

MEASUREMENT AND TECHNICAL REPORT

OMRON ASO COMPANY, LTD.
4429 Miyaji, Ichinomiya-Machi
Aso-gun, Kumamoto-Pref.
869-2696 JAPAN

DATE: 17 August 2000

This Report Concerns:	<input type="checkbox"/> Original Grant: X	<input type="checkbox"/> Class II Change:
Equipment Type:	DeviceNet Wireless Unit, Model WD30	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	<input type="checkbox"/> Yes: Defer until:	<input type="checkbox"/> No: X
<i>Company Name agrees to notify the Commission by:</i> <input type="checkbox"/> 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?	<input type="checkbox"/> Yes:	<input type="checkbox"/> *No:
(* <i>FCC Part 15, Paragraphs 15.109(a) and 15.247(a);(b)(1);(c);(e)</i>)		
<i>Report Prepared by:</i>	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	3
1.1 Product Description	3
1.2 Related Submittal Grant	5
1.3 Tested System Details	5
1.4 Test Methodology	5
1.5 Test Facility	5
2 SYSTEM TEST CONFIGURATION	6
2.1 Justification	6
2.2 EUT Exercise Software	6
2.3 Special Accessories	6
2.4 Equipment Modifications	6
2.5 Configuration of Tested System	6
3 RADIATED EMISSION EQUIPMENT/DATA	7
Field Strength Calculation	13
4 CONDUCTED EMISSION EQUIPMENT/DATA	14
5 PROCESSING GAIN (customer provided) EQUIPMENT/DATA	30
6 Signature page	33

1 GENERAL INFORMATION

EUT Description Wireless LAN Unit

EUT Name DeviceNet Wireless Unit

Model No.: WD30 Serial No.: _____

Product Options: N/A

Configurations to be tested: Full operation mode

Power Requirements

Voltage: 11VDC-
25VDC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: N/A

Current (Amps/phase(max)): 220mA Current (Amps/phase(nominal)): _____

Other N/A

Other Special Requirements

EUT needs to be supplied with power from separate power supply

Typical Installation and/or Operating Environment

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

Industrial/Factory

EUT Power Cable

Permanent OR Removable Length (in meters): 1m
 Shielded OR Unshielded
 Not Applicable

EUT Interface Ports and Cables

Interface		Shielding				Type	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
Type	Analogs	Digital	Qty	Yes	No						
Power cable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5 wires		micro connector	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

EUT Operating Modes to be Tested

1. Transmitting/Receiving mode =full communication

Oscillator Frequencies

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
16MHz	16MHz	OSC111	System Clock
13.2MHz	480MHz	RF001	IF Local Oscillator
13.2MHz	2160MHz-2243.5MHz	RF001	RF Local Oscillator

Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
DC Power Supply by EMC lab			<input type="checkbox"/> Switched-mode: (Frequency) <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

EUT System Components

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
Master Unit	WD30-M		FCC O4R WD30
Slave Unit	WD30-S		FCC O4R WD30

1.2 Related Submittal/Grant

None

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

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

Test Performed: 1. Conducted Emissions, FCC Part 15, Paragraphs 15.247(a);(b)(1);(c)
 2. Radiated Emissions EN55022: 1992 Class B limit, 30 - 1,000 MHz, 10 meters
 3. Radiated Emission per FCC Part 15, Paragraph 109(a), 15.247(c)
 4. Engineering evaluations
 5. Frequency Stability, Part 2, Paragraph 2.995, and Part 87, Paragraph 87.133
 6. RF Output Power, Part 2, Paragraph 2.985, Part 22, Paragraph 22.917
 7. Processing Gain, Part 15, Paragraph 15.247(e)

Both Conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8 - M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 10 GHz).

1.5 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. SYSTEM TEST CONFIGURATION

2.1 Justification

The **DeviceNet Wireless Unit, Model WD30** was initially tested for FCC emission in the following configuration:

See Block Diagram.

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Modification

None

2.5 Configuration of Tested System

See Block Diagram.

3 RADIATED EMISSION EQUIPMENT/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).

See test setup photos for radiated emissions test setup.

Emissions Test Conditions: RADIATED EMISSIONS, FCC Part 15, Paragraph 15.247(c)

The *RADIATED EMISSIONS* measurements were performed at the following test location :

- Test not applicable

- Roof (Small Open Area Test Site)

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.	Cal Date
3115	251	Antenna, Double Ridge Guide	EMCO	9412-4363	10/00
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	10/00
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	10/00
AMP-5D-010180-35-10P	719	Pre-Amplifier (40 dB gain), 1 - 18 GHz	Miteq, Inc.	549460	04/00
AA-190	655, 728, 733	HF cables	Micropore	--	*

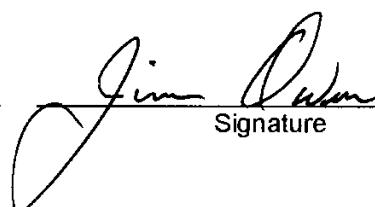
Remarks: (*) Verified internally

Shield over antenna connectors; limit to channel 34 use (see data record 3).

Radiated Electromagnetic Emissions

Test Report #:	S0296 Run 2		Test Area:	Site 3 Roof HF 728/733		Temperature:	23	°C
Test Method:	FCC Part 15, 15.241(c)		Test Date:	19-Jul-2000		Relative Humidity:	45	%
EUT Model #:	WD30-M/S		EUT Power:	24 Vdc		Air Pressure:	100.1	kPa
EUT Serial #:	NA					Page:	1 of 2	
Manufacturer:	OMRON					Level Key		
EUT Description:	Continuous Transmit (WD30-M)					Pk – Peak	Nb – Narrow Band	
Notes:	Transmit/receive set to channel 1					Qp – QuasiPeak	Bb – Broad Band	
On frequencies above 1 GHz, when the peak measured data was below the average limit, no average measurement was performed.								
FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBVm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC 15.209 (>1 GHz)	DELTA2 (dB) FCC Part 15.209(> 1GHz)		
2401.00	57.5 Pk	4.9 / 30.3 / -1.4	94.0	V / 1.5 / 296.0	N/A	40.0 *		
Antenna: Horn PN:251 3 meters								
PreAmp: 38 dB Preamp								
Attenuator: PN:655 10 ft								
Ambient measurements								
3331.00	27.0 Pk	6.3 / 32.2 / 38.7	26.8	V / 1.5 / 296.0	N/A	-27.2		
7195.30	25.6 Pk	8.5 / 37.5 / 35.5	36.2	V / 1.5 / 296.0	N/A	-17.8		
2nd harmonic measurement in restricted band								
4802.00	54.0 Pk	7.4 / 34.5 / 39.7	56.2	V / 1.5 / 296.0	N/A	2.2 *		
4802.00	47.8 Av	7.4 / 34.5 / 39.7	50.0	V / 1.5 / 296.0	N/A	-4.0		

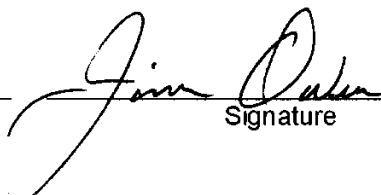
Tested by: _____
J Owen
Printed


Signature

Radiated Electromagnetic Emissions

Test Report #:	S0296 Run 03		Test Area:	Site 3 Roof HF 728/733		Temperature:	23	°C
Test Method:	FCC Part 15, 15.247(c)		Test Date:	19-Jul-2000		Relative Humidity:	45	%
EUT Model #:	WD30-M/S		EUT Power:	24 Vdc		Air Pressure:	100.1	kPa
EUT Serial #:	NA					Page:	1 of 2	
Manufacturer:	OMRON					Level Key		
EUT Description:	Continuous Transmit (WD30-M)					Pk – Peak	Nb – Narrow Band	
Notes:	Transmit/receive set to channel 18					Qp – QuasiPeak	Bb – Broad Band	
On frequencies above 1 GHz, when the peak measured data was below the average limit, no average measurement was performed.								
FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB)	FINAL (dB/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC 15.209 (<1 GHz)	DELTA2 (dB) FCC 15.209 (> 1GHz)		
Part 15.205 measurements using 1 MHz/1 MHz RBW/VBW for Pk and 1 MHz/10 Hz for avg								
Antenna: Horn PN:251 3 meters								
PreAmp: 38 dB Preamp								
Attenuator: PN:655 10 ft								
Ambient								
2491.73	42.3 Pk	5.0 / 30.6 / 39.0	38.9	V / 1.0 / 0.0	N/A	-15.1		
2772.00	41.3 Pk	5.4 / 31.0 / 38.9	38.8	V / 1.0 / 0.0	N/A	-15.2		
3263.50	41.3 Pk	6.2 / 32.0 / 38.7	40.8	V / 1.0 / 0.0	N/A	-13.2		
3335.50	42.4 Pk	6.3 / 32.2 / 38.7	42.2	V / 1.0 / 0.0	N/A	-11.8		
3351.90	42.4 Pk	6.4 / 32.2 / 38.7	42.3	V / 1.0 / 0.0	N/A	-11.7		
3999.20	37.6 Pk	7.2 / 34.5 / 39.8	39.5	V / 1.0 / 0.0	N/A	-14.5		
4824.40	38.5 Pk	7.4 / 34.6 / 39.7	40.7	V / 1.0 / 0.0	N/A	-13.3		
Fundamental Transmit Frequency Measurement using 30 kHz/30 kHz RBW/VBW average w/ 17 dB offset								
2441.80	51.7 Pk	4.9 / 30.4 / 0.0	87.0	V / 1.0 / 0.0	N/A	33.0 *		

Tested by: J Owen
Printed


Signature

10

Radiated Electromagnetic Emissions

Test Report #:	S0296 Run 04	Test Area:	Site 3 Roof HF 728/733		Temperature:	23	°C
Test Method:	FCC Part 15 15.247(c)	Test Date:	19-Jul-2000		Relative Humidity:	45	%
EUT Model #:	WD30-M/S	EUT Power:	24 Vdc		Air Pressure:	100.1	kPa
EUT Serial #:	NA						Page: 1 of 2
Manufacturer:	OMRON						Level Key
EUT Description:	Continuous Transmit (WD30-M)					Pk – Peak	Nb – Narrow Band
Notes:	Transmit/receive set to channel 34 <i>Shield down antenna connection; limit to channel 34</i>					Qp – QuasiPeak	Bb – Broad Band
						Av - Average	

On frequencies above 1 GHz, when the peak measured data was below the average limit, no average measurement was performed.

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 15.209 (<1GHz)	DELTA2 (dB) FCC Part 15.209 (> 1GHz)
Part 15.205 measurements using 1 MHz/1 MHz RBW/VBW for Pk and 1 MHz/10 Hz for avg						
Antenna: Horn PN:251 3 meters						
PreAmp: 38 dB Preamp						
Attenuator: PN:655 10 ft						
4960.18	51.6 Pk	7.4 / 35.0 / 39.7	54.3	V / 1.5 / 289.0	N/A	0.3
4960.18	46.2 Av	7.4 / 35.0 / 39.7	48.9	V / 1.5 / 289.0	N/A	-5.1
2242.62	57.2 Pk	4.6 / 29.7 / 39.1	52.4	V / 1.5 / 289.0	N/A	-1.6
2242.62	55.9 Av	4.6 / 29.7 / 39.1	51.1	V / 1.5 / 289.0	N/A	-2.9
2337.50	49.1 Pk	4.8 / 30.0 / 39.1	44.9	V / 1.5 / 289.0	N/A	-9.1
2483.55	47.3 Av	5.0 / 30.5 / 39.0	43.8	V / 1.5 / 289.0	N/A	-10.2
Band Edge Measurement						
PreAmp: None						
Attenuator: None						
2480.10	48.5 Pk	5.0 / 30.5 / 0.0	84.0	V / 1.5 / 289.0	N/A	N/A

Tested by: J Owen
Printed


Signature

11

Radiated Electromagnetic Emissions

Test Report #:	S0296 Run 06	Test Area:	Site 3 Roof	Temperature:	23	°C
Test Method:	FCC Part 15.109 (a)	Test Date:	19-Jul-2000	Relative Humidity:	45	%
EUT Model #:	WD30-S	EUT Power:	24 Vdc	Air Pressure:	100.1	kPa
EUT Serial #:	NA	Page: 1 of 2				
Manufacturer:	OMRON	Level Key				
EUT Description:	Continuous Receive (WD30-S)					Pk – Peak Nb – Narrow Band
Notes:	All emission levels ambient – no detectable emissions from EUT					Qp – QuasiPeak Bb – Broad Band
3 meters - 100 kHz RBW/VBW - Micropore cable PN: 728/733						

On frequencies above 1 GHz, when the peak measured data was below the average limit, no average measurement was performed.

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC B (< 1GHz)	DELTA2 (dB) FCC A (<1GHz) 3 me
Antenna: Bicon PN:491						
PreAmp: ZFL-1000LN PN: 666						
30.00	21.9 Pk	0.4 / 20.2 / 19.9	22.7	V / 1.0 / 0.0	-17.3	-26.4
60.60	21.2 Pk	0.6 / 10.3 / 19.9	12.2	V / 1.0 / 0.0	-27.8	-36.9
116.40	28.6 Pk	0.8 / 12.5 / 19.8	22.1	V / 1.0 / 0.0	-21.4	-31.4
206.40	23.4 Pk	1.1 / 17.6 / 19.9	22.2	V / 1.0 / 0.0	-21.3	-31.3
246.50	19.1 Pk	1.2 / 19.0 / 19.9	19.5	V / 1.0 / 0.0	-26.5	-36.9
Antenna: LPA PN:244						
PreAmp: None						
386.60	18.2 Pk	1.5 / 16.5 / 0.0	36.2	V / 1.0 / 0.0	-9.8	-20.2
496.50	17.9 Pk	1.7 / 18.2 / 0.0	37.9	V / 1.0 / 0.0	-8.1	-18.5

Tested by:

J Owen

Printed

Signature

12

Field Strength Calculation

If a preamplifier was used during the Radiated Emission Testing, it is required that the amplifier gain must be subtracted from the Spectrum Analyzer (Meter) Reading. In addition, a correction factor for the antenna , cable used and a distance factor, if any, must be applied to the Meter Reading before a true field strength reading can be obtained. In the automatic measurement, these considerations are automatically presented as a part of the print out. In the case of manual measurements and for greater efficiency and convenience, instead of using these correlation factors for each meter reading, the specification limit was modified to reflect these correlation factors at each frequency value so that the meter readings can be compared directly to the modified specification limit. This modified specification limit is referred to as the "Corrected Meter Reading Limit" or simply the CMRL, which is the actual field strength present at the antenna. The quantity can be derived in the following manner:

$$\text{Corrected Meter Reading Limit (CMRL)} = \text{SAR} + \text{AF} + \text{CL} - \text{AG} - \text{DC}$$

Where, SAR = Spectrum Analyzer Reading

AF = Antenna Factor

CL = Cable Loss

AG = Amplifier Gain (if any)

DC = Distance Correction (if any)

Assume the following situation: A meter reading of 29.4 dBuV was obtained from a Class A computing device measured at 83 MHz. Assume an antenna factor of 9.2 dB, a cable loss of 1.4 dB and amplifier gain of 20.0 dB at 83 MHz. The final field strength would be determined as follows:

$$\text{CMRL} = 29.4 \text{ dBuV} + 9.2 \text{ dB} = 1.4 \text{ dB} - 20 \text{ dB/M} - 0.0 \text{ dB}$$

$$\text{CMRL} = 20.0 \text{ dBuV/M}$$

This result is well below the FCC and CSA Class A limit of 29.5 dbuV/m at 83 MHz.

For the manual mode of measurement, a table of corrected meter reading limit was used to permit immediate comparison of the meter reading to determine if the measure emission amplitude exceeded the specification limit at that specific frequency.

4 CONDUCTED EMISSION EQUIPMENT/DATA

See following page(s).

Emissions Test Conditions: CONDUCTED EMISSIONS, FCC Part 15, Paragraph 15.247

The *RADIATED EMISSIONS* measurements were performed at the following test location :

- Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used :

Model #	Prop. #	Description	Manufacturer	Serial #	Cal Date
8491A	748	10 dB Attenuator	Hewlett Packard	--	*
AA-190-06.00.0	728	High Frequency Cable	United Microwave	--	*
8566B	720	Spectrum Analyzer	Hewlett Packard	211500842	03/01
8566B	721	Spectrum Analyzer Display	Hewlett Packard	2112A02185	03/01
437B	572	Power Meter	Hewlett Packard	3125U19308	03/01
8481A	554	Power Sensor	Hewlett Packard	1926A27807	09/00
8566B	720/721	Spectrym Analyzer/Display	Hewlett Packard	211500842 / 2112A02185	10/00

Remarks: (*) Verified internally

CLIENT: OMRON
TEST: 6 dB bandwidth
NOTE: Ant. Port 1

SPECIFICATION: Part 15.247(a)(2)
EUT: WD30.

DATE: 07/17/00

08: 19: 15 JUL 17, 2000

REF 10.0 dBm AT 10 dB PG -10.0 dB

PEAK

LOG

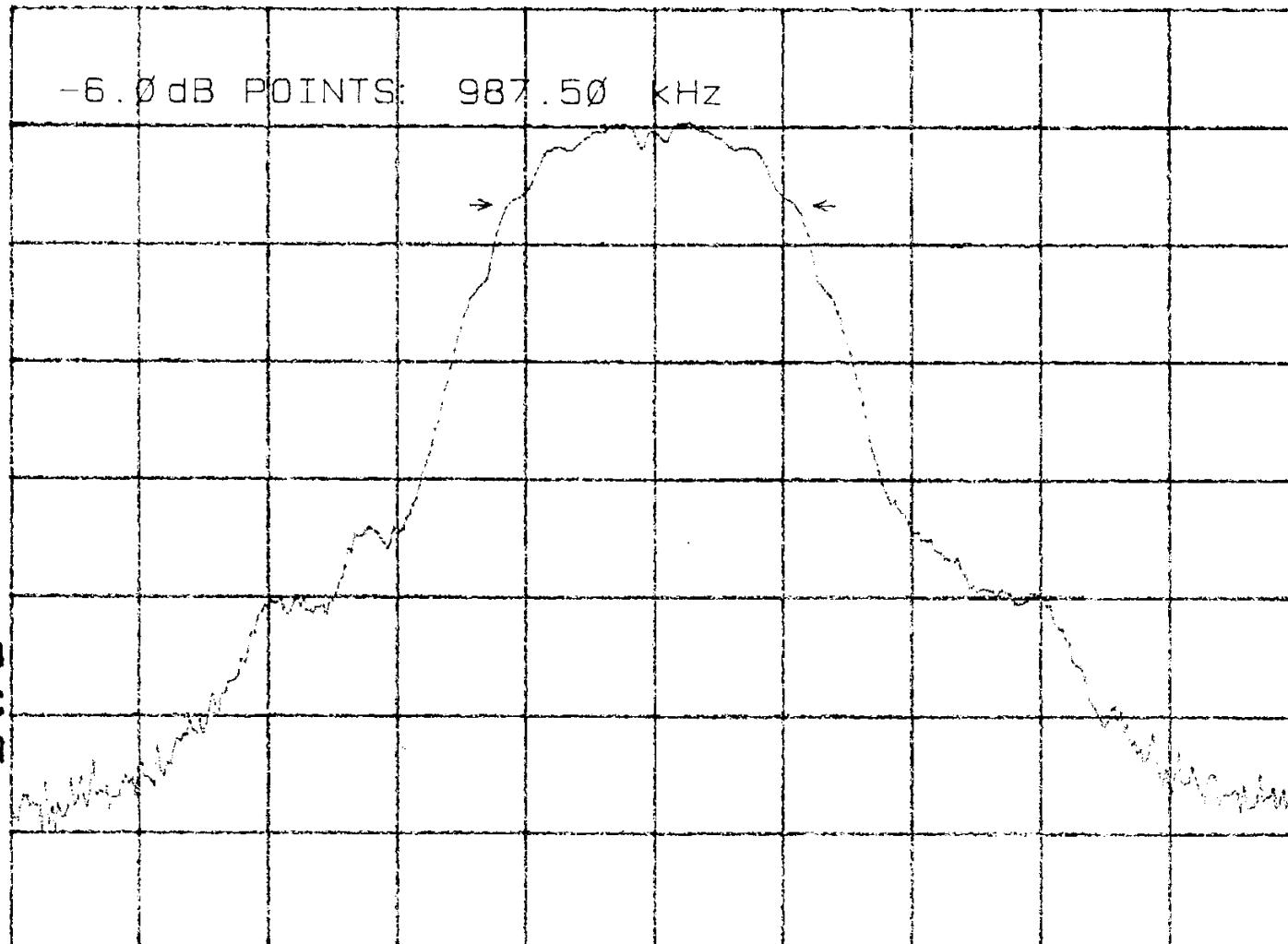
10

dB/

VA SB

SC FC

CORR



CENTER 2.441800 GHz

#RES BW 100 kHz

#VBW 300 kHz

SPAN 5.000 MHz

SWP 20.0 msec

error FCC 15.247(b)(1)
Chan. 1

18:07:45 AUG 10, 2000

1 watt = 30 dBm

10

MKR 2.40110 GHz

REF 10.0 dBm

AT 10 dB PG -10.0 dB

4.60 dBm

PEAK

LOG

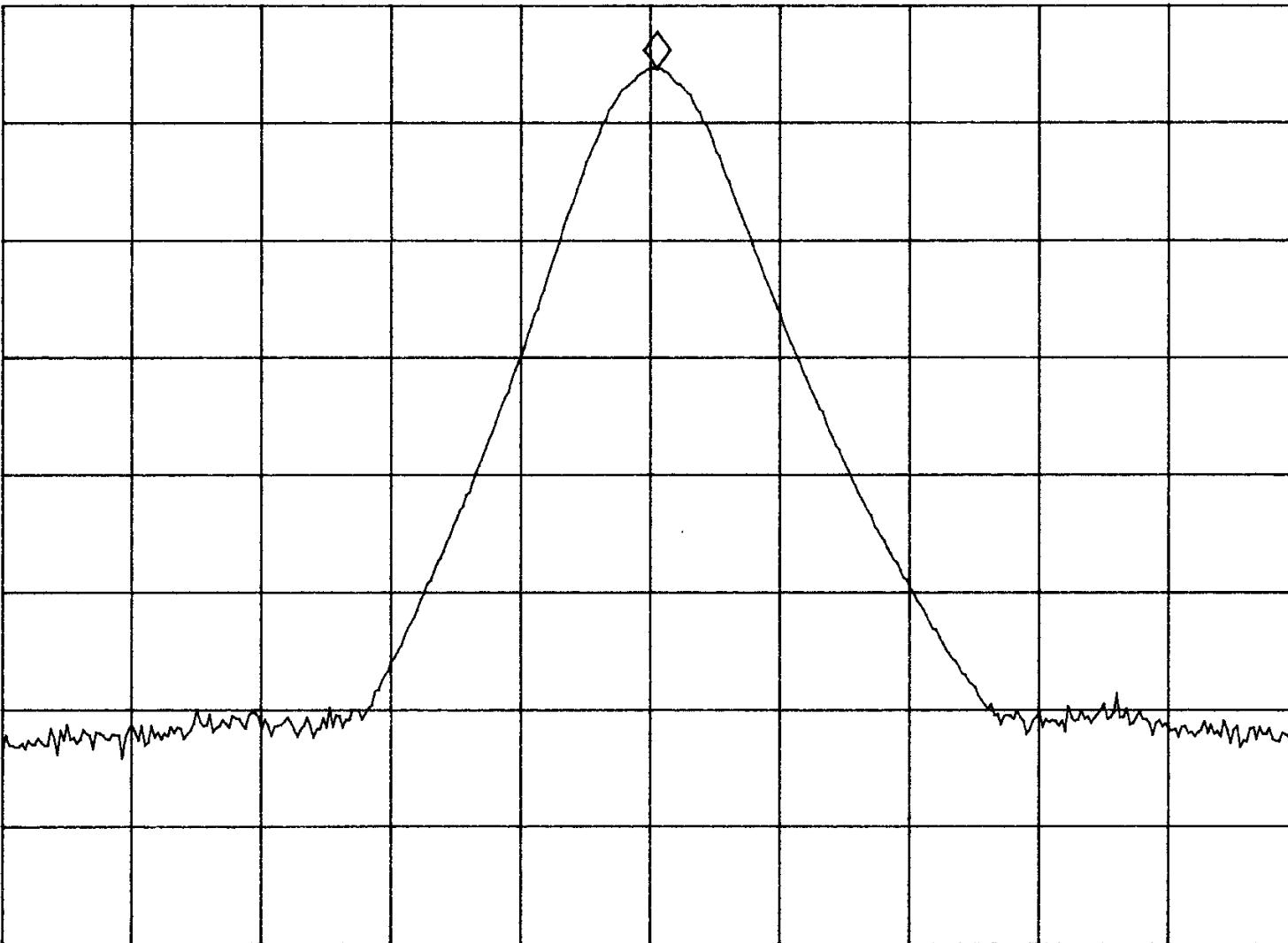
10

dB/

VA SB

SC FC

CORR



17

CENTER 2.40100 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 20.00 MHz

SWP 20.0 msec

Omron FCC 15.247(b)(1)
Chan. 18

1 watt = 30 dBm

18:05:14 AUG 10, 2000

MKR 2.44190 GHz

REF 10.0 dBm

AT 10 dB PG -10.0 dB

6.12 dBm

PEAK

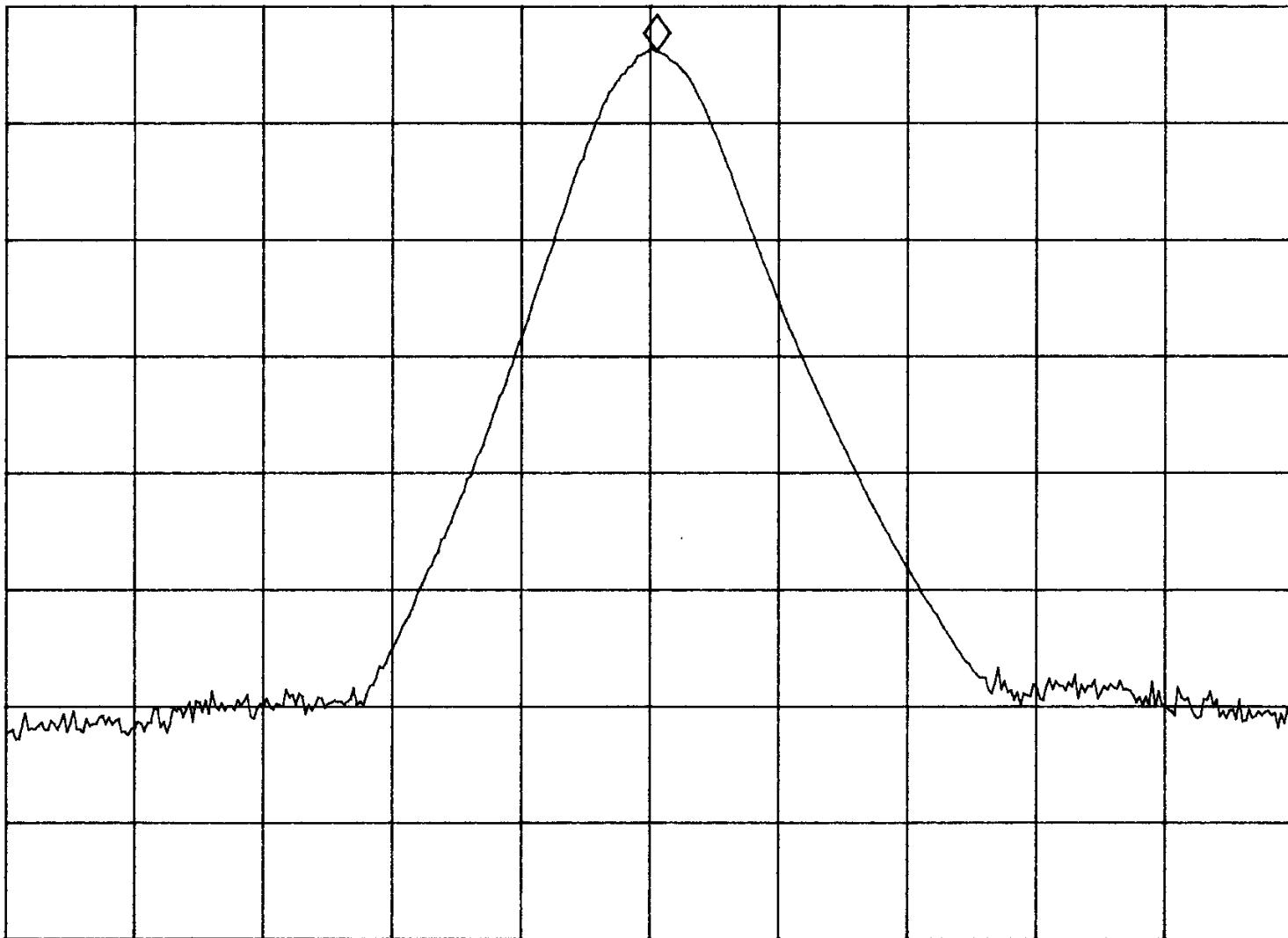
LOG

10
dB/

VA SB

SC FC

CORR



CENTER 2.44180 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 20.00 MHz

SWP 20.0 msec

(18)

Emerson FCC 15.241 (b) (1)

Chan. 34

1 watt = 30 dBm

17: 48: 06 AUG 10, 2000

HP

MKR 2.48025 GHz

REF 10.0 dBm

AT 10 dB PG -10.0 dB

7.40 dBm

PEAK

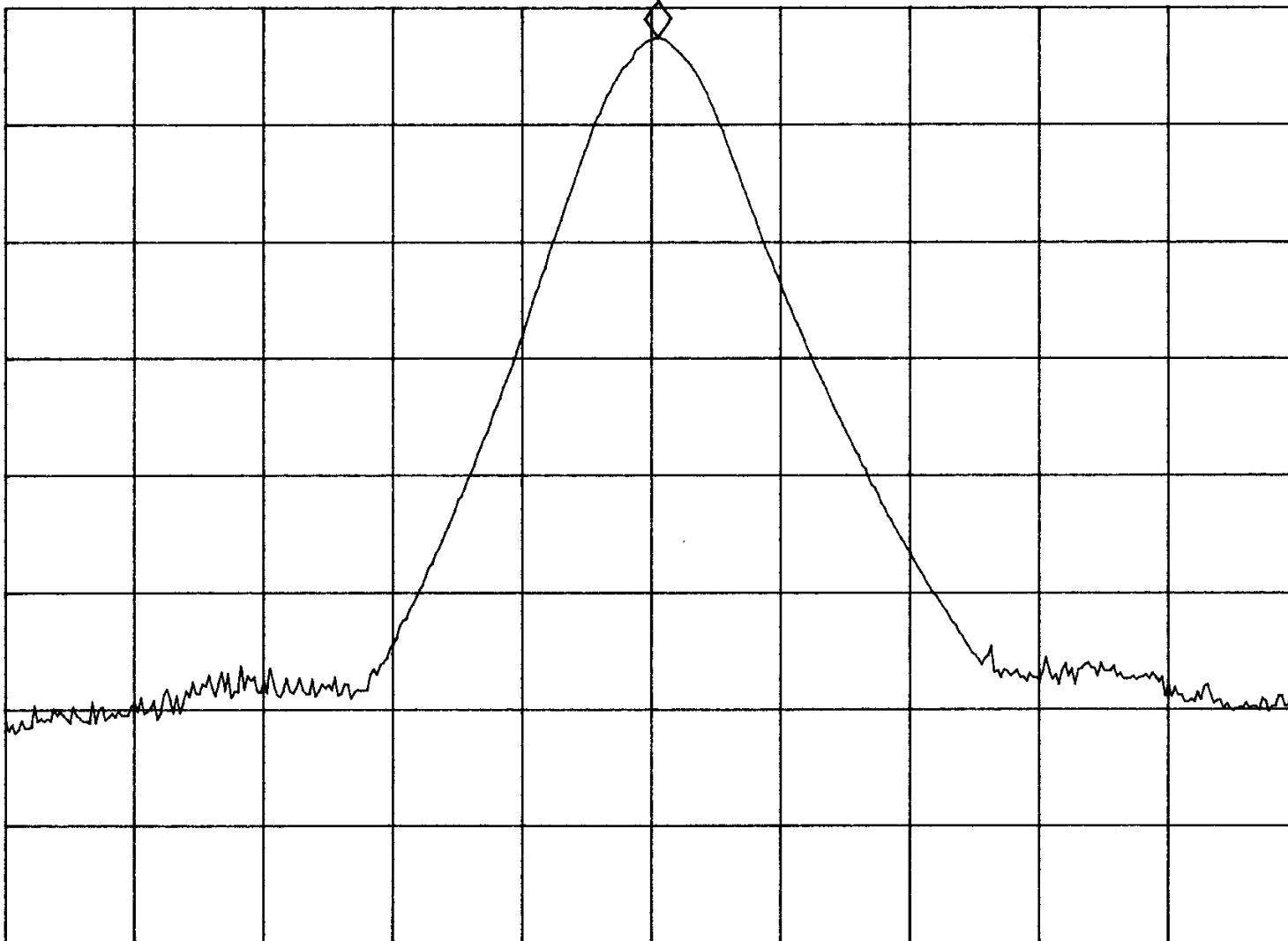
LOG

10
dB/

VA SB

SC FC

CORR



CENTER 2.48015 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

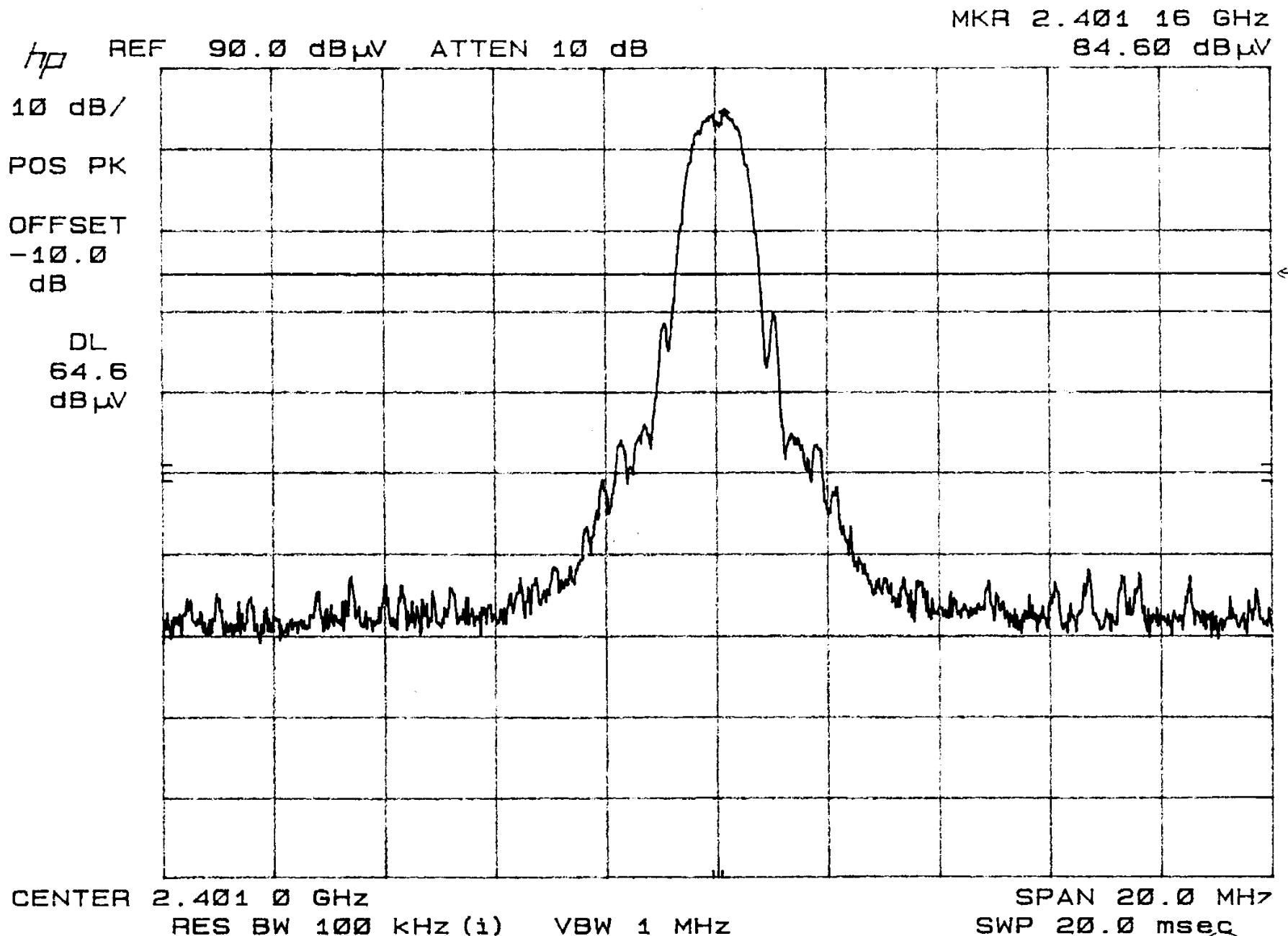
SPAN 20.00 MHz

SWP 20.0 msec

CLIENT: OMRON
TEST: Fundamental
NOTE: Ant. Port 1, Chan. 1

SPECIFICATION: Part 15.247(c)
EUT: WD30

DATE: 07/17/00



CLIENT: OMRON

SPECIFICATION: Part 15.247(c)

DATE: 07/17/00

EUT: WD30

NOTE: Ant. Port 1, Chan. 1, 30 - 2000 MHz

MKR 1.082 GHz

38.80 dB μ V

hp

REF 90.0 dB μ V ATTEN 10 dB

10 dB/

POS PK

OFFSET

-10.0
dB

DL
64.6
dB μ V

← 20dB

START 30 MHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 2.00 GHz

SWP 1.48 sec

(21)

CLIENT: OMRON

SPECIFICATION: Part 15.247(c)

DATE: 07/17/00

NOTE: Ant. Port 1, Chan. 1, 2 - 5 GHz

EUT: WD30

MKR 2.642 GHz

51.90 dB μ V

hp REF 90.0 dB μ V ATTEN 10 dB

10 dB/

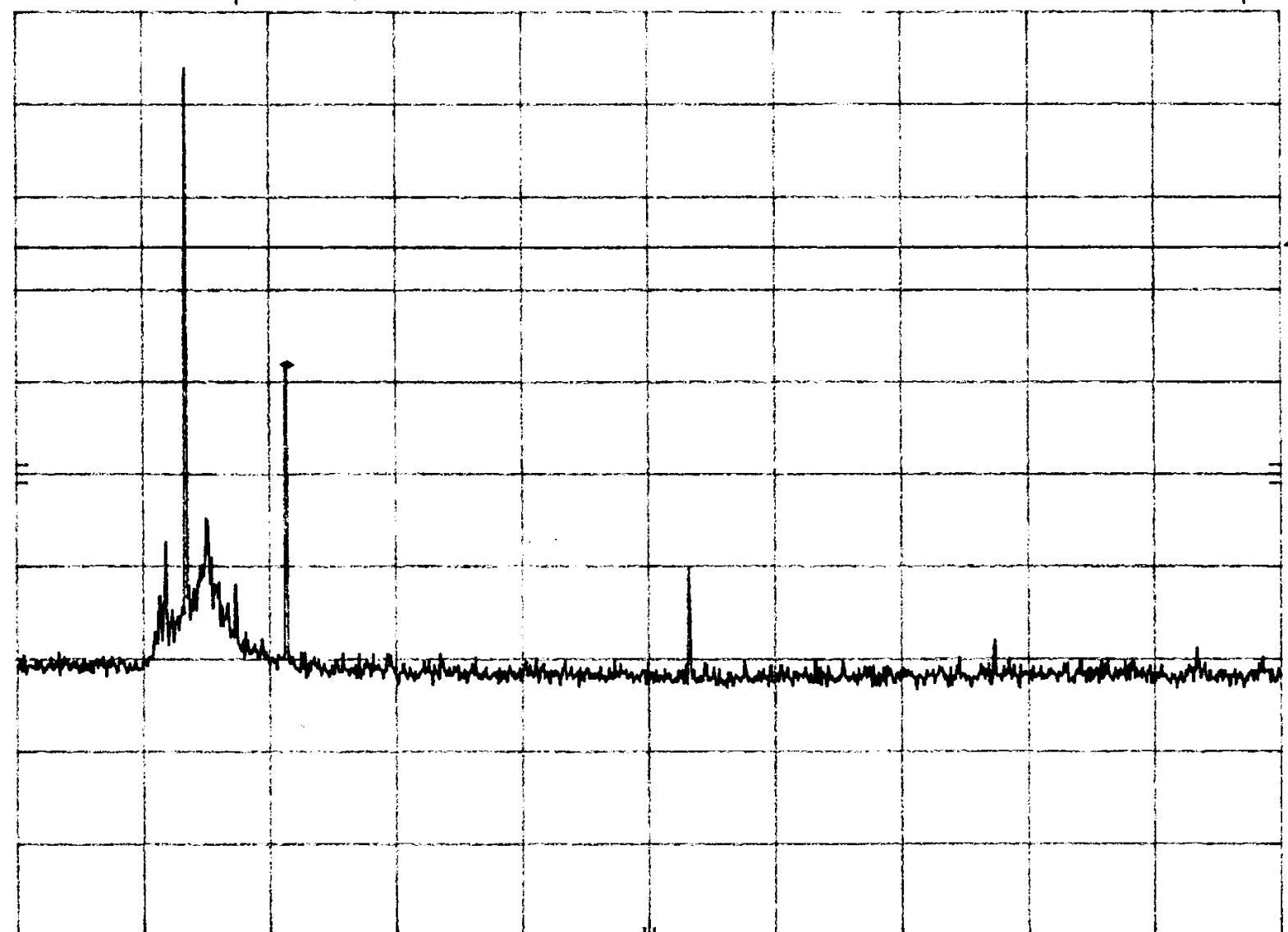
POS PK

OFFSET

-10.0
dB

DL
64.6
dB μ V

← 20dB



START 2.00 GHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 5.00 GHz

SWP 2.25 sec

22

CLIENT: OMRON

SPECIFICATION: Part 15.247(c)

DATE: 07/17/00

EUT: WD30

NOTE: Ant. Port 1, Chan. 1, 5 - 10 GHz

MKA 7.195 GHz

27.60 dB μ V

hp

REF 90.0 dB μ V ATTEN 10 dB

10 dB/

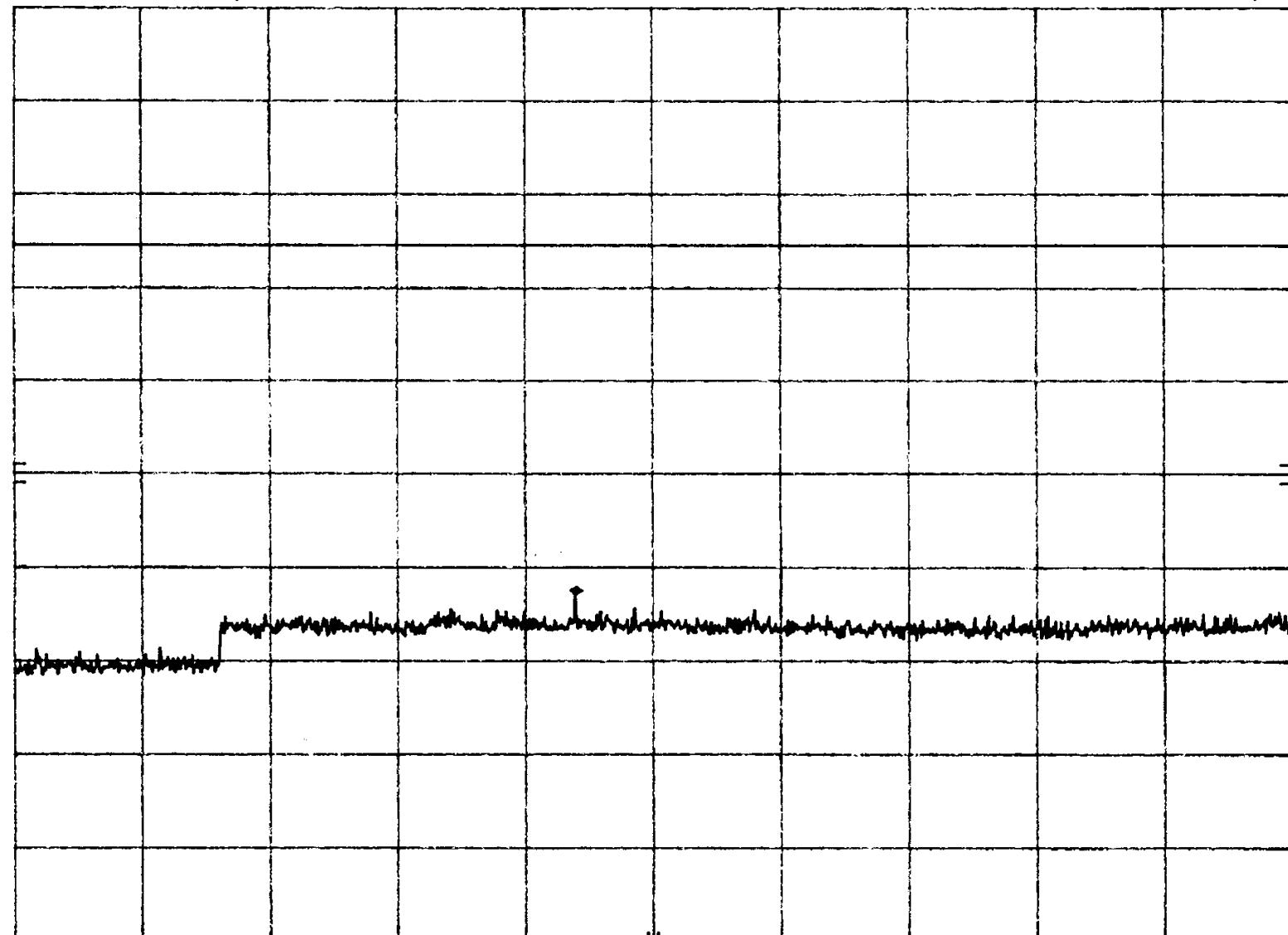
POS PK

OFFSET

-10.0
dB

DL

64.6
dB μ V



START 5.00 GHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 10.00 GHz

SWP 3.75 sec

23

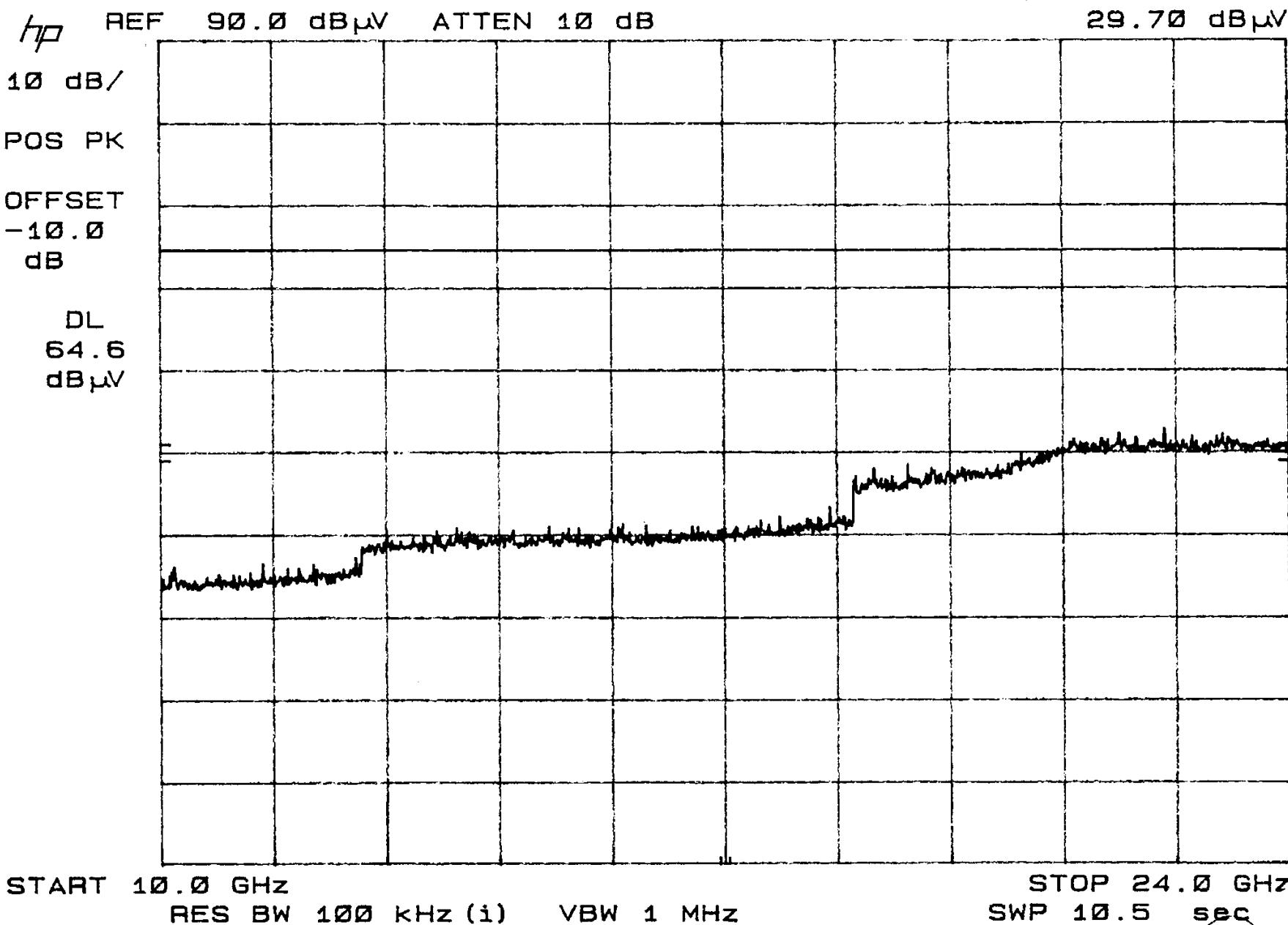
CLIENT: OMRON

SPECIFICATION: Part 15.247(c)

DATE: 07/17/00

EUT: WD30
NOTE: Ant. Port 1, Chan. 1, 10 - 24 GHz

MKR 16.15 GHz
29.70 dB μ V



24

CLIENT: OMRON

SPECIFICATION: Part 15.247(c)

DATE: 07/17/00

TEST: Fundamental

EUT: WD30

NOTE: Ant. Port 1, Chan. 18

MKR 2.441 94 GHz

85.80 dB μ VHP REF 90.0 dB μ V ATTEN 10 dB

10 dB/

POS PK

OFFSET

-10.0
dBDL
68.8
dB μ V

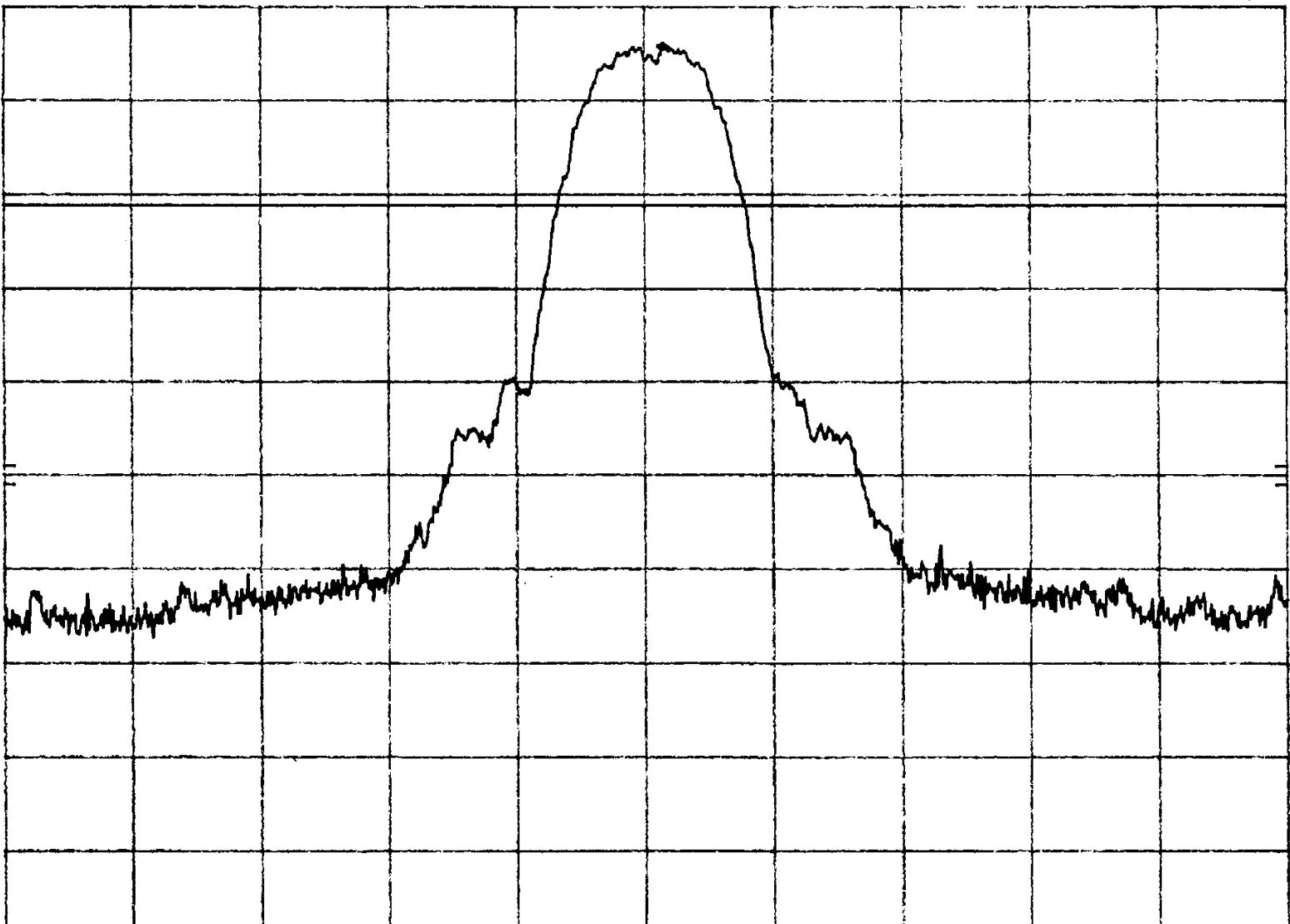
CENTER 2.441 8 GHz

RES BW 100 kHz (i)

VBW 1 MHz

SPAN 10.0 MHz

SWP 20.0 msec



← 200

25

CLIENT: OMRON
TEST: 30 - 2000 MHz
NOTE: Ant. Port 1 Chan. 18

SPECIFICATION: Part 15.247(c)
EUT: WD30

DATE: 07/17/00

MKA 1.102 GHz
38.30 dB μ V

HP REF 90.0 dB μ V ATTN 10 dB

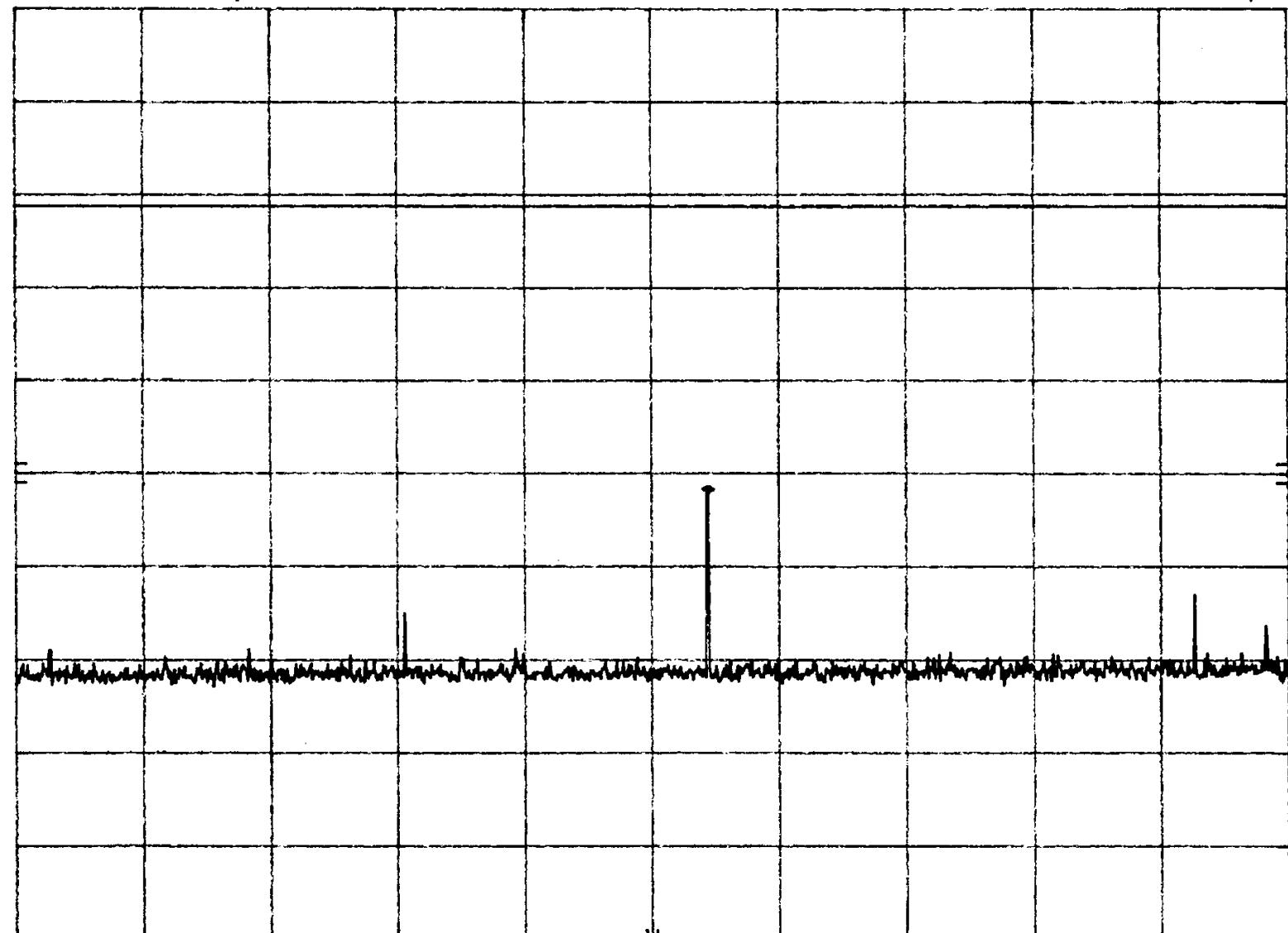
10 dB/

POS PK

OFFSET

-10.0
dB

DL
68.8
dB μ V



START 30 MHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 2.00 GHz

SWP 1.48 sec

26

CLIENT: OMRON
TEST: 2 - 5 GHz
NOTE: Ant. Port 1, Chan. 18

SPECIFICATION: Part 15.247(c)
EUT: WD30

DATE: 07/17/00

MKR 2.681 GHz

48.00 dB μ V

hp REF 90.0 dB μ V ATTEN 10 dB

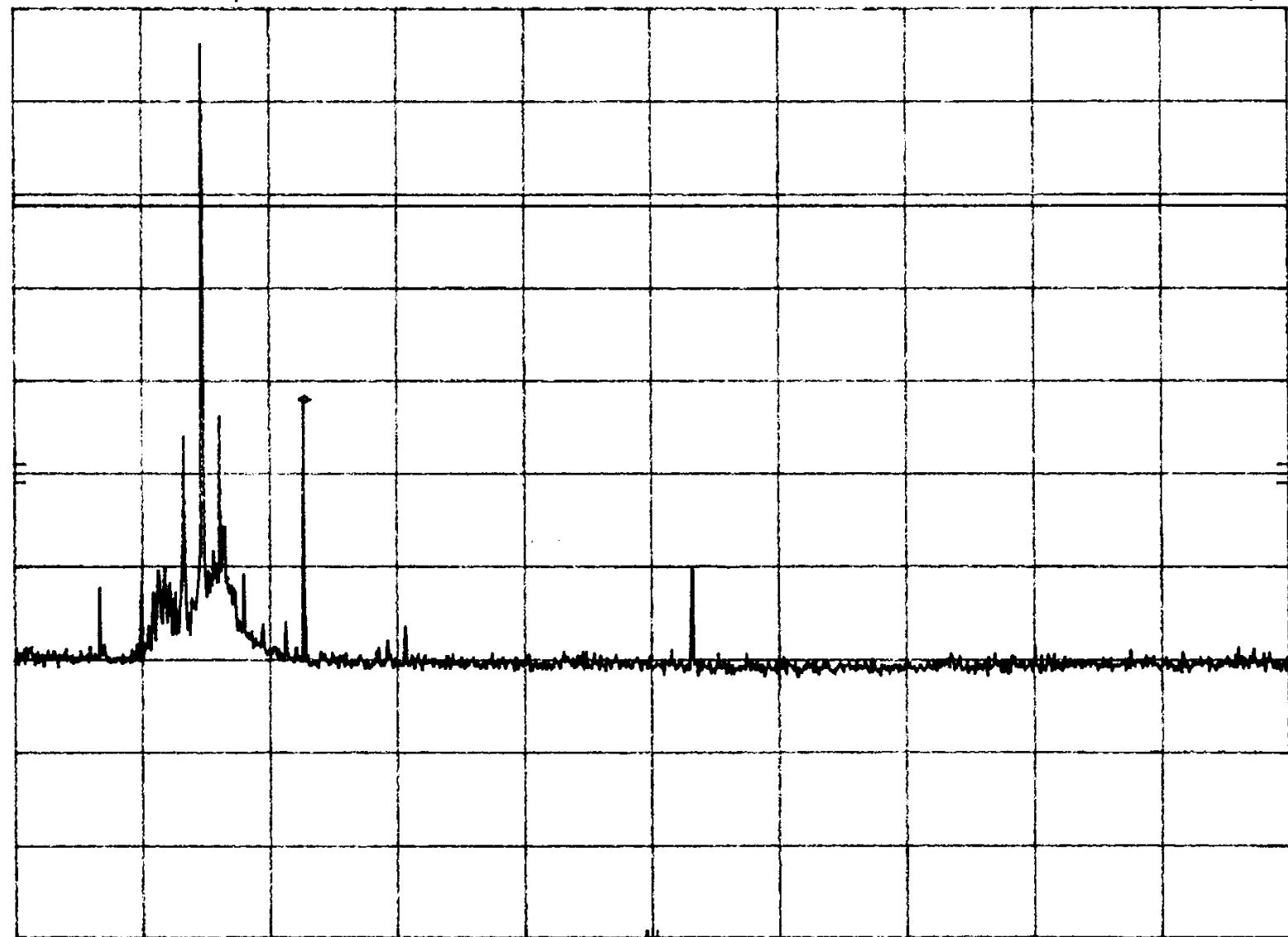
10 dB/

POS PK

OFFSET

-10.0
dB

DL
68.8
dB μ V



START 2.00 GHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 5.00 GHz

SWP 2.25 sec

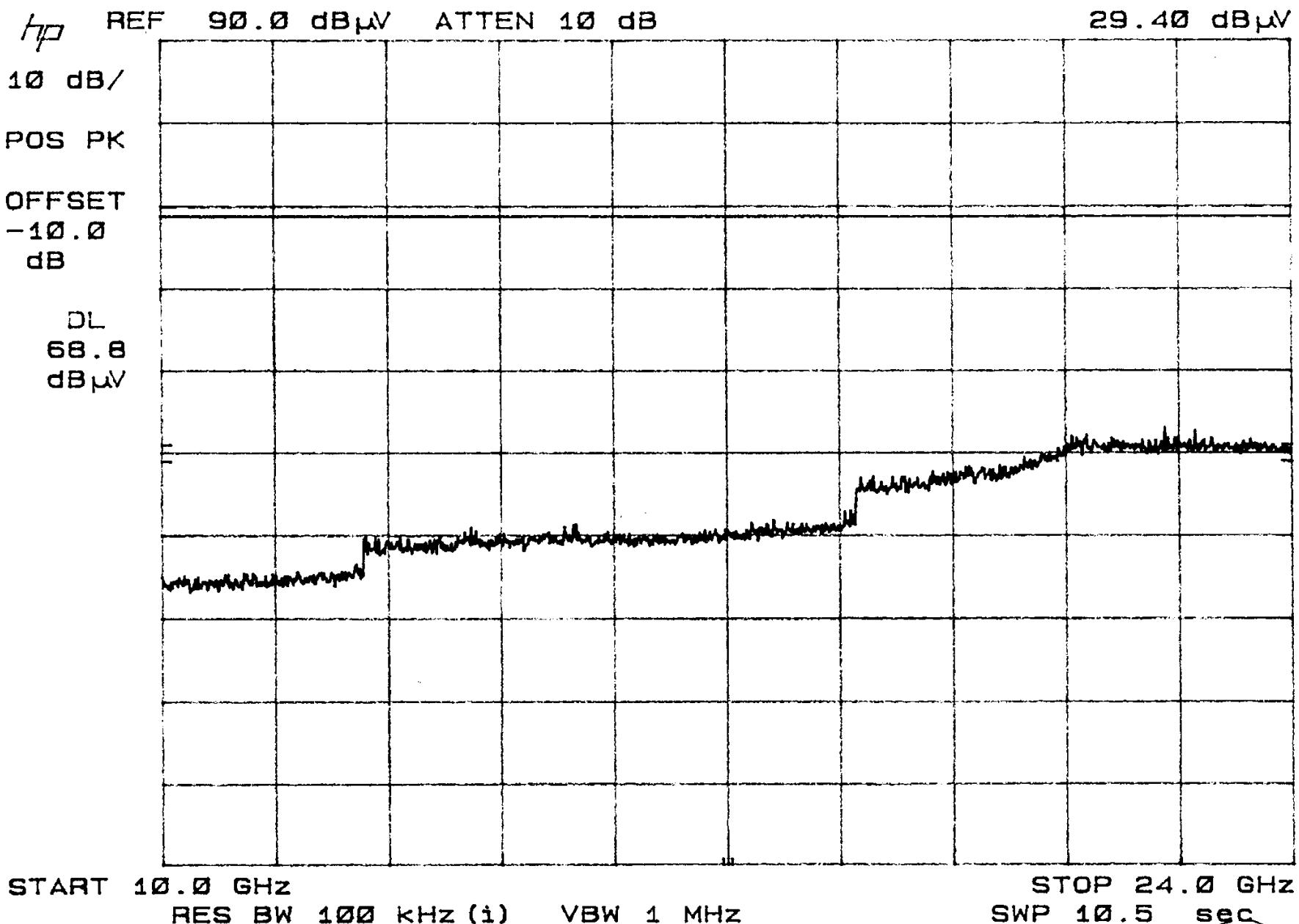
21

CLIENT: OMRON
TEST: 10 - 24 GHz
NOTE: Ant. Port 1, Chan. 18

SPECIFICATION: Part 15.247(c)
EUTWD30.

DATE: 07/17/00

MKR 16.15 GHz
29.40 dB μ V



CLIENT: OMRON
TEST: 5 - 10 GHz
NOTE: Ant. Port 1, Chan. 18

SPECIFICATION: Part 15.247(c)
EUT: WD30

DATE: 07/17/00

MKR 7.195 GHz
26.60 dB μ V

HP REF 90.0 dB μ V ATTEN 10 dB

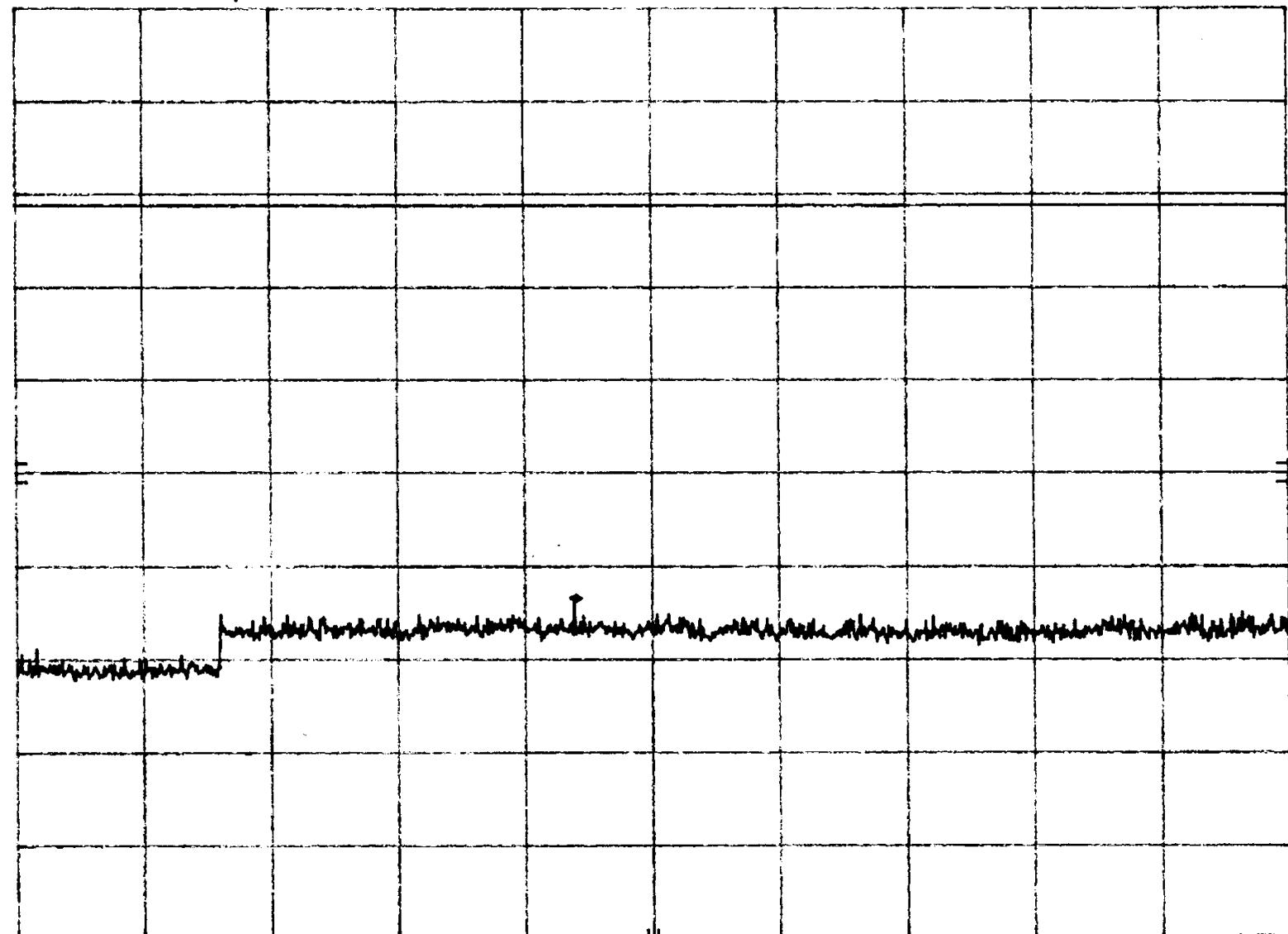
10 dB/

POS PK

OFFSET

-10.0
dB

DL
68.8
dB μ V



START 5.00 GHz

RES BW 100 kHz (i)

VBW 1 MHz

STOP 10.00 GHz

SWP 3.75 sec

129

5 PROCESSING GAIN EQUIPMENT/DATA

See following page(s).

PROCESSING GAIN, FCC Part 15, Paragraph 15.247(e) (Test performed by customer.)

Equipment	Model Name	Calibration date	Serial Number
Signal Generator (Agilent Technologies)	HP8673G	June 2000	2918A00162
Power Meter (Agilent Technologies)	HP437B	October 1999	3043U03977
Power Sensor (Agilent Technologies)	8485D	October 1999	2915A00695
Attenuator (Anritsu)	MN65A	February 2000	M17930
Communication Analyzer (Anritsu)	MD6420A	March 2000	MT01337
TTL Interface Unit (Anritsu)	MD0626A	June 2000	MT98836

ch1(2401MHz)

BER 1x10-5(S/N=10dB)

System loss=2dB

$$Gp=10(S/N)+2(L_{sys})+4(M_j)=16\text{dB}$$

Jammer frequency	Signal level(dBm)	Jammer level(dBm)	J/S(dB)
2399.9	-70	-53	16
2399.95	-70	-57	13
2400	-70	-58	12
2400.05	-70	-59	11
2400.1	-70	-60	10
2400.15	-70	-62	8
2400.2	-70	-62	8
2400.25	-70	-63	7
2400.3	-70	-64	6
2400.35	-70	-64	6
2400.4	-70	-65	5
2400.45	-70	-65	5
2400.5	-70	-66	4
2400.55	-70	-65	5
2400.6	-70	-65	5
2400.65	-70	-65	5
2400.7	-70	-65	5
2400.75	-70	-65	5
2400.8	-70	-66	4
2400.85	-70	-66	4
2400.9	-70	-67	3
2400.95	-70	-67	3
2401	-70	-58	12
2401.05	-70	-67	3
2401.1	-70	-66	4
2401.15	-70	-66	4
2401.2	-70	-66	4
2401.25	-70	-66	4
2401.3	-70	-66	4
2401.35	-70	-67	3
2401.4	-70	-67	3
2401.45	-70	-67	3
2401.5	-70	-65	5
2401.55	-70	-65	5
2401.6	-70	-66	4
2401.65	-70	-65	5
2401.7	-70	-65	5
2401.75	-70	-64	6
2401.8	-70	-64	6
2401.85	-70	-63	7
2401.9	-70	-62	8
2401.95	-70	-61	9
2402	-70	-60	10
2402.05	-70	-58	12
2402.1	-70	-57	13


 Worst 20%

6 SIGNATURE PAGE

GENERAL REMARKS:

SUMMARY:

All tests according to the standards sited on page 1 of this report.

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements cited on page 1.

- **Does not** fulfill the general approval requirements cited on page 1.

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:



Jim Owen
(EMC Engineer)