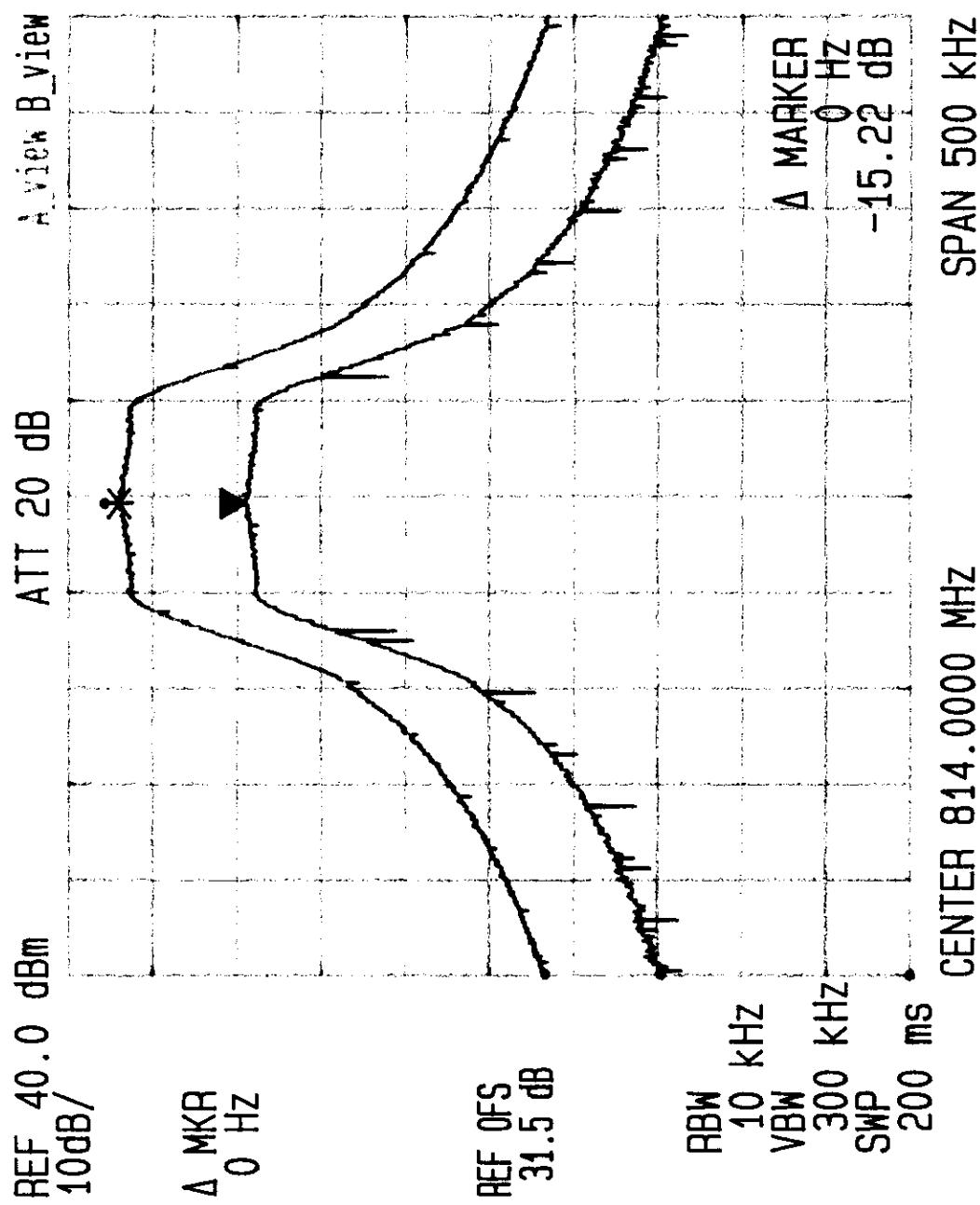
**5.6 Test Data**

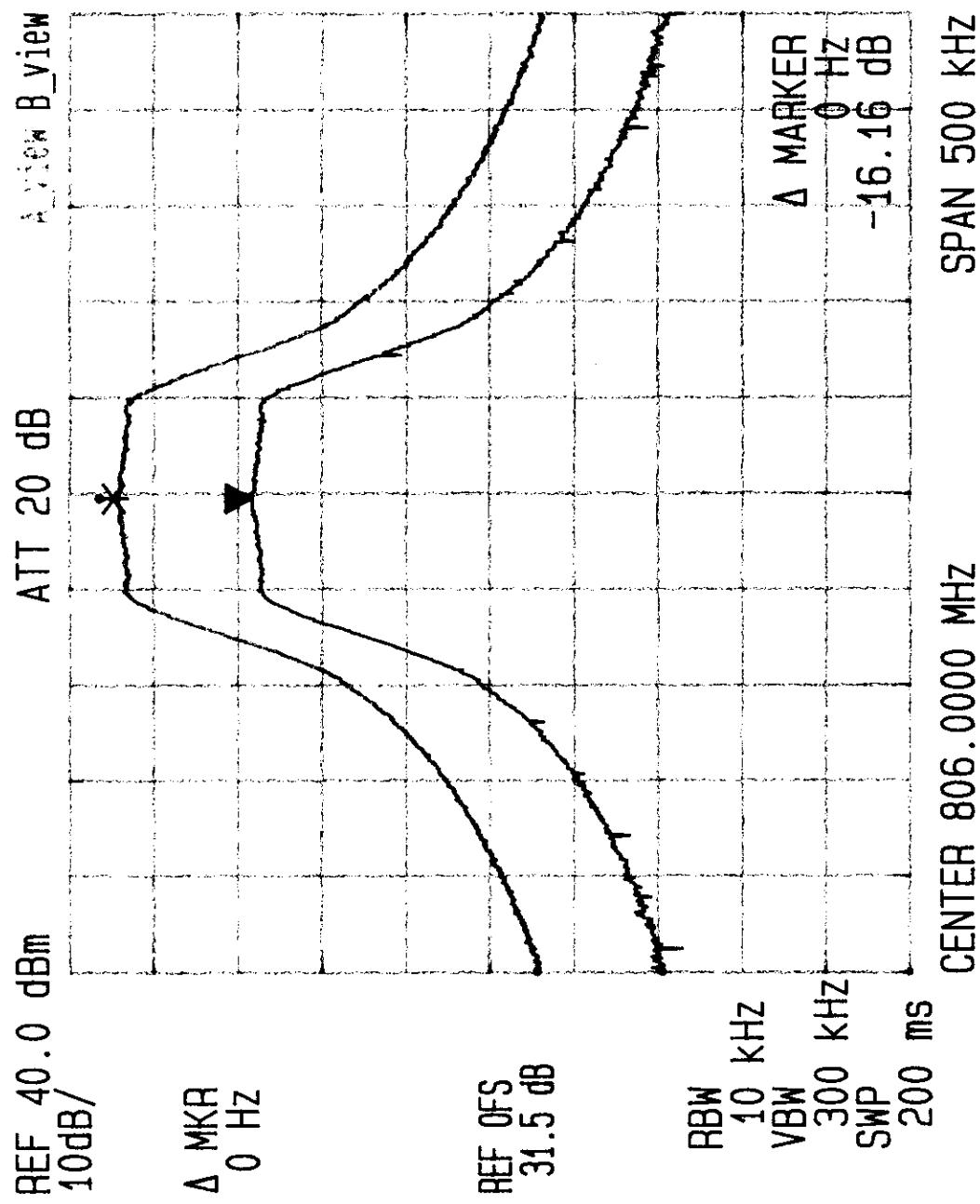
The results on the following page(s) were obtained when the device was tested in the condition described in section 4.

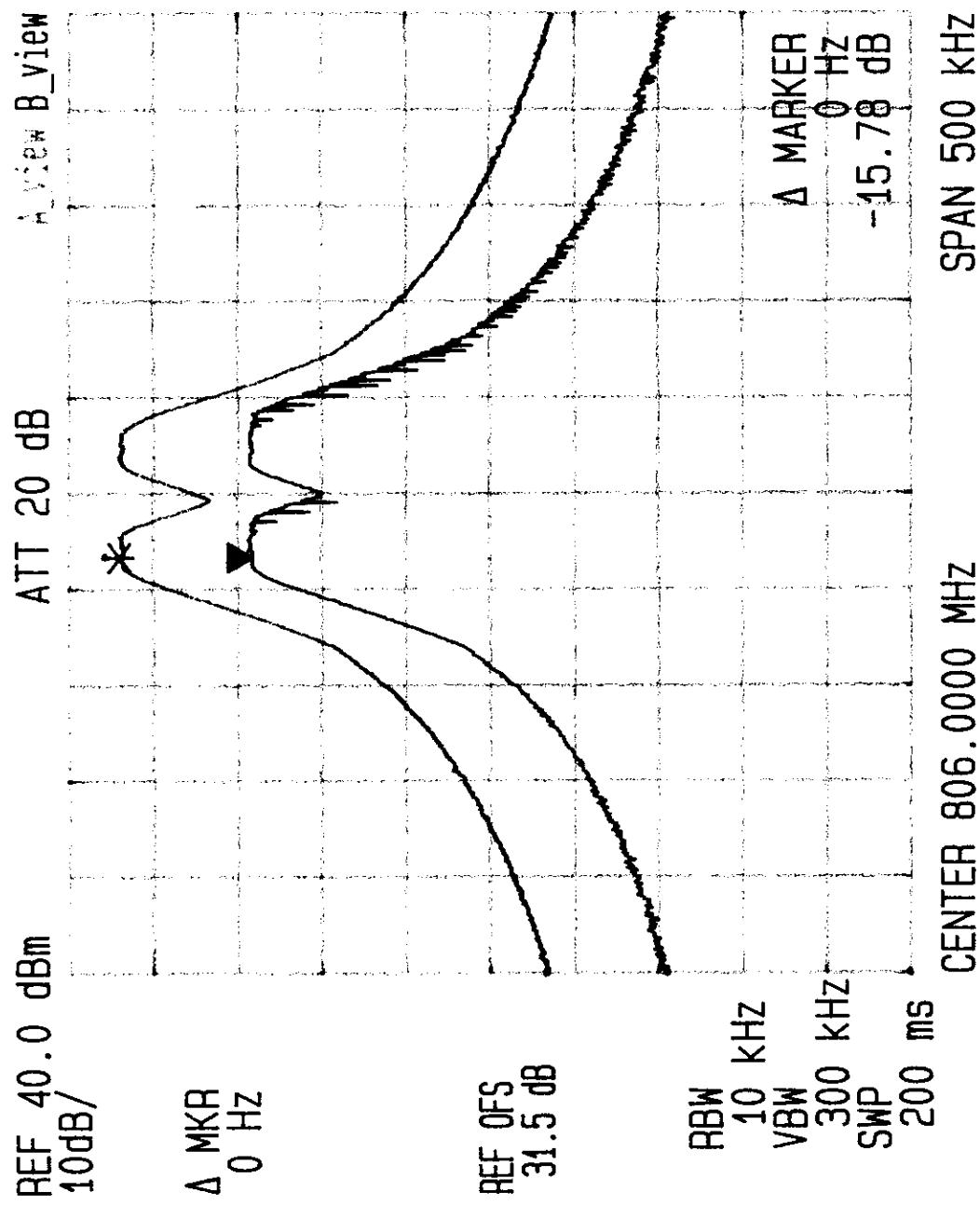
Test Distance, m	Maximum Field Strength Reading, V/m	Calculated Power Density, mW/cm <sup>2</sup>	FCC Limit for time-averaging interval of 30 min, mW/cm <sup>2</sup>
0.2	26.0	0.18	0.54
0.3	15.0	0.06	0.54

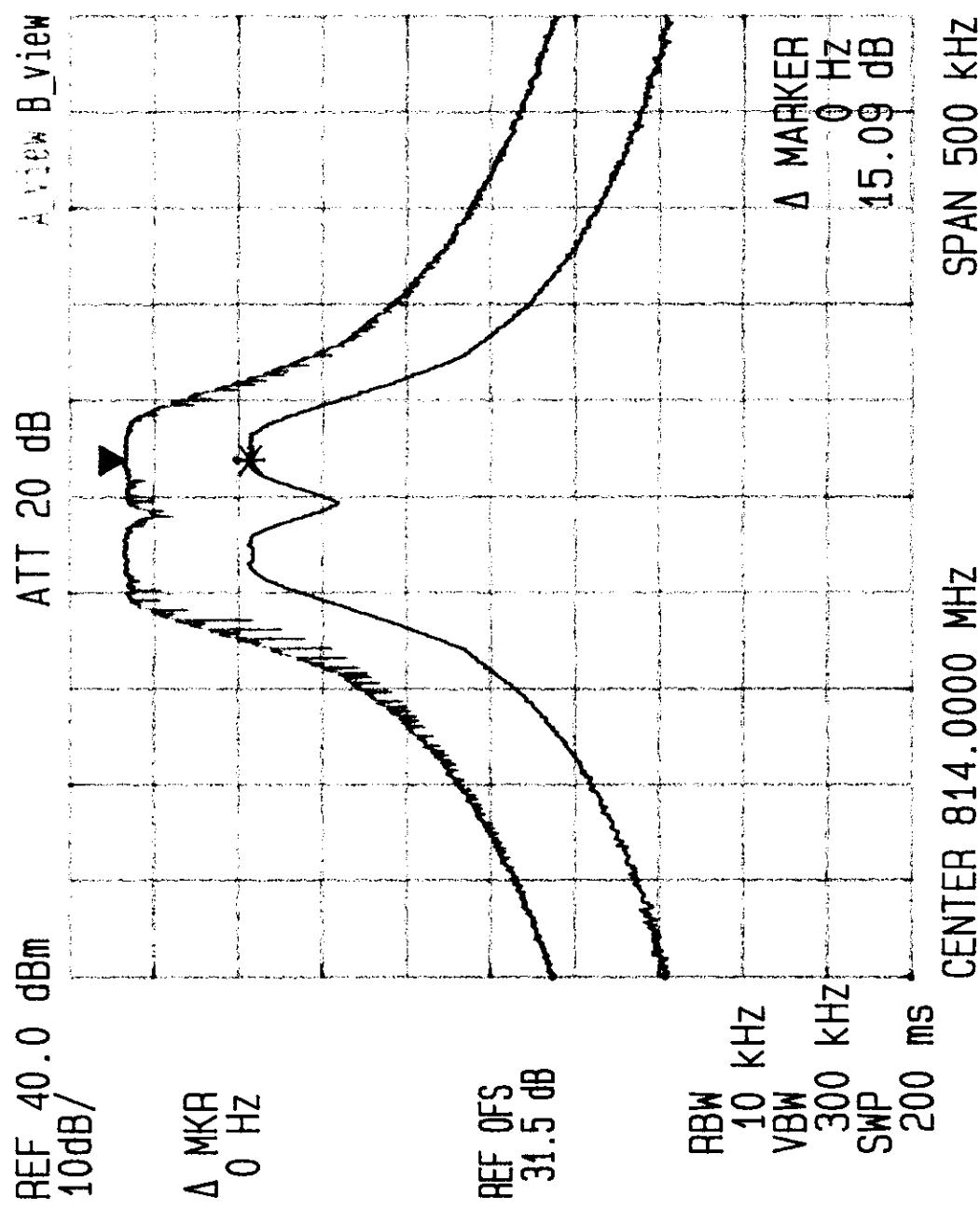
Judgement: Passed

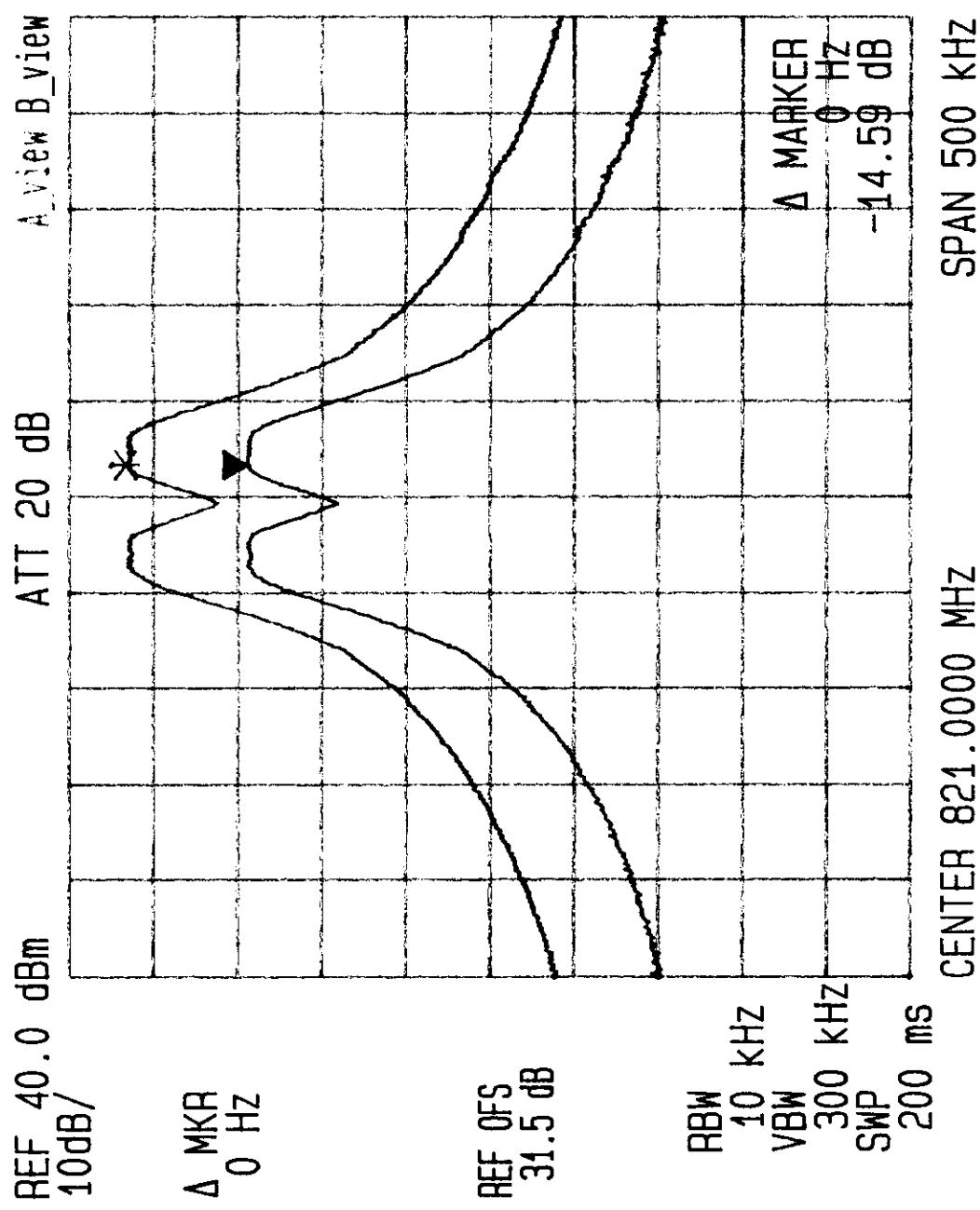












# REMOTEK

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Remotek Corporation, E-mail: remotek1@ms3.hinet.net  
15F-4, No. 77, Sec. 1, Hsin Tai Wu Road, Hsi-Chih, Taipei, Taiwan  
TEL: 886-2-2698-8258 FAX: 886-2-2698-8268

## Magnetic Car Antenna

### Specification

1. Antenna Type: Monopole Omni
2. Frequency range: 800 – 870 MHz
3. Gain: 0 dBi
4. VSWR: 2.0

此屬 iDEN Car Booster  
用小磁鐵天線規格。

## 4. MODULATION CHARACTERISTICS

### 4.1 Provisions Applicable

According to § 2.987 (a), for Voice Modulated Circuits, the response of the audio modulating circuit over a range of frequencies should be measured. And in accordance with § 2.987 (b), for equipment, there should be a curve or family of curves showing the percentage of voltage supplied to the modulating circuit.

According to § 90.210, transmitters operating in emission mask B or G. See the following descriptions.

#### **Emission Mask B.** For transmitters that are equipped

to § 90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows:

- 1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25dB
- 2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35dB.
- 3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

#### **Emission Mask G.** For transmitters that are not equipped with an audio low-pass filter pursuant to § 90.211(b), the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

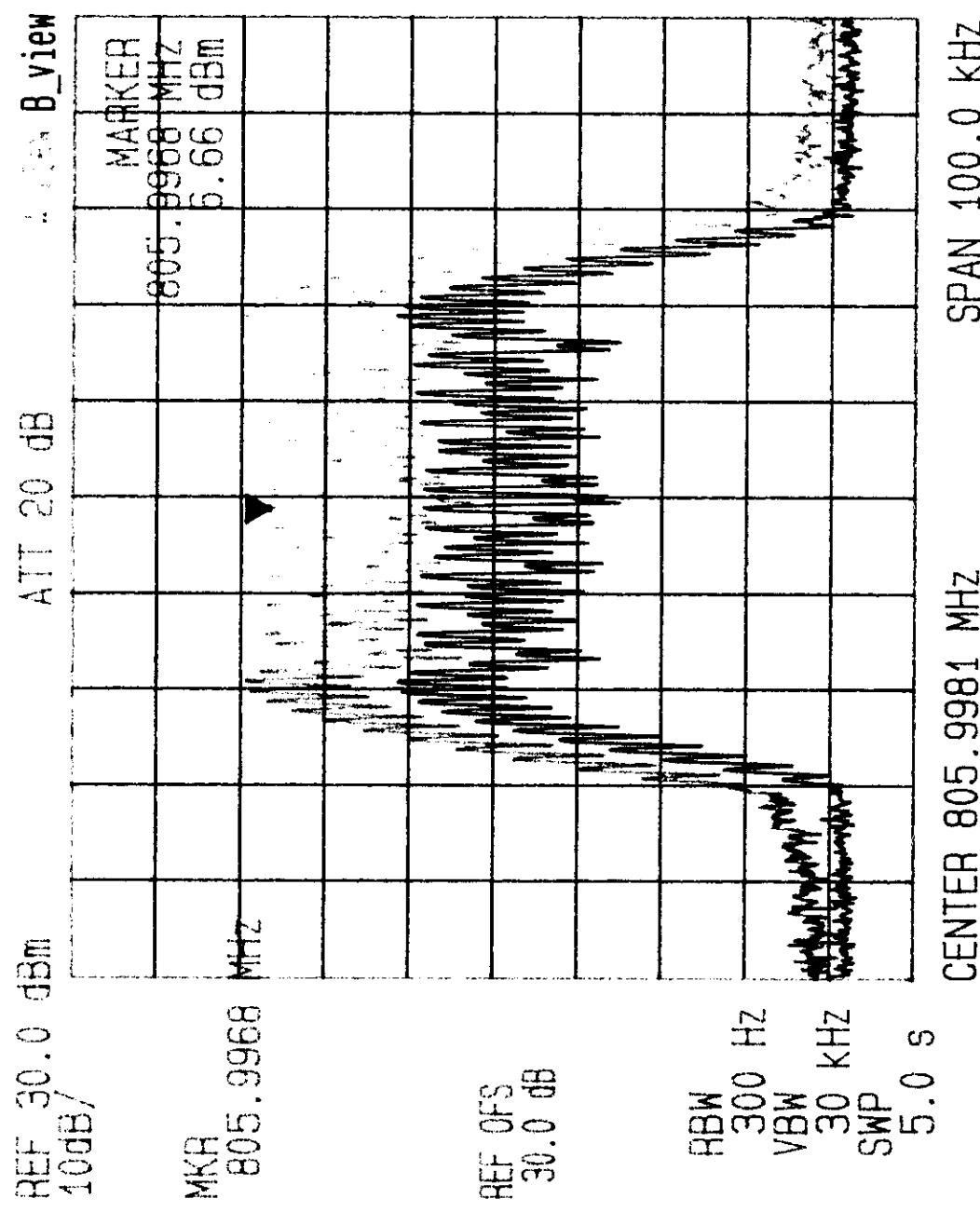
- 1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, but no more than 10 kHz: At least  $83 \log (f_d/5)$  dB;
- 2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log (f_d/6.1)$  dB, or  $50 + 10 \log (P)$  dB, or 70 dB, whichever is the lesser attenuation;
- 3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

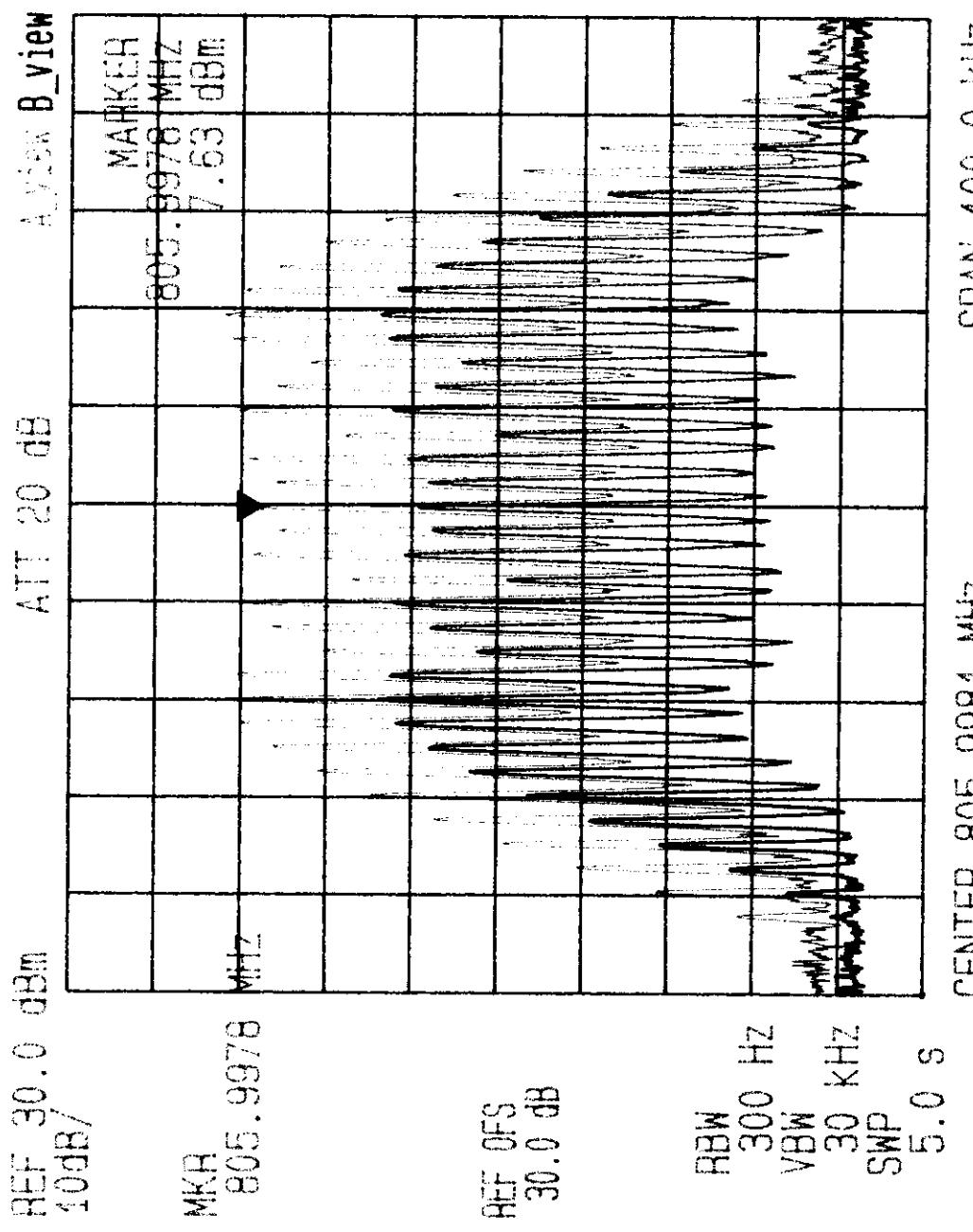
### 4.2 Result

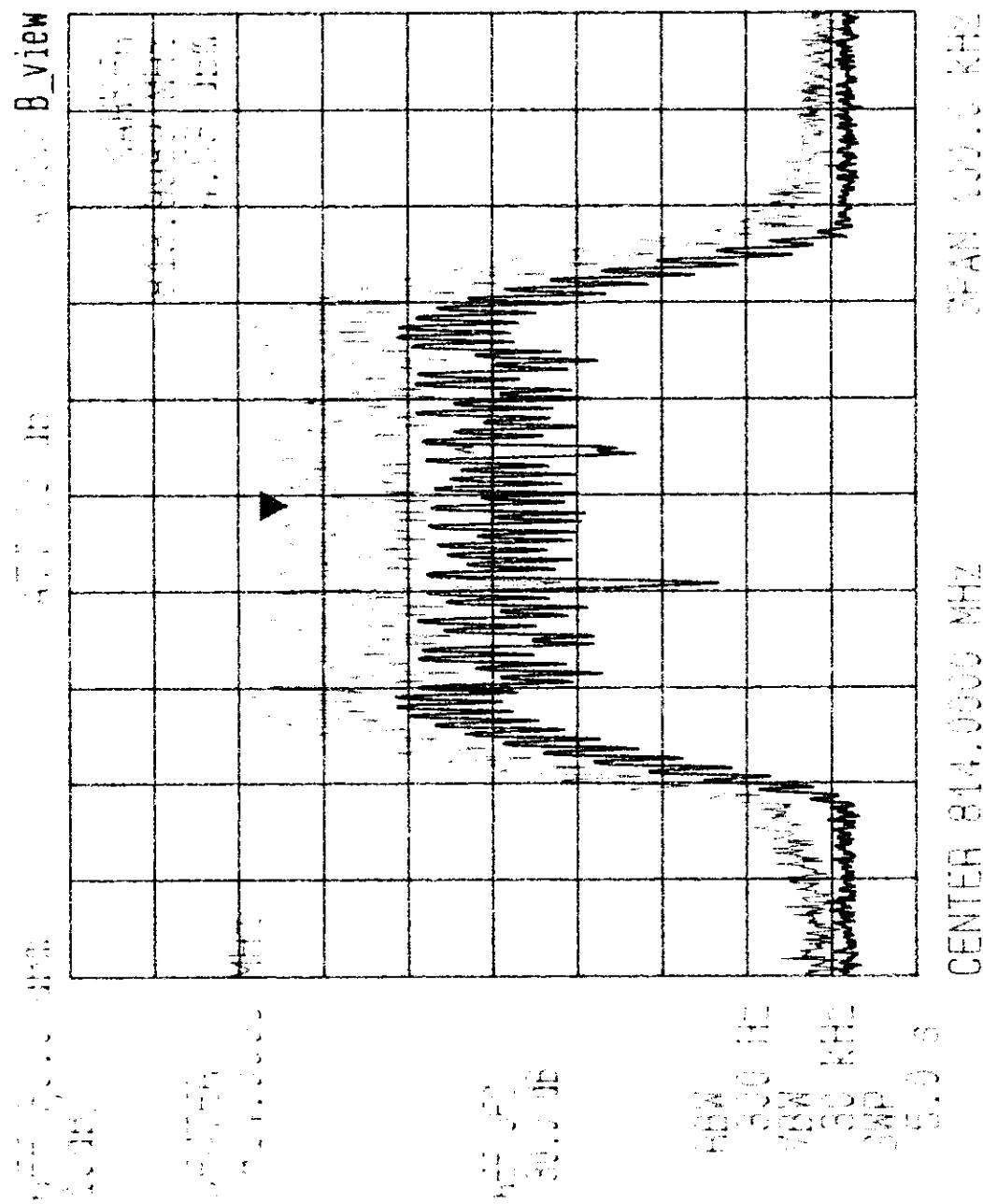
For this is just a booster, it can not generate any signals without connecting a IDEN phone, therefore measurement on modulation characteristics is impractical.

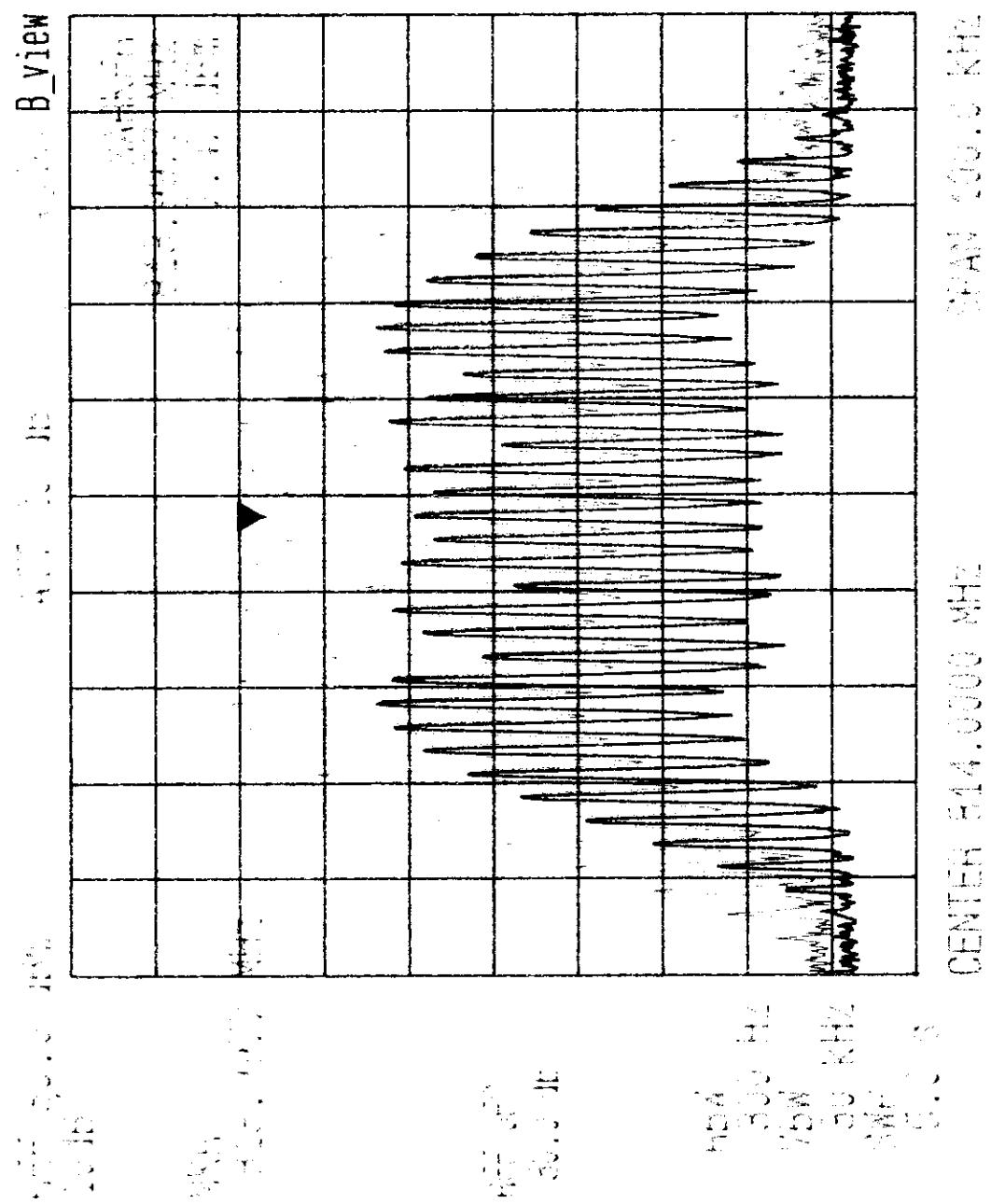
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**Exhibit C Measurement Report**



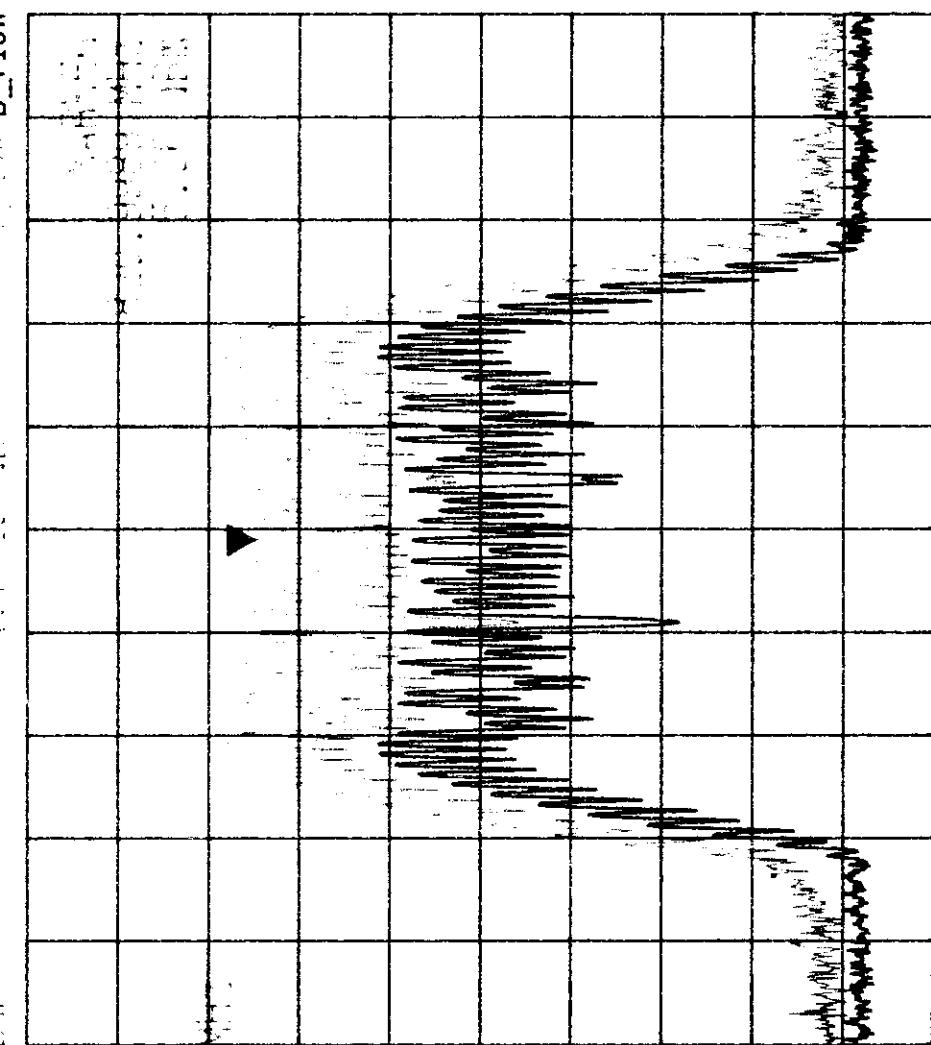






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### View



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