

TEST RESULT SUMMARY

FCC PART 90

MANUFACTURER'S NAME	ADC, Incorporated
NAME OF EQUIPMENT	Digivance Long Range Coverage Solution (SMR) System
MODEL NUMBER	DGVI-202XXXSYS
MANUFACTURER'S ADDRESS	P. O. Box 1101 Minneapolis MN 55440-1101
TEST REPORT NUMBER	NC105443
TEST DATE	17 July, 13 – 16 August 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 90.

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.

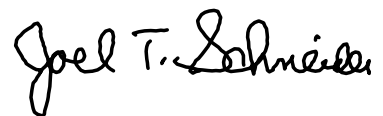
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 90.

Date: 27 August 2001

Location: Taylors Falls MN
USA



G. S. Jakubowski
Test Engineer



J. T. Schneider
Chief Engineer

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.

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*TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of
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Not Transferable

EMC EMISSION - T E S T R E P O R T

Test Report File Number: NC105443

Date of Issue: 27 August 2001

DIRECTORY

		Page(s)
Exhibit A	Max Composite Output Power Test Data (FCC Section 90.635)	2 - 5
Exhibit B	Occupied Bandwidth Test Data	6 - 12
Exhibit C	Spurious Conducted Emissions Test Data (FCC Section 90.669)	13 - 22
Exhibit D	Spurious Radiated Emissions Test Data	23 - 25
Exhibit E	Frequency Stability Test Data (FCC Section 90.213)	26
Exhibit F	Emission Mask Test Data (FCC Section 90.691)	27 - 29
Exhibit G	Inter-Modulation Test Data	30 - 48
Exhibit H	Test Equipment List	49 - 50
Exhibit I	Product Information	51 - 56
Exhibit J	Test Site Diagram / Measurement Info	57 - 58

**Max Composite Output Power Test for the ADC Inc.
Digivance LRCS SMR System.
Model DGVL-202XXSYS.**

This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected to the spectrum analyzer. 6 CW signals were used across the bandwidth of the EUT. The output of each signal was set to the maximum emission level of 5 Watts. The spectrum analyzer level was offset to compensate for attenuators and cable losses between the EUT and analyzer.

The maximum specified TX output power from the antenna port is 37dBm (5 Watts) per channel.

The maximum number of channels is 6.

The maximum composite output power of the system at the antenna port is 44.78 dBm (30 Watts)

To meet MPE requirements, the maximum gain antenna would be $60 - 44.78 = 15.22\text{dBi}$

From the following equations:

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

$44.78\text{dBm} + 15.22\text{dBi} = 60\text{dBm EIRP}$

$60\text{dBm EIRP} = 1000 \text{ Watts EIRP}$

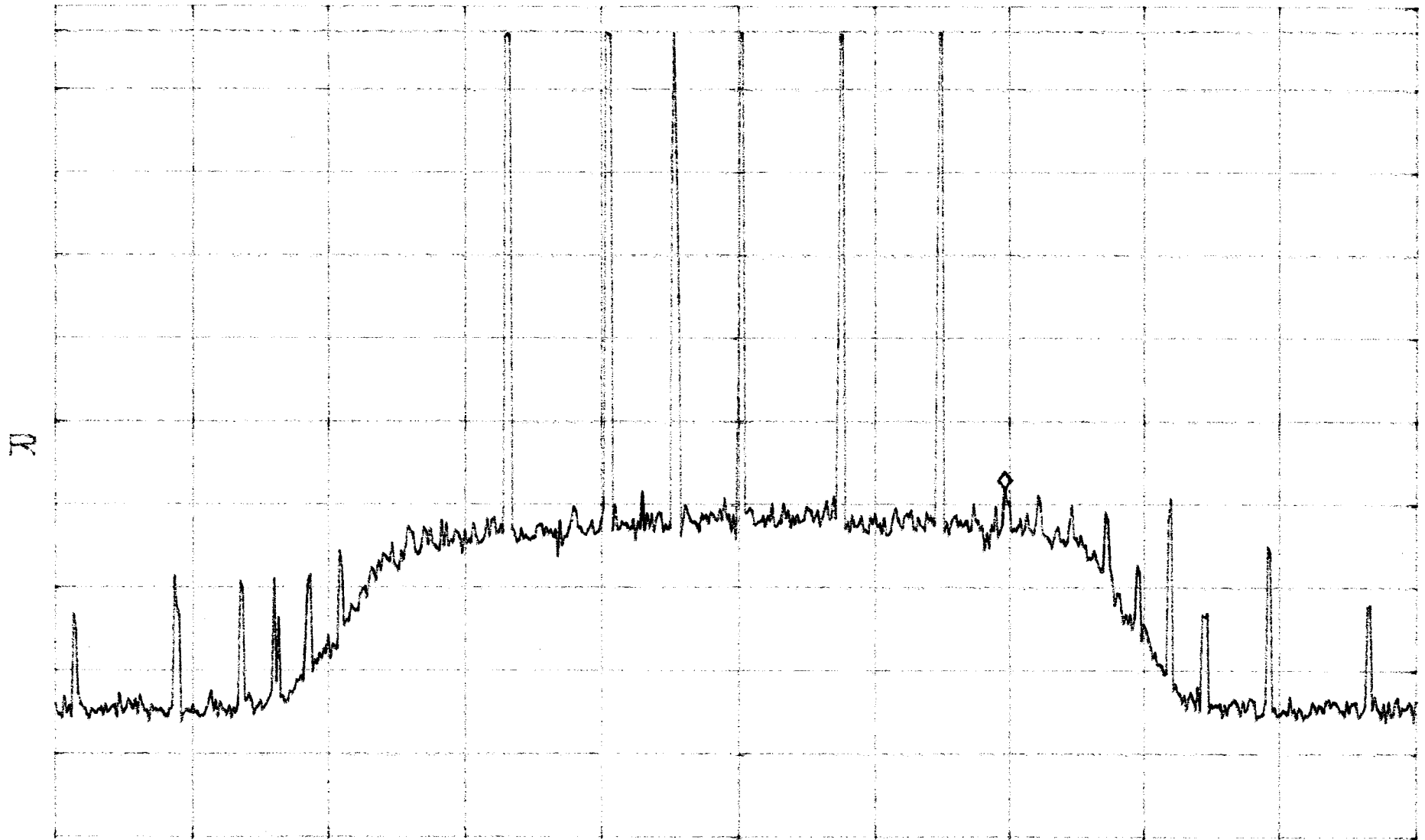
Max composite out

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.0dBm

10dB/

MKR -18.00dBm
866.75MHz



CENTER 858.69MHz
*RBW 10kHz VBW 10kHz

SPAN 40.95MHz
SWP 1.1sec

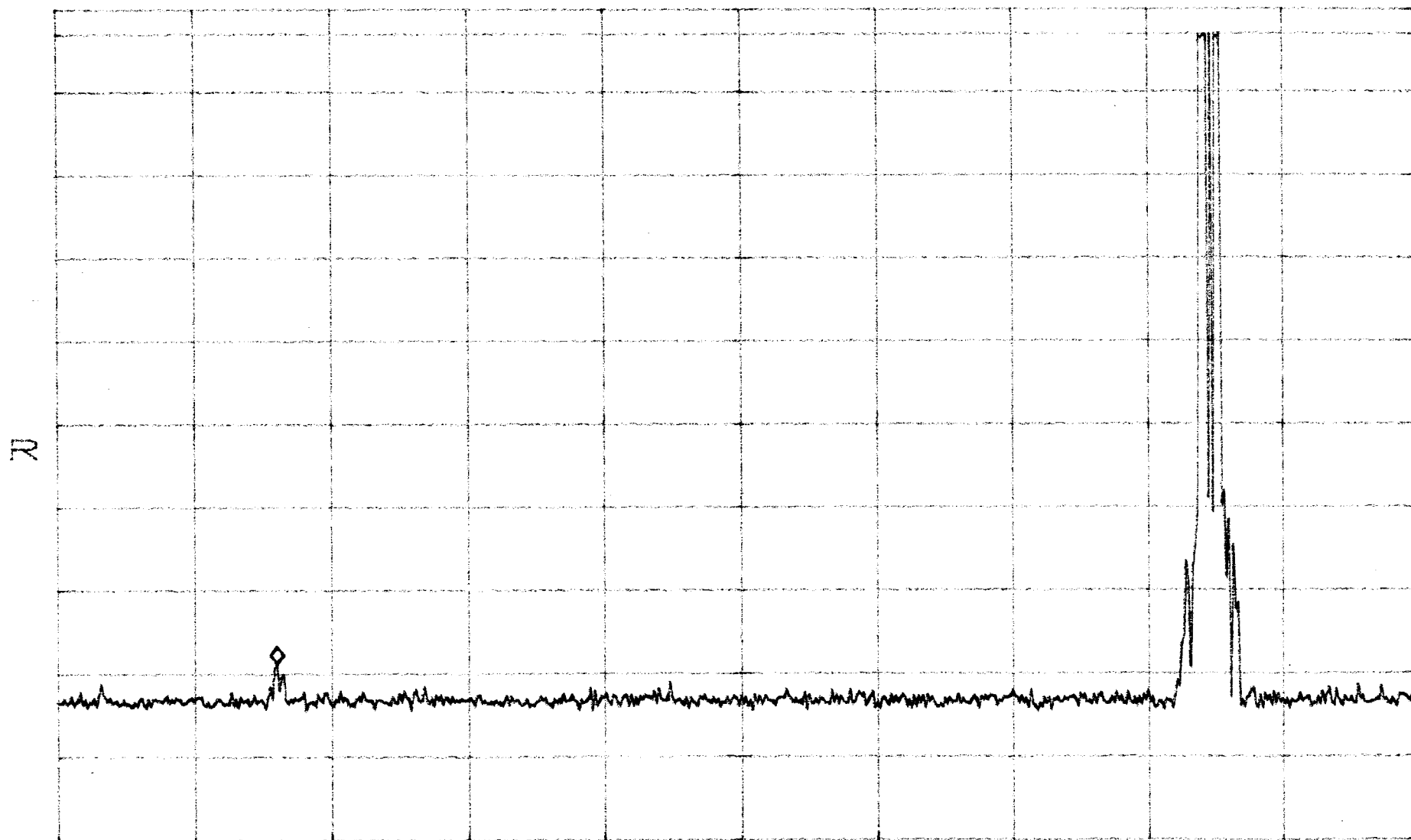
Max composite out

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.0dBm

10dB/

MKR -38.67dBm
185.2MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

Max composite out

FCC ID: F8I-DVLRCSMR

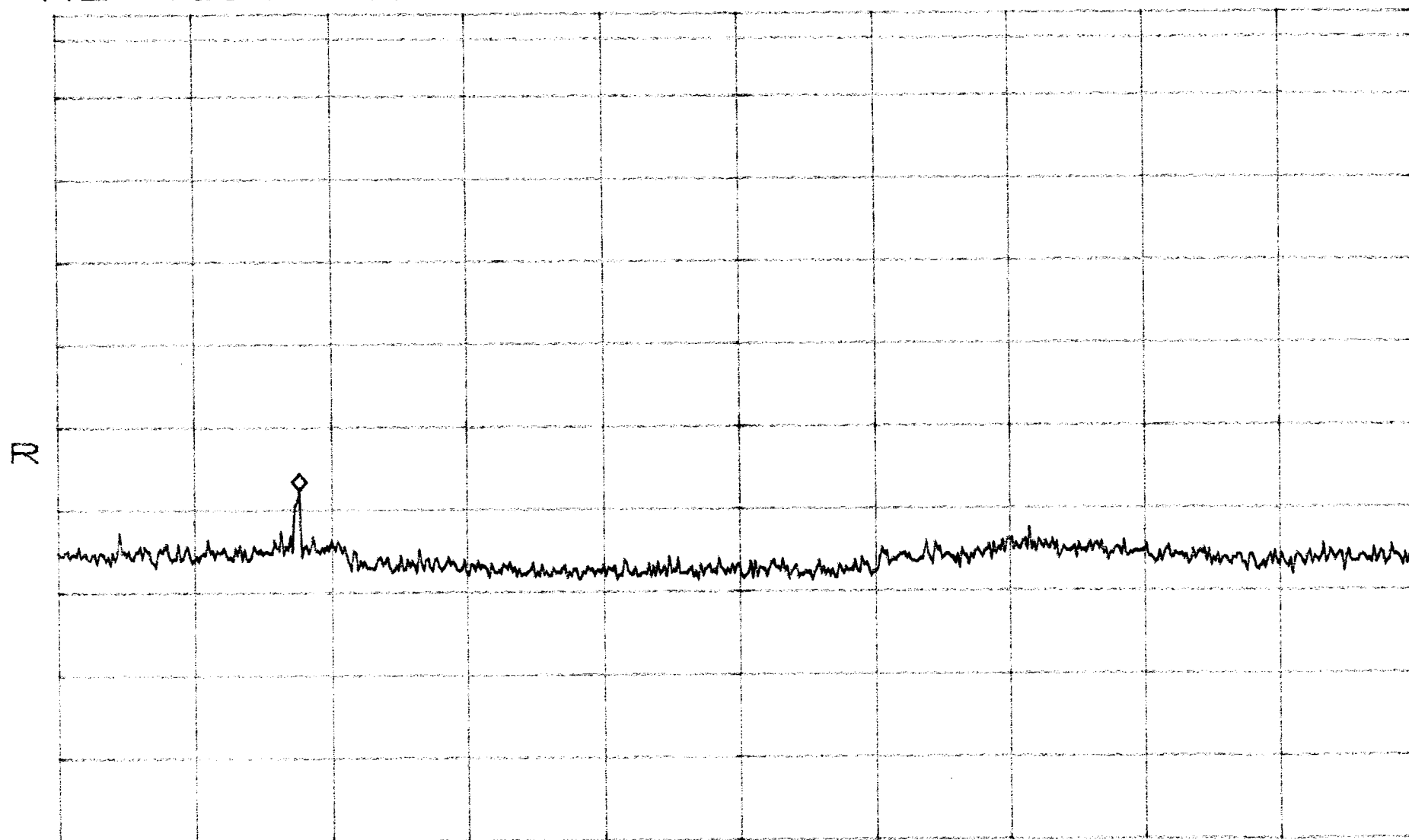
*ATTEN 10dB

MKR -17.50dBm

RL 40.00dBm

10dB/

2.590GHz



START 1.000GHz

STOP 10.000GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 180ms

Occupied Bandwidth Modulation Test for ADC Inc. Digivance LRCS SMR System Model DGVL-202XXXSYS.

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:
(see plots)

FM in

FCC ID: F8I-DVLRCSMR

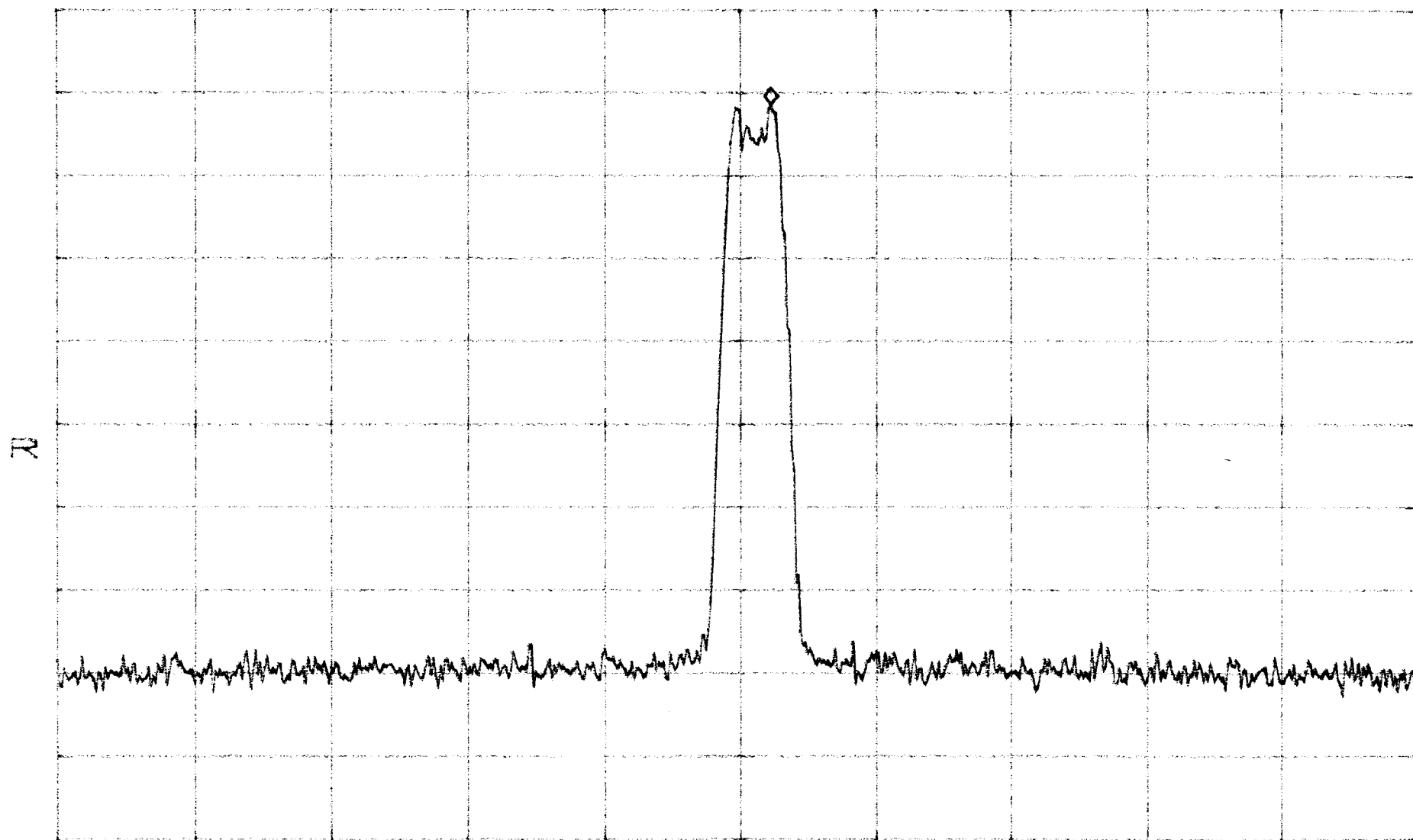
*ATTEN 10dB

MKR 10.67dBm

RL 22.0dBm

10dB/

858.0067MHz



CENTER 858.9950MHz

SPAN 500.0kHz

*RBW 1.0kHz

VBW 1.0kHz

SWP 1.3sec

FM out

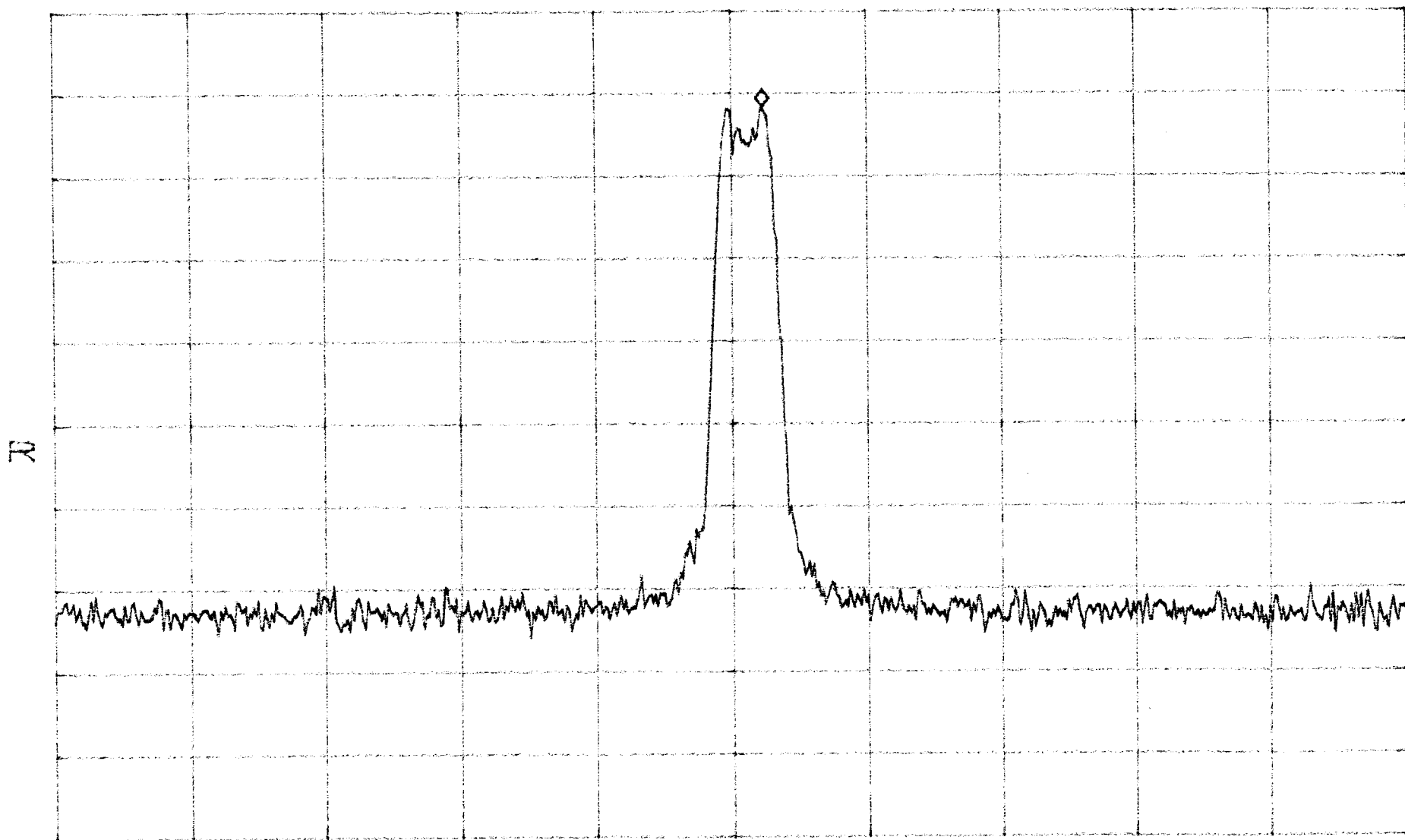
*ATTEN 10dB

MKR 30.30dBm

RL 41.8dBm

10dB/

859.0067MHz



CENTER 858.9950MHz

SPAN 500.0kHz

*RBW 1.0kHz

VBW 1.0kHz

SWP 1.3sec

TOMA in

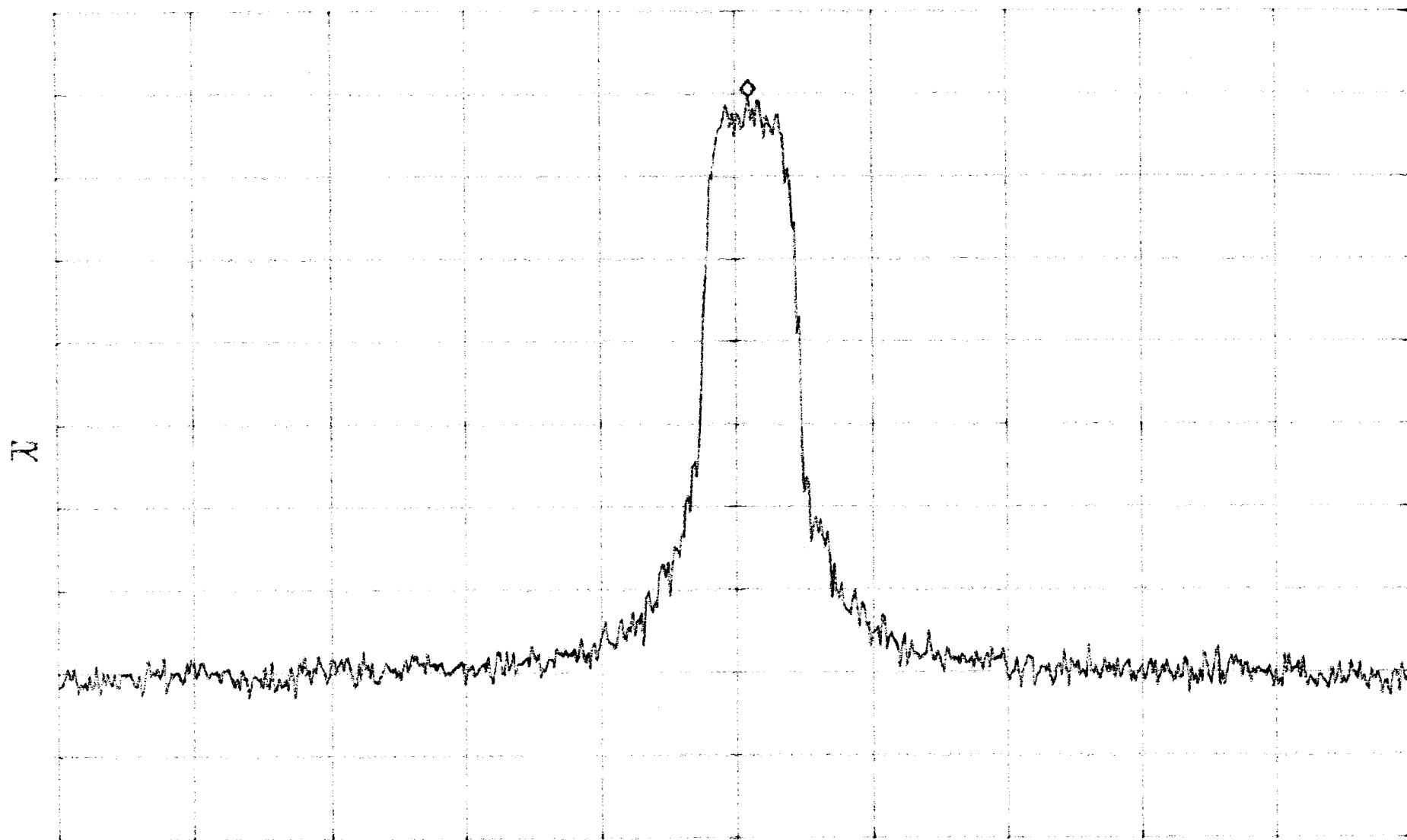
*ATTEN 10dB

MKR 11.67dBm

RL 22.0dBm

10dB/

858.0000MHz



CENTER 858.9950MHz

SPAN 500.0kHz

*RBW 1.0kHz

VBW 1.0kHz

SWP 1.3sec

TOMA out

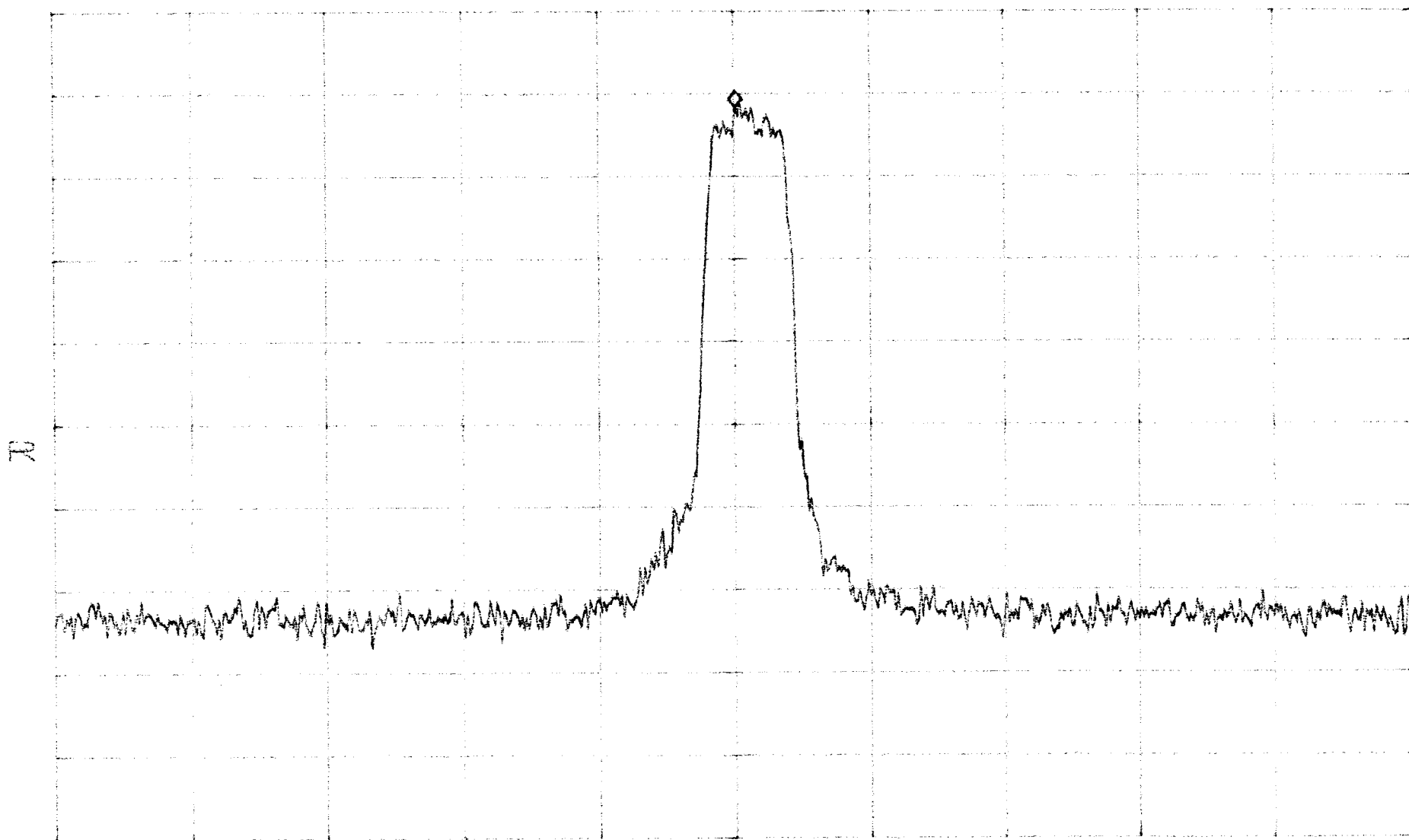
*ATTEN 10dB

MKR 30.13dBm

RL 41.8dBm

10dB/

858.9958MHz



CENTER 858.9950MHz

SPAN 500.0kHz

*RBW 1.0kHz

VBW 1.0kHz

SWP 1.3sec

CDMA in

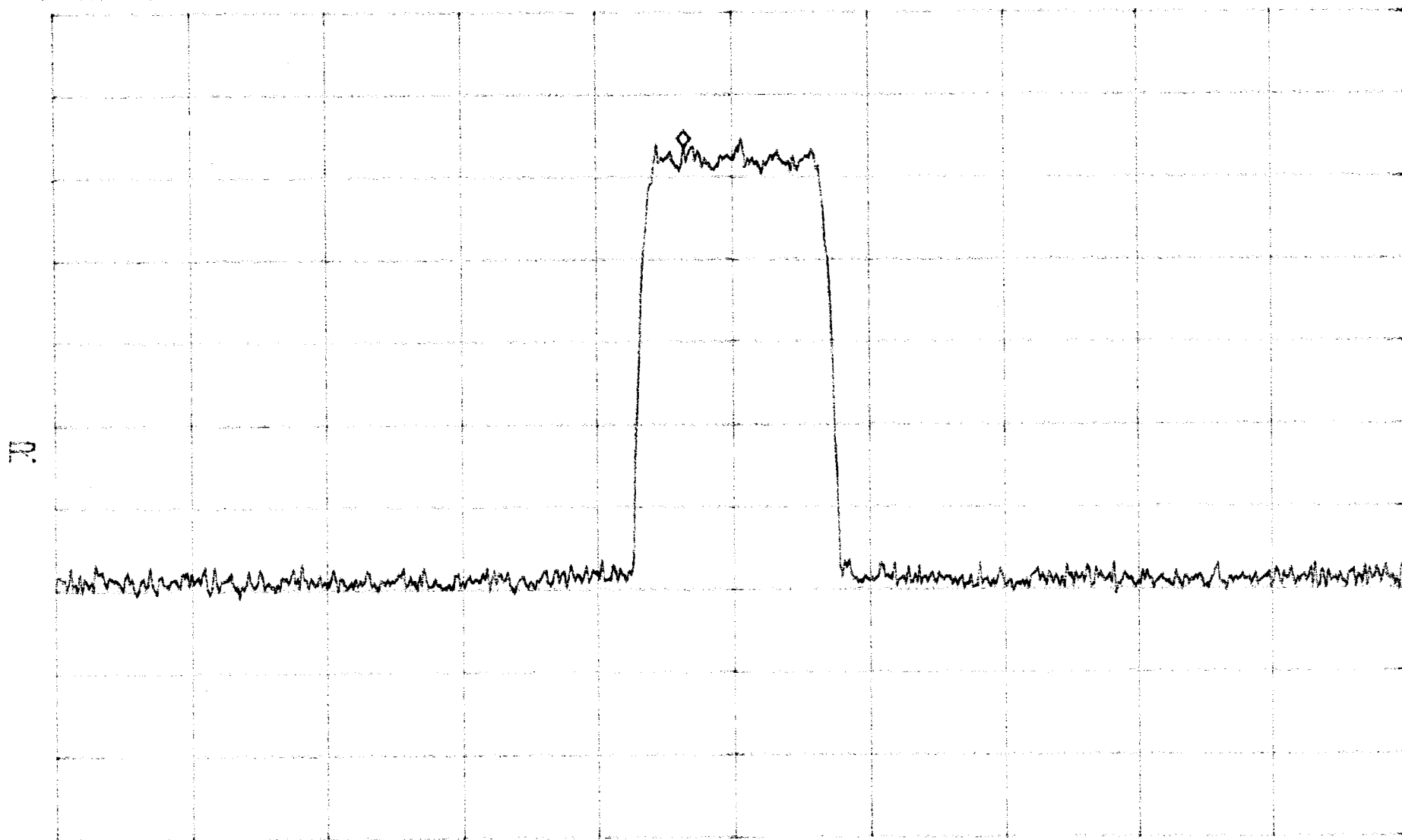
*ATTN 10dB

MKR 5.67dBm

RL 22.0dBm

10dB/

858.65MHz



CENTER 858.00MHz

SPAN 10.00MHz

*RBW 10kHz

VBW 10kHz

SWP 250ms

CDMA out

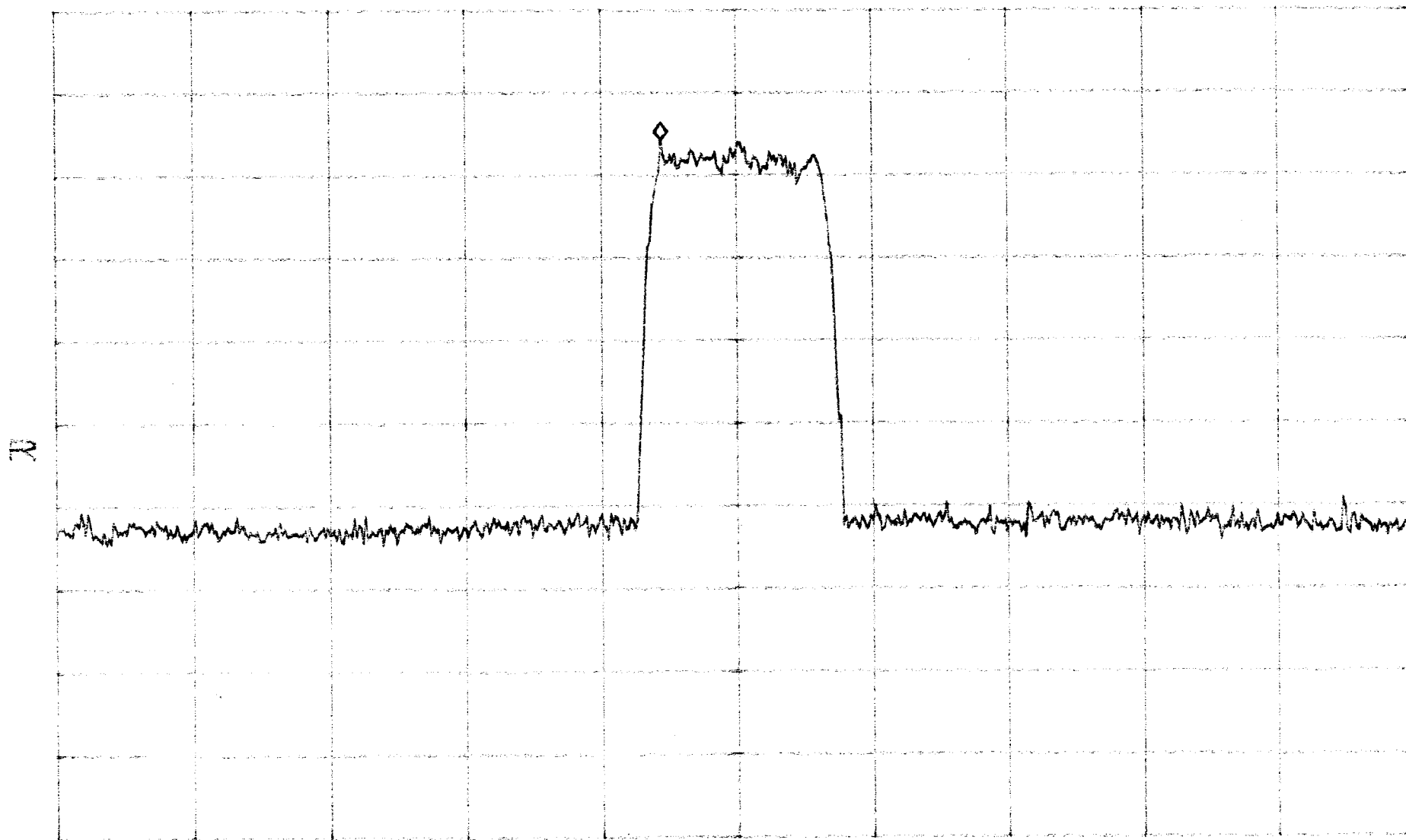
*ATTEN 10dB

MKR 26.13dBm

RL 41.8dBm

10dB/

858.45MHz



CENTER 859.00MHz

SPAN 10.00MHz

*RBW 10kHz

VBW 10kHz

SWP 250ms

Conducted Spurious Emissions Test for ADC Inc. Digivance LRCS SMR System

Model: DGVL-202XXXSYS

Per FCC CFR 47 Part 90.669

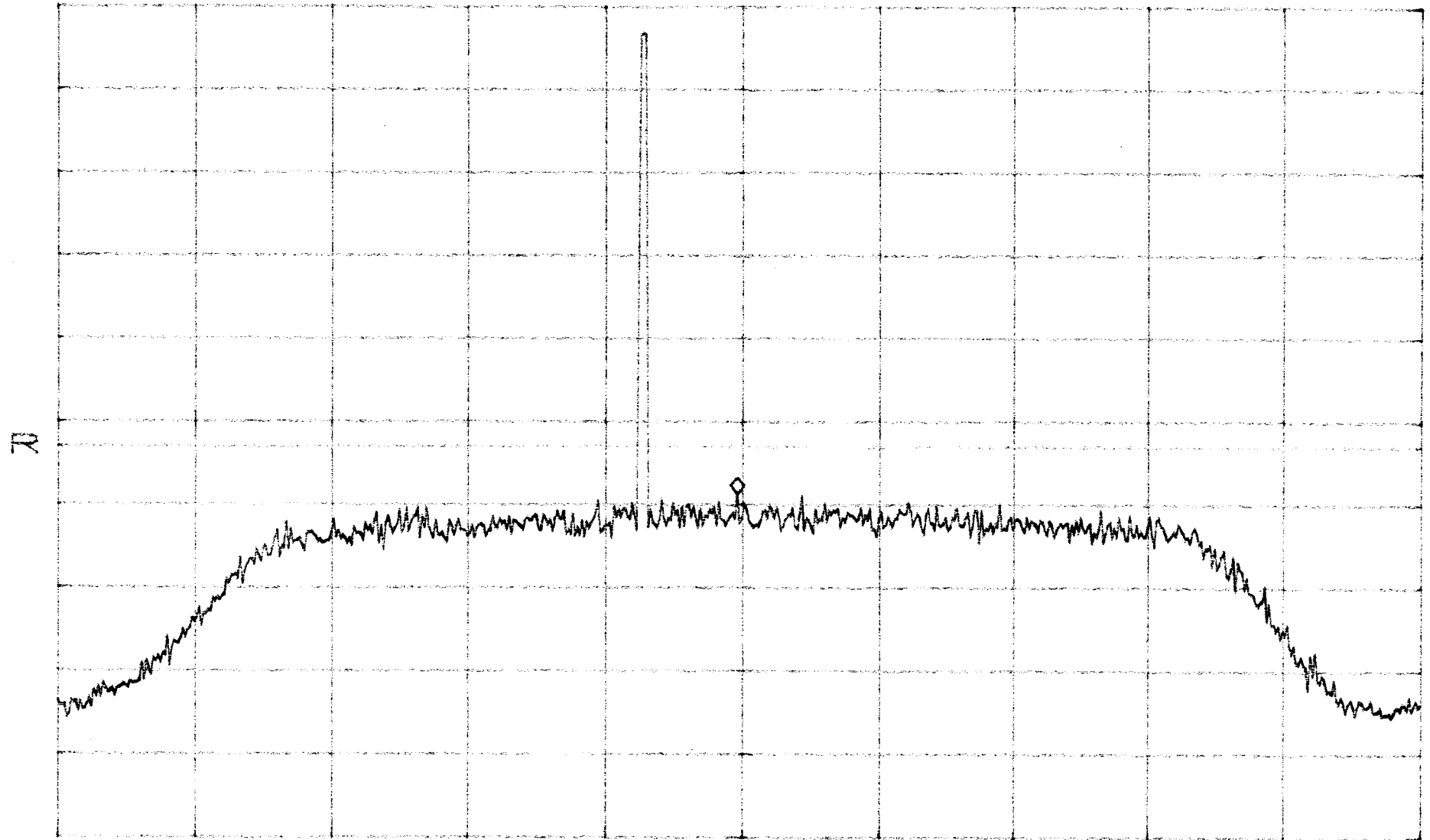
This measurement was made as a direct conducted emission measurement. The output from the EUT antenna connector was connected to the spectrum analyzer. FM (1KHz, 8KHz), TDMA, and CDMA type signals were input to the EUT and a search was made from 30MHz to the 10th harmonic of the highest fundamental frequency (10 GHz) for any spurious emissions greater than -13dBm from the equation $[43+10*\text{Log}(P)]$

Results:

Pass (See plots)

FCC ID: F8I-DVLRCSMR

MKR -18.67dBm
858.90MHz



CENTER 859.00MHZ
*RBW 10KHZ VBW 10KHZ

SPAN 30.00MHz
SWP 750ms

FM Spurious Emissions

FCC ID: F8I-DVLRCSMR

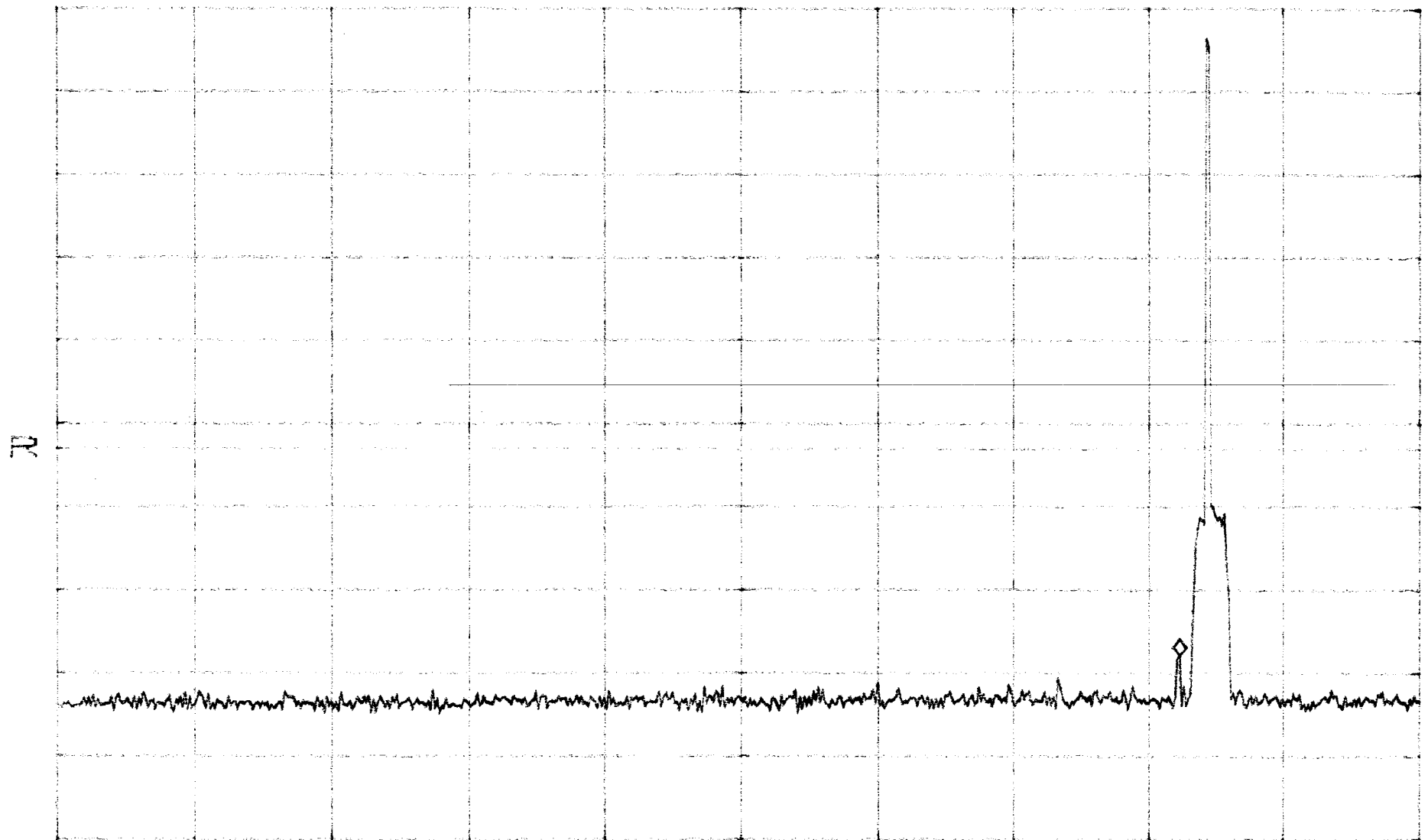
*ATTEN 10dB

MKR -37.83dBm

RL 40.0dBm

10dB/

828.6MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25600

FM Spurious Emissions

FCC ID: F8I-DVLRCSMR

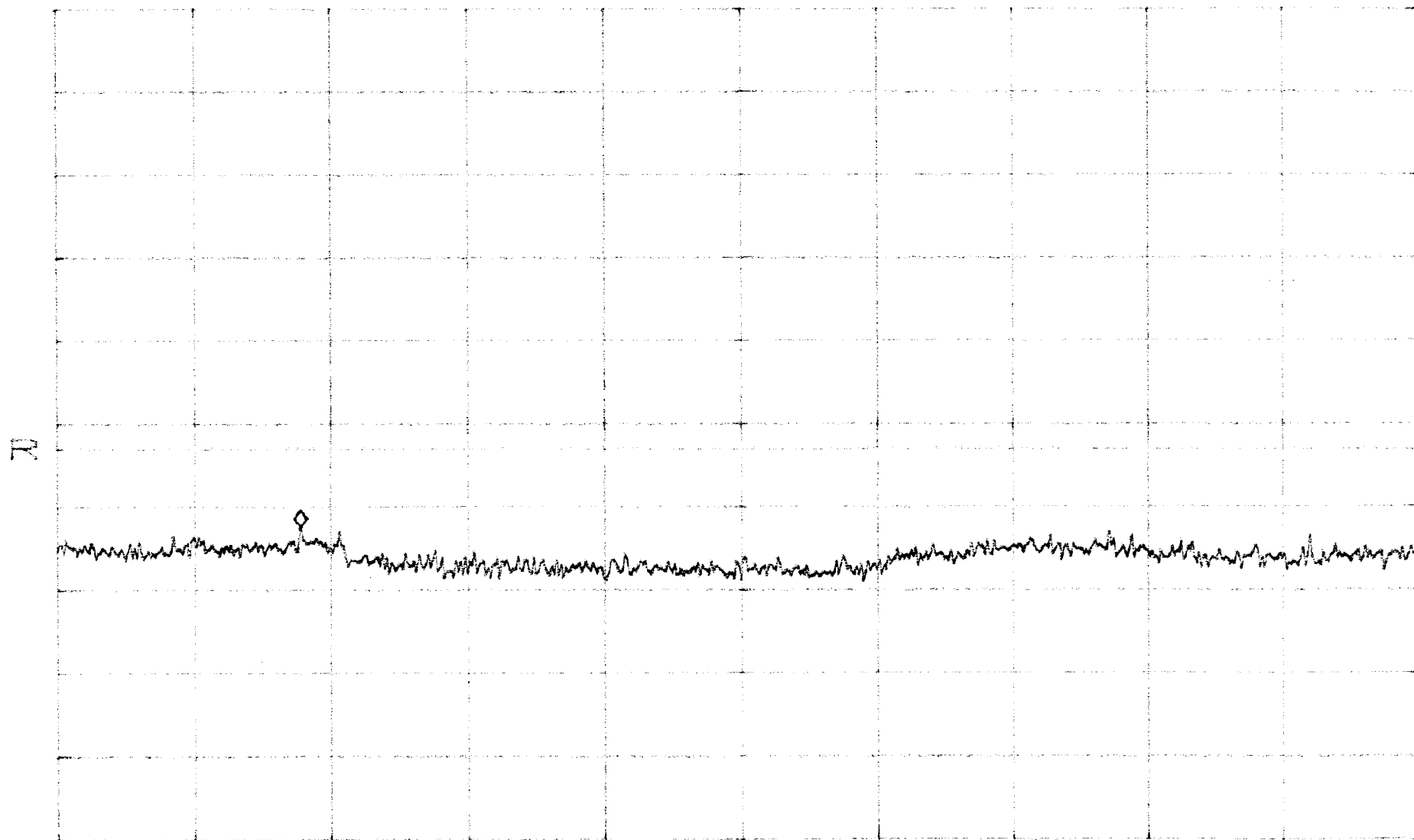
*ATTN 10dB

MKR -22.33dBm

RL 40.0dBm

10dB/

2.605GHz



START 1.000GHz

STOP 10.000GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 180ms

TDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

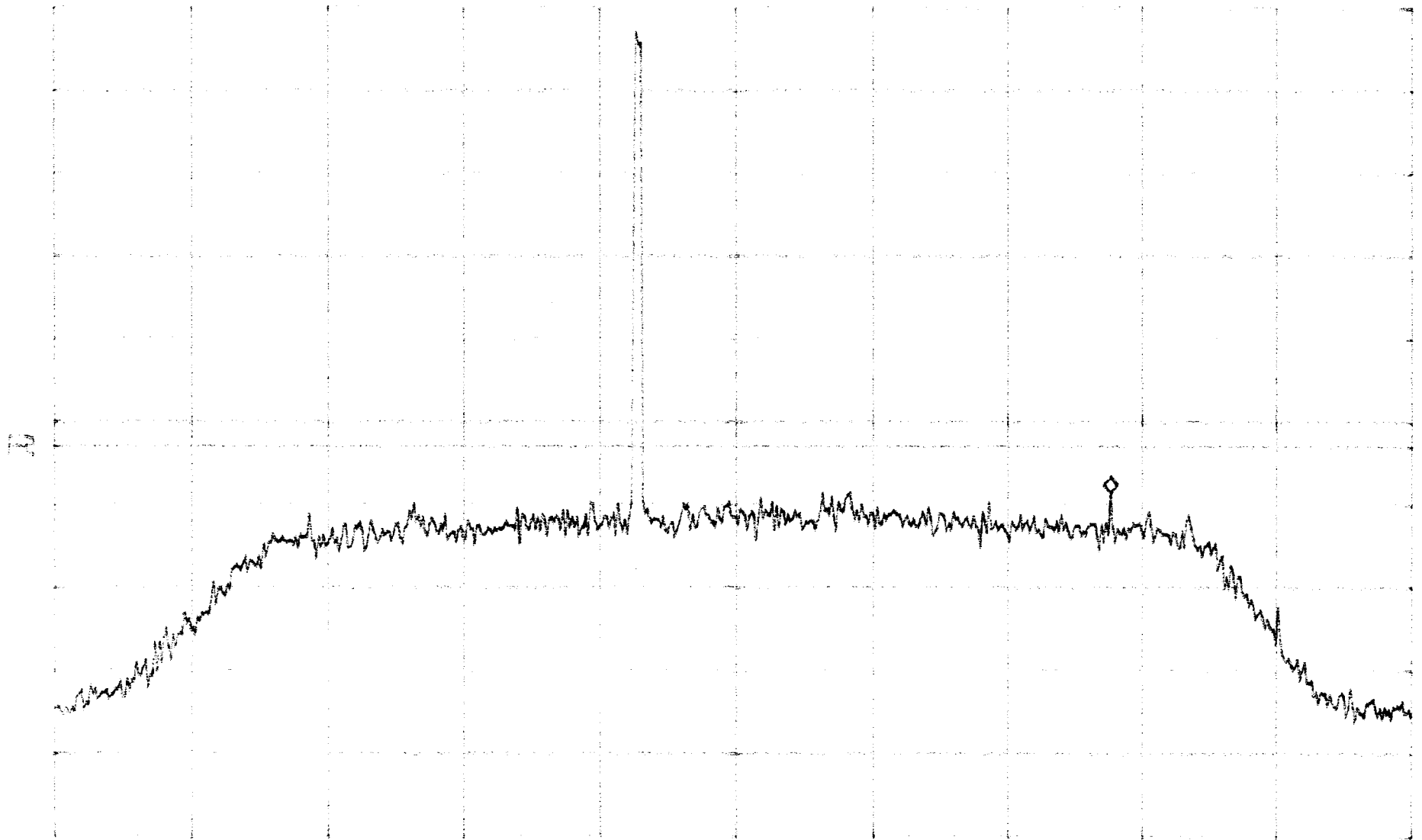
*ATTEN 10dB

MKR -18.50dBm

RL 40.0dBm

10dB

867.30MHz



CENTER 859.00MHz

SPAN 30.00MHz

*RBW 10kHz

VBW 10kHz

SWP 750ms

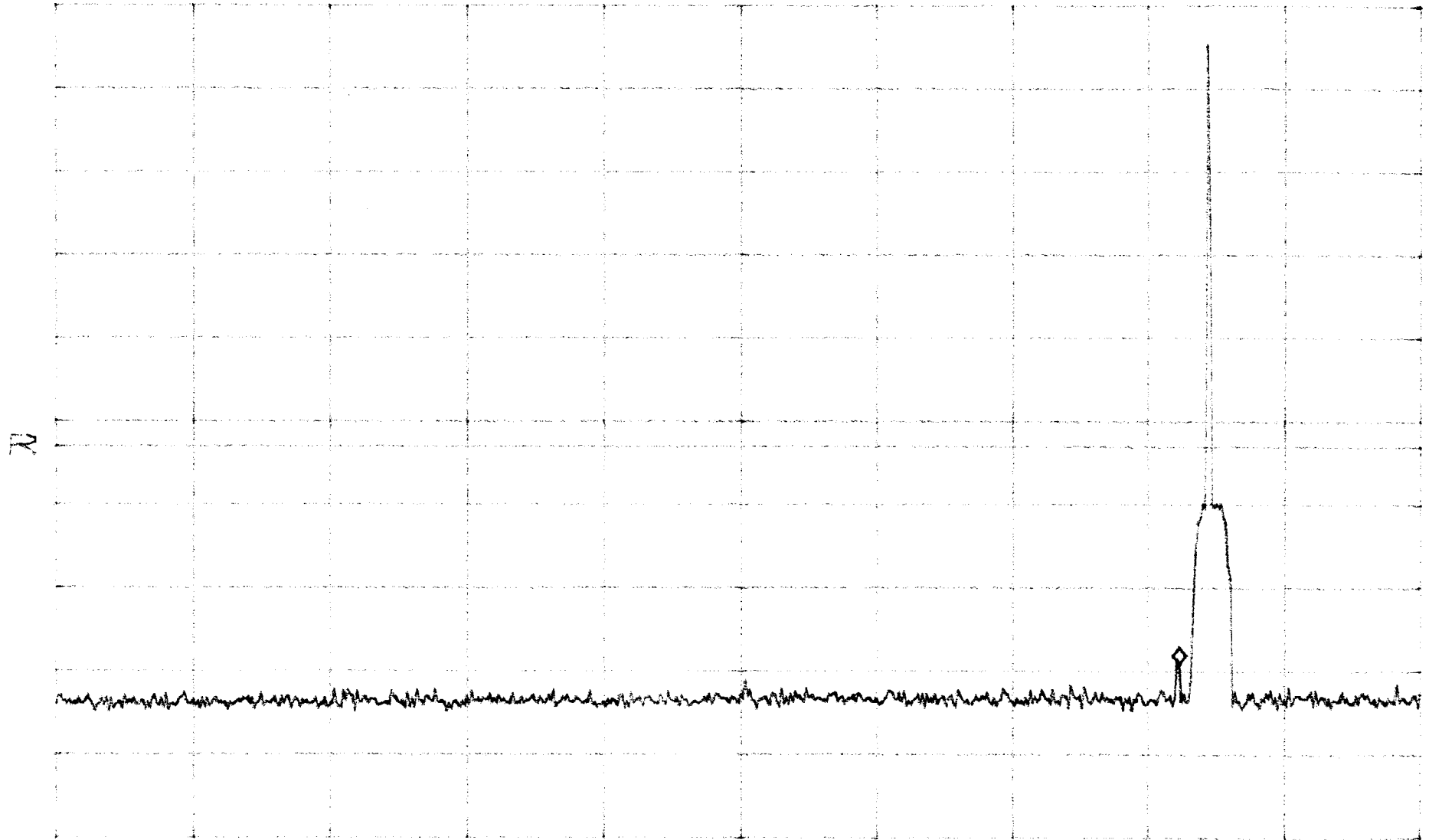
TDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

*ATTN 10dB
RL 40.0dBm

10dB/

MKR -39.00dBm
828.6MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

TDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

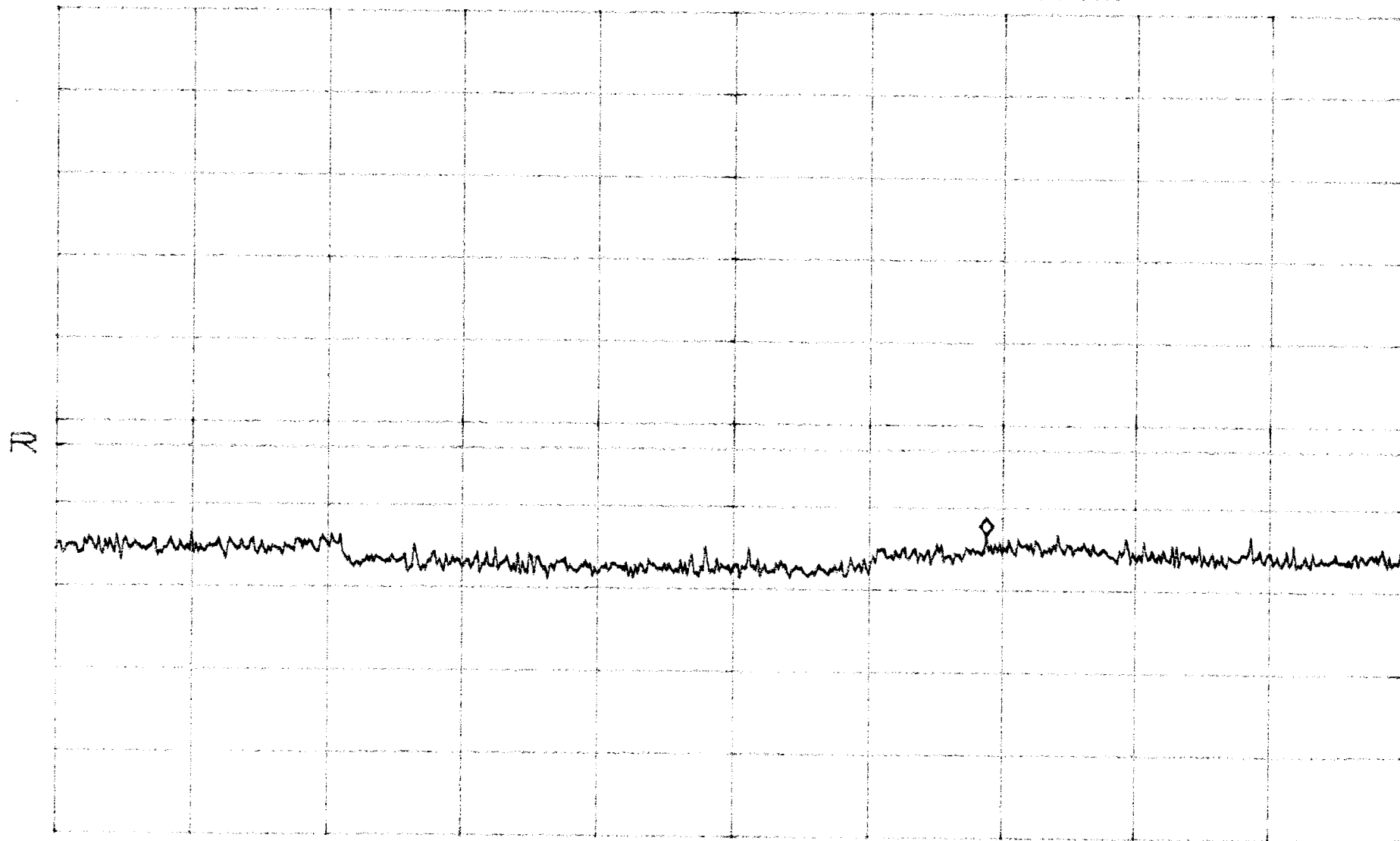
*ATTEN 10dB

MKR -23.17dBm

RL 40.0dBm

10dB/

7.195GHz



START 1.000GHz

STOP 10.000GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 180ms

CDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

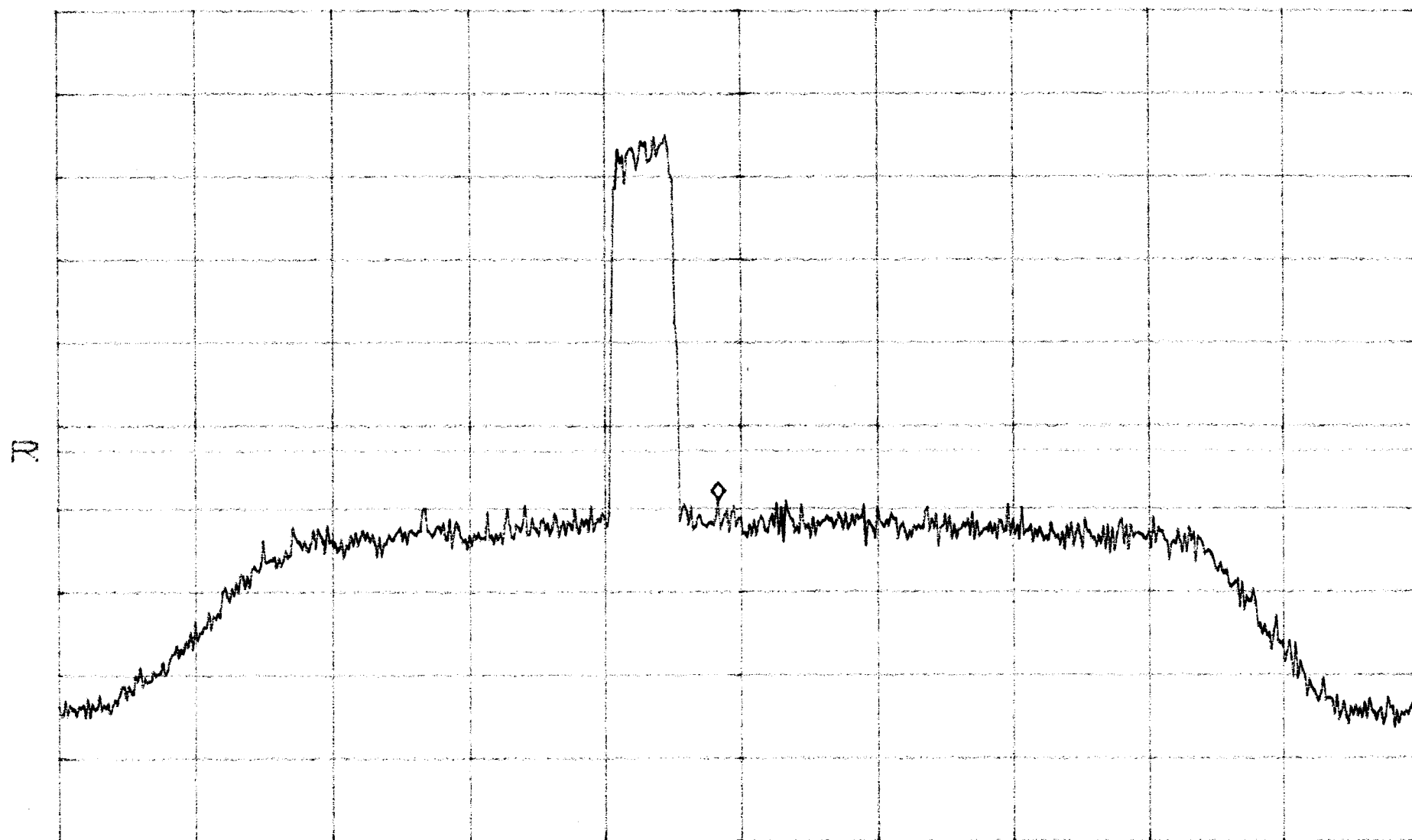
*ATTEN 10dB

MKR --18.83dBm

RL 40.0dBm

10dB/

858.49MHz



CENTER 859.00MHz

SPAN 30.42MHz

*RBW 10kHz

VBW 10kHz

SWP 770ms

CDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

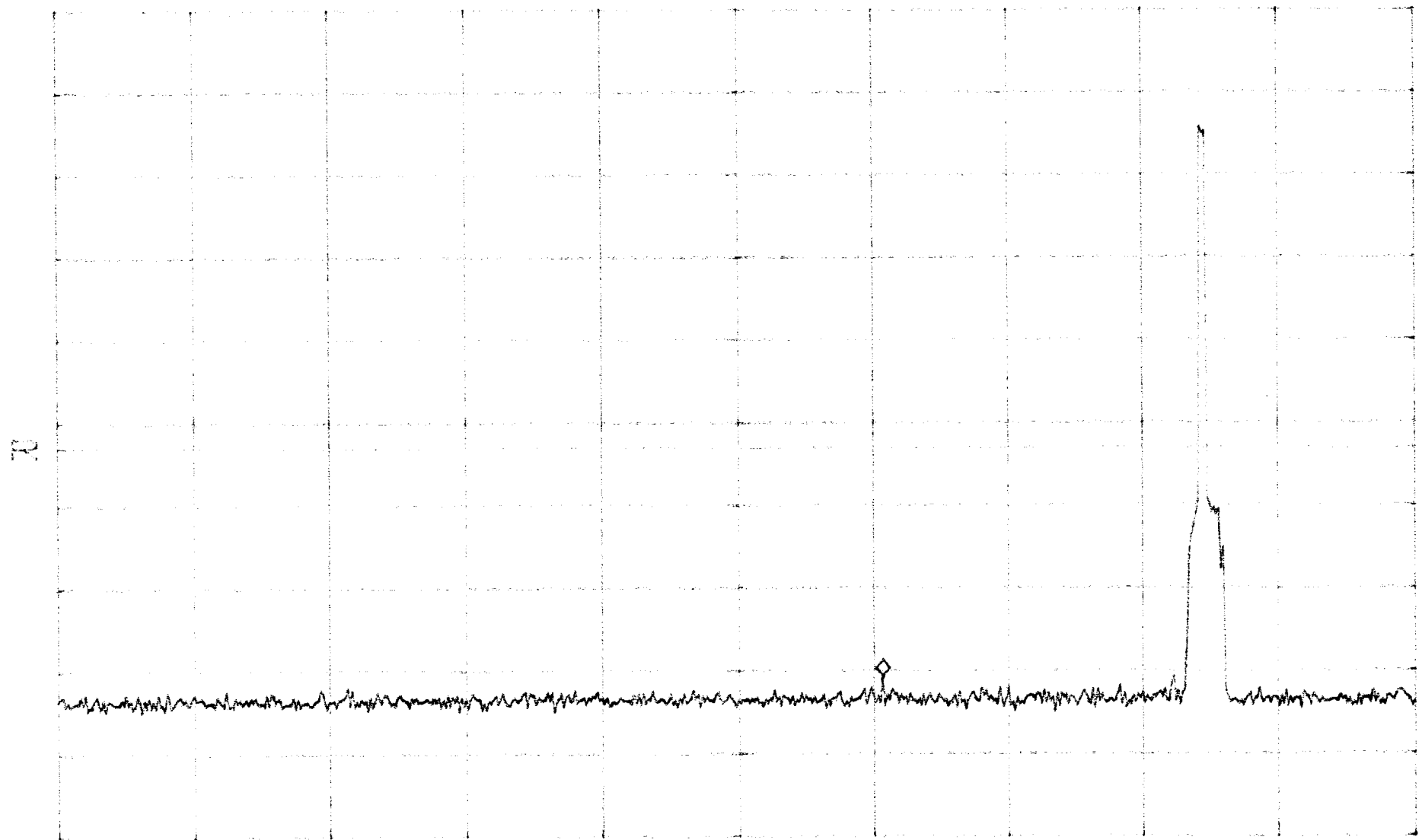
*ATTN 10dB

MKR -40.67dBm

RL 40.0dBm

10dB/

618.5MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

CDMA Spurious Emissions

FCC ID: F8I-DVLRCSMR

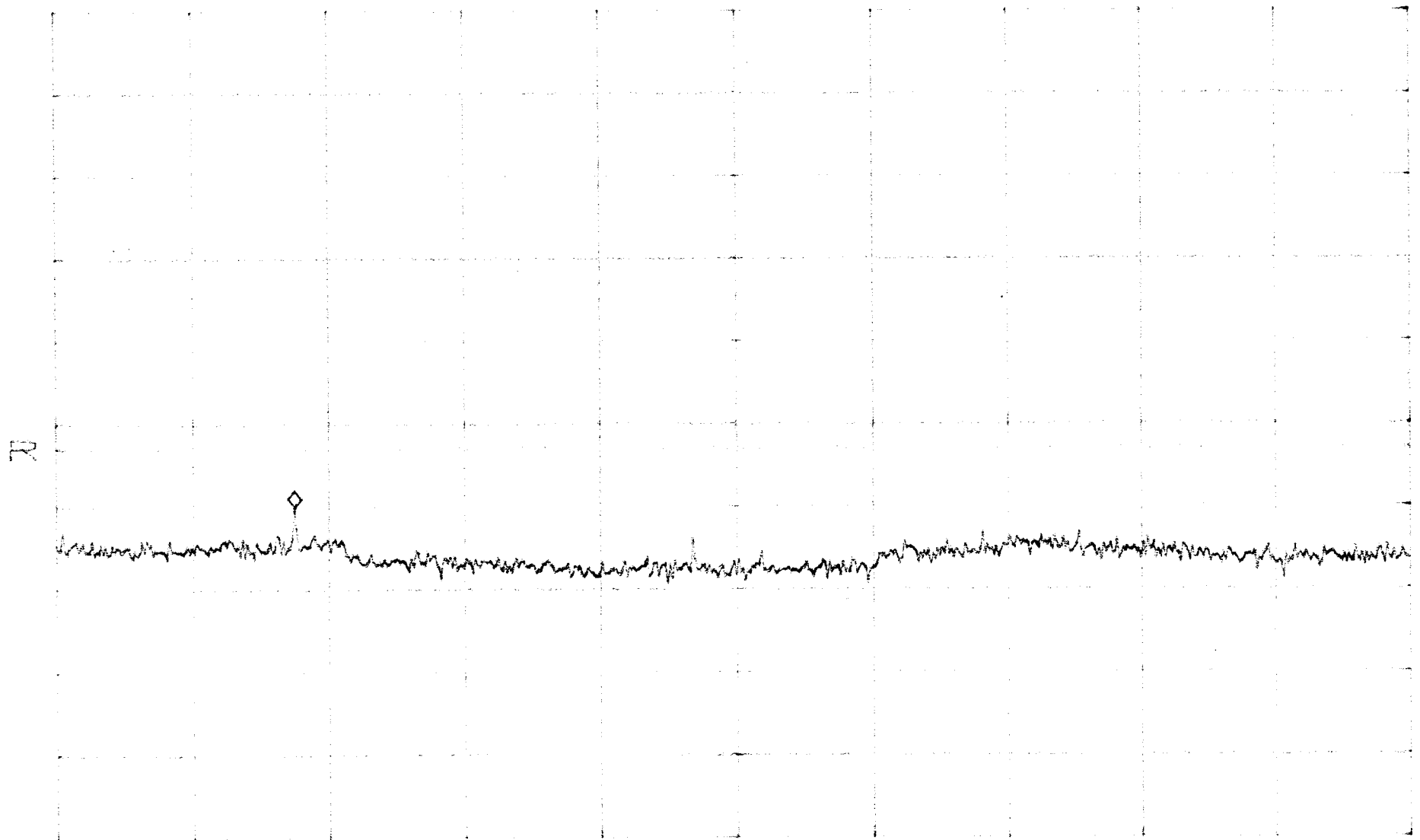
*ATTEN 10dB

MKR --20.00dBm

RL 40.0dBm

10dB/

2.575GHz



START 1.0000GHz

STOP 10.0000GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 180ms

Radiated Electromagnetic Emissions

Test Report #:	5443 Run 01	Test Area:	LTS 3m		
Test Method:		Test Date:	17-Jul-2001		
EUT Model #:	Digivance LRCS System	EUT Power:	60 Hz / 120 VAC & 48 VDC		
EUT Serial #:				Temperature:	25 °C
Manufacturer:	ADC Telecommunications			Relative Humidity:	80 %
EUT Description:	Long range communication service			Air Pressure:	98.5 kPa
Notes:	850 MHz, 858 MHz, & 865 MHz operating range			Page:	1 of 3

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	FINAL (dBm)	DELTA2 N/A
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***** MEASUREMENT SUMMARY *****						
213.00	84.9 Pk	1.7 / 11.0 / 25.8	71.8	H / 1.9 / 350.0	-25.60	N/A
639.00	68.0 Pk	2.8 / 19.9 / 26.2	64.6	H / 1.3 / 130.0	-32.80	N/A
426.00	67.2 Pk	2.4 / 16.8 / 26.1	60.4	H / 1.0 / 180.0	-37.00	N/A
355.00	68.4 Pk	2.1 / 14.9 / 25.9	59.5	H / 1.0 / 180.0	-37.90	N/A
834.58	60.4 Pk	3.2 / 21.9 / 26.1	59.4	V / 1.0 / 90.0	-38.00	N/A
781.00	59.6 Pk	3.1 / 21.5 / 26.1	58.2	V / 1.1 / 358.0	-39.20	N/A
2840.01	47.6 Pk	5.9 / 31.4 / 26.7	58.2	H / 1.2 / 234.0	-39.20	N/A
922.99	57.6 Pk	3.4 / 22.8 / 26.0	57.8	V / 1.1 / 358.0	-39.60	N/A
142.00	71.3 Pk	1.6 / 8.9 / 25.5	56.2	V / 1.0 / 180.0	-41.20	N/A
497.00	62.6 Pk	2.4 / 17.3 / 26.3	56.1	H / 1.9 / 350.0	-41.30	N/A
851.99	55.5 Pk	3.2 / 22.2 / 26.1	54.8	V / 1.0 / 0.0	-42.60	N/A
1562.01	49.4 Pk	4.8 / 26.3 / 26.1	54.4	H / 1.0 / 90.0	-43.00	N/A
158.60	69.3 Pk	1.7 / 8.9 / 25.6	54.3	V / 1.0 / 0.0	-43.10	N/A
158.88	69.1 Pk	1.7 / 8.9 / 25.6	54.0	V / 1.0 / 0.0	-43.40	N/A
2059.01	45.1 Pk	4.7 / 29.7 / 26.5	53.0	H / 1.6 / 0.0	-44.40	N/A
1917.06	44.6 Pk	6.4 / 28.3 / 26.6	52.7	V / 1.0 / 0.0	-44.70	N/A
284.00	64.0 Pk	1.9 / 12.6 / 25.9	52.6	V / 1.0 / 180.0	-44.80	N/A
1491.01	47.2 Pk	4.6 / 26.5 / 25.8	52.5	H / 1.0 / 90.0	-44.90	N/A
1633.01	46.1 Pk	5.1 / 27.4 / 26.2	52.5	V / 1.0 / 180.0	-44.90	N/A
5148.07	47.4 Pk	9.3 / 35.3 / 40.0	52.0	H / 1.5 / 10.0	-45.40	N/A
2201.01	43.1 Pk	5.0 / 30.0 / 26.4	51.7	H / 1.7 / 224.0	-45.70	N/A
67.10	65.5 Pk	1.2 / 10.0 / 25.3	51.5	V / 1.0 / 90.0	-45.90	N/A
71.00	66.5 Pk	1.3 / 9.0 / 25.3	51.5	V / 1.0 / 180.0	-45.90	N/A
710.00	53.9 Pk	3.0 / 20.8 / 26.3	51.3	V / 1.0 / 90.0	-46.10	N/A

Tested by: J Sausen, G Jakubowski

Printed

Signature

Reviewed by: J. T. Schneider

Printed

Signature

Radiated Electromagnetic Emissions

Test Report #:	5443 Run 01	Test Area:	LTS 3m	
Test Method:		Test Date:	17-Jul-2001	
EUT Model #:	Digivance LRCS System	EUT Power:	60 Hz / 120 VAC & 48 VDC	
EUT Serial #:				Temperature: 25 °C
Manufacturer:	ADC Telecommunications			Relative Humidity: 80 %
EUT Description:	Long range communication service			Air Pressure: 98.5 kPa
Notes:	850 MHz, 858 MHz, & 865 MHz operating range			Page: 2 of 3

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	FINAL (dBm)	DELTA2 N/A
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***** MEASUREMENT SUMMARY *****						
114.33	66.0 Pk	1.4 / 9.3 / 25.4	51.2	V / 1.0 / 90.0	-46.20	N/A
1207.01	48.4 Qp	3.9 / 24.5 / 25.7	51.2	H / 1.7 / 50.0	-46.20	N/A
1775.01	43.8 Pk	5.9 / 27.9 / 26.5	51.0	V / 1.0 / 0.0	-46.40	N/A
1349.05	46.9 Pk	4.2 / 25.6 / 25.8	50.9	V / 1.0 / 90.0	-46.50	N/A
94.06	66.7 Pk	1.2 / 8.3 / 25.4	50.8	V / 1.0 / 0.0	-46.60	N/A
1846.01	43.1 Pk	6.2 / 28.0 / 26.6	50.7	V / 1.0 / 0.0	-46.70	N/A
1278.01	47.2 Pk	4.0 / 25.0 / 25.8	50.5	V / 1.0 / 180.0	-46.90	N/A
67.63	64.4 Pk	1.2 / 9.8 / 25.3	50.1	V / 1.0 / 90.0	-47.30	N/A
568.00	55.1 Pk	2.6 / 18.6 / 26.2	50.1	H / 1.9 / 350.0	-47.30	N/A
1065.01	48.9 Pk	3.6 / 23.3 / 25.9	49.9	H / 1.7 / 0.0	-47.50	N/A
46.82	58.4 Pk	1.3 / 15.0 / 25.1	49.5	V / 1.0 / 0.0	-47.90	N/A
134.60	65.3 Pk	1.5 / 8.0 / 25.5	49.4	V / 1.0 / 0.0	-48.00	N/A
1136.01	47.5 Qp	3.7 / 23.9 / 25.8	49.3	H / 1.7 / 50.0	-48.10	N/A
60.20	61.4 Pk	1.2 / 11.7 / 25.3	49.1	V / 1.0 / 180.0	-48.30	N/A
2343.01	39.9 Pk	4.9 / 30.4 / 26.5	48.7	V / 1.4 / 188.0	-48.70	N/A
1420.01	43.4 Qp	4.4 / 26.4 / 25.8	48.4	H / 1.7 / 180.0	-49.00	N/A
5106.07	44.1 Pk	9.1 / 35.3 / 40.0	48.4	H / 1.4 / 164.0	-49.00	N/A
133.68	64.0 Pk	1.5 / 8.0 / 25.5	48.0	V / 1.0 / 0.0	-49.40	N/A
994.01	46.2 Pk	3.6 / 23.3 / 25.8	47.3	V / 1.0 / 0.0	-50.10	N/A
2485.01	37.8 Pk	5.0 / 30.7 / 26.8	46.7	V / 1.0 / 0.0	-50.70	N/A
839.63	47.3 Pk	3.2 / 22.0 / 26.1	46.4	V / 1.0 / 90.0	-51.00	N/A
2553.02	37.4 Pk	5.1 / 30.8 / 26.9	46.3	V / 1.0 / 0.0	-51.10	N/A
1704.01	38.6 Qp	5.5 / 27.9 / 26.4	45.6	H / 1.7 / 180.0	-51.80	N/A
839.85	46.1 Pk	3.2 / 22.0 / 26.1	45.3	V / 1.0 / 0.0	-52.10	N/A

Tested by: J Sausen, G Jakubowski

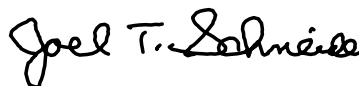
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Signature

Reviewed by: J. T. Schneider

Printed



Signature

Radiated Electromagnetic Emissions

Test Report #:	5443 Run 01	Test Area:	LTS 3m		
Test Method:		Test Date:	17-Jul-2001		
EUT Model #:	Digivance LRCS System	EUT Power:	60 Hz / 120 VAC & 48 VDC		
EUT Serial #:				Temperature:	25 °C
Manufacturer:	ADC Telecommunications			Relative Humidity:	80 %
EUT Description:	Long range communication service			Air Pressure:	98.5 kPa
Notes:	850 MHz, 858 MHz, & 865 MHz operating range			Page:	3 of 3

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	FINAL (dBm)	DELTA2 N/A
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***** MEASUREMENT SUMMARY *****						
3408.00	32.3 Pk	6.2 / 32.8 / 26.9	44.4	V / 1.0 / 0.0	-53.00	N/A
4255.07	43.0 Pk	7.5 / 34.1 / 41.1	43.4	V / 1.0 / 0.0	-54.00	N/A
4970.09	39.6 Pk	8.5 / 35.0 / 40.1	43.0	V / 1.0 / 0.0	-54.40	N/A
78.07	58.8 Pk	1.3 / 7.8 / 25.3	42.5	V / 1.0 / 0.0	-54.90	N/A
4757.08	40.6 Pk	7.7 / 34.5 / 40.5	42.3	H / 1.2 / 234.0	-55.10	N/A
860.99	42.6 Pk	3.2 / 22.2 / 26.1	41.9	V / 1.0 / 90.0	-55.50	N/A
4290.08	41.4 Pk	7.5 / 34.1 / 41.1	41.9	V / 1.0 / 0.0	-55.50	N/A
4189.08	38.9 Pk	7.4 / 34.2 / 41.1	39.4	H / 1.2 / 234.0	-58.00	N/A
4118.08	37.5 Pk	7.4 / 34.3 / 41.1	38.0	H / 1.2 / 234.0	-59.40	N/A

Substitution method used to verify measured emission at 213 MHz

Signal generator level adjusted to -13.2 dBm

Cable loss = 3.51 dB

Dipole antenna attenuation = 10 dB

Source power from substituted dipole antenna

-13.2dBm – 3.51 dB - 10 dB = -26.71 dBm

Tested by: J Sausen, G Jakubowski

Printed

Signature

Reviewed by: J. T. Schneider

Printed

Signature

Frequency Stability Test for ADC Inc. Digivance LRCS SMR System
Model DGVL-202XXSYS
Per FCC CFR 47 Part 90.213

Input Voltage	Carrier Frequency	Measured Frequency	Meets requirement?
102 VAC	851.000000 MHz	851.000000 MHz	Yes
120 VAC	851.000000 MHz	851.000000 MHz	Yes
138 VAC	851.000000 MHz	851.000000 MHz	Yes
102 VAC	858.000000 MHz	858.000000 MHz	Yes
120 VAC	858.000000 MHz	858.000000 MHz	Yes
138 VAC	858.000000 MHz	858.000000 MHz	Yes
102 VAC	865.000000 MHz	865.000000 MHz	Yes
120 VAC	865.000000 MHz	865.000000 MHz	Yes
138 VAC	865.000000 MHz	865.000000 MHz	Yes
Temperature	Carrier Frequency	Measured Frequency	Meets requirement?
-30 Deg C	851.000000 MHz	851.000000 MHz	Yes
-20 Deg C	851.000000 MHz	851.000000 MHz	Yes
-10 Deg C	851.000000 MHz	851.000000 MHz	Yes
0 Deg. C	851.000000 MHz	851.000000 MHz	Yes
10 Deg C	851.000000 MHz	851.000000 MHz	Yes
20 Deg C	851.000000 MHz	851.000000 MHz	Yes
30 Deg C	851.000000 MHz	851.000000 MHz	Yes
40 Deg C	851.000000 MHz	851.000000 MHz	Yes
50 Deg C	851.000000 MHz	851.000000 MHz	Yes
-30 Deg C	858.000000 MHz	858.000000 MHz	Yes
-20 Deg C	858.000000 MHz	858.000000 MHz	Yes
-10 Deg C	858.000000 MHz	858.000000 MHz	Yes
0 Deg. C	858.000000 MHz	858.000000 MHz	Yes
10 Deg C	858.000000 MHz	858.000000 MHz	Yes
20 Deg C	858.000000 MHz	858.000000 MHz	Yes
30 Deg C	858.000000 MHz	858.000000 MHz	Yes
40 Deg C	858.000000 MHz	858.000000 MHz	Yes
50 Deg C	858.000000 MHz	858.000000 MHz	Yes
-30 Deg C	865.000000 MHz	865.000000 MHz	Yes
-20 Deg C	865.000000 MHz	865.000000 MHz	Yes
-10 Deg C	865.000000 MHz	865.000000 MHz	Yes
0 Deg. C	865.000000 MHz	865.000000 MHz	Yes
10 Deg C	865.000000 MHz	865.000000 MHz	Yes
20 Deg C	865.000000 MHz	865.000000 MHz	Yes
30 Deg C	865.000000 MHz	865.000000 MHz	Yes
40 Deg C	865.000000 MHz	865.000000 MHz	Yes
50 Deg C	865.000000 MHz	865.000000 MHz	Yes

Note: EUT host is specified for indoor use only with temperature range of 0 to 50 degrees C and was tested within its range.

Note: EUT STM and LPA are specified with a temperature range of -30 to +50 degrees C and were tested within their range.

**Emission Mask Requirements Test for ADC Inc. DGVI-202XXSYS
PER FCC CFR 47 PART 90.691**

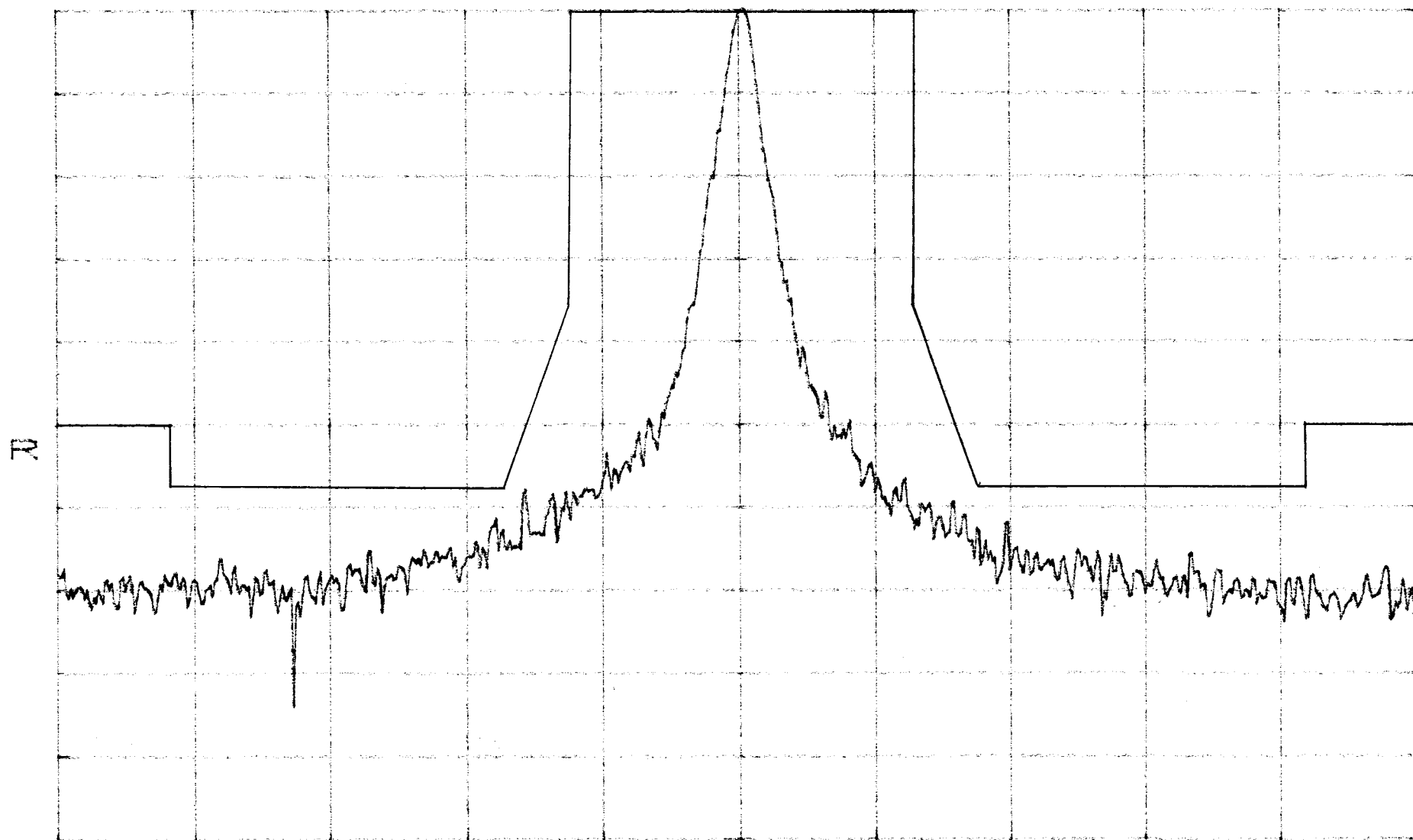
The emission mask test was performed at the band edges. The maximum composite output per channel was set at 5 Watts (+37dBm). The emission masks were added to the plots.

Results:
Pass (See Plots)

*ATTEN 10dB

RL 37.0dBm

10dB/



CENTER 851.0000MHz

SPAN 100.0kHz

*RBW 1.0kHz

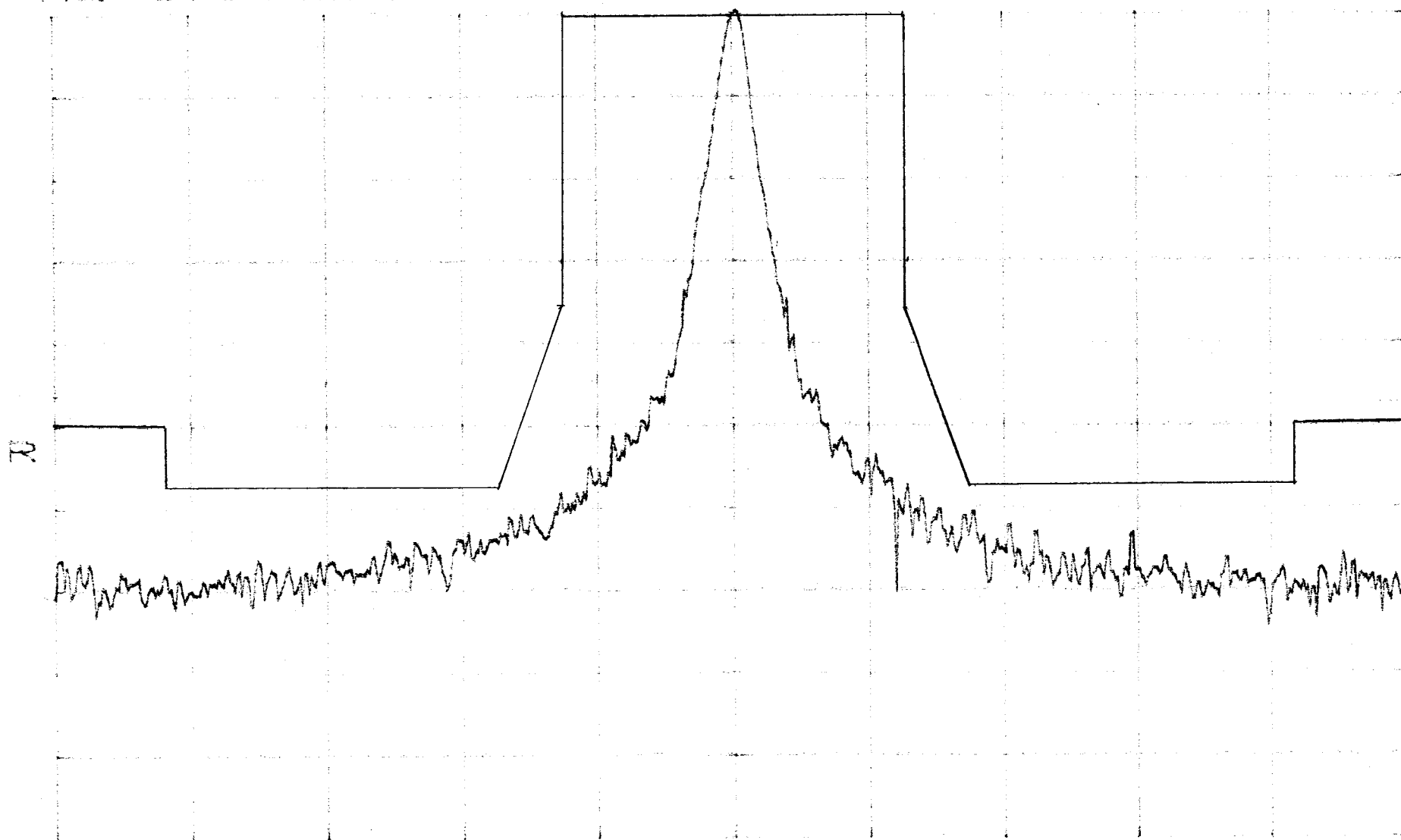
VBW 1.0kHz

SWP 250ms

*ATTEN 10dB

RL 37.0dBm

10dB



CENTER 866.0000MHz

SPAN 100.0kHz

*RBW 1.0kHz

VBW 1.0kHz

SWP 250ms

**Inter-modulation Test for ADC Inc. Digivance LRCS SMR System
Model DGVL-202XXXSYS.**

The intermodulation products test was performed for the EUT. Two tests were performed with each modulation type. Test 1 was with 2 signals input to the EUT at lower end channels. Test 2 was with 2 signals one at a lower end channel and one at a higher end channel. The modulations types tested were CDMA, TDMA, and FM (1kHz @8kHz deviation). An investigation was made from 30MHz to the 10th Harmonic of the highest fundamental frequency (~10GHz). The following plots show the results.

Results:
(See Plots)

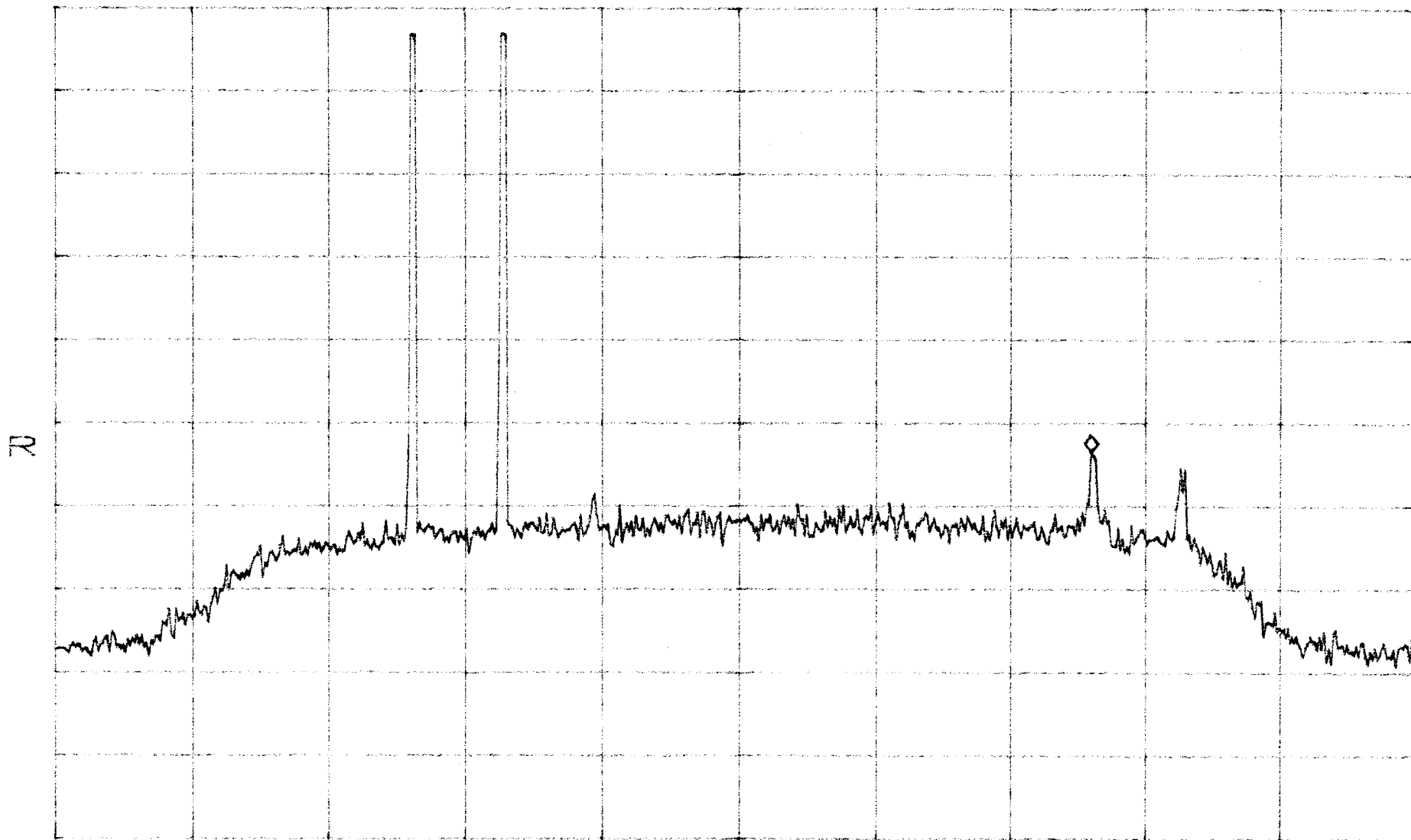
FM Intermod
~~close~~

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.03dBm
866.80MHz



CENTER 859.00MHz

SPAN 30.00MHz

*RBW 10kHz

VBW 10kHz

SWP 750ms

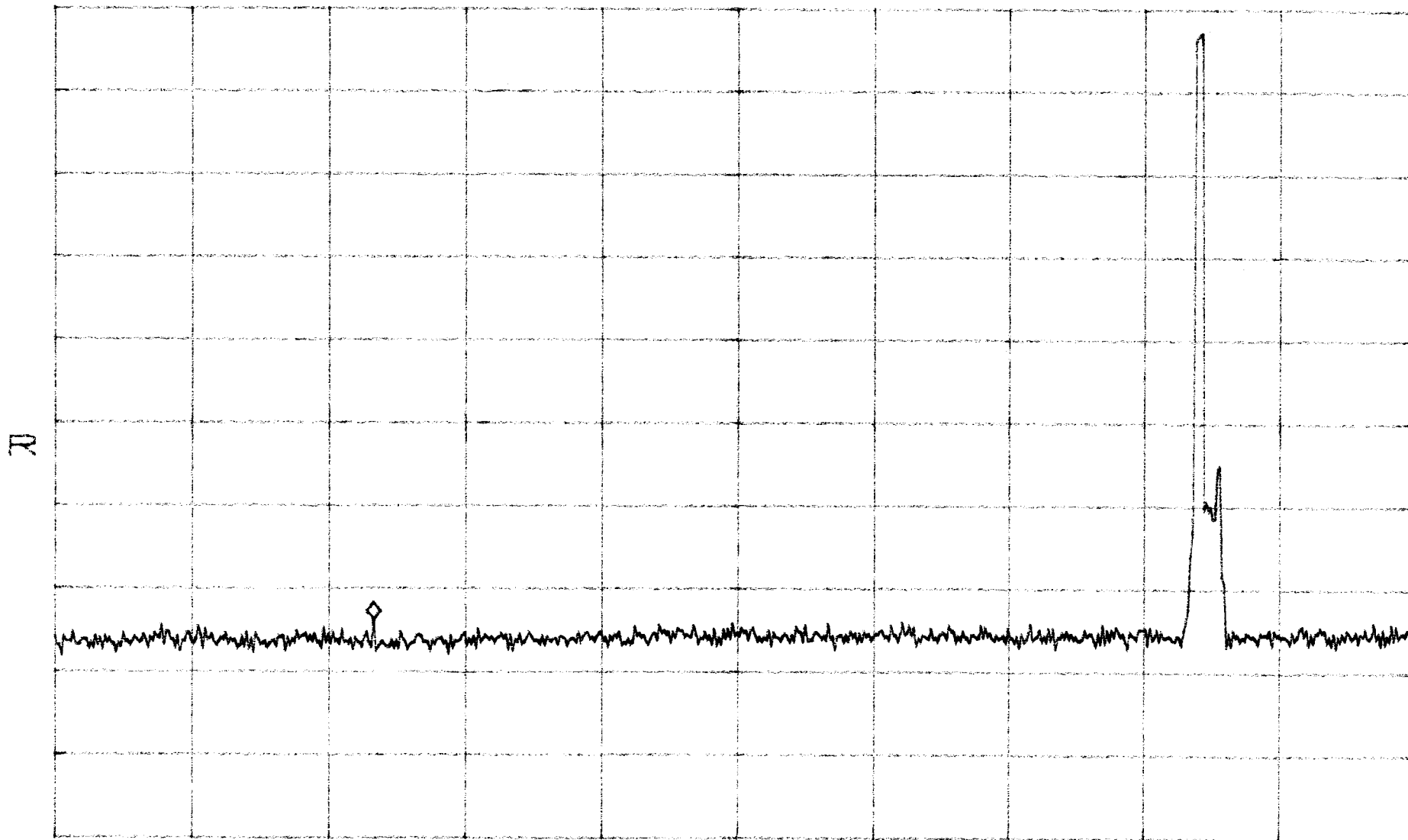
FM Intermod
close

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -33.37dBm
256.3MHz



START 30.0MHz STOP 1.0000GHz
*RBW 10kHz VBW 10kHz SWP 25sec

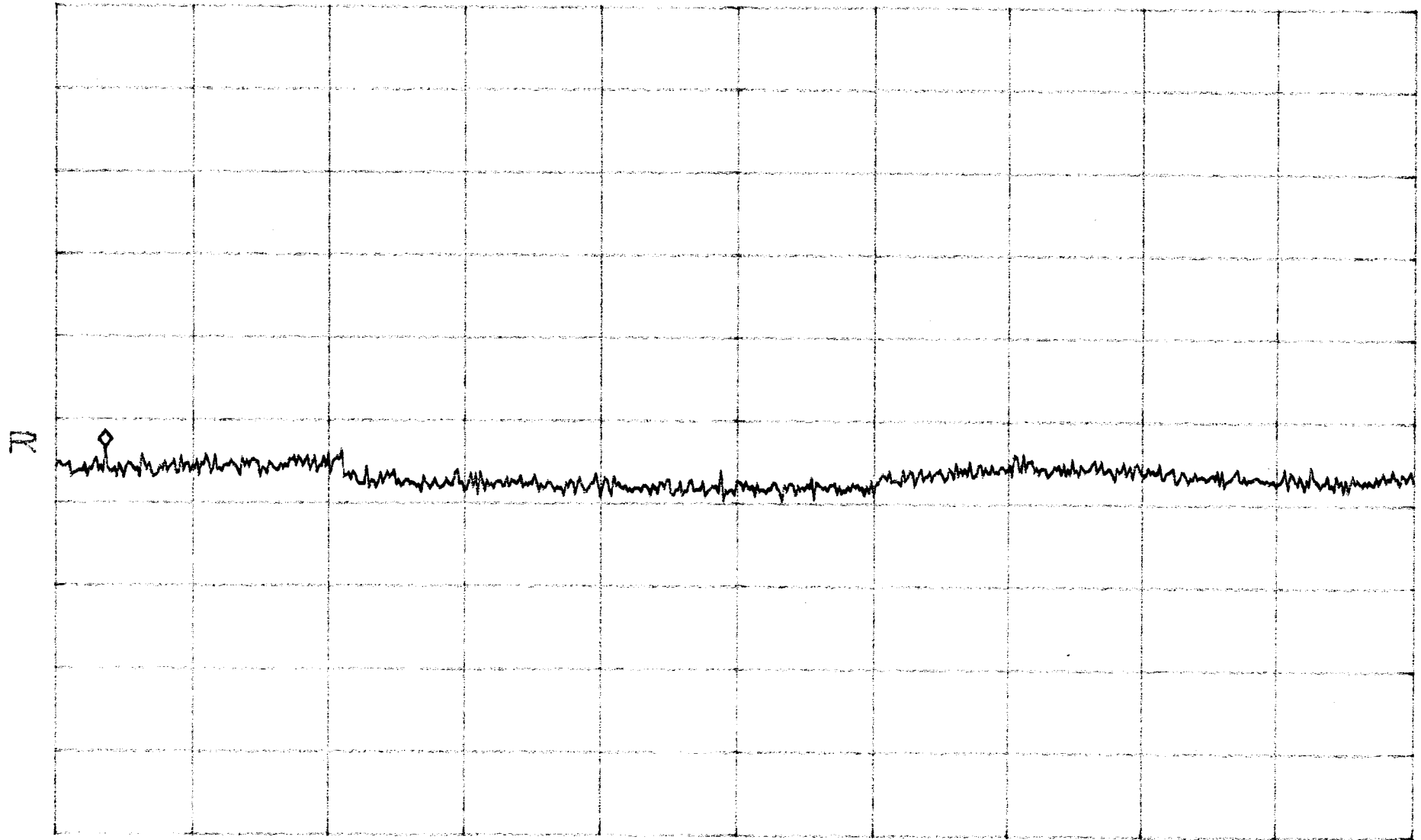
FM Intermod
close

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.03dBm
1.330GHz



START 1.000GHz STOP 10.000GHz
*RBW 1.0MHz VBW 1.0MHz SWP 180ms

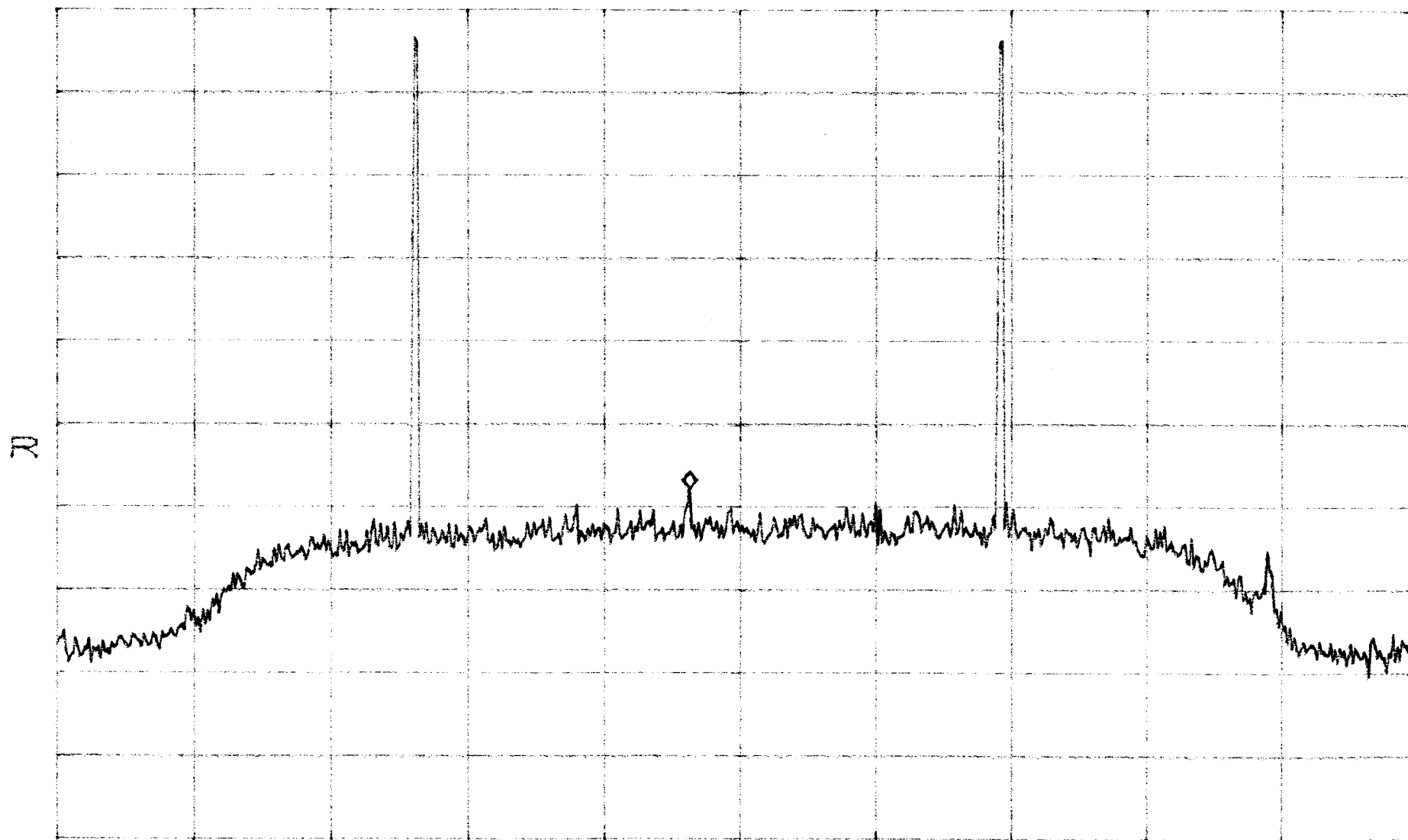
FM Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -17.37dBm
857.90MHz



CENTER 859.00MHz

SPAN 30.13MHz

*RBW 10kHz

VBW 10kHz

SWP 760ms

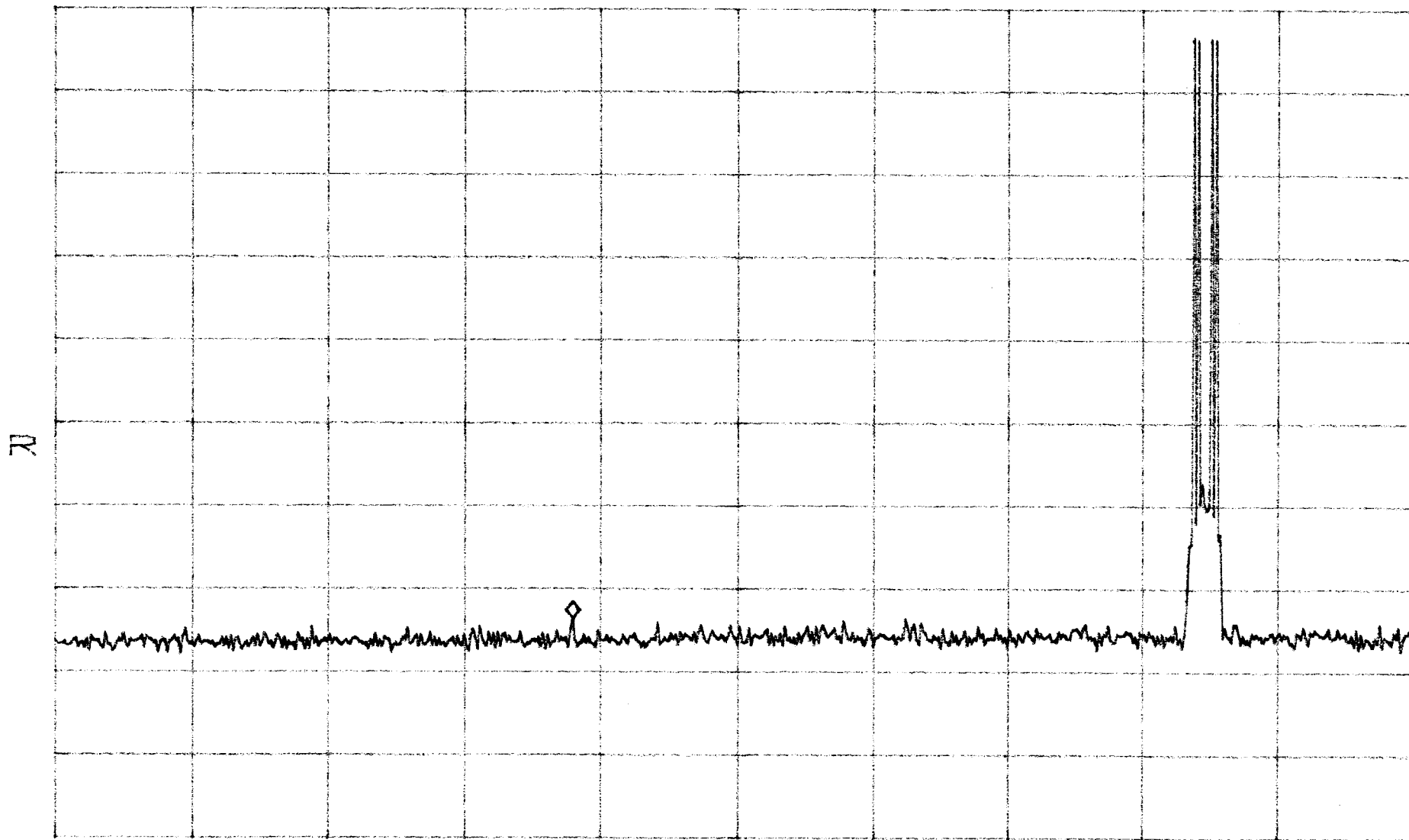
Fm Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -33.20dBm
398.6MHz



START 30.0MHz STOP 1.00000GHz
*RBW 10kHz VBW 10kHz SWP 25sec

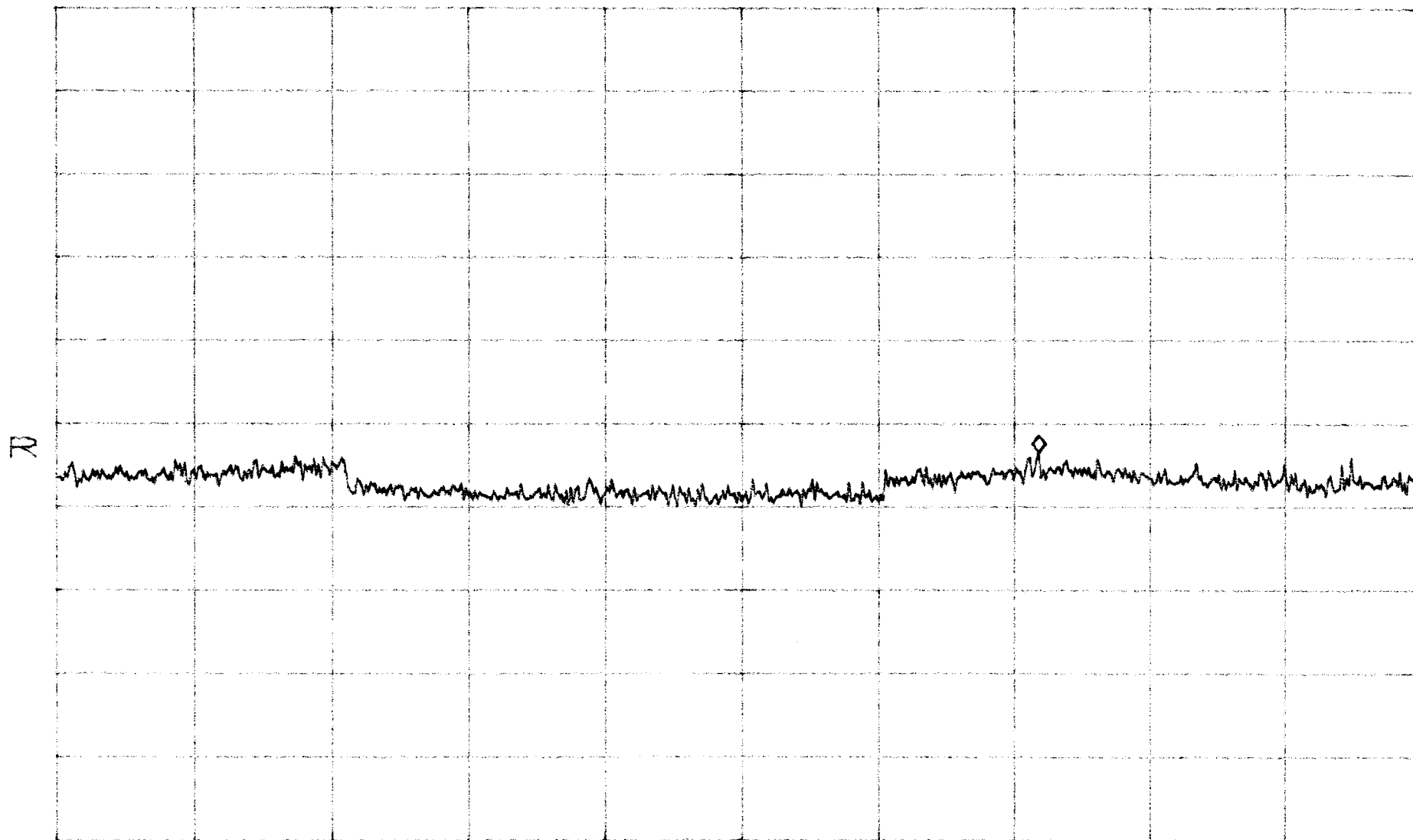
Fm Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.03dBm
7.465GHz



START 1.0000GHz

STOP 10.0000GHz

*RBW 1.0MHz

VBW 1.0MHz

SWP 180ms

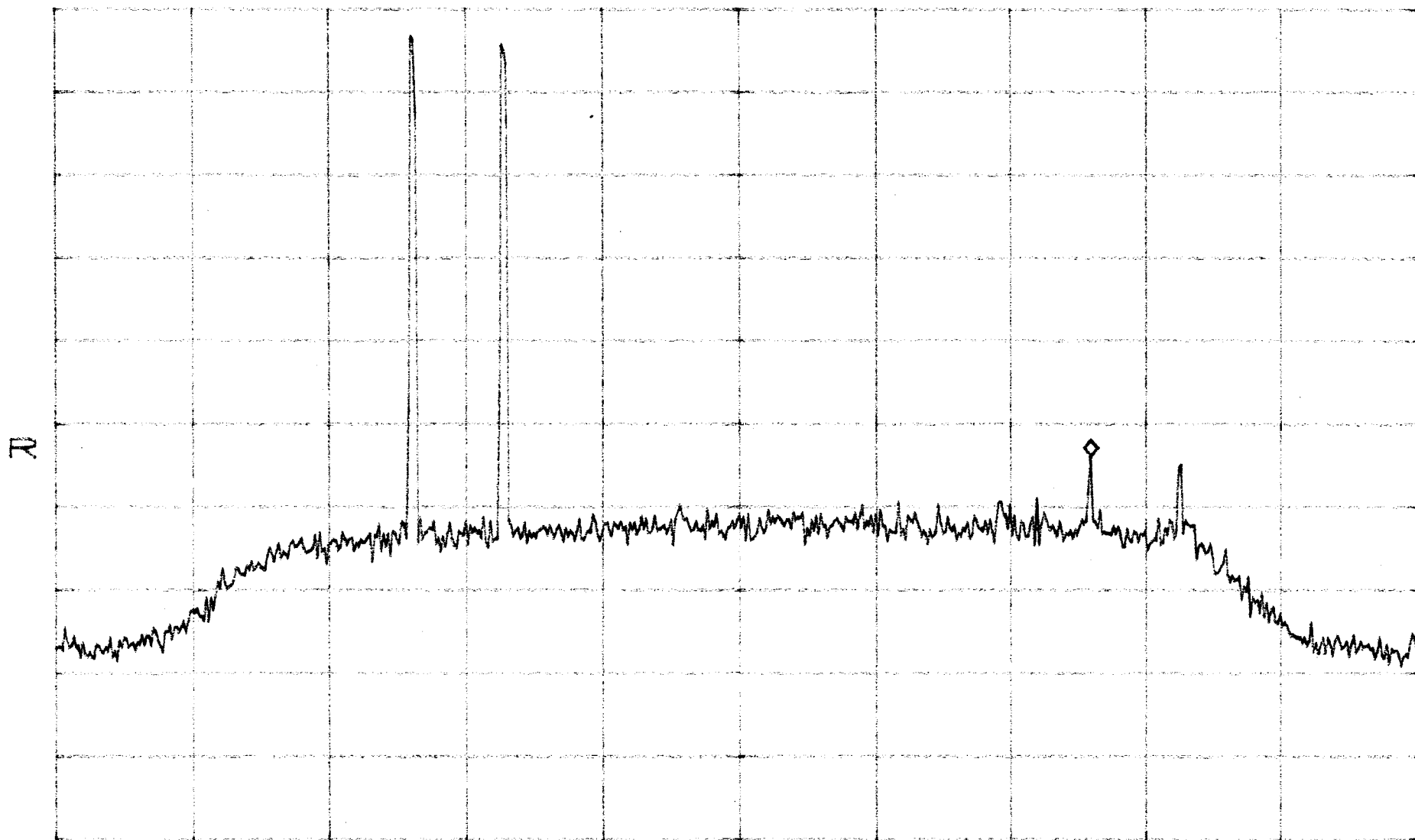
TDMA Intermod
cbse

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.53dBm
866.80MHz



CENTER 859.00MHz

SPAN 30.00MHz

*RBW 10kHz

VBW 10kHz

SWP 750ms

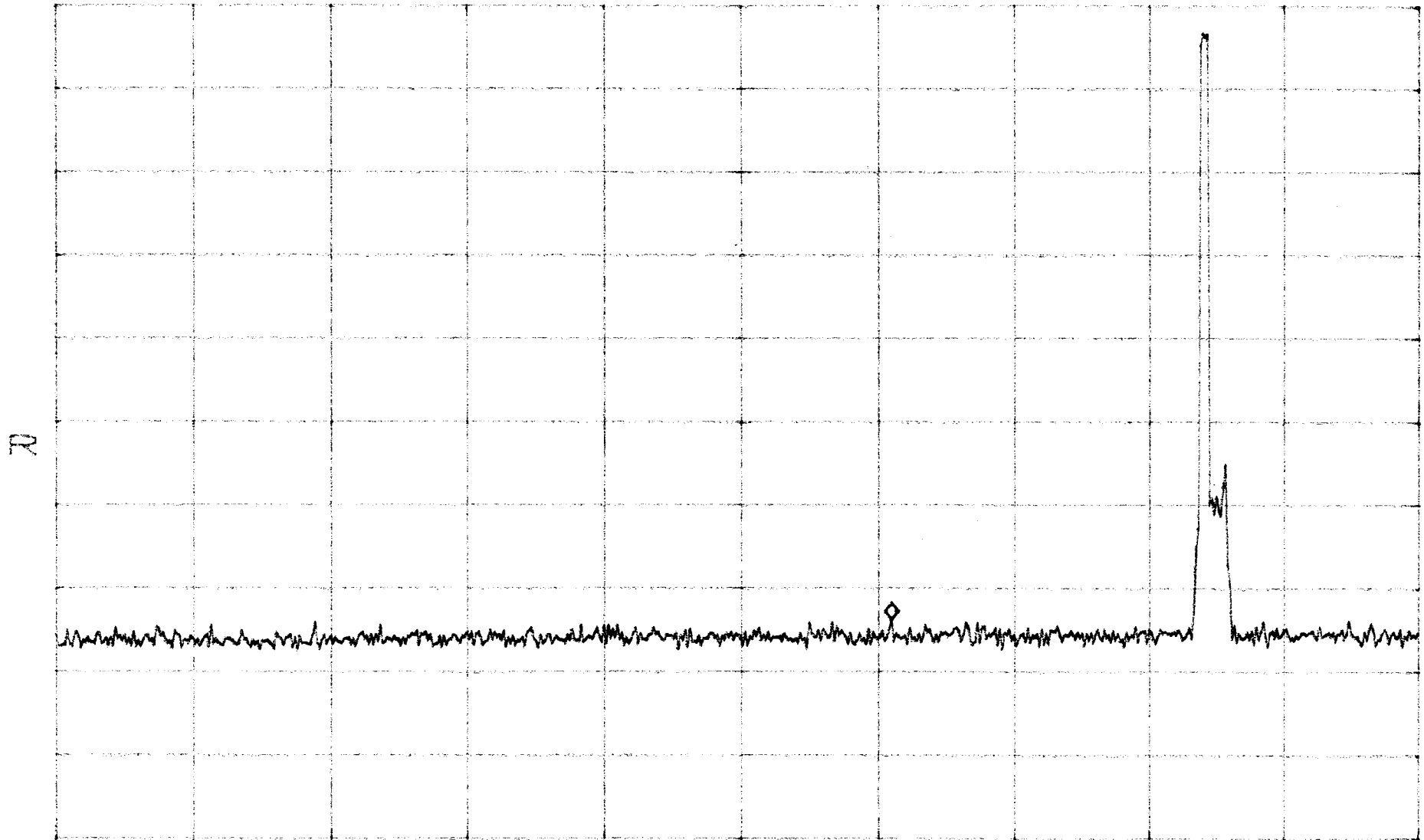
TDMA Intermod
close

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -33.37dBm
621.7MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

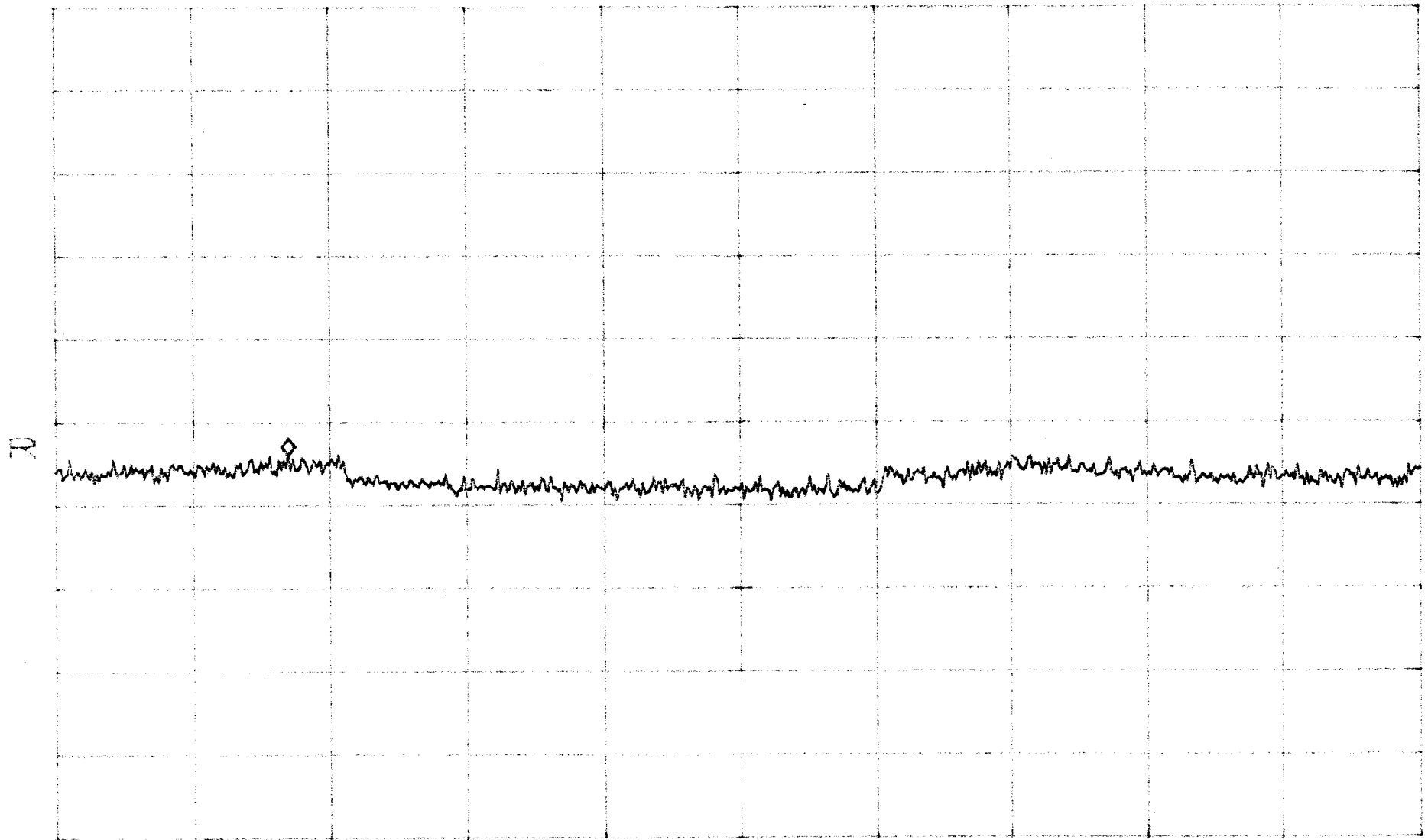
TDMA Intermod
cbse

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.53dBm
2.530GHz



START 1.000GHz STOP 10.000GHz
*RBW 1.0MHz VBW 1.0MHz SWP 180ms

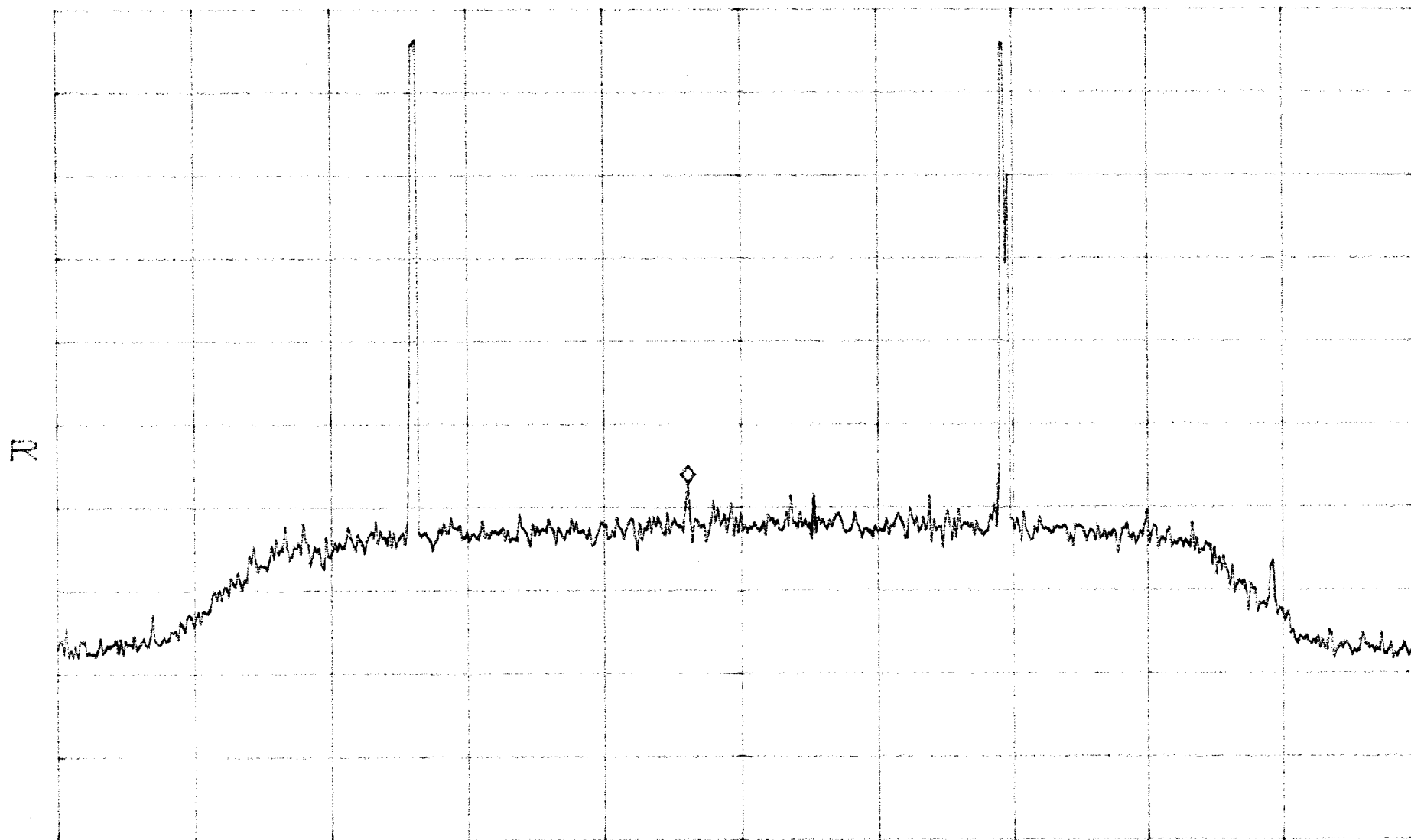
TDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -16.70dBm
857.85MHz



CENTER 859.00MHz

SPAN 30.02MHz

*RBW 10kHz

VBW 10kHz

SWP 760ms

TDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

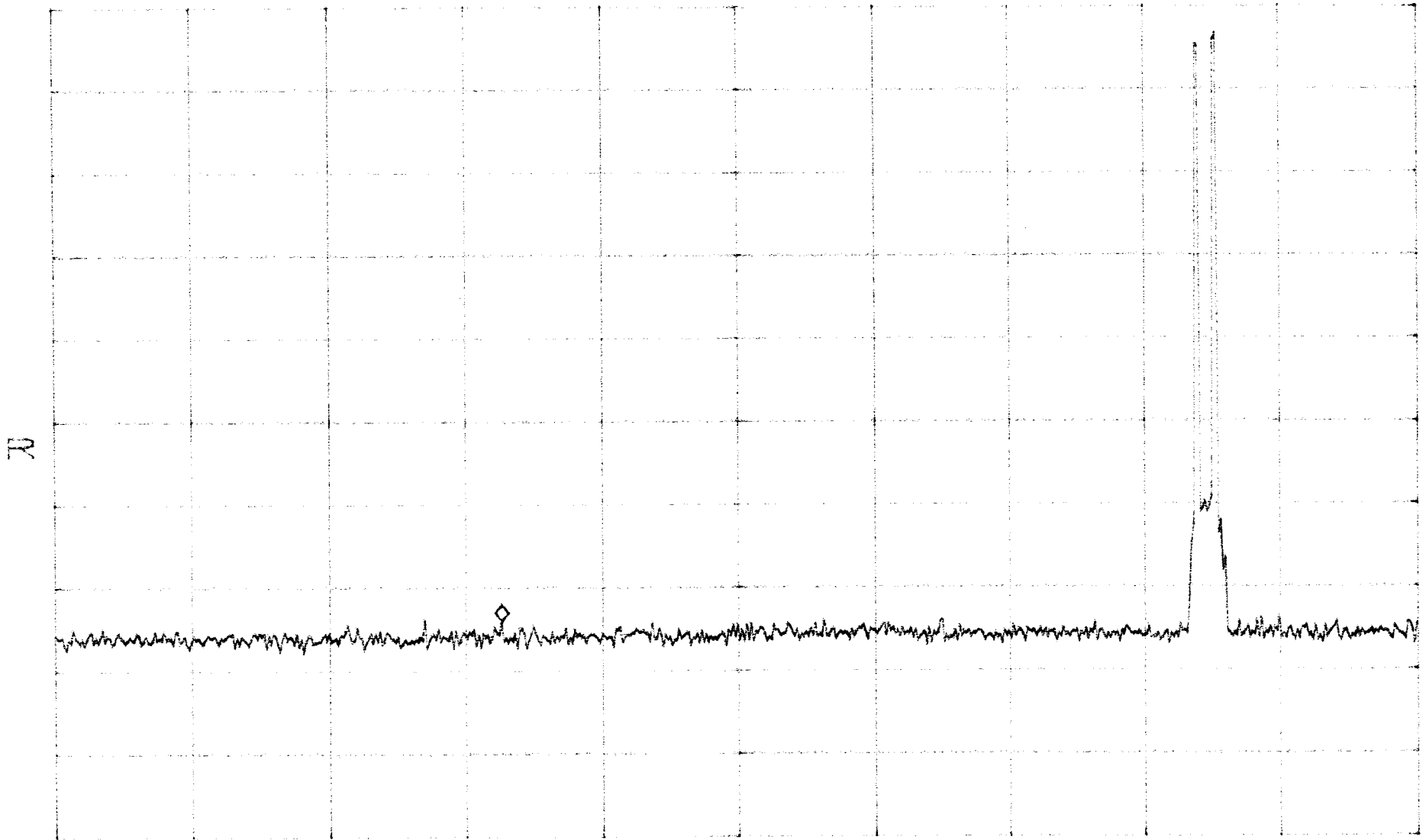
*ATTN 10dB

MKR -33.70dBm

RL 40.3dBm

10dB/

346.9MHz



START 30.0MHz

STOP 1.00000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

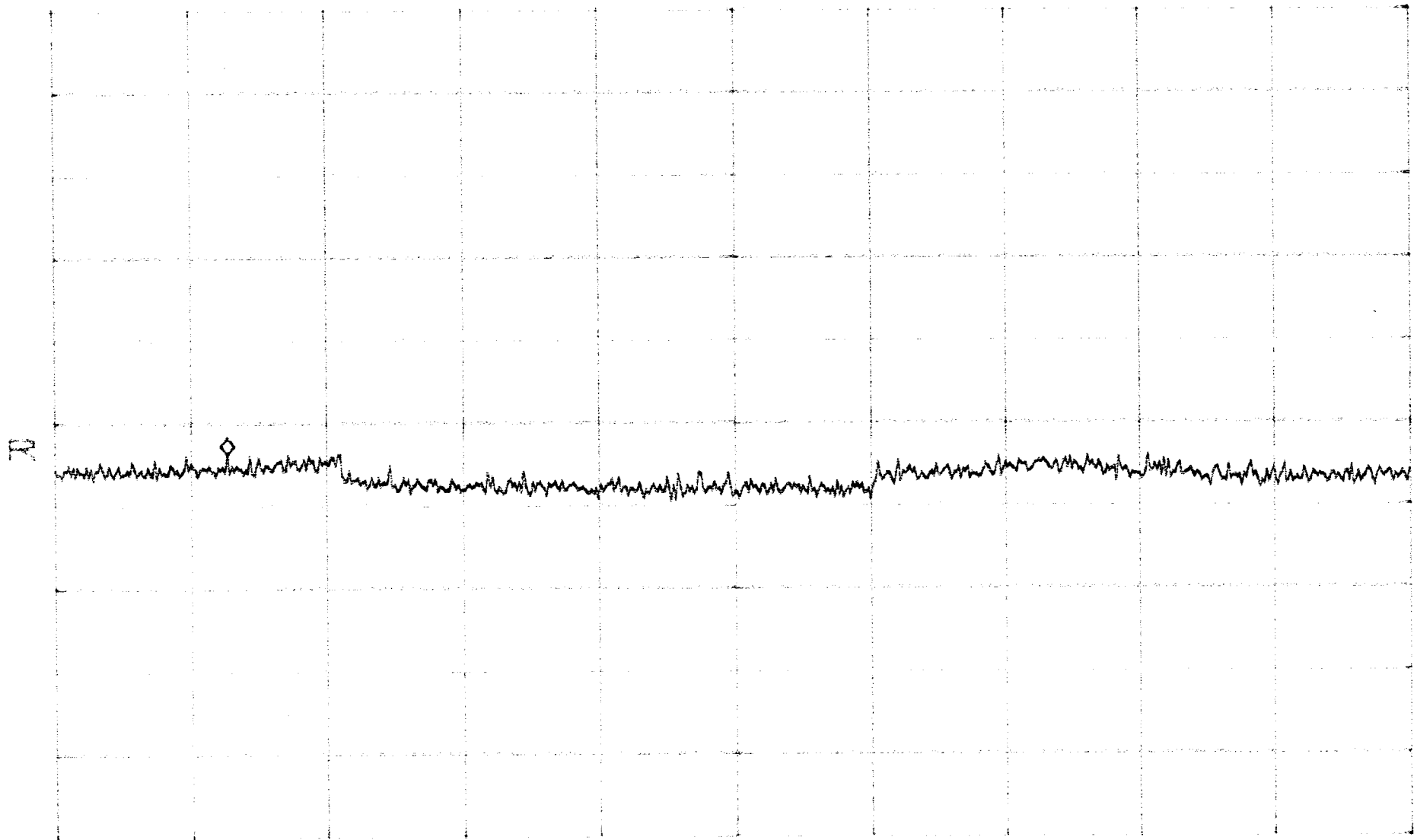
TDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.37dBm
2.140GHz



START 1.000GHz STOP 10.000GHz
*RBW 1.0MHz VBW 1.0MHz SWP 180ms

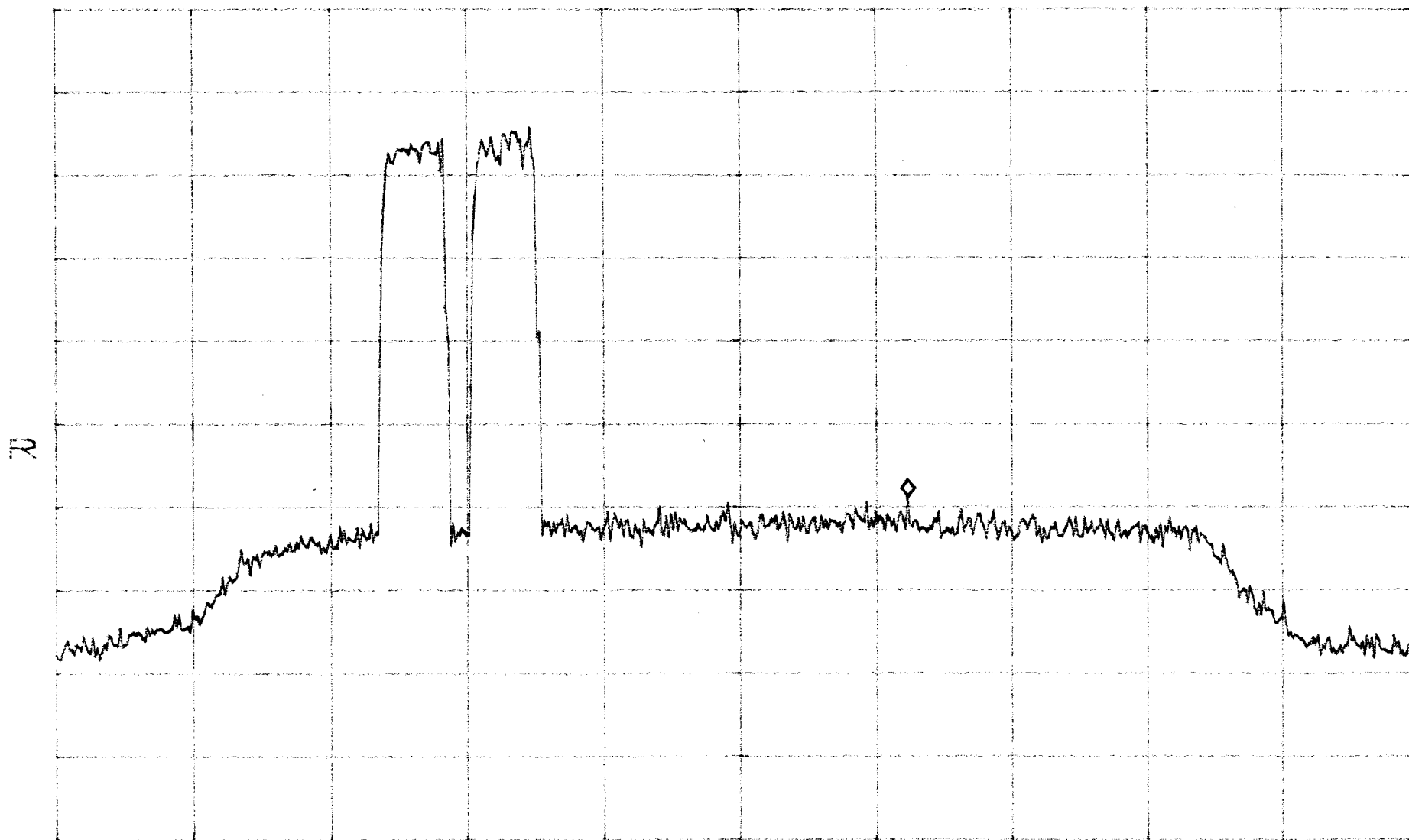
CDMA Intermod
close

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -18.37dBm
862.70MHz



CENTER 859.00MHz

SPAN 30.00MHz

*RBW 10kHz

VBW 10kHz

SWP 750ms

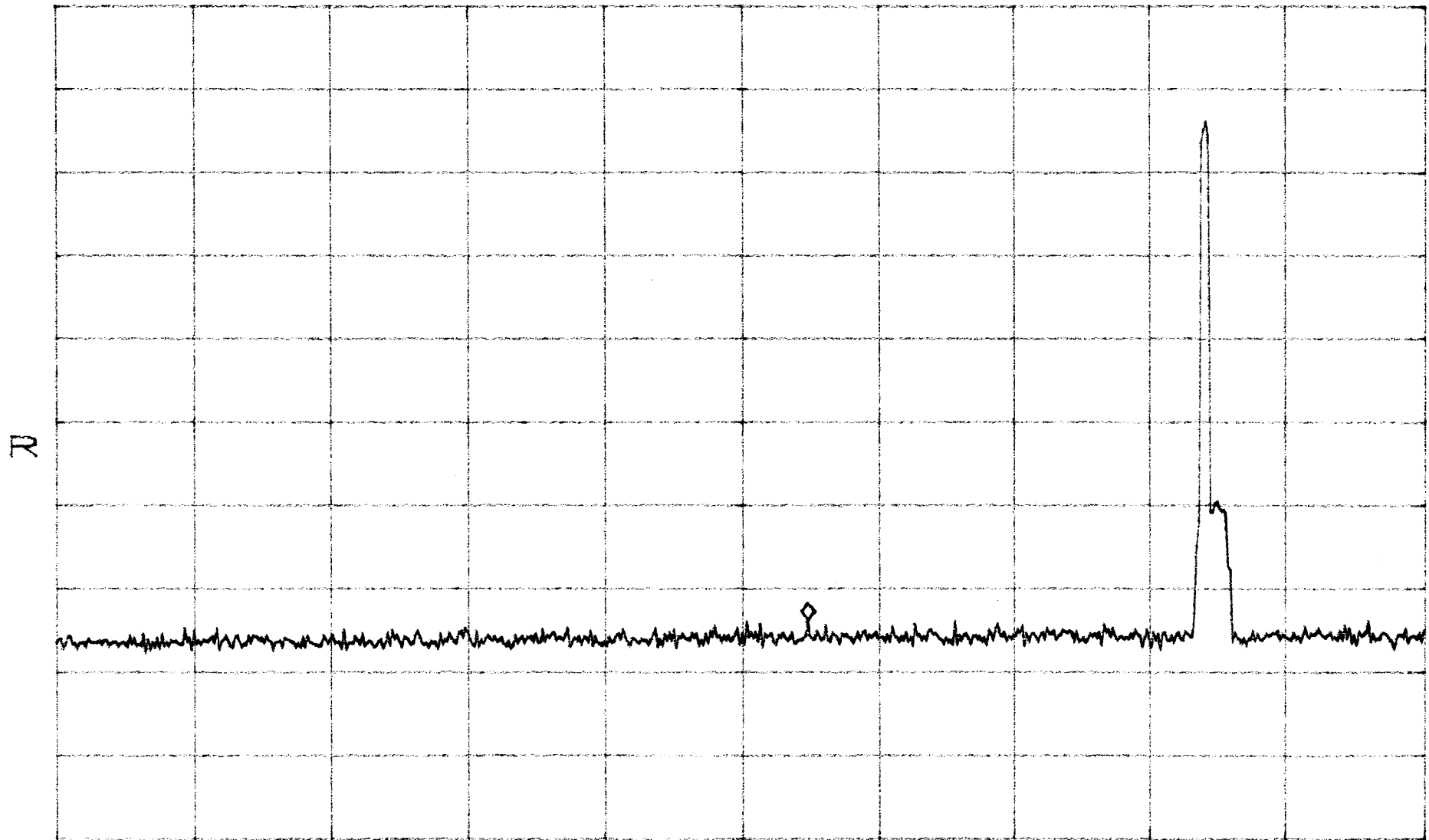
CDMA Intermod
close

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -33.37dBm
561.9MHz



START 30.0MHz STOP 1.0000GHz
*RBW 10kHz VBW 10kHz SWP 25sec

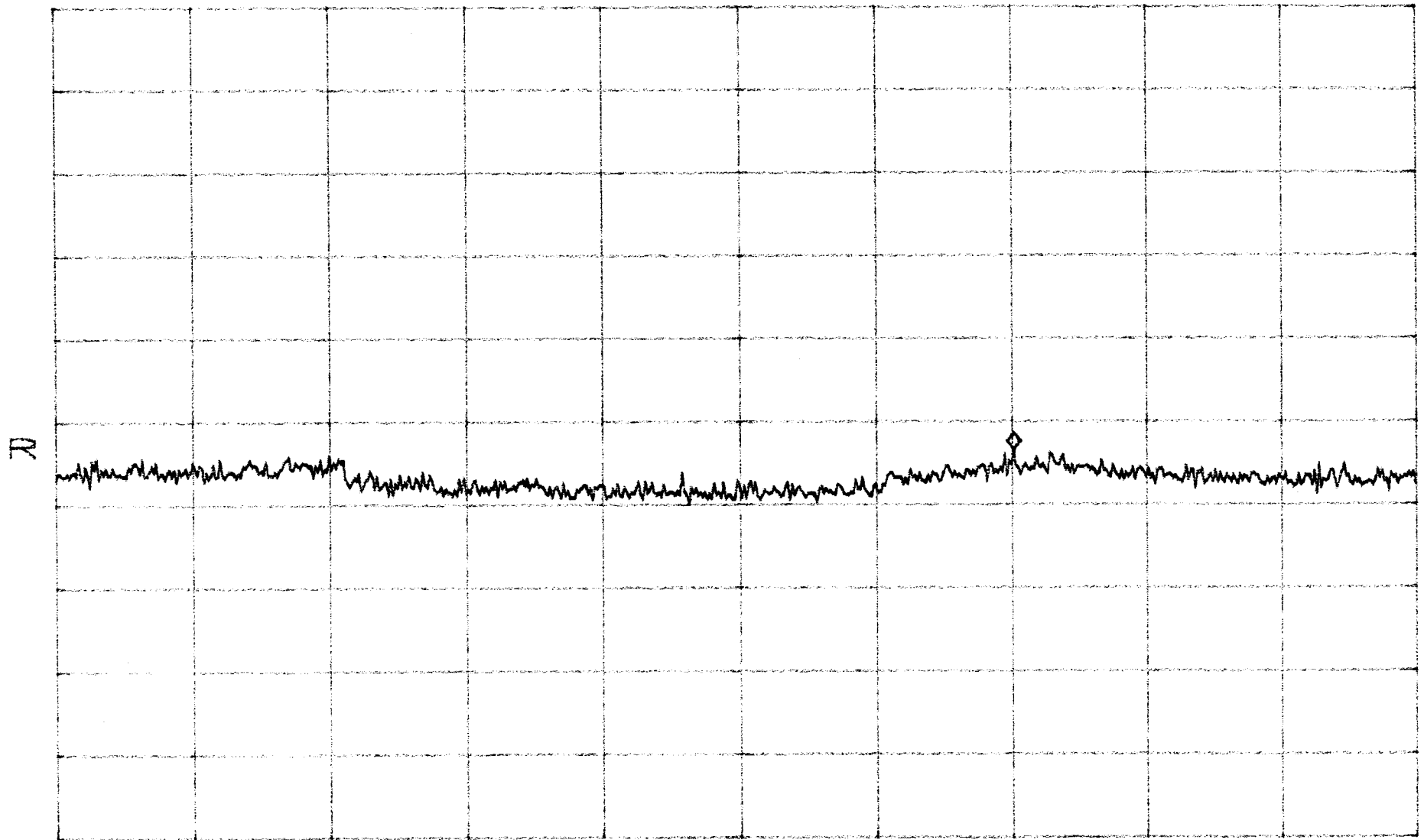
CDMA Intermod
cbse

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.03dBm
7.315GHz



START 1.0000GHz STOP 10.0000GHz
*RBW 1.0MHz VBW 1.0MHz SWP 180ms

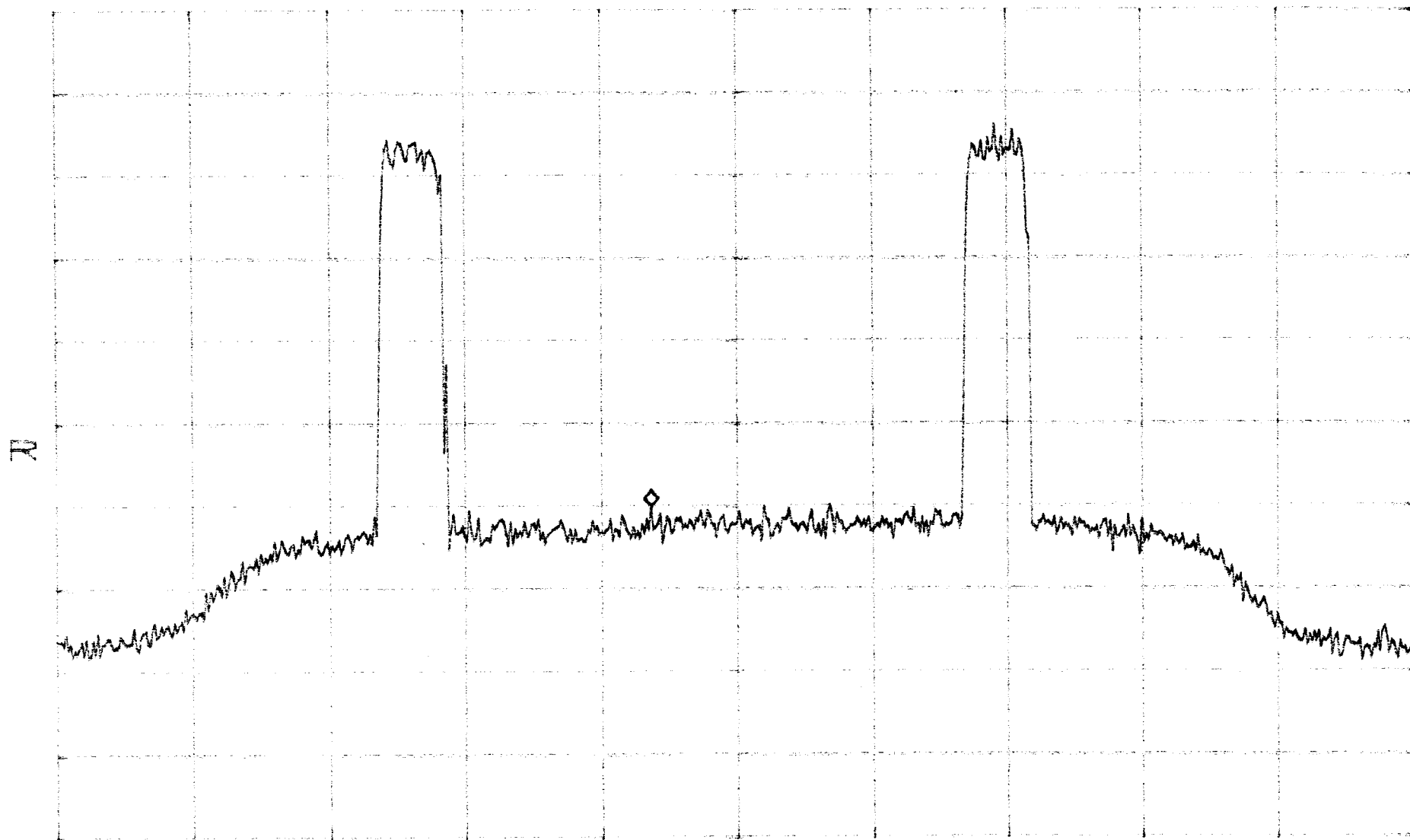
CDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -19.70dBm
857.10MHz



CENTER 859.00MHz
*RBW 10kHz VBW 10kHz

SPAN 30.00MHz
SWP 750ms

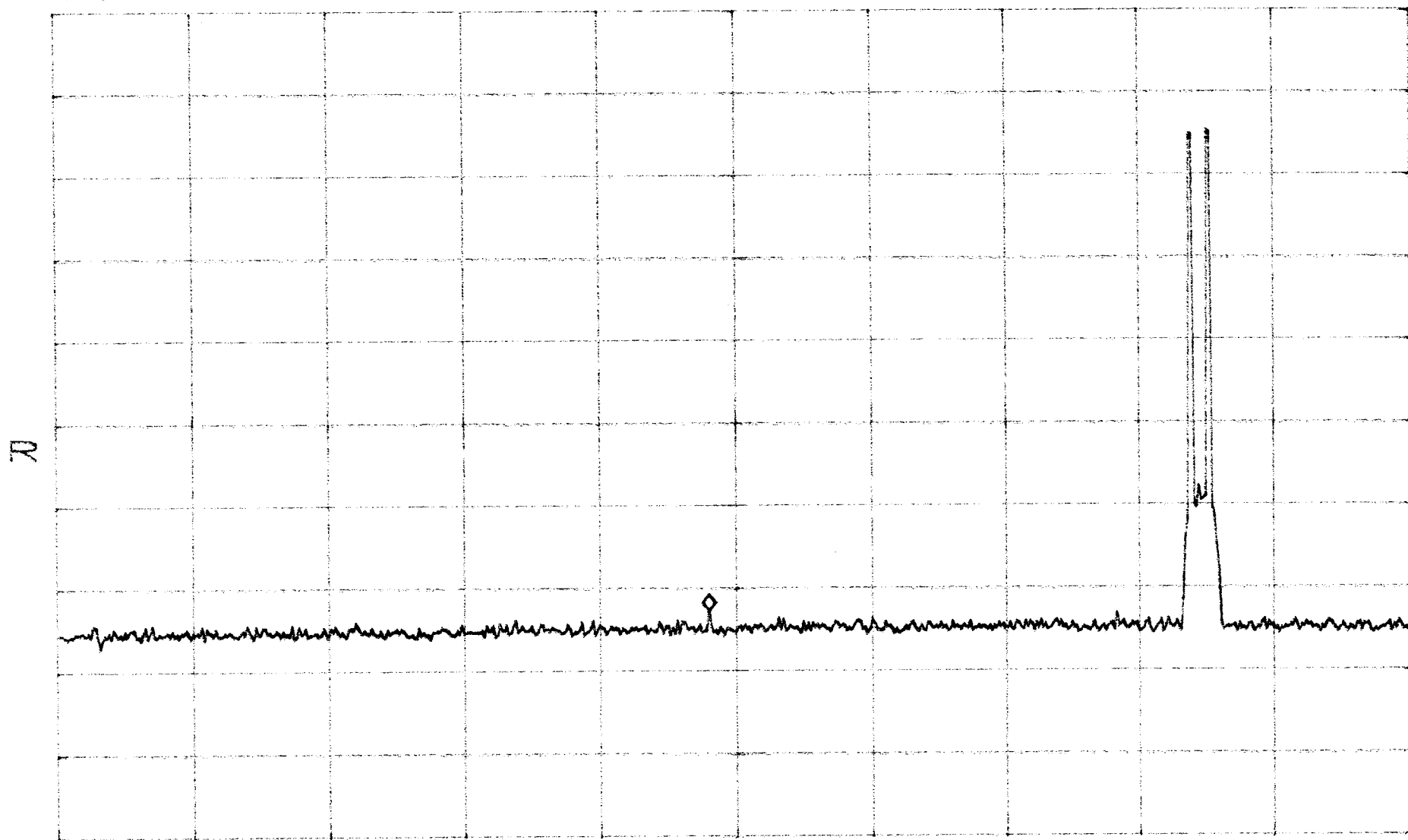
CDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -32.37dBm
495.6MHz



START 30.0MHz

STOP 1.0000GHz

*RBW 10kHz

VBW 10kHz

SWP 25sec

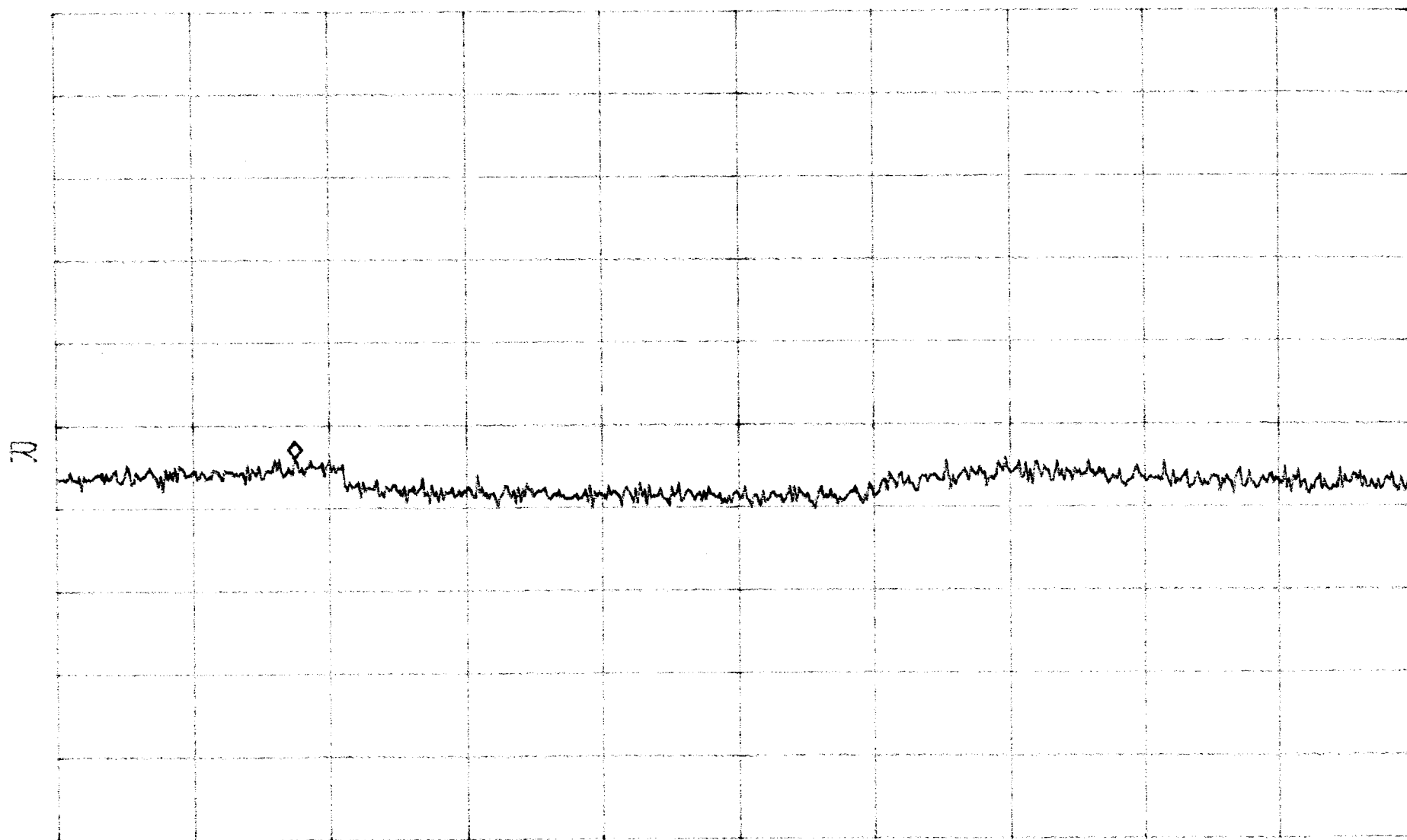
CDMA Intermod
apart

FCC ID: F8I-DVLRCSMR

*ATTEN 10dB
RL 40.3dBm

10dB/

MKR -13.53dBm
2.575GHz



START 1.0000GHz STOP 10.0000GHz
*RBW 1.0MHz VBW 1.0MHz SWP 180ms

Test Equipment List

Table 1 Test Equipment

Equipment	MFG/Model	ADC Serial Number	Calibration Due. (NIST)
Signal Generator	Agilent/E4436B	988616	Mar 03
Signal Generator	HP/E4432B	MC22109	June 02
Signal Generator	HP/8648B	MC24820	Feb 02
Signal Generator	HP/8648B	MC21669	Feb 02
Signal Generator	HP/8648B	MC21694	Feb 02
Signal Generator	HP/E4432B	MC27657	Sept 01
Combiner 5 pieces	ADC/Cavity	0002	CNR
Attenuator	Huber+Suhner/ 6810.17.A	-	CNR
Variable Attenuator	Trilithic/BMA-580	N/A	CNR
Spectrum Analyzer	HP/HP8563E	MC27690	Apr 02
Spectrum Analyzer	HP/HP8594E	MC27984	Feb 02
Power Meter	Rohde+Schwarz	MC21671	Aug 01
Variable Auto Transformer	Staco/1520CT	N/A	CNR
Multimeter	Fluke/75III	MC37971	Jan 02
Freq. Counter	HP/5347A	MC27569	May 02
Temperature Chamber	Despatch/Ecosphere	MC21679	Aug 01
DC Power Supply	HP 6633A	MC 21690	Mar 02
Power Attenuator	Pasternack/PE7019-20	NA	CNR

Note: Any equipment used in testing that has a Calibration Not Required (CNR) listing is verified and compensated for with NIST traceable calibrated equipment.

Test Equipment List

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2543	ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	4-04-02
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	9-21-01
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	10-20-01
■ -	2865	11867A	Hewlett-Packard	Limiter	01972	3-21-02
■ -	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	11-16-01
■ -	2678	85662A	Hewlett-Packard	Analyzer Display (Unit F)	2403A08134	11-16-01
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit F)	2521A01006	11-24-01
■ -	2396	2520	Wavetek	Signal Generator	6271013	3-13-02
■ -	2478	AWT-18037	Avantek	Preamplifier 8-18 GHz	1001-9226	3-21-02
■ -	2477	AFT-8434	Avantek	Preamplifier 4-8 GHz	2613A92801	3-21-02
■ -		UHAP-10dB	Schwarzbeck	Dipole Antenna 300-1000	164	N/A

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

Form

EMC Test Plan and Constructional Data Form



PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.

Applicant -- NOTE: This information will be input into your test report as shown below.
Press the F1 key at any time to get HELP for the current field selected.

Company: ADC Inc.

Address: P.O. Box 1101
Minneapolis, MN 55440-1101

Contact: Bert Hallaway Position: RF Technician

Phone: 952 233-6380 Fax: 952 233-6388

E-mail Address: bert_hallaway@adc.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description Transports RF between a remote antenna and a customer provided base station.

EUT Name Digivance Long Range Coverage Solution (SMR) System

Model No.: DGVI-202XXXXSYS Serial No.: FCC1

Product Options: Receive Diversity

Configurations to be tested: Full SMR Version with Diversity option

Test Objective

☐ EMC Directive 89/336/EEC (EMC)	☒ FCC: Class ☐ A ☐ B Part <u>90</u>
Std: _____	☐ VCCI: Class ☐ A ☐ B
☐ Machinery Directive 89/392/EEC (EMC)	☐ BCIQ: Class ☐ A ☐ B
Std: _____	☐ Canada: Class ☐ A ☐ B
☐ Medical Device Directive 93/42/EEC (EMC)	☐ Australia: Class ☐ A ☐ B
Std: _____	☐ Other: _____
☐ Vehicle Directive 72/245/EEC (EMC)	
Std: _____	
☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)	

TÜV Product Service Certification Requested

☐ Attestation of Conformity (AoC)	☐ International EMC Mark (IEM)
☐ Certificate of Conformity (CoC)	☐ Compliance Document
Protection Class (N/A for vehicles)	☐ Class I ☐ Class II ☐ Class III

(Press **F1** when field is selected to show additional information on Protection Class.)

Form**EMC Test Plan and Constructional Data Form****Attendance**

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

Failure - Complete this section if testing will not be attended by the customer.

If a failure occurs, TUV Product Service should:

- ☐ Call contact listed above, if not available then stop testing. (After hrs phone): _____
- ☐ Continue testing to complete test series.
- ☐ Continue testing to define corrective action.
- ☐ Stop testing.

EUT Specifications and Requirements

Length: 19 Width: 51" Height: 27 Weight: 62 LB

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 115 VAC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: 1

Current (Amps/phase(max)): 2.5 Current (Amps/phase(nominal)): 1.5

Other _____

Other Special Requirements

none

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Host indoor only with STM and LPA indoor or outdoor. System is typically employed as a Microcell.

EUT Power Cable

☐ Permanent OR ☒ Removable Length (in meters): 1

☐ Shielded OR ☒ Unshielded

☐ Not Applicable

Form

EMC Test Plan and Constructional Data Form



EUT Interface Ports and Cables

Interface			Shielding							
Type	Analog ☐ Digital ☐	Qty	Yes ☐ No ☐	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable ☐ Permanent ☐	
EXAMPLE:										
RS232	☐ ☒	2	☒ ☐	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	☒ ☐	
RF "N" type	☒ ☐	4	☒ ☐	Braid	Coaxial	N	50 Ohms	>3	☒ ☐	
Alarm	☒ ☐	1	☐ ☒	Not Specified	N/A	6 Pin Standoff		>3	☒ ☐	
Alarm	☒ ☐	1	☐ ☒	Not Specified	N/A	4 Pin Standoff		>3	☒ ☐	
Fiber	☐ ☒	3	☐ ☒	N/A	N/A	SC	N/A	>3	☒ ☐	
9 Pin Din	☐ ☒	2	☒ ☐	Not Specified	AC Coupled	Din		>3	☒ ☐	
Net in	☐ ☒	1	☐ ☒	Not Specified	N/A	Cat 5		>3	☒ ☐	
Battery connection	☒ ☐	1	☐ ☒	N/A	N/A	Standoff		<1	☒ ☐	
DC power block	☒ ☐	1	☐ ☒	None		Terminal		>3	☒ ☐	
AC power	☒ ☐	1	☐ ☒	None				<3	☒ ☐	
STM to Amp Interconnect	☒ ☒	1	☒ ☒	Varied	Chassis	Special		.3	☒ ☐	
Net out	☐ ☒	1	☐ ☒	Not Specified	N/A	Cat 5		>3	☒ ☐	
	☐ ☐		☐ ☐						☐ ☐	

Form

EMC Test Plan and Constructional Data Form



EUT Software.

Revision Level: Version 0.00.00.07

Description: Digivance Element Management System (DEMS). System Management and Interface Matching Software.

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

- 1. Max composite in and out
- 2.
- 3.

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
Host Unit	DGVI-202XXXHU	FCC1	
STM	DGVI-202XXXSTM	FCC1	
Amp	DGVI-202XXXLPA	FCC1	
Digivance LRCS SMR System Model DGVI-202XXXSYS consist of the HU, STM, and LPA.			

Form

EMC Test Plan and Constructional Data Form



Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
Signal Generator	HP E4432B	MC22109	
DC Power Supply	HP 6633A	MC21690	

Oscillator Frequencies

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>

Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
ADC			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>
None		

Form

EMC Test Plan and Constructional Data Form



Critical EMI Components (Capacitors, ferrites, etc.)				
Description	Manufacturer	Part # or Value	Qty	Component # / Location
None				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

none

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures

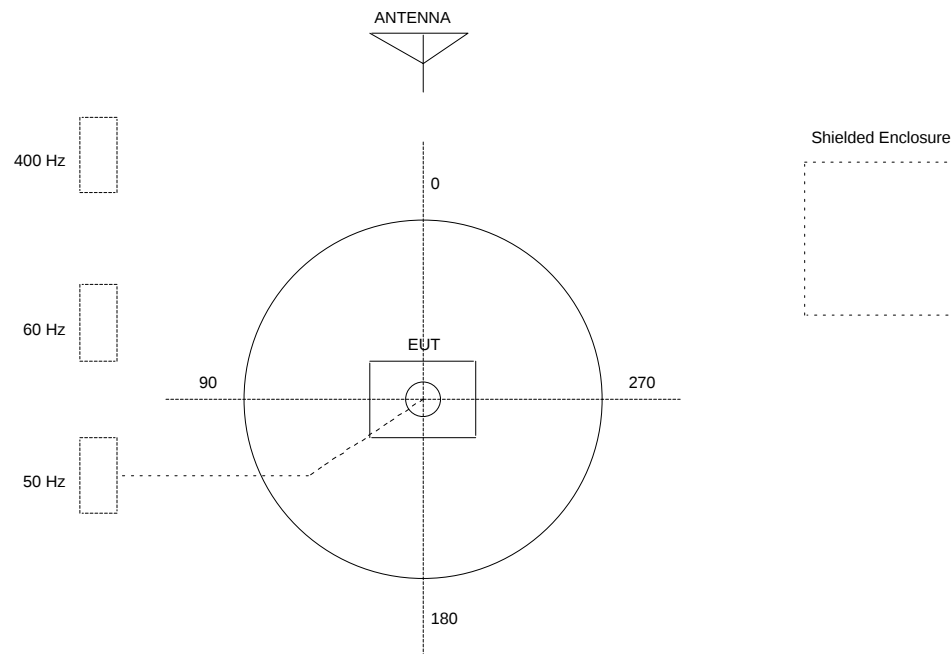
Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date
Reviewed by TÜV Product Service Associate	Date

TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)			FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)			DELTA1 FCC
60.80	42.5Qp	+	1.2	+ 10.9 - 25.5 =	29.1	V	1.0	0.0	-10.9

SUBSTITUTION ANTENNA

The substitution antenna is used to replace the EUT for tests in which a transmitting parameter(i.e. frequency error, effective radiated power, spurious emissions and adjacent channel power) is being measured. The substitution antenna is connected to a calibrated signal generator. The frequency of the calibrated signal generator is set to the frequency of the emission component detected. The test antenna is raised and lowered through the specified range of height to ensure the maximum signal is received. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the emission component was measured, corrected for any change of input attenuator setting of the measuring receiver. The input level to the substitution antenna is recorded as power level, corrected for any change of input attenuator setting of the measuring receiver.