

MEASUREMENT AND TECHNICAL REPORT

ORTEL CORPORATION
2015 West Chestnut Street
Alhambra, CA 91803

DATE: 14 April 1998

This Report Concerns:	Original Grant:	Class II Change: X
Equipment Type:	Mirror Cell PCS Repeater, Model CSR-1902-2 (C-band)	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes:	No: X
	Defer until:	
Company Name agrees to notify the Commission by:	N/A	
of the intended date of announcement of the product so that the grant can be issued on that date.		
Transition Rules Request per 15.37?	Yes:	*No:
<i>(*) FCC Part 2, Paragraphs 2.985, 2.989, 2.991 and 2.993; and Part 24, Paragraph 24.238</i>		
Report Prepared by:	TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 619 546 3999 Fax: 619 546 0364	

TABLE OF CONTENTS

	Pages
1 GENERAL INFORMATION	<u>3</u>
1.1 Product Description	<u>3</u>
1.2 Test Methodology	<u>4</u>
1.3 Test Facility	<u>4</u>
2 CONDUCTED EMISSION DATA (B-band) (Tested by ORTEL)	<u>5</u>
3 RADIATED EMISSION DATA	<u>82</u>

1 GENERAL INFORMATION

1.1 Product Description

Mirror Cell PCS Repeater, Model CSR-1902-2

1.2 Test Methodology

Purpose of Test: To demonstrate compliance with the ANSI C63.4 setup.

Test Performed:

- x 1. Conducted Emissions, FCC Part 2, Paragraphs 2.985, 2,989, 2.991 & Part 24, Paragraph 24.238
- x 2. Radiated Emissions, EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
- x 3. Radiated Emission per FCC Part 2, Paragraph 2.993, 1 - 20 GHz
- 4. Engineering evaluations

1.3 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV PRODUCT SERVICE
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 619 546 3999
Fax: 619 546 0364

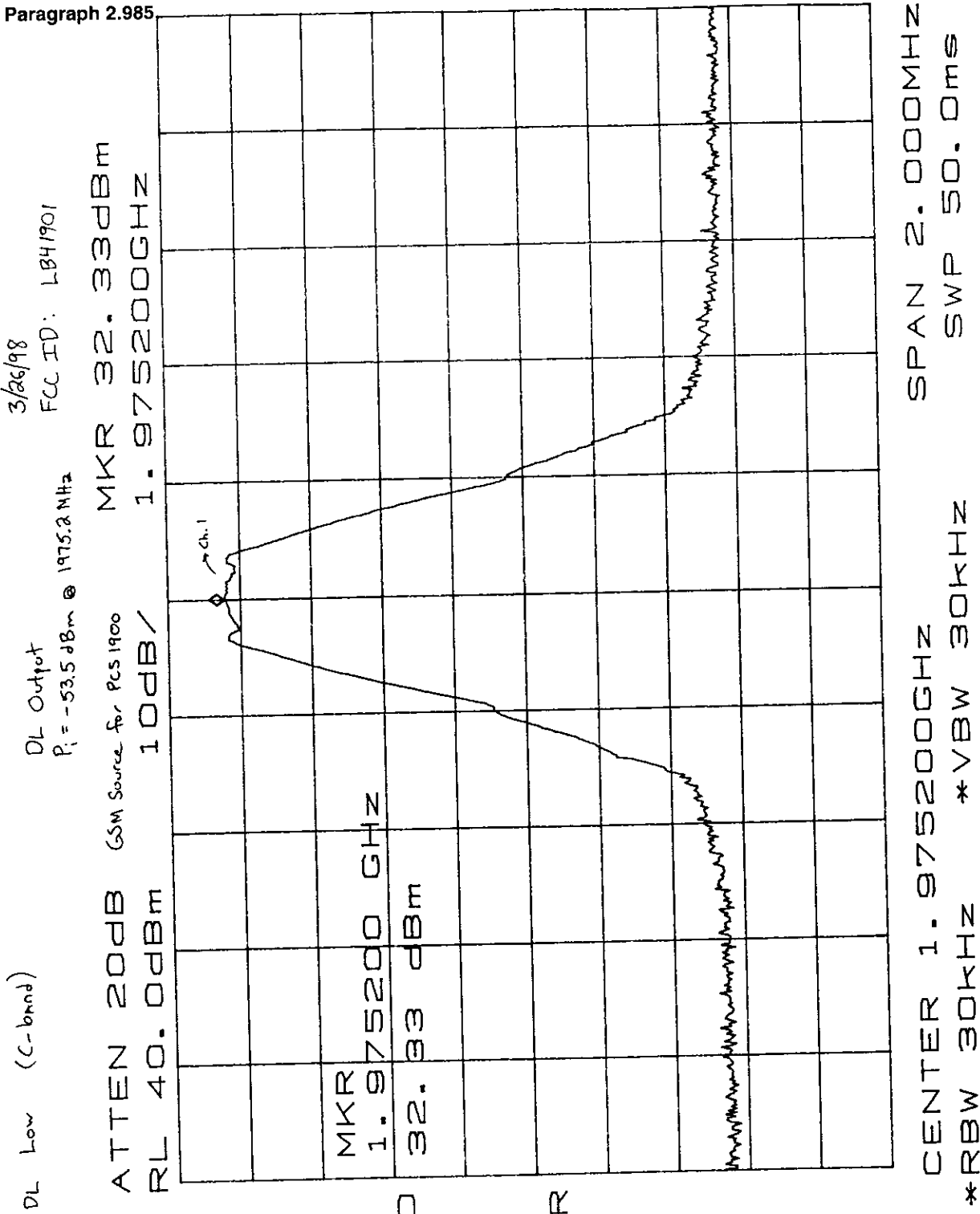
The Test Site Data and performance comply with ANSI 63.4 and are registered with the FCC, 7435 Oakland Mills Rd, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2 CONDUCTED EMISSION DATA

ORTEL CORPORATION
Mirror Cell PCS Repeater, Model CSR-1902-2 (C-band)

See following page(s).

Part 2, Paragraph 2.985



2.985

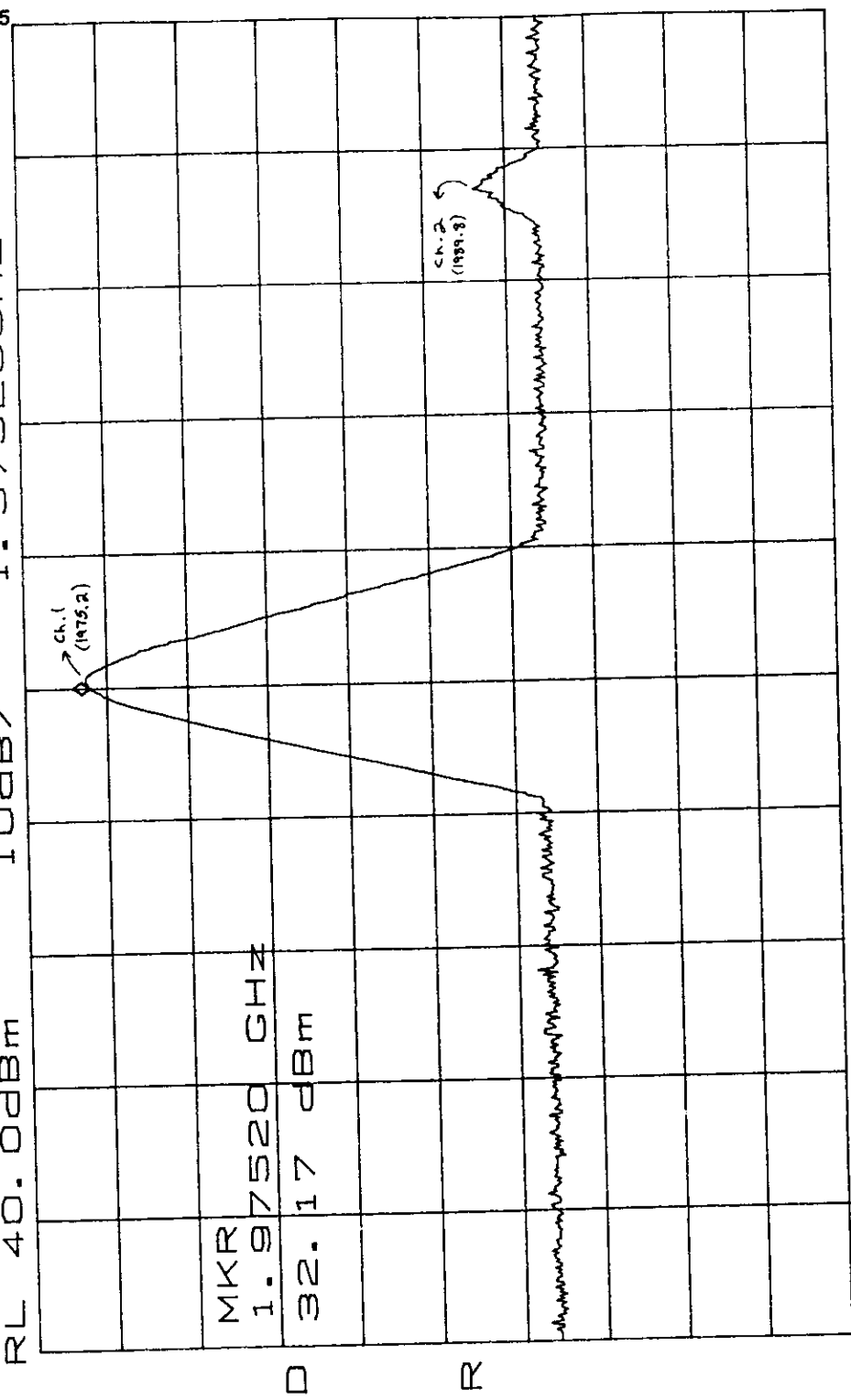
Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

DL Output
P_i = -53.5 dBm @ 1975.2 MHz

DL Low (C-band)
ATTEN 20dB (GSM noise for PCS 1900) MKR 32.17 dBm
RL 40.0 dBm 10dB/ 1.97520 GHz



CENTER 1.97520 GHz SPAN 40.00 MHz
*RBW 1.0 MHz *VBW 1.0 MHz SWP 50.00 MHz

2.985

Tested by ORTEL CORPORATION.

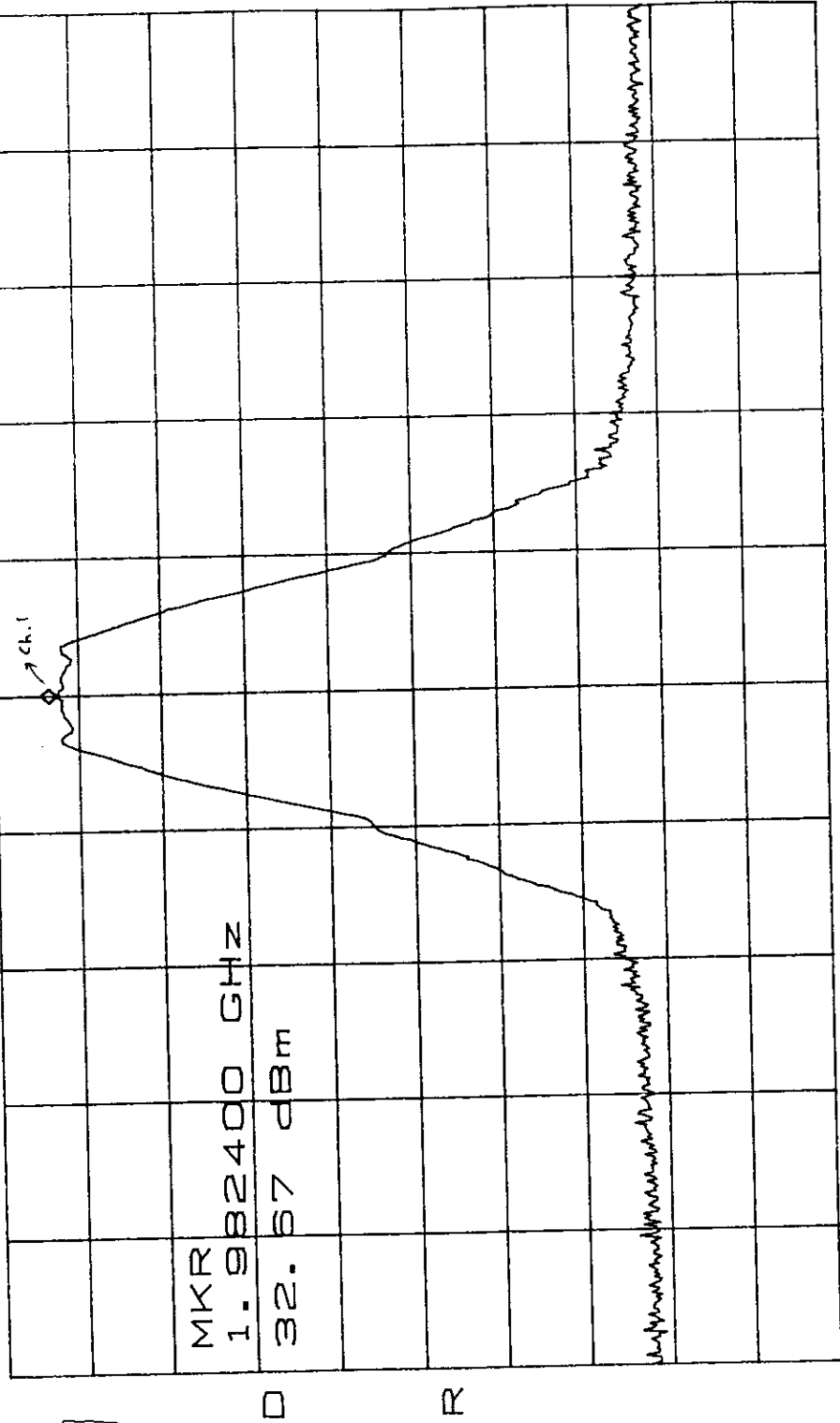
Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

DL Output
P_i = -53.0 dBm @ 1982.4 MHz

ATTEEN 20dB GSM source for PCS 1900 MKR 32.67 dBm
RL 40.0 dBm 10dB/ 1.982400GHZ

DL Mid (C-band)



CENTER 1.982400GHZ SPAN 2.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

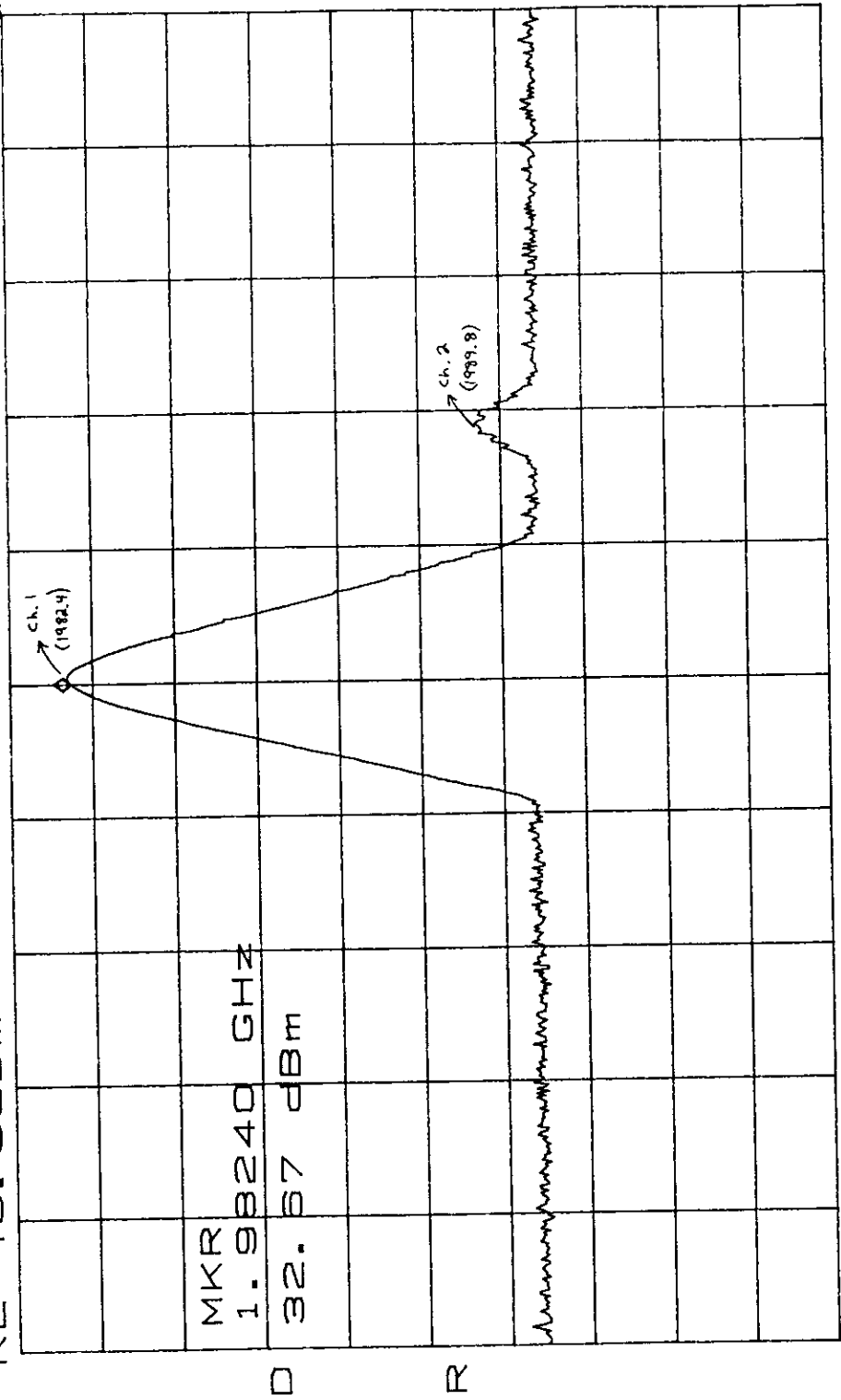
Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

DL Output
P₁ = -53.0 dBm @ 1982.4 MHz

ATLEN 20dB GSM source for PCS 1900 MKR 32.67 dBm
RL 40.0 dBm 10dB/ 1.98240 GHz



CENTER 1.98240 GHz SPAN 40.00 MHz
*RBW 1.0 MHz *VBW 1.0 MHz SWP 50.0 MHz

2.985

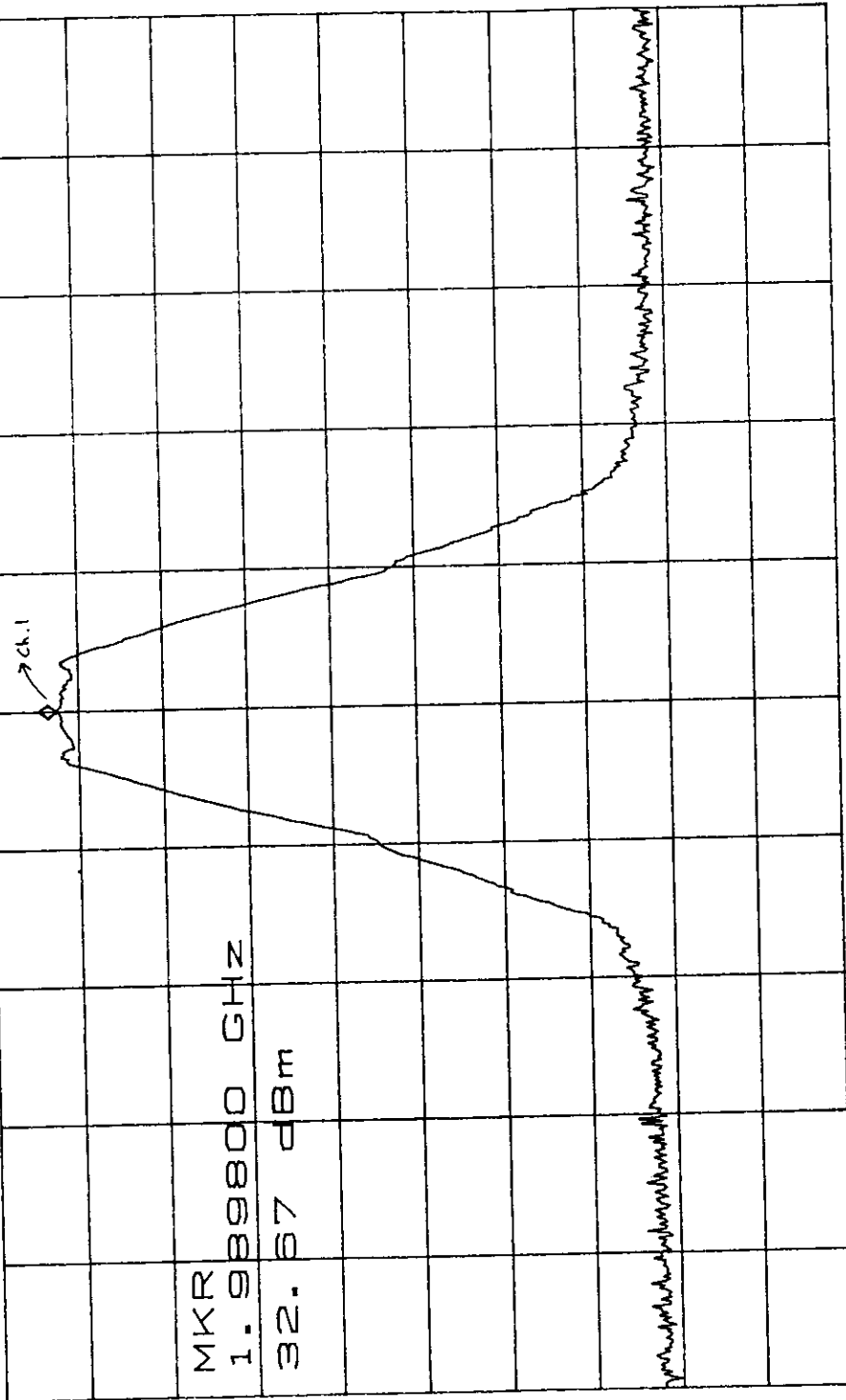
Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

DL High (C-band)
DL Output
 $P_i = -52.7 \text{ dBm @ } 1989.8 \text{ MHz}$
GSM noise for PCS 1900

ATTN 20dB
RL 40.0dBm
MKR 32.67dBm
1.989800GHZ
10dB/



CENTER 1.989800GHZ
*RBW 30KHZ
SPAN 2.000MHZ
SWP 50.0ms
*VBW 30KHZ

2.985

Tested by ORTEL CORPORATION.



Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

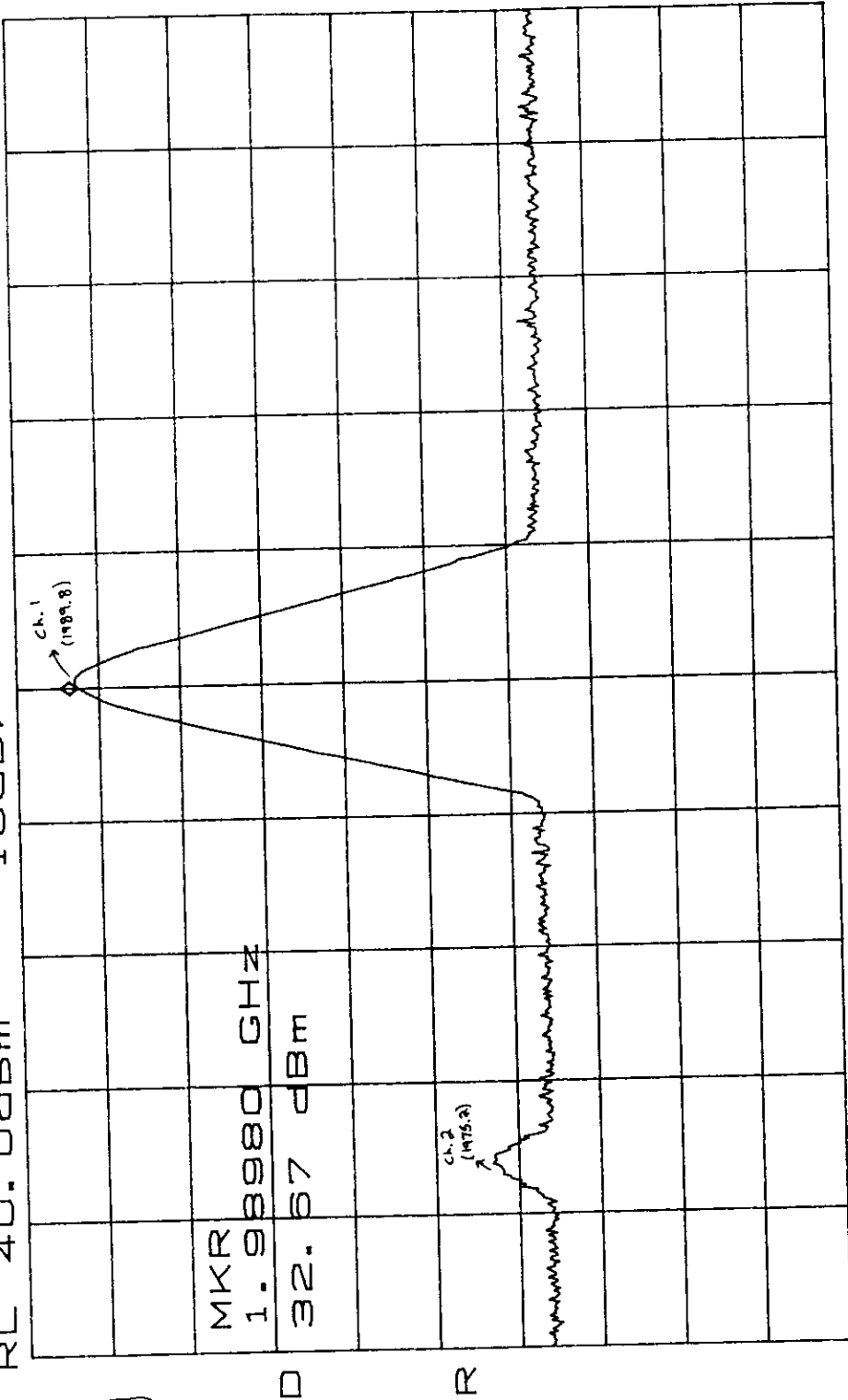
DL Output

$P_1 = -52.7 \text{ dBm @ } 1989.8 \text{ MHz}$

ATTE 20dB GSMT source for PCS 1900 MKR 32.67 dBm

RL 40.0 dBm 10dB/ 1.98980 GHz

DL High (C-band)



CENTER 1.98980GHZ *RBW 1.0MHZ SPAN 40.00MHZ
*VBW 1.0MHZ SWP 50.0ms

2.985

Tested by ORTEL CORPORATION.

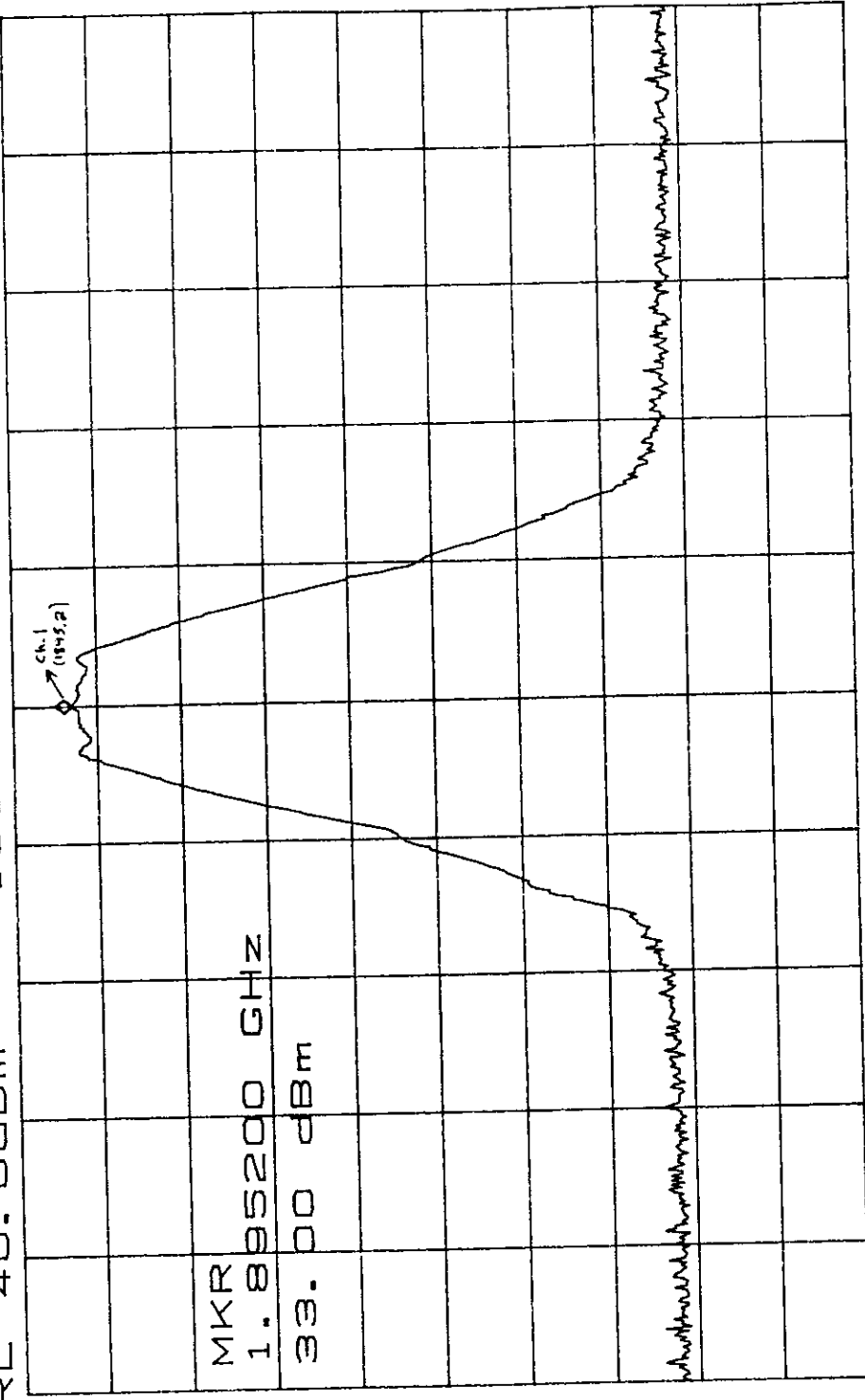
Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

UL Output

$P_1 = 53.7 \text{ dBm @ } 1895.2 \text{ MHz}$

ATTE 20dB GSM source for PCS 1900 MKR 33.00dBm
RL 40.00dBm 10dB / 1.895200GHZ



CENTER 1.895200GHZ SPAN 2.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

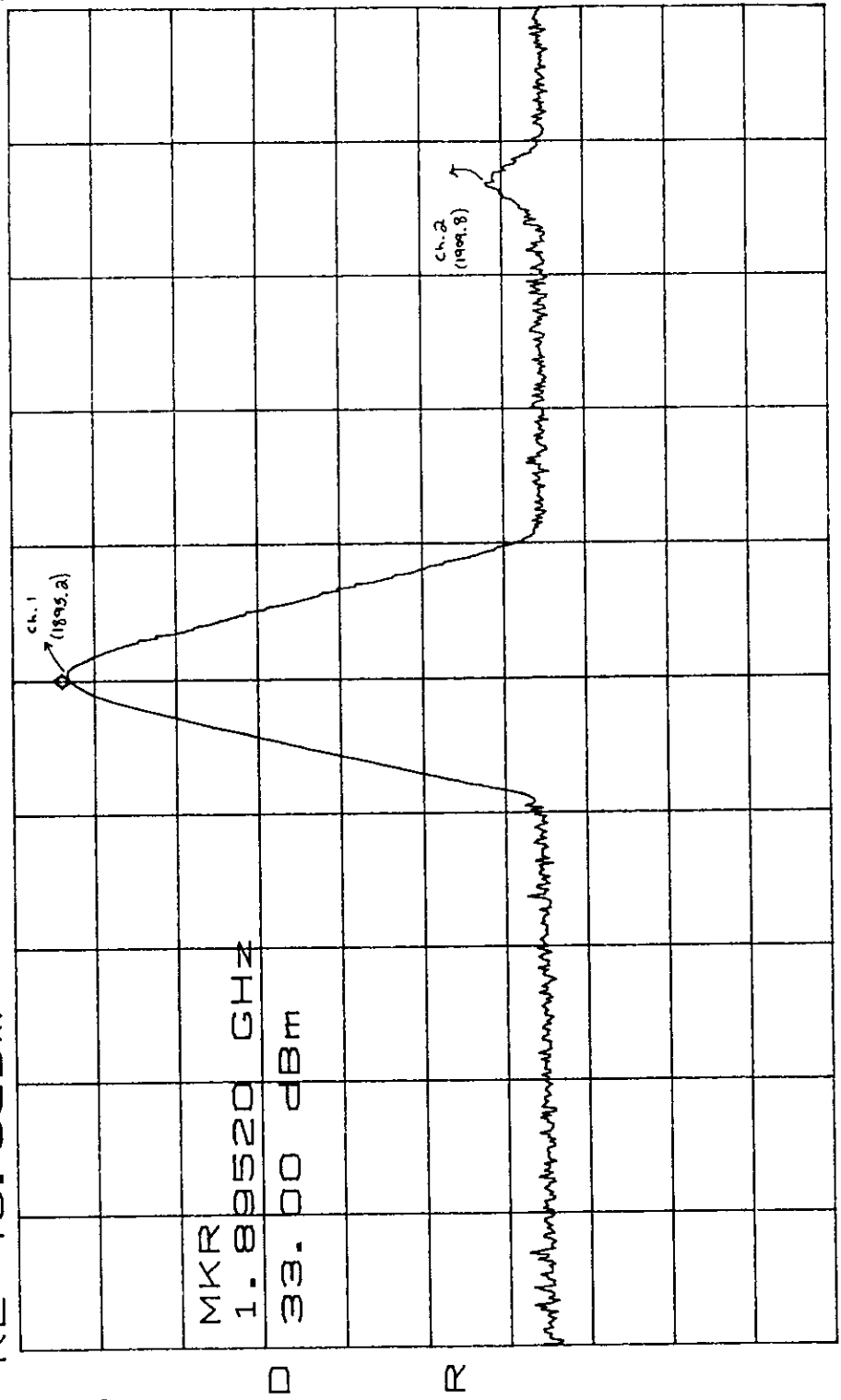
2.985

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

UL Low (C-band) 3/26/98 FCC ID: LB41901
UL Output P₁ = -53.7 dBm @ 1895.2 MHz

ATTEN 20dB Gsm source for PCS 1900 MKR 33.00dBm
RL 40.00dBm 10dB/ 1.89520GHz



CENTER 1.89520GHz SPAN 40.00MHz
*RBW 1.0MHz *VBW 1.0MHz SWP 50.0ms

2.985

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

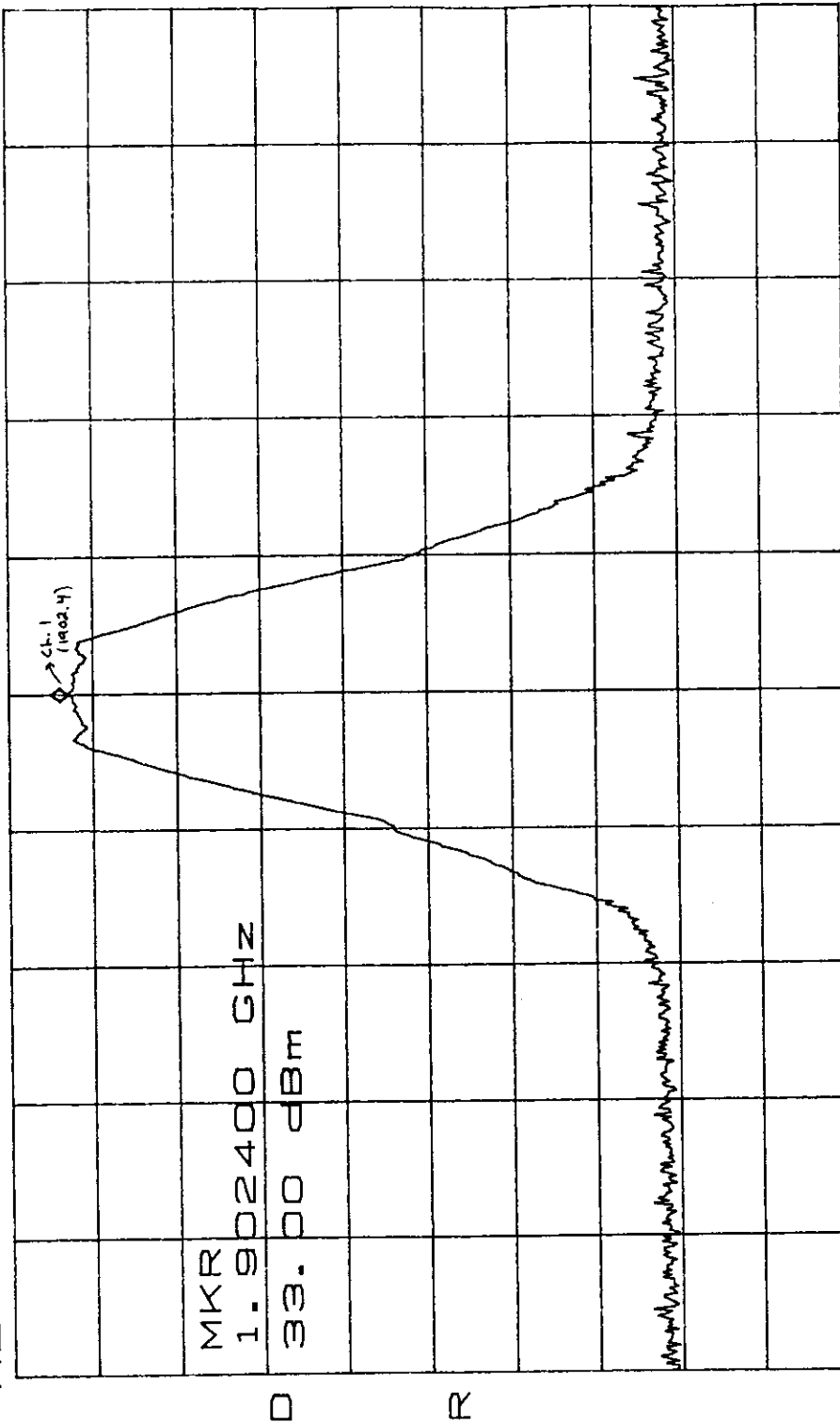
3/26/98
FCC ID: LB41901

UL Mid (C-band)

UL Output

$P_1 = -53.6 \text{ dBm}$ @ 1902.4 MHz
GSM source for PCS 1900

ATTN 20dB
RL 40.0dBm
MKR 33.00dBm
1.902400GHZ



CENTER 1.902400GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 2.000MHZ
SWP 50.0ms

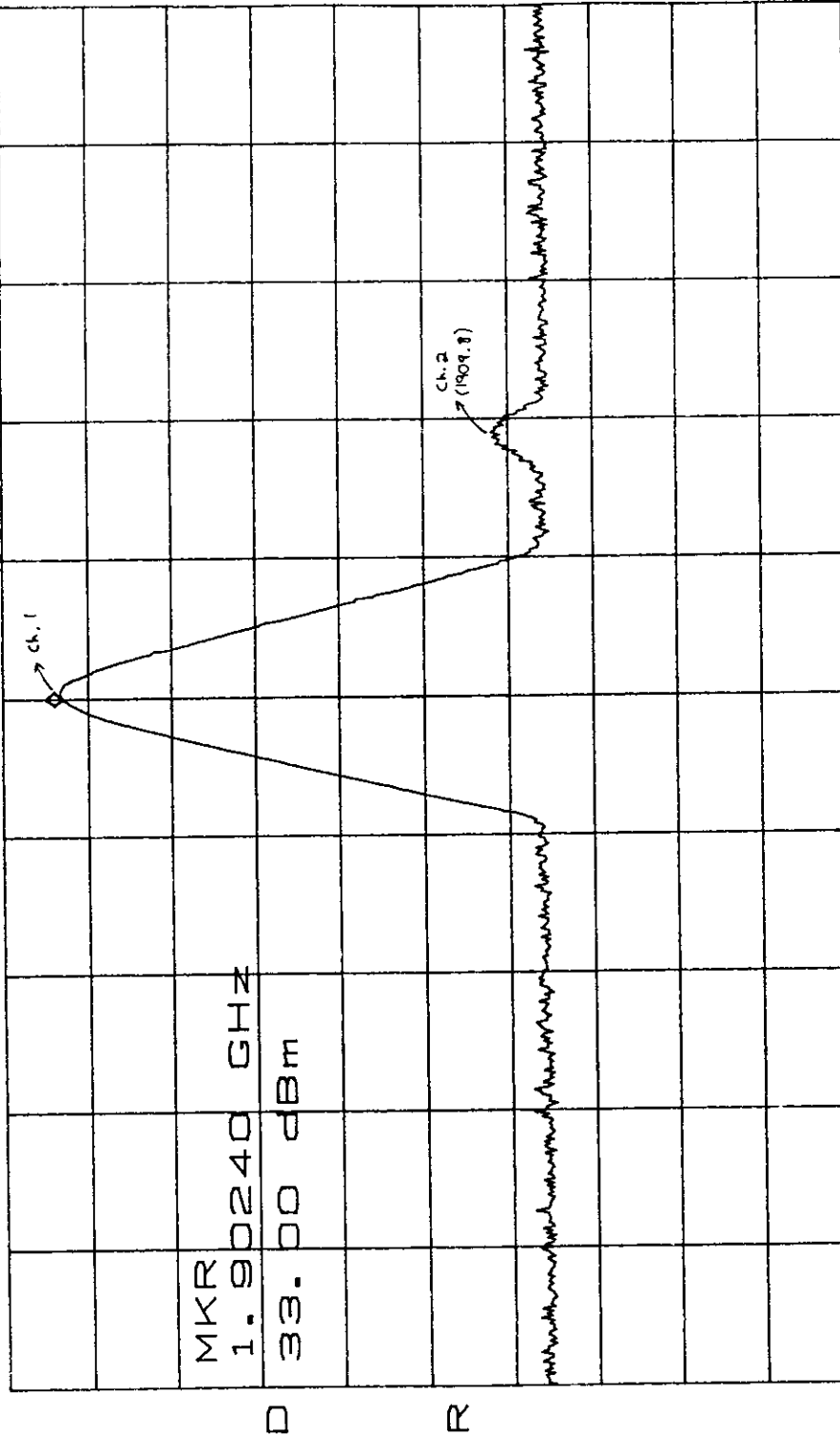
2.985

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.985

UL Mid (C-band) UL Output
 3/26/98 FCC ID: LB41901

ATTE 20dB MKR 33.00dBm
 RL 40.00dBm 1.90240GHZ
 P₁ = -53.6 dBm @ 1902.4 MHz
 GSM source for PCS 1900



2.985

Tested by ORTEL CORPORATION.

CENTER 1.90240GHZ SPAN 40.00MHZ
 *RBW 1.0MHZ *VBW 1.0MHZ
SWP 50.0ms

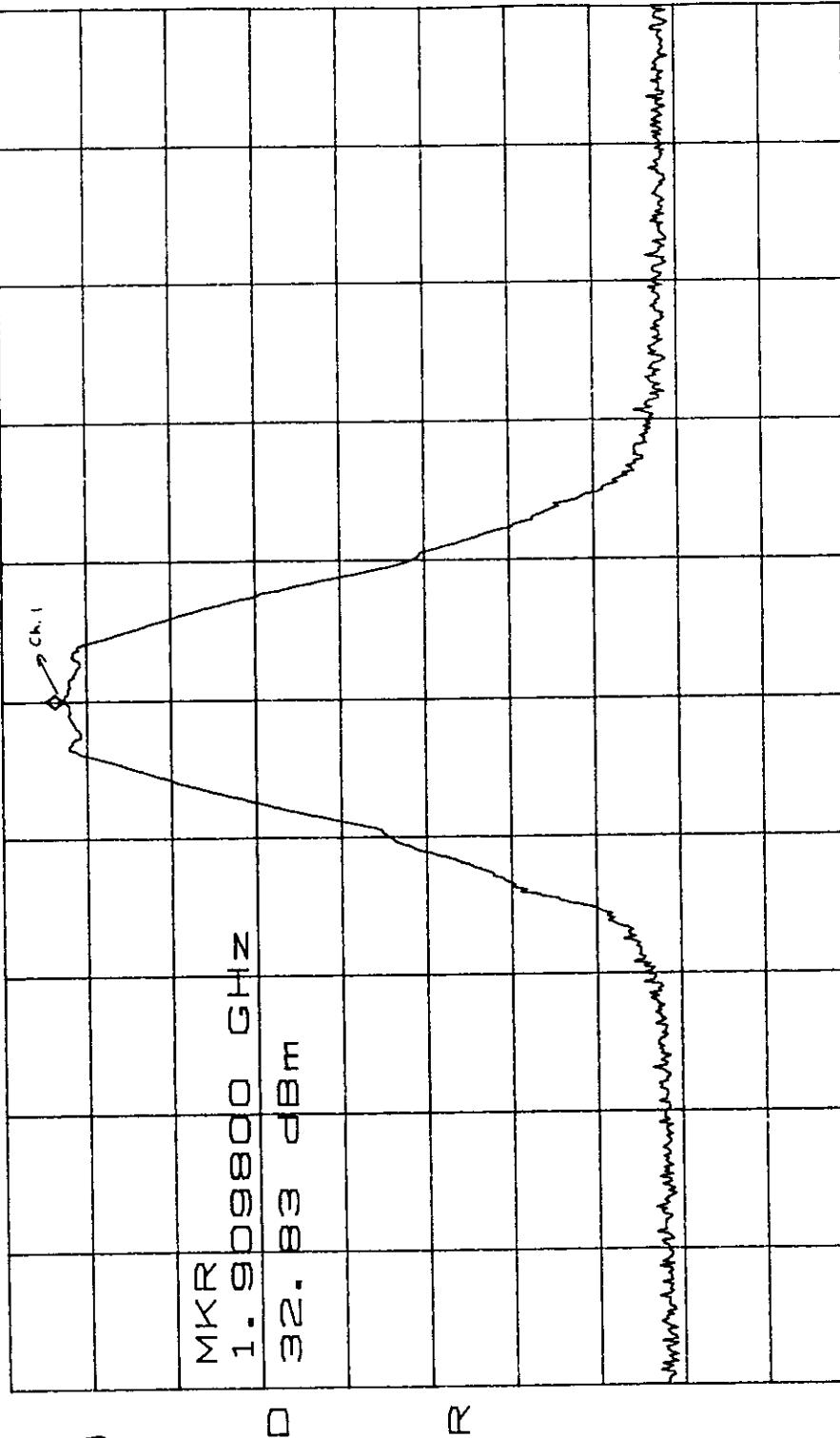
Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

UL Output
P₁ = -52.3 dBm @ 1909.8 MHz

UL High (C-band)

ATTE 20dB Gsm source for PCS 1900 MKR 32.83 dBm
RL 40.0 dBm 10dB/ 1.909800 GHz



CENTER 1.909800 GHz
RBW 30 kHz
SPAN 2.000 MHz
VBW 30 kHz
SWP 50.0 MHz

2.985

Tested by ORTEL CORPORATION.

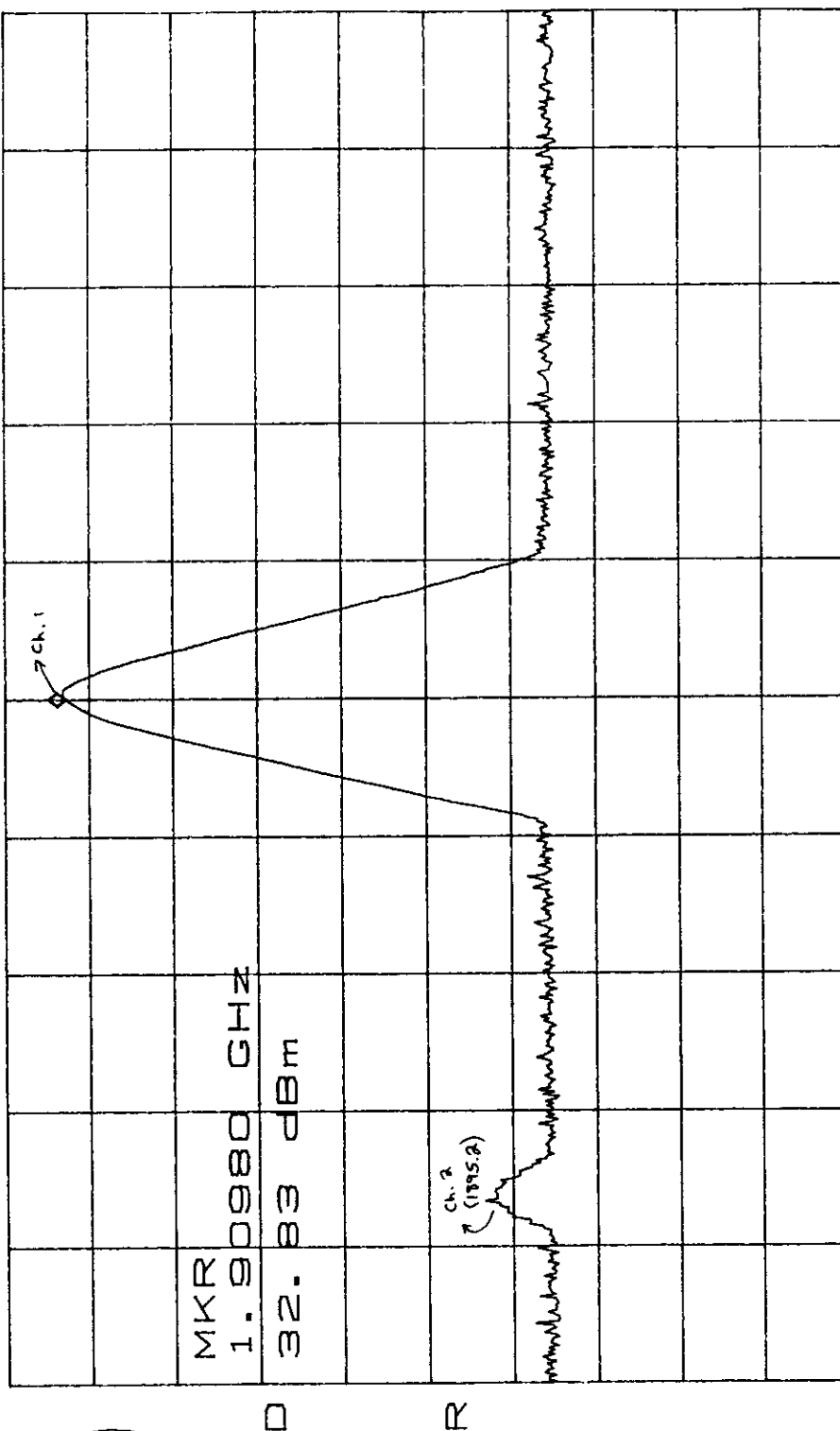
Part 2, Paragraph 2.985

3/26/98
FCC ID: LB41901

UL Output
P₁ = -52.3 dBm @ 1909.8 MHz

UL High (C-band)

ATTEN 20dB GSM source for PCS 1900 MKR 32.83dBm
RL 40.0dBm 10dB/ 1.90980GHZ



CENTER 1.90980GHZ SPAN 40.00MHZ
*RBW 1.0MHZ *VBW 1.0MHZ SWP 50.0ms

2.985

Tested by ORTEL CORPORATION.

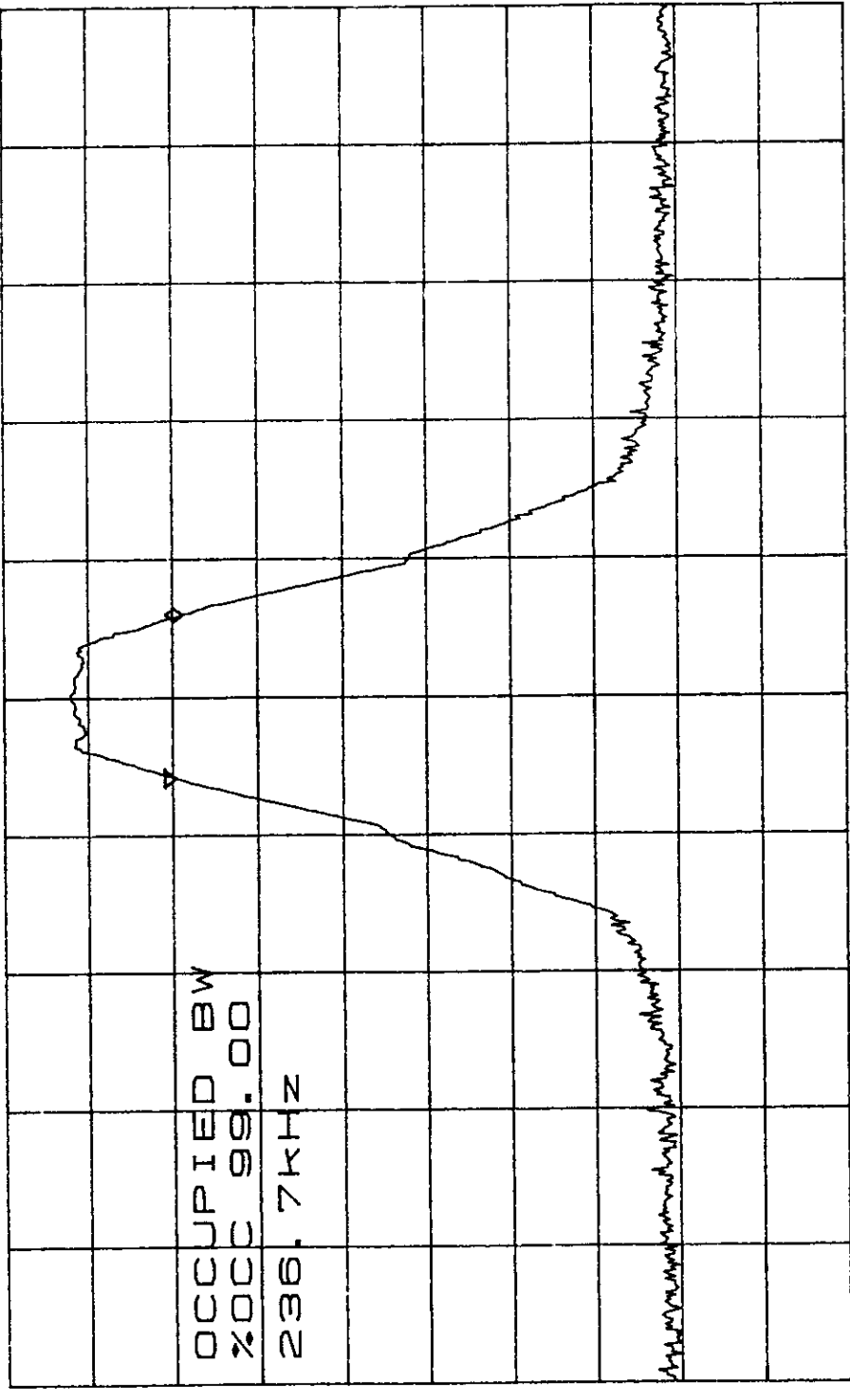
Part 2, Paragraph 2.989

3/27/98
FCC ID: LB41901

Occupied BW
Max Hold

DL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 ΔMKR - .84dB
RL 40.0dBm 10dB/ 237kHz



2.989

Tested by ORTEL CORPORATION.

CENTER 1.975200GHZ *RBW 30KHZ *VBW 30KHZ
SPAN 2.000MHZ SWP 50.0ms

Part 2, Paragraph 2.989

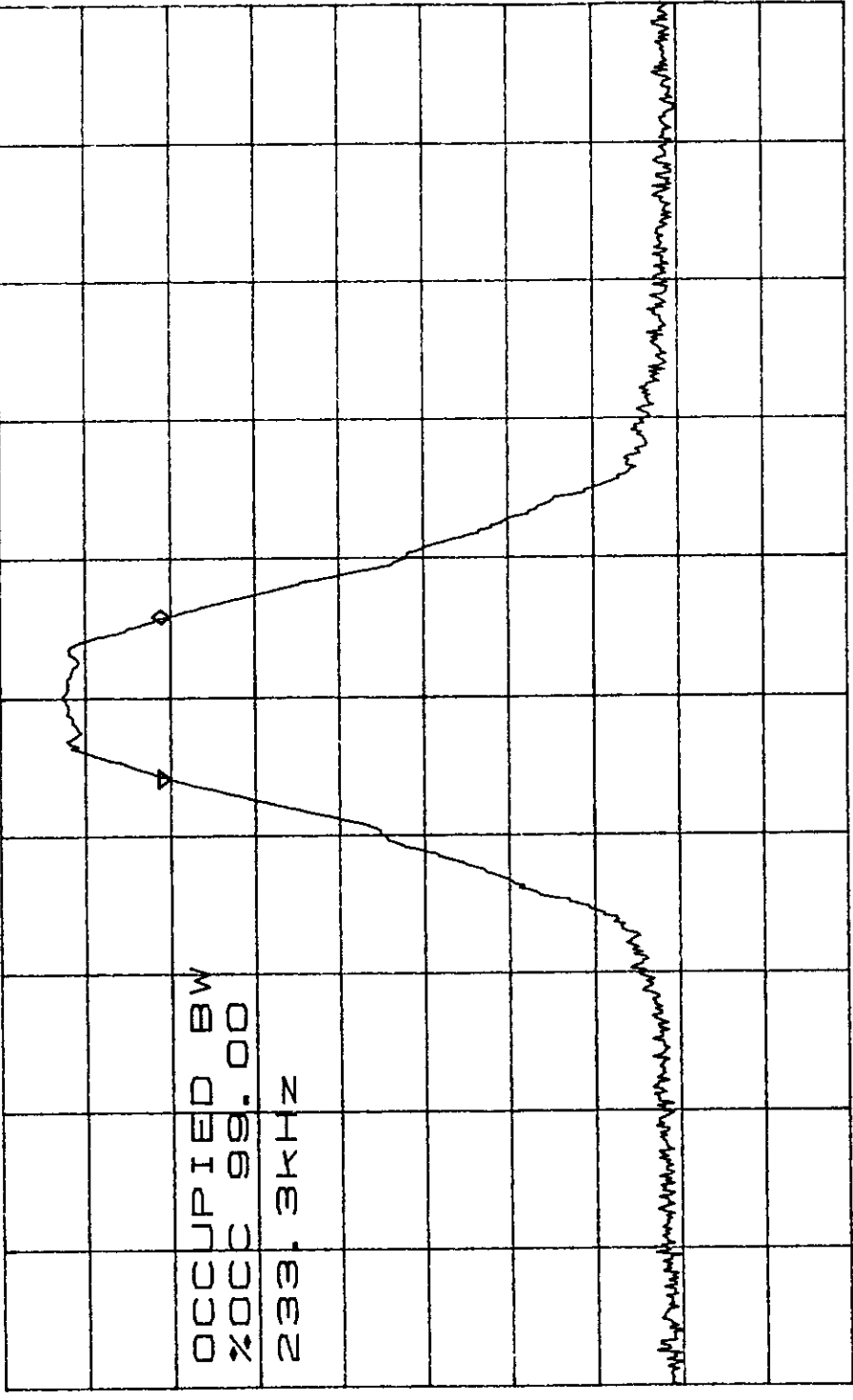
3/27/98
FCC ID: LB41901

DL Mid (C-band)

Occupied BW
Max Hold

ATTEN 20dB GSM source for PCS 1900 ΔMKR 0dB

RL 40.0dBm 10dB/ 233kHz



2.989

OCCUPIED BW
%OCC 99.00
233.3KHZ

CENTER 1.982400GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 2.000MHZ SWP 50.0ms

Tested by ORTEL CORPORATION.

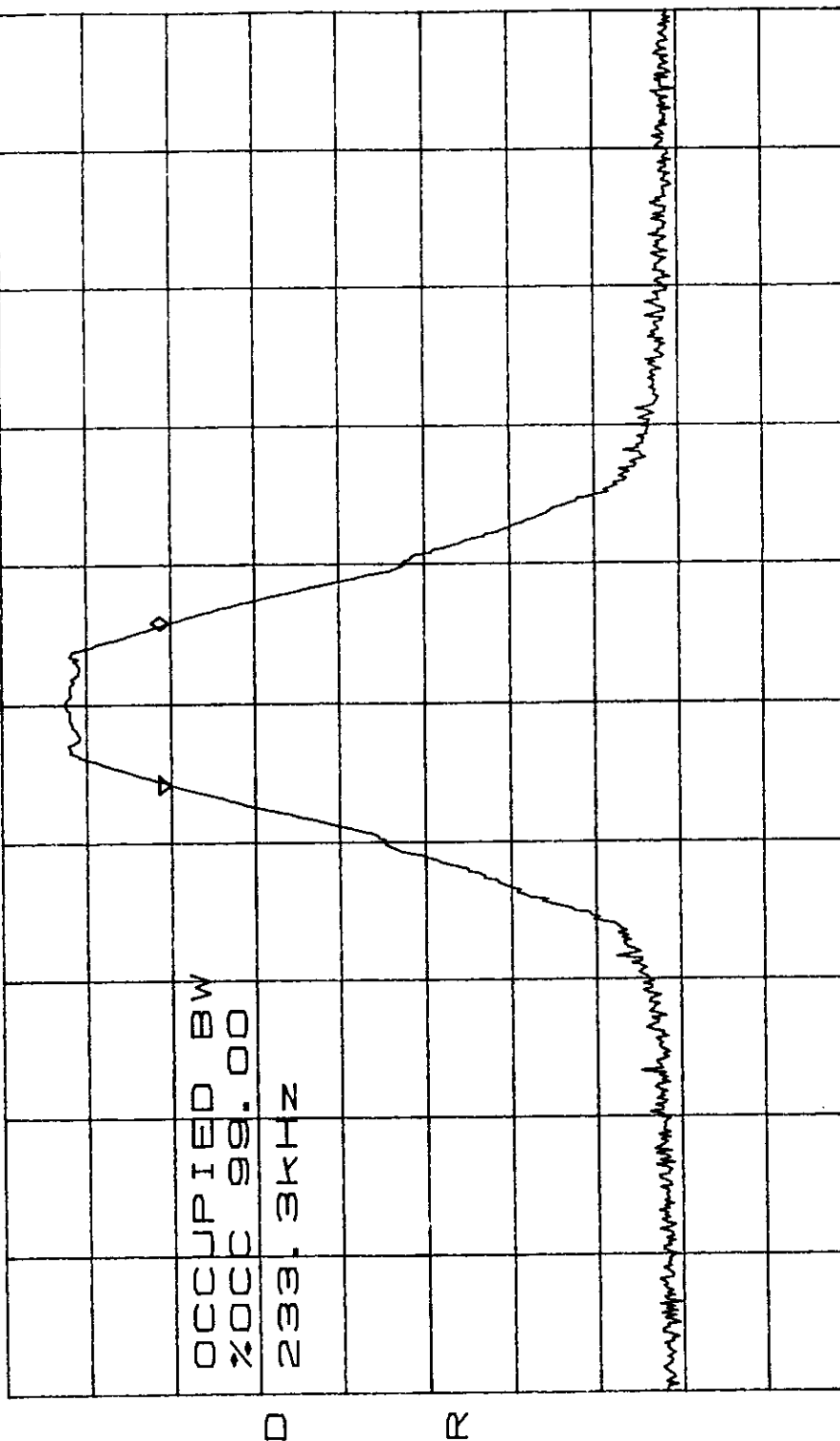
Part 2, Paragraph 2.989

3/27/99
FCC ID: LB41901

PL High (C-band)

Occupied BW
Max Hold

ATTEN 20dB GSM source for PCS 1900 Δ MKR .16dB
RL 40.0dBm 10dB/ 233kHz



2.989

Tested by ORTEL CORPORATION.

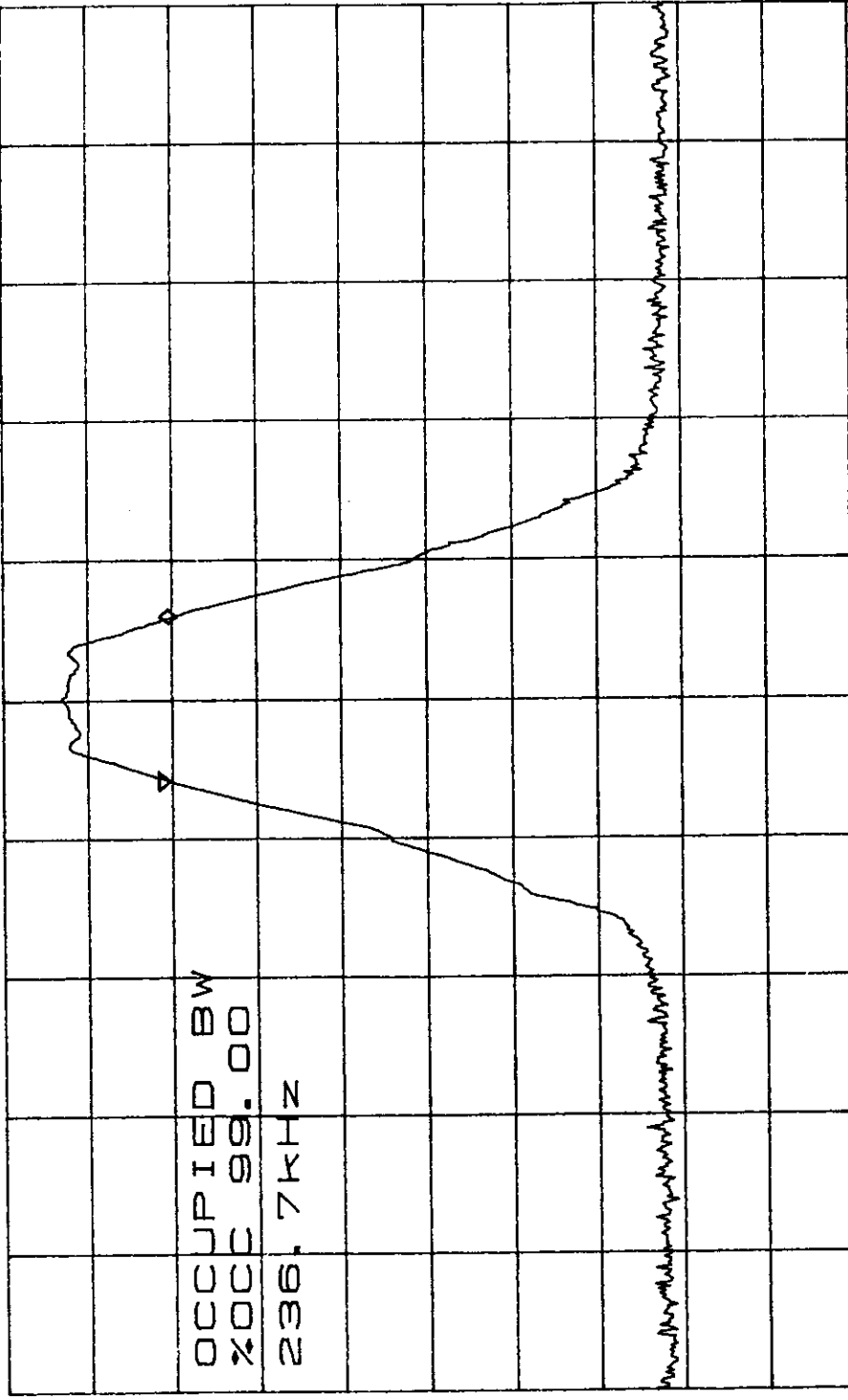
CENTER 1.989800GHZ SPAN 2.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Part 2, Paragraph 2.989

3/27/98
FCC ID: LB41901

Occupied BW
Max Hold

ATTEN 20dB GSM source for PCS 1900 ΔMKR - .83dB
RL 40.0dBm 10dB/ 237kHz



CENTER 1.895200GHZ SPAN 2.000MHZ
*RBW 30kHz *VBW 30kHz SWP 50.0ms

2.989

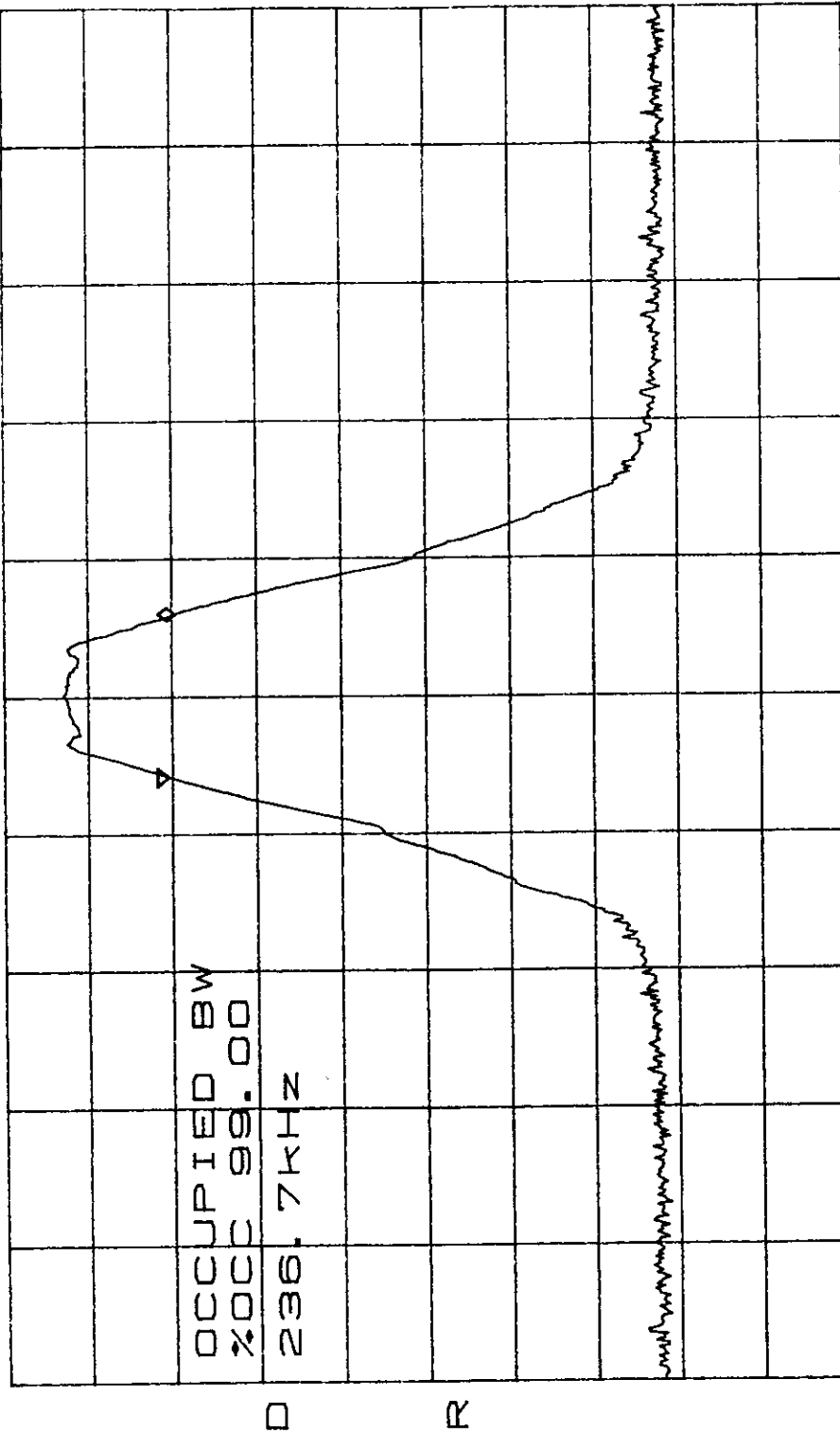
Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.989

3/27/98
FCC ID: LB41901

Occupied BW
Max Hold

ATTEEN 20dB GSM noise for PCS 1900 Δ MKR - .83dB
RL 40.0dBm 10dB/ 237kHz



CENTER 1.902400GHZ SPAN 2.000MHZ
*RBW 30kHz *VBW 30kHz SWP 50.0ms

2.989

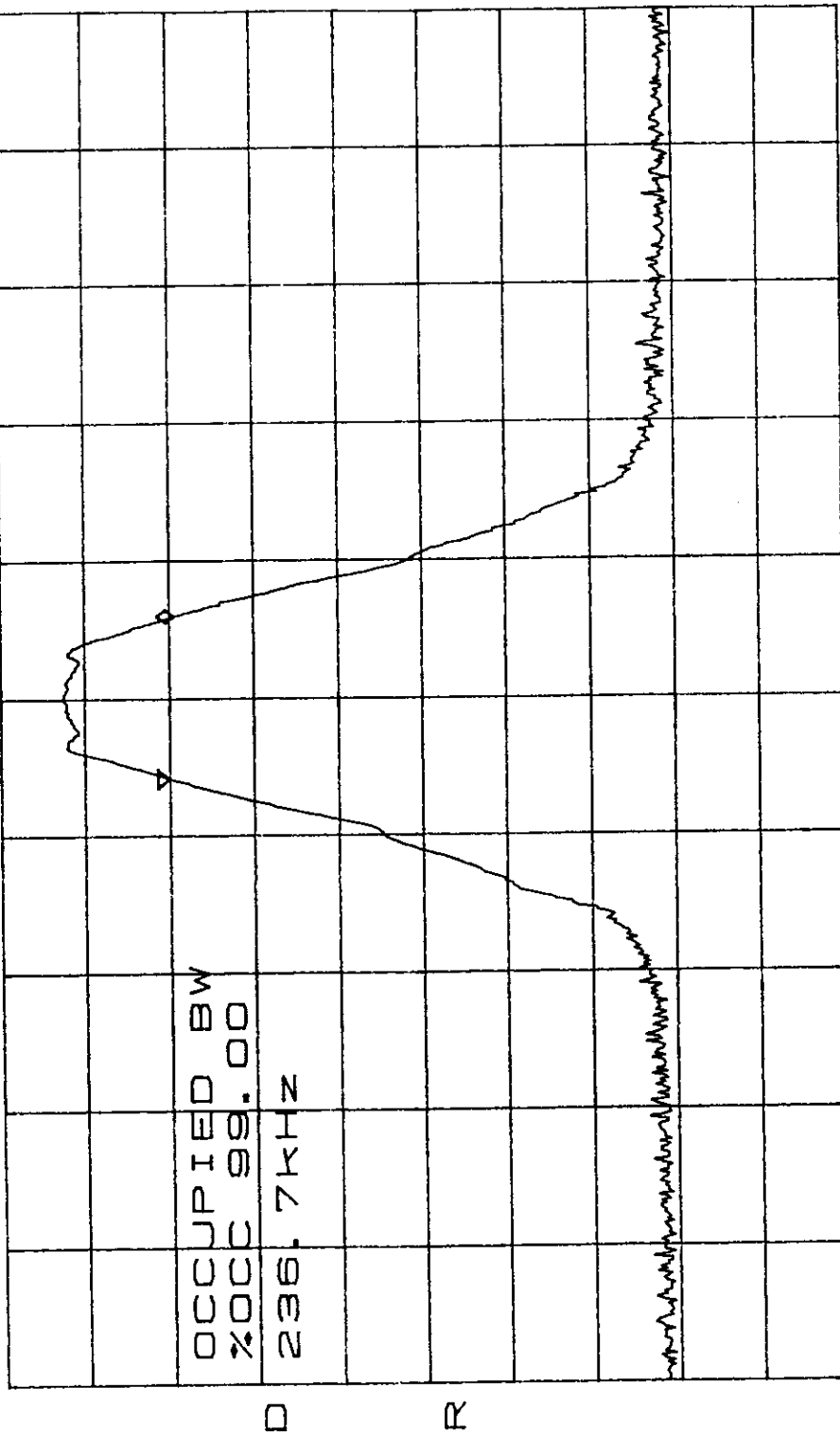
Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.989

3/27/98
FCC ID: LB41901

Occupied BW
Max Hold

ATTEN 20dB GSM source for PCS 1900 ΔMKR - .67dB
RL 40.0dBm 10dB/ 237kHz



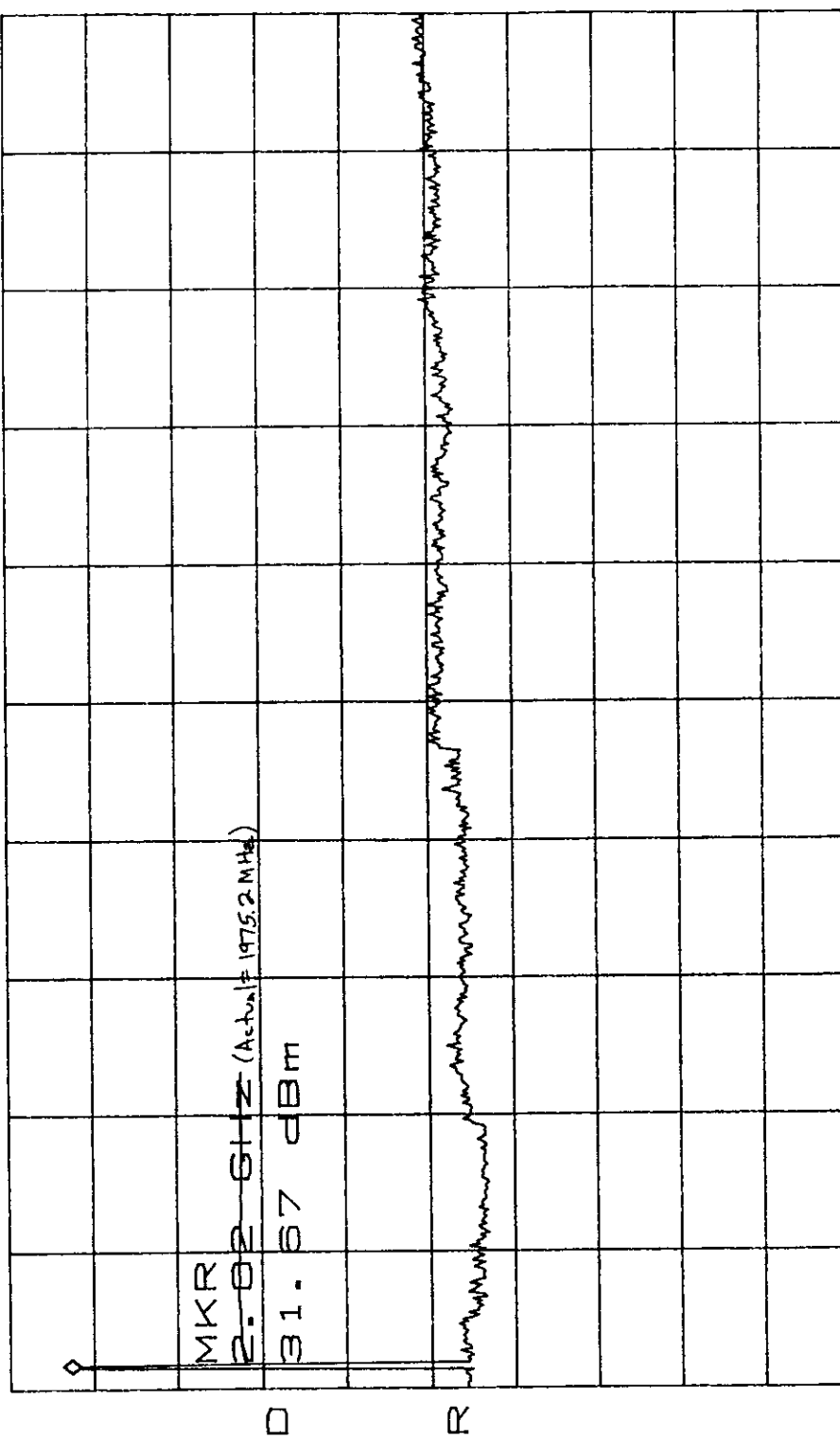
2.989

Tested by ORTEL CORPORATION.

CENTER 1.909800GHZ *RBW 30KHZ
SPAN 2.000MHZ *VBW 30KHZ
SWP 50.0ms

Part 2, Paragraph 2.991

DL Low (C-band) Spurs @ Antenna 3/26/98
 MAX HOLD FCC ID: LB41901
 *ATTEN 30dB GSM source for PCS 1900 MKR 31.67 dBm
 RL 40.0 dBm 10dB/ ~~2.026 GHz~~ (Actual = 1975.2 MHz)

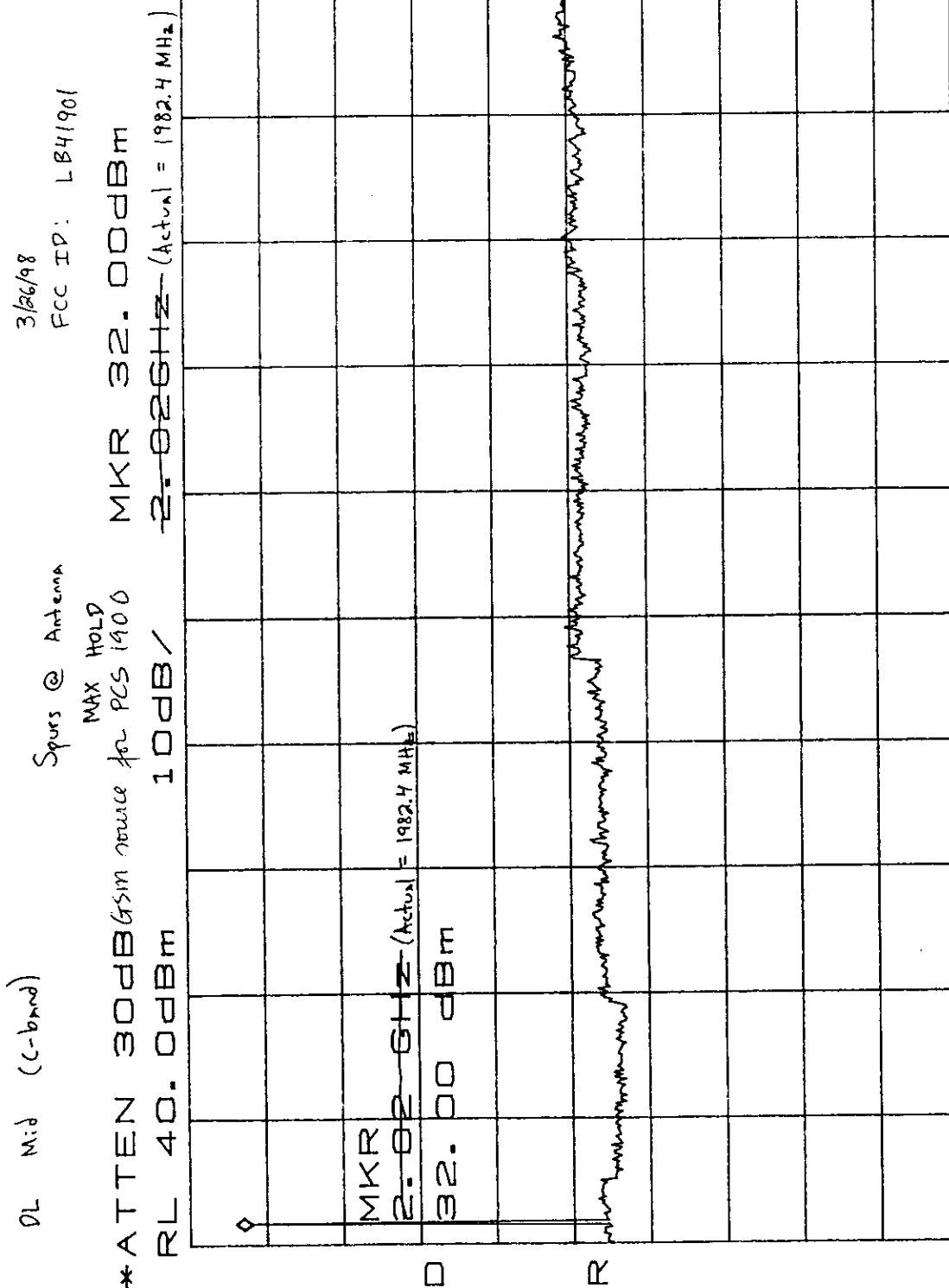


START 1.600 GHz STOP 26.500 GHz
 *RBW 1.0 MHz *VBW 1.0 MHz SWP 500ms

2.991

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.991



START 1.60GHZ STOP 26.50GHZ

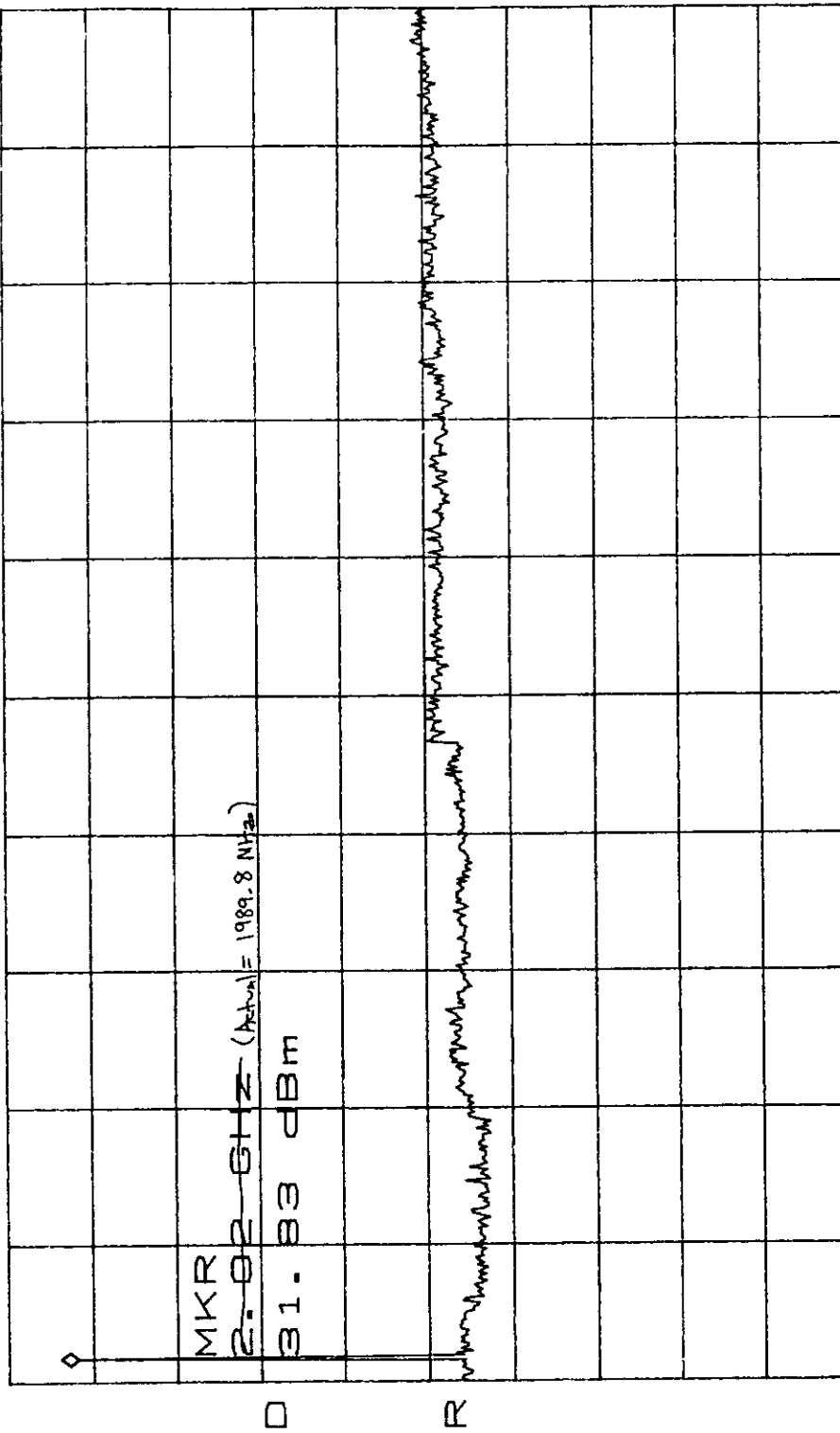
*RBW 1.0MHZ *VBW 1.0MHZ SWP 500ms

2.991

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.991

DL High (C-band) Spurs @ Antenna
 *ATTEN 30dB GSM source for PCS 1900 MKR 31.83dBm
 RL 40.0dBm 10dB/ ~~2.02GHz~~ (Actual = 1989.8 MHz)
 3/26/98 FCC ID: LB41901
 MAX HOLD
 *RBW 1.0MHz *VBW 1.0MHz SWP 500ms

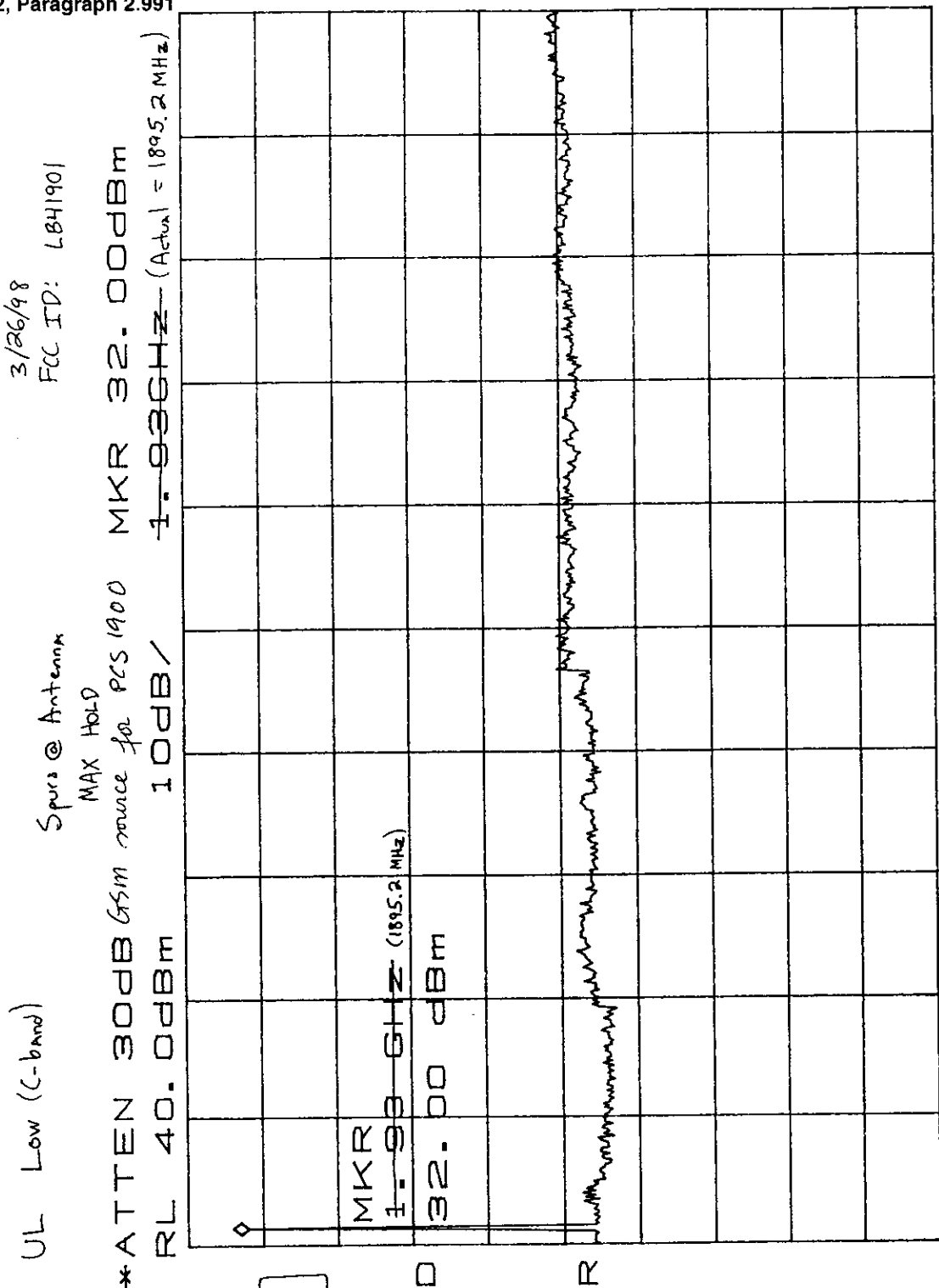


2.991

Tested by ORTEL CORPORATION.

START 1.60GHz STOP 26.50GHz
 *RBW 1.0MHz *VBW 1.0MHz SWP 500ms

Part 2, Paragraph 2.991

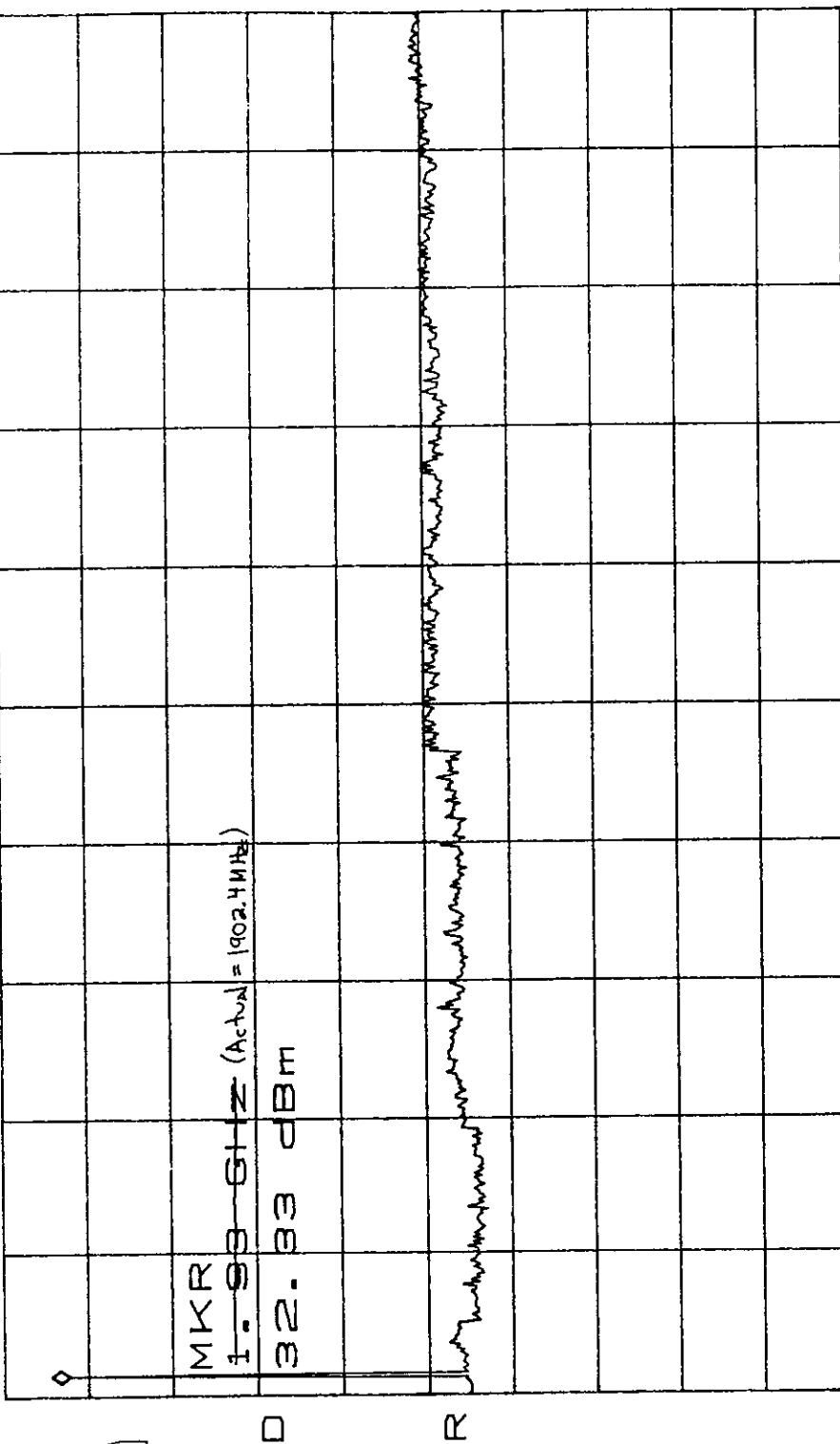


2.991

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.991

UL Mid (C-band) Spurs @ Antenna
 3/26/98 FCC ID: LB41901
 *ATTEN 30dB GSM source for PCS 1900 MKR 32.33dBm
 RL 40.0dBm 10dB/ ~~1.936GHz~~ (Actual = 1902.4 MHz)



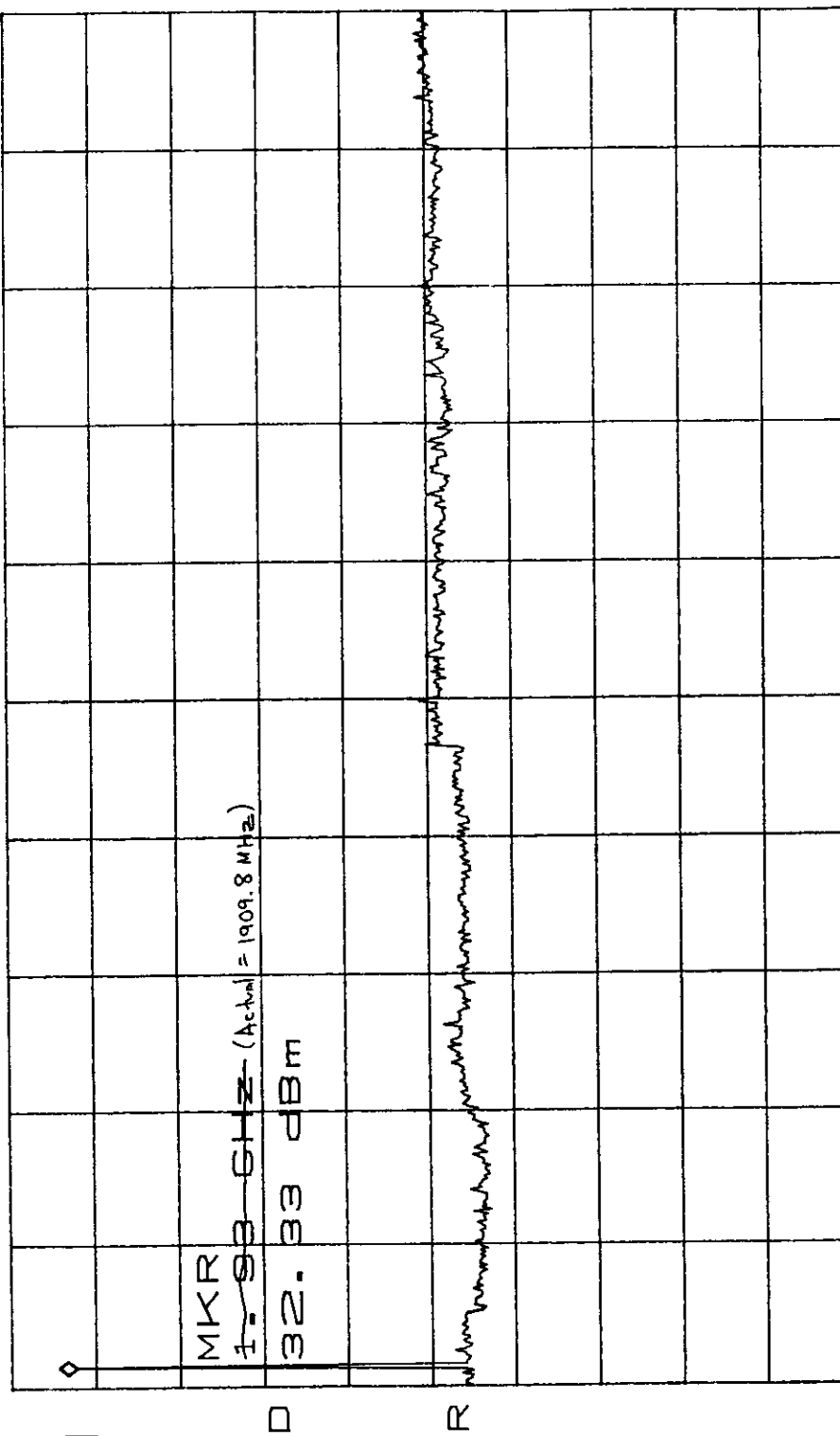
START 1.60GHz STOP 26.50GHz
 *RBW 1.0MHz *VBW 1.0MHz SWP 500ms

Tested by ORTEL CORPORATION.

Part 2, Paragraph 2.991

3/26/98
 FCC ID: LB41901
 Spurs @ Antenna
 MAX HOLD
 for PCS 1900
 10dB/

UL High (C-band)
 *ATTEN 30dB GSM source
 RL 40.0dBm
 MKR 32.33dBm
~~1.93GHz~~ (Actual = 1909.8 MHz)
~~1.93GHz~~ (Actual = 1909.8 MHz)



START 1.60GHz STOP 26.50GHz
 *RBW 1.0MHz *VBW 1.0MHz SWP 500ms

2.991

Tested by ORTEL CORPORATION.

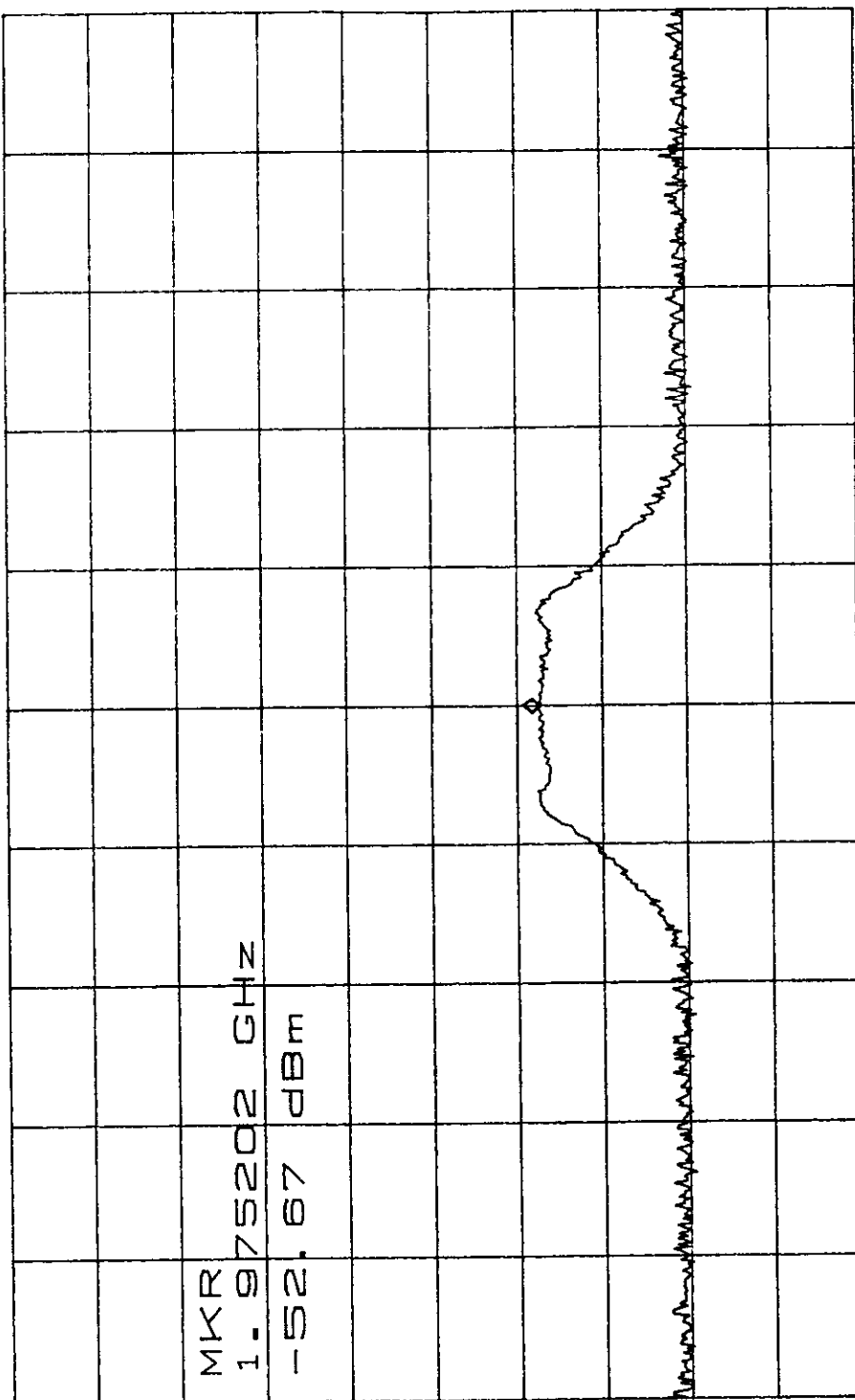
In/Out

3/27/98
FCC ID: LB41901

Input
Max Hold

DL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 MKR -52.67dBm
RL 10.0dBm 10dB/ 1.975202GHZ



CENTER 1.975202GHZ SPAN 1.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

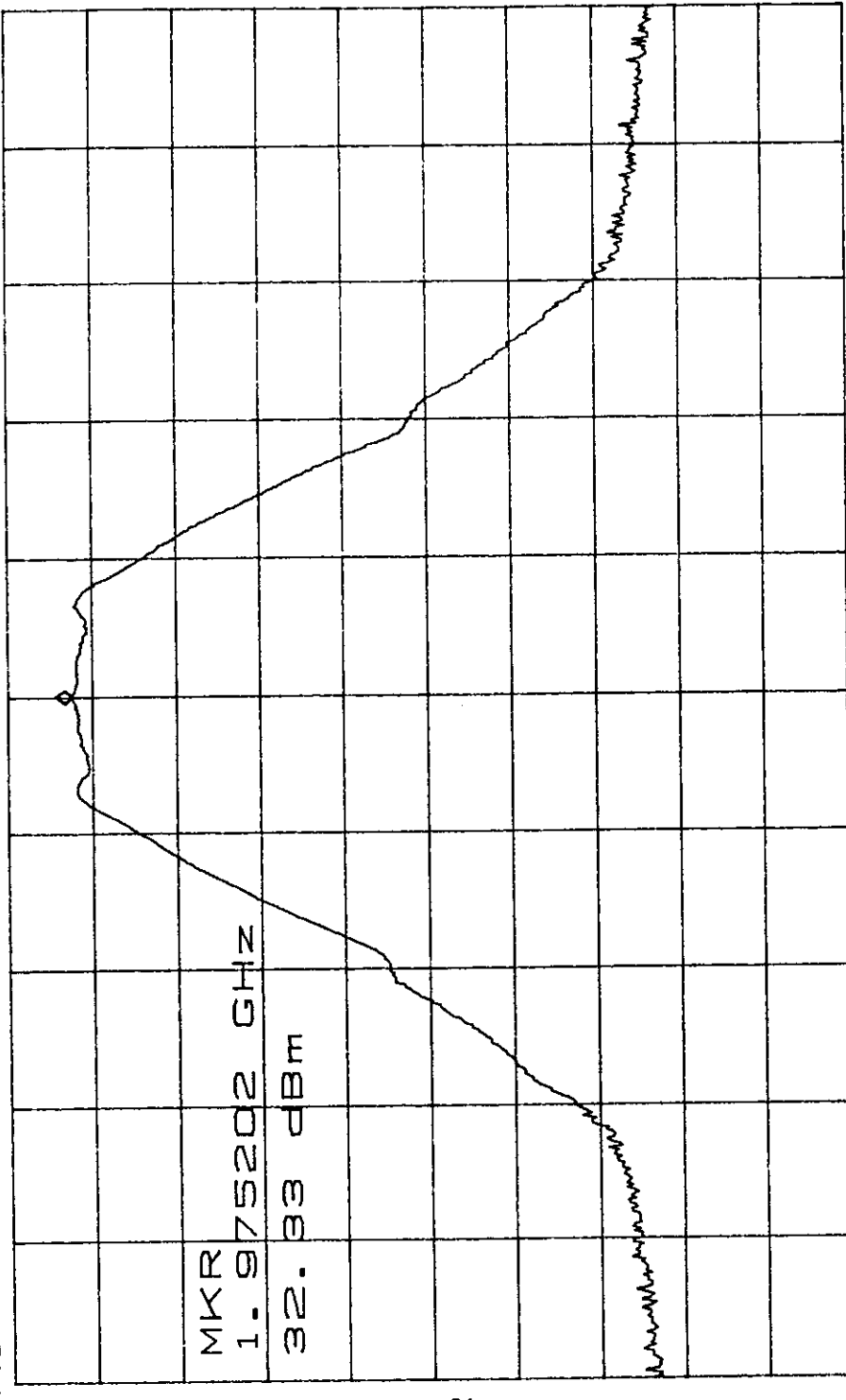
In/Out

3/27/98
FCC ID: LB41901

Output
MAX HOLD

DL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 MKR 32.33dBm
RL 40.0dBm 1.975202GHZ



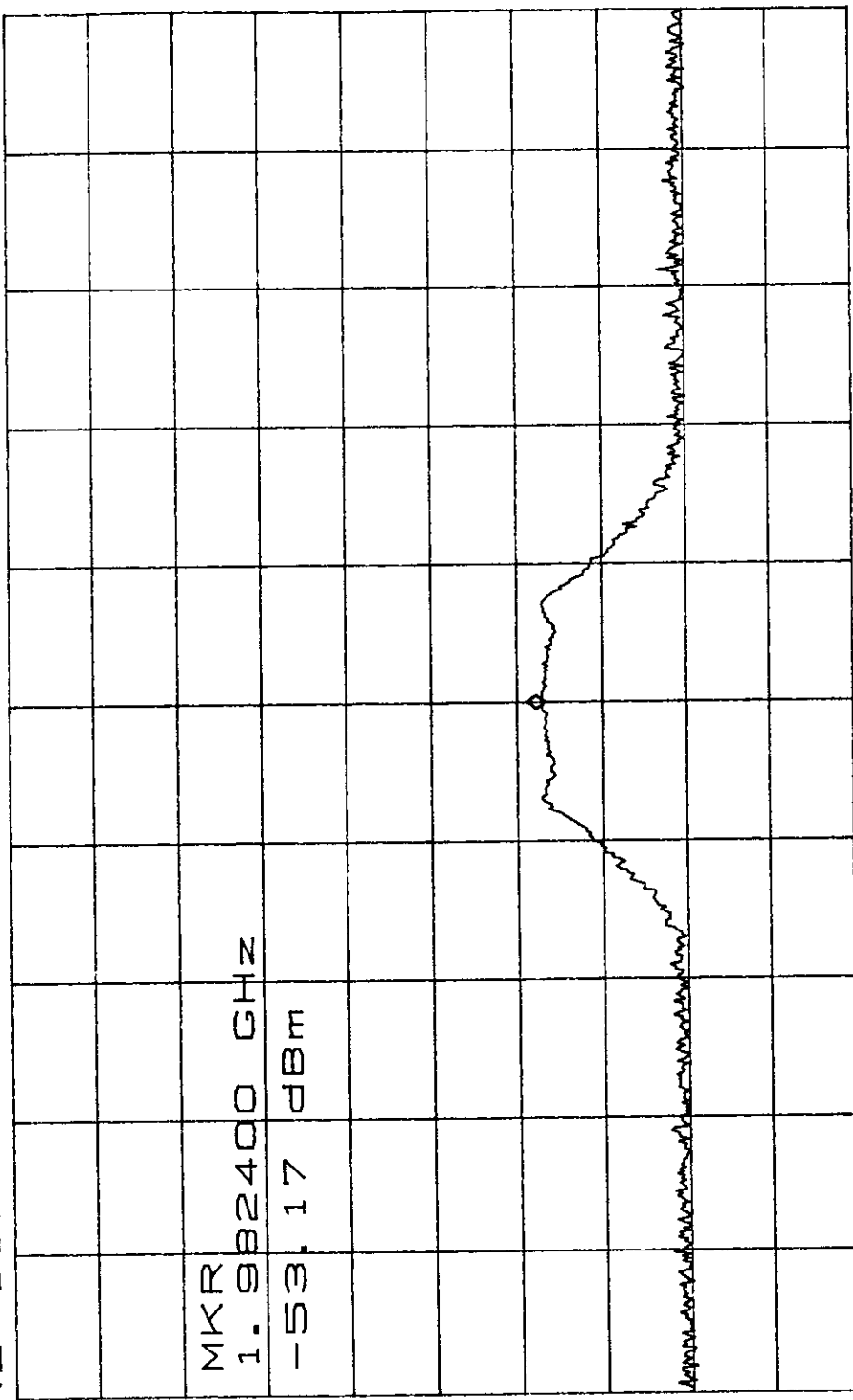
CENTER 1.975202GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 1.000MHZ
SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

In/Out

DL Mid (C-band)
3/27/98
FCC ID: LB41901
Input
Max Hold
ATTEN 20dB GSM receiver for PCS 1400 MKR -53.17dBm
RL 10.0dBm 1.982400GHZ 10dB/ 1.982400GHZ



CENTER 1.982400GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 1.000MHZ
SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

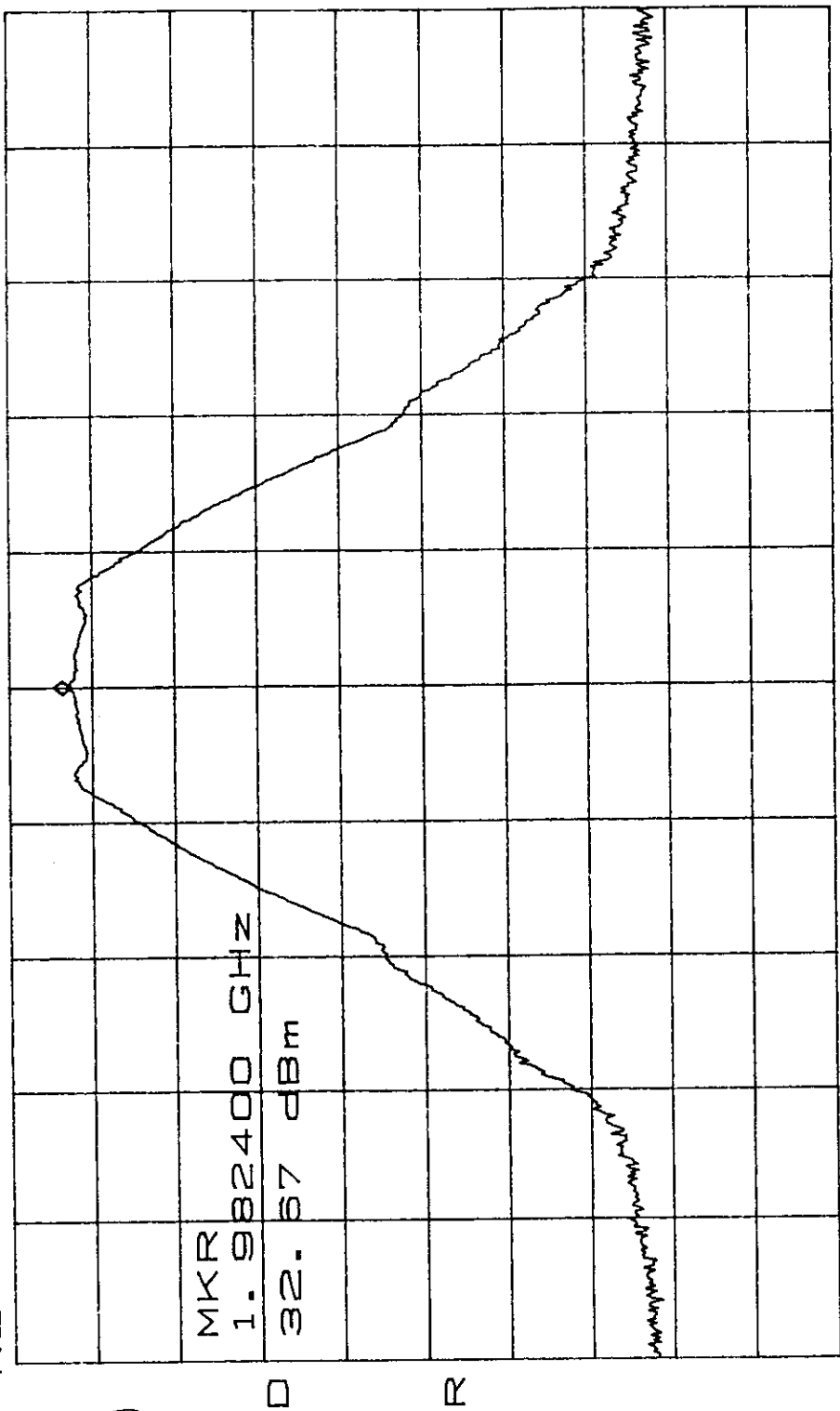
In/Out

3/27/98
FCC ID: LB41901

Output
Max Hold

DL Mid (c-band)

ATTEN 20dB GSM source for PCS 1900 MKR 32.67dBm
RL 40.0dBm 10dB/ 1.982400GHZ



CENTER 1.982400GHZ SPAN 1.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

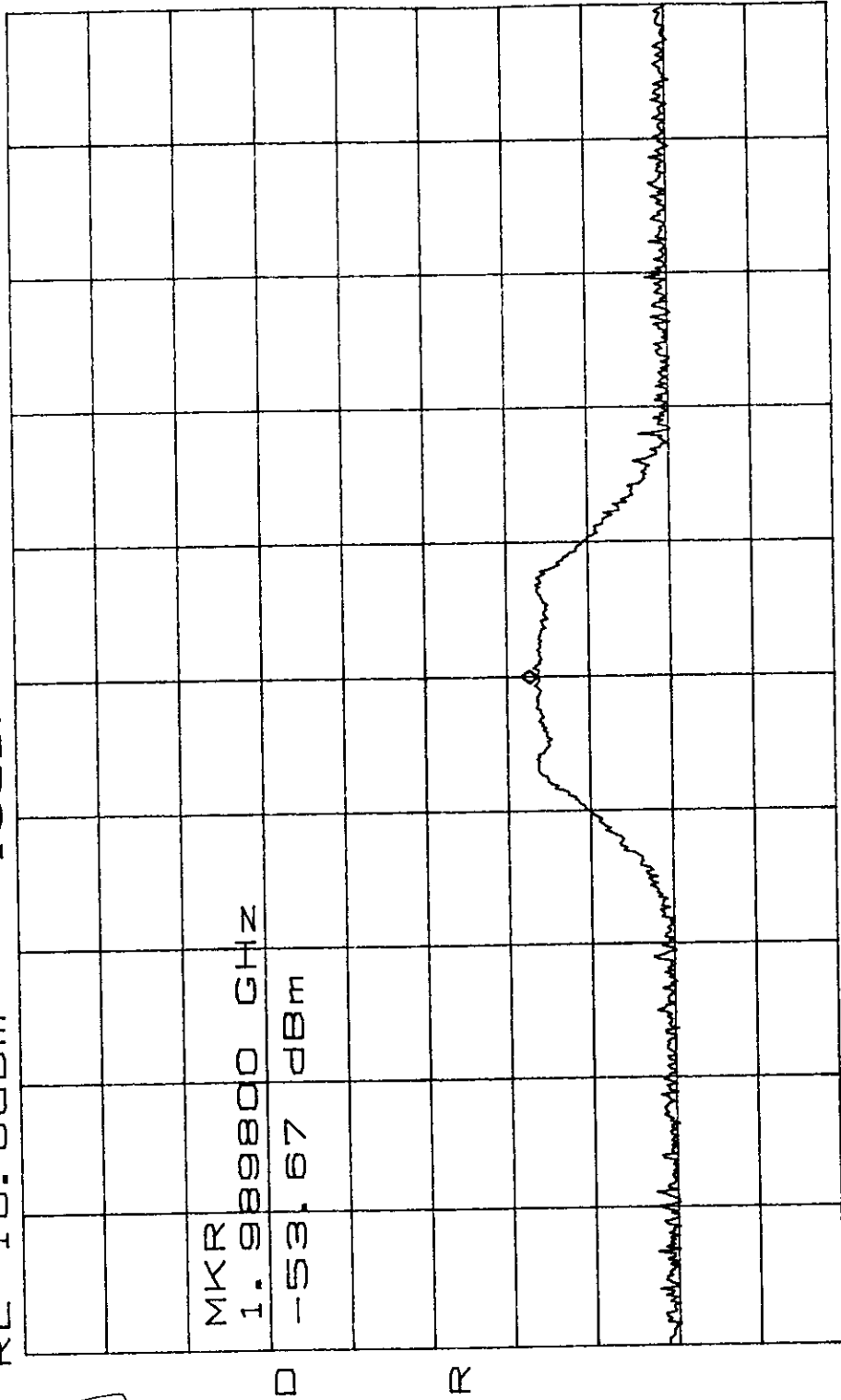
In/Out

3/27/98
FCC ID: LB41901

Input
Max Hold

DL High (C-band)

ATTEN 20dB GSM source for PCS 1900 MKR -53.67dBm
RL 10.0dBm 10dB/ 1.989800GHZ



In/Out

Tested by ORTEL CORPORATION.

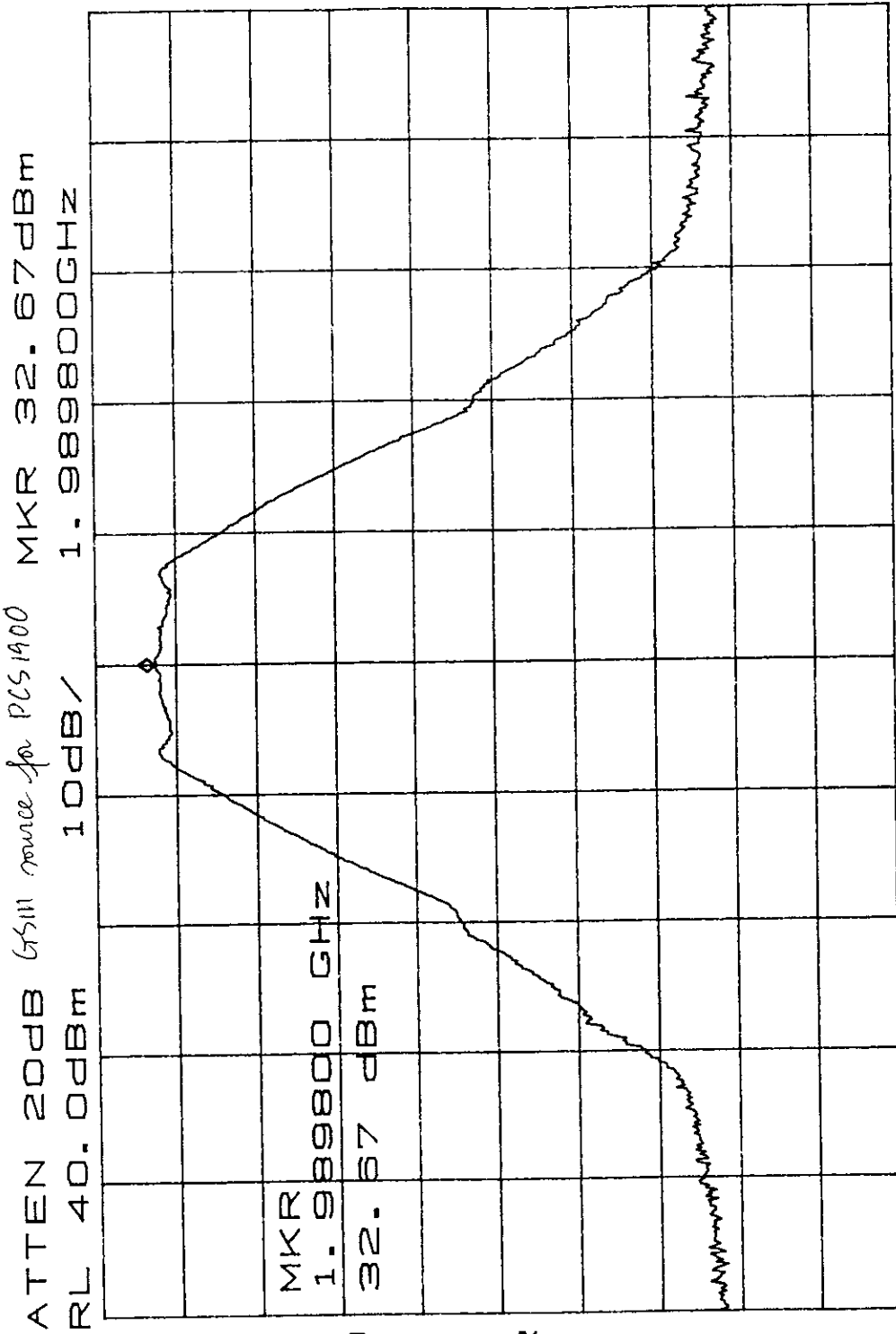
CENTER 1.989800GHZ SPAN 1.000MHZ
*RBW 30kHz *VBW 30kHz SWP 50.0ms

In/Out

3/27/98
FCC ID: LB41901

Output
MnX Hold

DL High (C-band)

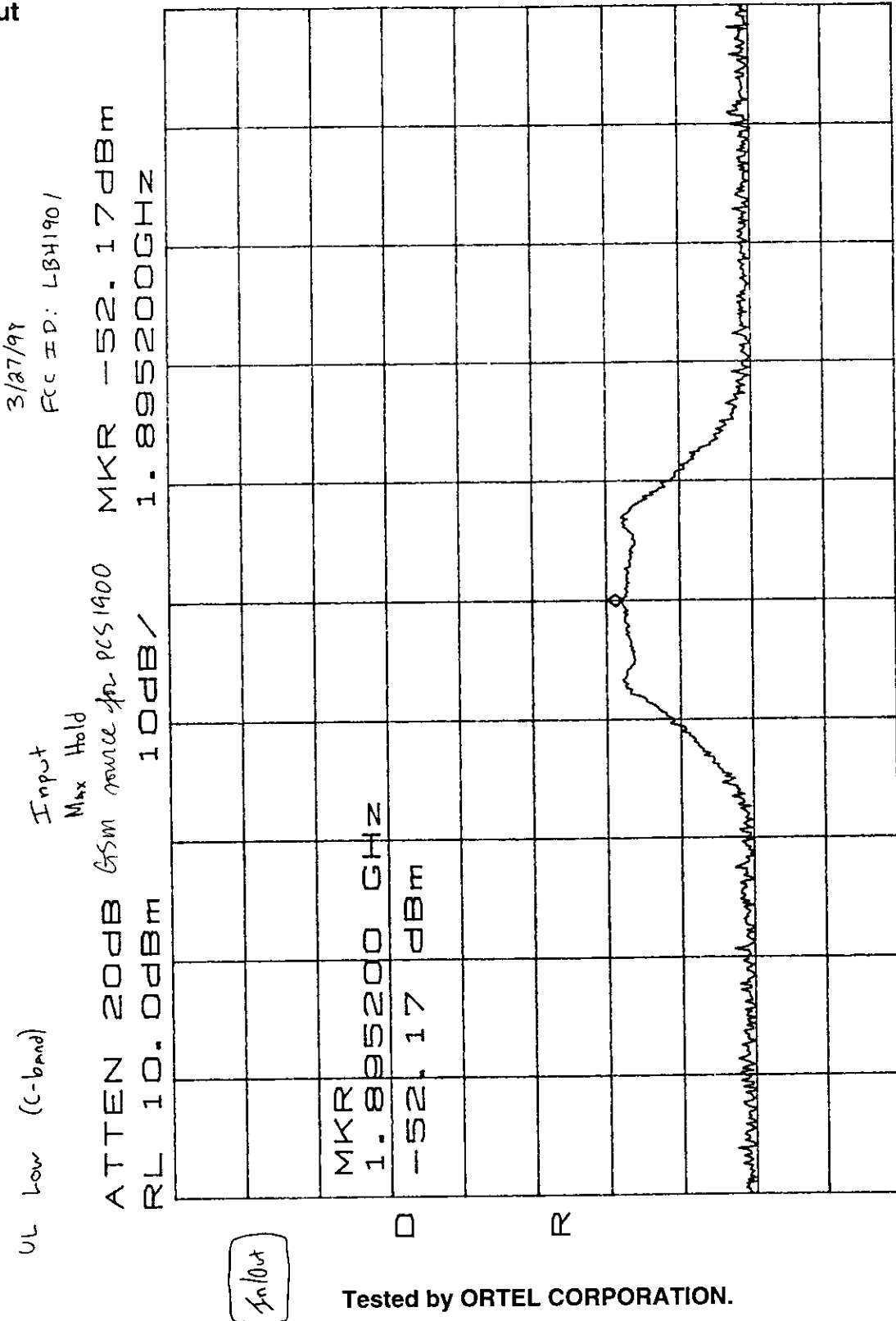


CENTER 1.989800GHZ SPAN 1.000MHZ
 *RBW 30KHZ *VBW 30KHZ SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

In/Out



CENTER 1.895200GHZ
*RBW 30kHz *VBW 30kHz

SPAN 1.000MHZ
SWP 50.0ms

Tested by ORTEL CORPORATION.

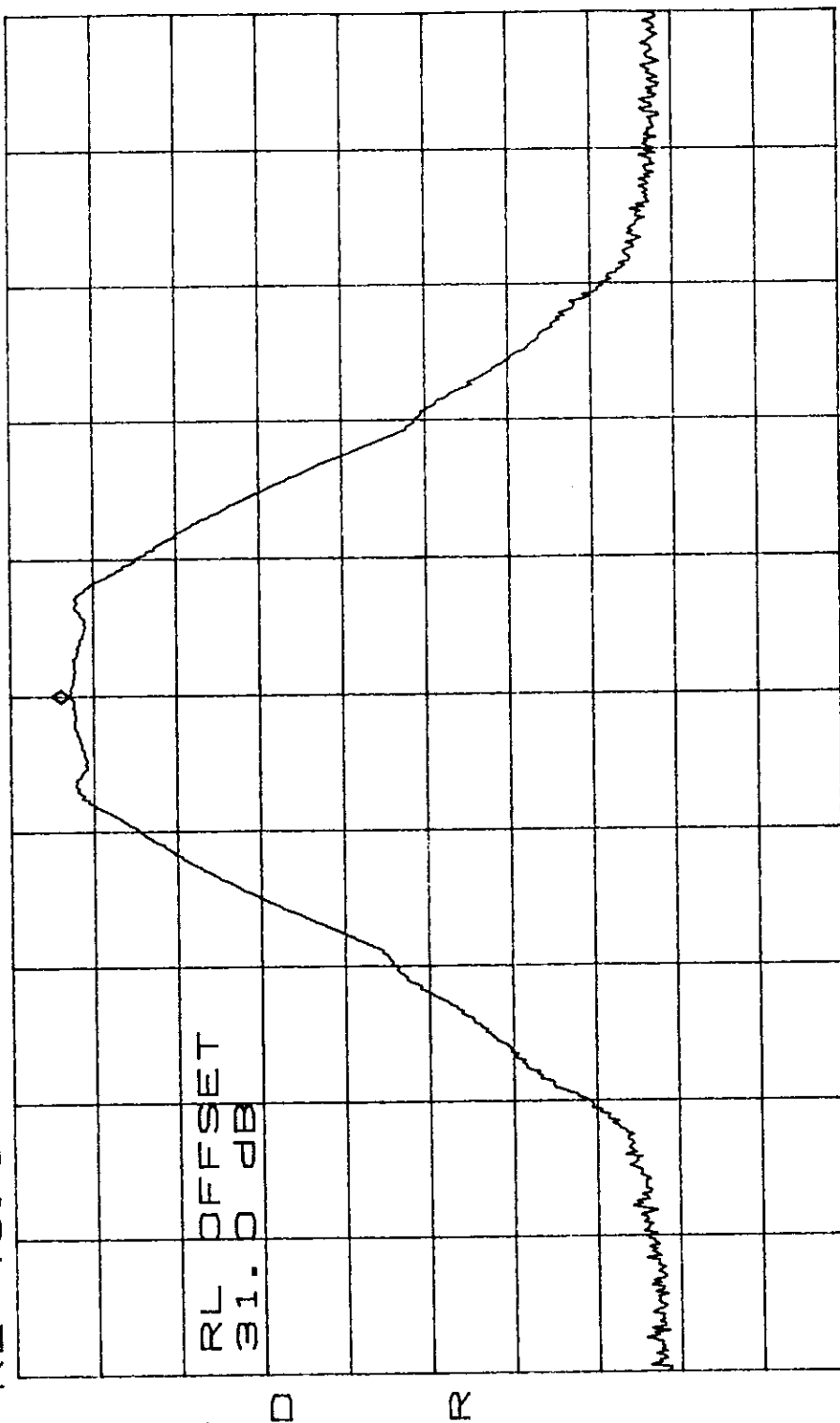
In/Out

3/27/98
FCC ID: LB41901

Output
Max Hold

UL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 MKR 33.00dBm
RL 40.00dBm 10dB / 1.895200GHZ

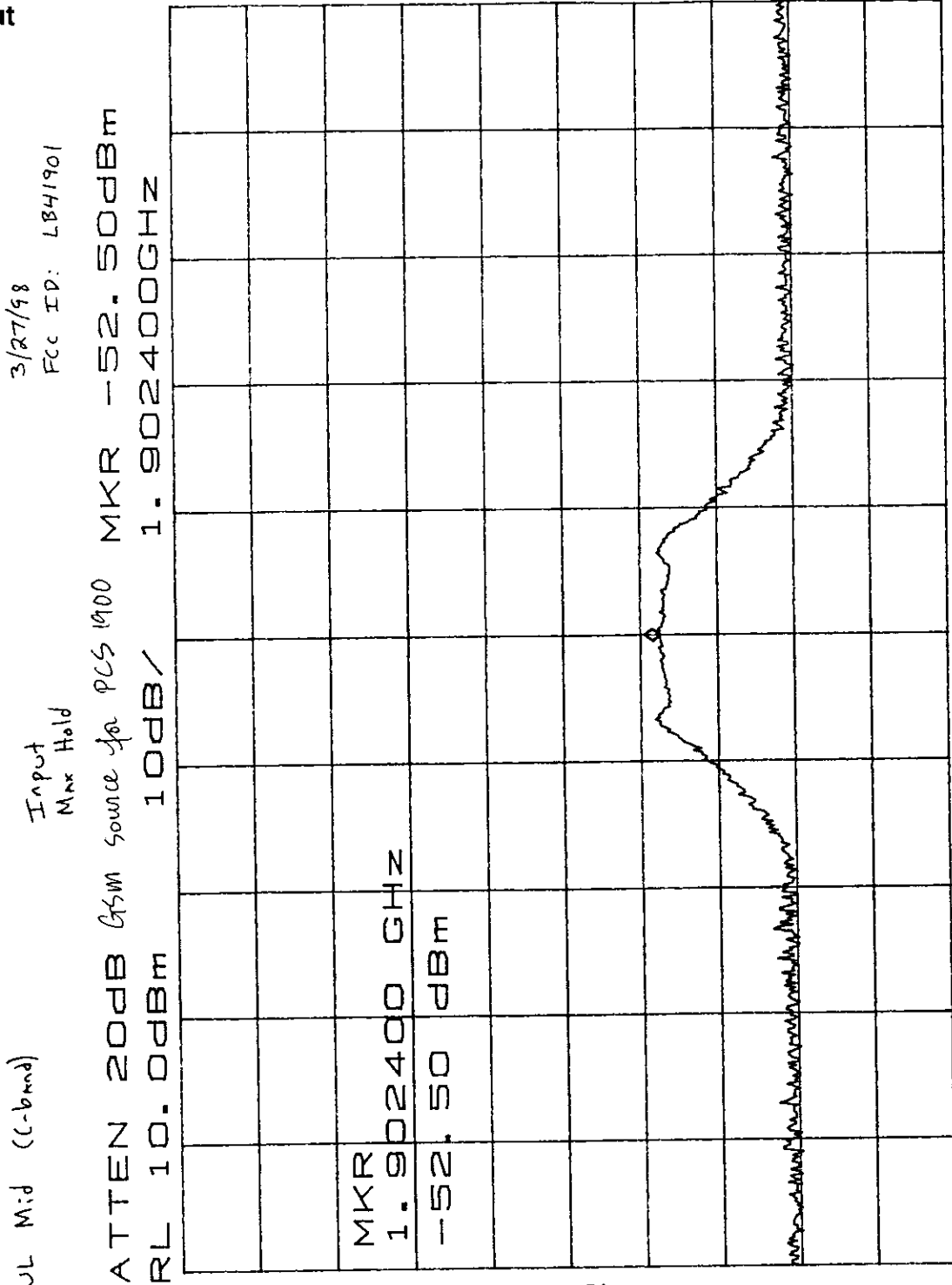


In/Out

Tested by ORTEL CORPORATION.

CENTER 1.895200GHZ SPAN 1.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

In/Out



In/Out

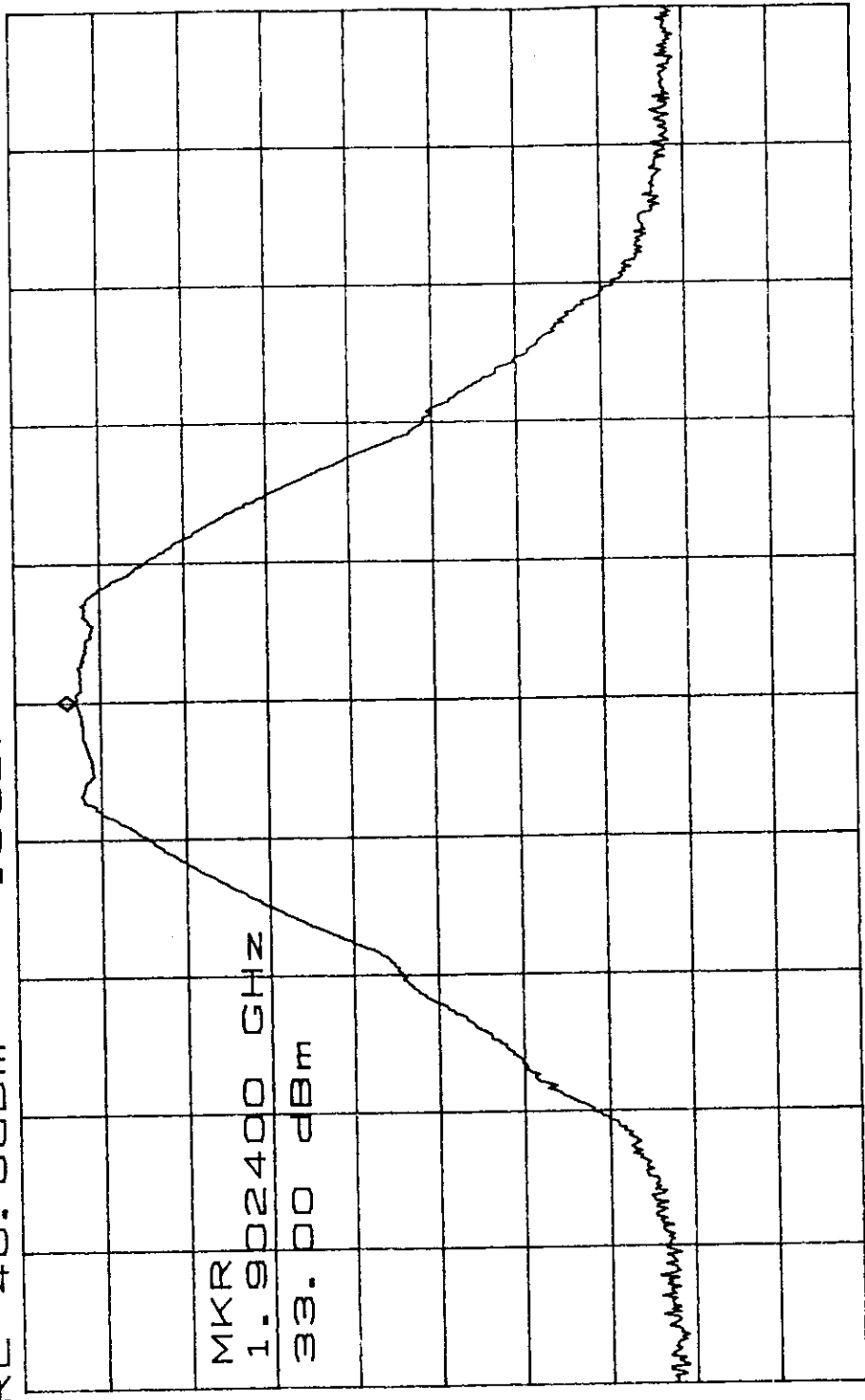
Tested by ORTEL CORPORATION.

In/Out

3/27/98
FCC ID: LB41901

Output
Max Hold

UL Mid (C-band)
ATTEN 20dB GSM source for PCS 1900 MKR 33.00dBm
RL 40.00dBm 10dB/ 1.902400GHZ



In/Out

MKR
1.902400 GHZ
33.00 dBm

CENTER 1.902400GHZ SPAN 1.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Tested by ORTEL CORPORATION.

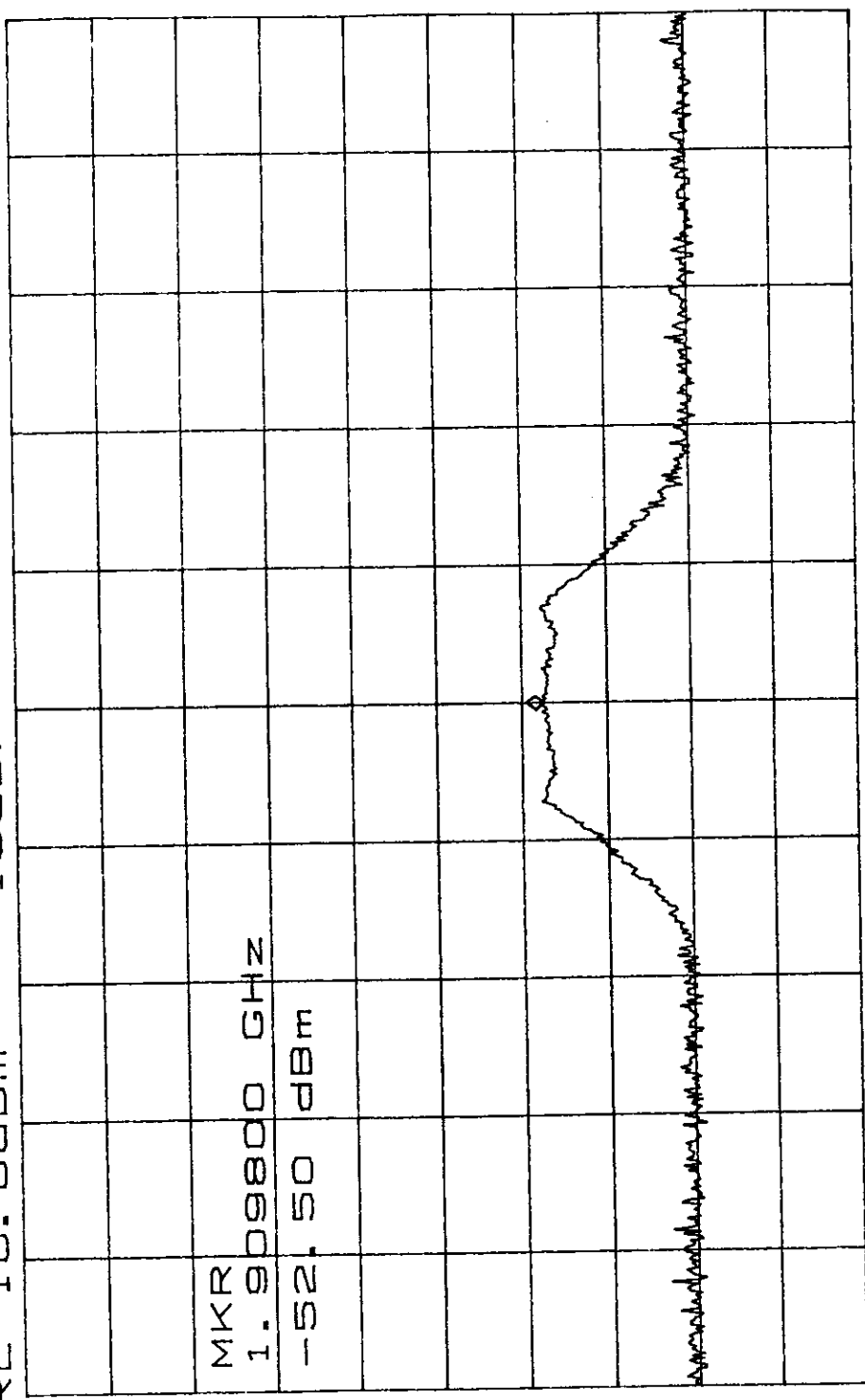
In/Out

3/27/98
FCC ID: LB41901

Input
Max Hold

UL High (C-band)

ATTEEN 20dB GSM source for PCS 1900 MKR -52.50dBm
RL 10.0dBm 10dB/ 1.909800GHZ

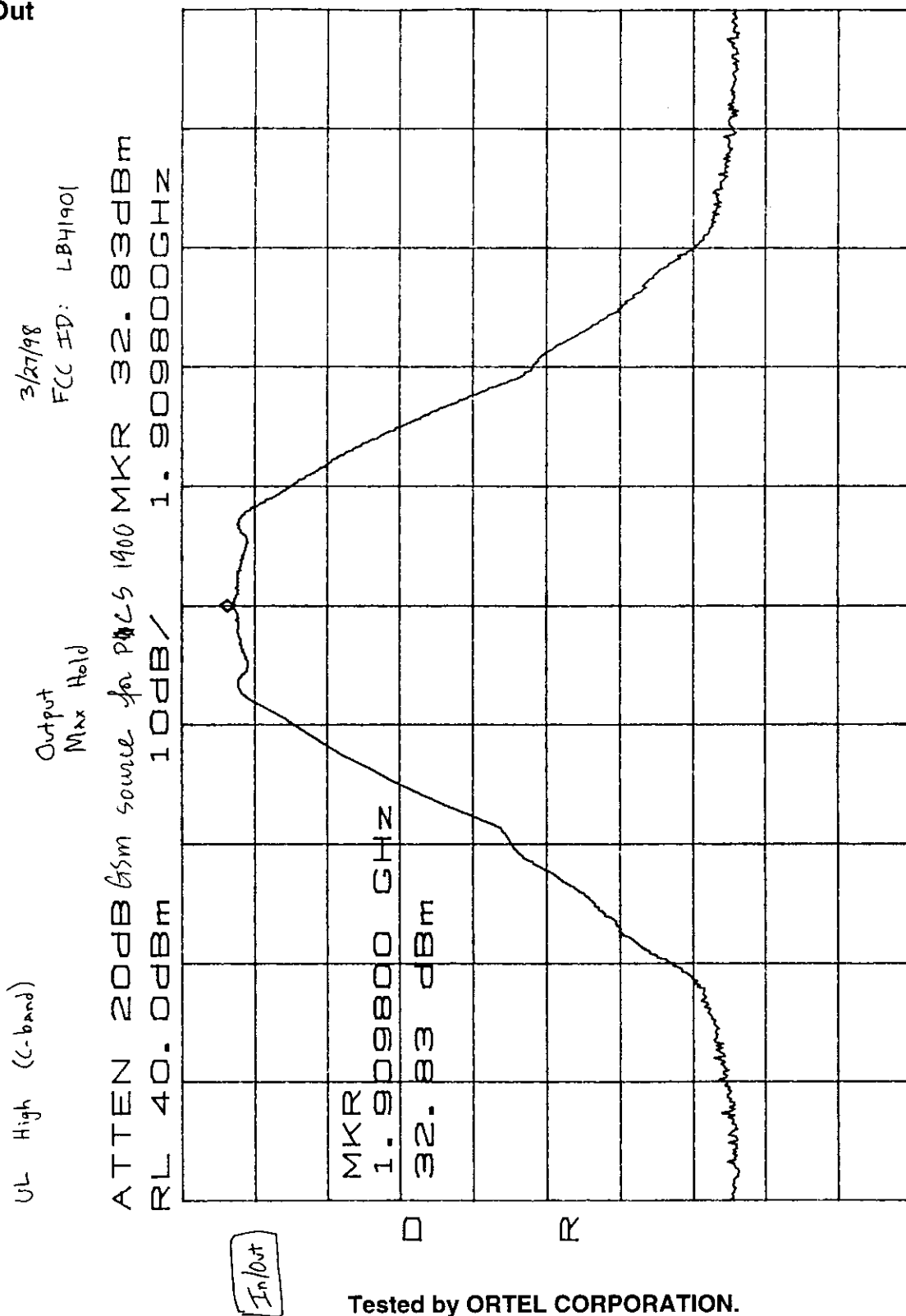


CENTER 1.909800GHZ *RBW 30KHZ *VBW 30KHZ
SPAN 1.000MHZ SWP 50.0ms

In/Out

Tested by ORTEL CORPORATION.

In/Out



CENTER 1.909800GHZ SPAN 1.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Tested by ORTEL CORPORATION.

2-Tone

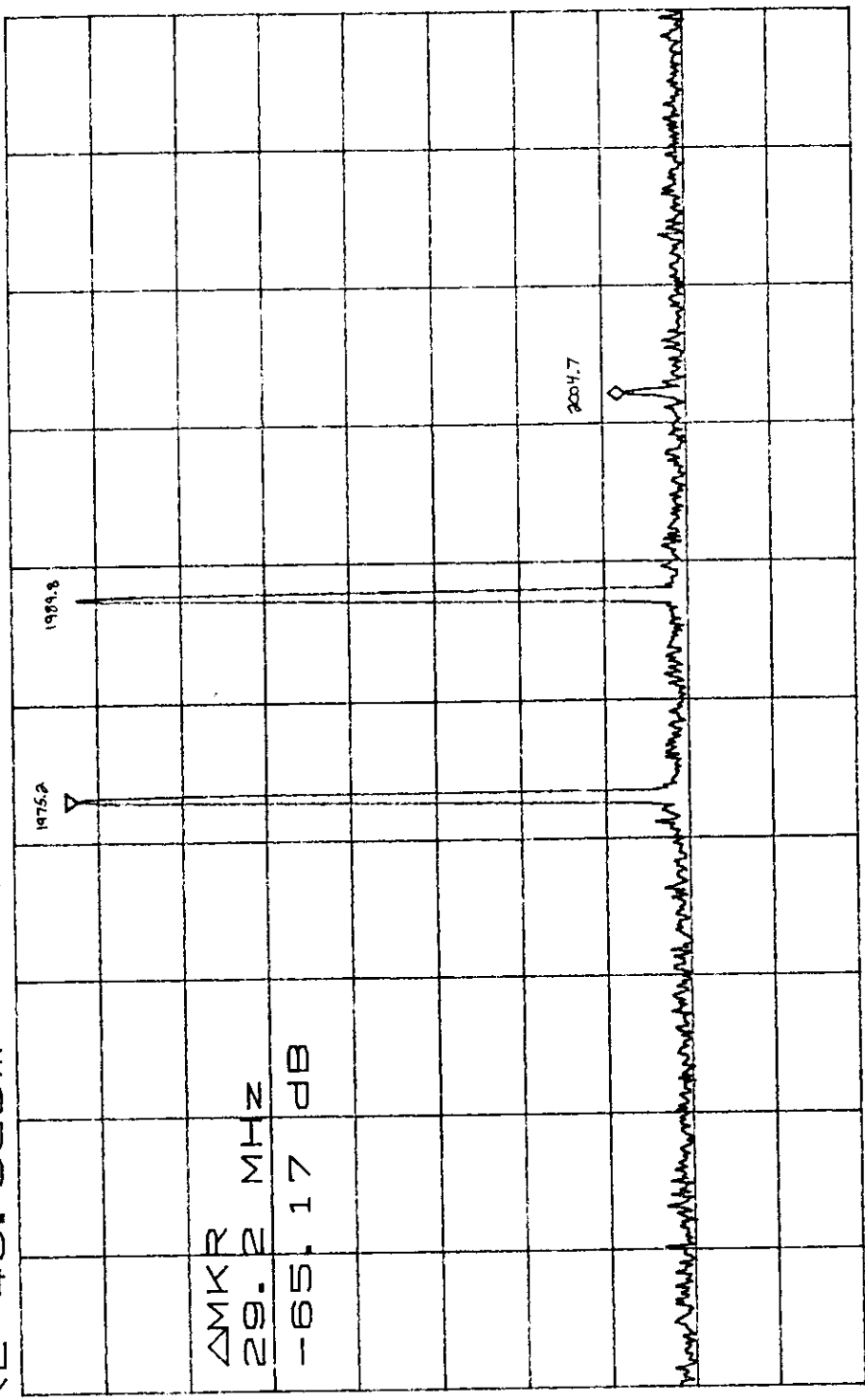
4/6/98
FCC ID: LB41901

Output Intermod's Over C-band
MAX HOLD

DL Input Freq's:
1975.2 MHz
1989.8 MHz

Set A: Ch. 1 = 810
Ch. 2 = 737

ATTEN 20dB GSM source for PCS 1900 ΔMKR -65.17dB
RL 40.0dBm 10dB/ 29.2MHz



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.9825GHZ *RBW 30KHZ *VBW 30KHZ
SPAN 100.0MHZ SWP 280ms

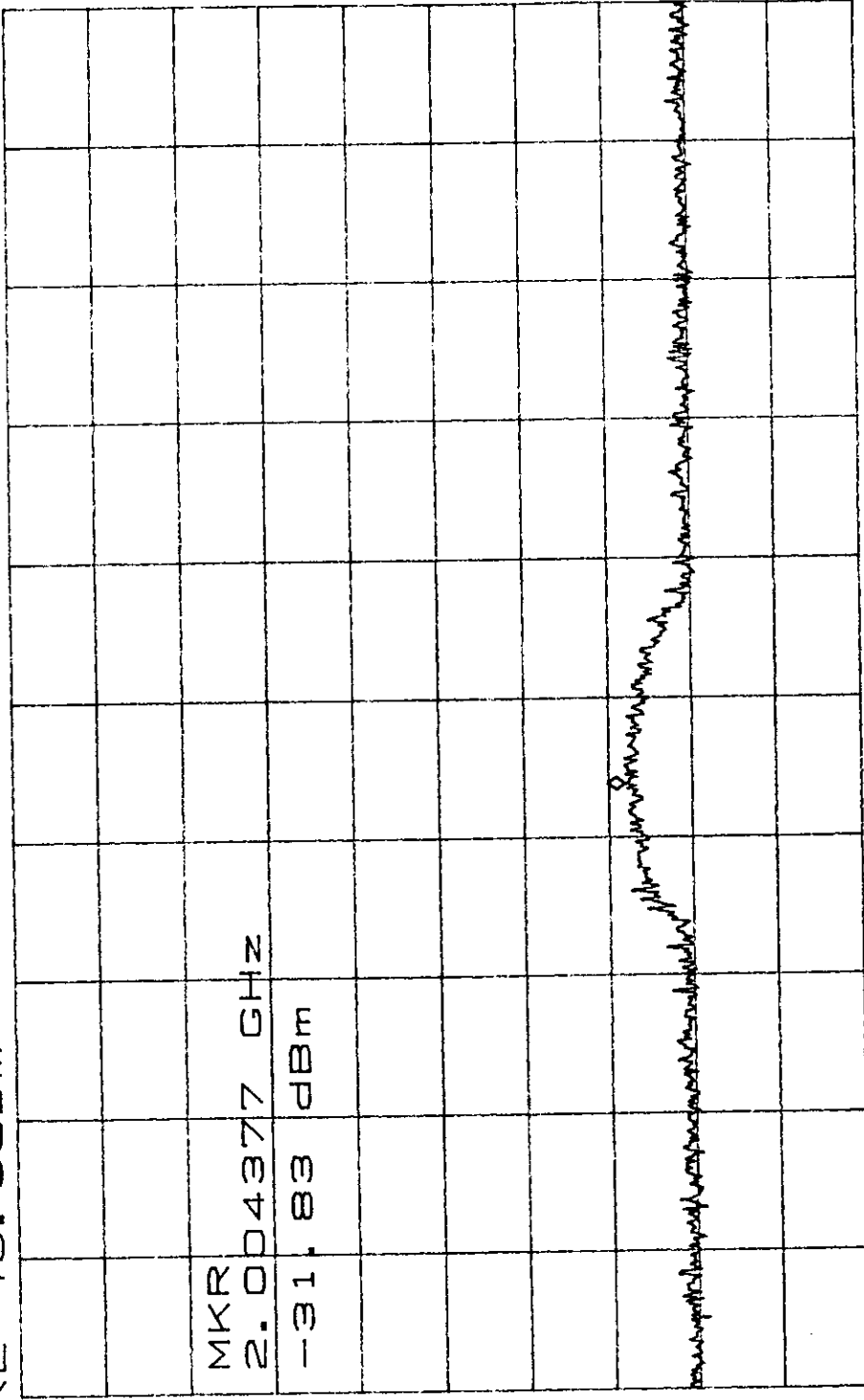
2-Tone

4/6/98
FCC ID: LB41901
C-band

Output Intermod @ ~2004. MHz
MAX HOLD

DL Input Freq's: 1975.2 MHz (ch.1)
1989.8 MHz (ch.2)

ATTEN 20dB GSM source for PCS 1900 MKR -31.83dBm
RL 40.0dBm 10dB/ 2.004377GHz



2-tone

MKR
2.004377 GHz
-31.83 dBm

CENTER 2.004500GHz SPAN 2.000MHz
*RBW 30kHz *VBW 30kHz SWP 50.0ms

Tested by ORTEL CORPORATION.

2-Tone

DL Inputs: 1975.2 MHz
 1989.8 MHz

Inputs for IMD
 C-band

4/6/98
 FCC ID: LB41901
 Slight input amplitude variation due to
 gain over bandwidth.

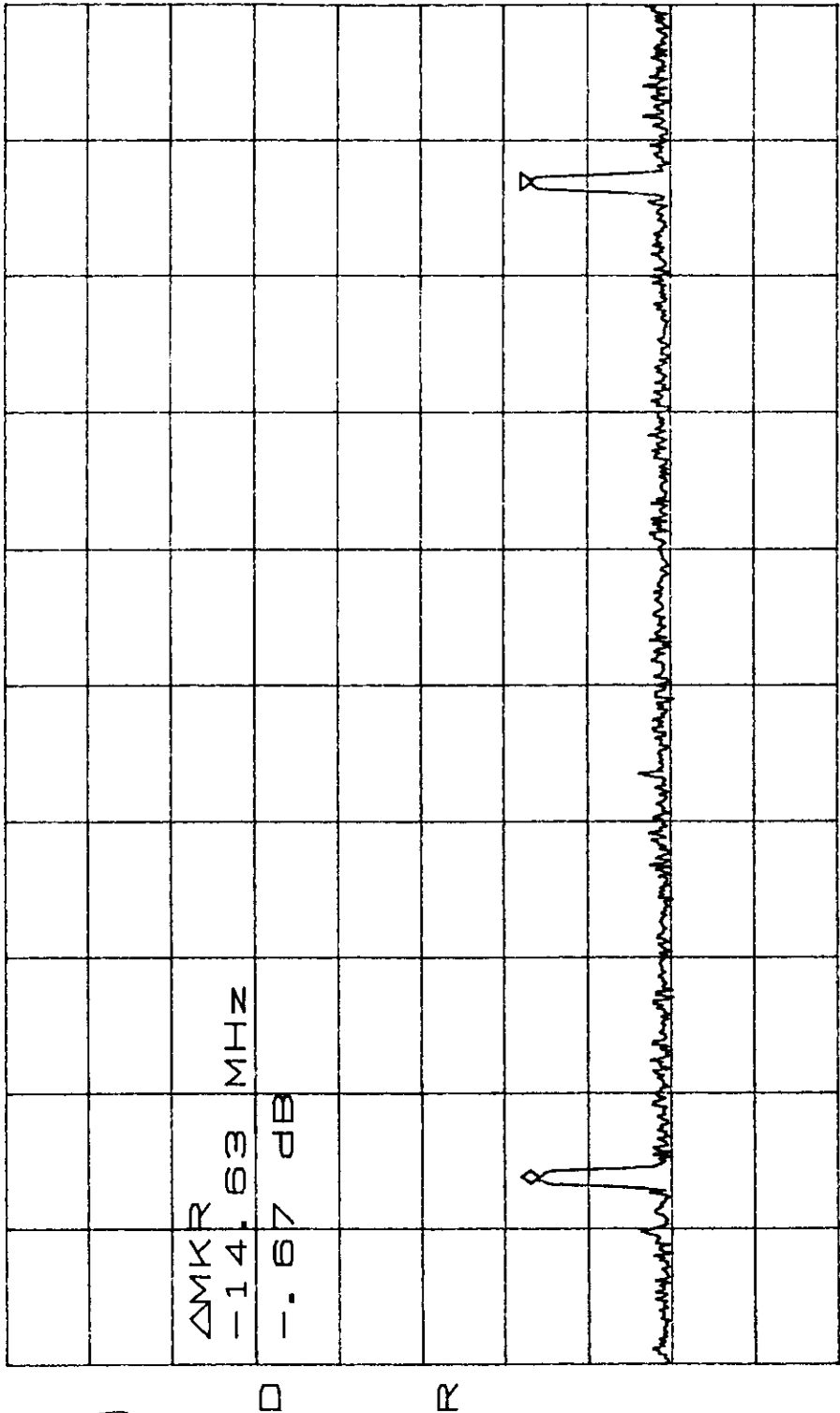
Set At: Ch1=810, Ch2=737

MAX HOLD
 GSM source for PCS 1900

ATTEN 20dB
 RL 10.0dBm 10dB/

Δ MKR -14.63 MHz
 -14.63 MHz
 -14.63 MHz
 -14.63 MHz

Δ MKR -14.63 MHz
 -14.63 MHz



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.98250GHZ
 *RBW 30KHZ *VBW 30KHZ

SPAN 20.00MHZ
 SWP 56.0ms

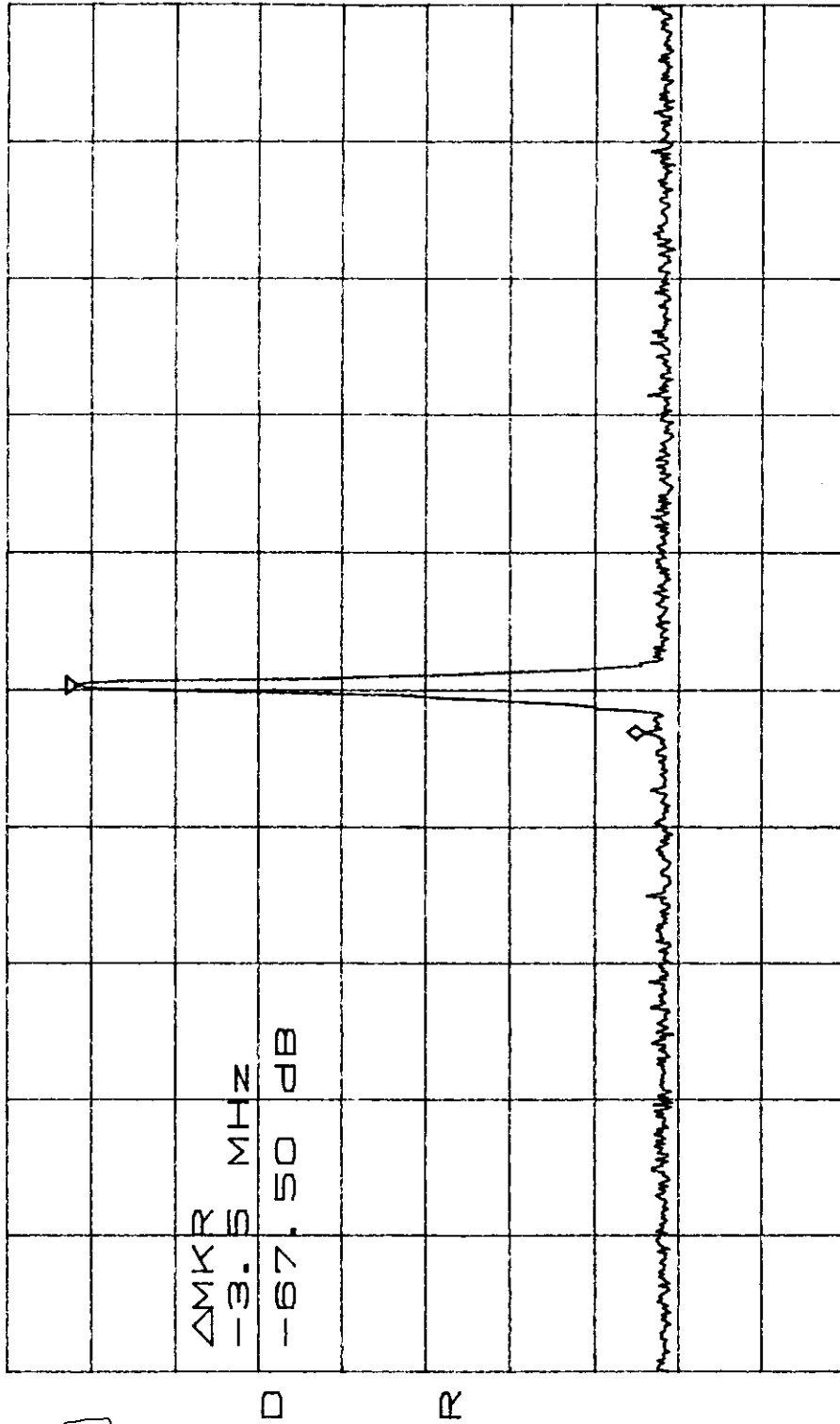
2-Tone

4/6/98
FCC ID: LB41901

DL Input Freq's: 1975.2 MHz
1975.4 MHz
Output Intermod's Over C-band
MAX HOLD

Set at: CH1=739
CH2=737

ATTEN 20dB GSM source for PCS 1900
RL 40.0dBm 10dB/ ΔMKR -67.50dB
-3.5MHz



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.9753GHz *RBW 30kHz *VBW 30kHz
SPAN 100.0MHz SWP 280ms

2-Tone

4/6/98
FCC ID: LB41901

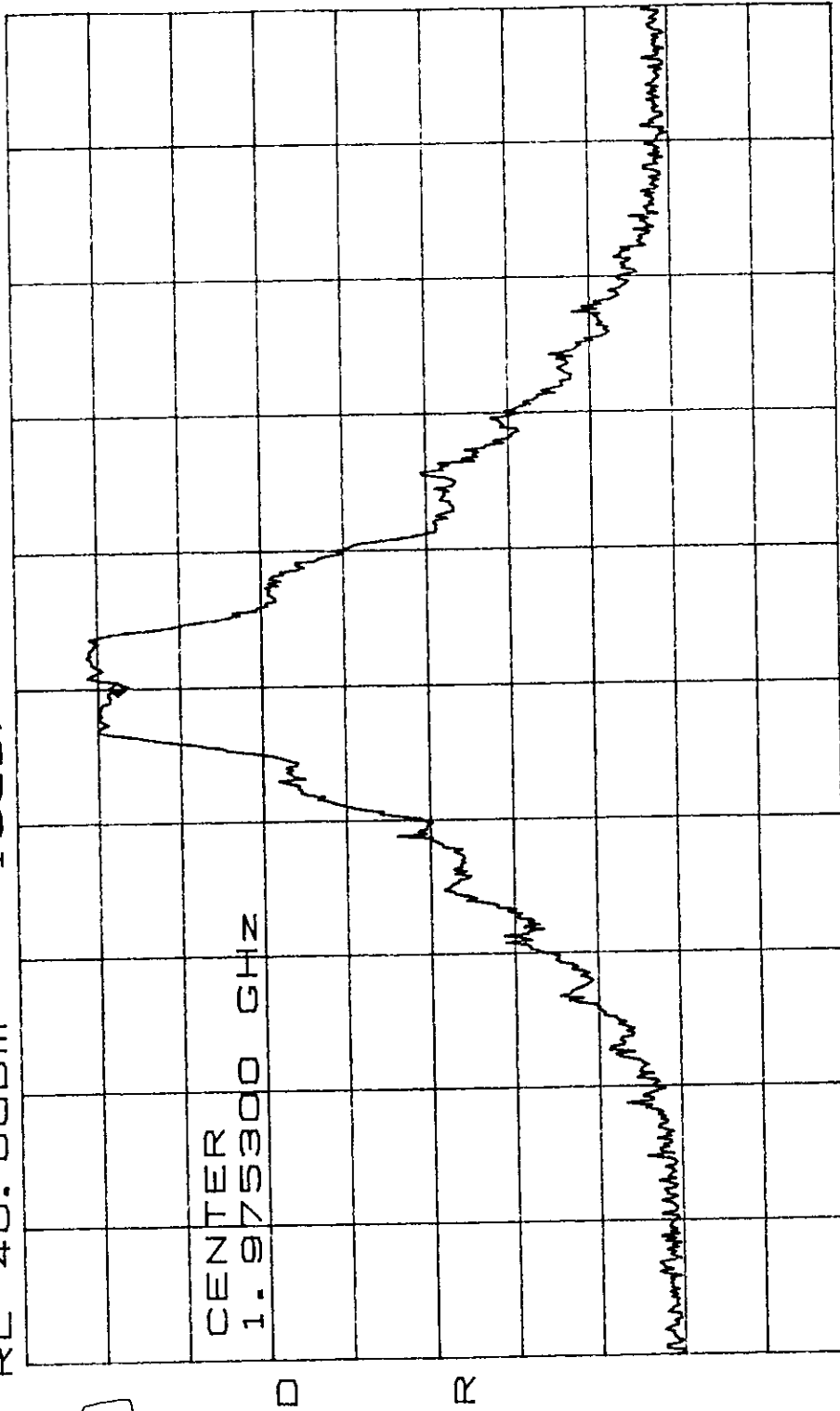
Intermods Over C-band

MAX HOLD

DL Input Freq's: 1975.2 MHz
1975.4 MHz

Set up: ch.1=738 ch.2=737
ATTEN 20dB GSM source for PCS 1900

MKR 26.67dBm
RL 40.0dBm
1.975300GHZ
10dB/



CENTER 1.975300GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 5.000MHZ
SWP 50.0ms

2-tone

Tested by ORTEL CORPORATION.

2-Tone

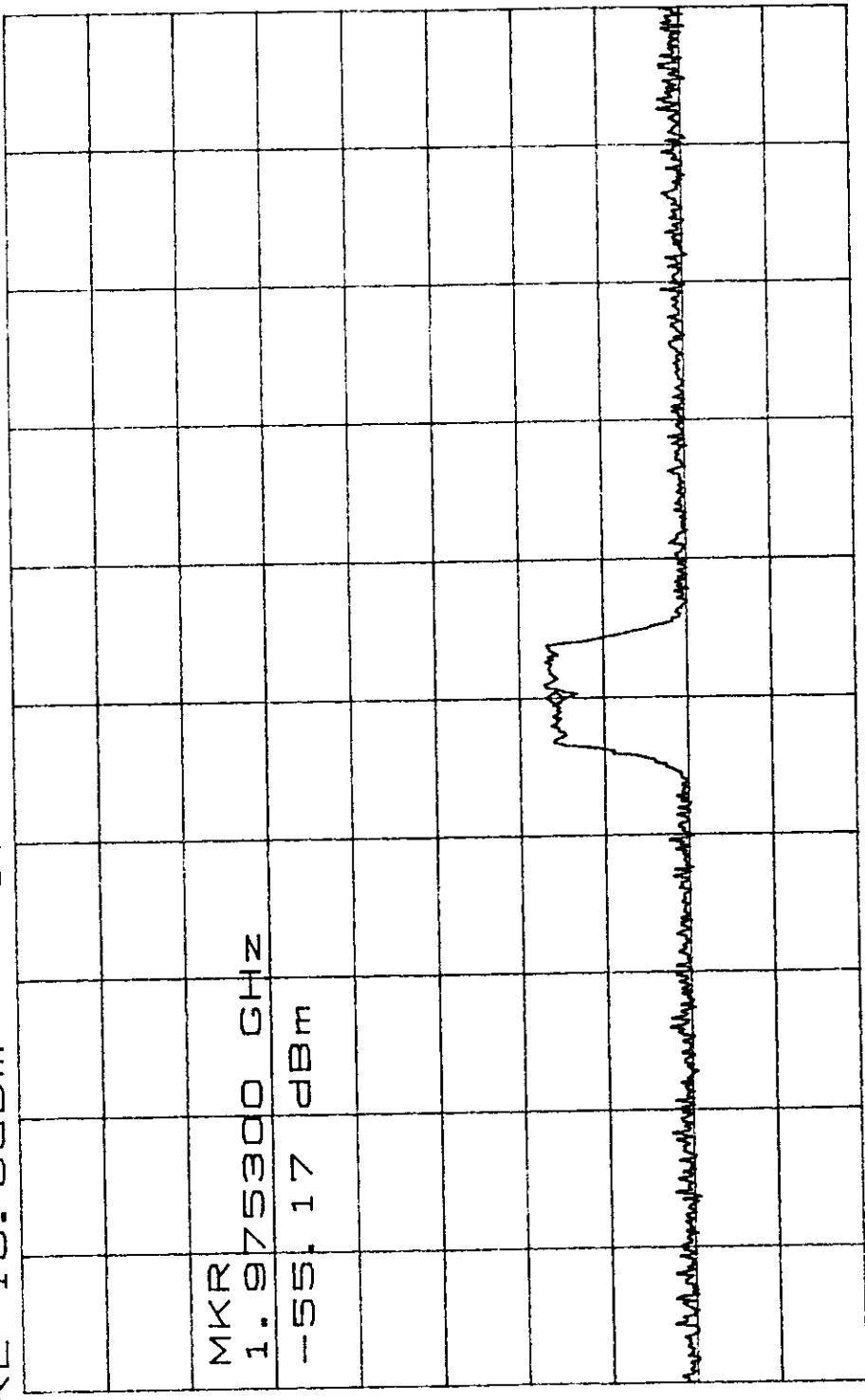
4/6/98
FCC ID: LB41901

Inputs for IMD
C-band

Set At: Ch.1=738 Ch.2=737

AT TEN 20dB MAX HOLD
RL 10.0dBm GSM source for PCS1900
10dB/

MKR -55.17dBm
1.975300GHZ



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.975300GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0MS

2-Tone

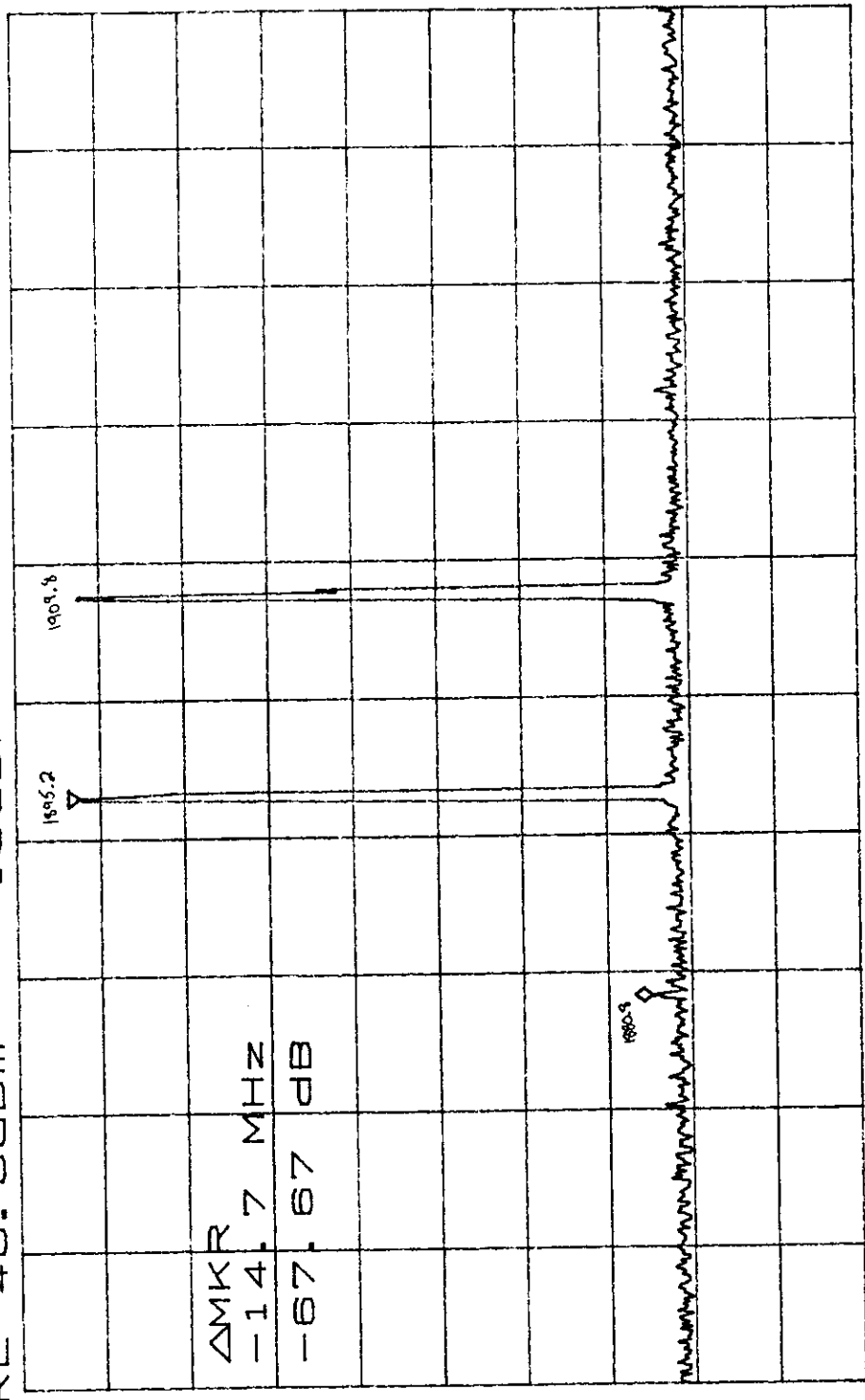
4/6/98
FCC ID: LB41901

Output Intermods Over C-band
MAX HOLD

UL Input Freq's: 1895.2 MHz
1909.8 MHz

Set at: ch.1=810 ch.2=737

ATTEN 20dB GSM source for PCS 1900 ΔMKR -67.67dB
RL 40.0dBm 10dB/ -14.7MHz



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.9025GHZ
*RBW 30KHZ *VBW 30KHZ
SPAN 100.0MHZ
SWP 280ms

2-Tone

4/6/98
FCC ID: LB41901
C-band

Output Intermod @ ~1880 MHz

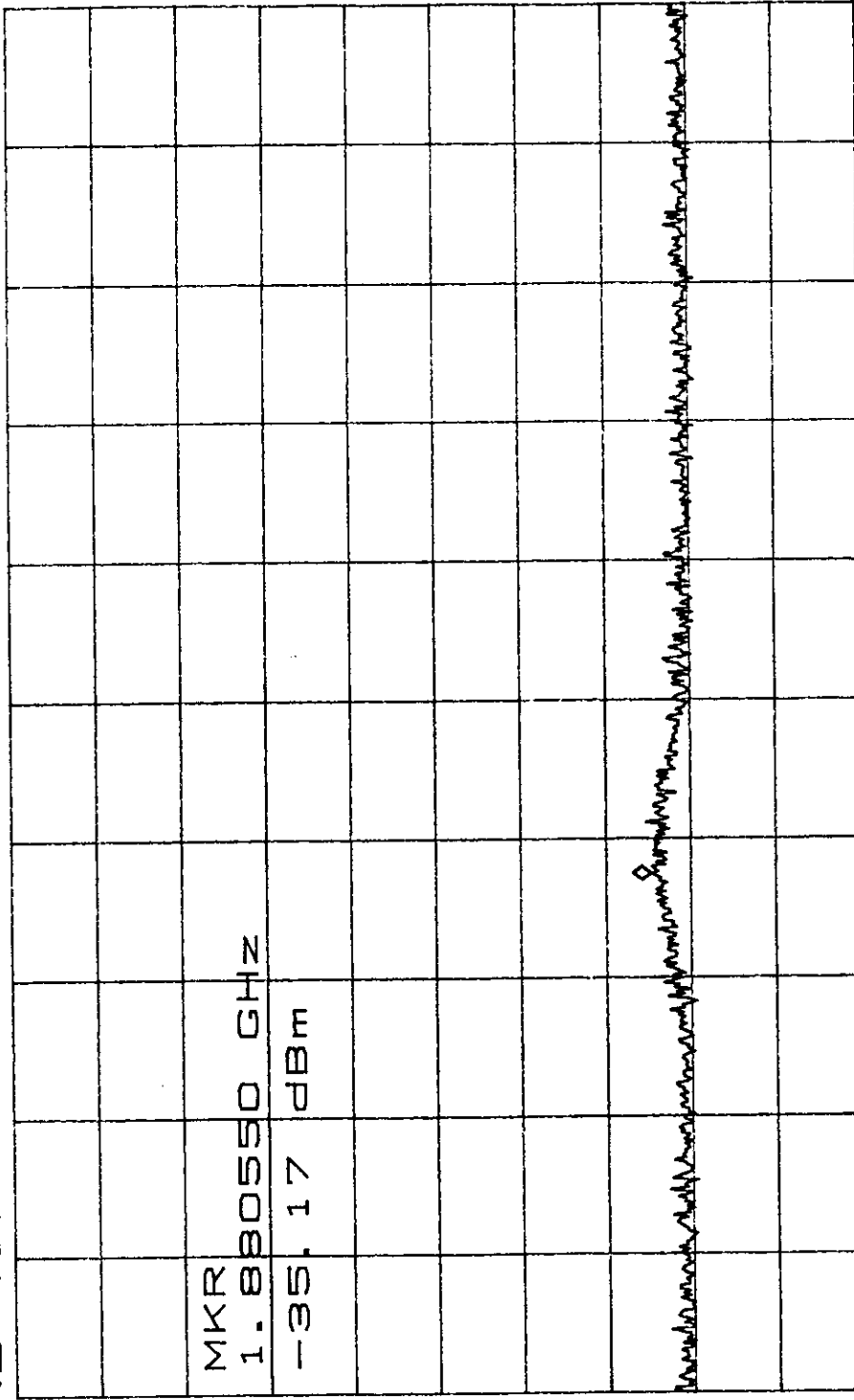
UL Input Freq's: 1895.2 MHz
1909.8 MHz

Set pt: ch.1=810 ch.2=737

MAX HOLD

ATTEN 20dB GSM source for PCS 1900 MKR -35.17dBm

RL 40.0dBm 10dB/ 1.880550GHZ



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.880800GHZ SPAN 2.000MHZ

*RBW 30kHz *VBW 30kHz SWP 50.0ms

2-Tone

UL Inputs: 1895.2 MHz
1909.8 MHz

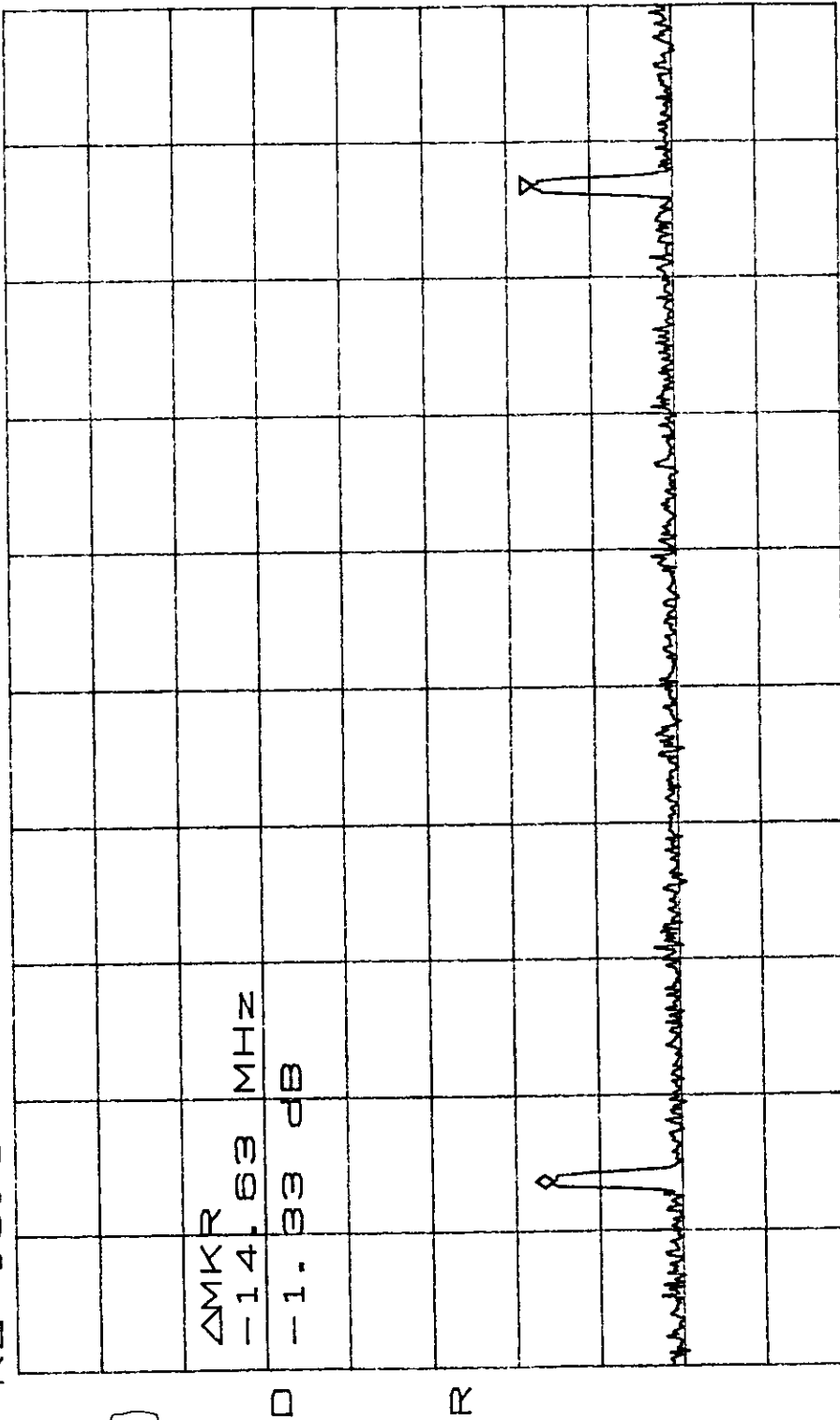
Set pt: Ch.1=810 Ch.2=737

Inputs for IMD C-band
MAX HOLD
GSM source for PCS 1900
10dB/

4/6/98 FCC ID: LB41901
Slight input amplitude variation due to gain over BW.

AMKR -1.33dB
-14.63MHz

RL 10.0dBm



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.90250GHZ SPAN 20.00MHZ
*RBW 30KHZ *VBW 30KHZ SWP 56.0ms

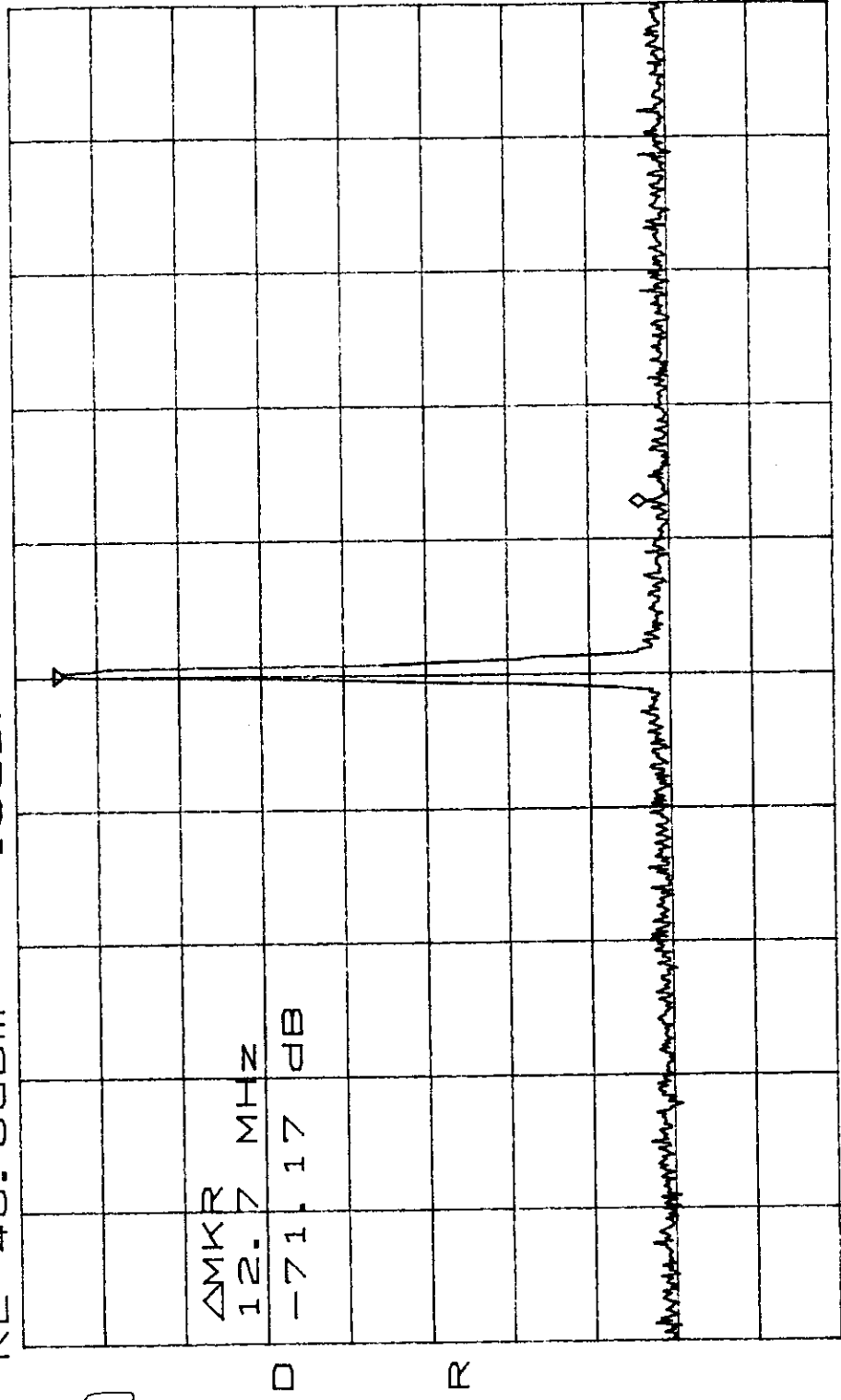
2-Tone

4/6/98
FCC ID: LB41901

Output Intermod: Over C-band
MAX HOLD

UL Input Freq's: 1895.2 MHz
1895.4 MHz

Set At: Ch. 1=738 Ch. 2=737
ATTEN 20dB GSM source for PCS 1900 ΔMKR -71.17dB
RL 40.0dBm 10dB/ 12.7MHz



CENTER 1.8953GHz SPAN 100.0MHz
*RBW 30kHz *VBW 30kHz SWP 280ms

2-tone

Tested by ORTEL CORPORATION.

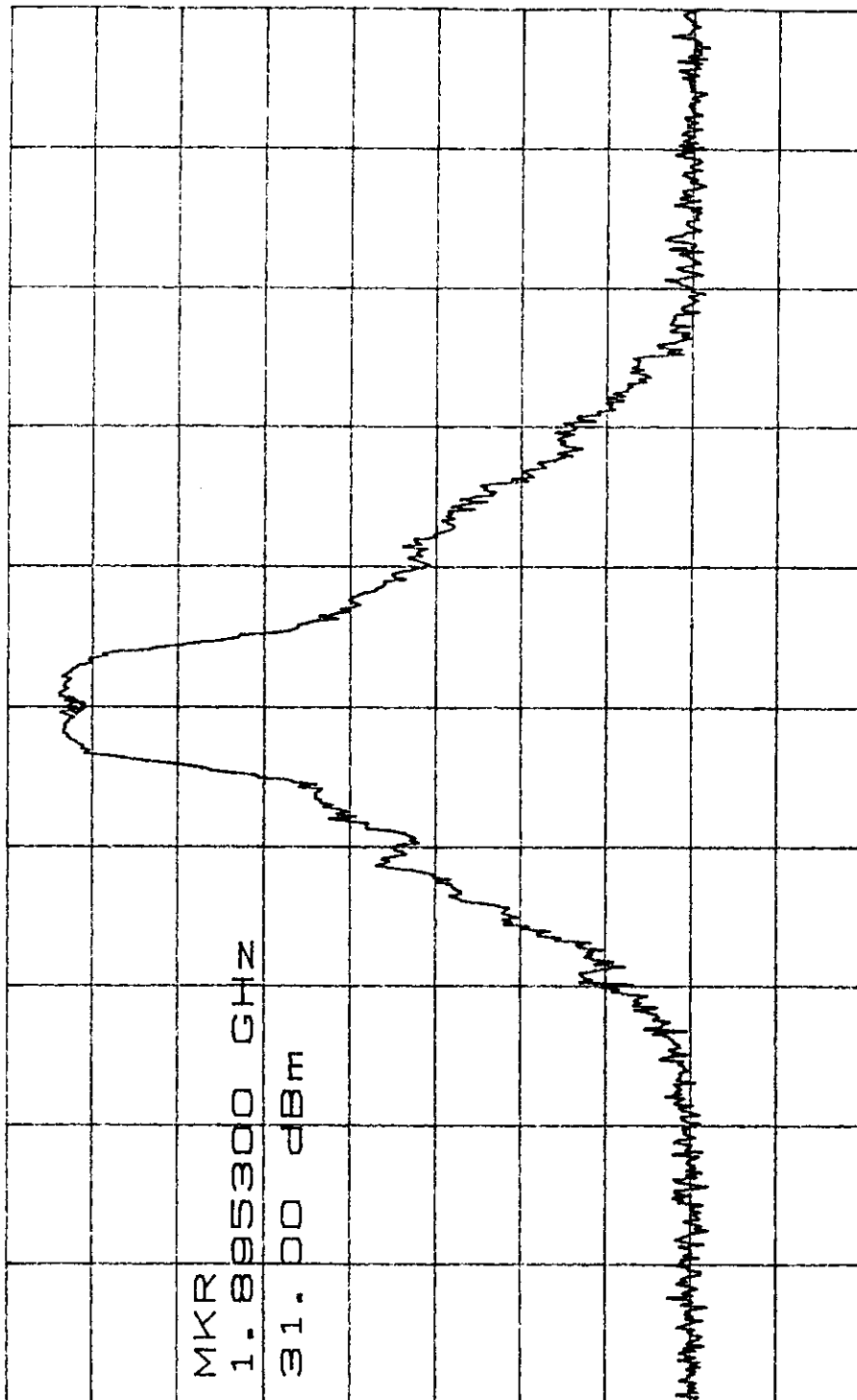
2-Tone

4/6/98
FCC ID: LB41901

Intermods Over C-band
MAX HOLD

UL Input Freq's: 1895.2 MHz
1895.4 MHz
Set pt: Ch.1=736 Ch.2=737

ATTEN 20dB GSM source for PCS 1900 MKR 31.00dBm
RL 40.00dBm 1.895300GHZ 10dB/



2-Tone

Tested by ORTEL CORPORATION.

CENTER 1.895300GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

2-Tone

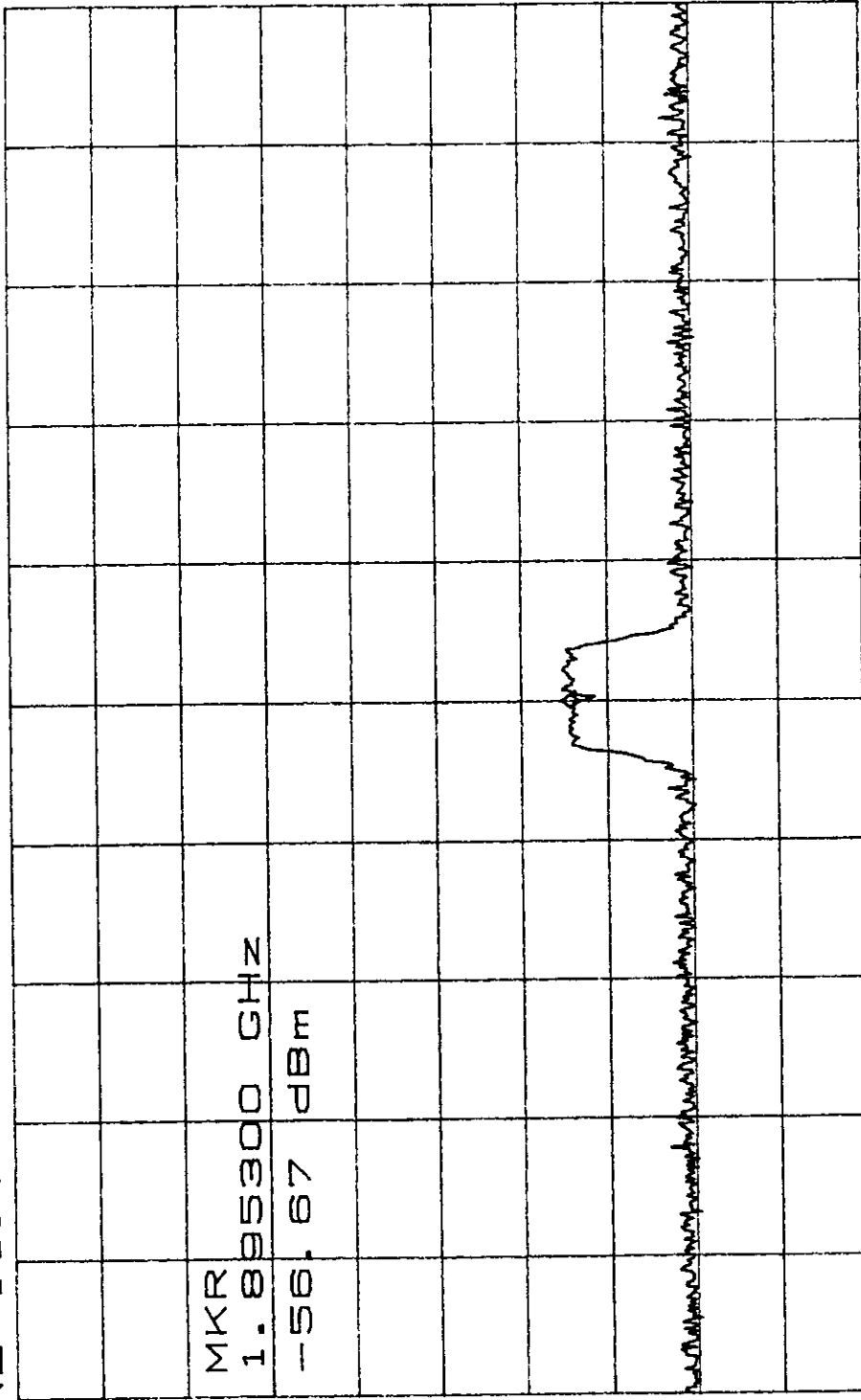
4/6/98
FCC ID: LB41901

Input for IMP
C-band

UL Inputs: 1895.2 MHz
1895.4 MHz

Set at: CH.1=738 CH.2=737

ATTEN 20dB GSM MAX HOLD source for PCS 1900 MKR -56.67 dBm
RL 10.0dBm 10dB/ 1.895300GHZ



2-tone

Tested by ORTEL CORPORATION.

CENTER 1.895300GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

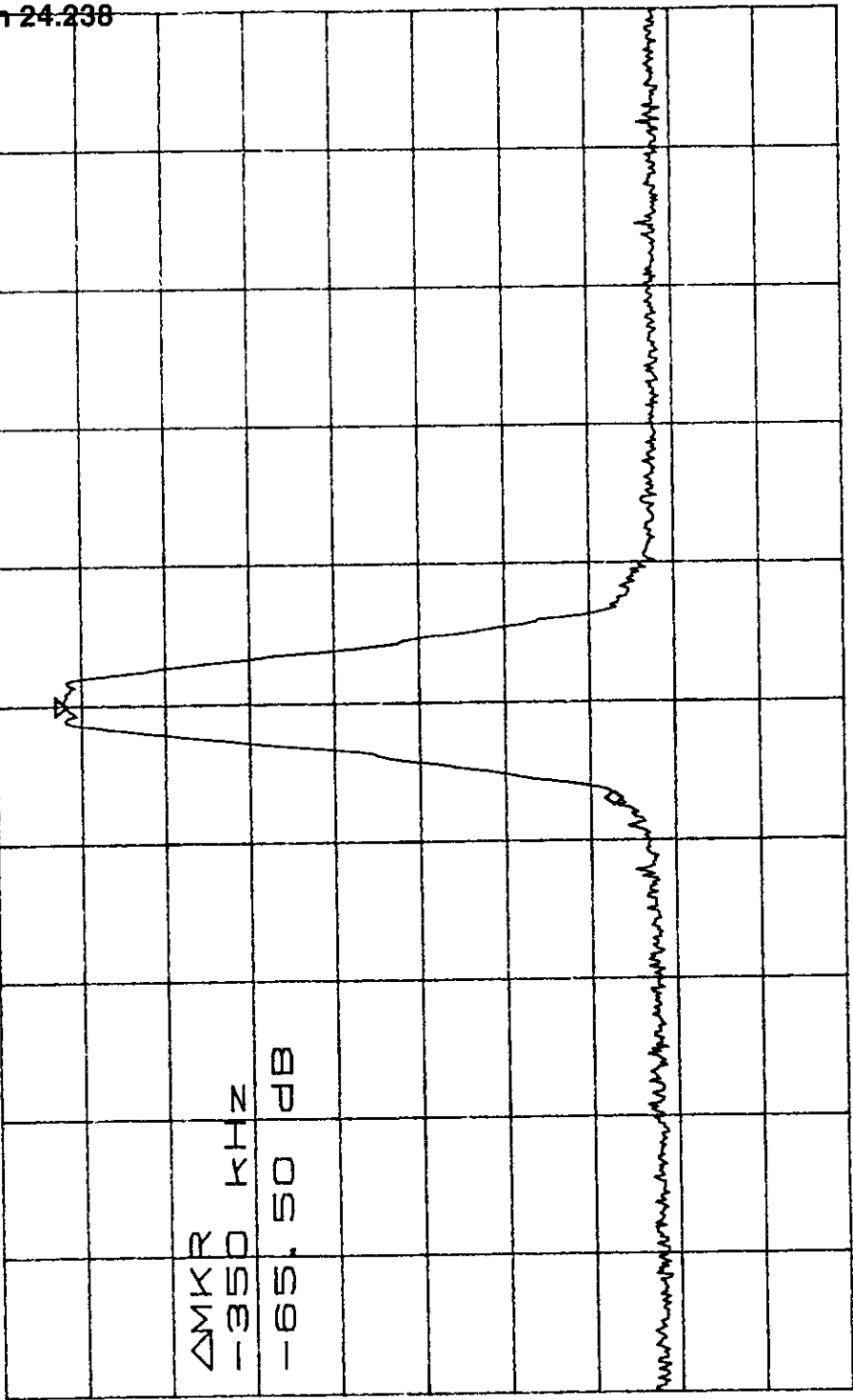
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

DL Low (C-band)

ATTEN 20dB GSM source for PCS1900 ΔMKR -65.50dB
RL 40.0dBm 10dB / -350kHz



CENTER 1.975200GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

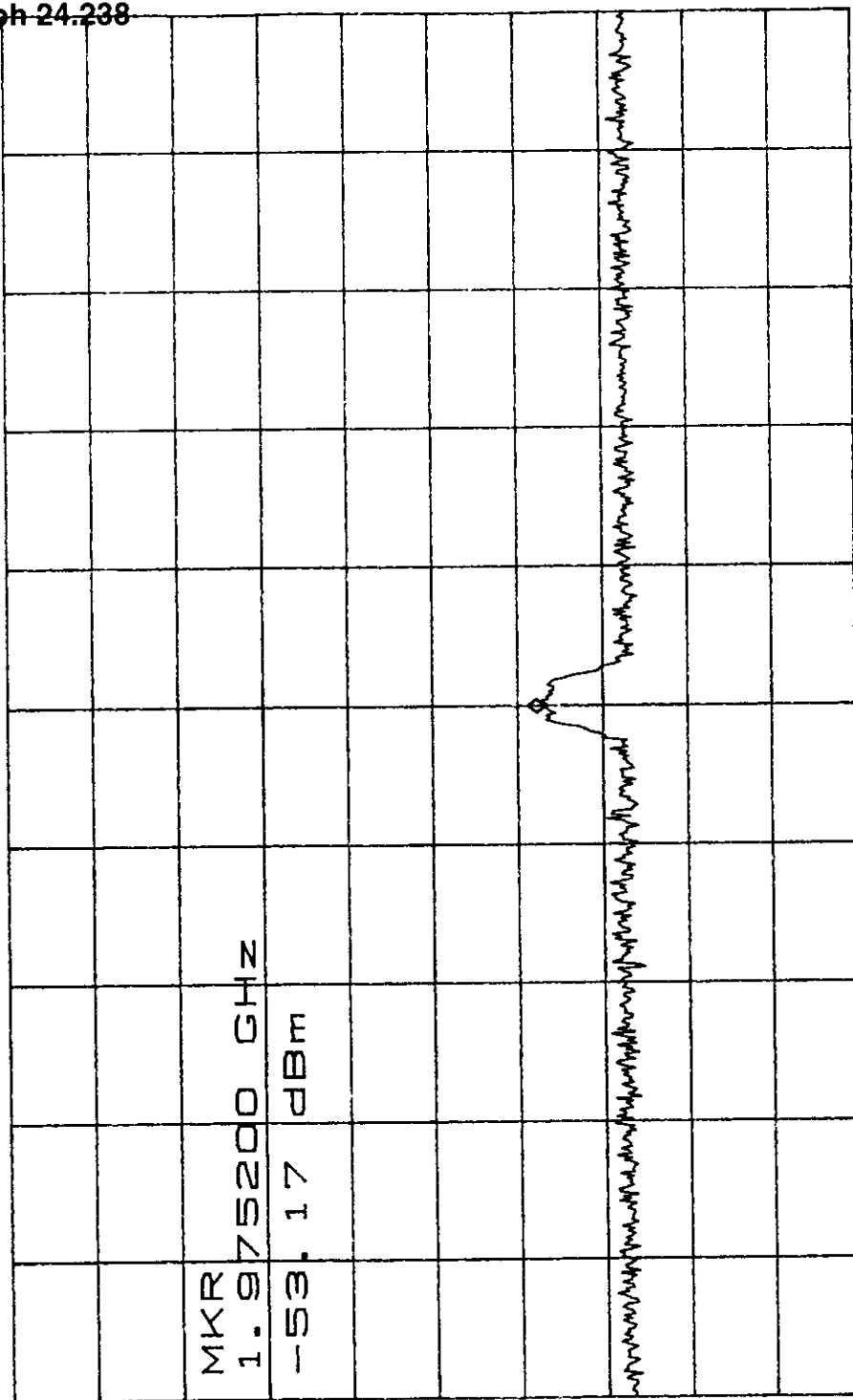
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

Input Signal
Max Hold

DL Low (C-band)

ATTEN 30dB GSM source for PCS1900 MKR -53.17dBm
RL 10.0dBm 10dB / 1.975200GHZ



24.238

Tested by ORTEL CORPORATION.

CENTER 1.975200GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

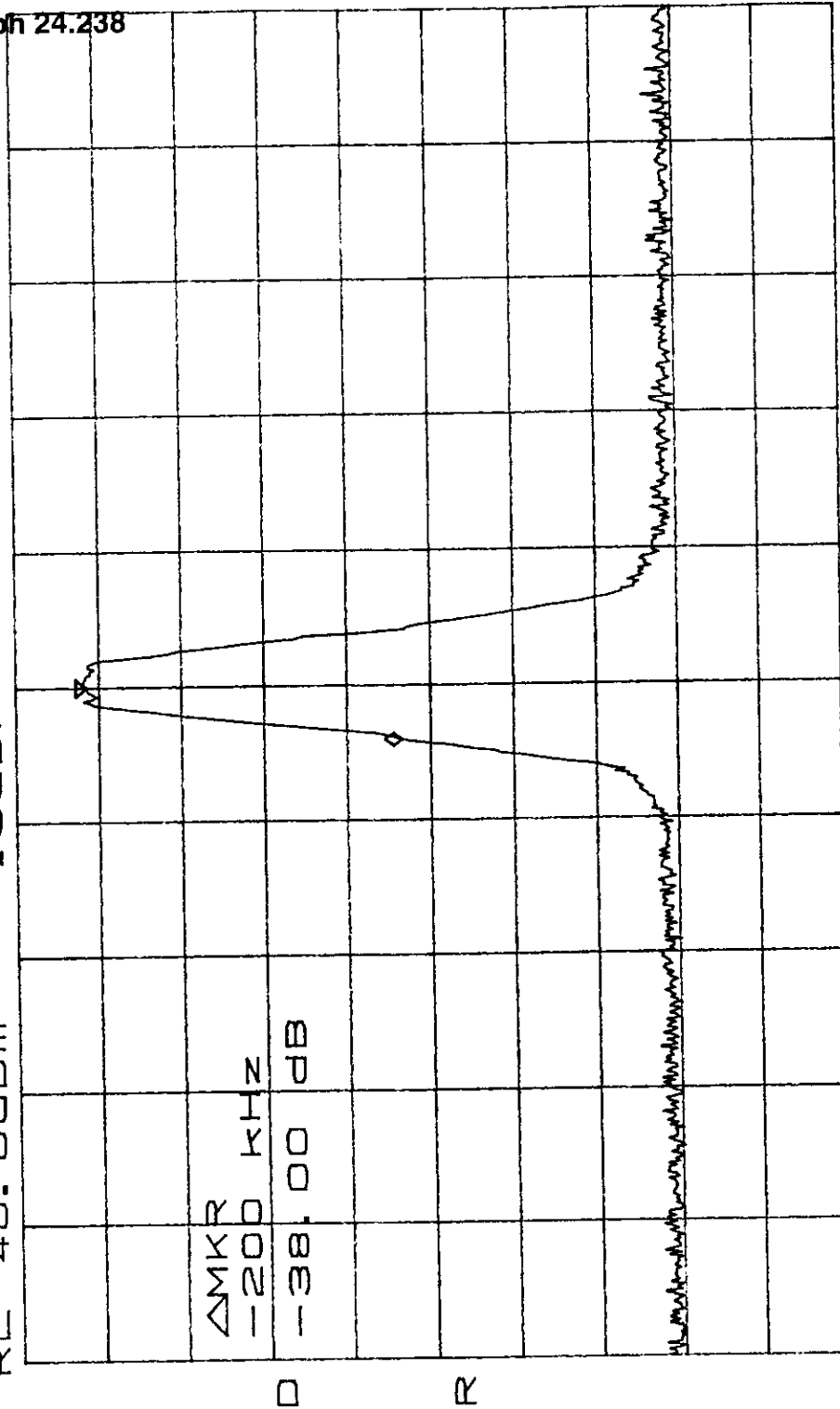
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

DL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 ΔMKR -38.00dB
RL 40.00dB 10dB/ -200kHz

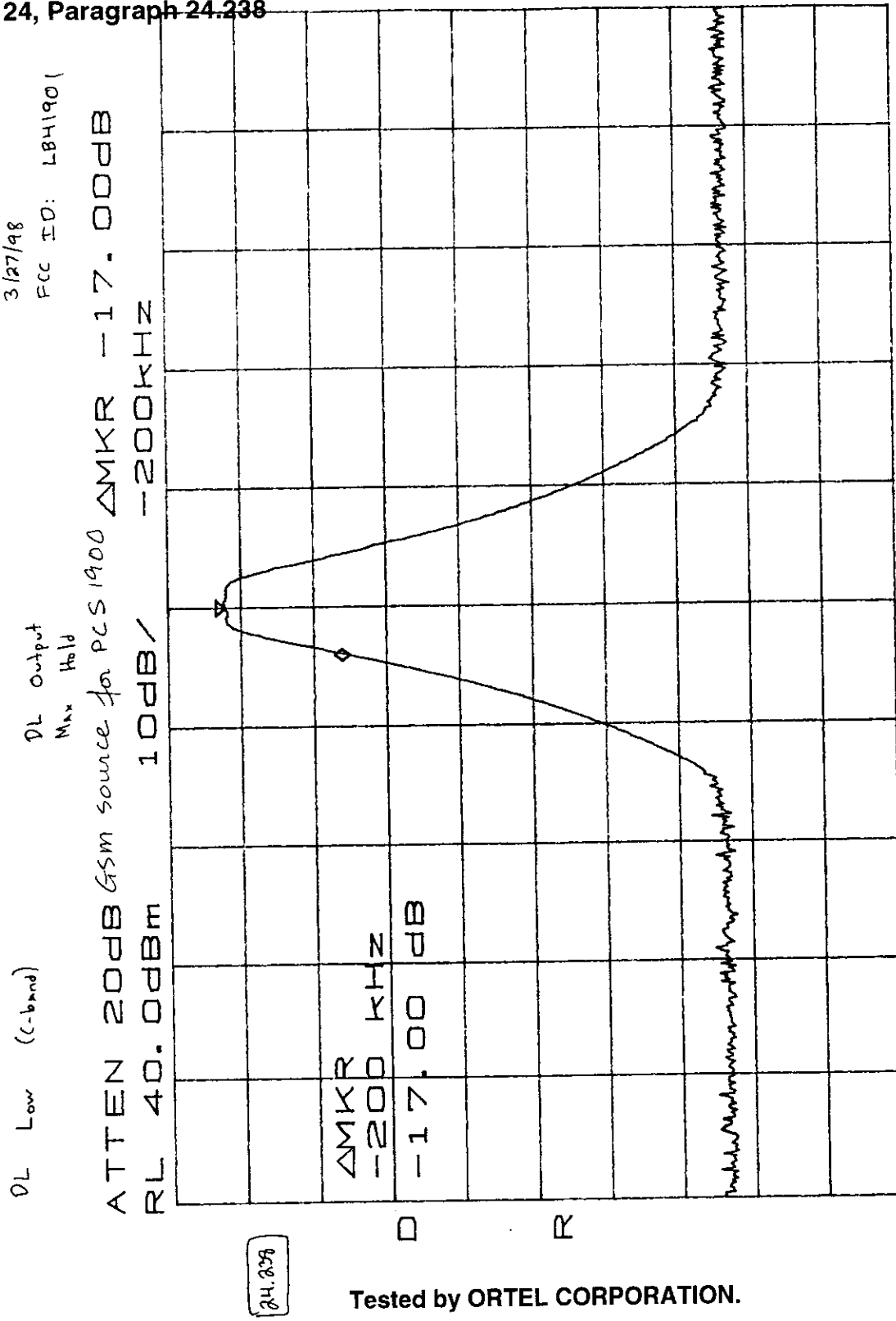


CENTER 1.975200GHZ *RBW 30KHZ
SPAN 5.000MHZ *VBW 30KHZ
SWP 50.0ms

24 2058

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238



CENTER 1.975200GHZ
*RBW 100KHZ *VBW 30KHZ
SPAN 5.000MHZ
SWP 50.0ms

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

3/27/08
FCC ID: LB41901

DL Low (C-band)

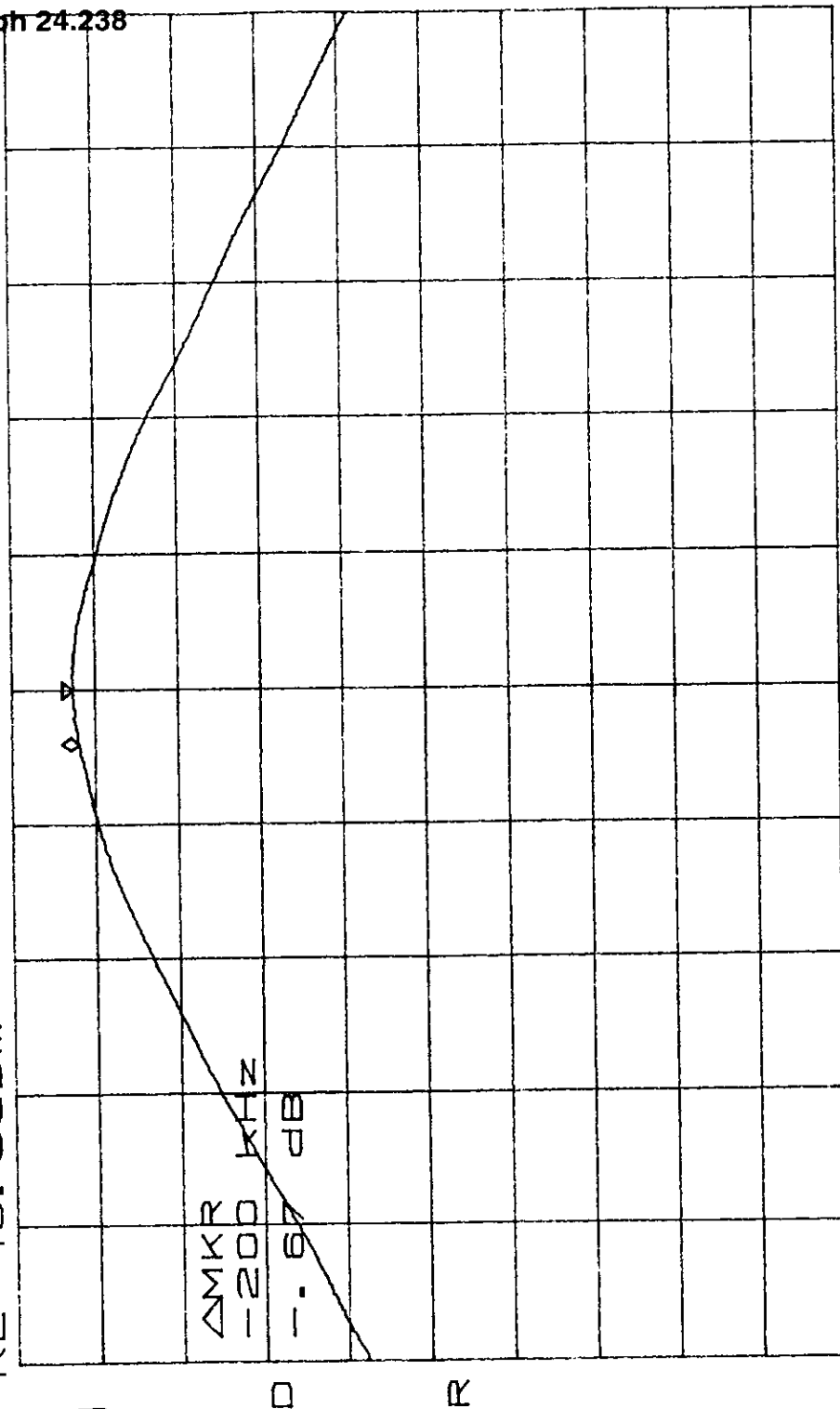
DL Output
Max Hold

ATTEN 20dB GSM source for PCS1400 ΔMKR -200kHz

RL 40.0dBm

10dB / -200kHz

ΔMKR
-200 kHz
-67 dB



SPAN 5.000MHZ

SWP 50.0ms

CENTER 1.975200GHZ

*RBW 1.0MHZ *VBW 1.0MHZ

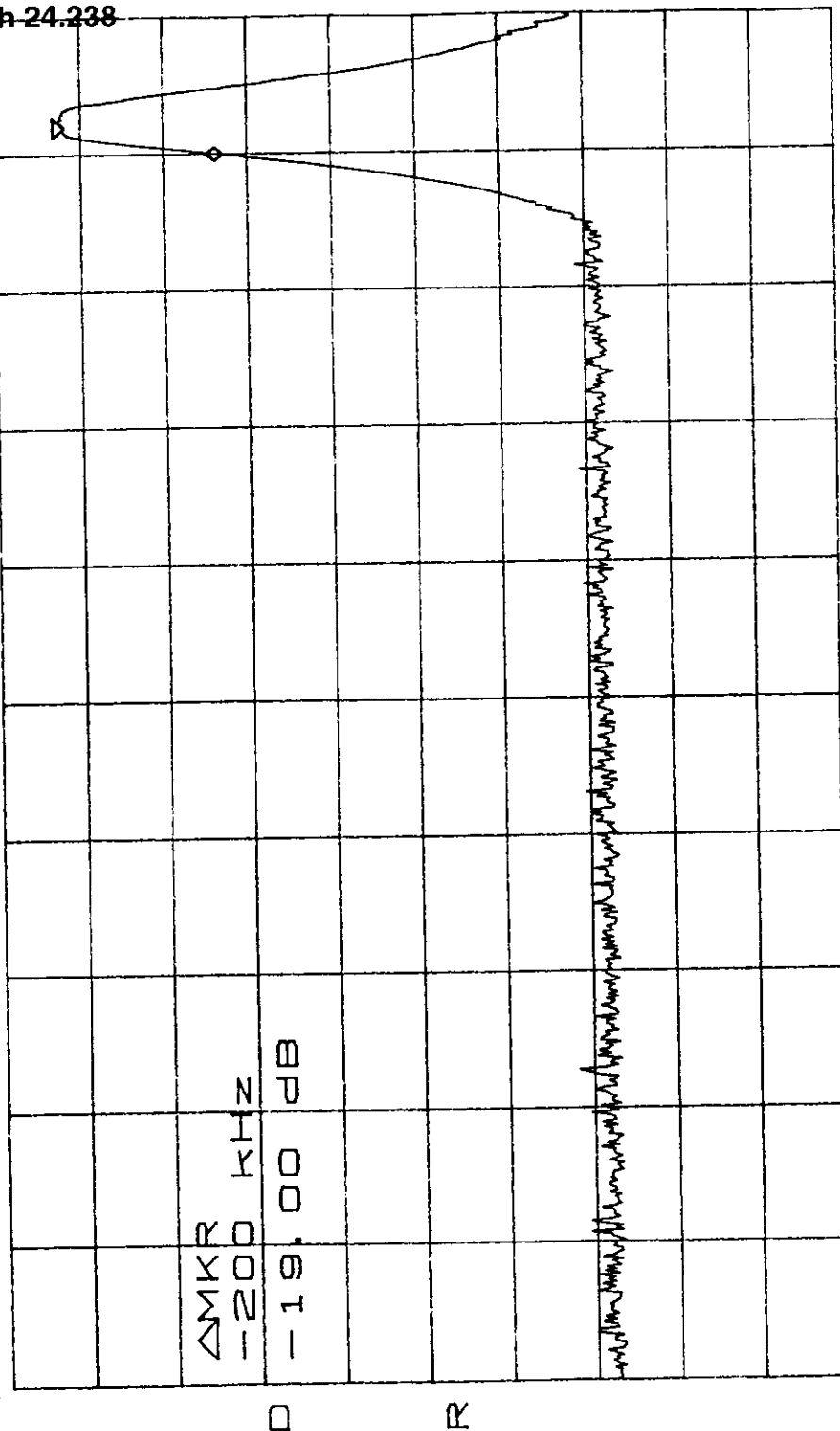
Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

DL Low (C-band)
3/27/98
FCC ID: LB41901

DL Output
Max Hold

ATTEN 20dB GSM source for PCS1900 ΔMKR -19.00dB
RL 40.0dBm 10dB/ -200KHZ



CENTER 1.97100GHZ SPAN 10.00MHZ
*RBW 100KHZ *VBW 1.0MHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

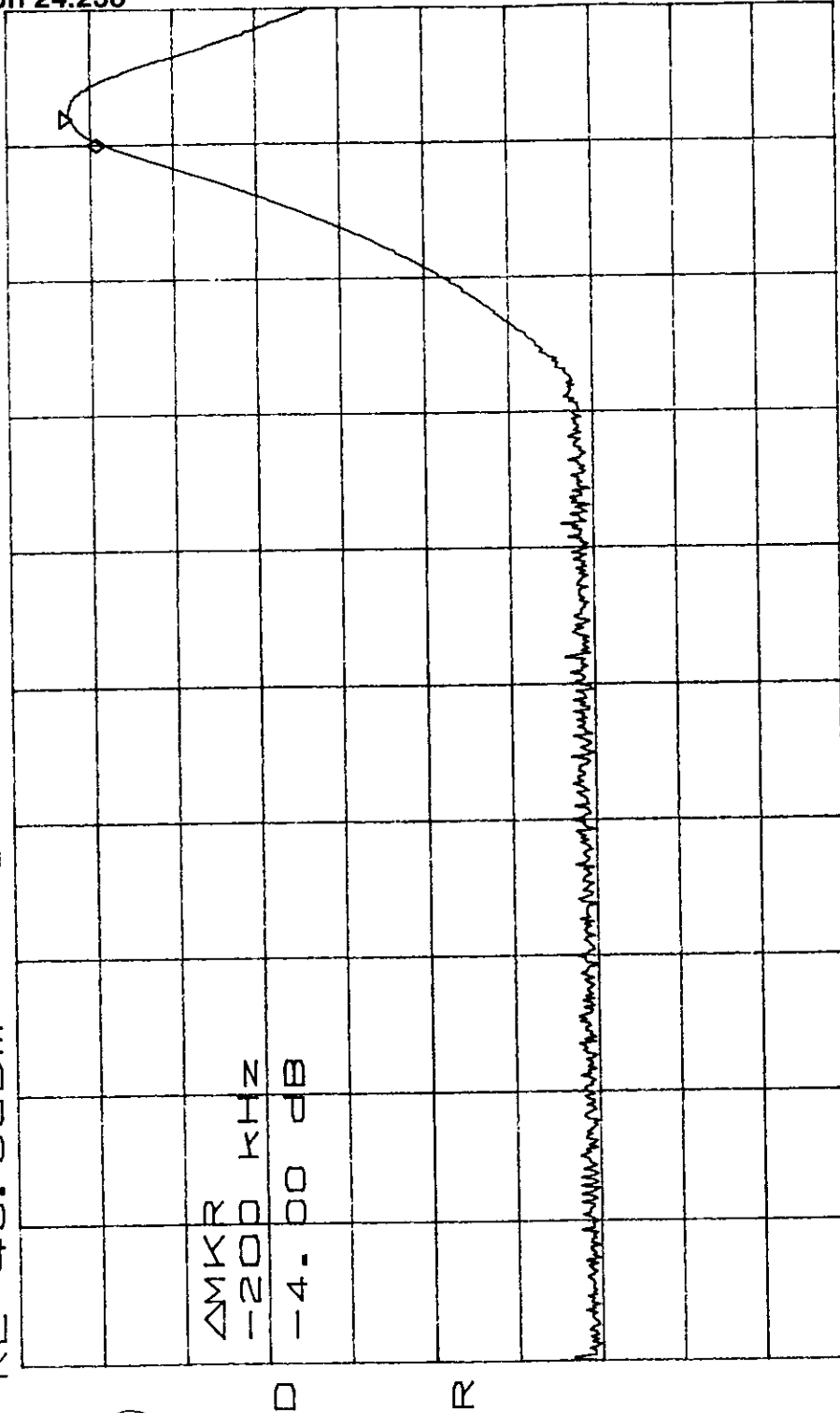
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

DL Low (C-band)

ATTEN 20dB GSM source for PCS1900 ΔMKR -4.00dB
RL 40.0dBm 10dB/ -200kHz



CENTER 1.97100GHZ
*RBW 300KHZ *VBW 1.0MHZ
SPAN 10.00MHZ
SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

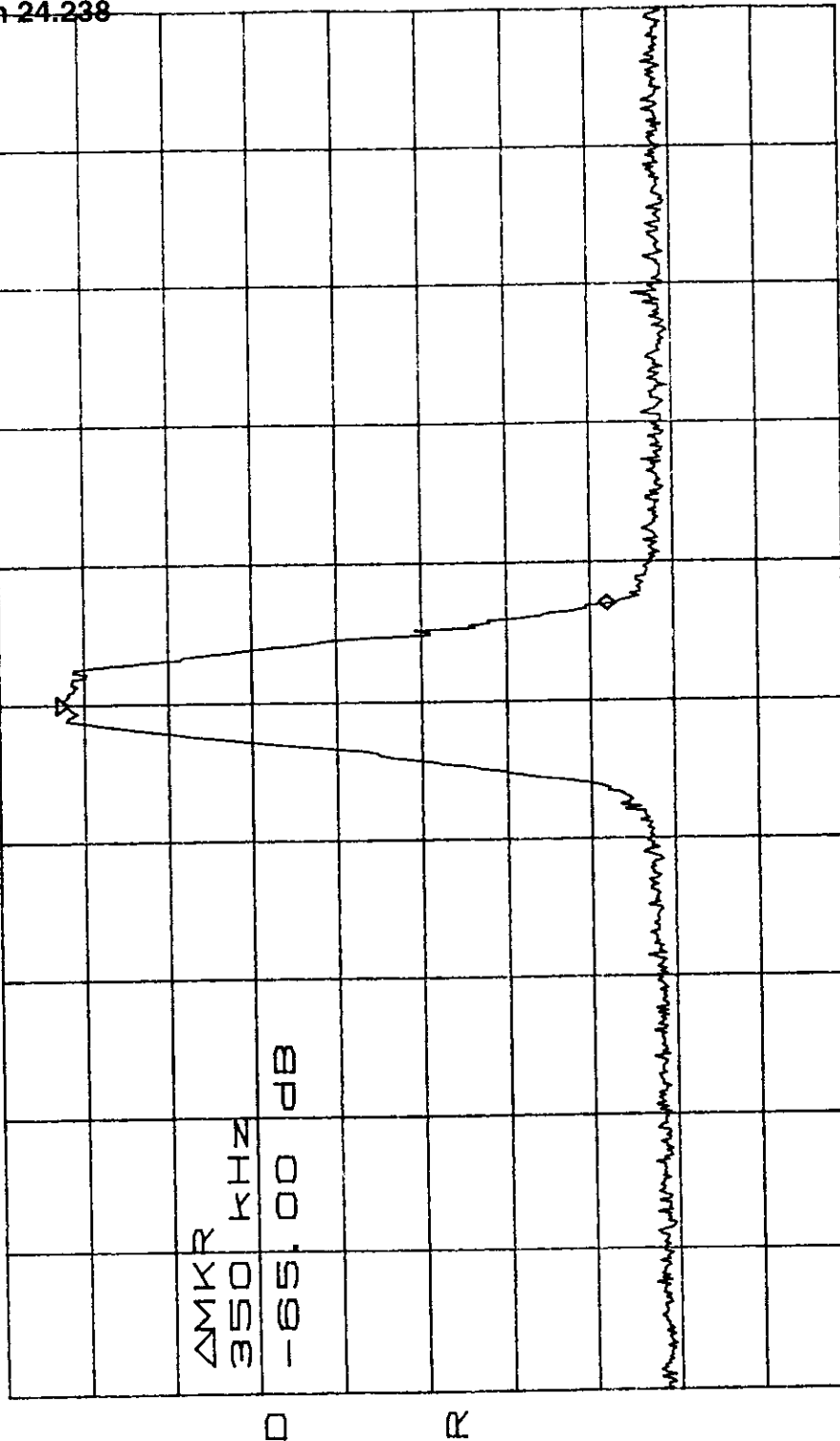
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

DL High (C-band)

ATTEN 20dB GSM source for PCS 1900 ΔMKR -65.00dB
RL 40.00dBm 10dB/ 350kHz



CENTER 1.989800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

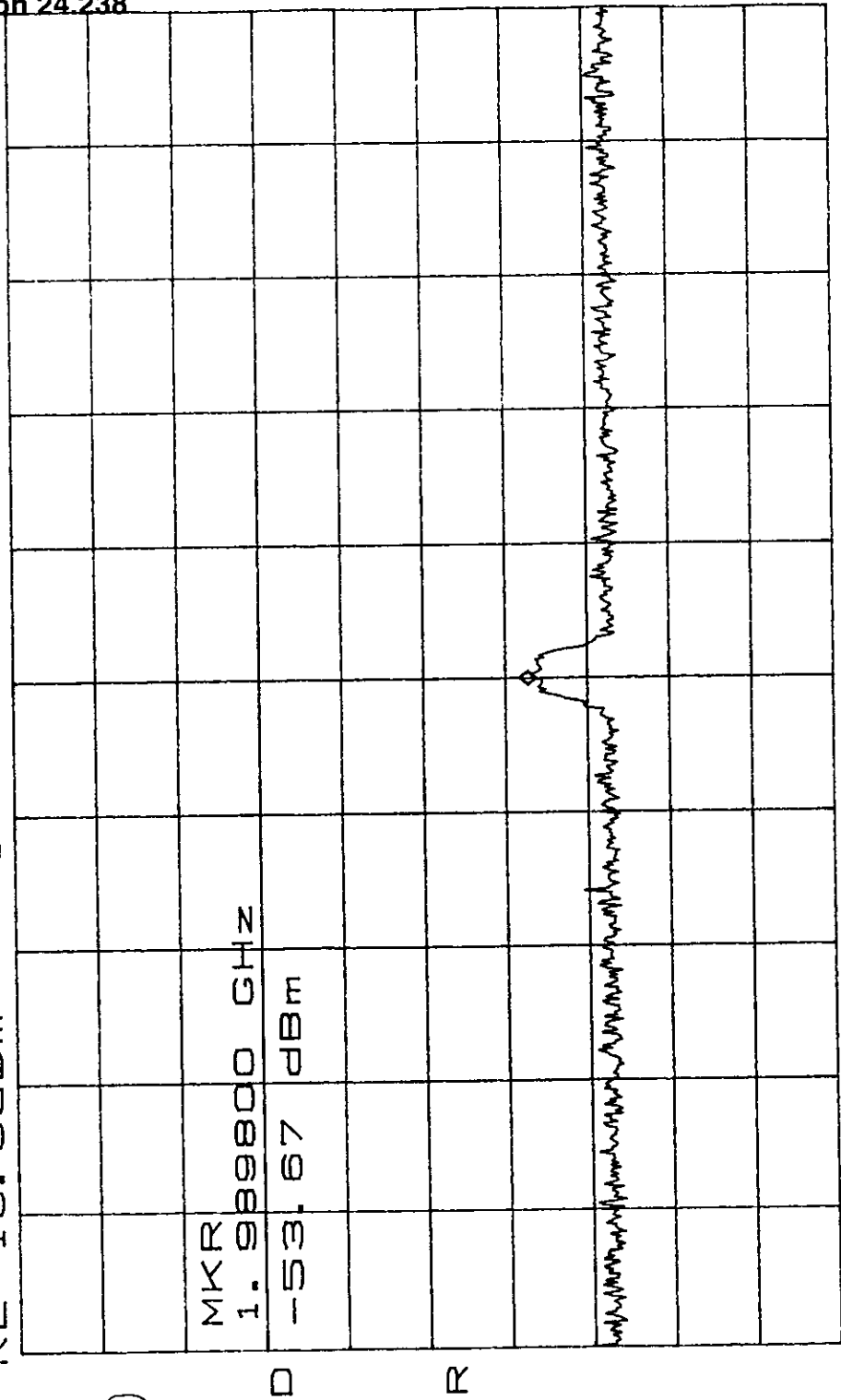
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

Input Signal
Max Hold

DL High (C-band)

ATTEN 30dB GSM source for PCS 1900 MKR -53.67dBm
RL 10.0dBm 10dB/ 1.989800GHZ



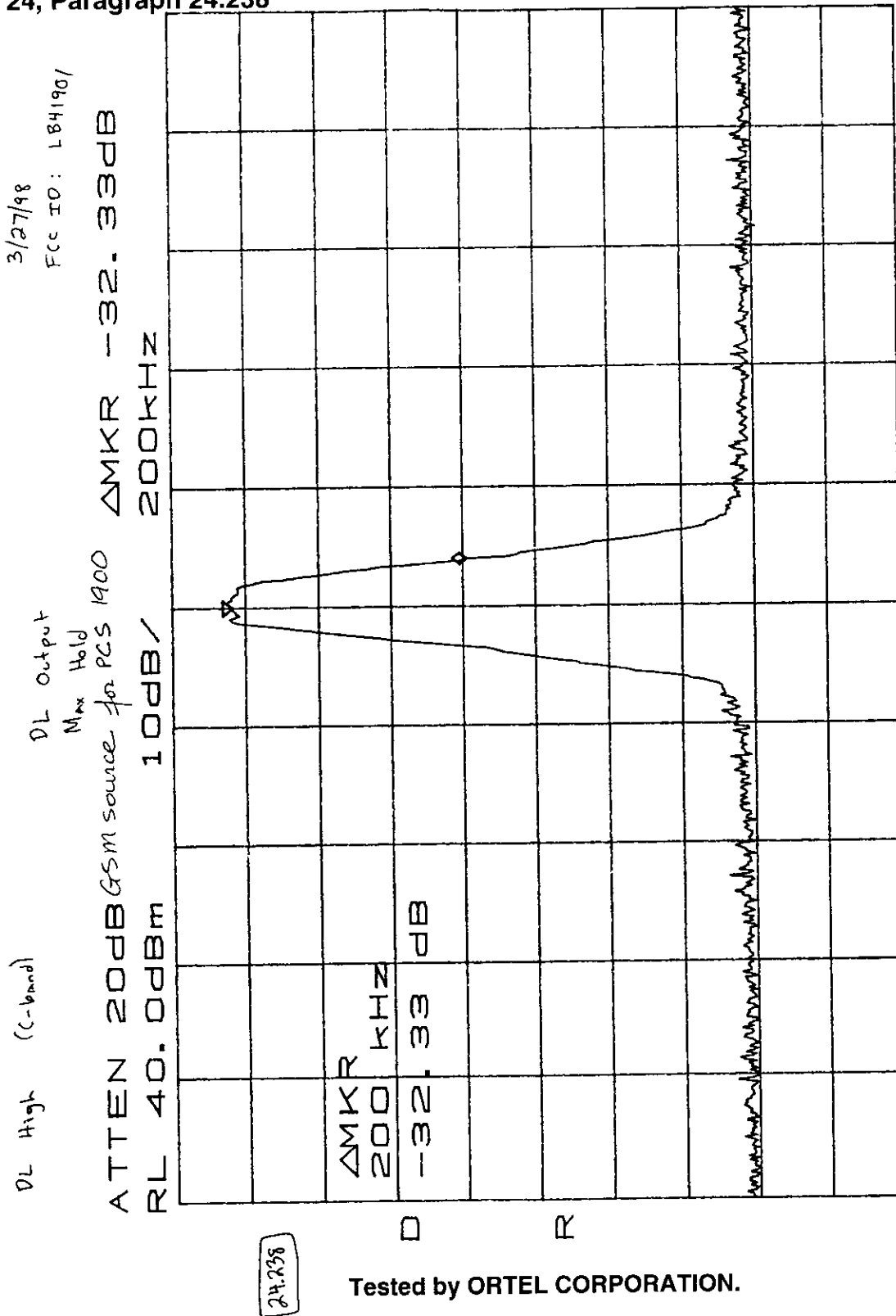
MKR
1.989800 GHZ
-53.67 dBm

CENTER 1.989800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

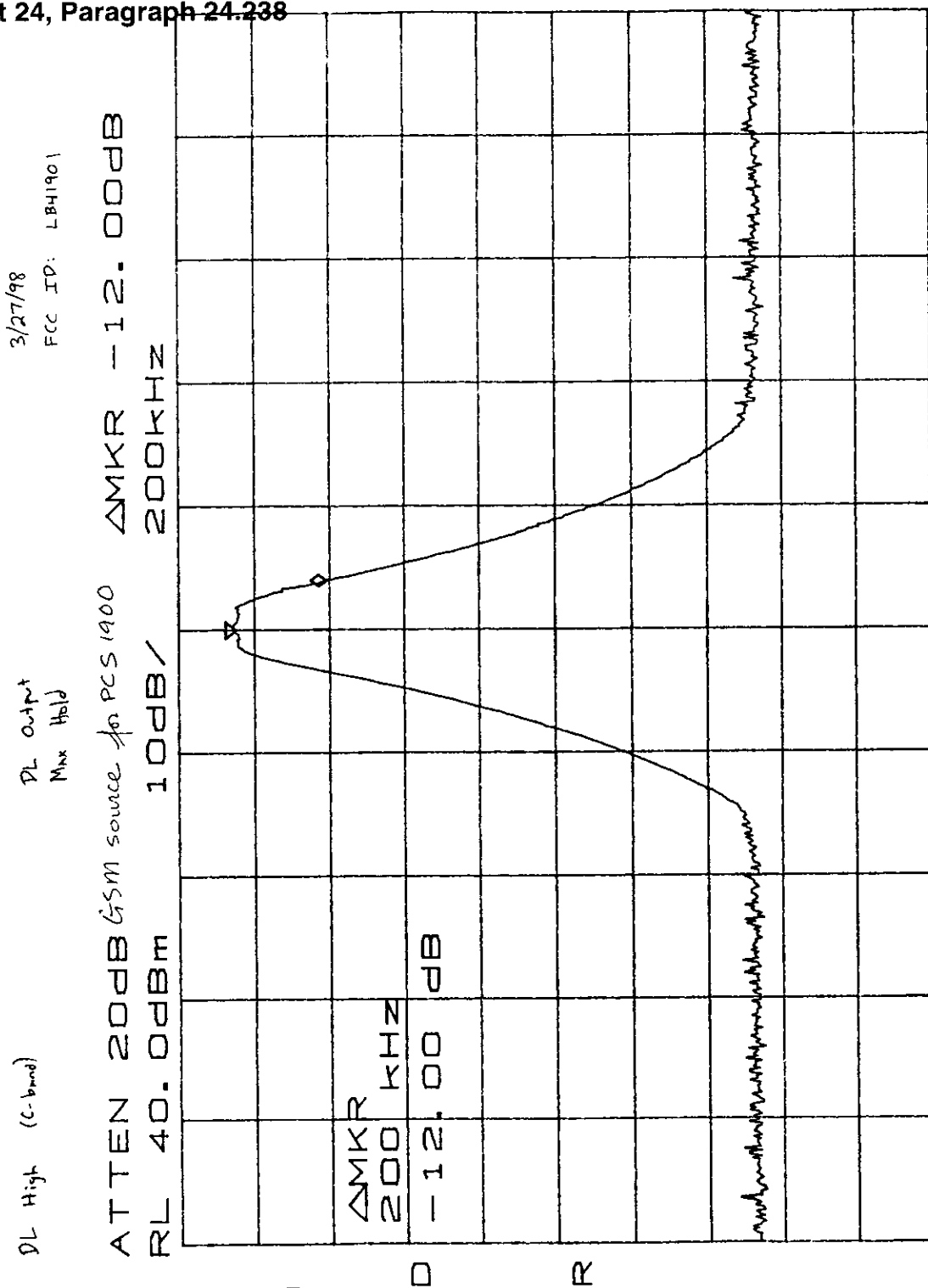
Part 24, Paragraph 24.238



CENTER 1.989800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

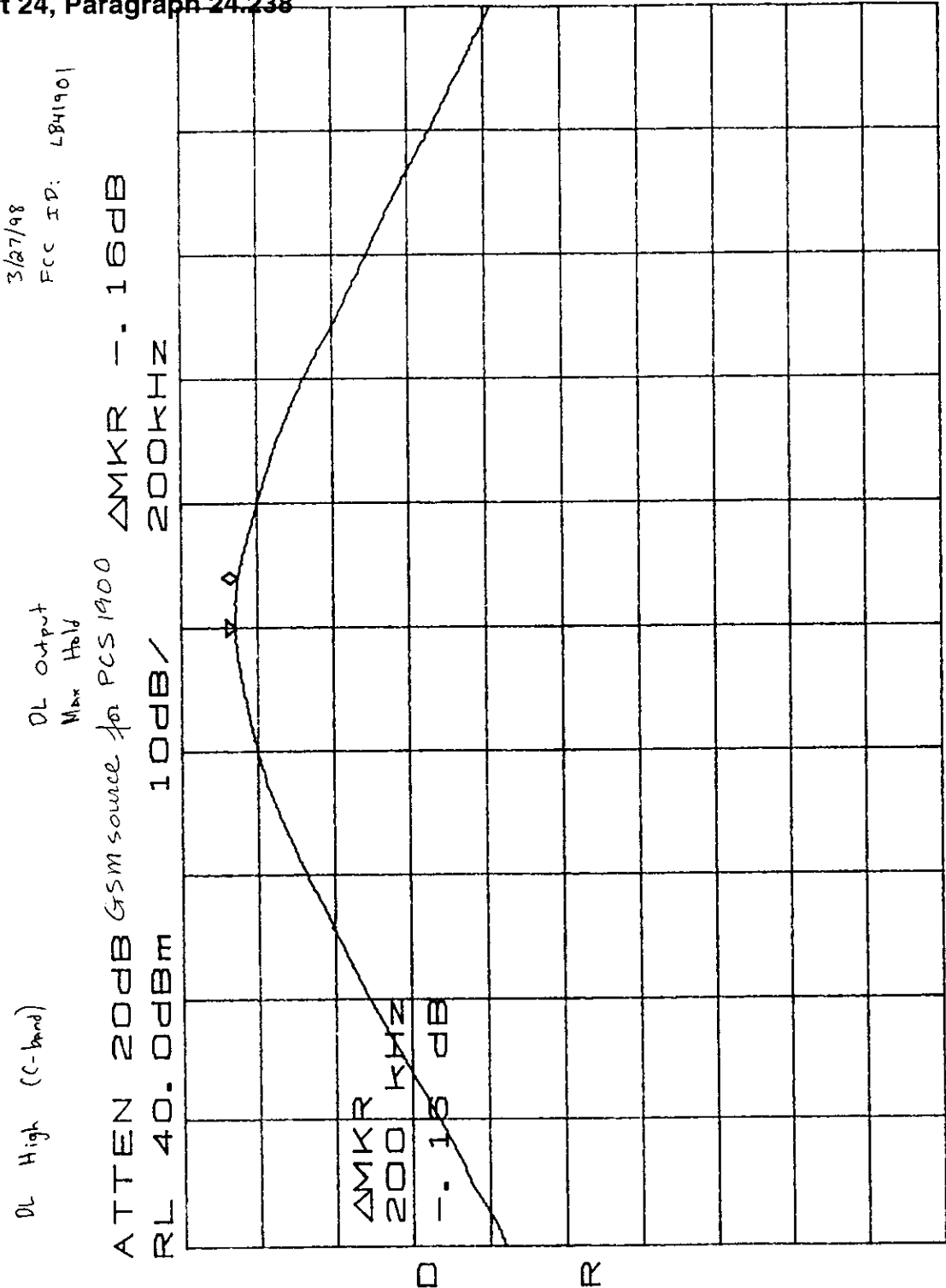


CENTER 1.989800GHZ SPAN 5.000MHZ
*RBW 100KHZ *VBW 30KHZ SWP 50.0ms

24A36

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238



CENTER 1.989800GHZ
*RBW 1.0MHZ *VBW 1.0MHZ
SPAN 5.000MHZ
SWP 50.0ms

Tested by ORTEL CORPORATION.

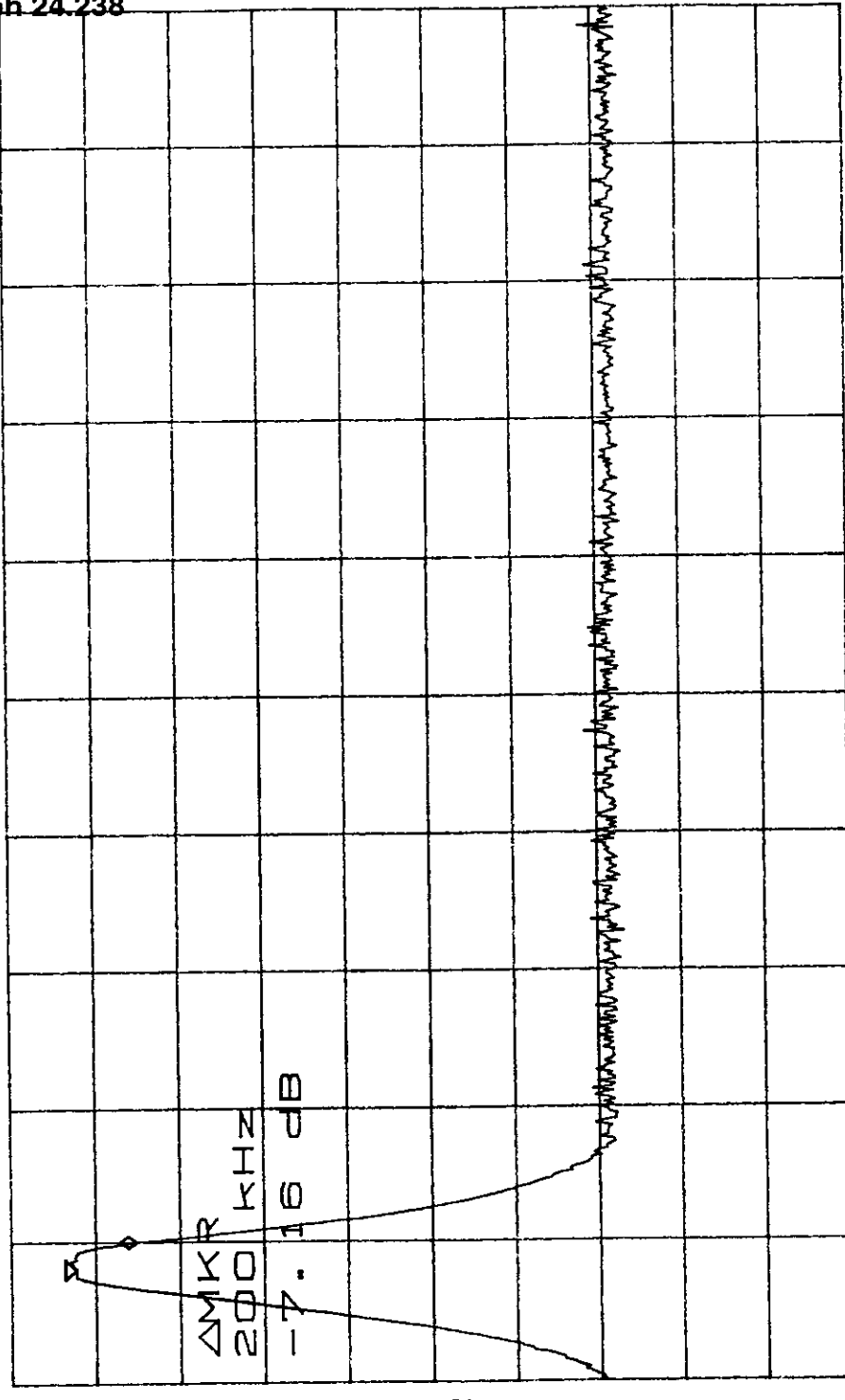
Part 24, Paragraph 24.238

3/27/98
Fcc ID: LB41901

DL Output
Max Hold

DL High (C-band)

ATTEN 20dB GSM source for PCS 400 ΔMKR -7.16dB
RL 40.0dBm 10dB/ 200KHZ



24.235

Tested by ORTEL CORPORATION.

CENTER 1.99400GHZ SPAN 10.00MHZ
*RBW 100KHZ *VBW 1.0MHZ SWP 50.0ms

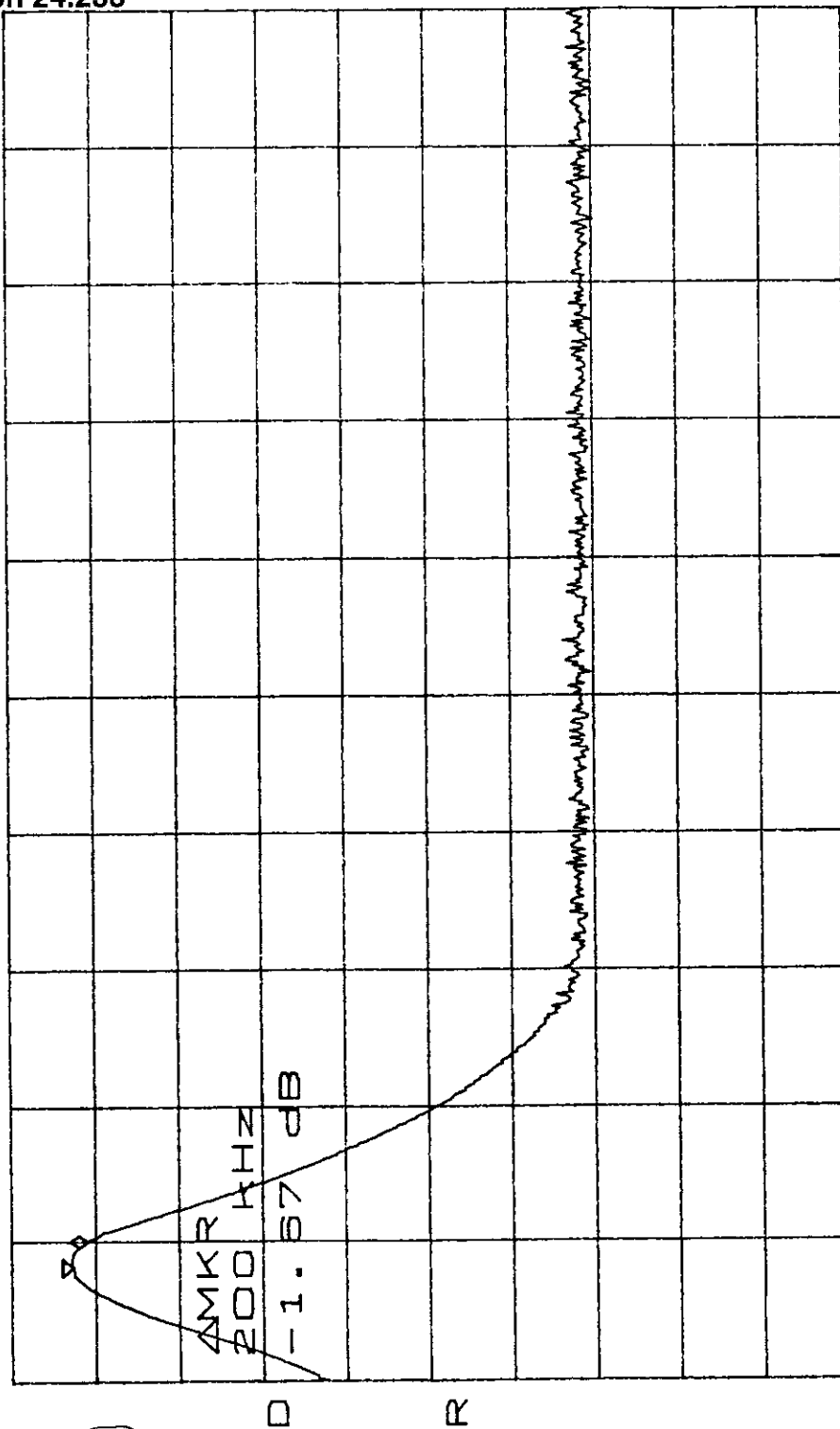
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

ATTEN 20dB GSM source for PCS 1900 ΔMKR -1.67dB
RL 40.0dBm 10dB/ 200KHZ

DL High (C-band)



CENTER 1.98400GHZ SPAN 10.00MHZ
*RBW 300KHZ *VBW 1.0MHZ SWP 50.0ms

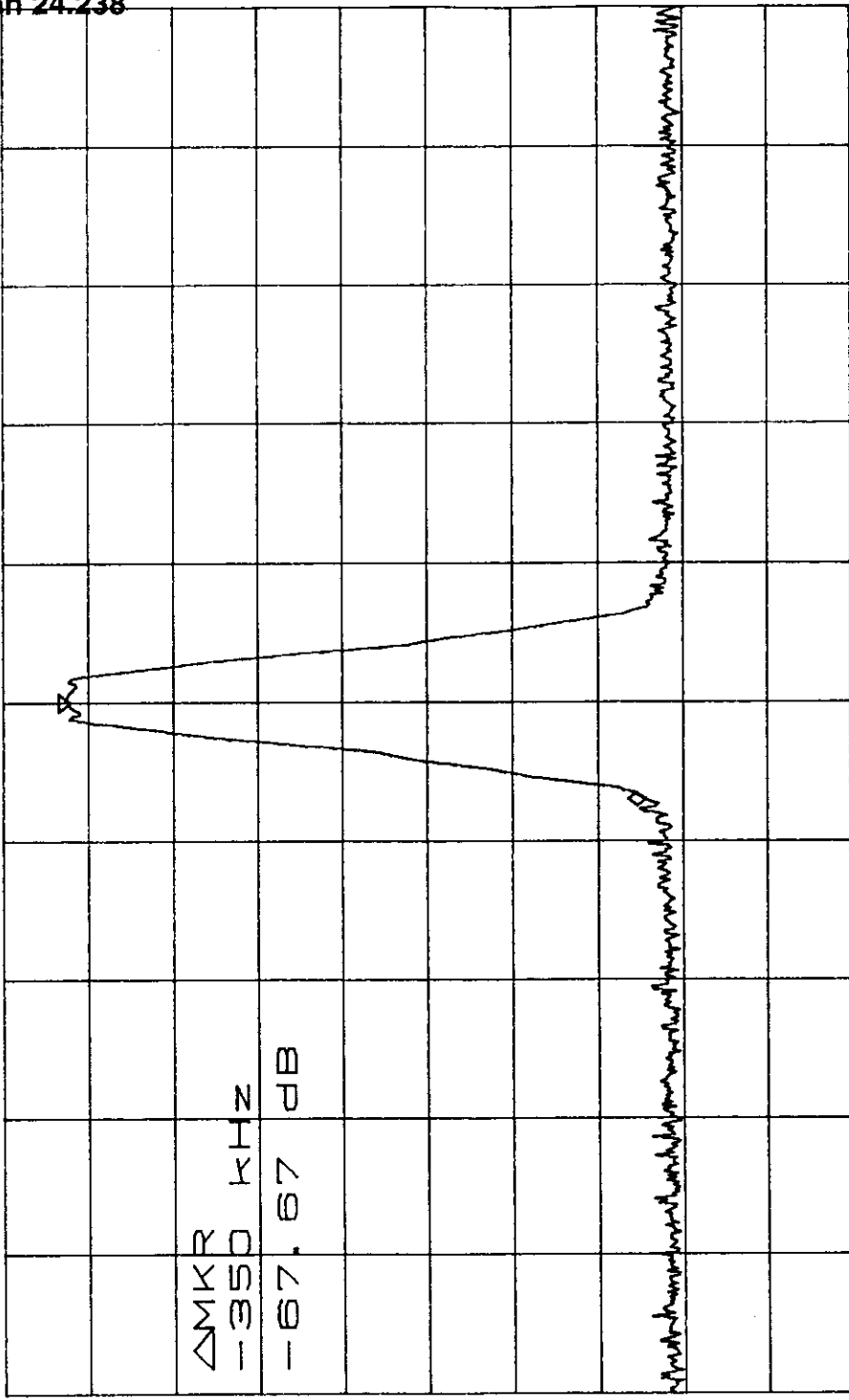
24238

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

UL Low (C-band) UL ~~Low~~ Output 3/28/97
 Max Hld FCC ID: LB41901

ATTEN 20dB GSM source for PCS 1900 ΔMKR -67.67dB
 RL 40.0dBm 10dB/ -350kHz



CENTER 1.895200GHZ SPAN 5.000MHZ
 *RBW 30kHz *VBW 30kHz SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

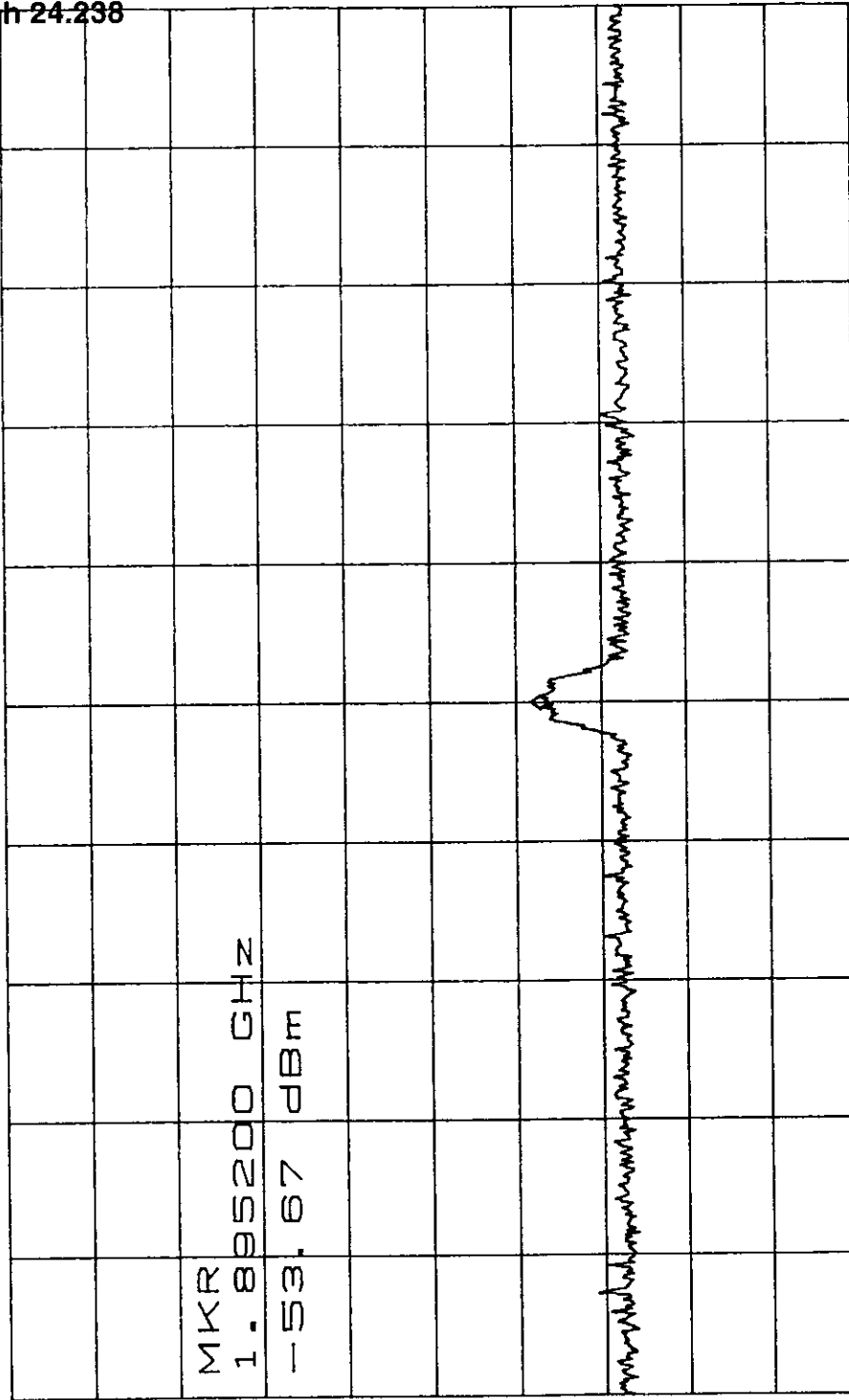
Part 24, Paragraph 24.236

3/28/98
FCC ID: LB41901

Input Signal
Max Hold

UL Low (C-band)

ATTEN 30dB GSM source for PCS 1900 MKR -53.67dBm
RL 10.0dBm 10dB/ 1.895200GHZ



CENTER 1.895200GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

24.236

Tested by ORTEL CORPORATION.

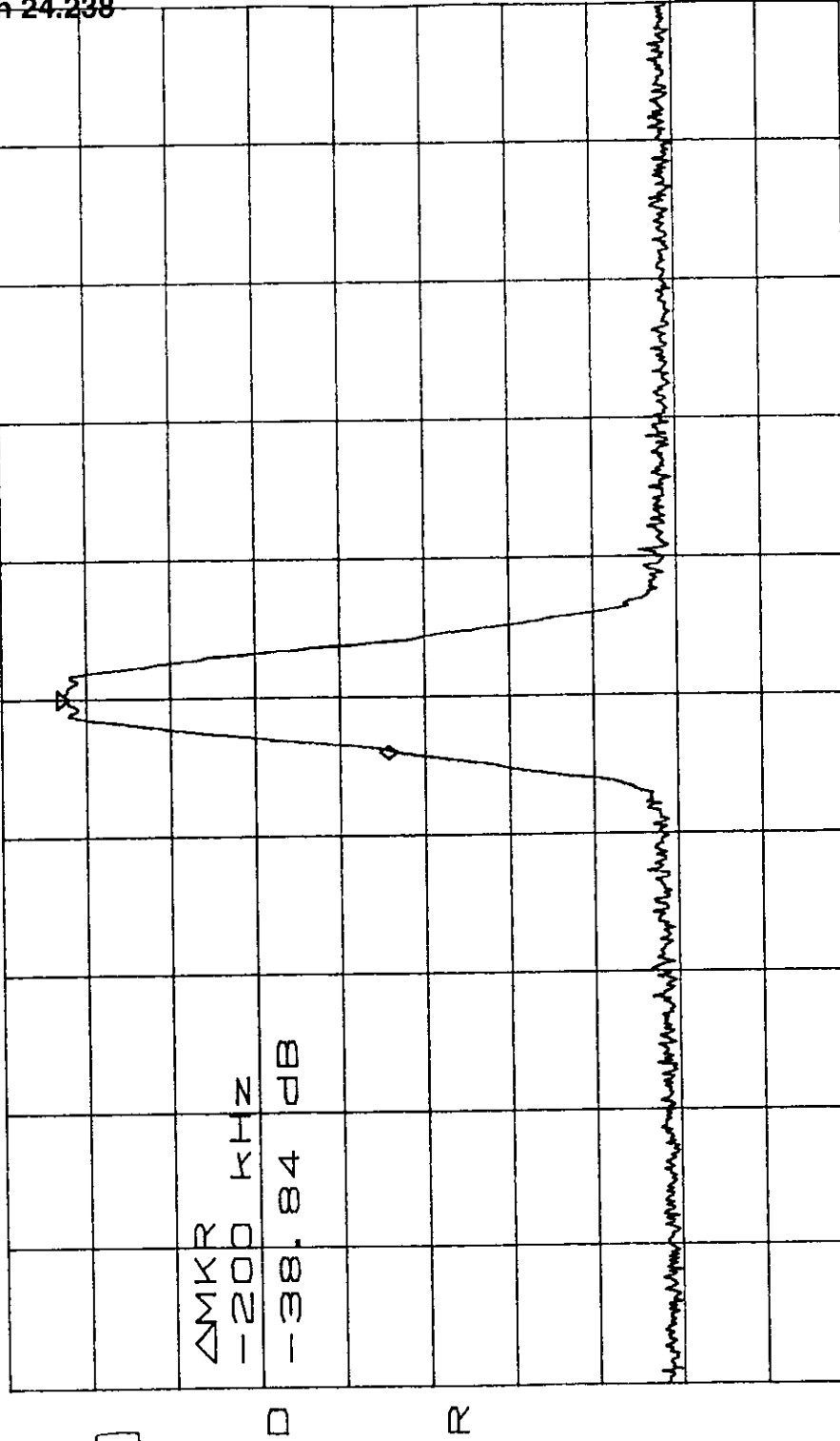
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Max Hold

UL Low (C-band)

ATTEN 20dB GSM source for PCS 1900 ΔMKR -38.84dB
RL 40.0dBm 10dB/-200kHz



24.238

Tested by ORTEL CORPORATION.

CENTER 1.895200GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

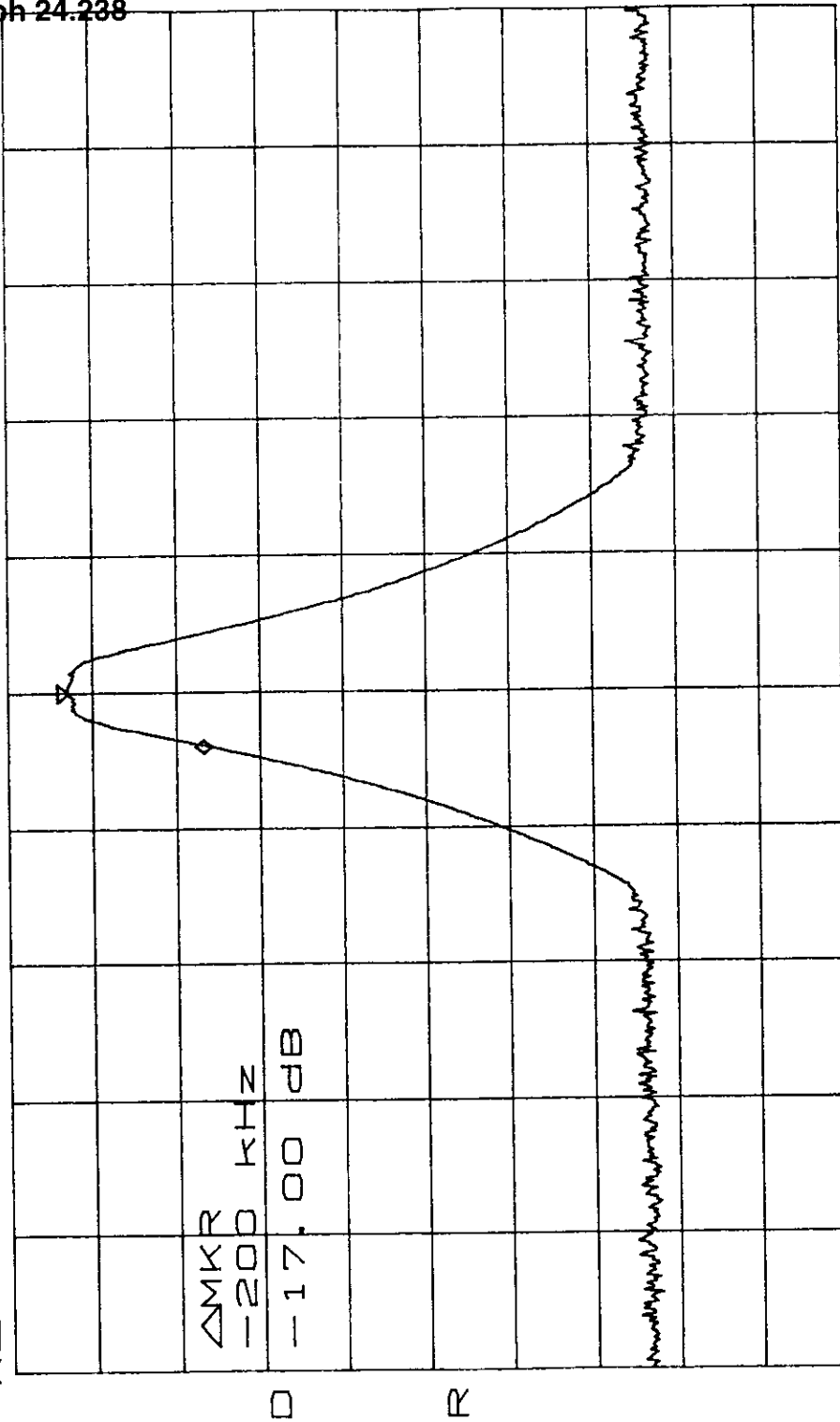
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Max Hold

UL Low (C-band)

ATTEN 20dB GSM source for PCS 900 ΔMKR -17.00dB
RL 40.00dBm -200kHz



24.238

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

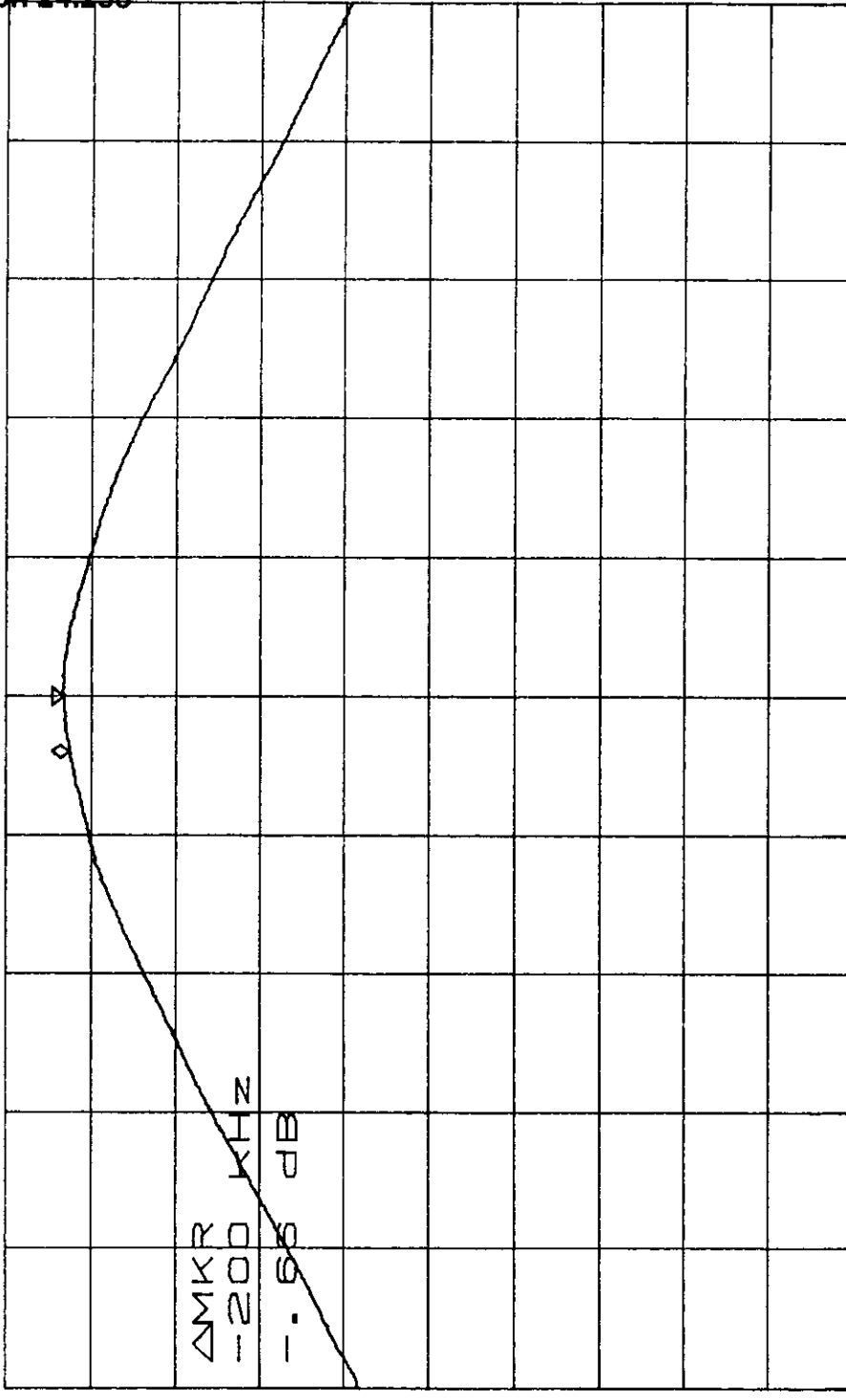
3/27/98
FCC ID: LB41901

UL ~~Low~~ Output
Max Hold

UL Low (C-band)

ATTEN 20dB GSM source for PCS1900 Δ MKR -200kHz

RL 40.0dBm 10dB / -200kHz



Δ MKR
-200 KHZ
-1.68 DB

CENTER 1.895200GHZ SPAN 5.000MHZ

*RBW 1.0MHZ *VBW 1.0MHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

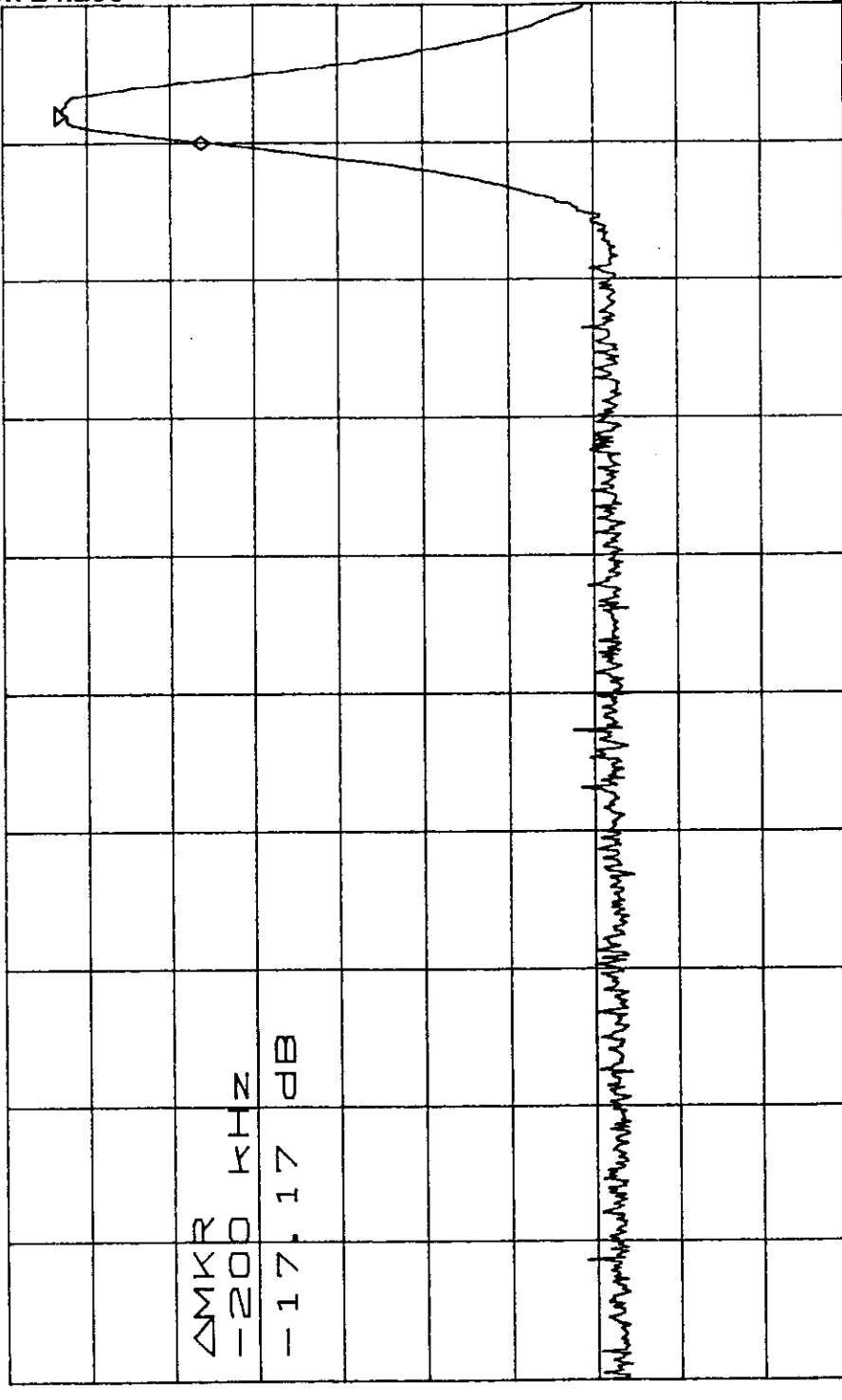
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Mix Hold

UL Low (C-band)

ATTEN 20dB GSM source for PCS1900 ΔMKR -17.17dB
RL 40.0dBm 10dB/-200kHz



24.238

Tested by ORTEL CORPORATION.

CENTER 1.89100GHZ SPAN 10.00MHZ
*RBW 100kHz *VBW 1.0MHZ SWP 50.0ms

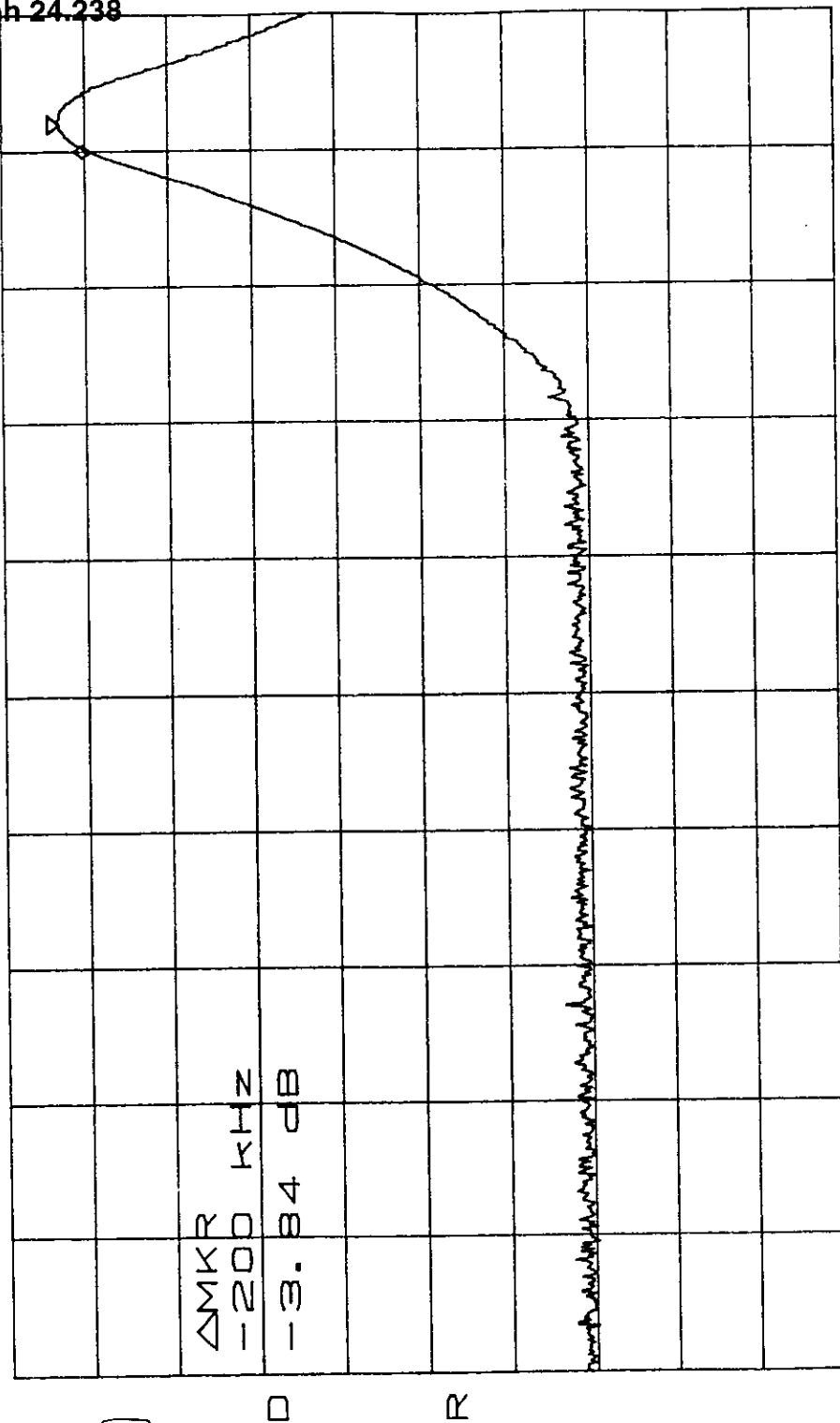
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Low (C-band)

UL output
Max Hold

ATTEN 20dB GSM source for PCS 1900 ΔMKR -3.84dB
RL 40.0dBm 10dB/ -200KHZ



SPAN 10.00MHZ

SWP 50.0ms

CENTER 1.89100GHZ

*RBW 300KHZ *VBW 1.0MHZ

*RBW 300KHZ *VBW 1.0MHZ

24.238

Tested by ORTEL CORPORATION.

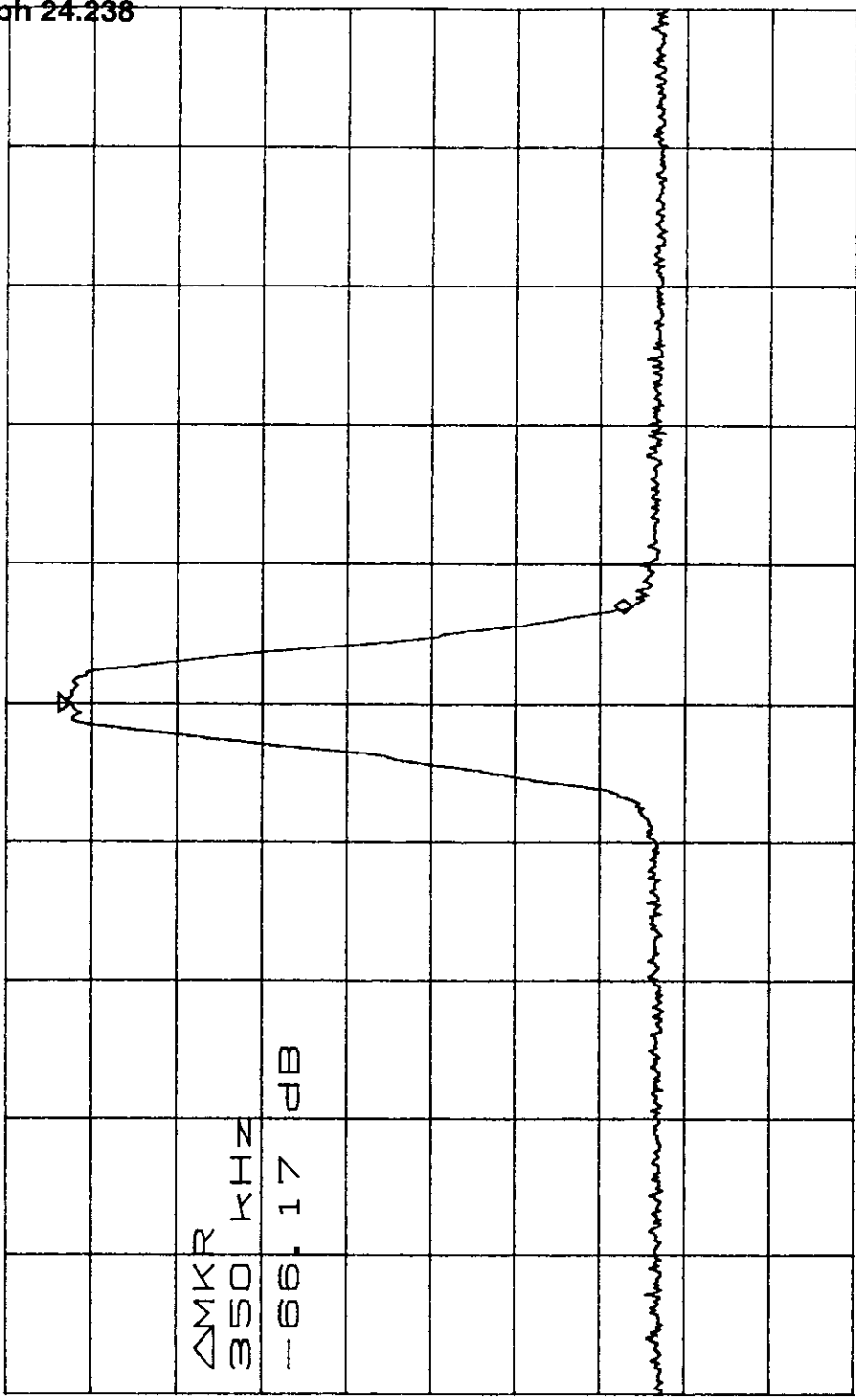
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Max Hold
for PCS 1900

UL High (C-band)

ATTEN 20dB GSM source for PCS 1900 Δ MKR -66.17dB
RL 40.0dBm 10dB/ 350kHz



Δ MKR
350 KHZ
-66.17 dB

CENTER 1.909800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

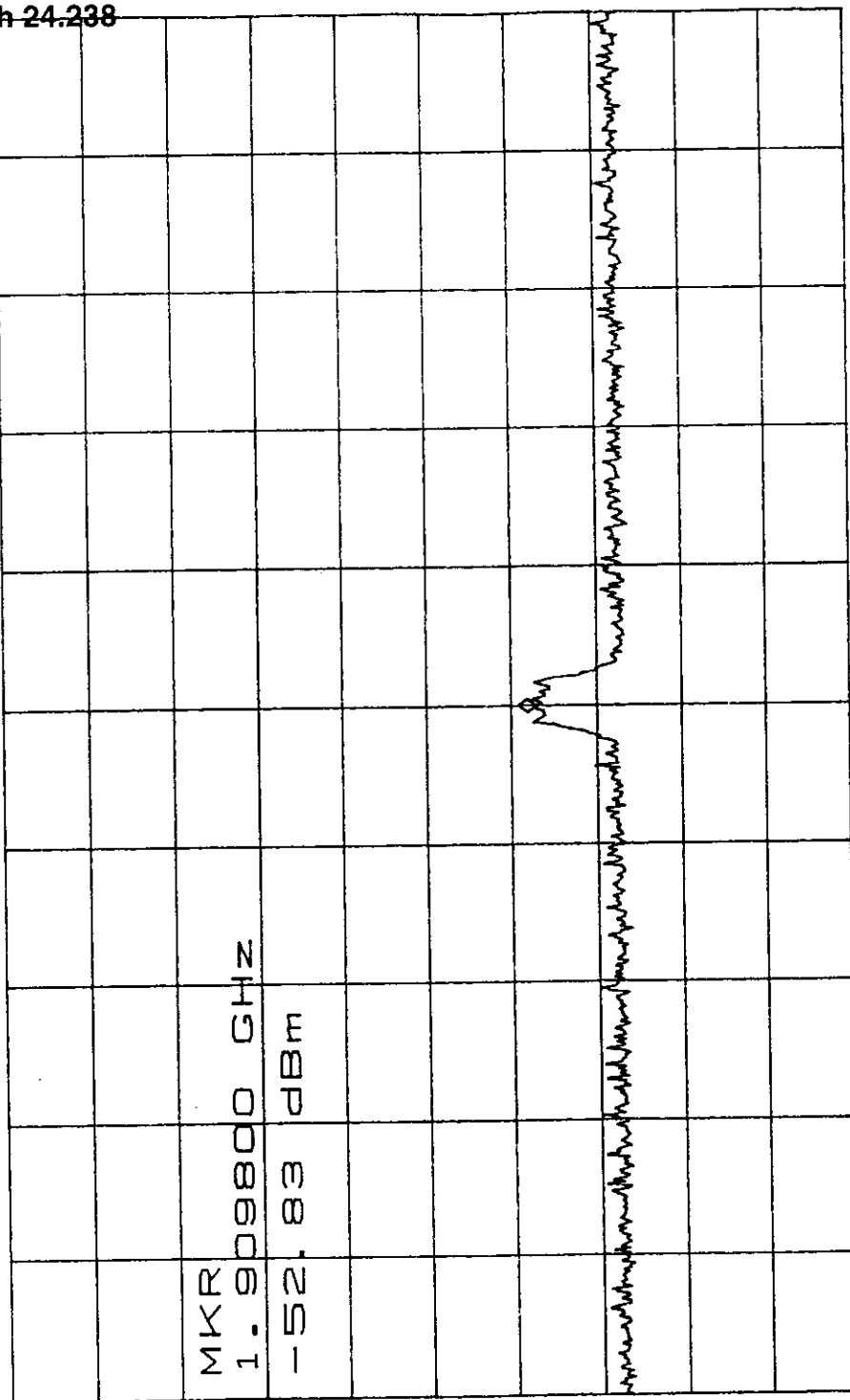
24.238

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238

UL High (C-band) Input Signal
Max Hold 3/27/98 FCC ID: LB41901

ATTEN 30dB GSM source for PCS 1900 MKR -52.83dBm
RL 10.0dBm 10dB/ 1.909800GHZ



MKR
1.909800 GHz
-52.83 dBm

CENTER 1.909800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Tested by ORTEL CORPORATION.

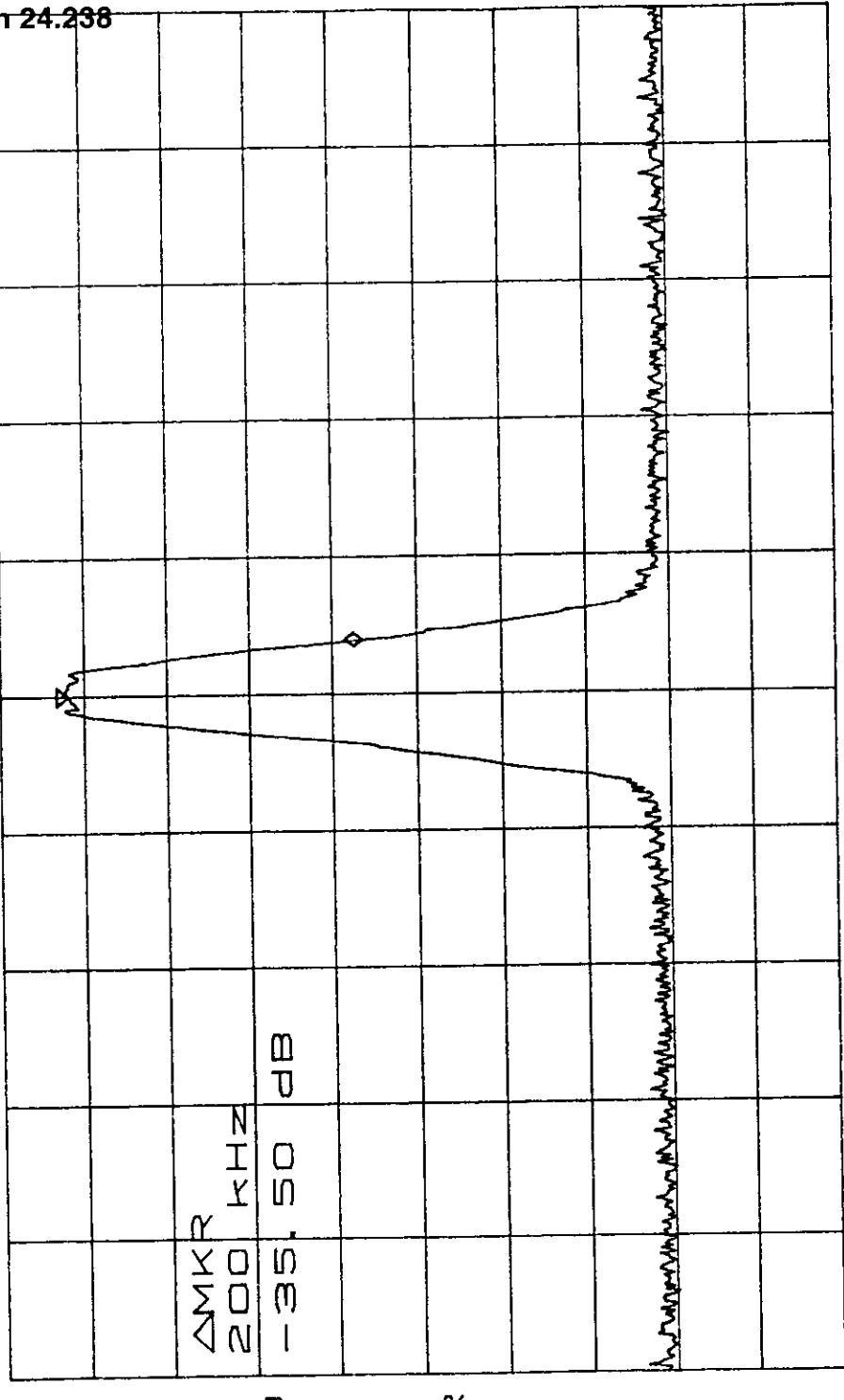
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

DL Output
Max Hold

UL High (C-band)

ATTEN 20dB GSM source for PCS 1900 Δ MKR -35.50dB
RL 40.0dBm 10dB/ 200KHZ

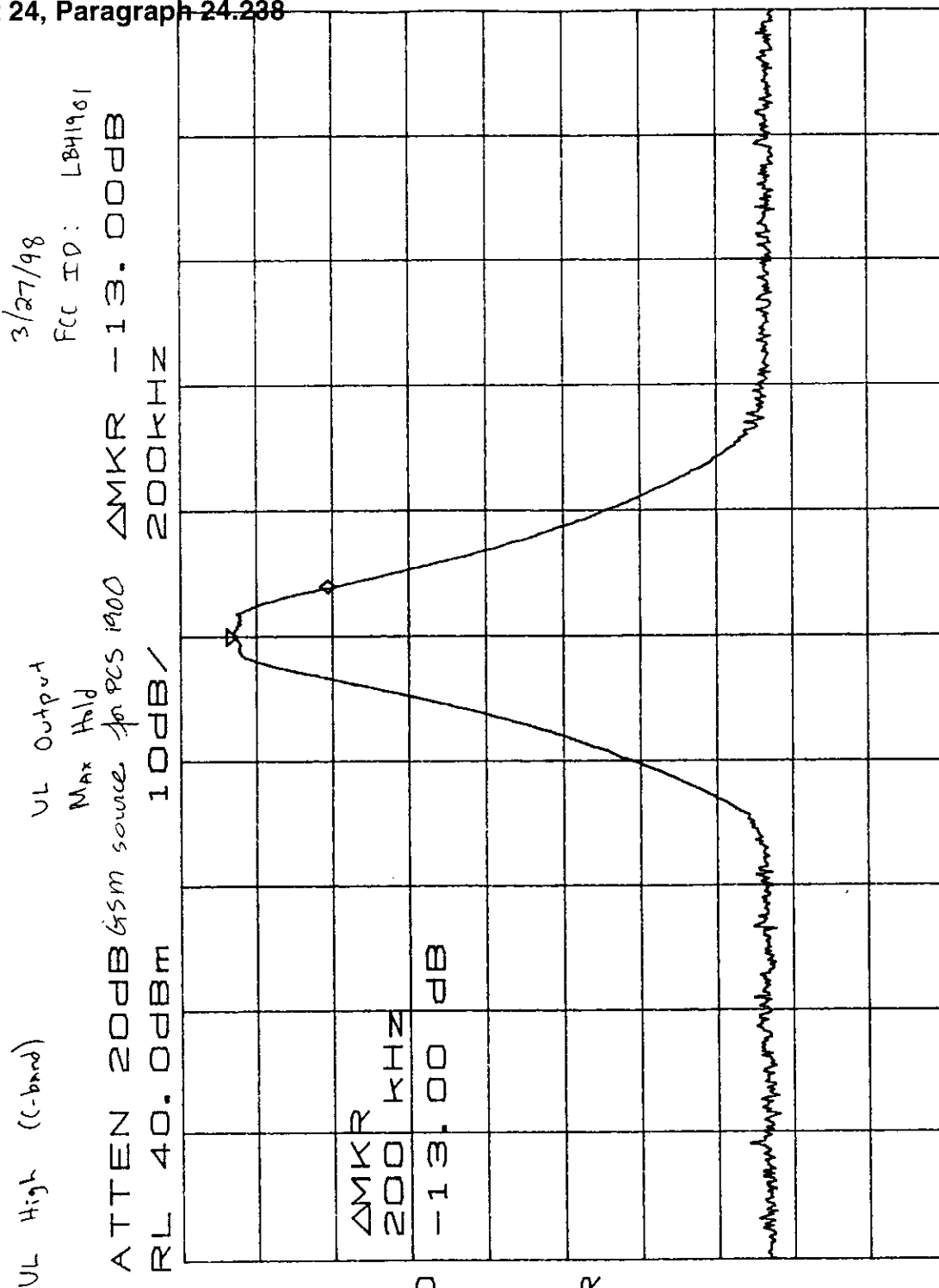


24.238

Tested by ORTEL CORPORATION.

CENTER 1.909800GHZ SPAN 5.000MHZ
*RBW 30KHZ *VBW 30KHZ SWP 50.0ms

Part 24, Paragraph 24.238

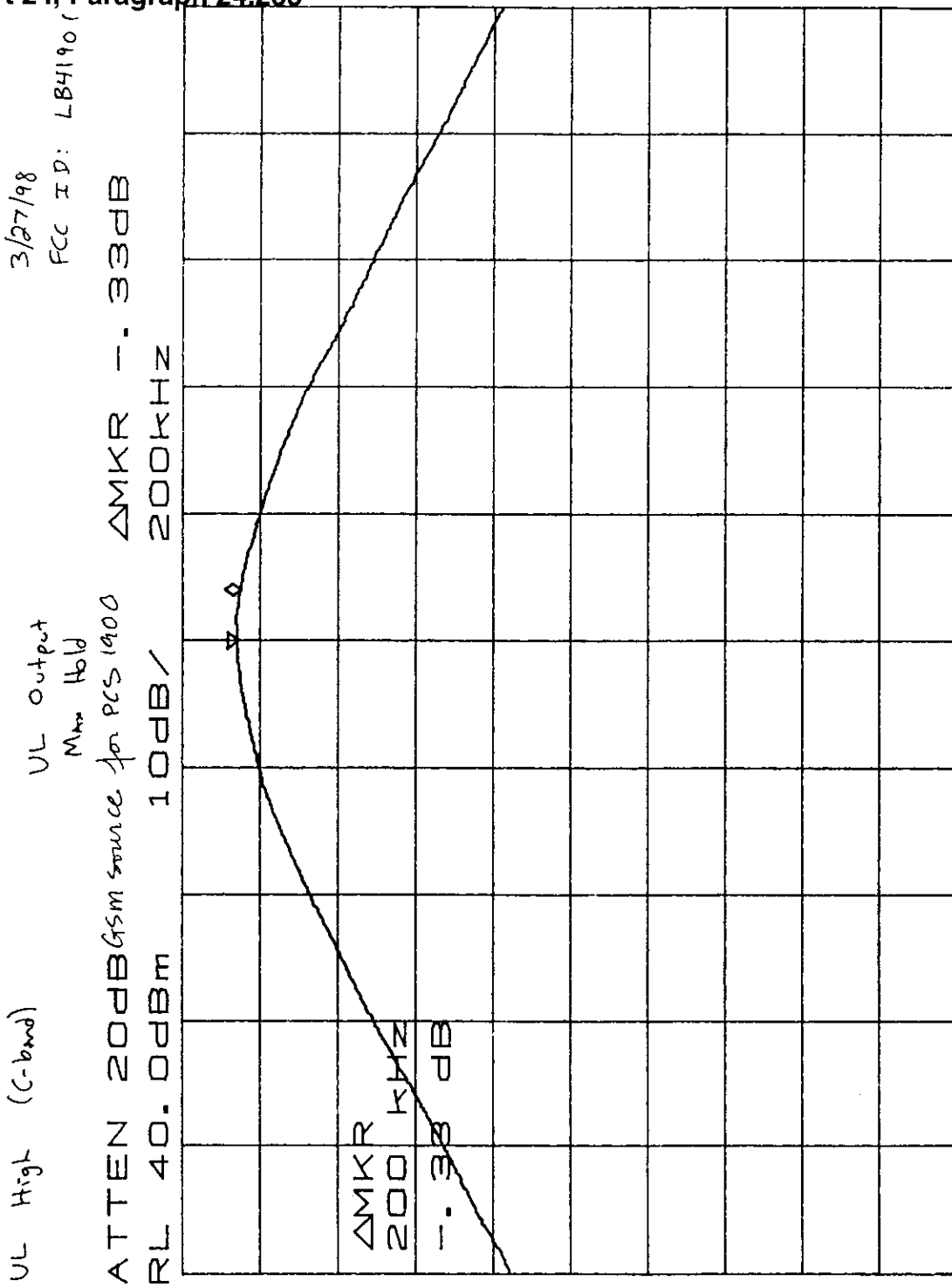


CENTER 1.909800GHZ
*RBW 100KHZ *VBW 30KHZ
SPAN 5.000MHZ
SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

Part 24, Paragraph 24.238



CENTER 1.909800GHZ

*RBW 1.0MHZ *VBW 1.0MHZ

SPAN 5.000MHZ

SWP 50.0ms

Tested by ORTEL CORPORATION.

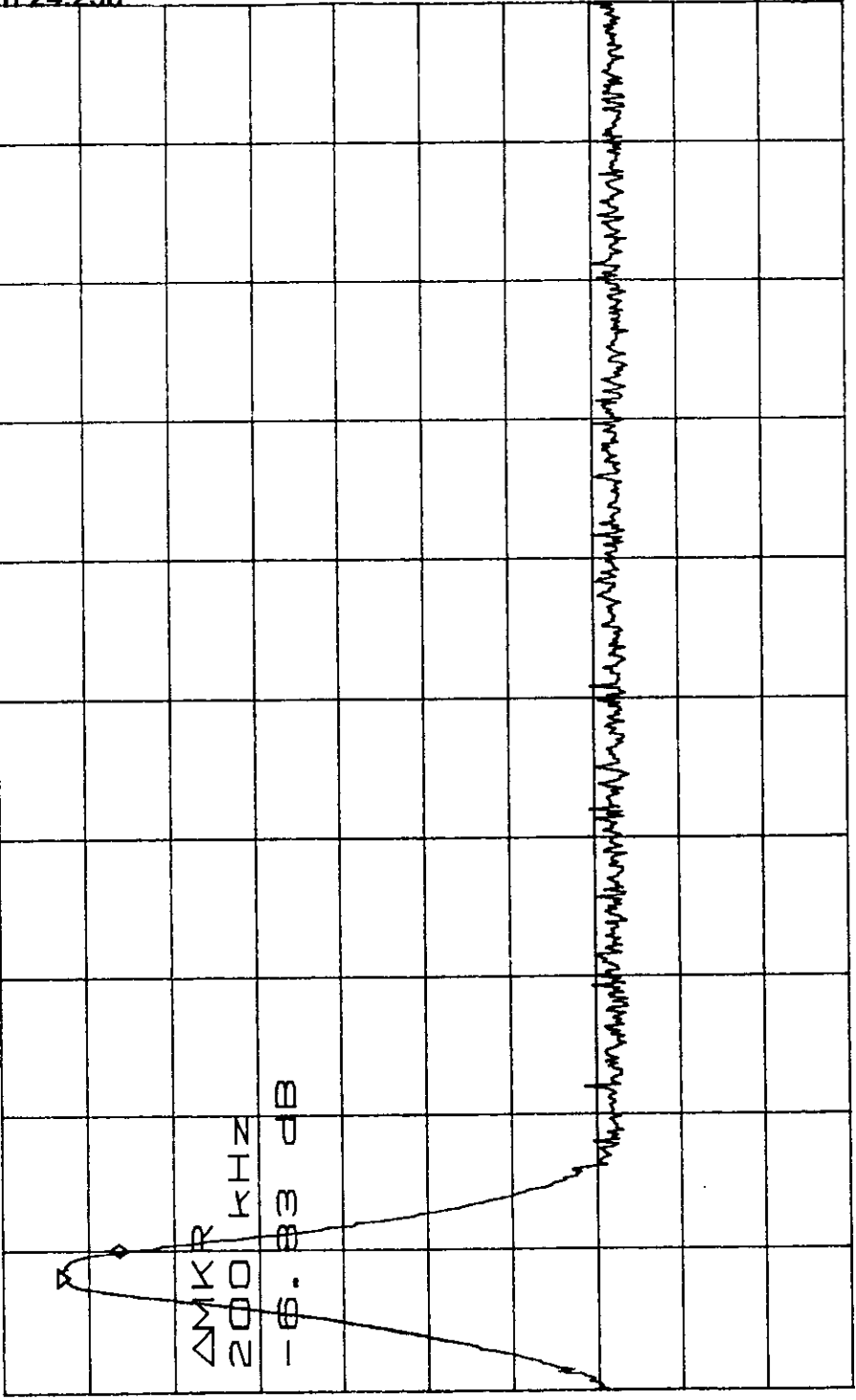
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Max Hold

UL High (C-band)

ATTEN 20dB GSM source for PCS 1900 Δ MKR -6.83dB
RL 40.0dBm 10dB/ 200KHZ



CENTER 1.91400GHZ SPAN 10.00MHZ
*RBW 100KHZ *VBW 1.0MHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

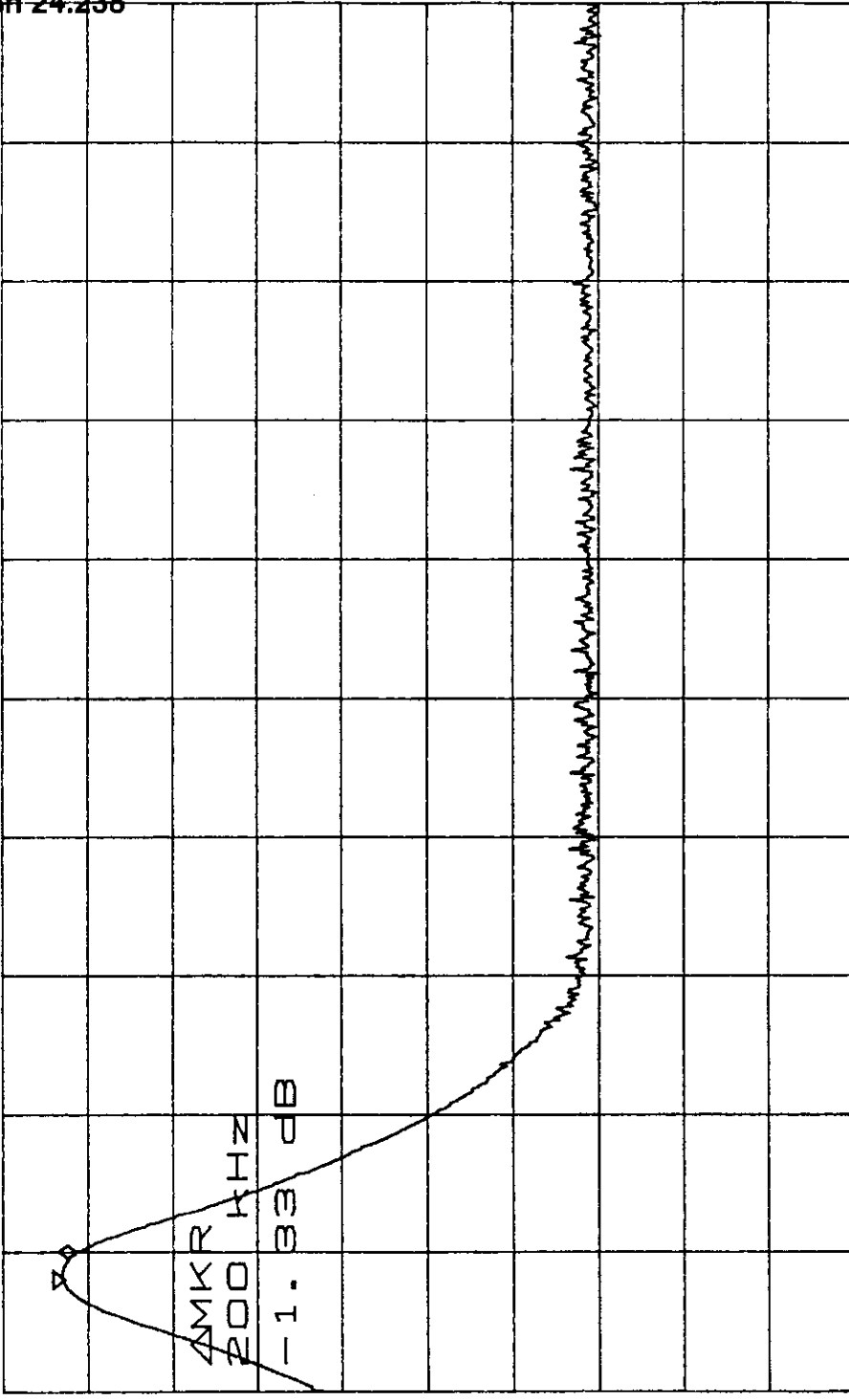
Part 24, Paragraph 24.238

3/27/98
FCC ID: LB41901

UL Output
Max Hold

UL High (C-band)

ATTEN 20dB GSM source for PCS1900 ΔMKR -1.33dB
RL 40.0dBm 10dB/ 200KHZ



CENTER 1.91400GHZ SPAN 10.00MHZ
*RBW 300KHZ *VBW 1.0MHZ SWP 50.0ms

24.238

Tested by ORTEL CORPORATION.

3 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (which includes cable and antenna corrections), the corrected reading, and the limit.

See following page(s).

REPORT No: S-8181 TESTED BY: *[Signature]* SPEC: FCC Para 2.993 & 24.238

CUSTOMER: Ortel Corp TEST DIST: 3 Meters

E U T: Low Power Repeater Model CSR 1902-C Band

EUT MODE: UPLINK BICONICAL: N/A

DATE: 8-Apr-98 LOG PERIODIC: N/A

NOTES: OTHER: 453

RBW & VBW 1 MHZ

Fundamental only emission measurable @ 3 meters all other measurements are noise floor readings.

FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		Ratio	EUT	Antenna Height
	pk	av	pk	av		pk	av	pk	av	pk	av			
1895.2	36.3		32.1		32.4	68.7						180	1.75	
3790.4	-4.1		-2		39.8	37.8		84.4		-46.6				
5685.4	-4.2		-2		43.4	41.4		84.4		-43				
1902.4	29.2		22.5		32.5	61.7						180	1.5	
3804.8	-4.2		-1.6		39.9	38.3		84.4		-46.1				
1909.8	30.6		23.5		32.5	63.1								
3819.6	-4.3		-3.6		39.9	36.3		84.4		-48.1		180	1.5	



REPORT No: S-8181 TESTED BY: dm *DM* SPEC: FCC Para. 2.993 & 24.238

CUSTOMER: Ortel Corp TEST DIST: 3 Meters

EUT: Low Power Repeater Model CSR 1902-C Band

EUT MODE: DOWNLINK BICONICAL: N/A

DATE: 8-Apr-98 LOG PERIODIC: N/A

NOTES: OTHER: 453

RBW & VBW 1 MHZ
 Fundamental only emission measurable @ 3 meters all other measurements
 are noise floor readings.

FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		EUT Rotatio	Antenna Height
	pk	av	pk	av		pk	av	pk	av	pk	av		
1975.2	33		30.8		32.9	65.9						180	1.75
3950.27	-5.4		-7.6		40.4	35.0		84.4		-49.4			
1982.4	27.7		28.7		32.9	61.6						180	1.5
3964.8	-4.3		-4.2		40.5	36.3		84.4		-48.1			
1989.8	34.6		28.2		32.9	67.5						180	2
3979.6	-4.6		-4.2		40.5	36.3		84.4		-48.1			

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 20 GHz were performed in a horizontal and vertical polarization at the following test location :

- Test not applicable

- Roof (Small Open Area Test Site)
- Canyon #1 (10- and 30-Meter Open Area Test Site), Carroll Canyon, San Diego
- Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

Testing was performed at a test distance of:

- 1 meters
- 3 meters
- 10 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.
<input checked="" type="checkbox"/> - 8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209
<input checked="" type="checkbox"/> - 85662B	406	Spectrum Analyzer Display	Hewlett Packard	2309A04682
<input type="checkbox"/> - 3115	453	Antenna, Double Ridge Guide	EMCO	9412-4363
<input checked="" type="checkbox"/> - 3115	251	Antenna, Double Ridge Guide	EMCO	2495
<input type="checkbox"/> - AFD3-0102-13-ST	366	Pre-Amplifier (38 dB gain), 1 to 2 GHz	Miteq, Inc.	16429
<input checked="" type="checkbox"/> - AFD3-0208-40-ST	367	Pre-Amplifier (30 dB gain), 2 to 8 GHz	Miteq, Inc.	155382
<input checked="" type="checkbox"/> - AFS4-08001800-70-10P-4	368	Pre-Amplifier (22 dB gain), 8 to 18 GHz	Miteq, Inc.	167
<input type="checkbox"/> - 91888-2	252	Horn Antenna (1 to 2 GHz)	Eaton	101
<input type="checkbox"/> - 91889-2	253	Horn Antenna (2 to 3.6 GHz)	Eaton	101
<input type="checkbox"/> - 91892-1	254	Reflector Antenna (3.6 to 18 GHz)	Eaton	--
<input type="checkbox"/> - 94613-1	255	Horn Antenna (3.6 to 7.6 GHz)	Eaton	--
<input type="checkbox"/> - 91891-2	256	Horn Antenna (7.3 to 12 GHz)	Eaton	--
<input type="checkbox"/> - 94614-1	257	Horn Antenna (12 to 18 GHz)	Eaton	--

Remarks: _____