

TEST RESULT SUMMARY

FCC PART 24 SUBPART E

MANUFACTURER'S NAME	ADC Telecommunications
NAME OF EQUIPMENT	Digivance In-Building Coverage Solution (Wireless Communication System)
MODEL NUMBER	DGVI-312110 DHU DGVI-313110 DRU
MANUFACTURER'S ADDRESS	PO Box 1101 Minneapolis MN 55440
TEST REPORT NUMBER	NC103808
TEST DATE	30 April, 08 May, 14 June 2001

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 24 Subpart E.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 24 Subpart E.

Date: 19 July 2001

Location: Taylors Falls MN
USA



G. S. Jakubowski
Test Engineer



E. J. Borgstrom
Minnesota EMC Manager

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **NC103808** Date of issue: 19 July 2001

Model / Serial No. : **DGVI-312110 DHU / FCC1**
DGVI-313110 DRU / ----

Product Type : **Digivance In-Building Coverage Solution (Wireless Communication System)**

Applicant : **ADC Telecommunications**

Manufacturer : **ADC Telecommunications**

License holder : **ADC Telecommunications**

Address : **PO Box 1101**
Minneapolis MN 55440

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number : **NC103808**

Reference(s) : **NC103808**

Total pages including Appendices : **188**

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001. TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports. This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

D I R E C T O R Y - E M I S S I O N S

A) Documentation	Page(s)
Test report	<u>1 – 181</u>
Directory	<u>2</u>
Test Regulations	<u>3</u>
 B) Test data	
Conducted emissions on power leads 150 kHz - 30 MHz	<u>5 - 8</u>
24.232 Power and Antenna Height Limits	<u>9 - 10</u>
24.235 Frequency Stability	<u>11 - 28</u>
24.238 Emission Limits	<u>29 - 103</u>
Intermodulation Data	<u>104 - 176</u>
Test Setup Photo(s)	<u>See Test Setup Exhibit</u>
Product Information Form	<u>A1 – A7</u>

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|---|---|------------------------------------|
| ☐ - EN 50081-1 / 1991 | ☐ - Group 1 | ☐ - Group 2 |
| ☐ - EN 55011 / 1991 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55013 / 1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1987 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55014 / A2:1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1993 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55015 / 1987 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55015 / A1:1990 | | |
| ☐ - EN 55015 / 1993 | | |
| ☐ - EN 55022 / 1987 | | |
| ☒ - FCC Part 24 Subpart E | | |
| ☐ - BS | ☐ - Class A | ☐ - Class B |
| ☐ - VCCI | ☐ - Class A | ☐ - Class B |
| ☐ - FCC | ☐ - Class A | ☐ - Class B |
| ☐ - AS 3548 (1992) | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 11 (1990) | ☐ - Group 1 | ☐ - Group 2 |
| | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 22 (1993) | ☐ - Class A | ☐ - Class B |

Environmental conditions in the lab:

	<u>Actual</u>
Temperature	: 22 - 23 °C
Relative Humidity	: 33 - 54 %
Atmospheric pressure	: 98.4 – 98.6 kPa
Power supply system	: 60 Hz - 115 V - 1-phase

Sign Explanations:

- ☐ - not applicable
- ☒ - applicable



Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage) per 15.207

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

☐ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☒ - Wild River Lab Screen Room
- ☐ - New Brighton Lab Shielded Room

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2417	3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	8812-1439	21 Sep 01
■ -	2534	ESHS-20	Rhode & Schwarz	EMI Receiver	837055/003	22 Aug 01
■ -	2741	11947A	Hewlett-Packard	Transient Limiter	3107A00779	21 Mar 02

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Conducted Emissions data on next 3 pages

Conducted Electromagnetic Emissions



Test Report #:	3808 Run 02	Test Area:	SCREEN ROOM		
Test Method:	FCC	Test Date:	08-May-2001		
EUT Model #:	DGVI 200000-1	EUT Power:	60 Hz 120 VAC		
EUT Serial #:				Temperature:	23 °C
Manufacturer:	ADC			Relative Humidity:	33 %
EUT Description:	1900 MHz In building coverage system			Air Pressure:	98.6 kPa
Notes:	System consisting of: digital host unit and digital remote unit			Page:	1 of 3
	1900 MHz PCS bands.				

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 FCC B	DELTA2 N/A
0.473	15.1 Qp	0.0 / 0.1 / -9.9	25.1	Neutral	-22.9	N/A
0.750	14.9 Qp	0.0 / 0.1 / -9.9	24.9	Neutral	-23.1	N/A
1.02	14.5 Qp	0.0 / 0.1 / -9.9	24.5	Neutral	-23.5	N/A
1.50	13.2 Qp	0.0 / 0.1 / -9.9	23.2	Neutral	-24.8	N/A
2.10	10.8 Qp	0.0 / 0.1 / -9.9	20.8	Neutral	-27.2	N/A
3.00	12.1 Qp	0.1 / 0.1 / -9.9	22.1	Neutral	-25.9	N/A
4.00	12.7 Qp	0.1 / 0.1 / -9.8	22.7	Neutral	-25.3	N/A
6.00	15.1 Qp	0.1 / 0.1 / -9.9	25.2	Neutral	-22.8	N/A
8.00	15.7 Qp	0.2 / 0.1 / -9.9	25.9	Neutral	-22.1	N/A
11.97	26.1 Qp	0.2 / 0.1 / -9.9	36.4	Neutral	-11.6	N/A
12.02	22.4 Qp	0.3 / 0.1 / -9.9	32.7	Neutral	-15.3	N/A
12.84	30.9 Qp	0.3 / 0.2 / -9.9	41.2	Neutral	-6.8	N/A
14.33	36.3 Qp	0.3 / 0.2 / -9.9	46.7	Neutral	N/A	Quasi-peak vs. average
14.33	29.8 Av	0.3 / 0.2 / -9.9	40.2	Neutral	N/A	>6 dB, subtract 13 dB
14.33	36.3 Qp	0.3 / 0.2 / -9.9 / -13	33.7	Neutral	-14.3	N/A
16.02	30.2 Qp	0.4 / 0.2 / -9.8	40.6	Neutral	-7.4	N/A
25.41	22.4 Qp	0.6 / 0.4 / -10.0	33.4	Neutral	-14.6	N/A
0.473	12.3 Pk	0.0 / 0.1 / -9.9	22.3	Line 1	-25.7	N/A
0.750	10.8 Qp	0.0 / 0.1 / -9.9	20.8	Line 1	-27.2	N/A
1.02	11.7 Qp	0.0 / 0.1 / -9.9	21.7	Line 1	-26.3	N/A
1.50	12.6 Qp	0.0 / 0.1 / -9.9	22.6	Line 1	-25.4	N/A
2.10	10.6 Qp	0.0 / 0.1 / -9.9	20.6	Line 1	-27.4	N/A
3.00	12.4 Qp	0.1 / 0.1 / -9.9	22.4	Line 1	-25.6	N/A
4.00	13.4 Qp	0.1 / 0.1 / -9.8	23.4	Line 1	-24.6	N/A
6.00	14.2 Qp	0.1 / 0.1 / -9.9	24.3	Line 1	-23.7	N/A
8.00	17.4 Qp	0.2 / 0.1 / -9.9	27.6	Line 1	-20.4	N/A

Tested by: J. T. Schneider

Printed

Joel T. Schneider

Signature

Reviewed by: T. K. Swanson

Printed

Thomas K. Swanson

Signature

Conducted Electromagnetic Emissions



Test Report #:	3808 Run 02	Test Area:	SCREEN ROOM		
Test Method:	FCC	Test Date:	08-May-2001		
EUT Model #:	DGVI 200000-1	EUT Power:	60 Hz 120 VAC		
EUT Serial #:				Temperature:	23 °C
Manufacturer:	ADC			Relative Humidity:	33 %
EUT Description:	1900 MHz In building coverage system			Air Pressure:	98.6 kPa
Notes:	System consisting of: digital host unit and digital remote unit			Page:	2 of 3
	1900 MHz PCS bands.				

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 FCC B	DELTA2 N/A
11.97	32.2 Qp	0.2 / 0.1 / -9.9	42.5	Line 1	-5.5	N/A
12.02	31.5 Qp	0.3 / 0.1 / -9.9	41.8	Line 1	-6.2	N/A
12.84	37.3 Qp	0.3 / 0.2 / -9.9	47.6	Line 1	N/A	Quasi-peak vs. average
12.84	28.3 Av	0.3 / 0.2 / -9.9	38.6	Line 1	N/A	>6 dB, subtract 13 dB
12.84	37.3 Qp	0.3 / 0.2 / -9.9/-13	34.6	Line 1	-13.4	N/A
14.33	34.5 Qp	0.3 / 0.2 / -9.9	44.9	Line 1	N/A	Quasi-peak vs. average
14.33	27.5 Av	0.3 / 0.2 / -9.9	37.9	Line 1	N/A	>6 dB, subtract 13 dB
14.33	34.5 Qp	0.3 / 0.2 / -9.9/-13	31.9	Line 1	-16.1	N/A
16.02	21.9 Qp	0.4 / 0.2 / -9.8	32.3	Line 1	-15.7	N/A
25.41	24.2 Qp	0.6 / 0.4 / -10.0	35.2	Line 1	-12.8	N/A
13.01	38.0 Qp	0.3 / 0.2 / -9.9	48.3	Line 1	N/A	Quasi-peak vs. average
13.01	29.7 Av	0.3 / 0.2 / -9.9	40.0	Line 1	N/A	>6 dB, subtract 13 dB
13.01	38.0 Qp	0.3 / 0.2 / -9.9/-13	35.3	Line 1	-12.7	N/A

Tested by: J. T. Schneider

Printed

Signature

Reviewed by: T. K. Swanson

Printed

Signature

Conducted Electromagnetic Emissions



Test Report #:	3808 Run 02	Test Area:	SCREEN ROOM		
Test Method:	FCC	Test Date:	08-May-2001		
EUT Model #:	DGVI 200000-1	EUT Power:	60 Hz 120 VAC		
EUT Serial #:				Temperature:	23 °C
Manufacturer:	ADC			Relative Humidity:	33 %
EUT Description:	1900 MHz In building coverage system			Air Pressure:	98.6 kPa
Notes:	System consisting of: digital host unit and digital remote unit			Page:	3 of 3
	1900 MHz PCS bands.				

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 FCC B	DELTA2 N/A
---------------	-----------------	------------------------------	-----------------	------------	-----------------	---------------

***** MEASUREMENT SUMMARY *****						
13.01	38.0 Qp	0.3 / 0.2 / -9.9/-13	35.3	Line 1	-12.7	N/A
12.84	37.3 Qp	0.3 / 0.2 / -9.9	47.6	Line 1	-6.8	N/A
14.33	36.3 Qp	0.3 / 0.2 / -9.9/-13	33.7	Neutral	-14.3	N/A
11.97	32.2 Qp	0.2 / 0.1 / -9.9	42.5	Line 1	-5.5	N/A
12.02	31.5 Qp	0.3 / 0.1 / -9.9	41.8	Line 1	-6.2	N/A
16.02	30.2 Qp	0.4 / 0.2 / -9.8	40.6	Neutral	-7.4	N/A
0.473	25.2 Qp	0.0 / 0.1 / -9.9	35.2	Neutral	-12.8	N/A
25.41	24.2 Qp	0.6 / 0.4 / -10.0	35.2	Line 1	-12.8	N/A
0.750	25.0 Qp	0.0 / 0.1 / -9.9	35.0	Neutral	-13.0	N/A
1.02	24.2 Qp	0.0 / 0.1 / -9.9	34.2	Neutral	-13.8	N/A
1.50	23.0 Qp	0.0 / 0.1 / -9.9	33.0	Neutral	-15.0	N/A
8.00	17.4 Qp	0.2 / 0.1 / -9.9	27.6	Line 1	-20.4	N/A
6.00	15.1 Qp	0.1 / 0.1 / -9.9	25.2	Neutral	-22.8	N/A
4.00	13.4 Qp	0.1 / 0.1 / -9.8	23.4	Line 1	-24.6	N/A
3.00	12.4 Qp	0.1 / 0.1 / -9.9	22.4	Line 1	-25.6	N/A
2.10	10.8 Qp	0.0 / 0.1 / -9.9	20.8	Neutral	-27.2	N/A
0.450	9.9 Qp	0.0 / 0.1 / -9.9	19.9	Neutral	-28.1	N/A

Tested by: J. T. Schneider

Printed

Signature

Reviewed by: T. K. Swanson

Printed

Signature

24.232 Effective Radiated Power Limit

The Effective Radiated Power Limit measurements were tested at the following test location :

☐ - Test not applicable

■ - ADC facility

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - 8563E	Hewlett-Packard	Spectrum Analyzer	MC27690	Apr 02
■ - 6810.17.A	Huber+Suhner	Attenuator		CNR

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually. Equipment labeled CNR (Calibration Not Required) is verified and compensated for with NIST traceable calibrated equipment.

This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected directly to the spectrum analyzer, which was set up with a 1 MHz resolution bandwidth. The spectrum analyzer level was offset by 20 dB to compensate for the attenuator placed between the EUT and the analyzer, and by 2 dB for the measured cable loss between the EUT and the analyzer.

ERP data on next page

**Effective Isotropic Radiated Power Limit Test for the ADC Inc.
Digivance 1900 MHz ICS System.
Models DGVI-312110DHU and DGVI-313110DRU.
Per FCC CFR 47 Part 24.232 (b) and (c)**

This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected to the spectrum analyzer as shown below. A CW signal was used at the low , mid and high parts of the selected band. The spectrum analyzer level was offset by 35dB to compensate for attenuators and cable losses between the EUT and analyzer.

The maximum specified TX output power from the EUT antenna port is 19dBm.
The minimum specified TX output power from the EUT antenna port is 13dBm.
The maximum gain antenna available for use with the EUT has a gain of 8dBi.
From the following equations:

Peak Output of EUT at antenna Connector (dBm) + Gain of Antenna (dBi) = Peak TX Power (dBm) EIRP
 $10 * \log_{10}(\text{Peak TX Power} * E^3 \text{ Watts}) = \text{Peak TX Power (dBm) EIRP}$

19dBm + 8dBi = 27dBm EIRP
 27dBm EIRP = 0.5 Watts EIRP

Band A		Band D	
Carrier Frequency	Carrier Output	Carrier Frequency	Carrier Output
1930.0 MHz	+13.17dBm	1945.0 MHz	+15.17dBm
1937.0 MHz	+15.83dBm	1947.0 MHz	+15.33dBm
1945.0 MHz	+15.0dBm	1950.0 MHz	+14.83dBm
Band B		Band E	
Carrier Frequency	Carrier Output	Carrier Frequency	Carrier Output
1950.0 MHz	+16.17dBm	1965.0 MHz	+15.0dBm
1957.0 MHz	+15.83dBm	1967.0 MHz	+16.0dBm
1965.0 MHz	+15.0dBm	1970.0 MHz	+15.67dBm
Band C		Band F	
Carrier Frequency	Carrier Output	Carrier Frequency	Carrier Output
1975.0 MHz	+17.5dBm	1970.0 MHz	+15.5dBm
1982.0 MHz	+15dBm	1972.0 MHz	+17.17dBm
1990.0 MHz	+13.0dBm	1975.0 MHz	+15.83dBm

24.235 Frequency Stability

The Frequency Stability measurements were tested at the following test location :

☐ - Test not applicable

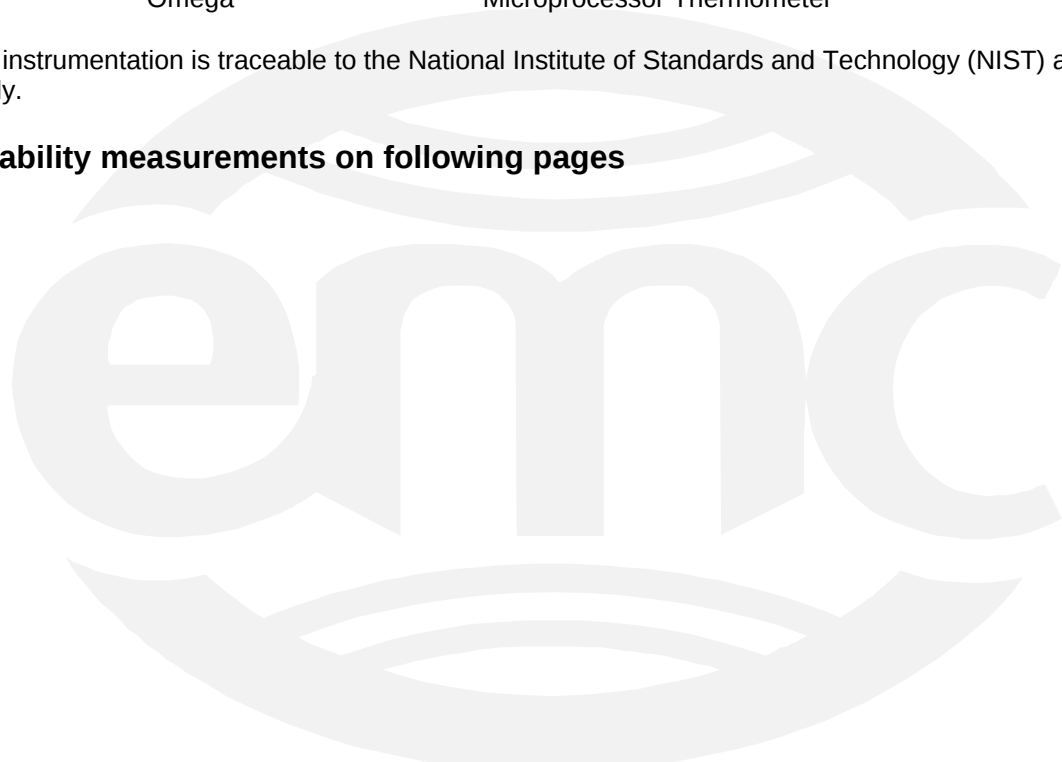
■ - ADC facility

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	F-12-CHV-S-5	Despatch/Ecosphere	Temperature chamber	MC21679	Aug 01
■ -	5385A	Hewlett-Packard	Microwave Frequency Counter	MC27851	Feb 02
■ -	HH23	Omega	Microprocessor Thermometer		Nov 01

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Frequency Stability measurements on following pages



**Frequency Tolerance Test for ADC Inc. Digivance 1900 MHz ICS System
Models DGVI-312110DHU and DGVI-313110DRU.
Per FCC CFR 47 Part 24.235**

EUT Band A and D Selected

Input Voltage	Carrier Frequency	Measured Frequency	Meets requirement?
102 VAC	1930.000000 MHz	1930.000000 MHz	Yes
120 VAC	1930.000000 MHz	1930.000000 MHz	Yes
138 VAC	1930.000000 MHz	1930.000000 MHz	Yes
102 VAC	1940.000000 MHz	1940.000000 MHz	Yes
120 VAC	1940.000000 MHz	1940.000000 MHz	Yes
138 VAC	1940.000000 MHz	1940.000000 MHz	Yes
102 VAC	1950.000000 MHz	1950.000000 MHz	Yes
120 VAC	1950.000000 MHz	1950.000000 MHz	Yes
138 VAC	1950.000000 MHz	1950.000000 MHz	Yes
Temperature	Carrier Frequency	Measured Frequency	Meets requirement?
-30 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
-20 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
-10 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
0 Deg. C	1930.000000 MHz	1930.000000 MHz	Yes
10 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
20 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
30 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
40 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
50 Deg C	1930.000000 MHz	1930.000000 MHz	Yes
-30 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
-20 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
-10 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
0 Deg. C	1940.000000 MHz	1940.000000 MHz	Yes
10 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
20 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
30 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
40 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
50 Deg C	1940.000000 MHz	1940.000000 MHz	Yes
-30 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
-20 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
-10 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
0 Deg. C	1950.000000 MHz	1950.000000 MHz	Yes
10 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
20 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
30 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
40 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
50 Deg C	1950.000000 MHz	1950.000000 MHz	Yes

EUT Band D, B, and E Selected

Input Voltage	Carrier Frequency	Measured Frequency	Meets requirement?
102 VAC	1945.000000 MHz	1945.000000 MHz	Yes
120 VAC	1945.000000 MHz	1945.000000 MHz	Yes
138 VAC	1945.000000 MHz	1945.000000 MHz	Yes
102 VAC	1960.000000 MHz	1960.000000 MHz	Yes
120 VAC	1960.000000 MHz	1960.000000 MHz	Yes
138 VAC	1960.000000 MHz	1960.000000 MHz	Yes
102 VAC	1970.000000 MHz	1970.000000 MHz	Yes
120 VAC	1970.000000 MHz	1970.000000 MHz	Yes
138 VAC	1970.000000 MHz	1970.000000 MHz	Yes
Temperature	Carrier Frequency	Measured Frequency	Meets requirement?
-30 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
-20 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
-10 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
0 Deg. C	1945.000000 MHz	1945.000000 MHz	Yes
10 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
20 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
30 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
40 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
50 Deg C	1945.000000 MHz	1945.000000 MHz	Yes
-30 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
-20 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
-10 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
0 Deg. C	1960.000000 MHz	1960.000000 MHz	Yes
10 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
20 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
30 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
40 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
50 Deg C	1960.000000 MHz	1960.000000 MHz	Yes
-30 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
-20 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
-10 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
0 Deg. C	1970.000000 MHz	1970.000000 MHz	Yes
10 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
20 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
30 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
40 Deg C	1970.000000 MHz	1970.000000 MHz	Yes
50 Deg C	1970.000000 MHz	1970.000000 MHz	Yes

EUT Band B, E, and F Selected

Input Voltage	Carrier Frequency	Measured Frequency	Meets requirement?
102 VAC	1950.000000 MHz	1950.000000 MHz	Yes
120 VAC	1950.000000 MHz	1950.000000 MHz	Yes
138 VAC	1950.000000 MHz	1950.000000 MHz	Yes
102 VAC	1965.000000 MHz	1965.000000 MHz	Yes
120 VAC	1965.000000 MHz	1965.000000 MHz	Yes
138 VAC	1965.000000 MHz	1965.000000 MHz	Yes
102 VAC	1975.000000 MHz	1975.000000 MHz	Yes
120 VAC	1975.000000 MHz	1975.000000 MHz	Yes
138 VAC	1975.000000 MHz	1975.000000 MHz	Yes
Temperature	Carrier Frequency	Measured Frequency	Meets requirement?
-30 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
-20 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
-10 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
0 Deg. C	1950.000000 MHz	1950.000000 MHz	Yes
10 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
20 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
30 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
40 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
50 Deg C	1950.000000 MHz	1950.000000 MHz	Yes
-30 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-20 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-10 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
0 Deg. C	1965.000000 MHz	1965.000000 MHz	Yes
10 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
20 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
30 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
40 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
50 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-30 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
-20 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
-10 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
0 Deg. C	1975.000000 MHz	1975.000000 MHz	Yes
10 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
20 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
30 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
40 Deg C	1975.000000 MHz	1975.000000 MHz	Yes
50 Deg C	1975.000000 MHz	1975.000000 MHz	Yes

EUT Band E, F, and C Selected

Input Voltage	Carrier Frequency	Measured Frequency	Meets requirement?
102 VAC	1965.000000 MHz	1965.000000 MHz	Yes
120 VAC	1965.000000 MHz	1965.000000 MHz	Yes
138 VAC	1965.000000 MHz	1965.000000 MHz	Yes
102 VAC	1980.000000 MHz	1980.000000 MHz	Yes
120 VAC	1980.000000 MHz	1980.000000 MHz	Yes
138 VAC	1980.000000 MHz	1980.000000 MHz	Yes
102 VAC	1990.000000 MHz	1990.000000 MHz	Yes
120 VAC	1990.000000 MHz	1990.000000 MHz	Yes
138 VAC	1990.000000 MHz	1990.000000 MHz	Yes
Temperature	Carrier Frequency	Measured Frequency	Meets requirement?
-30 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-20 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-10 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
0 Deg. C	1965.000000 MHz	1965.000000 MHz	Yes
10 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
20 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
30 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
40 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
50 Deg C	1965.000000 MHz	1965.000000 MHz	Yes
-30 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
-20 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
-10 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
0 Deg. C	1980.000000 MHz	1980.000000 MHz	Yes
10 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
20 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
30 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
40 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
50 Deg C	1980.000000 MHz	1980.000000 MHz	Yes
-30 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
-20 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
-10 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
0 Deg. C	1990.000000 MHz	1990.000000 MHz	Yes
10 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
20 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
30 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
40 Deg C	1990.000000 MHz	1990.000000 MHz	Yes
50 Deg C	1990.000000 MHz	1990.000000 MHz	Yes

Note: EUT is only specified for indoor use only with temperature range of 0 to 50 degrees C.

Occupied Bandwidth Modulation Test for ADC Inc. Digivance 1900 MHz ICS System Models DGV1-312110DHU and DGV1-313110DRU.

An input/output Occupied Bandwidth test was done with 3 different modulation types: FM (8KHz, 1KHz), TDMA, and CDMA. The purpose was to determine the amount of distortion added to different types of modulation schemes by the EUT. The following plots show input signals vs. output signals.

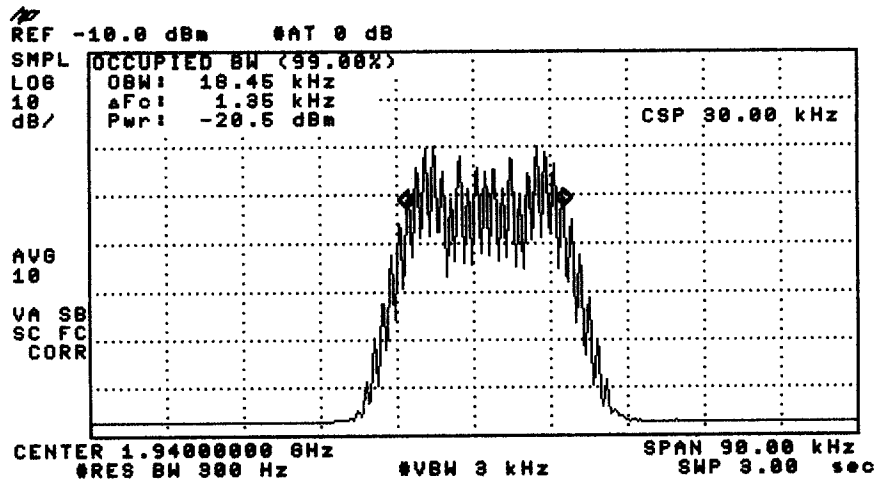
Results:

Pass (see plots)

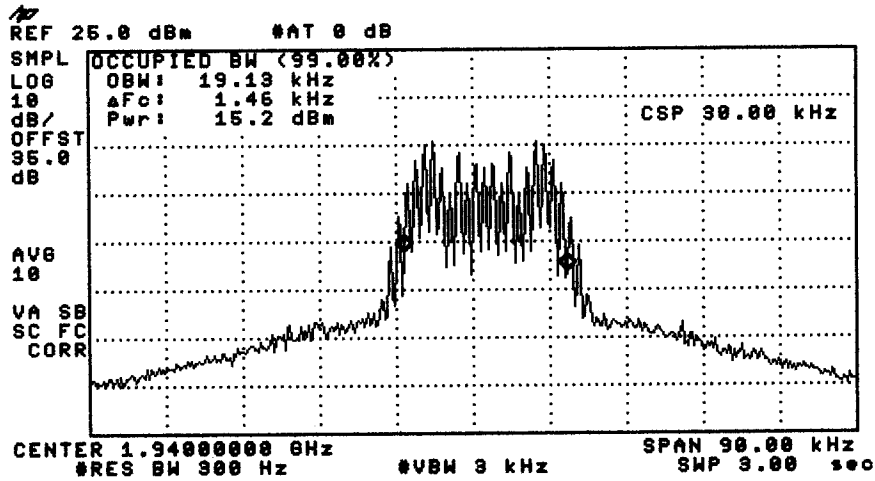
Band A+D

OCL BW

(8k, 1k)



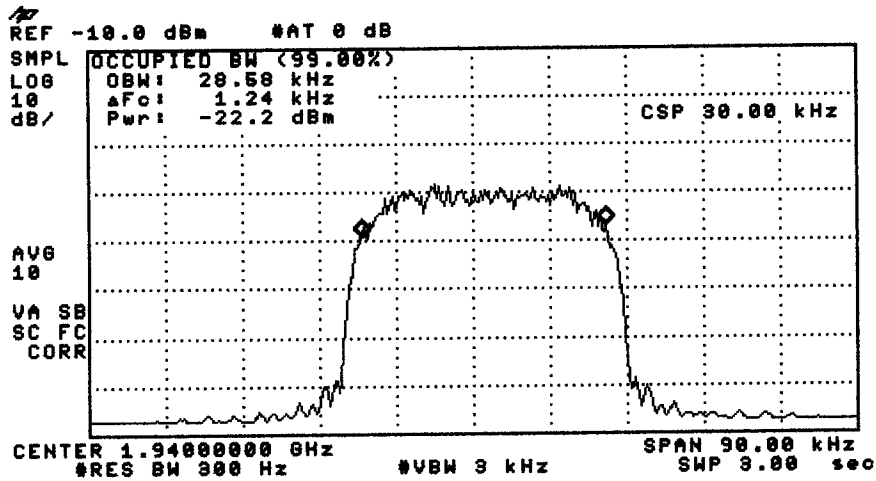
Fm IW



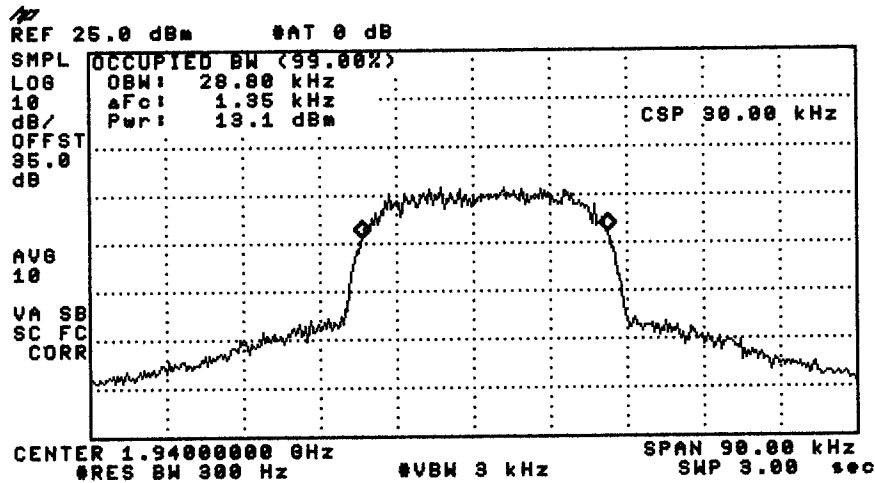
Fm out

Band A+D

OCC BW



TDMA IN

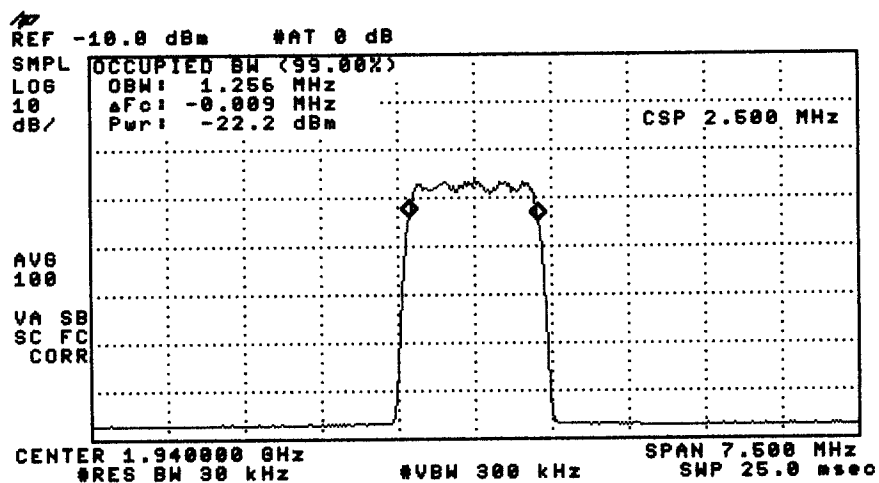


TDMA
out

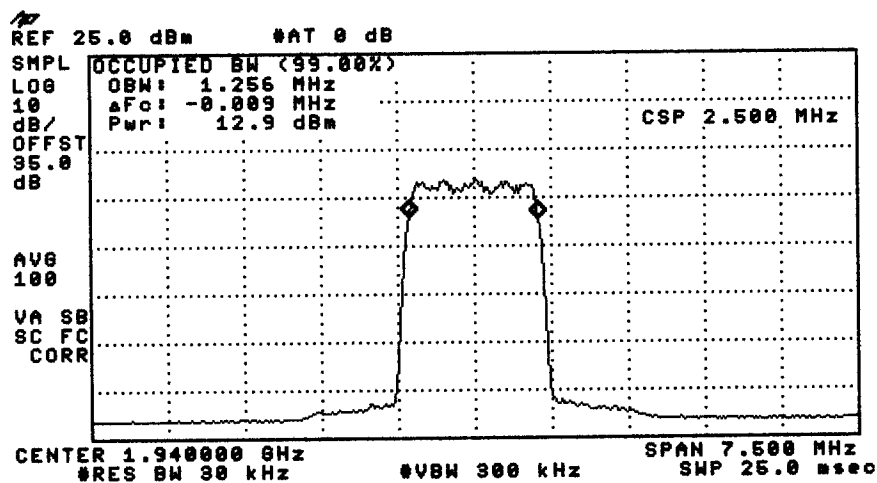
1900
Host + Remote

Band A+D

OCC BW



CDMA
IN

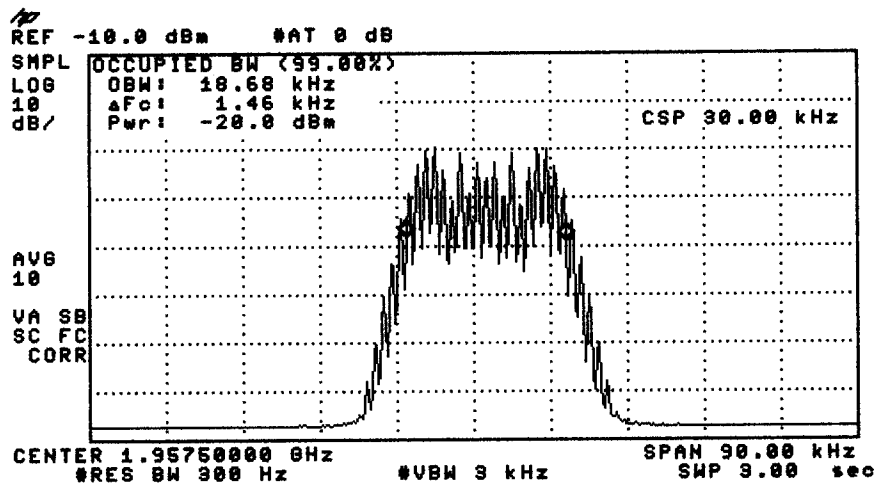


CDMA
out

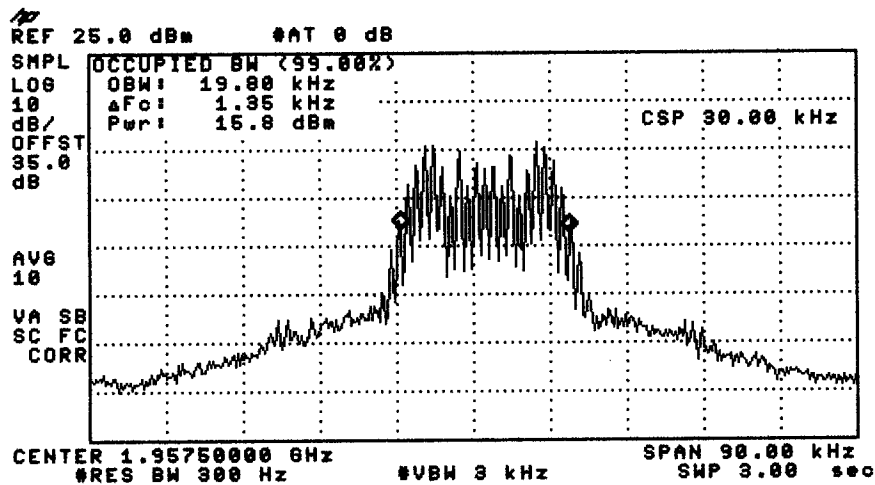
Band D, B, E

OCC BW

(8k, 1k)



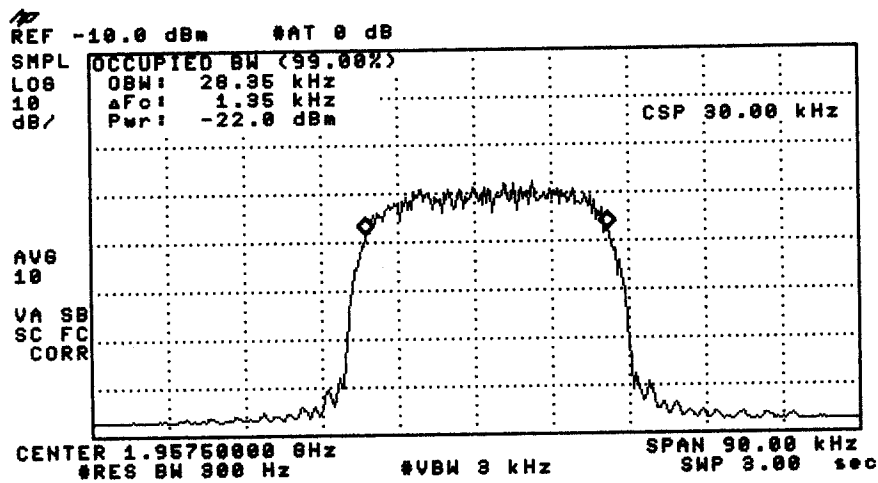
F_m
I_N



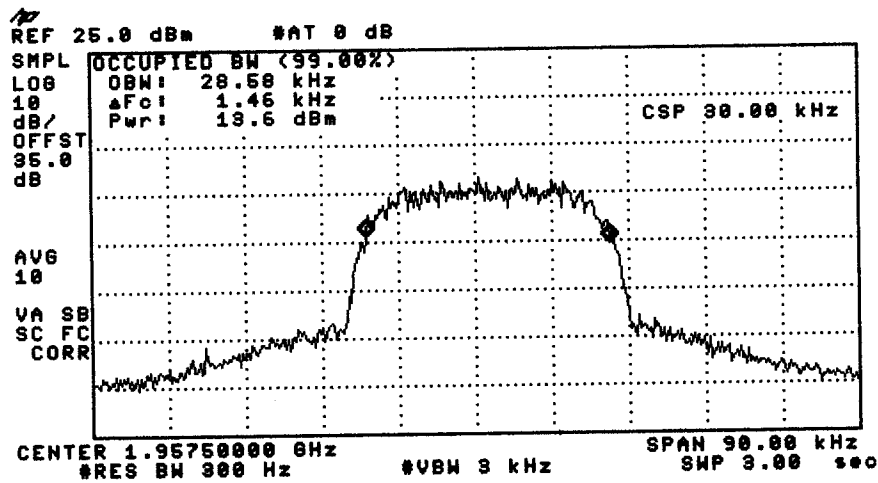
F_m
out

Band D,B+E

OCC BW



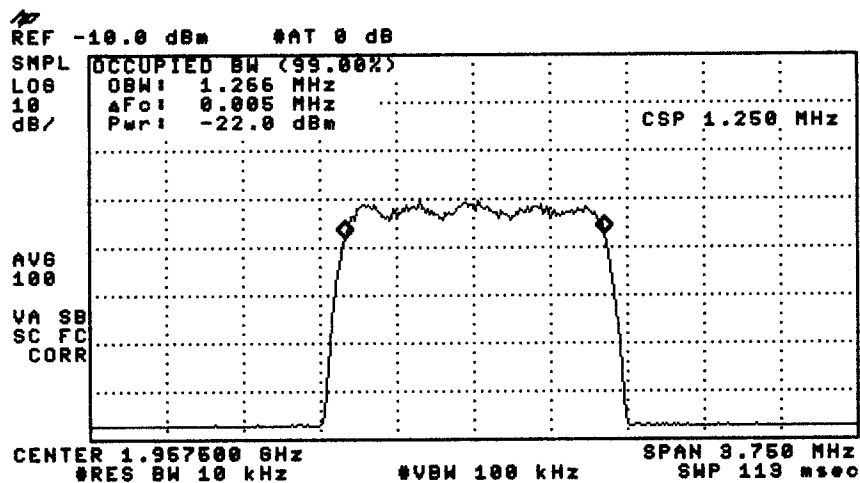
TDMA
IW



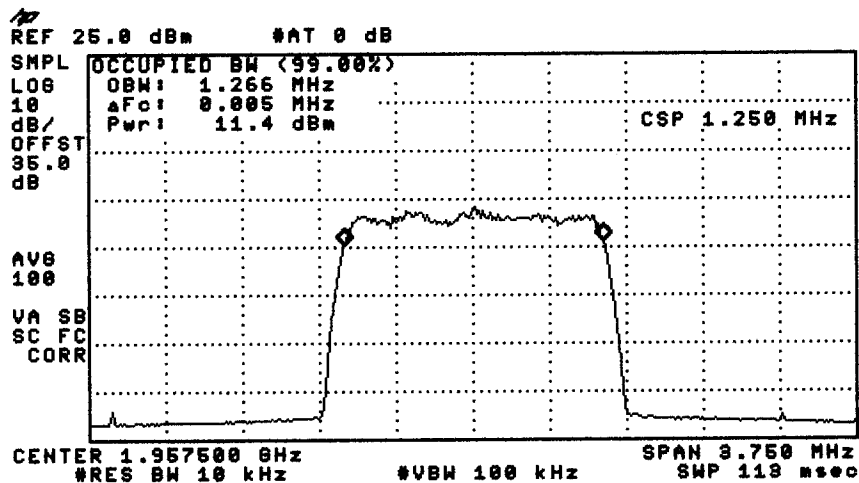
TDMA
out

Band D, B+E

OCC BW



CDMA
IN.

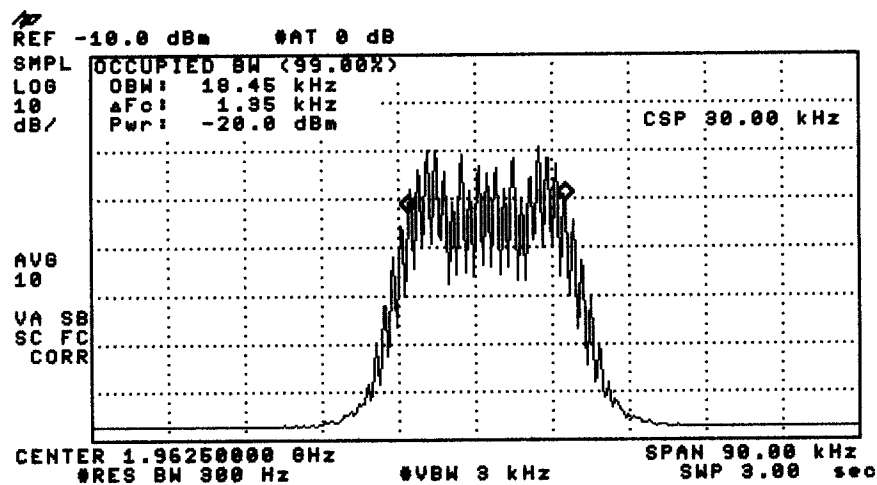


CDMA
out

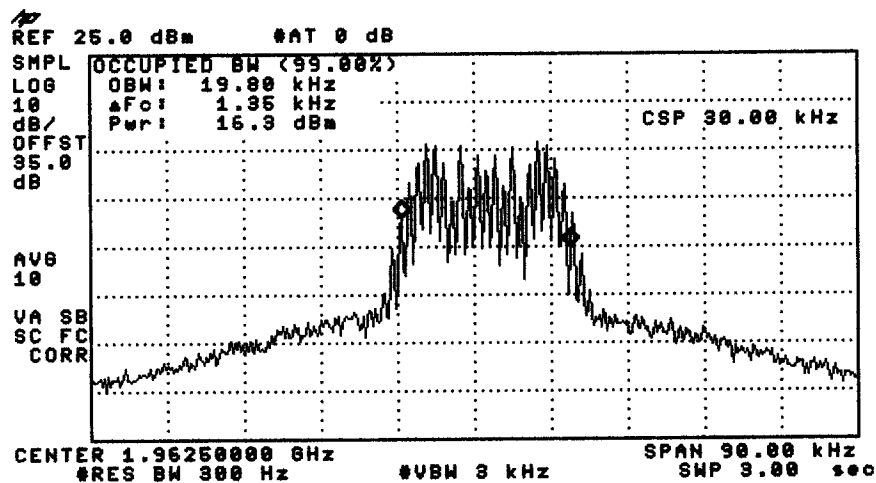
Band B, E, F

occ BW

(8k, 1k)



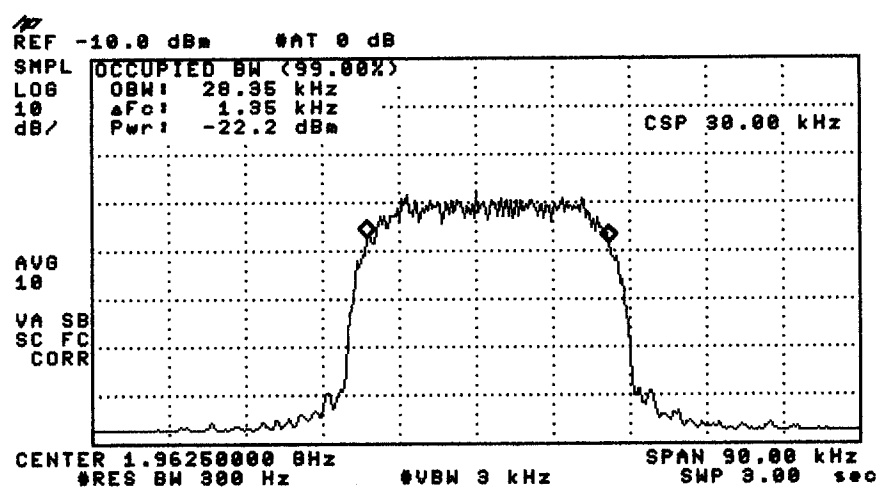
F_m
IN



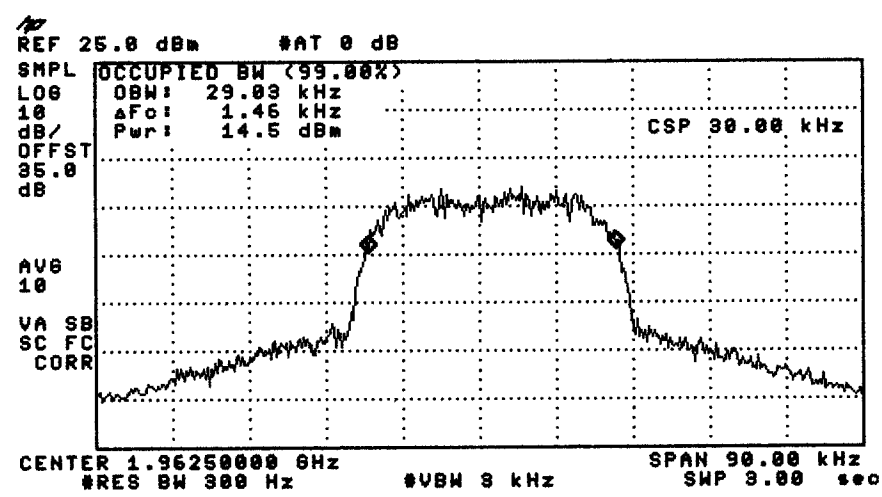
F_m
out

Band B, E+F

OCC BW



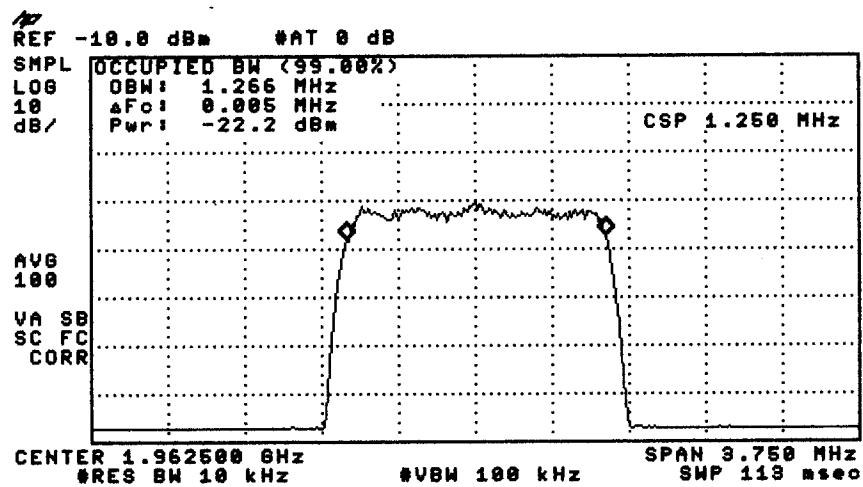
TDMA IN



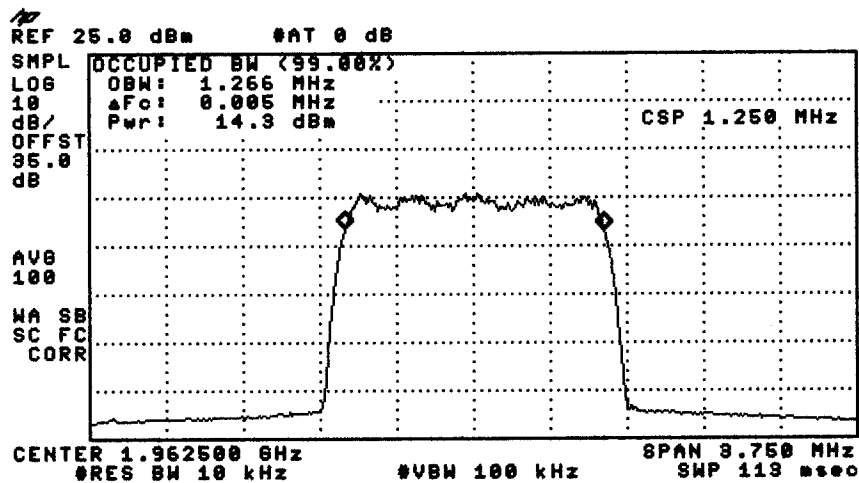
TDMA out

Band B, E+F

Occ BW



CDMA
IN

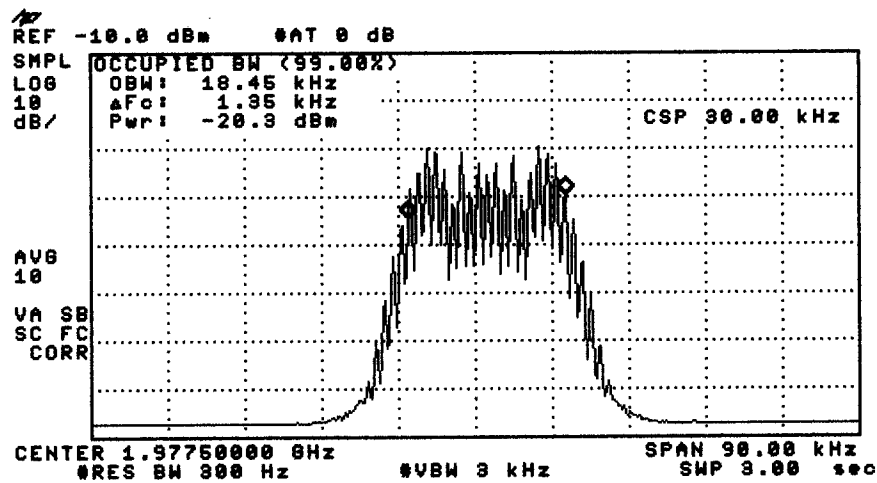


CDMA
out

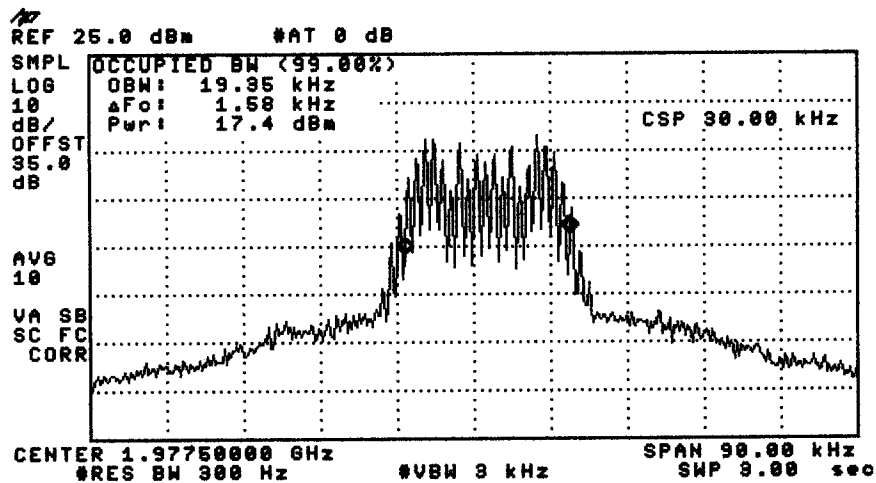
Band E, F, C

OCC BW

(8k, 1k)



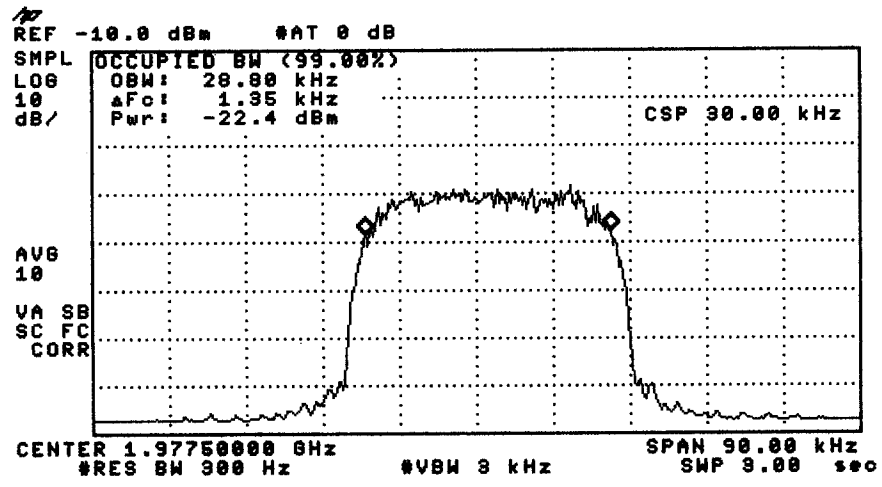
Fm
IW



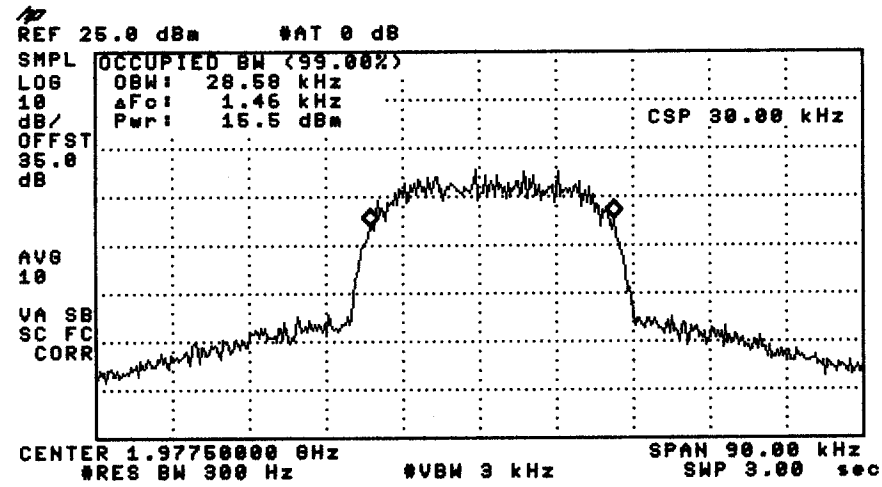
Fm
out.

Band E, F+C

Occ BW



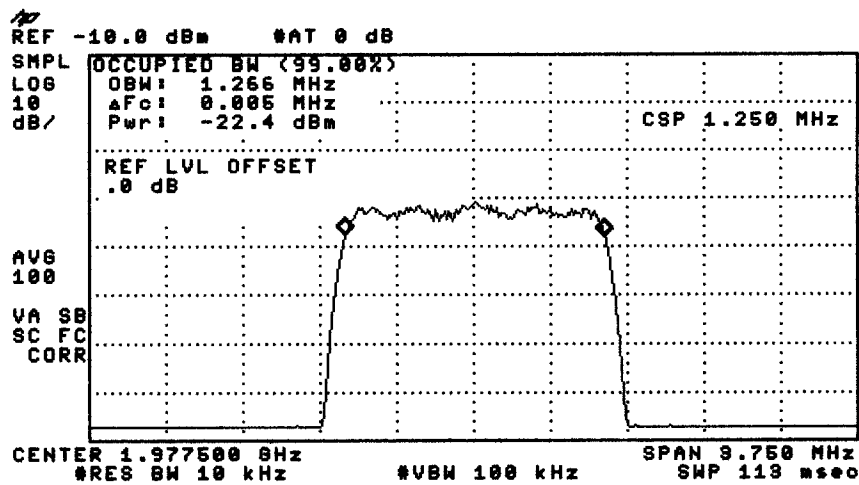
TDM A
IN



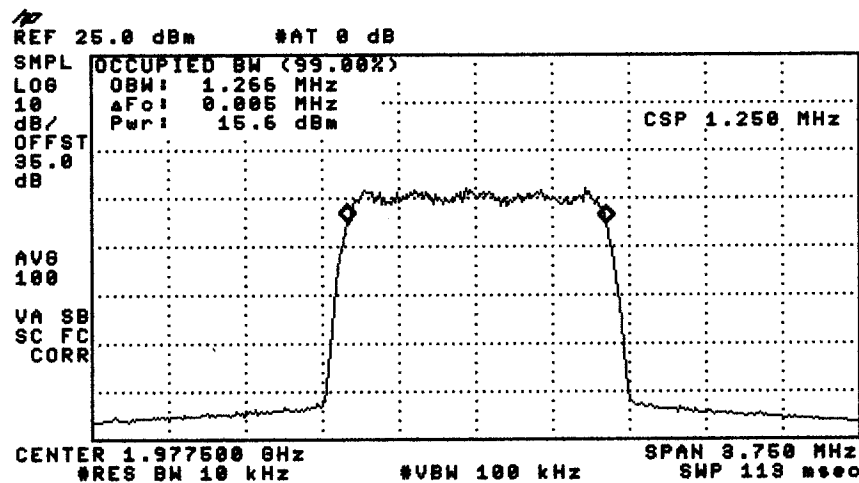
TDM A
out.

Band E, F, C

Occ BW



CDMA
IN



CDMA
out

24.238 Emission Limits

The Emission limitations for cellular measurements were performed at the following test location :

- - ADC facility
- - Wild River Lab Large Test Site (Case Emissions Test)

TÜV Product Service Test equipment used for Case Emissions Test:

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	21 Sep 01
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant 1-18 GHz	9001-3275	20 Oct 01
■ -	2865	11867A	Hewlett-Packard	RF Limiter	01972	Code B
■ -	2543	ZHL-1042J	Hewlett-Packard	Preamplifier 1-4 GHz	HO72294-11	Code B
■ -	2477	AFT-8434	Avantek	Preamplifier 4-8 GHz	2613A92801	21 Mar 02
■ -	2478	AWT-18037	Avantek	Preamplifier 8-18 GHz	1001-9226	21 Mar 02
■ -	2690	8566B	Hewlett-Packard	Spectrum Analyzer	2430A00930	16 Nov 01
■ -	2678	85662A	Hewlett-Packard	Analyzer Display	2403A08134	16 Nov 01
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter	2521A01006	16 Nov 01

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually. Equipment labeled CNR (Calibration Not Required) is verified and compensated for with NIST traceable calibrated equipment.

Emissions Limits Data on following pages

**Conducted Emission Limits Test for ADC Inc. Digivance 1900 MHz ICS System
Models DGV1-312110DHU and DGV1-313110DRU.
Per FCC CFR 47 Part 24.238 Emission Limits**

The out of band emissions were measured directly from the EUT antenna output with a spectrum analyzer from 30MHz to the 10th harmonic of the highest carrier frequency . Test signals used were: CW, FM (1kHz, 8KHz), TDMA and CDMA. The different signals were input one at a time to the EUT. In all cases, the out of band emissions were less than -13dBm from the equation $(19\text{dBm} - [43 + 10 \log(0.08\text{W})])$

Band edge compliance is also demonstrated using a CW signal at the upper and lower limits of the band and a resolution bandwidth of 300Hz per 24.238 (b).

Results:

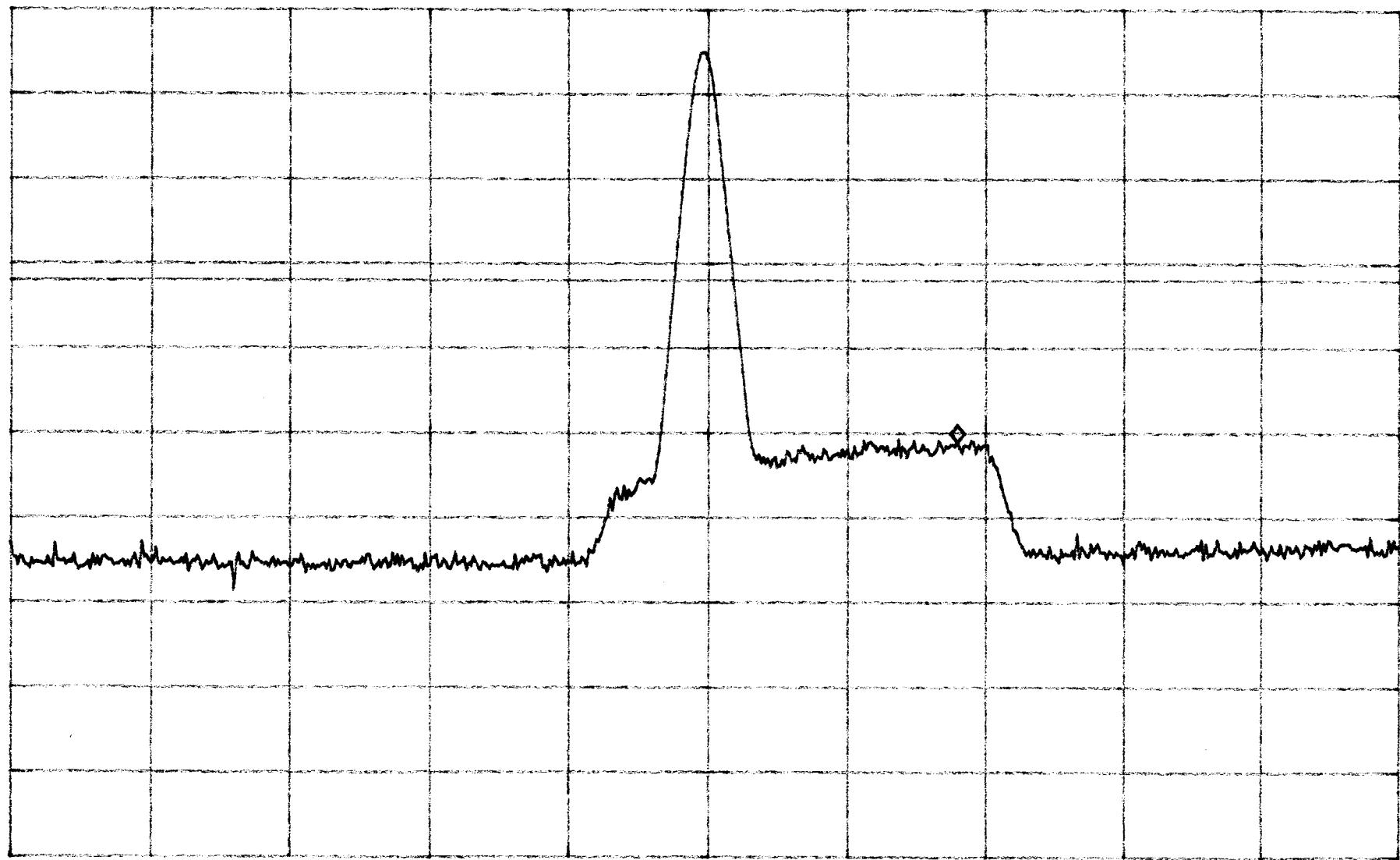
Pass (see plots)

A Emission Limits
@F_i

ATTN 30dB
RL 19.0dBm

MKR -32.00dBm
1.9481GHz

10dB/



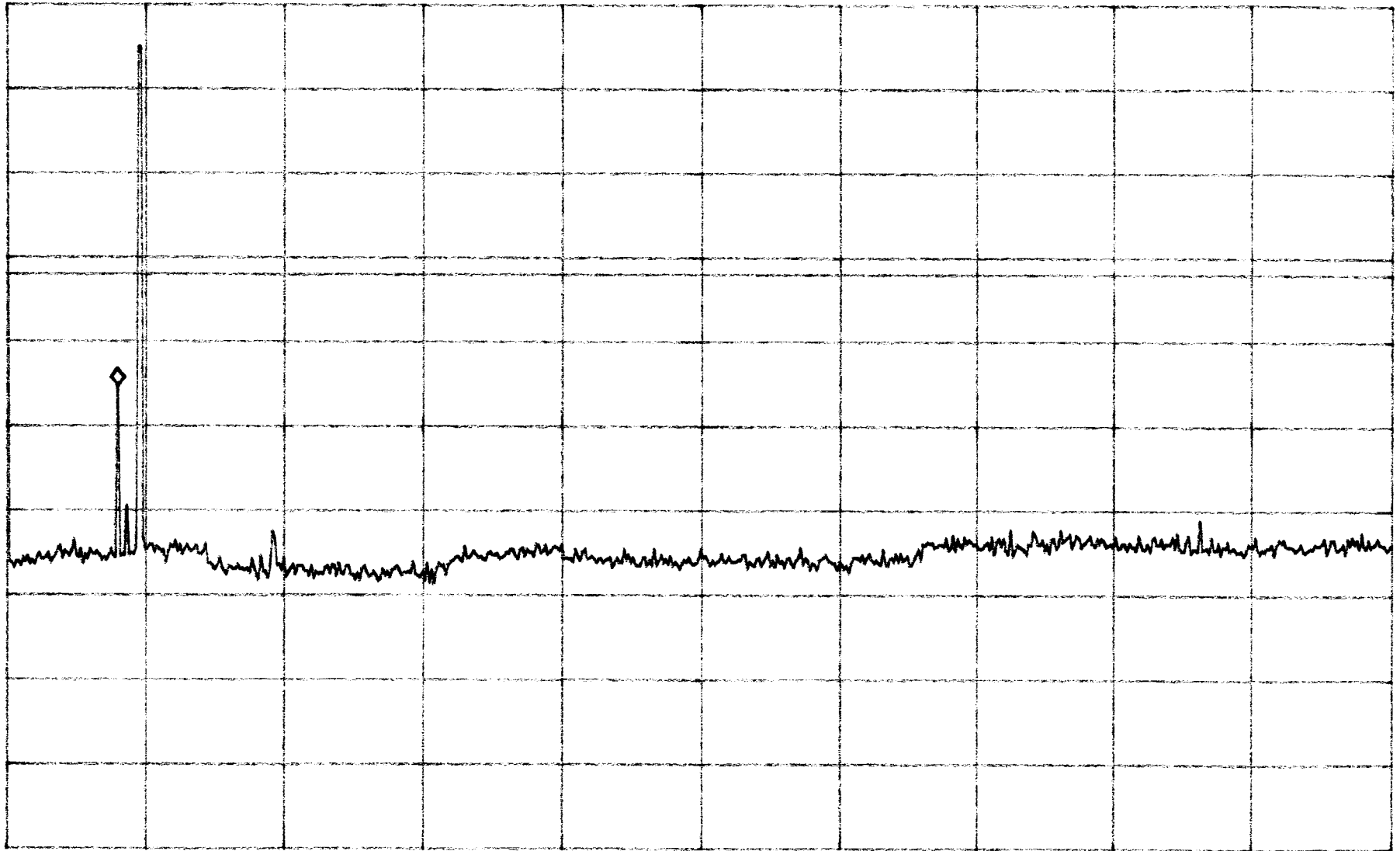
CENTER 1.9301GHz SPAN 100.0MHz
*RBW 1.0MHz VBW 1.0MHz SWP 50ms

A Emission Limits
@ F_i

ATTEN 30dB
RL 19.0dBm

MKR -26.17dBm
1.63GHz

10dB/



START 30MHz

STOP 20.00GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 400ms

A Emission limits

CF2

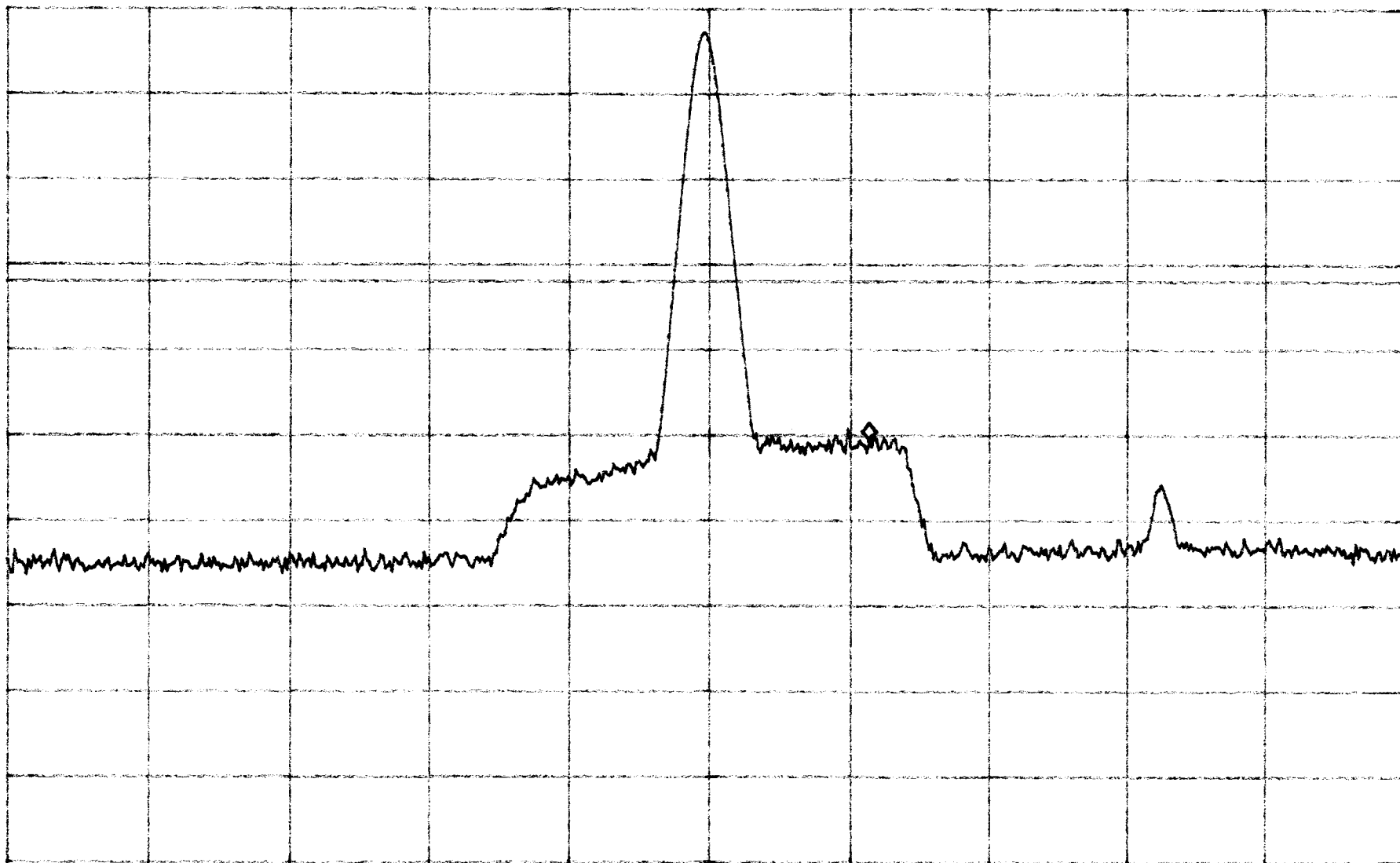
ATTN 30dB

MKR -31.50dBm

RL 19.0dBm

10dB/

1.9483GHz



CENTER 1.9370GHz

SPAN 100.0MHz

*RBW 1.0MHz

VBW 1.0MHz

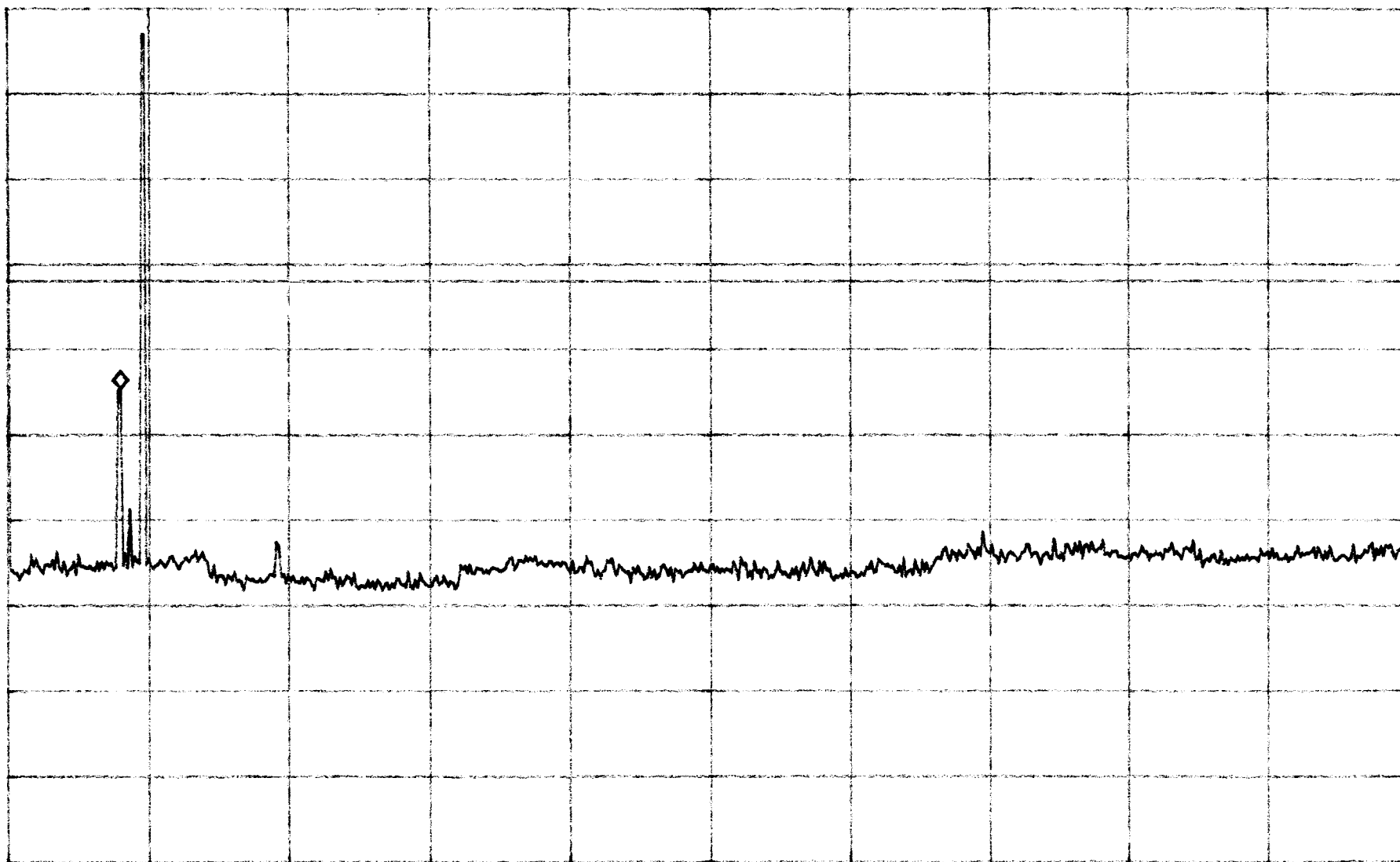
SWP 50ms

A Emission limits
@ F2

ATTN 30dB
RL 19.0dBm

10dB/

MKR -25.50dBm
1.63GHz



START 30MHz STOP 20.00GHz
*RBW 1.0MHz VBW 1.0MHz SWP 400ms

A Emission Limits

@F₃

ATTN 30dB

RL 19.0dBm

MKR -31.00dBm

1.9496GHz

10dB/



CENTER 1.9449GHz

SPAN 100.0MHz

*RBW 1.0MHz

VBW 1.0MHz

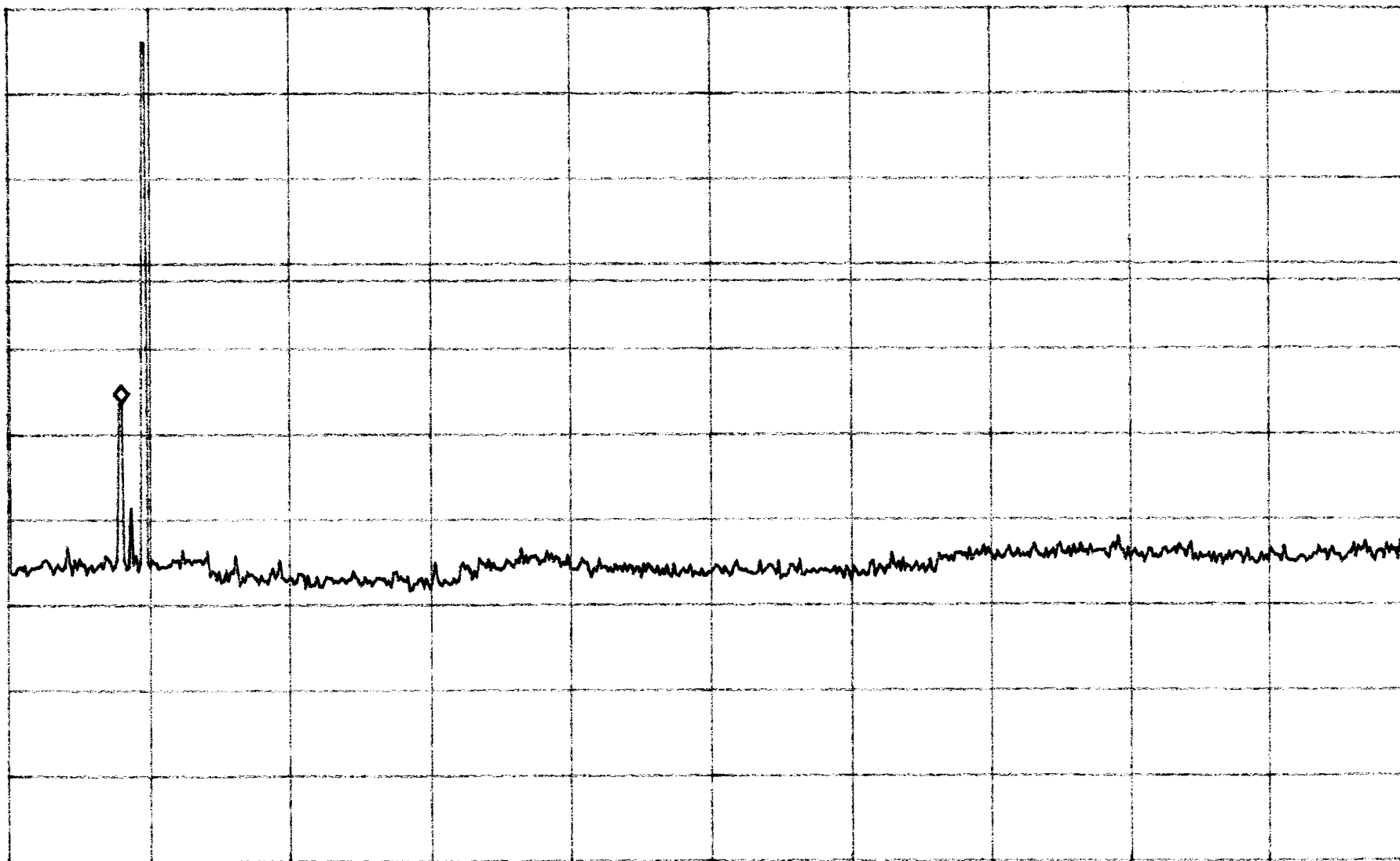
SWP 50ms

A Emission limits
@F3

ATTN 30dB
RL 19.0dBm

10dB/

MKR -27.17dBm
1.63GHz



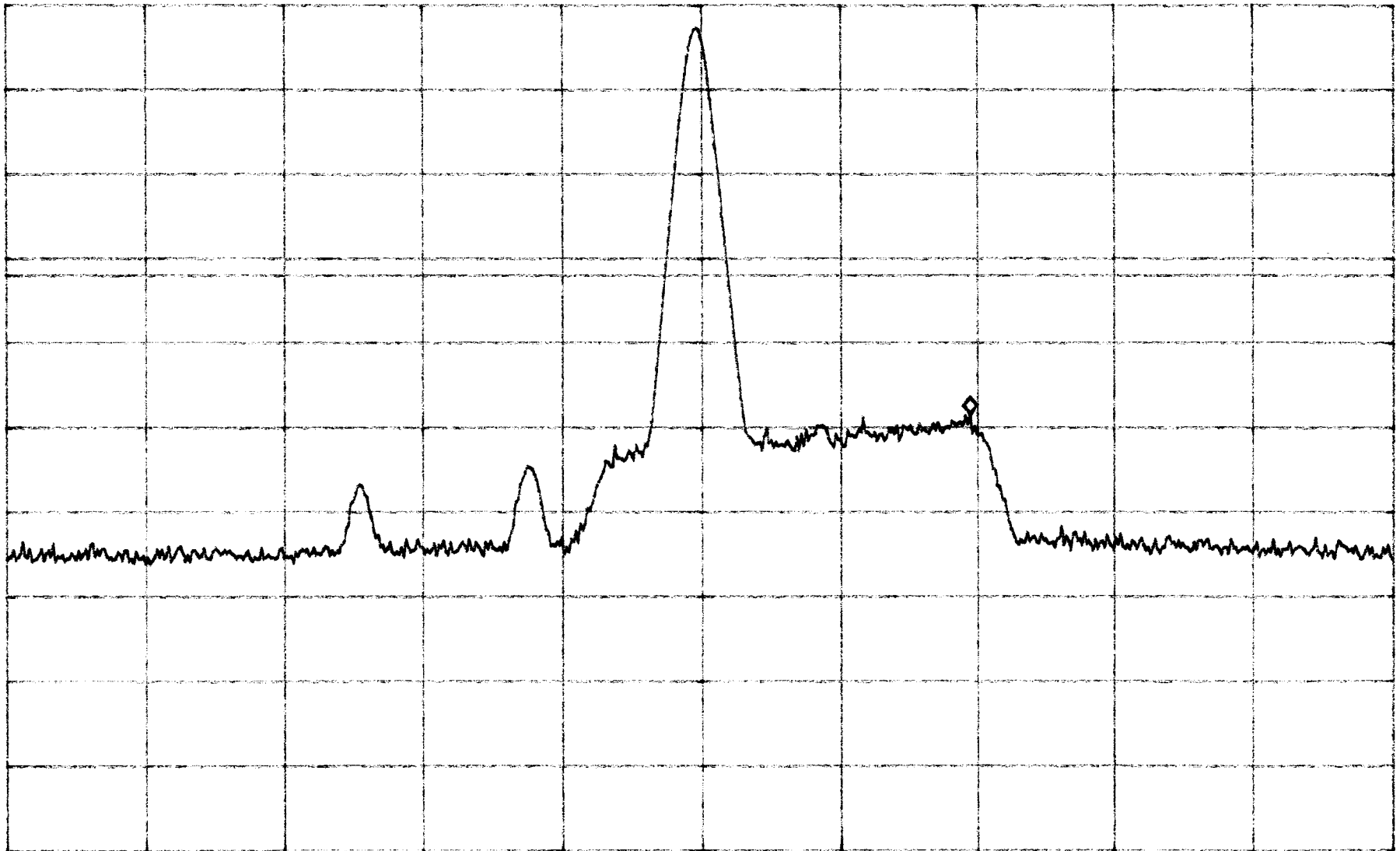
START 30MHz STOP 20.00GHz
*RBW 1.0MHz VBW 1.0MHz SWP 400ms

B Emission limits
@ F1

ATTN 30dB
RL 19.0dBm

10dB/

MKR -29.33dBm
1.9696GHz



CENTER 1.9501GHz
*RBW 1.0MHz VBW 1.0MHz

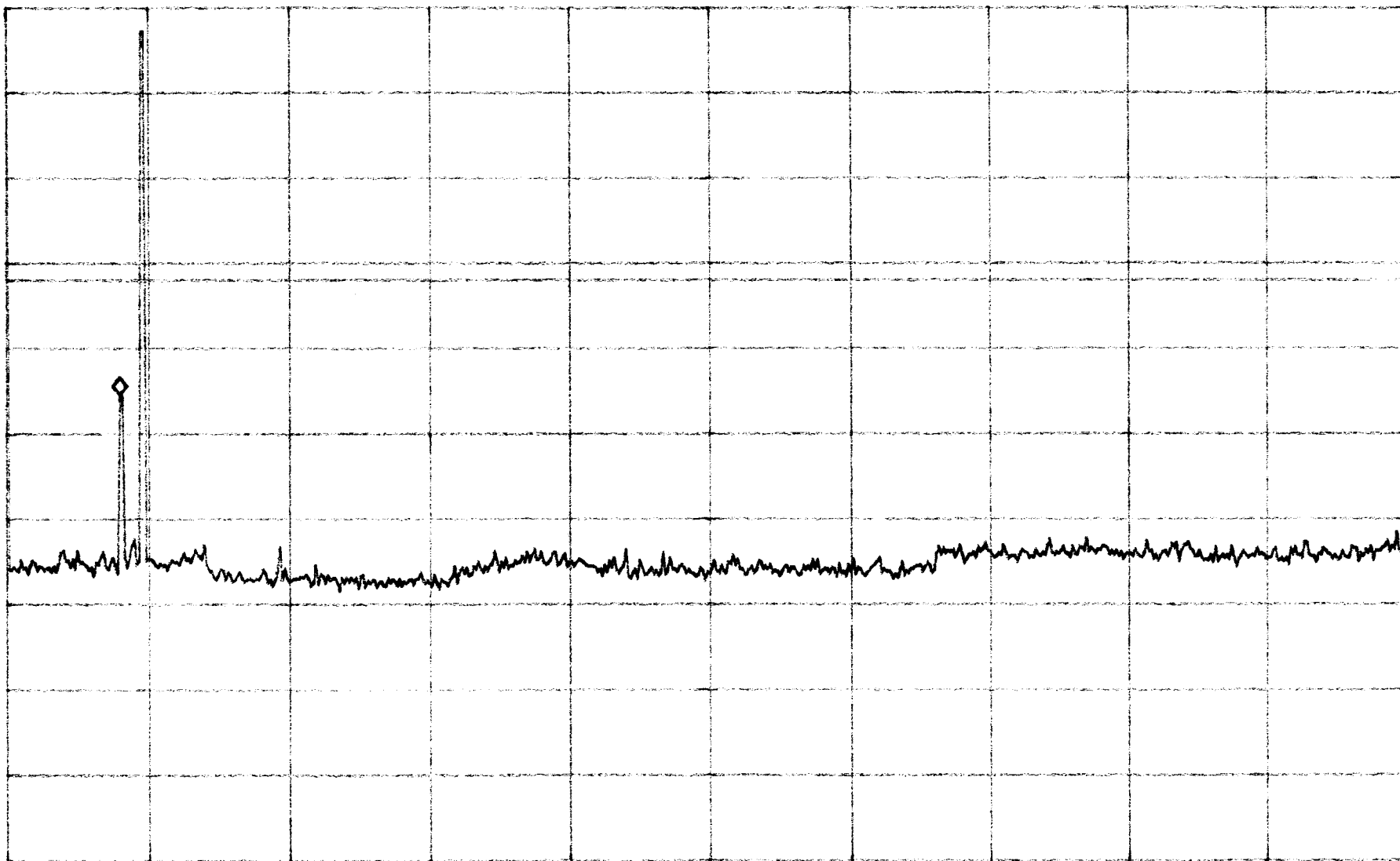
SPAN 100.0MHz
SWP 50ms

B Emission limits
© F1

ATTN 30dB
RL 19.0dBm

MKR -26.33dBm
1.63GHz

10dB/



START 30MHz

STOP 20.00GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 400ms

B Emission limits
@ F2

ATTN 30dB
RL 19.0dBm

10dB/

MKR -29.17dBm
1.9702GHz



CENTER 1.9570GHz
*RBW 1.0MHz VBW 1.0MHz

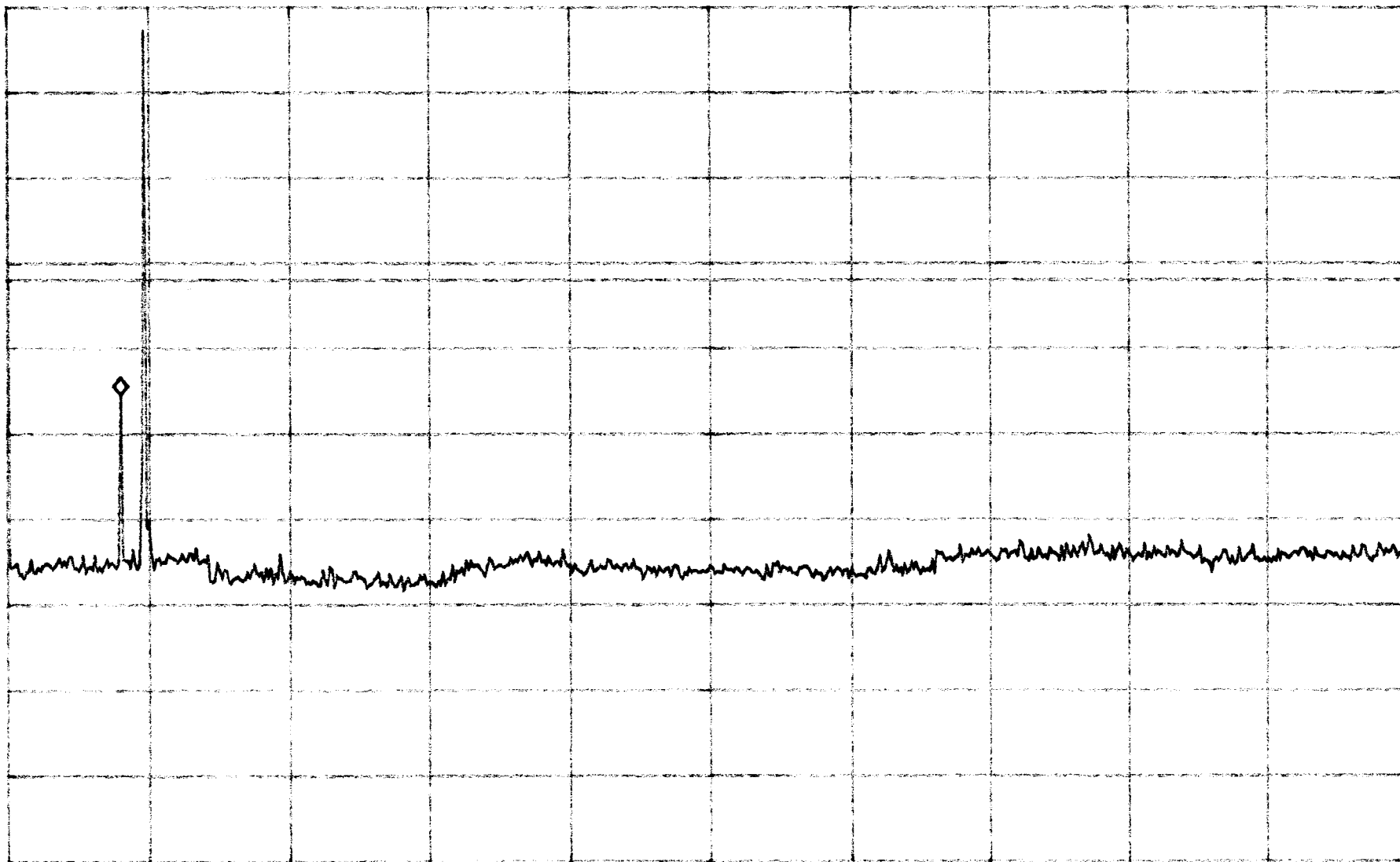
SPAN 100.0MHz
SWP 50ms

B Emission limits
@ F2

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -26.33dBm
1.63GHz



START 30MHz

STOP 20.00GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 400ms

B Emission limits
@ F3

ATTEN 30dB

RL 19.0dBm

10dB/

MKR -29.67dBm

1.9587GHz



CENTER 1.9649GHz

SPAN 100.0MHz

*RBW 1.0MHz

VBW 1.0MHz

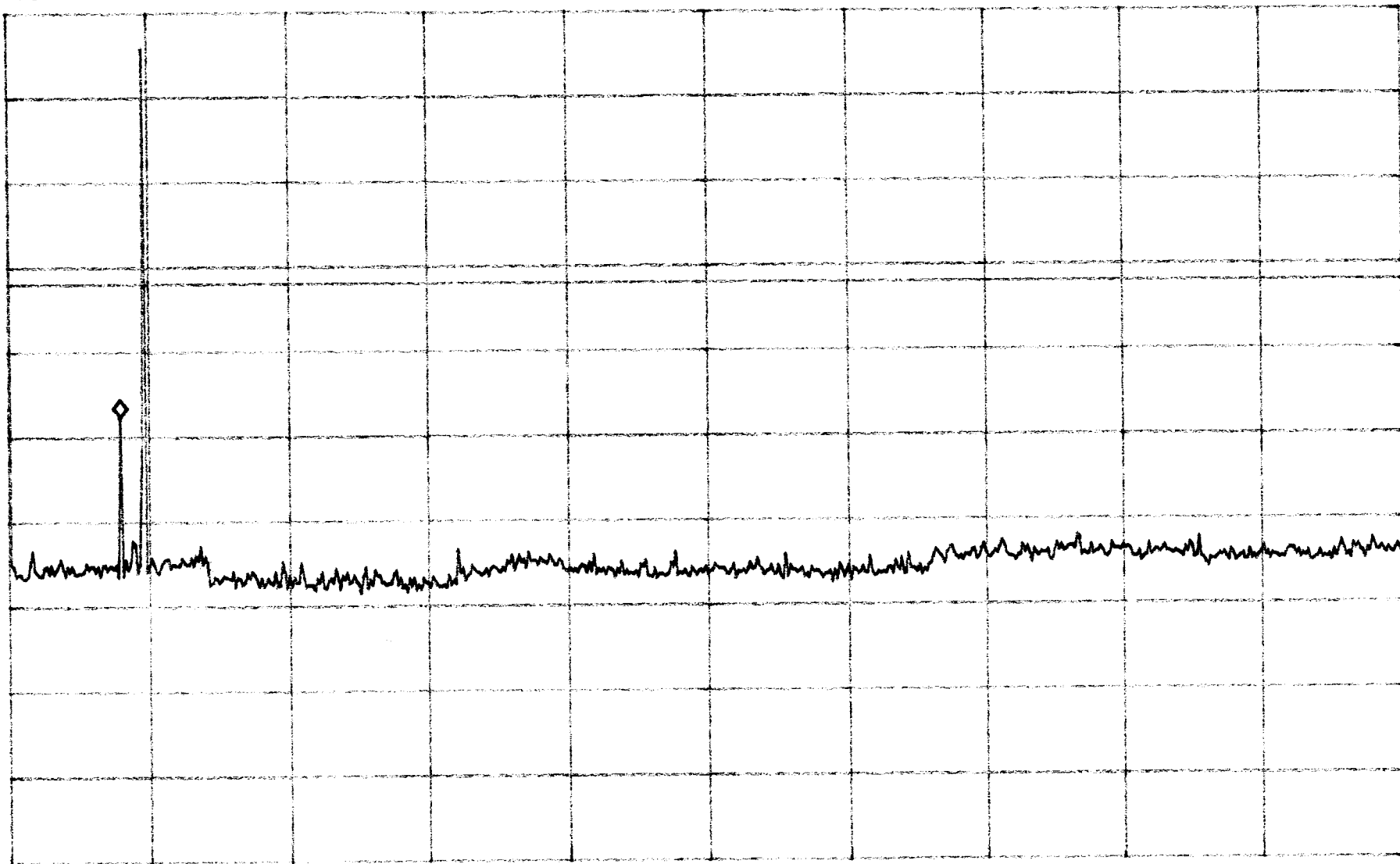
SWP 50ms

B Emission limits
@ F3

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -28.50dBm
1.63GHz



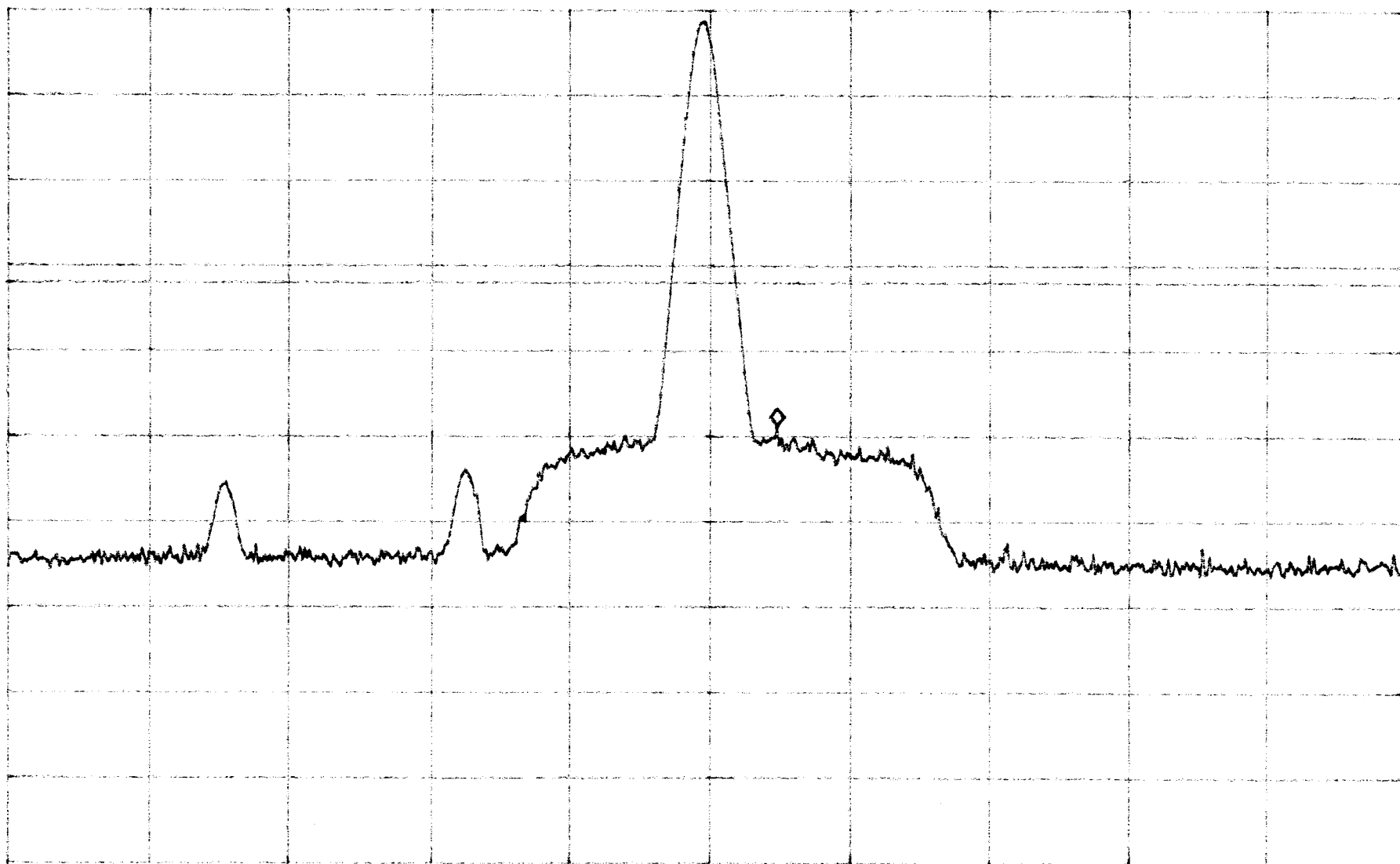
START 30MHz STOP 20.00GHz
*RBW 1.0MHz VBW 1.0MHz SWP 400ms

C Emission limits
@ F1

ATTN 30dB
RL 19.0dBm

10dB/

MKR -29.67dBm
1.9799GHz



CENTER 1.9751GHz
*RBW 1.0MHz VBW 1.0MHz

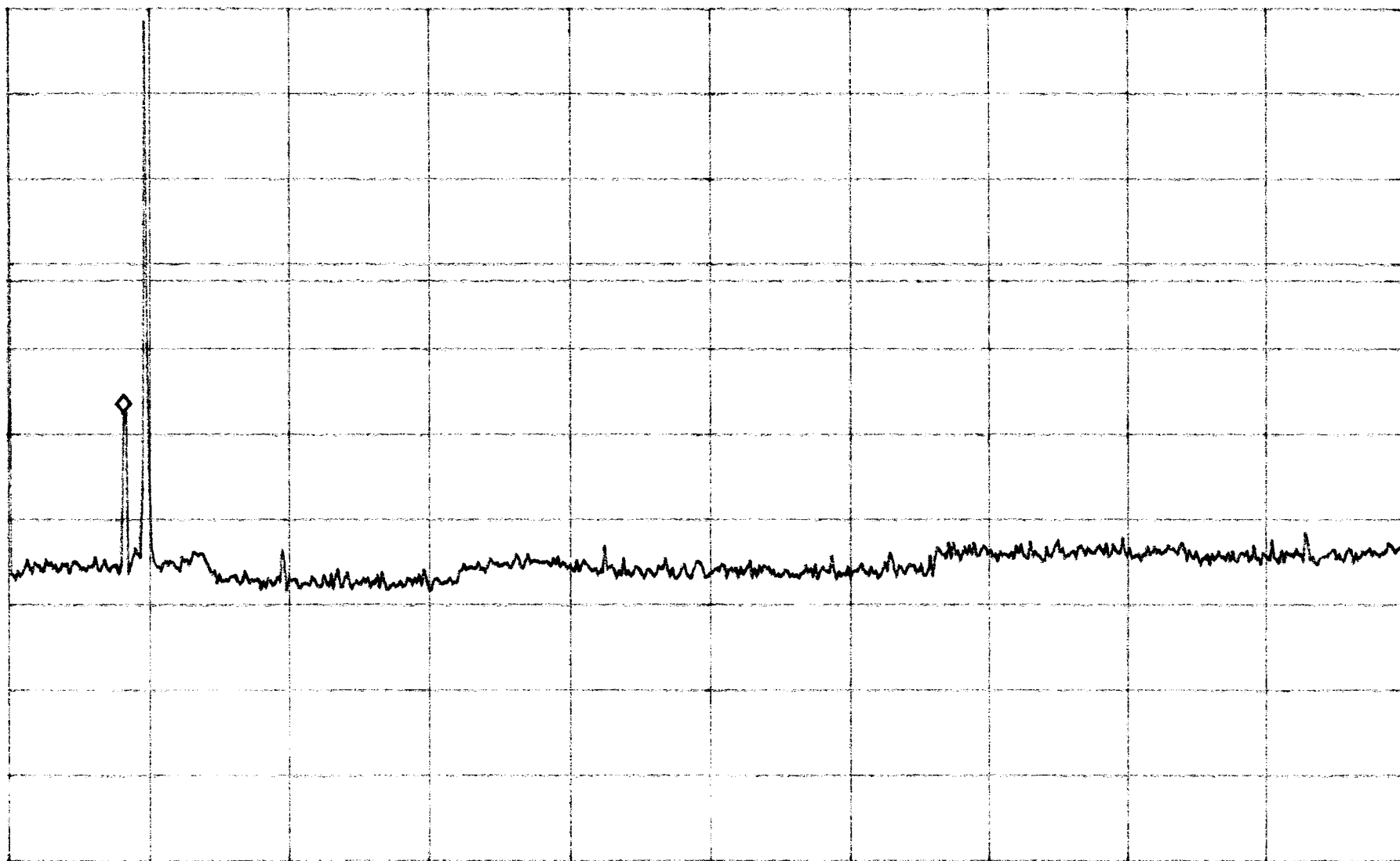
SPAN 100.0MHz
SWP 50ms

C Emission Limits
@ F1

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -28.33dBm
1.66GHz



START 30MHz

STOP 20.00GHz

*RBW 1.0MHz

VBW 1.0MHz

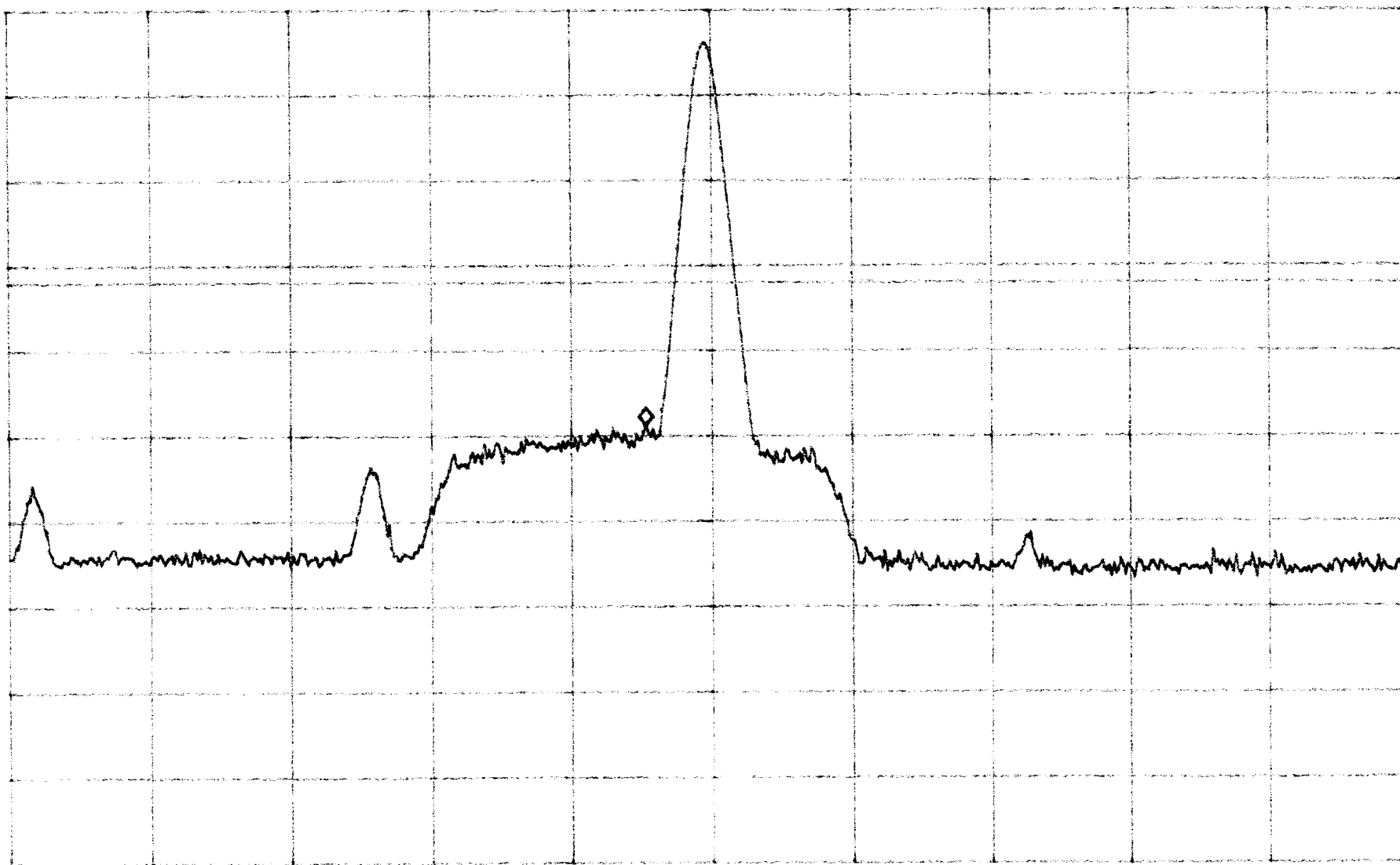
SWP 400ms

C Emission Limits
@ F2

ATTN 30dB
RL 19.0dBm

MKR -29.67dBm
1.9773GHz

10dB/



CENTER 1.9820GHz
*RBW 1.0MHz VBW 1.0MHz

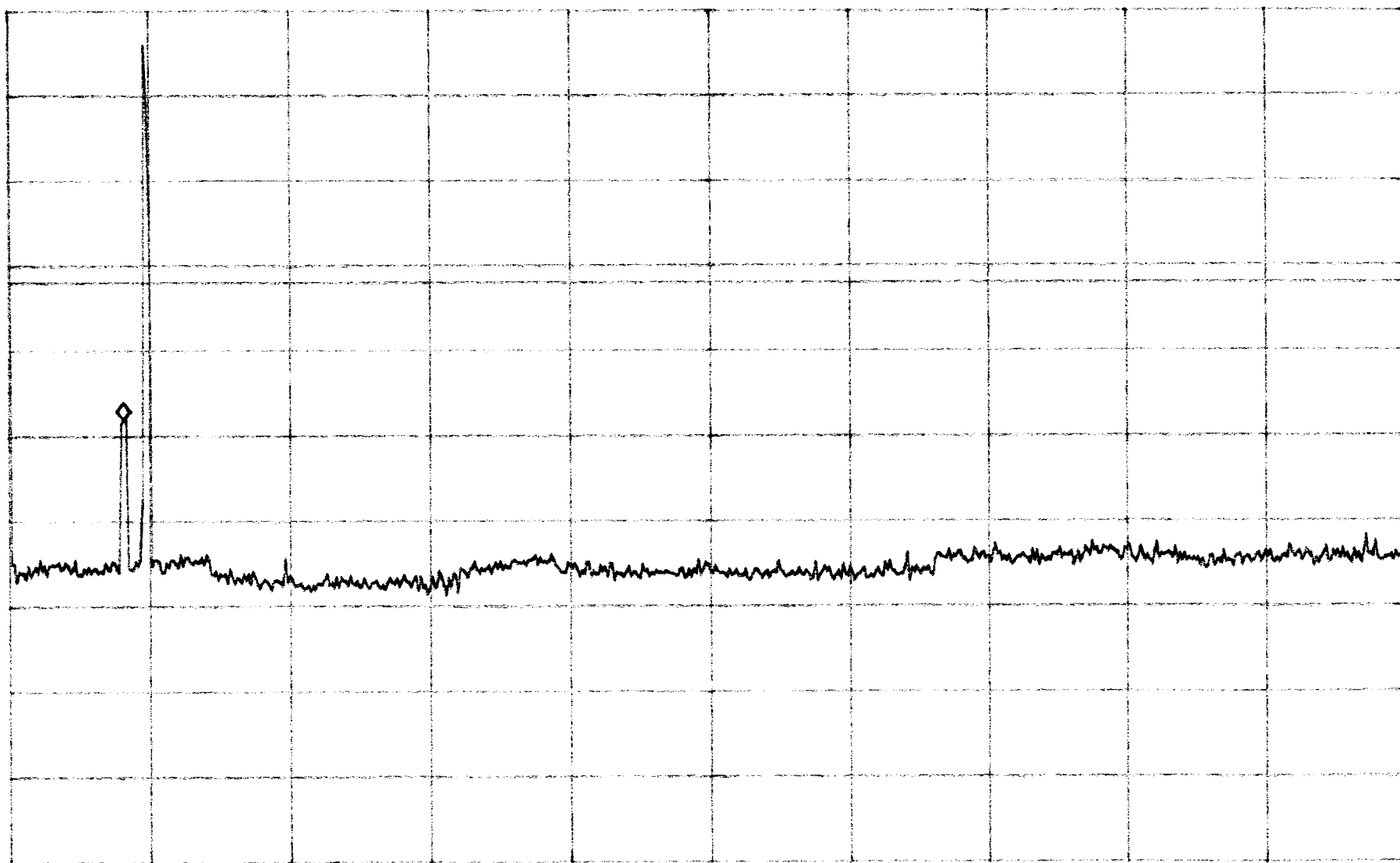
SPAN 100.0MHz
SWP 50ms

C Emission limits
@ F2

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -29.00dBm
1.66GHz



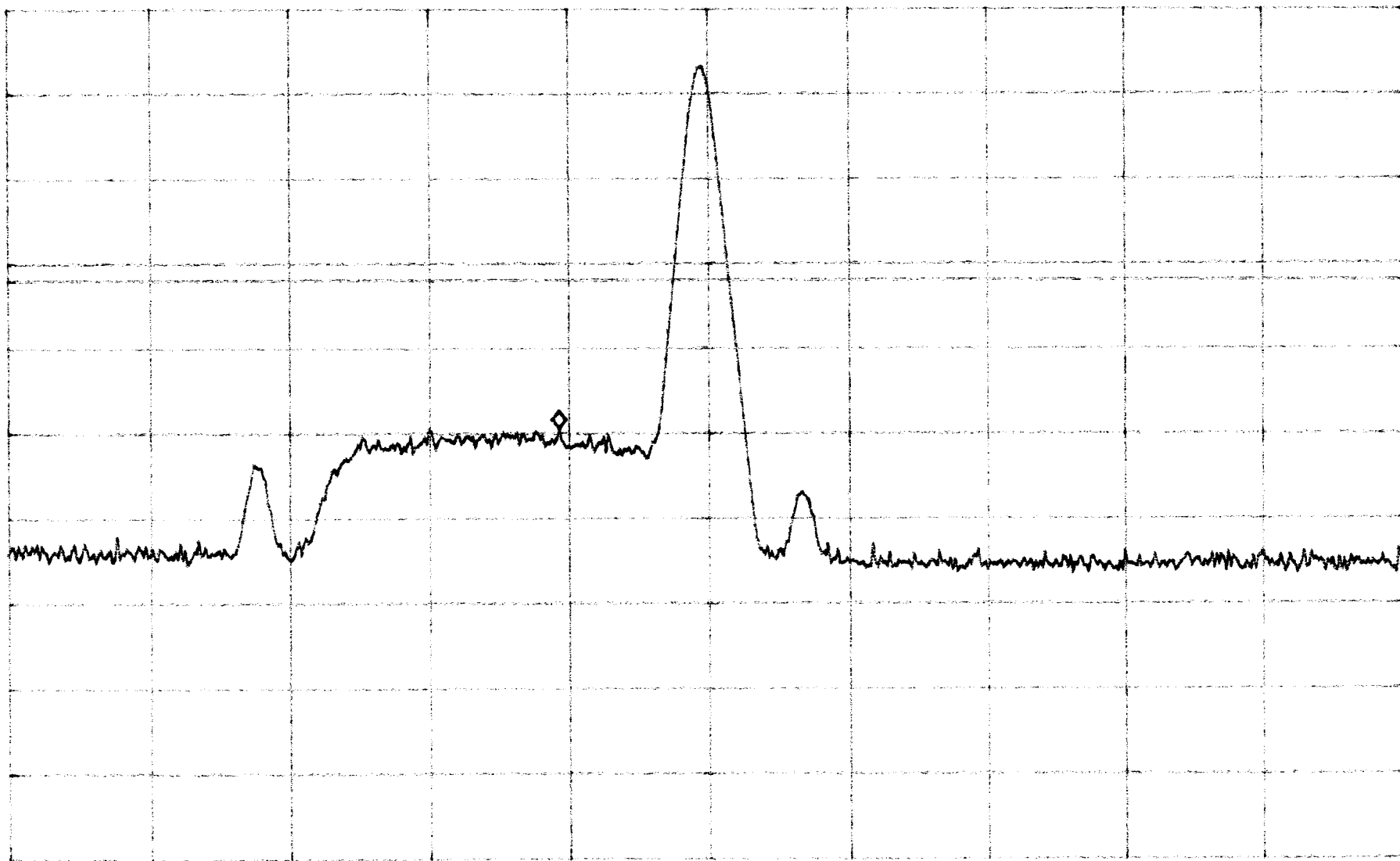
START 30MHz STOP 20.00GHz
*RBW 1.0MHz VBW 1.0MHz SWP 400ms

C Emission Limits
@ F3

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -30.33dBm
1.9792GHz



CENTER 1.9899GHz
*RBW 1.0MHz VBW 1.0MHz

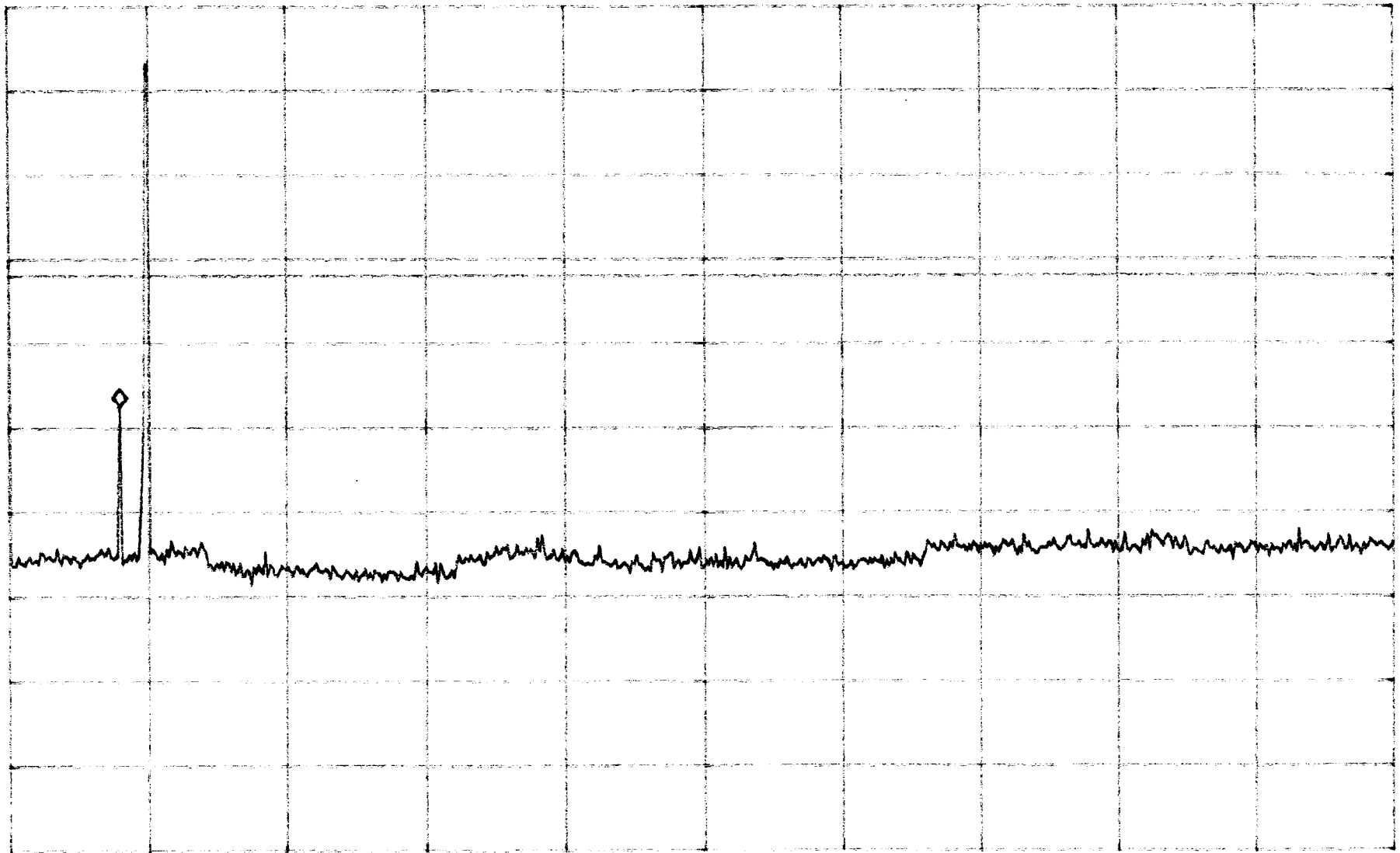
SPAN 100.0MHz
SWP 50ms

C Emission limits
© F3

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -28.33dBm
1.63GHz



START 30MHz STOP 20.00GHz
*RBW 1.0MHz VBW 1.0MHz SWP 400ms

D Emission limits
CF1

ATTEN 30dB
RL 19.0dBm

10dB/

MKR -28.83dBm
1.9486GHz



CENTER 1.9451GHz
*RBW 1.0MHz VBW 1.0MHz

SPAN 100.0MHz
SWP 50ms