



FCC CFR47 PART 15 TV INTERFACE DEVICE

TEST REPORT

FOR

RF ADAPTOR FOR USE WITH THE
SEGA 16 BIT GAME STATION

MODEL: 98Y-404S

FCC ID: NH3P455664SA

REPORT NUMBER: 98E7247

ISSUE DATE: MAY 12, 1998

Prepared for
YUEHUA ELECTRON CO.,LTD. OF ZHUHAI
30 BLDG., CHUIZHU INDUSTRIAL DISTRICT
ZHUHAI, GUANGDONG
CHINA 519000

Prepared by
COMPLIANCE ENGINEERING SERVICES, INC.
1366 BORDEAUX DRIVE
SUNNYVALE, CA 94089, USA
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1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: YUEHUA ELECTRON CO.,LTD. OF ZHUHAI
 30 BLDG., CHUIZHU INDUSTRIAL DISTRICT
 ZHUHAI, GUANGDONG
 CHINA 519000

CONTACT PERSON: JIANG HANXIONG / MANAGER

TELEPHONE NO: (0756) 861-0916

MODEL NO/NAME: 98Y-404S

SERIAL NO: N/A

DATE TESTED: MAY 12, 1998

TYPE OF EQUIPMENT:	TV INTERFACE DEVICE	
MEASUREMENT DISTANCE:	(X) 3 METER	() 10 METER
FCC RULES:	PART 15.115	
MEASUREMENT PROCEDURE	ANSI C63.4:92	
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION	
MODIFICATIONS MADE ON EUT	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
DEVIATIONS FROM MEASUREMENT PROCEDURE	<input type="checkbox"/> YES (refer to section 21 for comments)	<input checked="" type="checkbox"/> NO
TEST RESULT	PASSED	

The above equipment was tested by Compliance Consulting Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Reviewed By



MIKE C.I. KUO / VICE PRESIDENT
 COMPLIANCE CONSULTING SERVICES

2. PRODUCT DESCRIPTION

EUT is an RF adapter made for use with a game station. It is designed to operate at Channels 3 and 4 of TV , and serves as an interface device between TV and Game stations. By installing this device, the user can use TV as a monitor. The EUT is connected to TV via F jack.

CHASSIS TYPE	PLASTIC
LIST OF EACH OSC. OR XTAL. FREQ. (FREQ.>=1 MHz)	NONE
NUMBER OF PCB LAYERS	1 LAYER
POWER REQUIREMENTS	120 V AC, 60 Hz
NO. OF EXTERNAL I/O CONNECTORS	1

External I/O Cable Construction Description

CABLE NO: 1	
I/O Port: Special	Number of I/O ports of this type: 1
Number of Conductors: 3	Connector Type: Sega
Capture Type: Snap-in	Type of Cable used: Unshielded
Cable Connector Type: Molded	Cable Length: 1.2 M
Bundled During Tests: No	Data Traffic Generated: No
Remark: N/A	

CABLE NO: 2	
I/O Port: RCA jack	Number of I/O ports of this type: 1
Number of Conductors: 1	Connector Type: RCA jack
Capture Type: Snap-in	Type of Cable used: Shielded
Cable Connector Type: Molded	Cable Length: 0.25 M
Bundled During Tests: No	Data Traffic Generated: No
Remark: N/A	

3. TESTED SYSTEM DETAILS

During the tests, TV is tuned to Channels 3 and 4 to activate game program. EUT was individually tested with different game stations.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

6. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged waveguide, liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

7. MEASURING INSTRUMENT CALIBRATION

The measuring equipment which was utilized in performing the tests documented herein has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment which is traceable to recognized national standards.

8. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} \left[(32 \text{ dBuV/m}) / 20 \right] = 39.8 \text{ uV/m}$$

9. ANTENNAS

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 meters from the leading edge of the turn table.

10. CONDUCTED EMISSION TEST PROCEDURE

The EUT is located so that the distance between the boundary of the EUT and the closest surface to the LISN is 0.8m.

EUT test configuration is according to Section 7 of ANSI C63.4/1992.

Conducted disturbance shall be measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz shall be investigated.

Set the EMI receiver to PEAK detector setting and sweep continuously over the frequency range to be investigated. Set resolution bandwidth to 9kHz minimum. Connect EMI receiver input cable to LINE 1 RF measurement connection on the LISN. Connect a 50ohm terminator to the unused RF connection on the LISN. For each mode of EUT operation, maximize emissions readings by manipulating cable and wire positions. Record the configuration for each EUT power cord which produces emissions closest to the limit. Repeat the same procedure for LINE 2 of each EUT power cord.

11. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80 cm above the ground screen. Antenna to EUT distance is 3 meters. During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

12. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	14° C	16° C
Humidity	84%	83%

13. EQUIPMENT MODIFICATIONS

To achieve compliance to 15.115 levels, the following change(s) were made during compliance testing:

Mod.#1 Added 39 kΩ resistor between #10 pin and #11 pin of IC.

Mod.#2 Added 2 pF capacitor between #4 pin and #5 pin of IC.

Mod.#3 Added 12 pF capacitor to #3 pin of IC and GND.
(or 15 pF capacitor on #3 pin of IC was replaced by 27 pF.)

Mod.#4 56 pF capacitor at RF output was replaced by 120 pF.

Mod.#5 Removed red wire between antenna port and antenna switch. And made them direct connection in antenna switch box.

Mod.#6 Replaced original black wire between both GND by a piece of thicker black wire in antenna switch box.

15. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	H.P.	8568A	2314A02604	B	02/98	02/99
Pre-Amp	H.P.	8447D	2944A06589	B	09/98	09/99
Antenna	Eaton	94455-1	1197	B	10/97	10/98
Antenna	Emco	3146	2120	B	10/97	10/98
Pre-Amp	H.P.	8449B	3008A00369	B	03/98	03/99
LISN	Fischer	LISN2	N/A	Cond	12/97	12/98
LISN	Fischer	CISPR adapter	N/A	Cond	12/97	12/98
EMI Receiver	Rhode Schwarz	ESHS20	827129/006	Cond	03/98	03/99
Abs. Clamp	Fischer	F-201	251	Cond	04/98	04/99
LISN	Fischer	FCCLISN 50/250-25-2	114	Cond	08/97	08/98

16. TEST RESULT SUMMARY

Model name: 98Y-404S

1) Test Requirements: 15.115 (a)

Technical Limits: 15.109

Test Result: please refer to radiated emission data report number 980526F3. (Channel 3 & 4)

2) Test Requirements: 15.115 (b) (1) (ii), 15.115(2) (ii)

Technical Limits: Video signal: $346.4 \times \sqrt{R}$ in microvolts
 Audio signal: $77.5 \times \sqrt{R}$ in microvolts

Technical Limits: -4.6 MHz of Video carrier frequency and +7.4 MHz shall not exceed $10.95 \times \sqrt{R}$ in microvolts or 39.5dBuV.

Test Result:

R=75Ω

Video signal limits = 69.5 dBuV, audio signal limits=56.5 dBuV

CHANNEL 3 15.115(1) (ii), 15.115(2) (ii)								
	Freq. MHz	Reading (dBuV)	L1 (dB)	L2 (dB)	Adj. Reading (dBuV)	Limit (dBuV)	Margin (dB)	Plot No.
Picture	61.61	65.3	0.8	1.7	67.8	69.5	-1.7	1,7
Audio	66.02	45.6	0.8	1.7	48.1	56.5	-8.4	2
-4.6 M	57.11	29.5	0.8	1.7	32.0	39.5	-7.5	3
+7.4 M	69.01	28.5	0.8	1.7	31.0	39.5	-8.5	4
2 nd harmonic	123.03	32.9	1.0	1.7	35.6	39.5	-3.9	5,8
3 rd harmonic	184.54	28.7	1.2	1.7	31.6	39.5	-7.9	6

CHANNEL 4 15.115(1) (ii), 15.115(2) (ii)								
	Freq. MHz	Reading (dBuV)	L1 (dB)	L2 (dB)	Adj. Reading (dBuV)	Limit (dBuV)	Margin (dB)	Plot No.
Picture	67.79	62.8	0.8	1.7	65.3	69.5	-4.2	9,15
Audio	72.2	42.4	0.8	1.7	44.9	56.5	-11.6	10
-4.6 M	63.29	30.2	0.8	1.7	32.7	39.5	-6.8	11
+7.4 M	75.24	30.2	0.8	1.7	32.7	39.5	-6.8	12
2 nd harmonic	135.29	32.5	1.0	1.7	35.2	39.5	-4.3	13,16
3 rd harmonic	203.76	30.0	1.2	1.7	32.9	39.5	-6.6	14,17

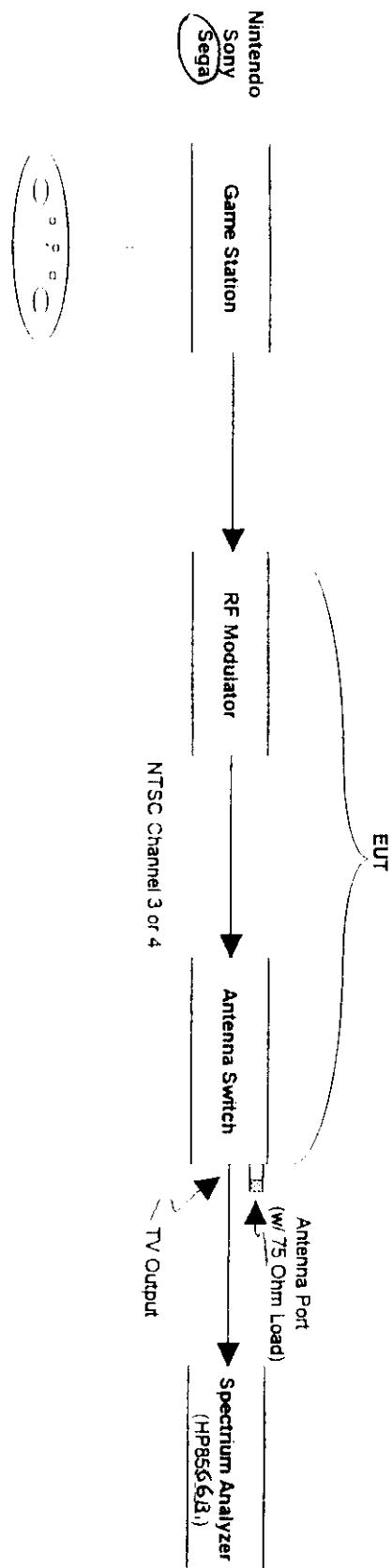
L1 - Cable loss, L2 - impedance loss

3. Conducted Emission Test:

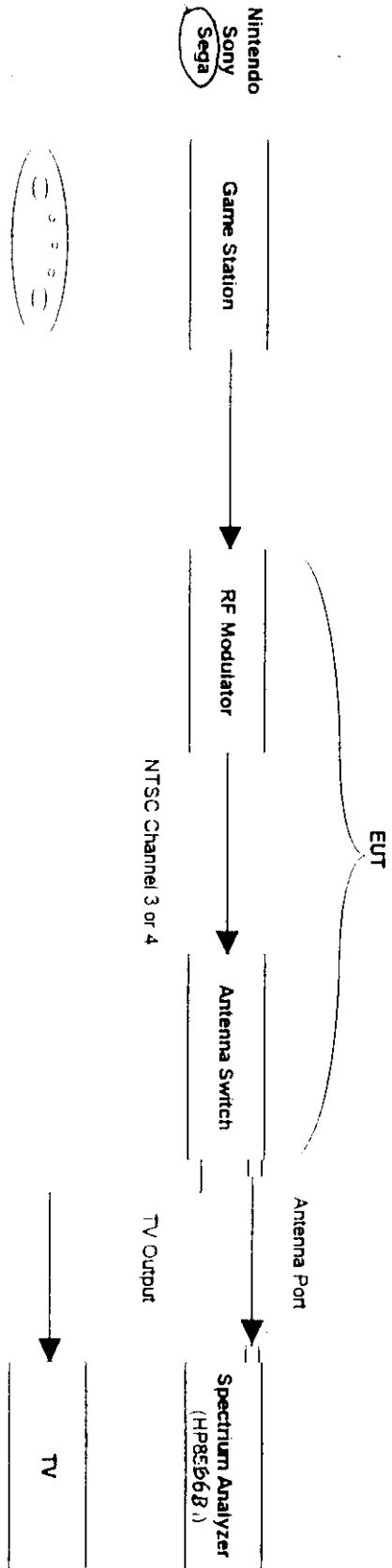
Technical requirement: 15.107 (a)

Test Result: (Channel 3 & 4)

Please refer to spectrum plots (#18)



Test Block Diagram of 15.115 (b)(1)(ii) & (b)(2)(ii)



Test Block Diagram of 15.115 (c)(1)(ii)

TO: Mike Zhu

Compliance Engineering Services Inc.

Project No. : 98E7247
Report No. : 980526F3
Date : 05/26/1998
Time : 09:38
Test Engr : MIKE ZHU

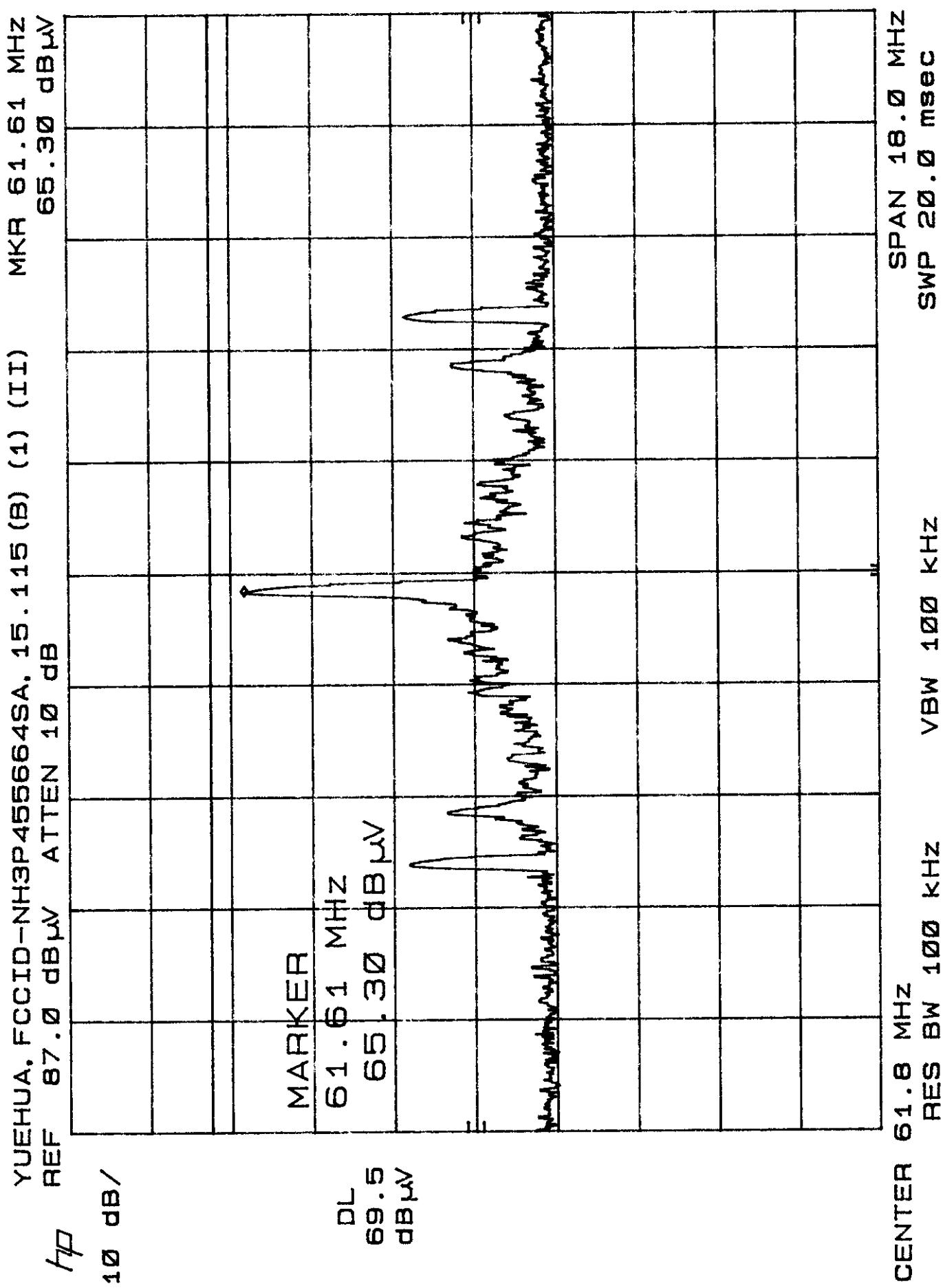
>> 3 M RADIATED EMISSION DATA <<

Company : YUEHUA ELECTRON CO LTD OF ZHUHAI
Equipment Under Test : P-044A/RF ADAPTOR FOR SEGA 16 BIT GAME STATION
Test Configuration : EUT/SEGA 16 BIT GAME STATION/TV
Type of Test : FCC CLASS B
Mode of Operation : STANDARD CH3/CH4

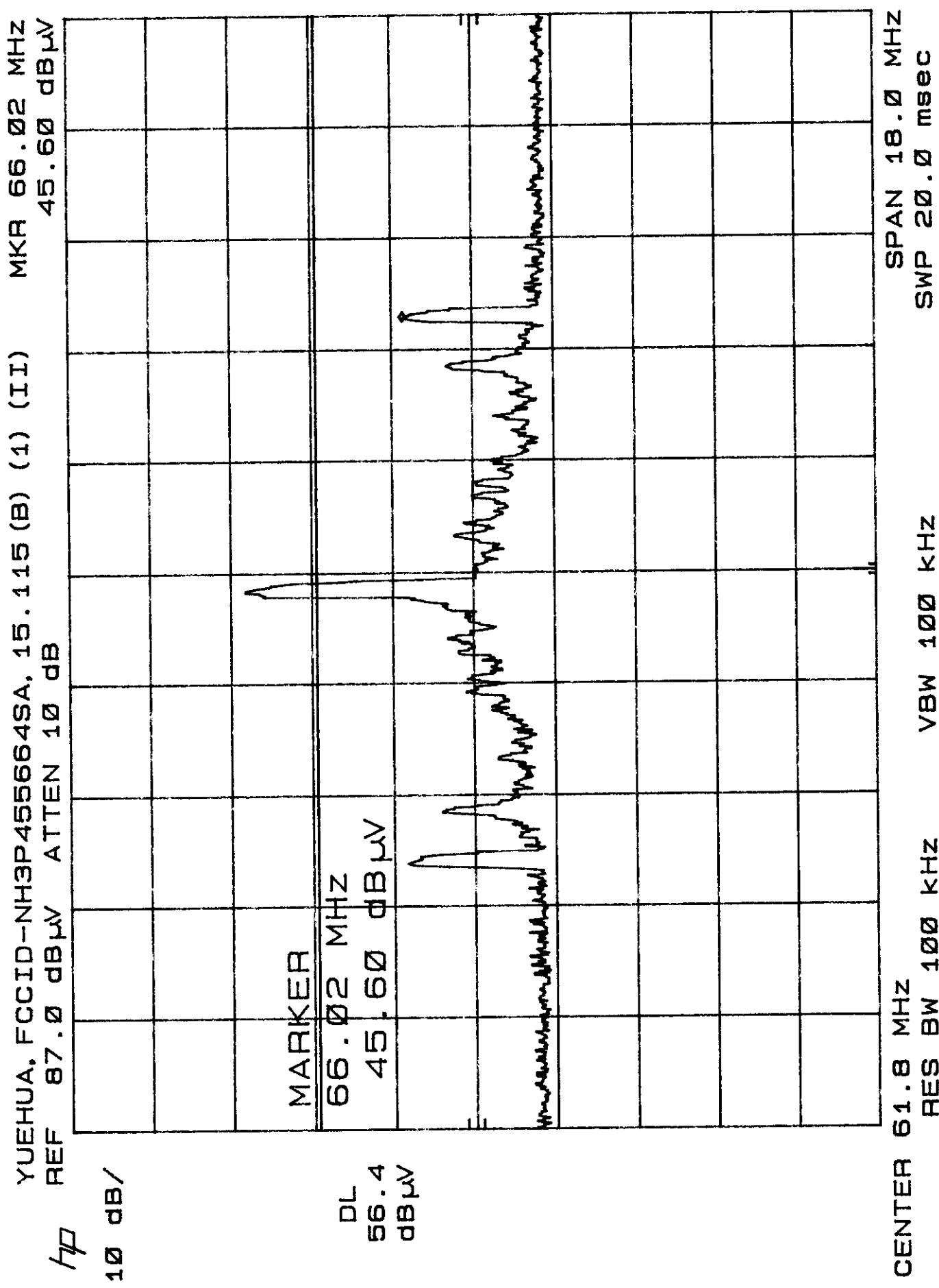
Freq.	dBuV	PreAmp	Ant	Cable	dBuV/m	Limit	Margin	Pol	Hgt (m)	Az
CH3:										
Biconical 8909-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
61.40	53.00	-31.84	7.30	1.86	30.32	40.00	-9.68	V	1.0	180
122.72	44.50	-31.54	12.68	2.58	28.22	43.50	-15.28	V	1.0	180
184.08	42.90	-31.19	17.43	3.13	32.27	43.50	-11.23	V	1.0	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
245.20	33.40	-30.82	11.76	3.68	18.02	46.00	-27.98	V	1.0	180
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
61.40	51.60	-31.84	7.71	1.86	29.33	40.00	-10.67	H	3.0	180
122.72	43.20	-31.54	12.96	2.58	27.20	43.50	-16.30	H	3.0	180
184.00	40.90	-31.19	16.12	3.13	28.96	43.50	-14.54	H	3.0	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
245.20	32.80	-30.82	12.29	3.68	17.96	46.00	-28.04	H	1.0	180
CH4:										
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
67.90	48.60	-31.77	5.62	2.00	24.46	40.00	-15.54	V	1.0	180
135.66	41.10	-31.45	14.75	2.69	27.09	43.50	-16.41	V	1.0	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
203.61	34.10	-31.06	11.46	3.29	17.79	43.50	-25.71	V	1.0	180
Biconical 8908-1079 ; Pre-pamp = 8447D-P2 2944A07781:										
67.90	45.20	-31.77	6.25	2.00	21.69	40.00	-18.31	H	3.0	180
135.66	40.10	-31.45	13.67	2.69	25.01	43.50	-18.49	H	3.0	180
LP NSN=X100 ; Pre-pamp = 8447D-P2 2944A07781:										
203.60	31.81	-31.06	11.18	3.29	15.22	43.50	-28.28	H	1.0	180

Total # of data 14
V. f2.2

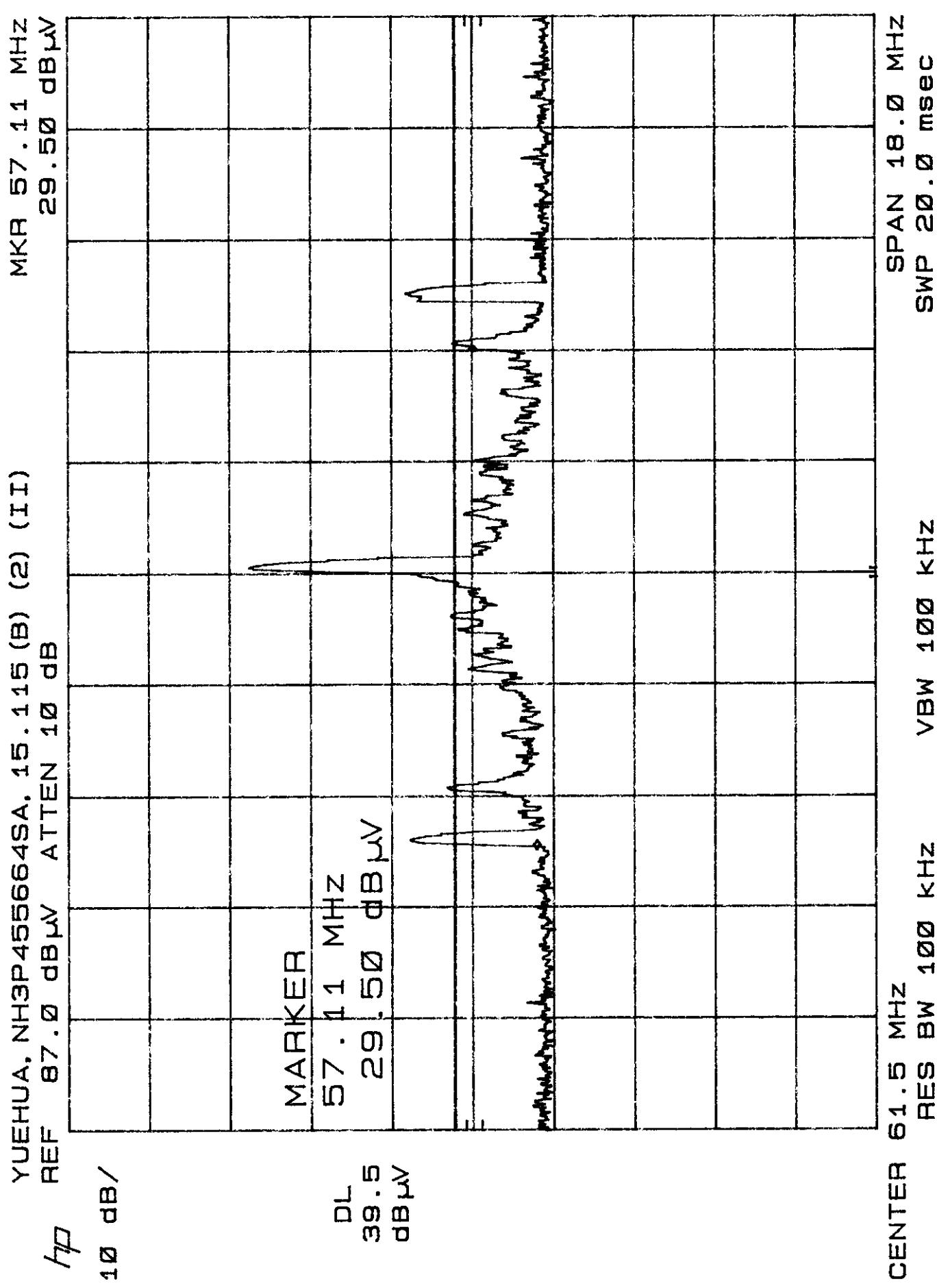
Plot #1



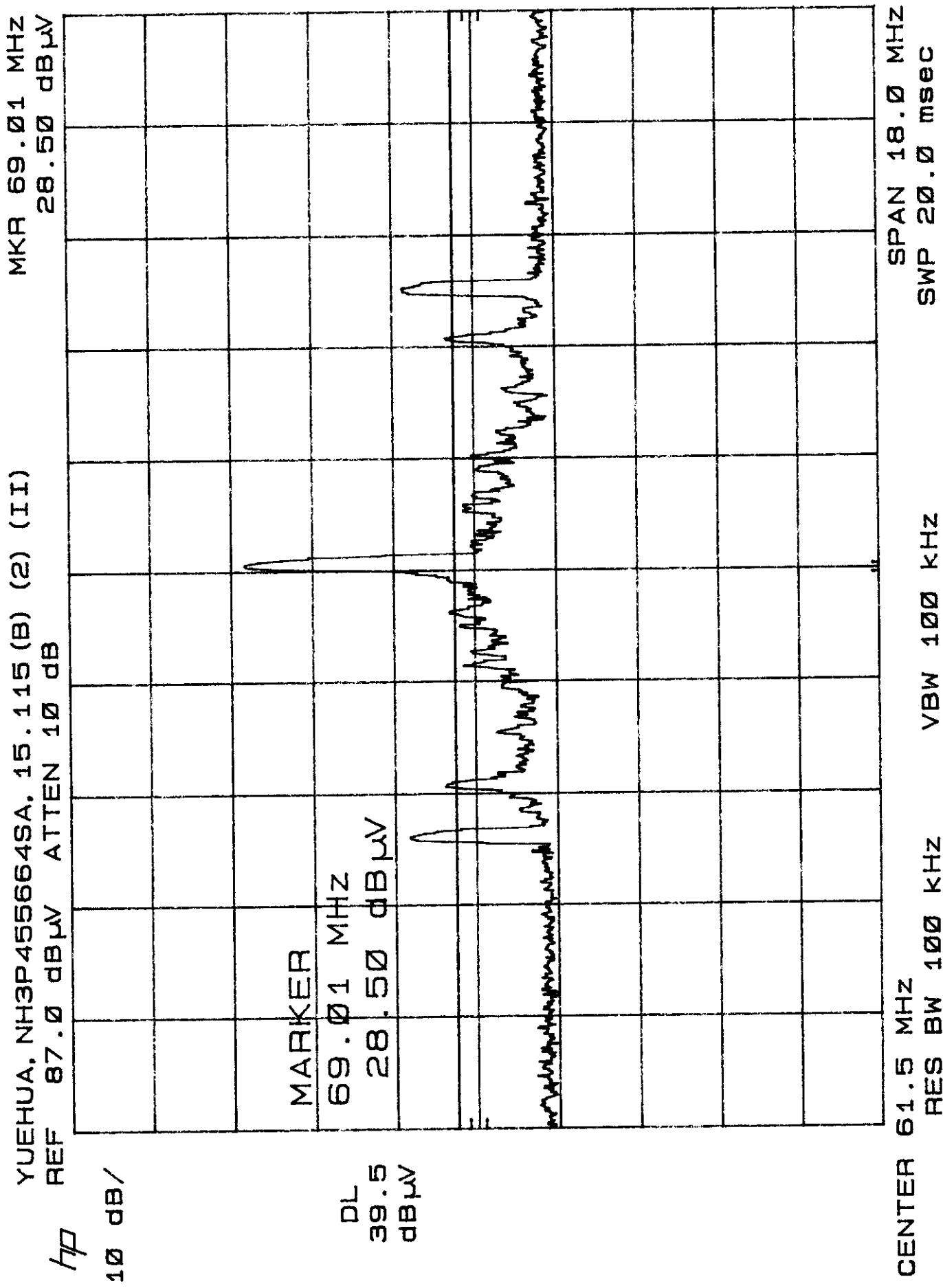
Plot #2

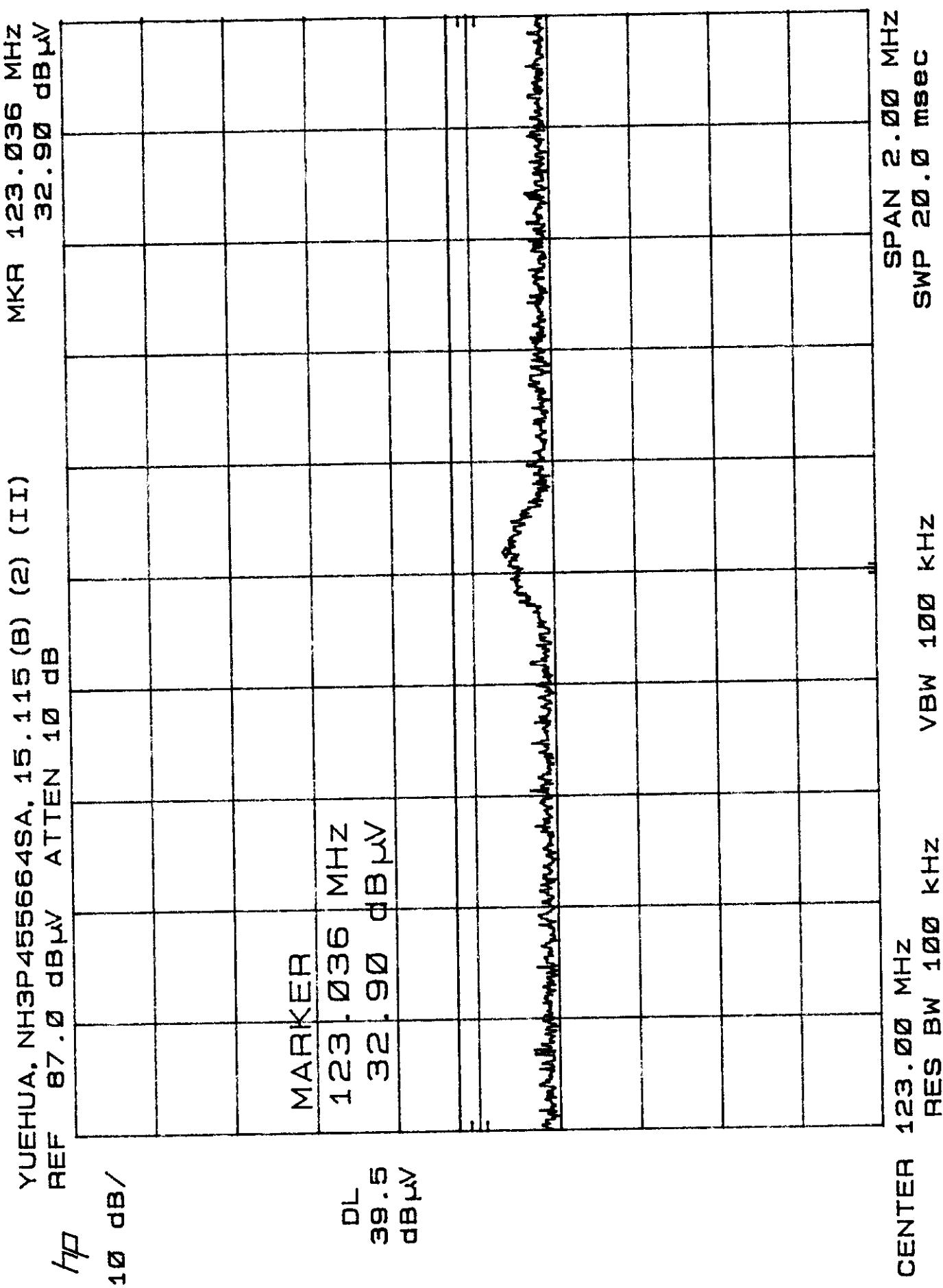


Plot #3



Plot #4



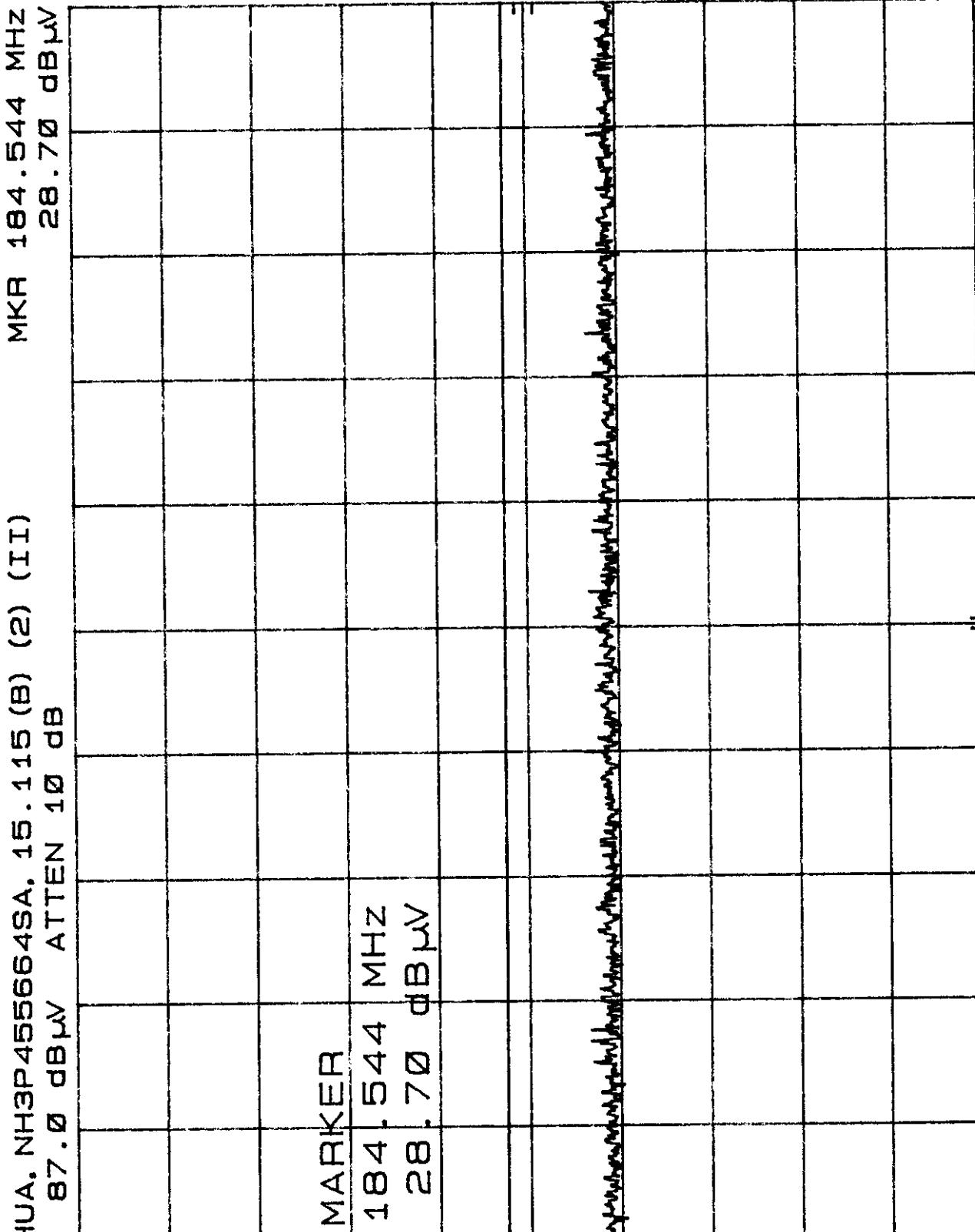


YUEHUA. NH3P4555664SA. 15. 115 (B) (2) (II)

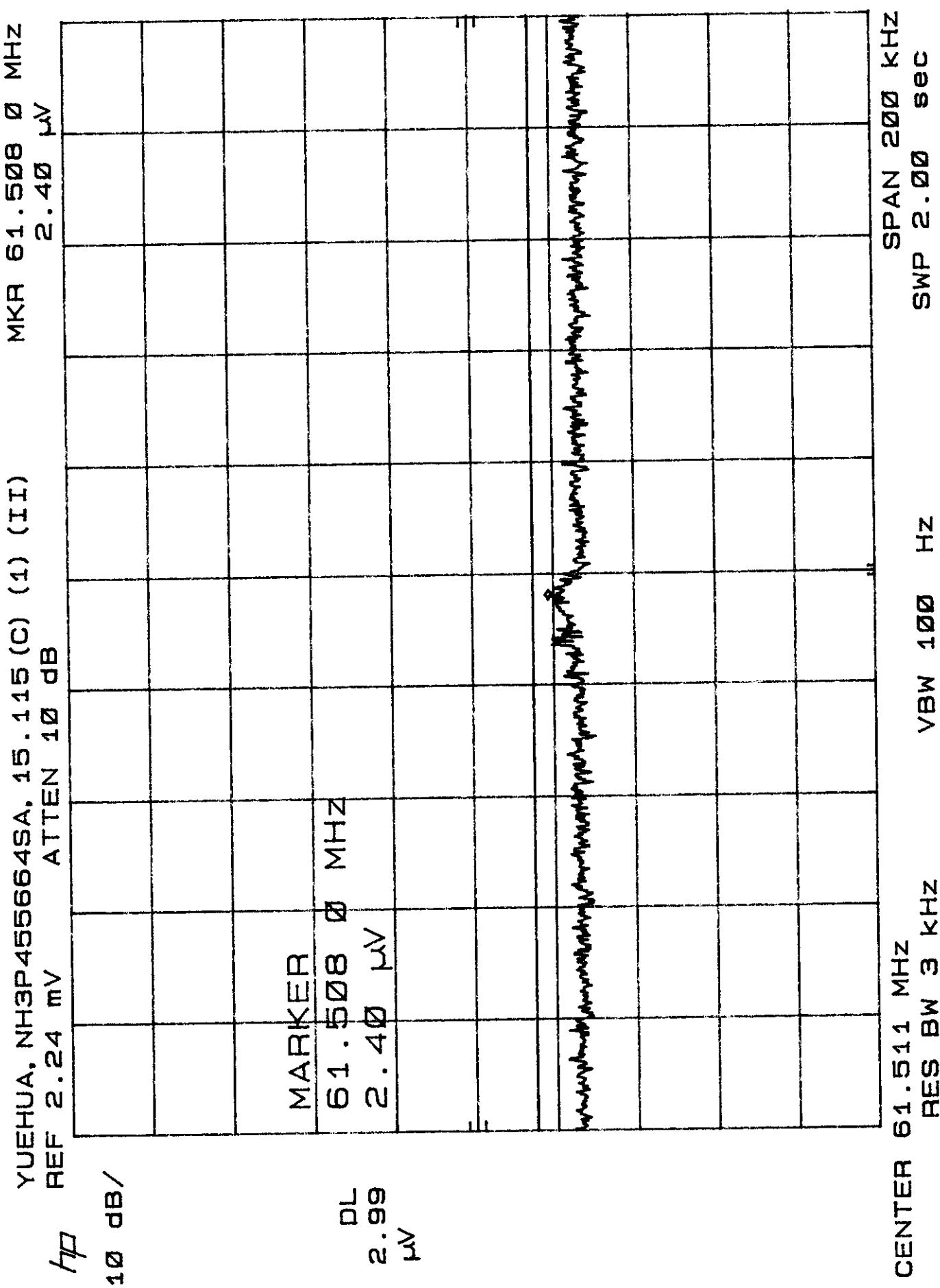
REF 87.0 dB μ V ATTEN 10 dB10 dB/ μ V

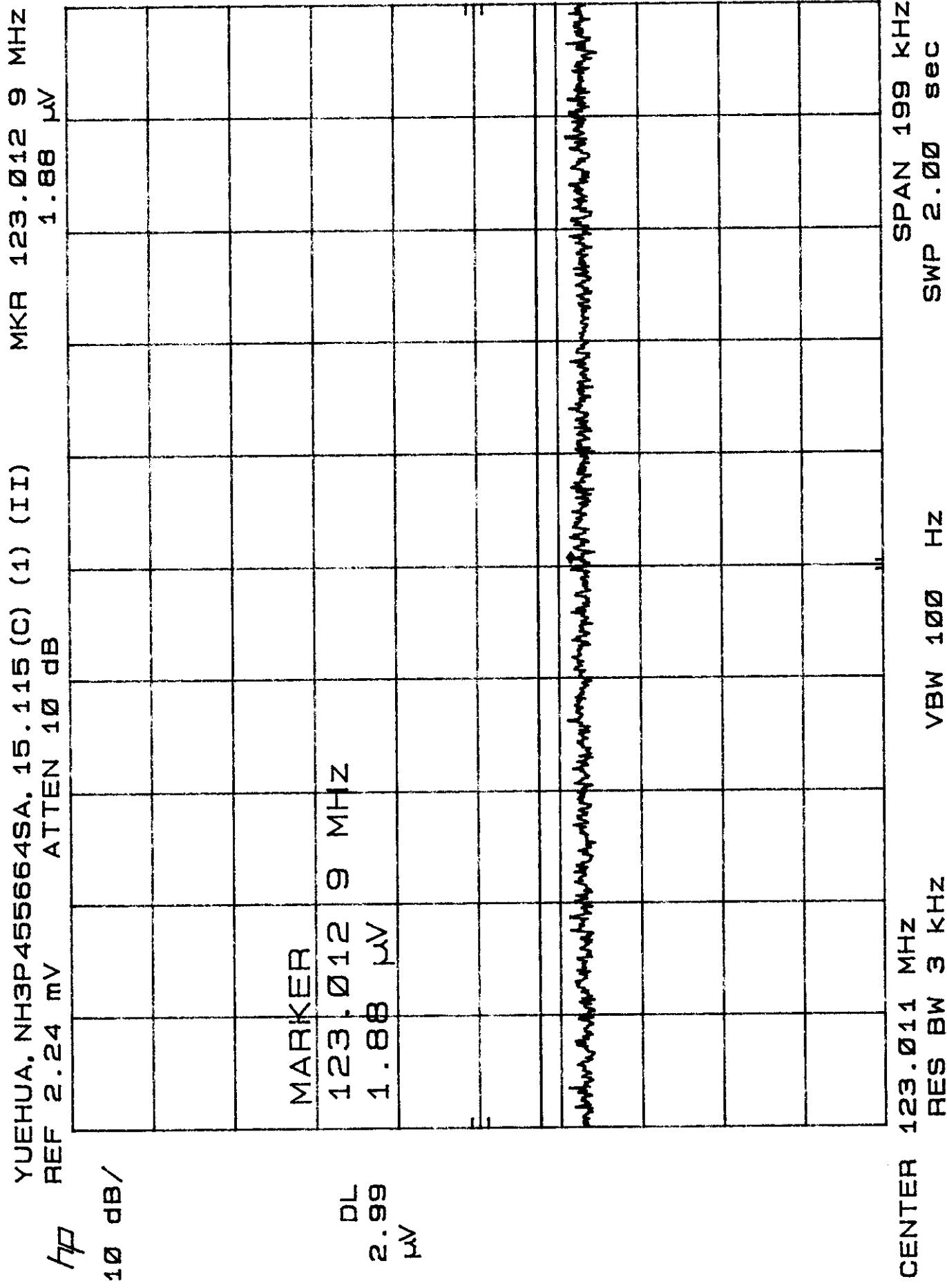
MARKER

184.544 MHz

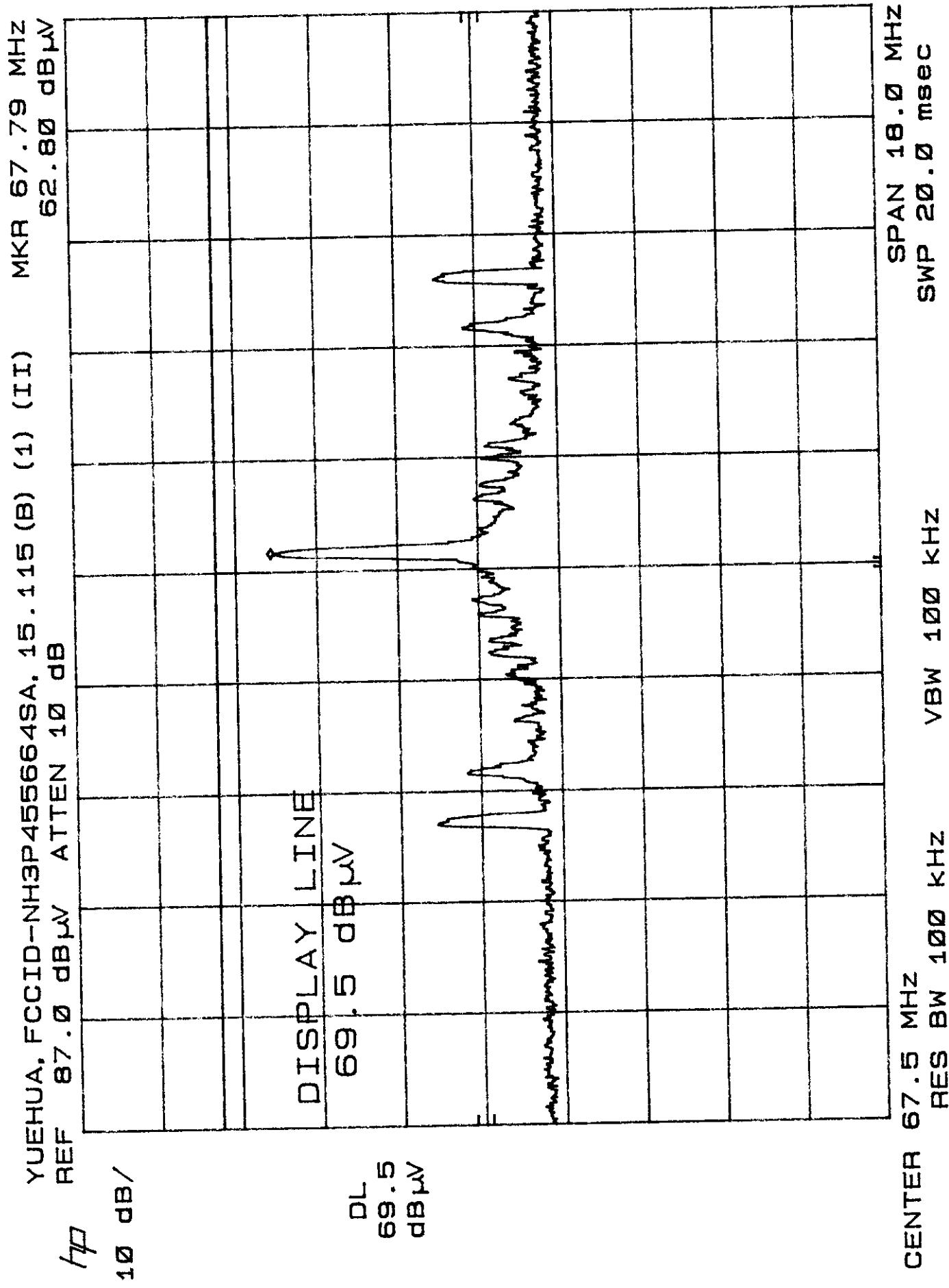
28.70 dB μ VDL
39.5
dB μ VCENTER 184.50 MHz
RES BW 100 kHz VBW 100 kHz
SPAN 2.00 MHz SWP 20.0 msec

Plot #7

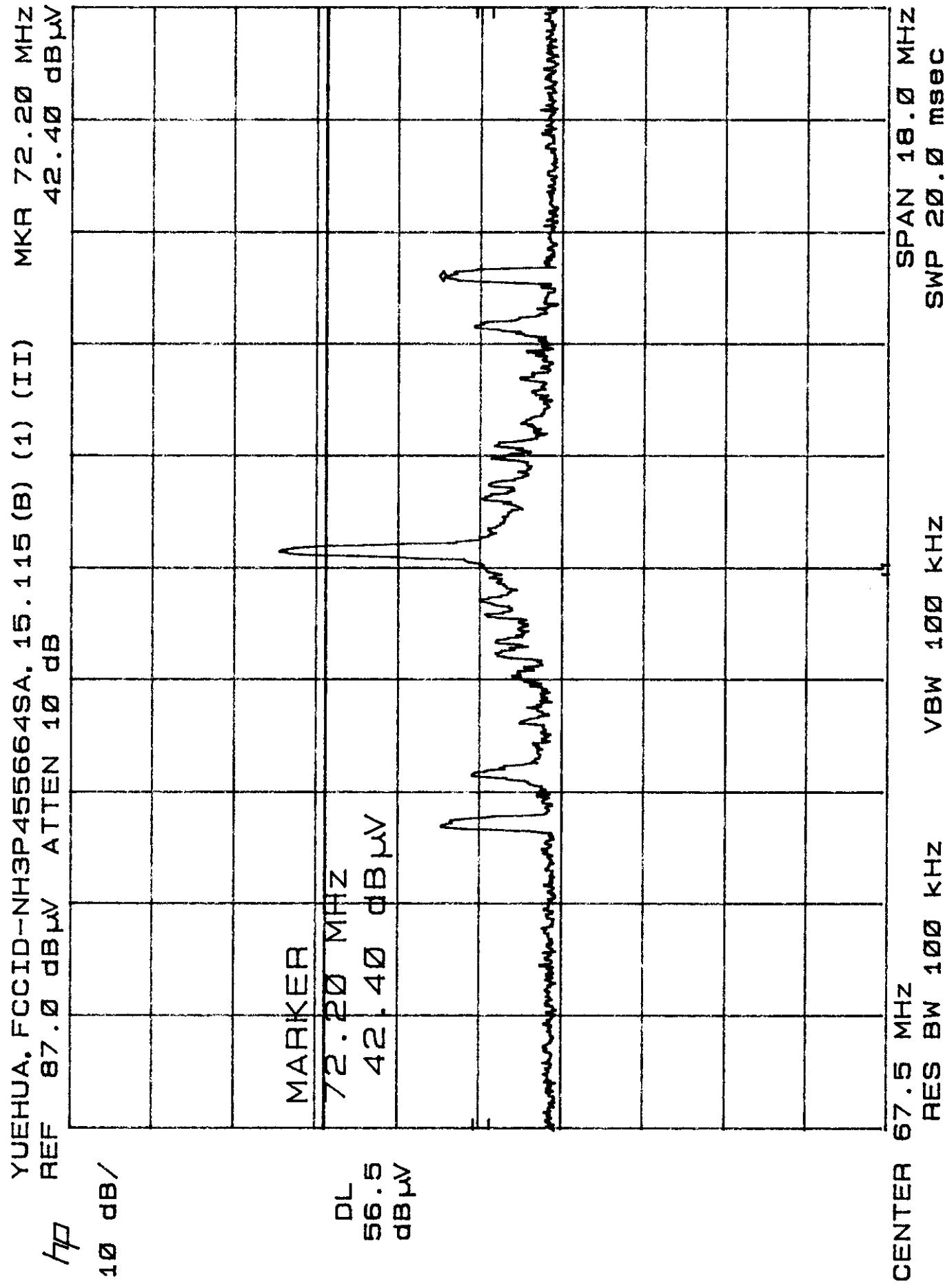




Plot #9



Plot #10

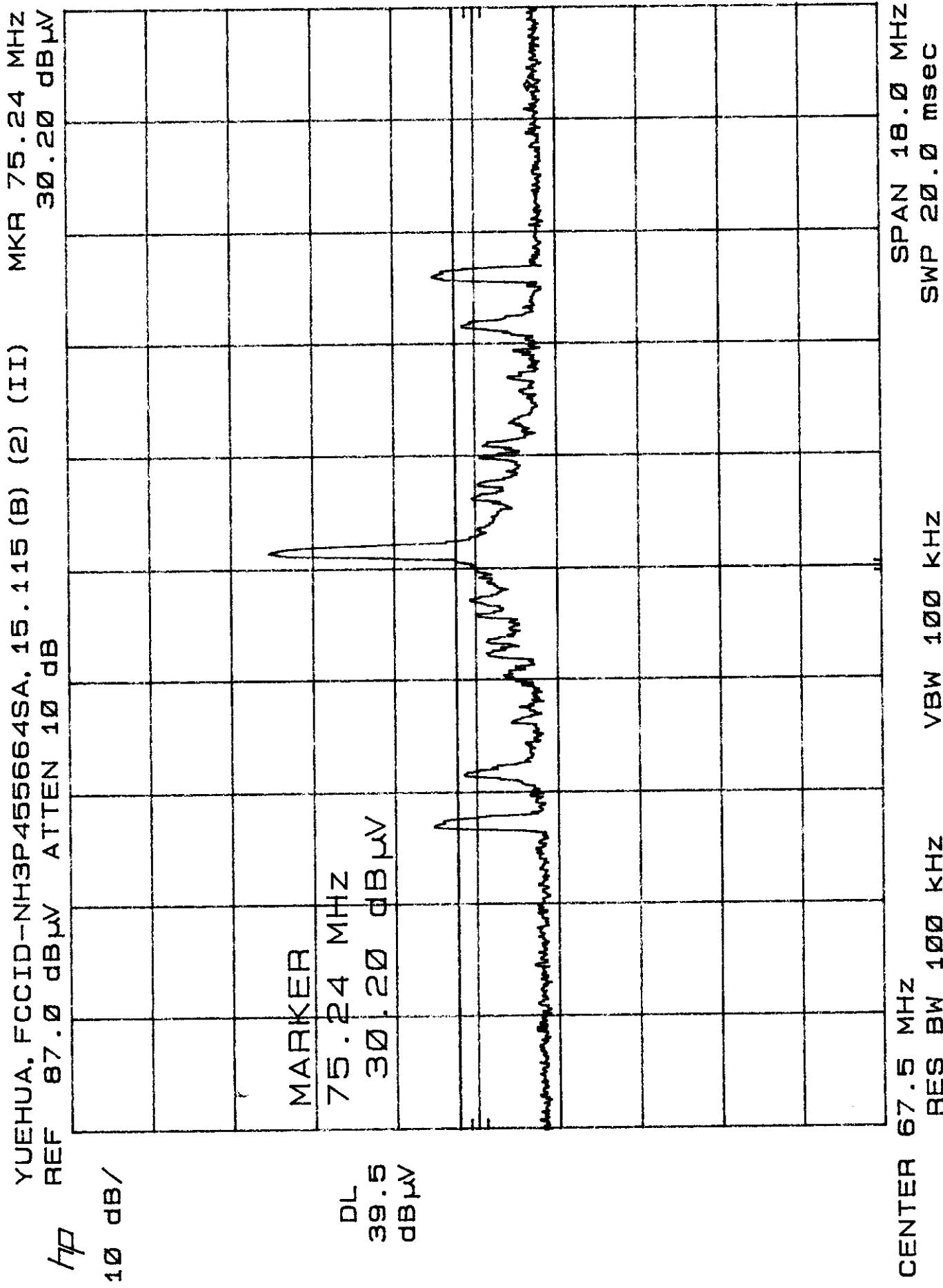


plot #11

YUEHUA, FCCID-NH3P455664SA, 15.115 (B) (2) (II) 63.29 MHz
 REF 87.0 dB μ V ATTN 10 dB 30.20 dB μ V SPAN 18.0 MHz
 10 dB/ 39.5 dB μ V SWP 20.0 msec
 CENTER 67.5 MHz RES BW 100 kHz
 MARKER 63.29 MHz 30.20 dB μ V

Detailed description: This is a spectrum analysis plot from a YUEHUA FCCID-NH3P455664SA receiver. The plot shows a noisy signal with several markers. The top markers are labeled '63.29 MHz' and '30.20 dB μ V'. The bottom markers are labeled 'DL' and '39.5 dB μ V'. The plot has a grid and a vertical scale of 10 dB. The span is 18.0 MHz and the sweep width is 20.0 msec. The center frequency is 67.5 MHz and the resolution bandwidth is 100 kHz.

Plot #12



Plot #13

YUEHUA, NH3P4555664SA. 15.115(B) (2) (II)

REF 87.0 dB μ V ATEN 10 dB

μ V

10 dB/

MARKER

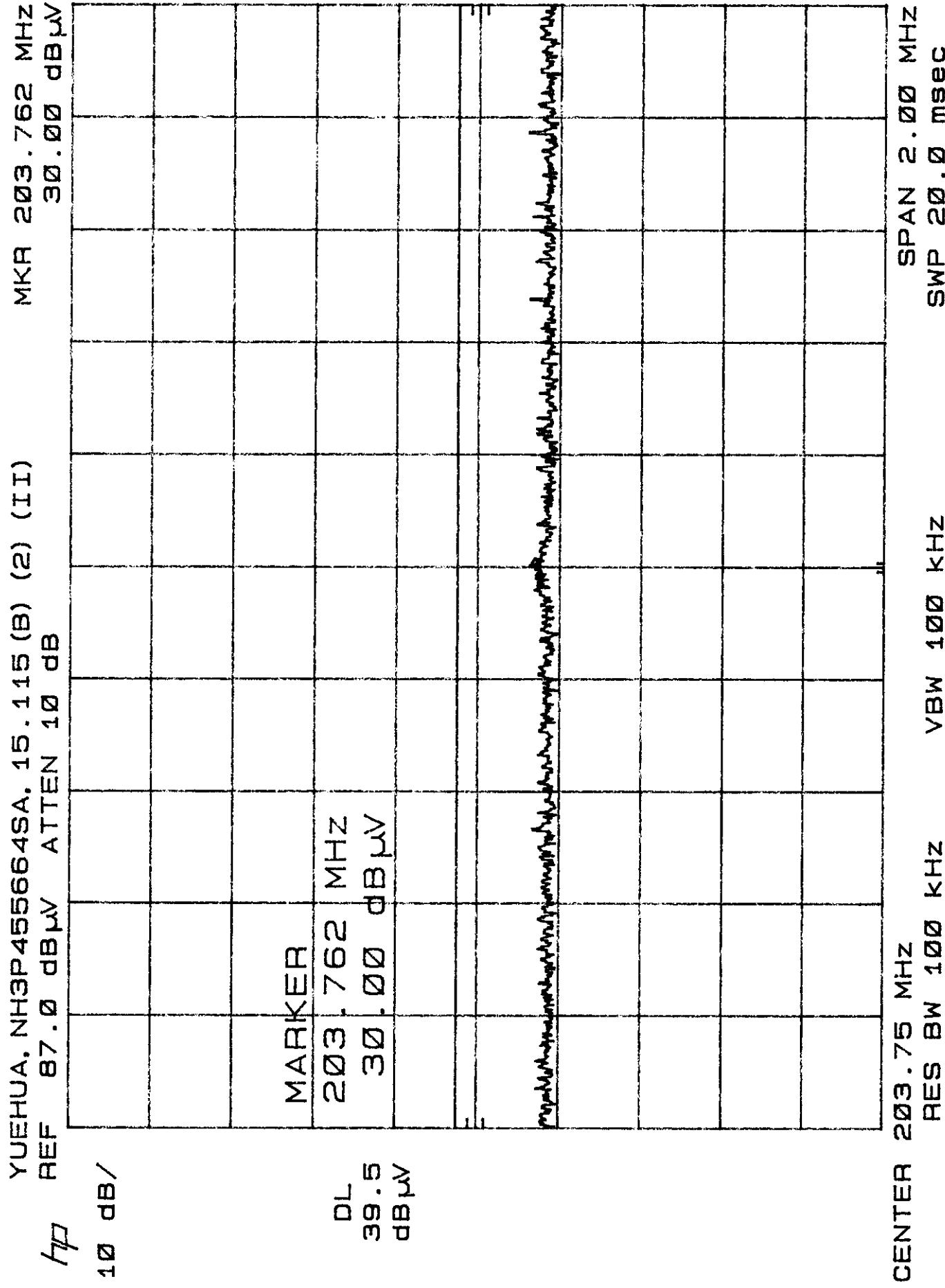
135.298 MHz
32.50 dB μ V

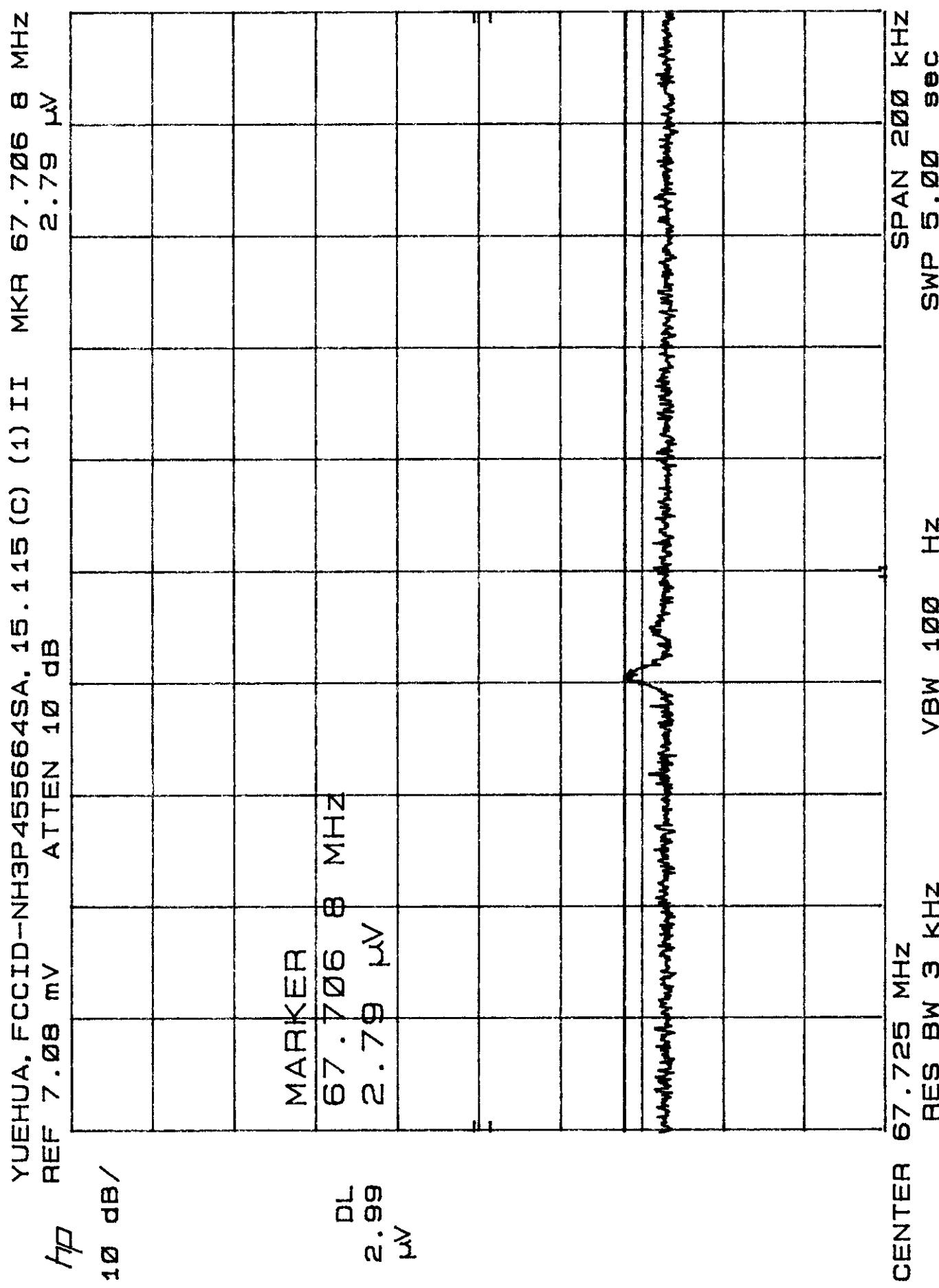
DL
39.5
dB μ V

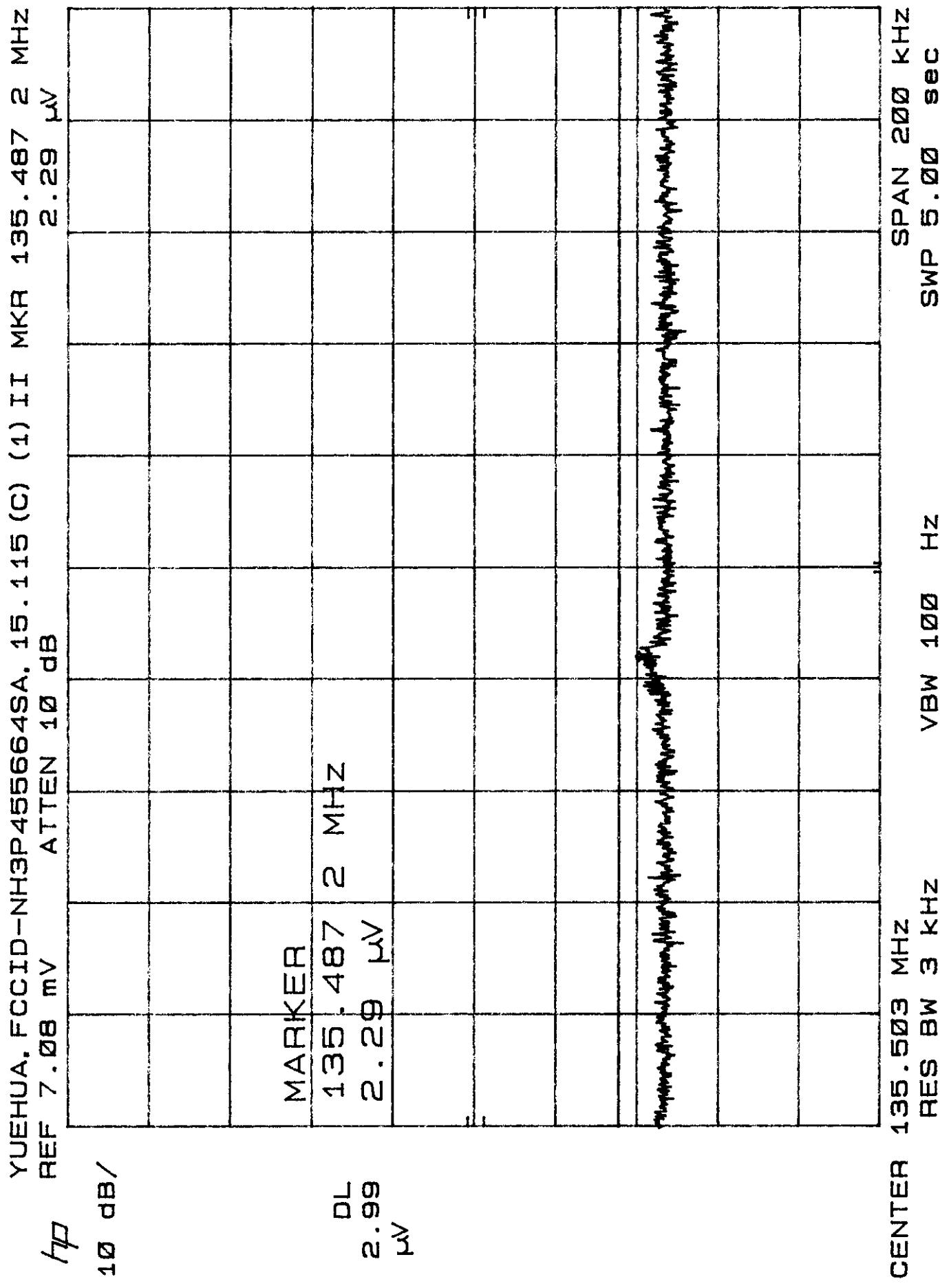
MKR 135.298 MHz
32.50 dB μ V

SPAN 1.00 MHz
SWP 20.0 msec

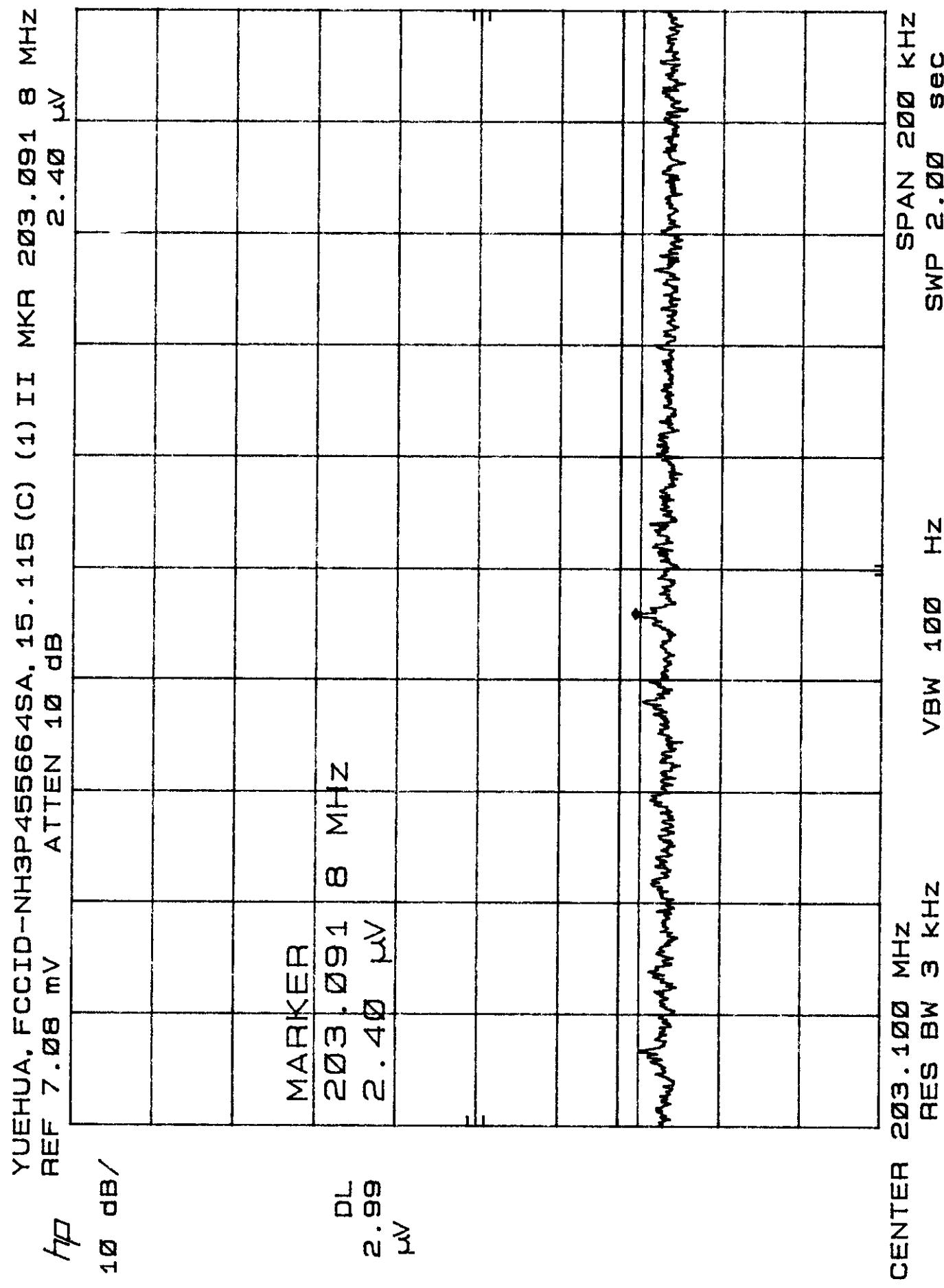
CENTER 135.29 MHz
RES BW 100 kHz
VBW 100 kHz







Plot #17



COMPLIANCE ENGINEERING SERVICES INC.

12. May 88 10:55

RFI VOLTAGE

EUT: P-044A, RF ADAPTOR (FOR SEGA 16BIT STATION)
 Manuf: YUEHUA ELECTRON CO., LTD. OF ZHUHAI
 Op Cond: RUNNING CH3 WITH SEGA GAME STATION
 Operator: MIKE ZHUBILL
 Test Spec: FCC CLASS B
 Comment: LINE: HOT (RED), NEUTRAL (BLUE)
 120Vac, 60Hz.

M-2

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	500k	500Hz	10K	PK	100ms	AUTO	LN OFF	80dB
500k	30M	5K	10K	PK	20ms	AUTO	LN OFF	80dB

Final Measurement: x GP
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 6dB

Transducer No. Start Stop Name
 1 8K 30M FISCHER

FCC_B

