

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

***FCC Part 15 Subpart C***  
***EMI TEST REPORT***  
*of*

E.U.T. : Remote Control  
FCC ID. : I55RCU202R2SR  
MODEL : RCU202R-16  
Working Frequency : 315 MHz

*for*

APPLICANT : MERRY ELECTRONICS CO., LTD.  
ADDRESS : NO. 22, 23RD ROAD, TAICHUNG INDUSTRIAL  
PARK, TAICHUNG, TAIWAN, R.O.C.

Test Performed by

**ELECTRONICS TESTING CENTER, TAIWAN**  
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Report Number : ET88R-05-023-04

## TEST REPORT CERTIFICATION

Applicant : MERRY ELECTRONICS CO., LTD.  
NO. 22, 23RD ROAD, TAICHUNG INDUSTRIAL PARK,  
TAICHUNG, TAIWAN, R.O.C.

Manufacturer : MERRY ELECTRONICS (THAILAND) CO., LTD.  
221 MU 3 EXPORT PROCESSING ZONE 1 LEAM CHABANG  
INDUSTRIAL PARK EPZ. THUNGSUKLA, SIRACHA,  
CHONBURI, THAILAND 20230

Description of EUT :

a) Type of EUT : Remote Control  
b) Trade Name : MIDGARD  
c) Model No. : RCU202R-16  
d) FCC ID : I55RCU202R2SR  
e) Working Frequency : 315 MHz  
f) Power Supply : DC 12V Battery

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (1996)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded 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 : JUL. 08, 1999

Test Engineer : S. S. Liou  
( S. S. Liou )

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       | : Remote Control |
| b) Trade Name        | : MIDGARD        |
| c) Model No.         | : RCU202R-16     |
| d) FCC ID            | : I55RCU202R2SR  |
| e) Working Frequency | : 315 MHz        |
| f) Power Supply      | : DC 12V Battery |

### 1.2 Characteristics of Device:

This device is a manually operated remote controller. There are 3 buttons on this device. These buttons can control the control unit to set "ARM", "DISARM" and emergency call. The working frequency is 315 MHz

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4.

The Remote Control under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.

The receiving antenna polarized horizontally was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the Remote Control under test.

In order to determining the average value during one pulse train of the radiated power generated from the Remote Control under test, the encoded wave form in the time domain was used.

### 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, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsine, 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. DEFINITION AND LIMITS

### 2.1 Definition

Intentional radiator:

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

### 2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz               | MHz                   | MHz           | GHz         |
|-------------------|-----------------------|---------------|-------------|
| 0.090 - 0.110     | 16.42-16.423          | 399.9-410     | 4.5-5.25    |
| 0.495 - 0.505 **  | 16.69475 - 16.69525   | 608-614       | 5.35-5.46   |
| 2.1735 - 2.1905   | 16.80425 - 16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67            | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25            | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6               | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2             | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 108-121.94            | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138               | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05          | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475 - 156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9           | 2655-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17       | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2          | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285               | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4             | 3360-4400     | Above 38.6  |
| 13.36-13.41       |                       |               |             |

Remark "\*\*\*": Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

### 2.3 Limitation

#### (1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

| Frequency<br>( MHz ) | Emission<br>( $\mu$ V ) | Emission<br>( dB $\mu$ V ) |
|----------------------|-------------------------|----------------------------|
| 0.45 - 30.0          | 250                     | 48.0                       |

**(2) Radiated Emission Limits :**

According to 15.231 ,Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Frequency Band (MHz) | Field strength of Fundamental (uV/m) | Field strength of Spurious (uV/m) |
|----------------------|--------------------------------------|-----------------------------------|
| 40.66-40.70          | 2250                                 | 225                               |
| 70-130               | 1250                                 | 125                               |
| 130-174              | *1,250 to 3,750                      | *125 to 375                       |
| 174-260              | 3750                                 | 375                               |
| 260-470              | *3,750 to 12,500                     | *375 to 1250                      |
| Above 470            | 12500                                | 1250                              |

\* Linear interpolations.

According to 15.235, the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental |                                     |
|-----------------------------|-------------------------------|-------------------------------------|
|                             | $\mu\text{V}/\text{meter}$    | $\text{dB}\mu\text{V}/\text{meter}$ |
| 49.82 - 49.90               | 10000                         | 80                                  |

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209,as following table:

| Other Frequencies (MHz) | Field Strength of Fundamental |                                     |
|-------------------------|-------------------------------|-------------------------------------|
|                         | $\mu\text{V}/\text{meter}$    | $\text{dB}\mu\text{V}/\text{meter}$ |
| 30 - 88                 | 100                           | 40.0                                |
| 88 - 216                | 150                           | 43.5                                |
| 216 - 960               | 200                           | 46.0                                |
| Above 960               | 500                           | 54.0                                |

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

### **(3) Limit of transmission time**

- a) A manually operated transmitter shall employ a switch that will automatically deactivate the Remote Control within not more than 5 seconds of being released.
- b) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

## **2.4 Labeling Requirement**

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## **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. RADIATED EMISSION MEASUREMENT

#### 3.1 Applicable Standard

For periodic operation intentional radiator, the radiated emission shall comply with § 15.231(b).

#### 3.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. 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 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

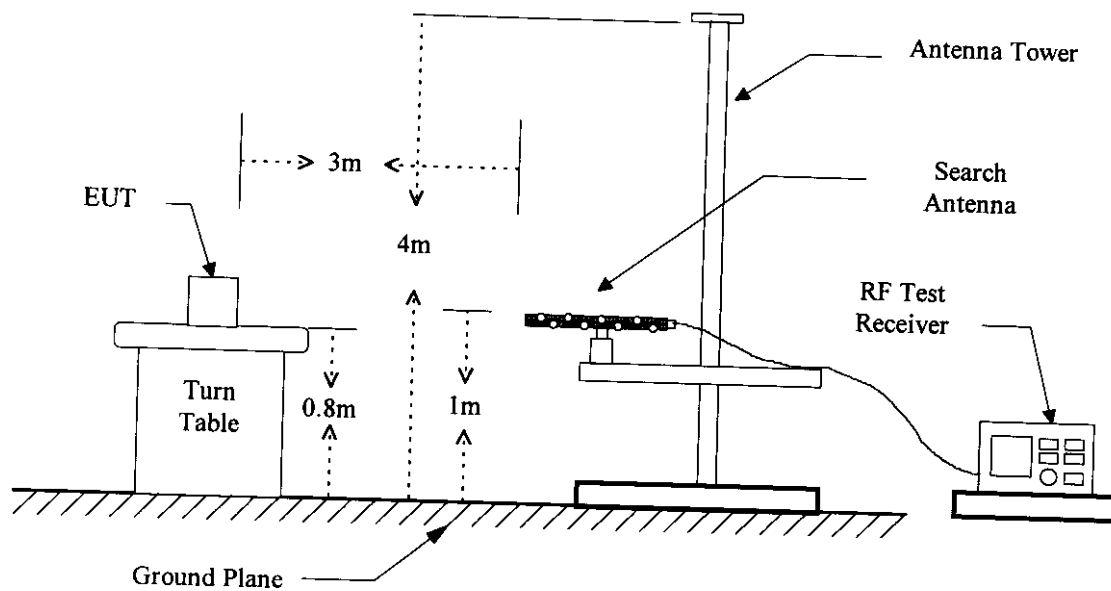
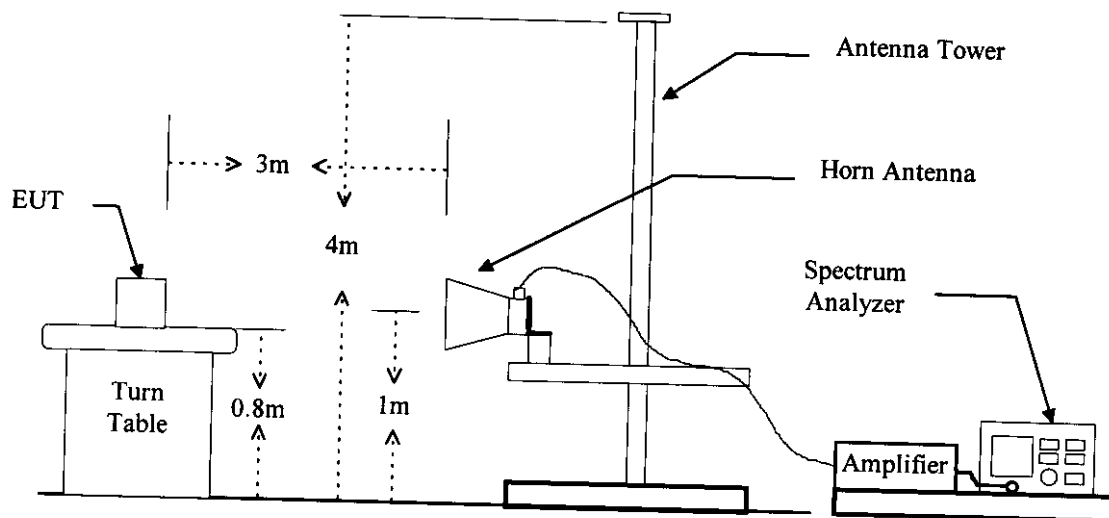


Figure 2 : Frequencies measured above 1 GHz configuration



**3.3 Test Data**

Temperature : 27 °C  
 Humidity : 65 %  
 Operated mode : Transmitting  
 Test Date : MAY 11, 1999

| Frequency<br>(MHz) | Ant<br>Pol<br>H/V | Reading<br>(dBuV)<br>Peak | Factor<br>(dB) |       | Result @3m<br>(dBuV/m) |      | Limit @3m<br>(dBuV/m) |      | Margin<br>(dB) | Table<br>Degree<br>(Deg.) | Ant.<br>High<br>(m) |
|--------------------|-------------------|---------------------------|----------------|-------|------------------------|------|-----------------------|------|----------------|---------------------------|---------------------|
|                    |                   |                           | C              | D     | Peak                   | Ave. | Peak                  | Ave. |                |                           |                     |
| 315.450            | H                 | 85.0                      | -6.8           | -12.7 | 78.2                   | 65.5 | 95.7                  | 75.7 | -10.2          | 180                       | 1.80                |
| 630.543            | H                 | 66.2                      | -3.2           | -12.7 | 63.0                   | 50.3 | 75.7                  | 55.7 | -5.4           | 180                       | 1.80                |
| 945.950            | H                 | 60.2                      | 3.2            | -12.7 | 63.4                   | 50.7 | 75.7                  | 55.7 | -5.0           | 180                       | 2.00                |
| 1261.825           | H                 | 45.2                      | -8.5           | -12.7 | 36.7                   | 24.0 | 75.7                  | 55.7 | -31.7          | 180                       | 1.80                |
| *1577.220          | V                 | 45.6                      | -7.1           | -12.7 | 38.5                   | 25.8 | 74.0                  | 54.0 | -28.2          | 180                       | 1.00                |
| 1892.620           | V                 | 37.2                      | -5.2           | -12.7 | 32.0                   | 19.3 | 75.7                  | 55.7 | -36.4          | 180                       | 1.20                |
| *2208.150          | H/V               | ---                       | -3.8           | -12.7 | ---                    | ---  | 74.0                  | 54.0 | ---            | ---                       | ---                 |
| 2523.600           | H/V               | ---                       | -2.6           | -12.7 | ---                    | ---  | 75.7                  | 55.7 | ---            | ---                       | ---                 |
| *2839.050          | H/V               | ---                       | -1.7           | -12.7 | ---                    | ---  | 74.0                  | 54.0 | ---            | ---                       | ---                 |
| 3154.500           | H/V               | ---                       | -0.8           | -12.7 | ---                    | ---  | 75.7                  | 55.7 | ---            | ---                       | ---                 |

**Note :**

1. Factor C means "corrected", and that includes antenna factor, cable loss, amplifier gain (if any). And Factor D means "Duty", that is for calculating the average value and derived from section 3.6 in this test report.
2. Peak Result = Reading + C. Factor  
Ave. Result = Peak Result + D Factor
3. "\*" means the frequency fall in the restricted frequency band, and the limit of emission is referred to FCC class B
4. The limit for spurious emissions refers to FCC § 15.231.

If the measured frequencies fall in the restricted frequency band, the limit employed is § 15.209 general requirement when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function, no duty factor applied.

### 3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

And the average value is

$$\text{Average} = \text{Peak Value} + \text{Duty Factor}$$

*Note : If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.*

### 3.5 Activate Time

This Remote Control is operated by Manual, and Activate Time is less than 5 second after being released.

### 3.6 Calculation of Duty Factor

The duty factor is calculated with following formula :

$$20\log \frac{\text{Total Duty}}{\text{Period of Pulse Train}}$$

*Note : Please see appendix 1 for Plotted Data*

**3.7 Radiated Test Equipment**

| Equipment            | Manufacturer    | Model No. | Next Cal. Date |
|----------------------|-----------------|-----------|----------------|
| Spectrum Analyzer    | Hewlett-Packard | 8568B     | 12/02/1999     |
| Pre-selector         | Hewlett-Packard | 85685A    | 12/07/1999     |
| Quasi Peak Detector  | Hewlett-Packard | 85650A    | 12/02/1999     |
| Spectrum Analyzer    | Hewlett-Packard | 8564C     | 01/24/2000     |
| RF Test Receiver     | Rohde & Schwarz | ESVS 30   | 01/10/2000     |
| Horn Antenna         | EMCO            | 3115      | 08/22/1999     |
| Log periodic Antenna | EMCO            | 3146      | 09/15/1999     |
| Biconical Antenna    | EMCO            | 3110      | 09/15/1999     |
| Preamplifier         | Hewlett-Packard | 8449B     | 06/17/2000     |
| Preamplifier         | Hewlett-Packard | 8447D     | 11/30/1999     |

**3.8 Measuring Instrument Setup**

Explanation of measuring instrument setup in frequency band measured is as following :

| Frequency Band (MHz) | Instrument        | Function   | Resolution bandwidth | Video Bandwidth |
|----------------------|-------------------|------------|----------------------|-----------------|
| 30 to 1000           | RF Test Receiver  | Quasi Peak | 120 kHz              | N/A             |
|                      | Spectrum Analyzer | Peak       | 100 kHz              | 100 kHz         |
| Above 1000           | Spectrum Analyzer | Peak       | 1 MHz                | 1 MHz           |

## 4. BANDWIDTH OF EMISSION

### 4.1 Applicable Standard

Per FCC rule § 15.231(c), the permitted emission bandwidth is no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

### 4.2 Bandwidth Test Equipment

| Equipment         | Manufacturer    | Model No. | Next Cal. Date |
|-------------------|-----------------|-----------|----------------|
| Spectrum Analyzer | Rohde & Schwarz | ESBI      | 09/15/1999     |
| Plotter           | Hewlett-Packard | 7550A     | N/A            |
|                   |                 |           |                |

### 4.3 Plot Graphic of Bandwidth

The emission bandwidth limit for this transmitter is

$$315.450 \text{ MHz} \times 0.25\% = 788.625 \text{ KHz}$$

***Note : Please see appendix 2 for Plotted Data***

## **5. CONDUCTED EMISSION MEASUREMENT**

### **5.1 Standard Applicable**

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to § 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

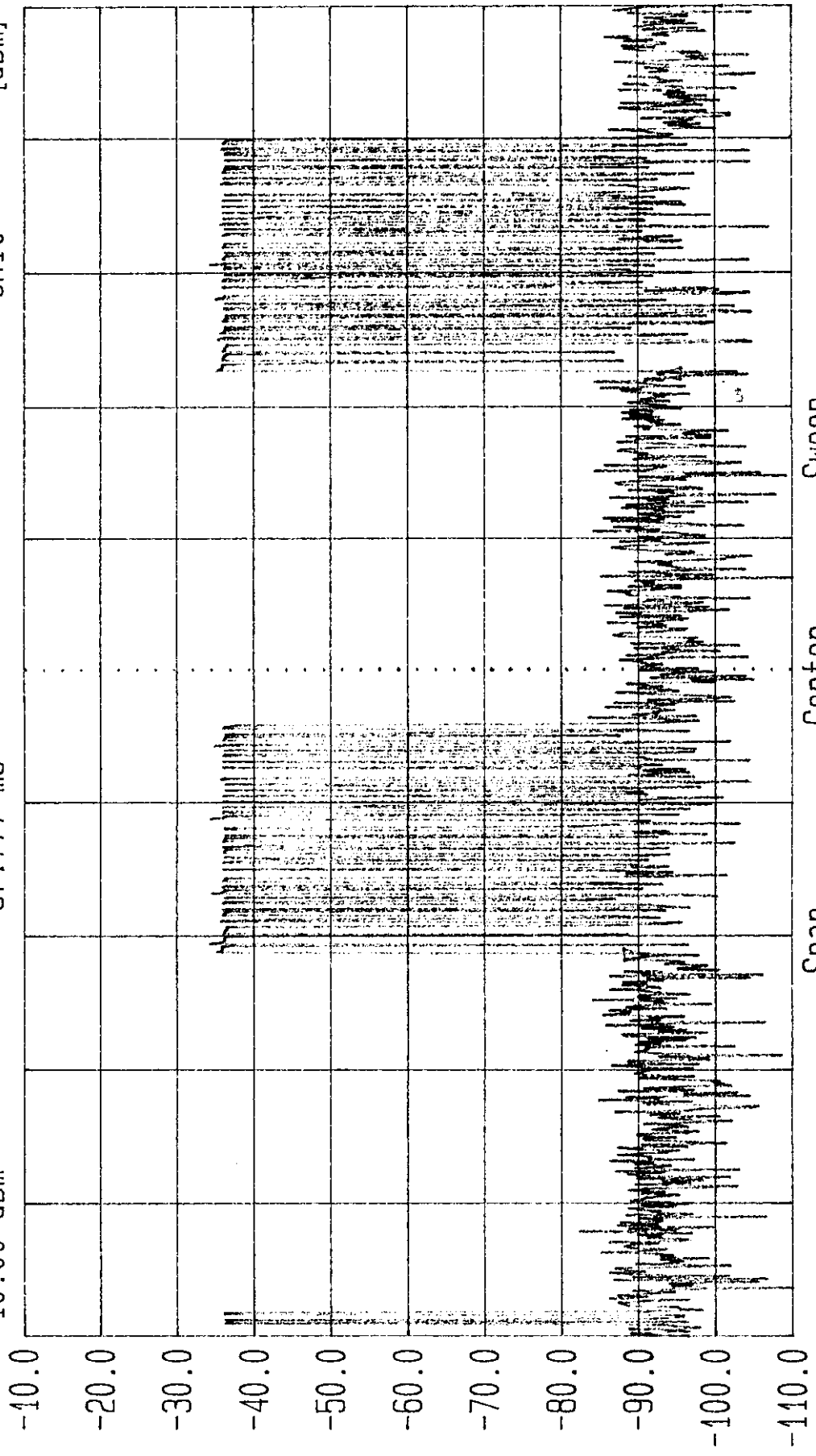
## APPENDIX 1 : PLOTTED DATA FOR DUTY FACTOR

$$20\log \frac{(1.288ms \times 3) + (711.111\mu s \times 12) + (400.000\mu s \times 20)}{87.777ms} = -12.7 \text{ dB}$$



Date 21 Jun. '99 Time 11:32:20  
Ref.Lvl Delta  
-10.00 dBm -1.44 dB  
87.777 ms

Res.Bw 30.0 kHz [3dB]  
TG.Lvl off  
CF.Stp 3.000 kHz  
Vid.Bw 100 kHz  
RF.Att 20 dB  
Unit [dBm]

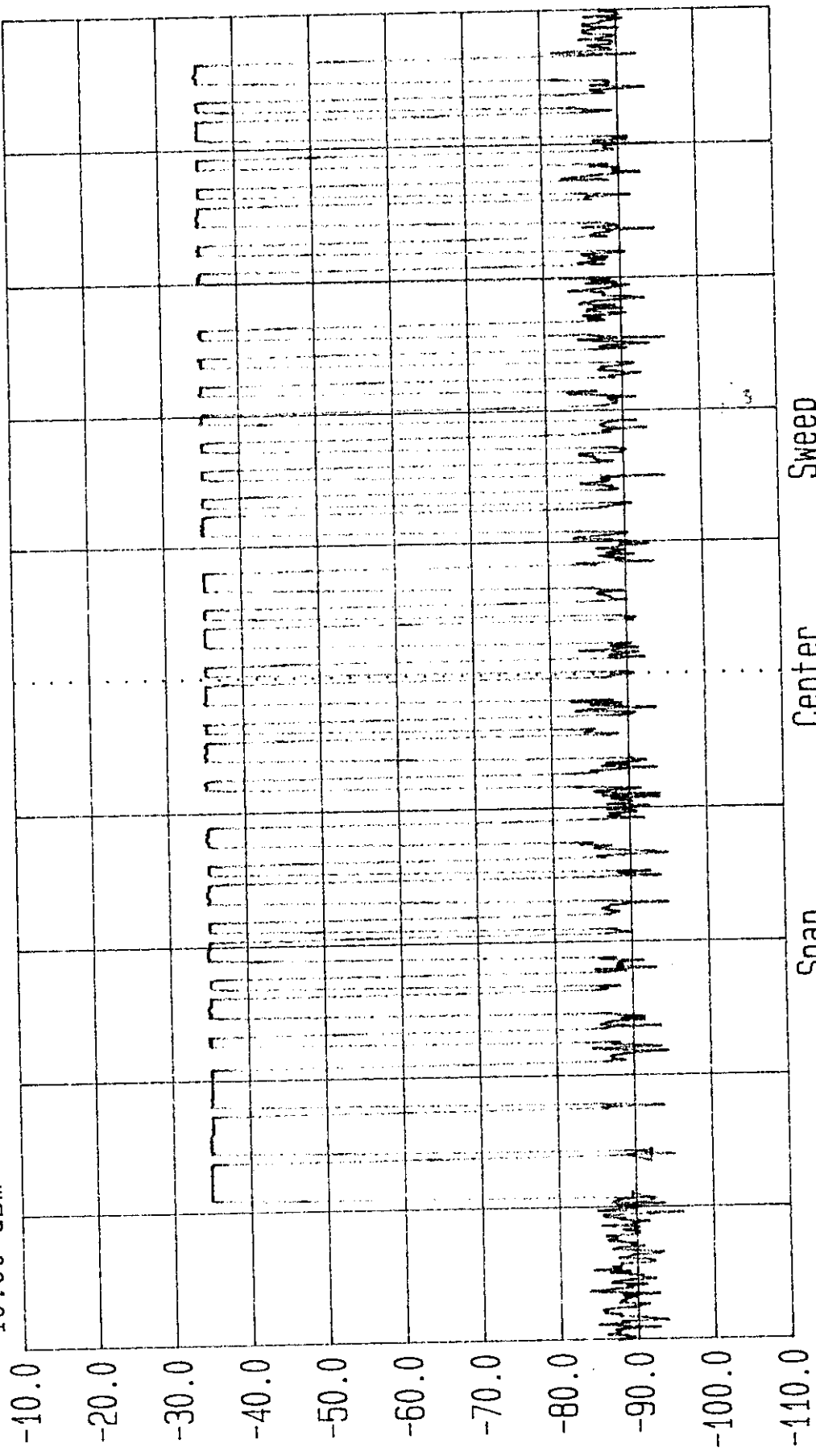


Span 0 Hz  
Center 315.444721 MHz  
Sweep 200 ms



Date 24 Jun. '99 Time 12:06:18  
Ref.Lvl Delta 3.40 dB  
-10.00 dBm 1.288 ms

Res.Bw 30.0 kHz [3dB]  
TG.Lvl Off  
CF.Stp 3.000 kHz  
Vid.Bw 100 kHz  
RF.Att 20 dB  
Unit [dBm]



Span 0 Hz  
Center 315.444721 MHz  
Sweep 40 ms



Date 21.Jun.'99 Time 12:14:54

Ref.Lvl Delta

-10.00 dBm

1.47 dB

711.111  $\mu$ s

Res.Bw

TG.Lvl

CF.Stp

30.0 kHz [3dB]

off

3.000 kHz

Vid.Bw

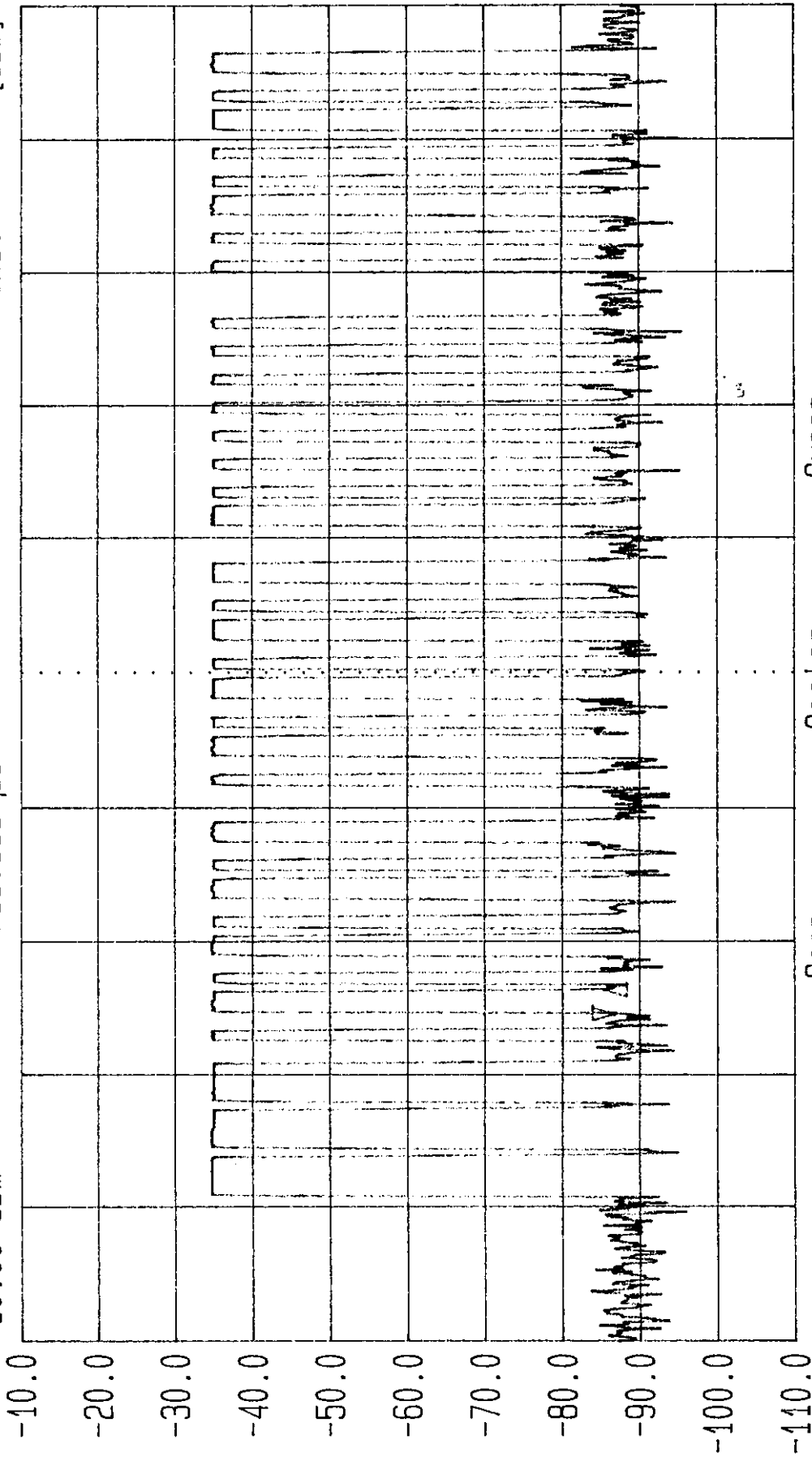
RF.Att

Unit

100 kHz

20 dB

[dBm]



Span  
0 Hz

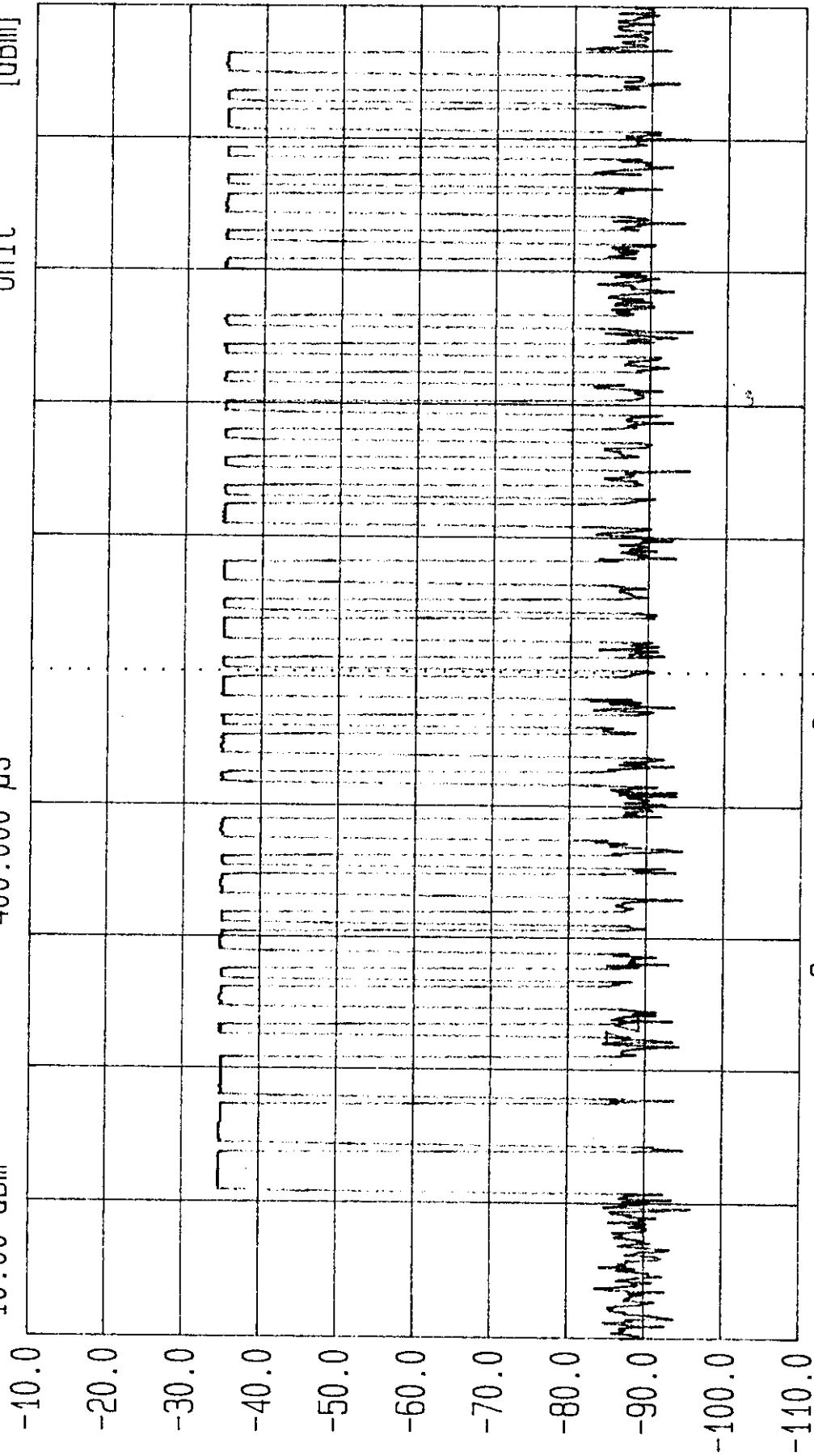
Center  
315.444721 MHz

Sweep  
40 ms



Date 21.Jun.'99 Time 12:10:33  
Ref.Lvl Delta 1.93 dB  
-10.00 dBm 400.000  $\mu$ s

Res.Bw 30.0 kHz [3dB]  
TG.Lvl Off  
CF.Stp 3.000 kHz  
Vid.Bw 100 kHz  
RF.Att 20 dB  
Unit [dBm]



Span 0 Hz  
Center 315.444721 MHz  
Sweep 40 ms

## **APPENDIX 2 : PLOTTED DATA FOR BANDWIDTH**

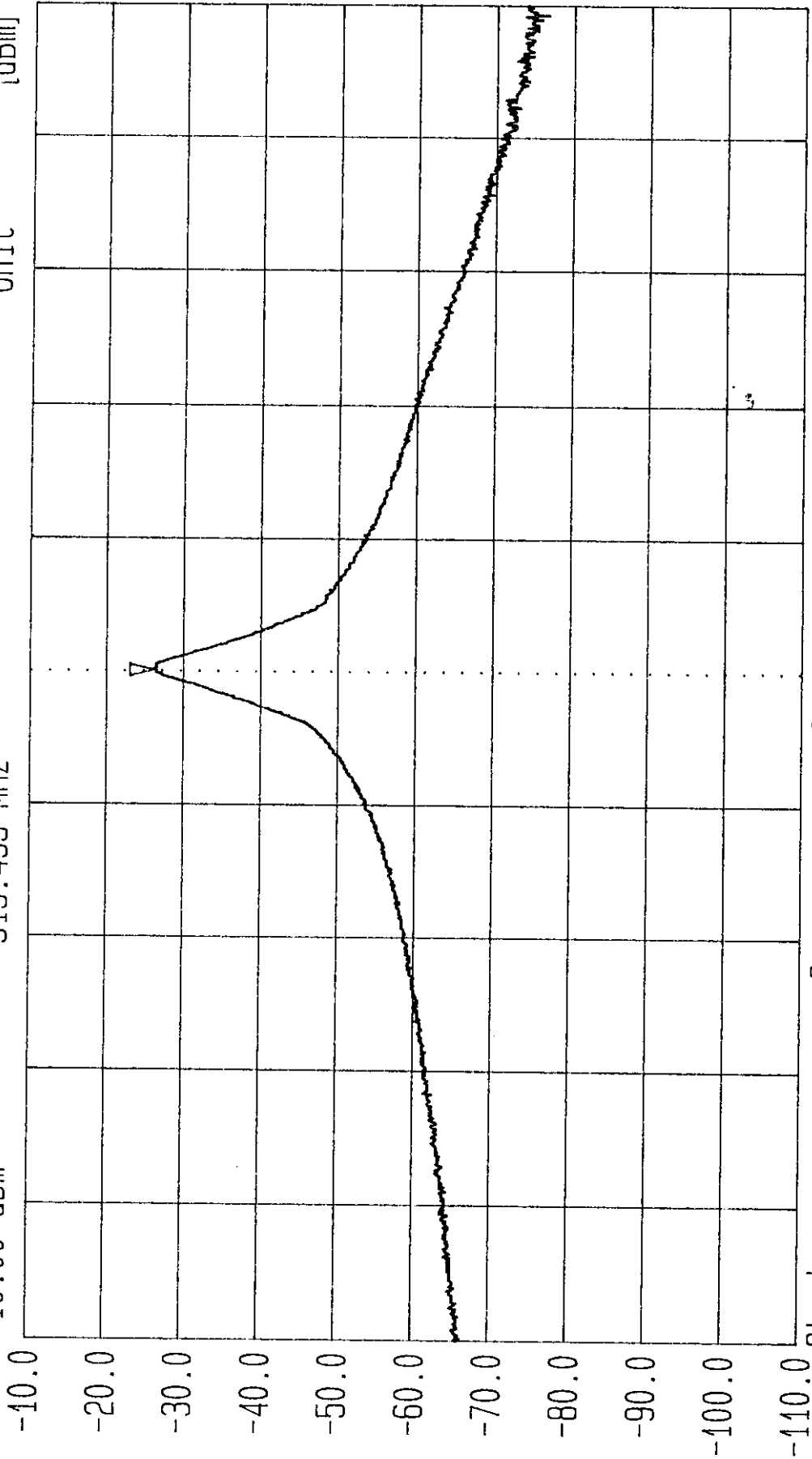
$$\text{Bandwidth Limit} = 315.450 \text{ MHz} \times 0.25\% = 788.625 \text{ KHz}$$

$$\text{Bandwidth} = 173.3 \text{ KHz} < 788.625 \text{ KHz}$$



Date 21. Jun. '99 Time 11:06:07  
Ref.Lvl -10.00 dBm  
Marker -26.07 dBm  
315.435 MHz

Res.Bw 30.0 kHz [3dB]  
TG.Lvl off  
CF.Stp 200.000 kHz  
Vid.Bw 100 kHz  
RF.Att 20 dB  
Unit [dBm]



Start 314.43111 MHz  
Center 315.43111 MHz  
Stop 316.43111 MHz  
Span 2 MHz  
Sweep 200 ms



Date 21 Jun '99 Time 11:23:03  
Ref.Lvl Delta 0.15 dB  
-10.00 dBm 173.3 kHz

Res.Bw 30.0 kHz [3dB]  
TG.Lvl off  
CF.Stp 200.000 kHz  
Vid.Bw 100 kHz  
RF.Att 20 dB  
Unit [dBm]



|               |               |        |               |
|---------------|---------------|--------|---------------|
| Start         | Center        | Sweep  | Stop          |
| 314.43111 MHz | 315.43111 MHz | 200 ms | 316.43111 MHz |
| Span          |               |        |               |
| 2 MHz         |               |        |               |