FCC PART 22 TYPE APPROVAL
EMI MEASUREMENT AND TEST REPORT

FOR

CELLULAR SPECIALTIES, INC.

670 N. Commercial St.

Manchester NH 03101

FCC ID: NVRCSI110-03

February 4, 2000

This Report Concerns:	**Equipment Type:**
☒ Original Report	Amplifier

Test Engineer:	John Chan
Test Date:	January 26, 2000
Reviewed By:	John Y. Chan – Engineering Manager
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street, Suite 2 Sunnyvale, CA 94086 (408) 732-9162

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Cellular Specialties, Inc.*, FCC ID *NVRCSI110-03 (AMPLIFIER) or the* "EUT" as referred to in this report is a device using in enclosed structures where sufficient signal from local cell sites to operate cell phones was unavailable within the building. The device is connected to an external antenna, usually on the roof, and to one or more internal antennas placed strategically throughout the area where phone service is desired. The EUT measures 10" L x 12" W x 3.5" H.

1.2 Objective

This type approval report is prepared on behalf of *Cellular Specialties, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and B, and Part 22 Subpart H, of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for output power, 20 dB bandwidth, occupied bandwidth, spurious emission at antenna terminal, two-tone test, conducted and radiated margin.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Suite 2, Sunnyvale, California, USA.

Test sites at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-674 and R-657. The test sites has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1993, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Data
HP	Spectrum Analyzer	8566B	2610A02165	12/6/00
HP	Spectrum Analyzer	8593B	2919A00242	12/20/00
HP	Amplifier	8349B	2644A02662	12/20/00
HP	Quasi-Peak Adapter	85650A	917059	12/6/00
HP	Amplifier	8447E	1937A01046	12/6/00
A.H. System	Horn Antenna	SAS0200/571	261	12/27/00
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/00
Com-Power	Biconical Antenna	AB-100	14012	11/2/00
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/00
Com-Power	LISN	LI-200	12208	12/20/00
Com-Power	LISN	LI-200	12005	12/20/00
BACL	Data Entry Software	DES1	0001	12/20/00
Rohde & Schwarz	Signal Generator	SMIQ03B	1125.5555.03	7/10/2002
Rohde & Schwarz	I/Q Modulation Generator	AMIQ	1110.2003.02	8/10/2002

1.7 Equipment Under Test (EUT)

Manufacturer	Description	Model	Serial Number	FCC ID
Cellular Specialties, Inc.	Amplifier	NVRCSI110-03	None	NVRCSI110-03

1.8 Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Rohde & Schwarz	Signal Generator	SMIQ03B	1125.5555.03	Doc
Rohde & Schwarz	I/Q Modulation Generator	AMIQ	1110.2003.02	Doc

1.9 EUT Configuration Details and List

NOT APPLICABLE

1.10 External I/O Cabling

Cable Description	Length (M)	Port/From	To
Shielded BNC Cable	2.0	Rohde & Schwarz	EUT

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

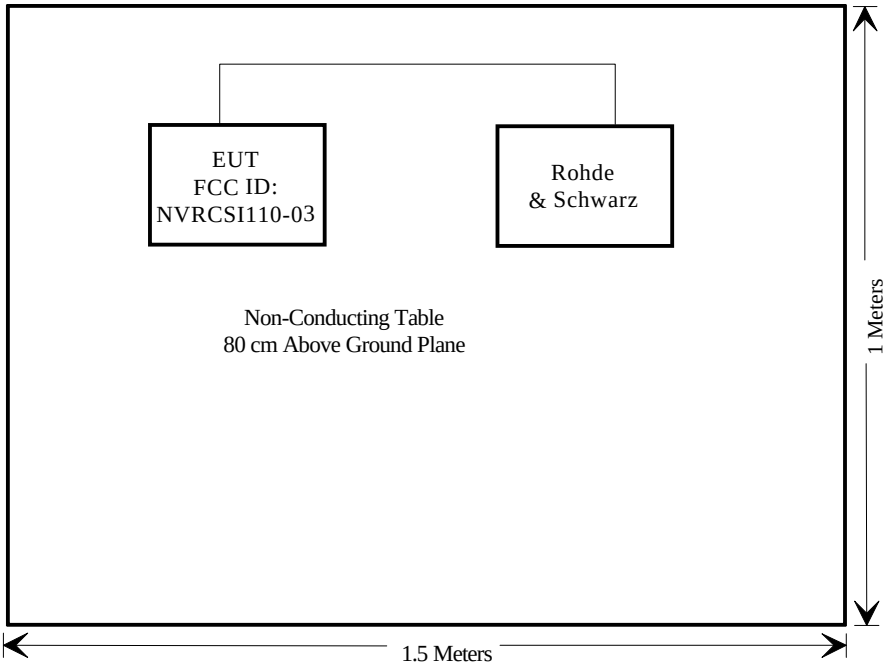
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode.

2.2 Block Diagram

Appendix A contains a copy of the EUT's block diagram as reference.

2.3 Test Setup Block Diagram



2.4 Equipment Modifications

No modifications were necessary for the EUT to comply.

3.0 Summary of Test Results

FCC RULE	DESCRIPTION OF TEST	RESULT
2.1046	RF power output	Pass
2.1047	Modulation Characteristics	Pass
2.1049	Emission, Occupied Bandwidth	Pass
2.1051	Spurious emissions at antenna terminals	Pass
2.1051	Two-Tone Test (Spurious emissions at antenna terminals)	Pass
2.1053	Field strength of spurious radiation	Pass
2.1055 (a) 2.1055 (d)	Frequency stability vs. temperature Frequency stability vs. voltage	N/A
15.107	AC Line Conducted emission	Pass

3.1.0 RF Power Output

Requirements: FCC Part 2.1046

3.1.1 Test Procedure

The antenna was removed and SMA connector was connected to the transmitter output. The transmitter output was connected to a calibrated coaxial attenuator (50 Ohm), the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter was determined by adding the value of the attenuator to the spectrum analyzer reading.

The test was performed at three frequencies (low, middle, and high channels) and on all power levels which can be setup on the transmitter.

3.1.2 Test equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

3.1.3 Test Results

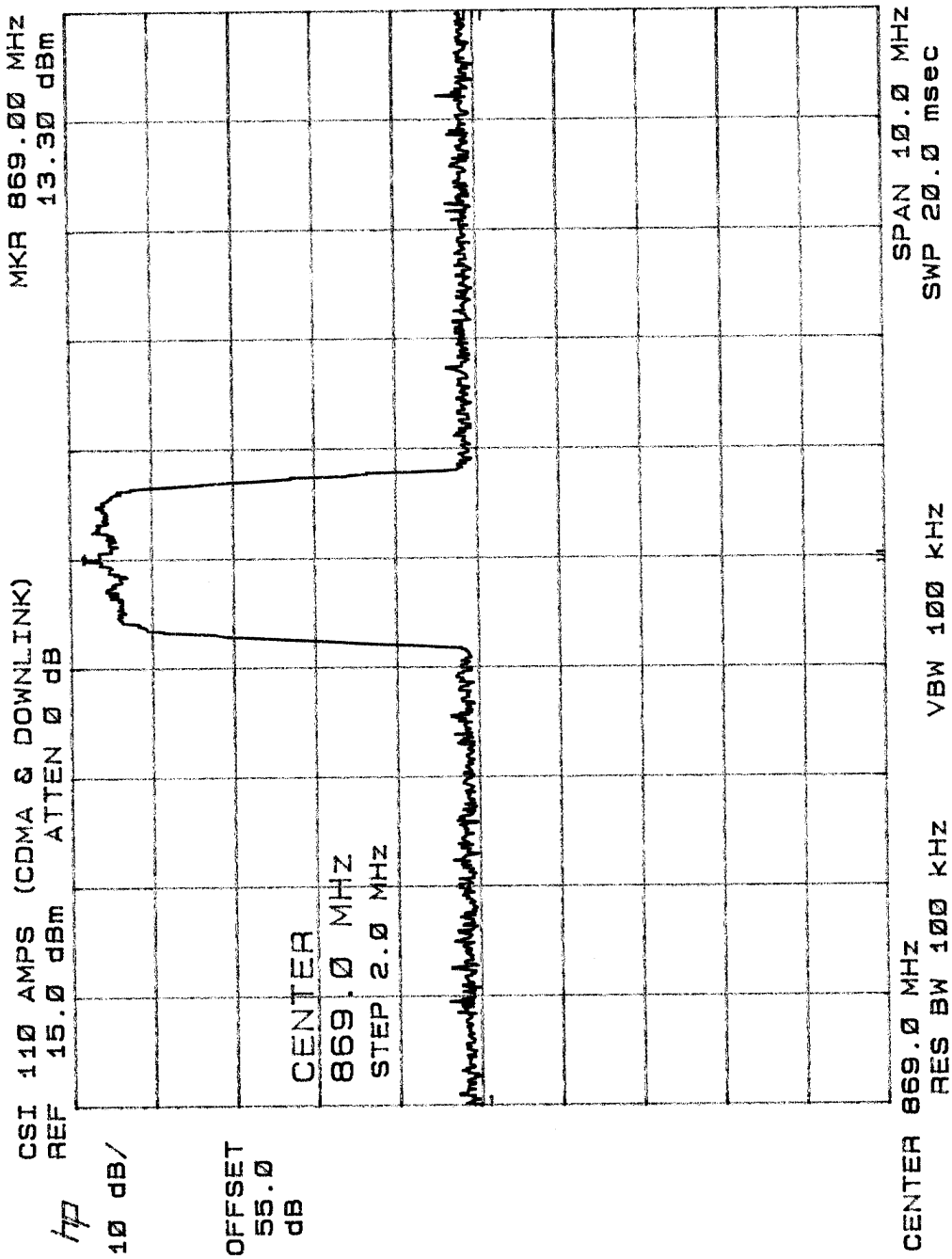
Refer to the attached to the following plots:

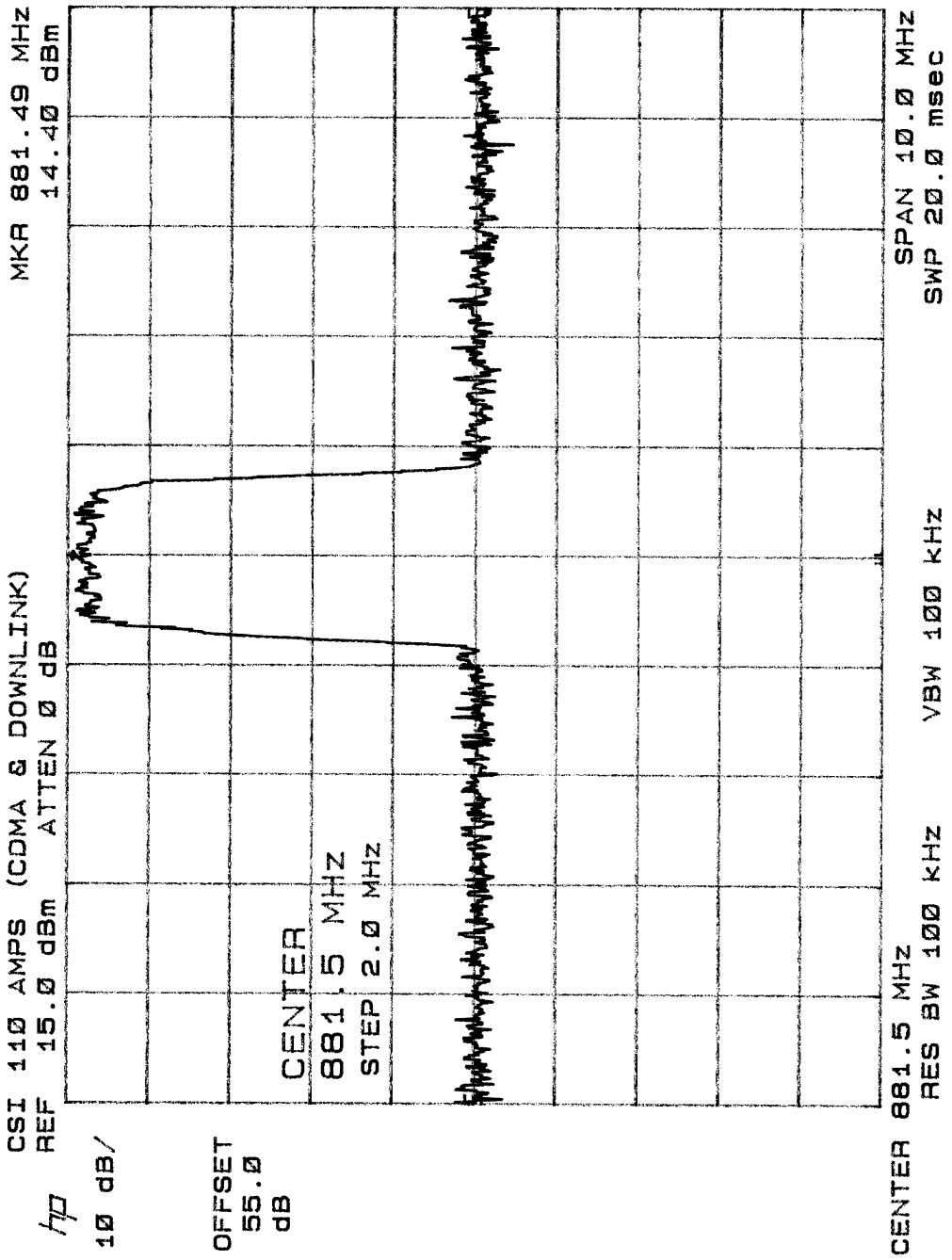
DOWNLINK

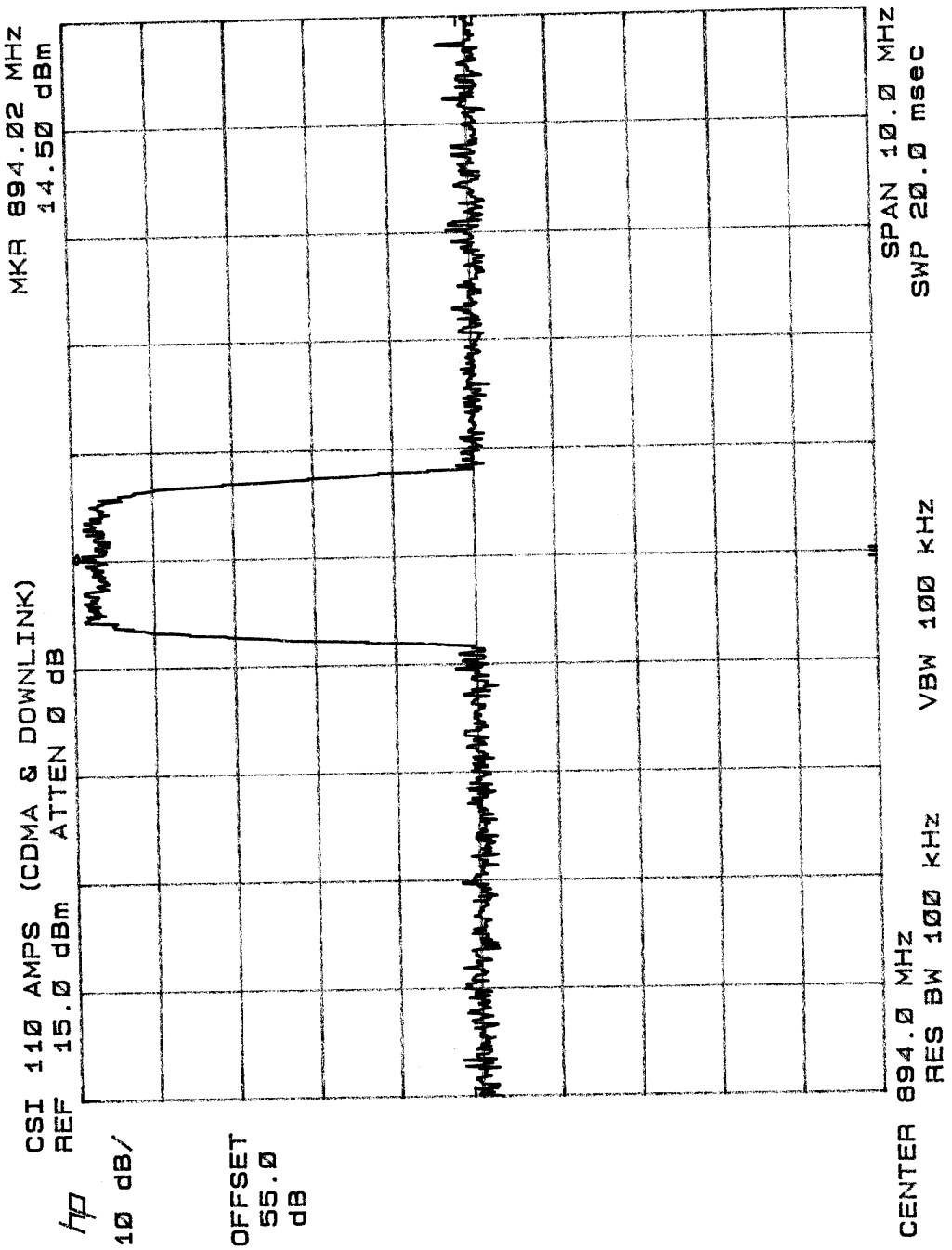
RF Power Output Plots		
CDMA	Low 15dBm	Page 11
	Middle 15dBm	Page 12
	High 15dBm	Page 13
GSM	Low 15dBm	Page 17
	Middle 15dBm	Page 18
	High 15dBm	Page 19
TDMA	Low 15dBm	Page 14
	Middle 15dBm	Page 15
	High 15dBm	Page 16

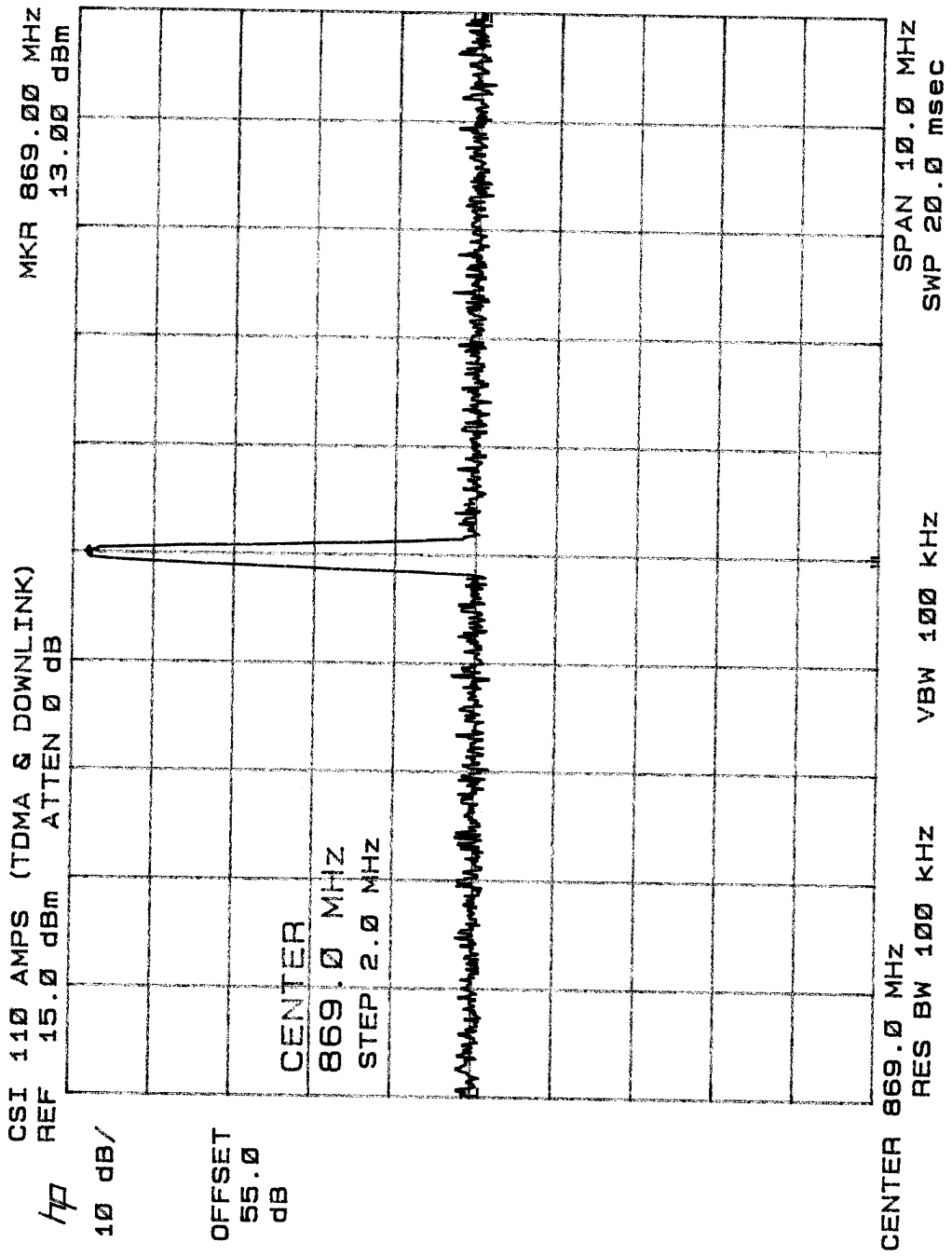
UPLINK

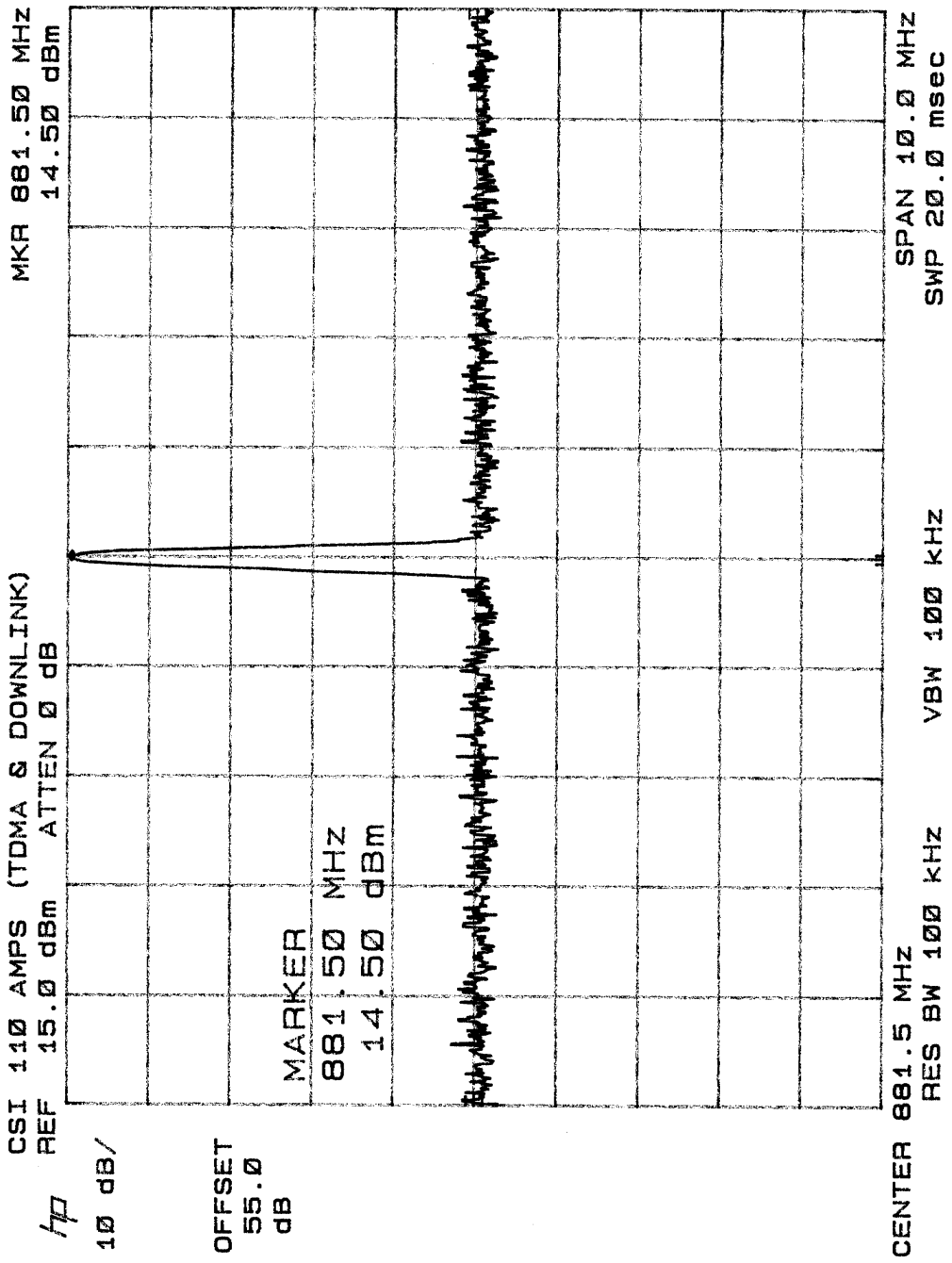
RF Power Output Plots		
GSM	Low 25dBm	Page 26
	Middle 25dBm	Page 27
	High 25dBm	Page 28
TDMA	Low 25dBm	Page 23
	Middle 25dBm	Page 24
	High 25dBm	Page 25
CDMA	Low 25dBm	Page 20
	Middle 25dBm	Page 21
	High 25dBm	Page 22

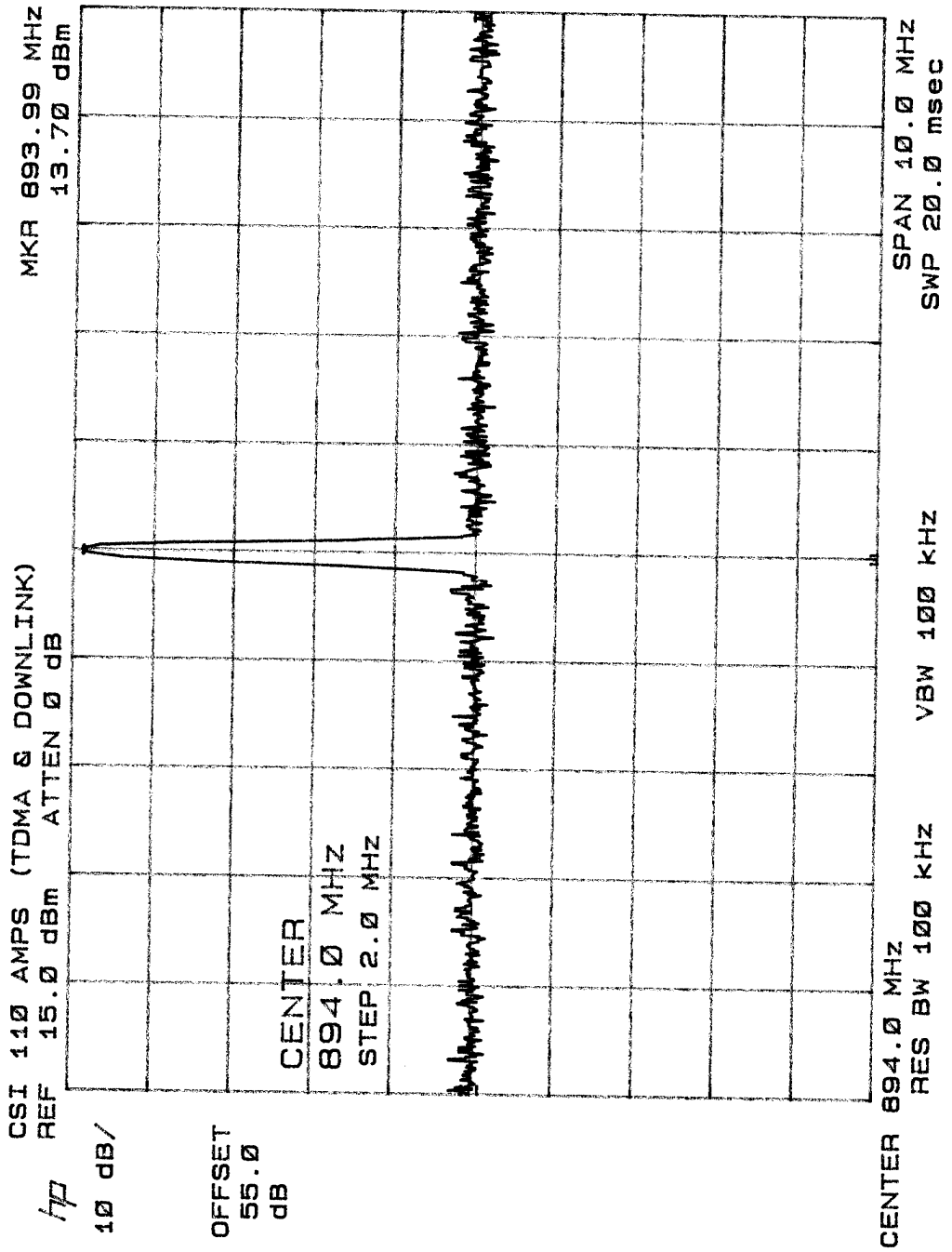

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 869.00 MHz
13.30 dBm
10 dB/
OFFSET
55.0
dB
CENTER
869.0 MHz
STEP 2.0 MHz
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

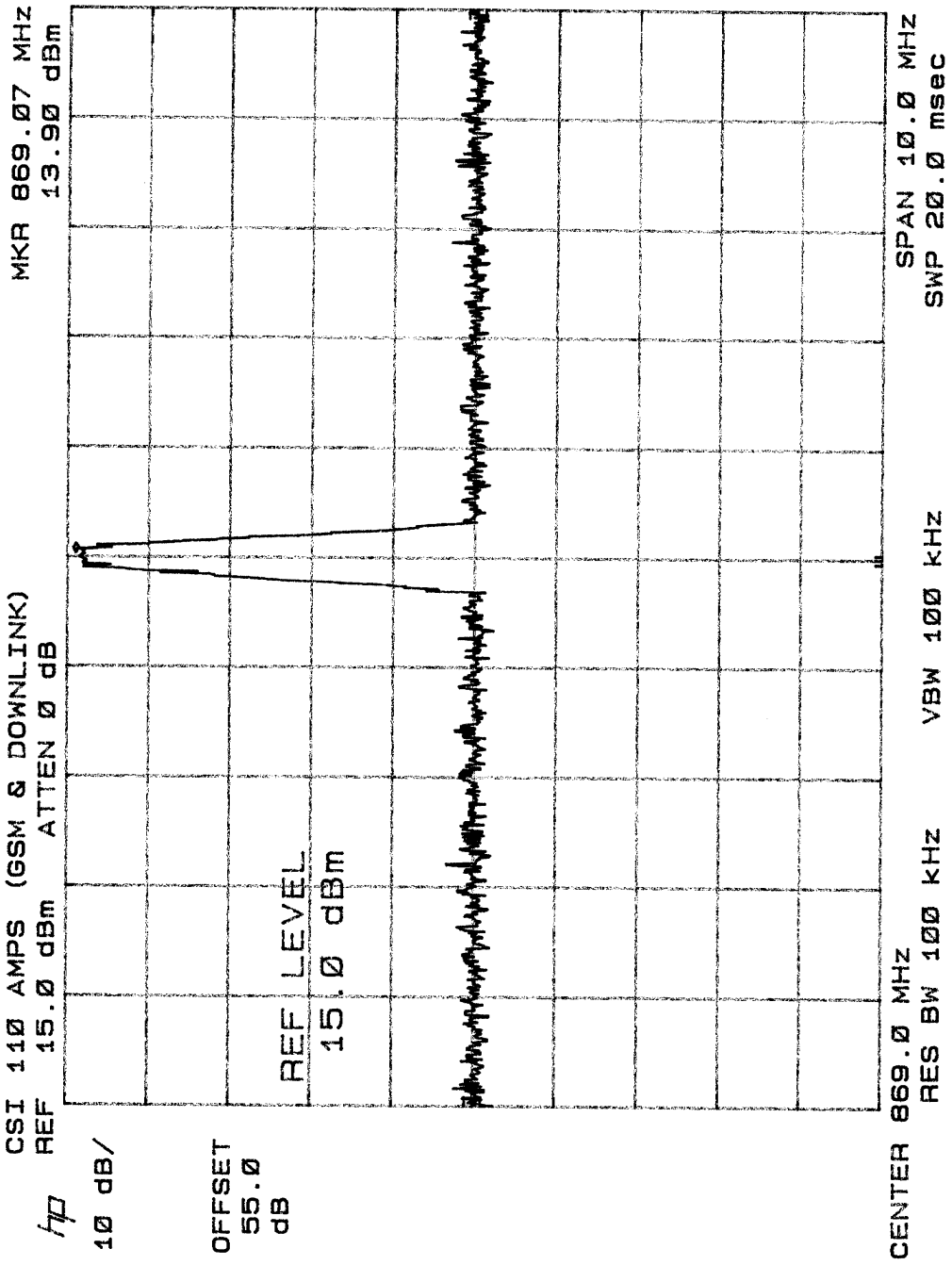

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 881.49 MHz
14.40 dBm
10 dB/
OFFSET
55.0
dB
CENTER
881.5 MHz
STEP 2.0 MHz
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

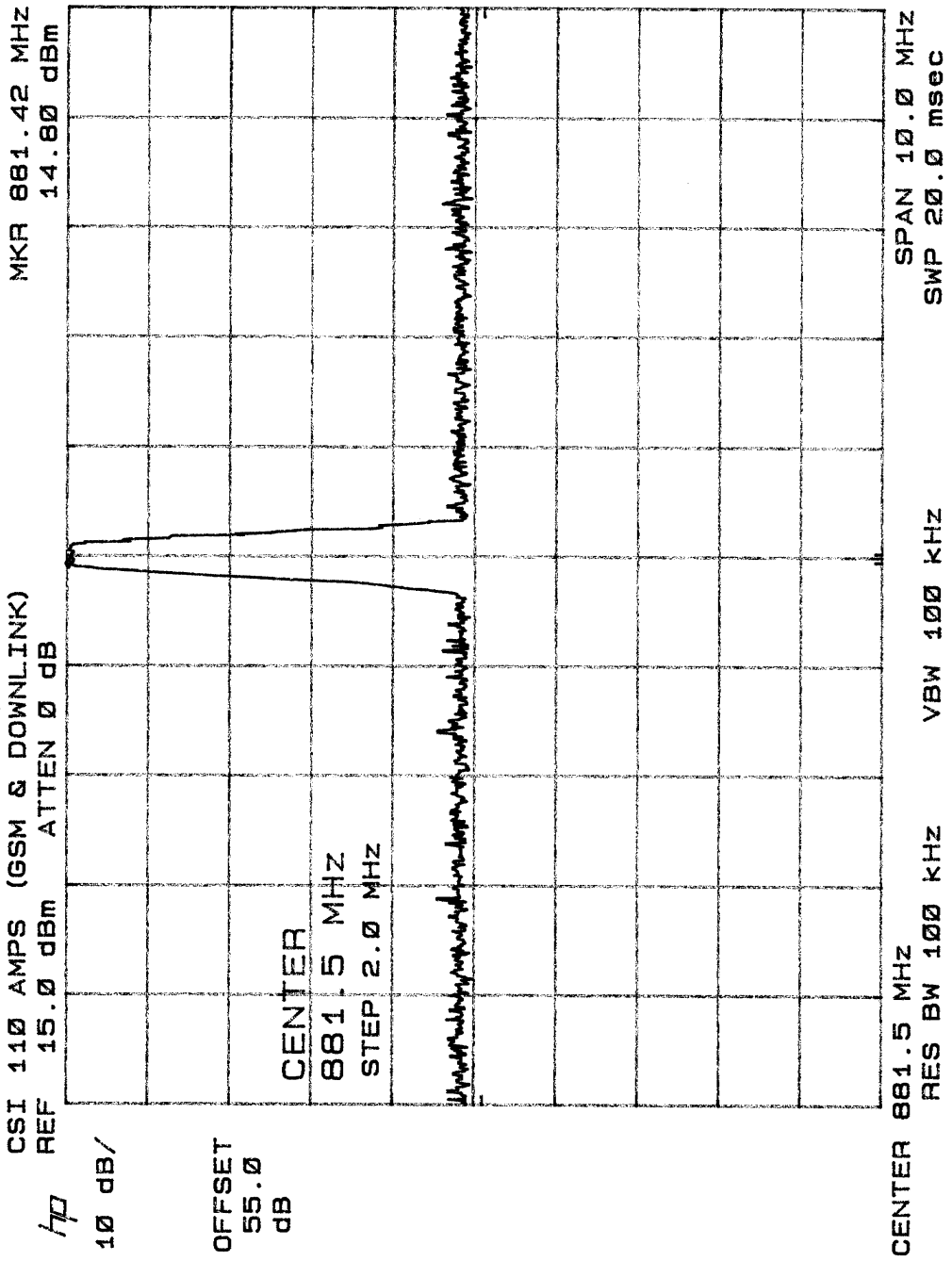

MKR 894.02 MHz
14.50 dBm
CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 894.0 MHz
RES BW 100 kHz

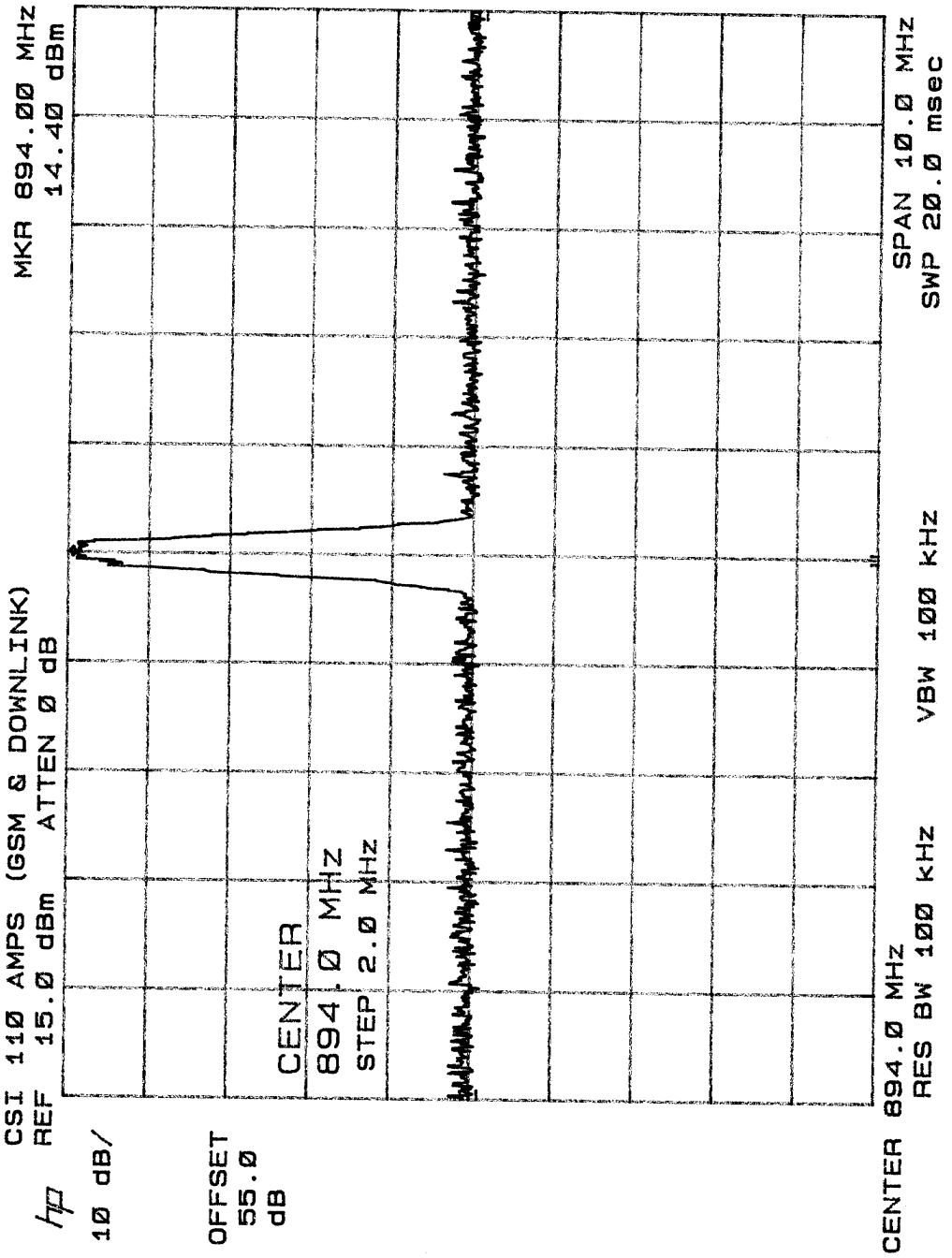

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 869.00 MHz
13.00 dBm
10 dB/
OFFSET
55.0
dB
CENTER
869.0 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 869.0 MHz
RES BW 100 kHz

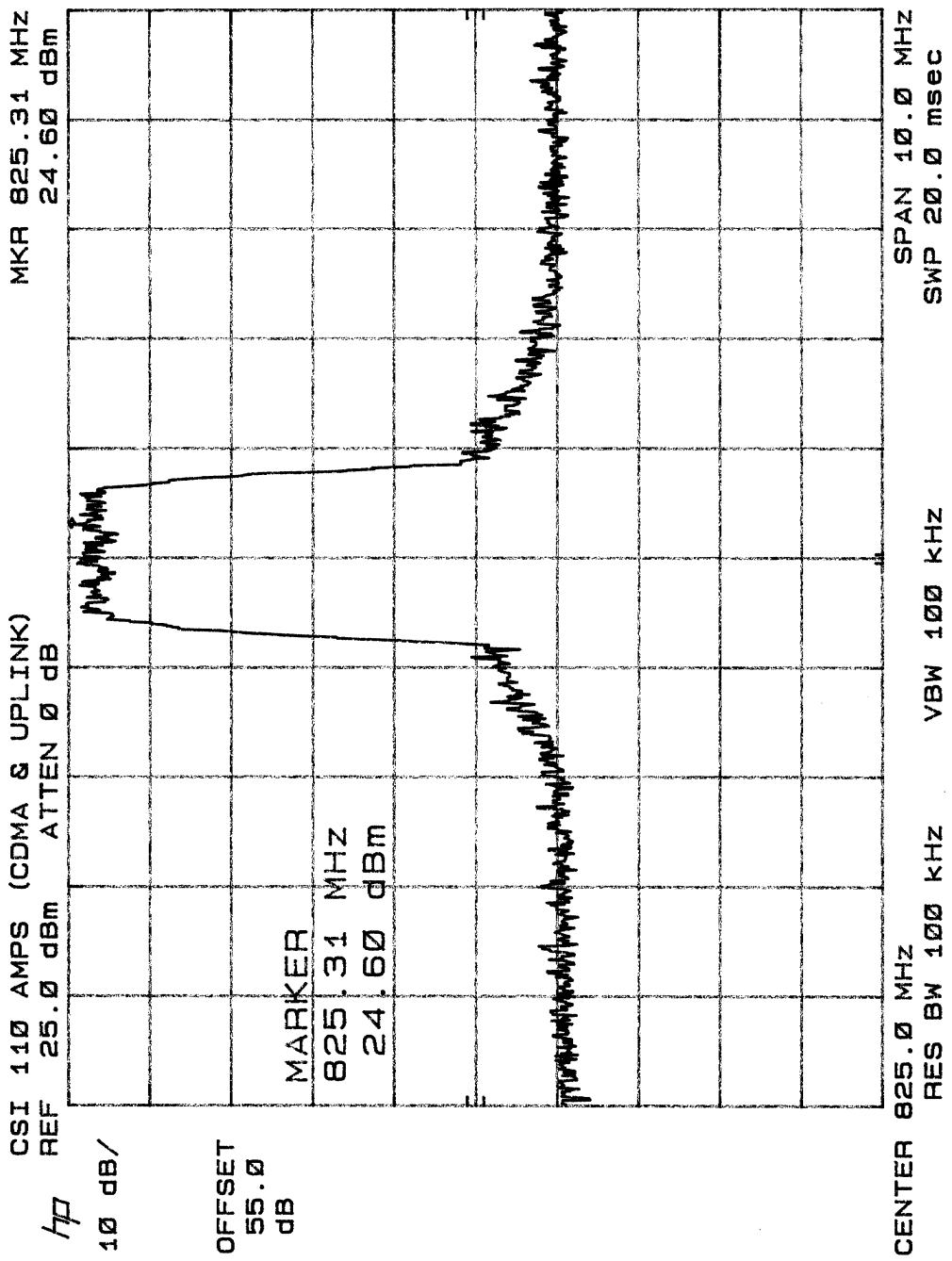

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 881.50 MHz
14.50 dBm
10 dB/
OFFSET
55.0
dB
MARKER
881.50 MHz
14.50 dBm
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

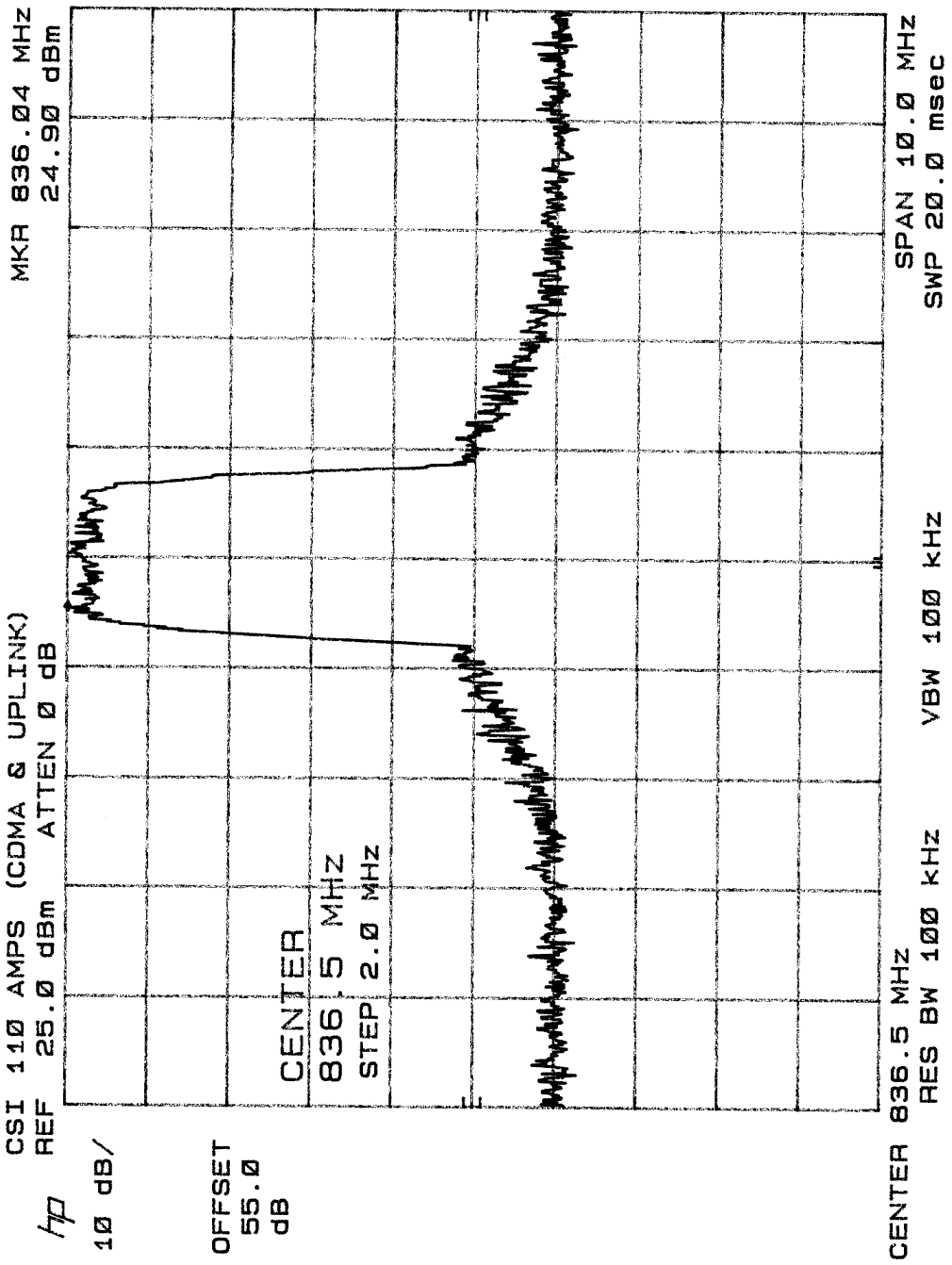

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 893.99 MHz
13.70 dBm
10 dB/
OFFSET
55.0
dB
CENTER
894.0 MHz
STEP 2.0 MHz
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

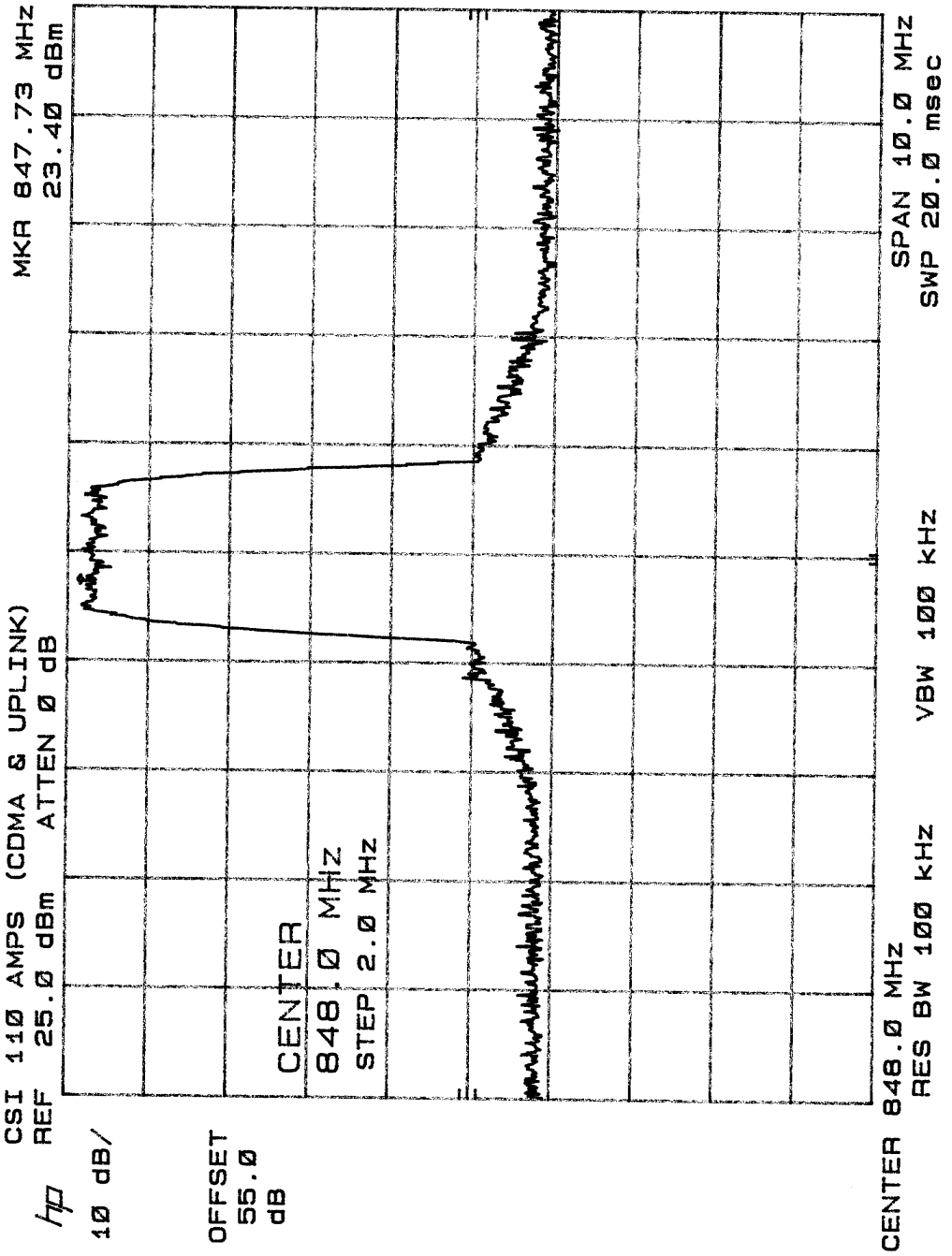

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 869.07 MHz
13.90 dBm
10 dB/
OFFSET
55.0
dB
REF LEVEL
15.0 dBm
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

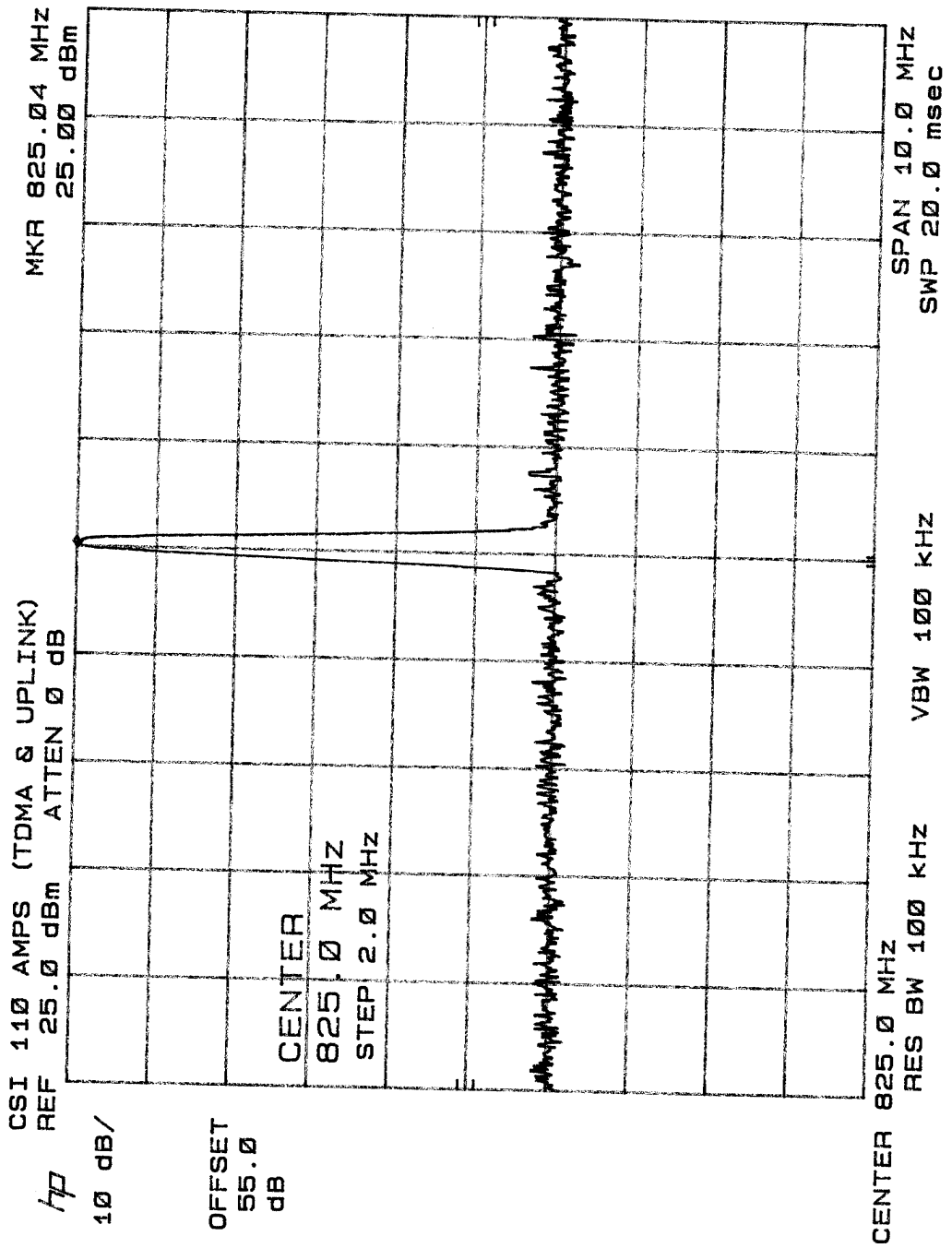

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 881.42 MHz
14.80 dBm
10 dB/
OFFSET
55.0
dB
CENTER
881.5 MHz
STEP 2.0 MHz
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

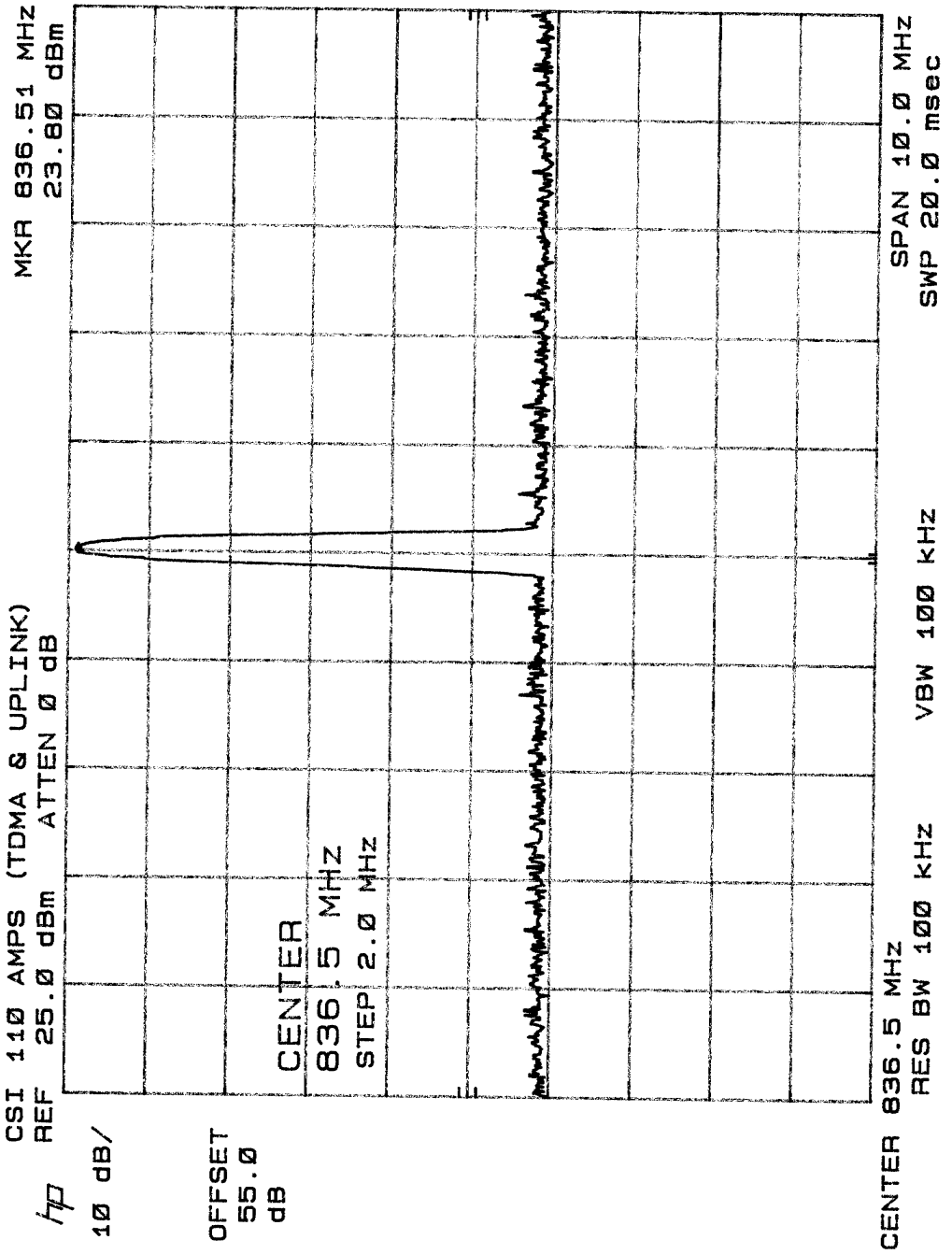

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 894.00 MHz
14.40 dBm
10 dB/
OFFSET
55.0
dB
CENTER
894.0 MHz
STEP 2.0 MHz
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

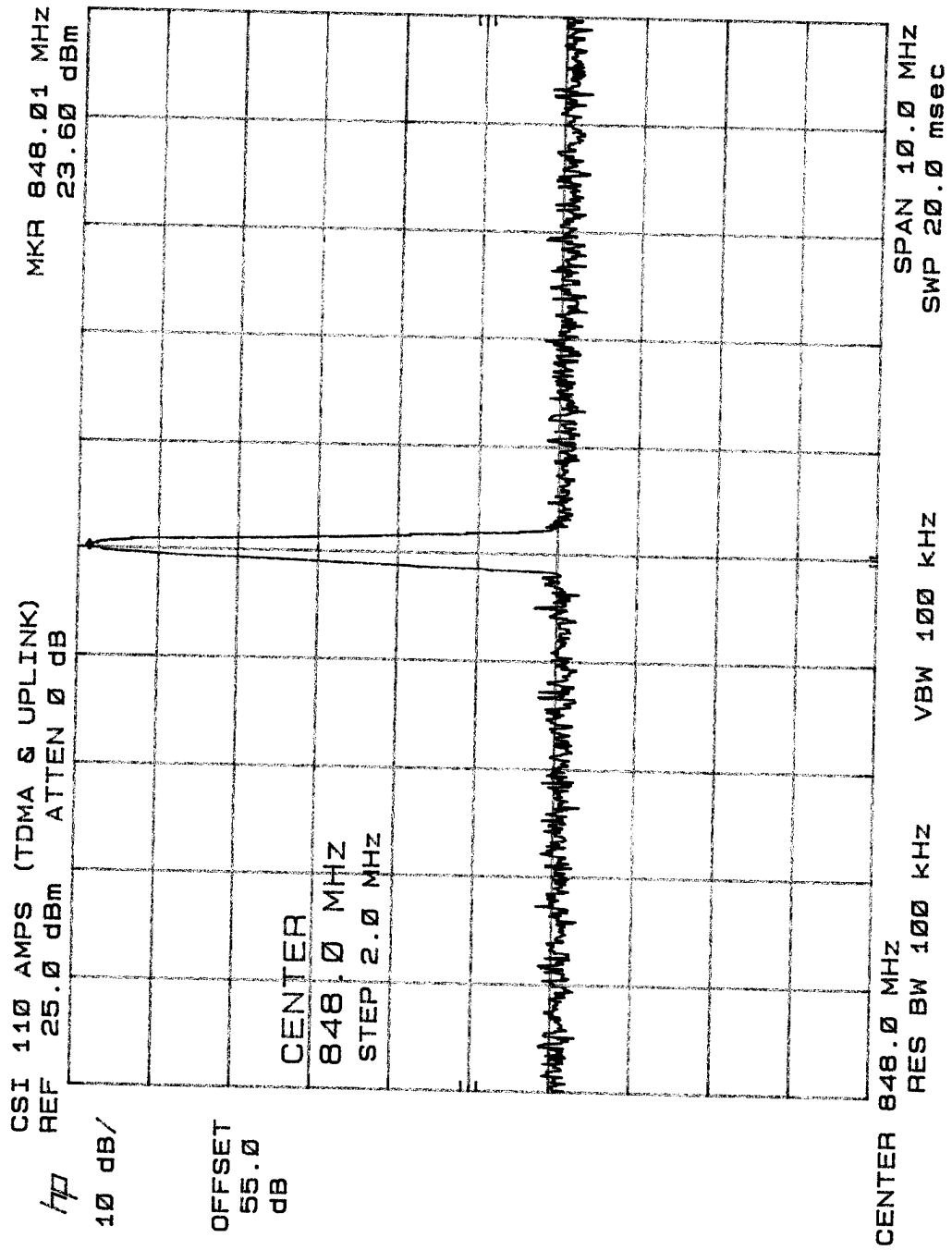

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 825.31 MHz
24.60 dBm
10 dB/
OFFSET
55.0
dB
MARKER
825.31 MHz
24.60 dBm
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

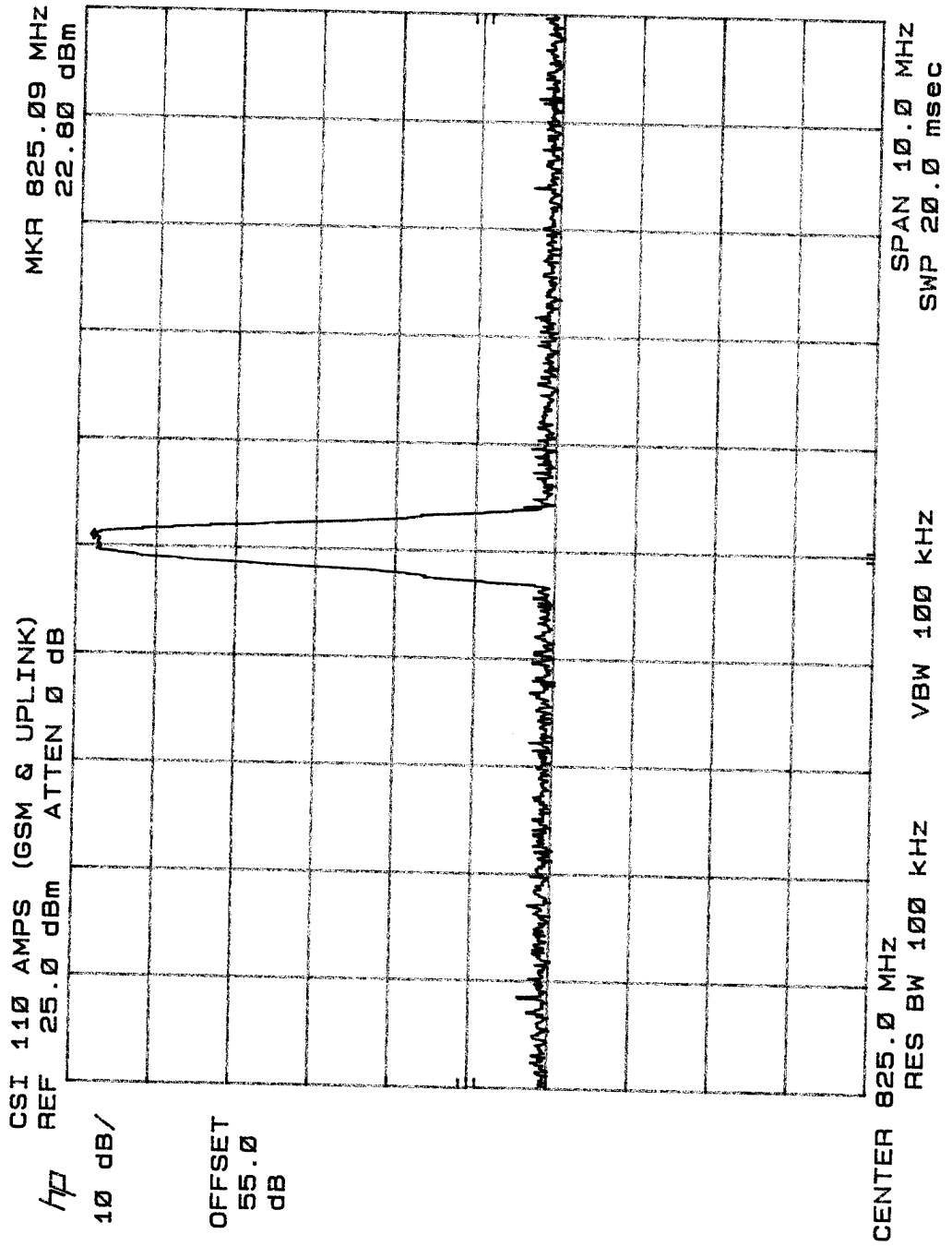

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 836.04 MHz
24.90 dBm
10 dB/
OFFSET
55.0
dB
CENTER
836.5 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz

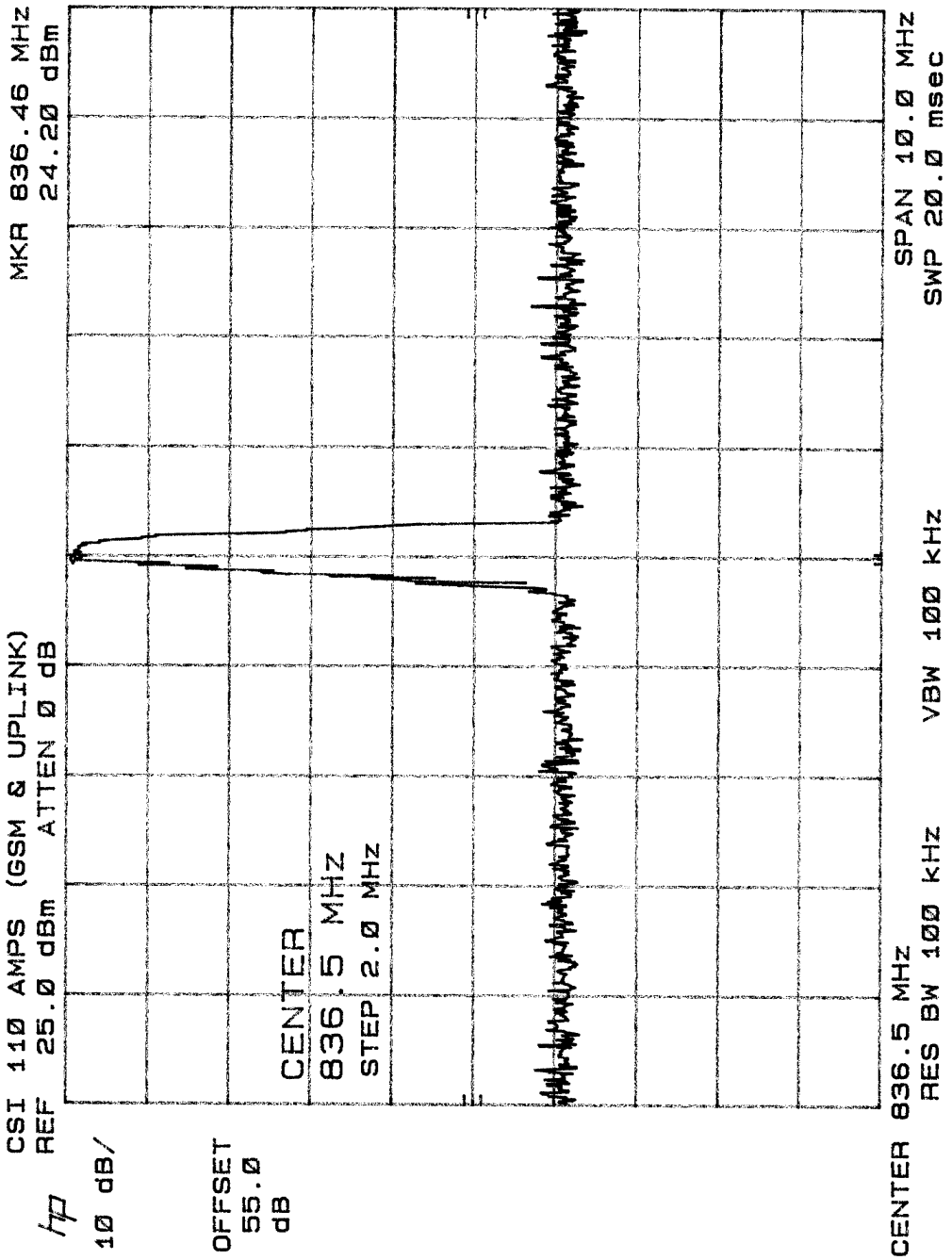

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 847.73 MHz
23.40 dBm
10 dB/
OFFSET
55.0
dB
CENTER
848.0 MHz
STEP 2.0 MHz
CENTER 848.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

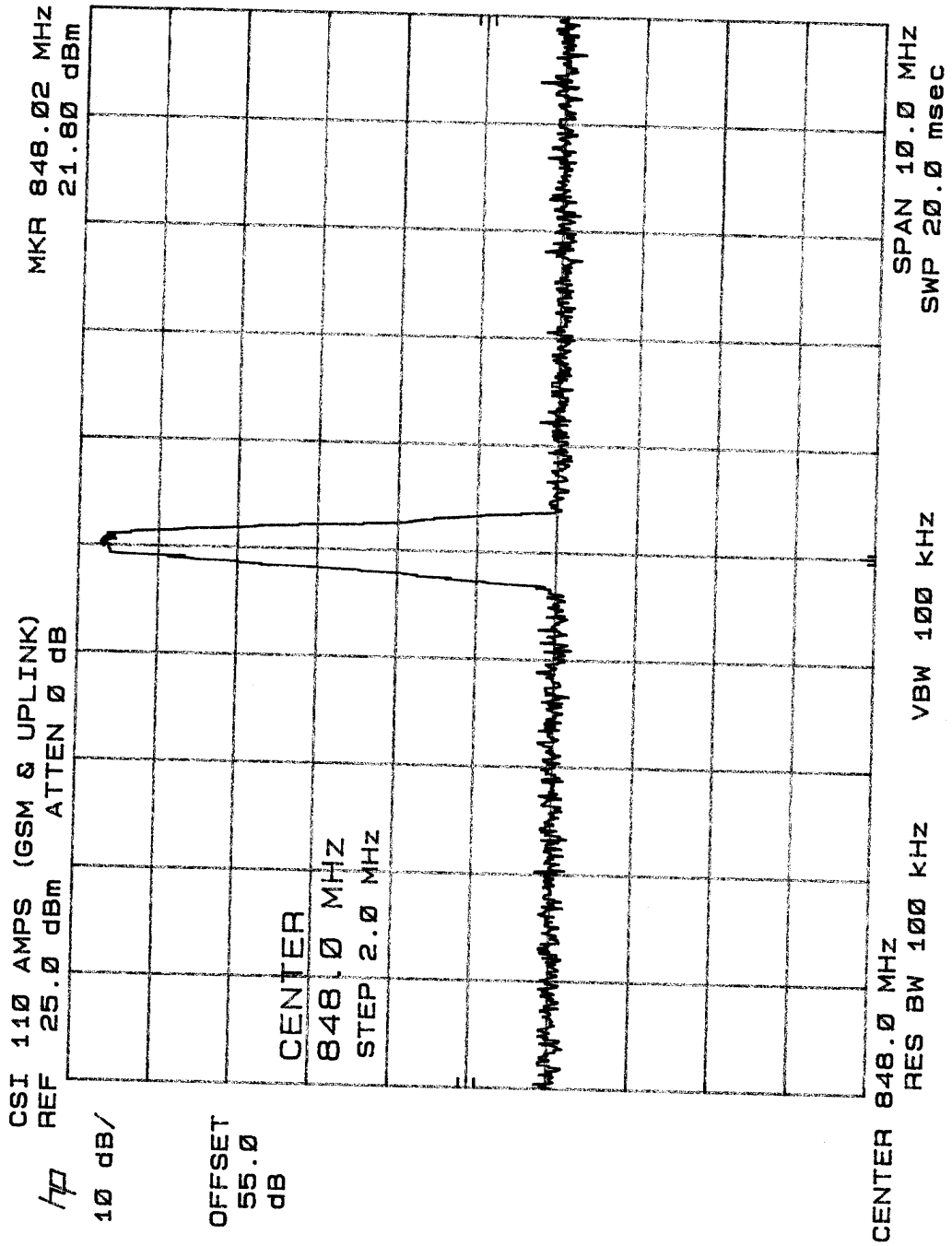

MKR 825.04 MHz
25.00 dBm
CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
CENTER
825.0 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 825.0 MHz
RES BW 100 kHz


CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 836.51 MHz
23.80 dBm
10 dB/
OFFSET
55.0
dB
CENTER
836.5 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 836.5 MHz
RES BW 100 kHz


CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 848.01 MHz
23.60 dBm
10 dB/
OFFSET
55.0
dB
CENTER
848.0 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 848.0 MHz
RES BW 100 kHz


MKR 825.09 MHz
22.80 dBm
CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 836.46 MHz
24.20 dBm
10 dB/
OFFSET
55.0
dB
CENTER
836.5 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 848.02 MHz
21.80 dBm
10 dB/
OFFSET
55.0
dB
CENTER
848.0 MHz
STEP 2.0 MHz
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 848.0 MHz
RES BW 100 kHz

3.2.0 Modulation Characteristics

Requirement: FCC 2.987

3.2.1 Test Procedure

For this device, three digital modes are used by EUT. The RF carrier was modulated by the Rohde and Schwarz AMIQ I/Q and Rohde and Schwarz SMIQ03B. Since digital is used and no analog, frequency response of EUT was not performed. Test was performed both at Uplink and DownLink.

3.2.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

3.2.3 Test Results:

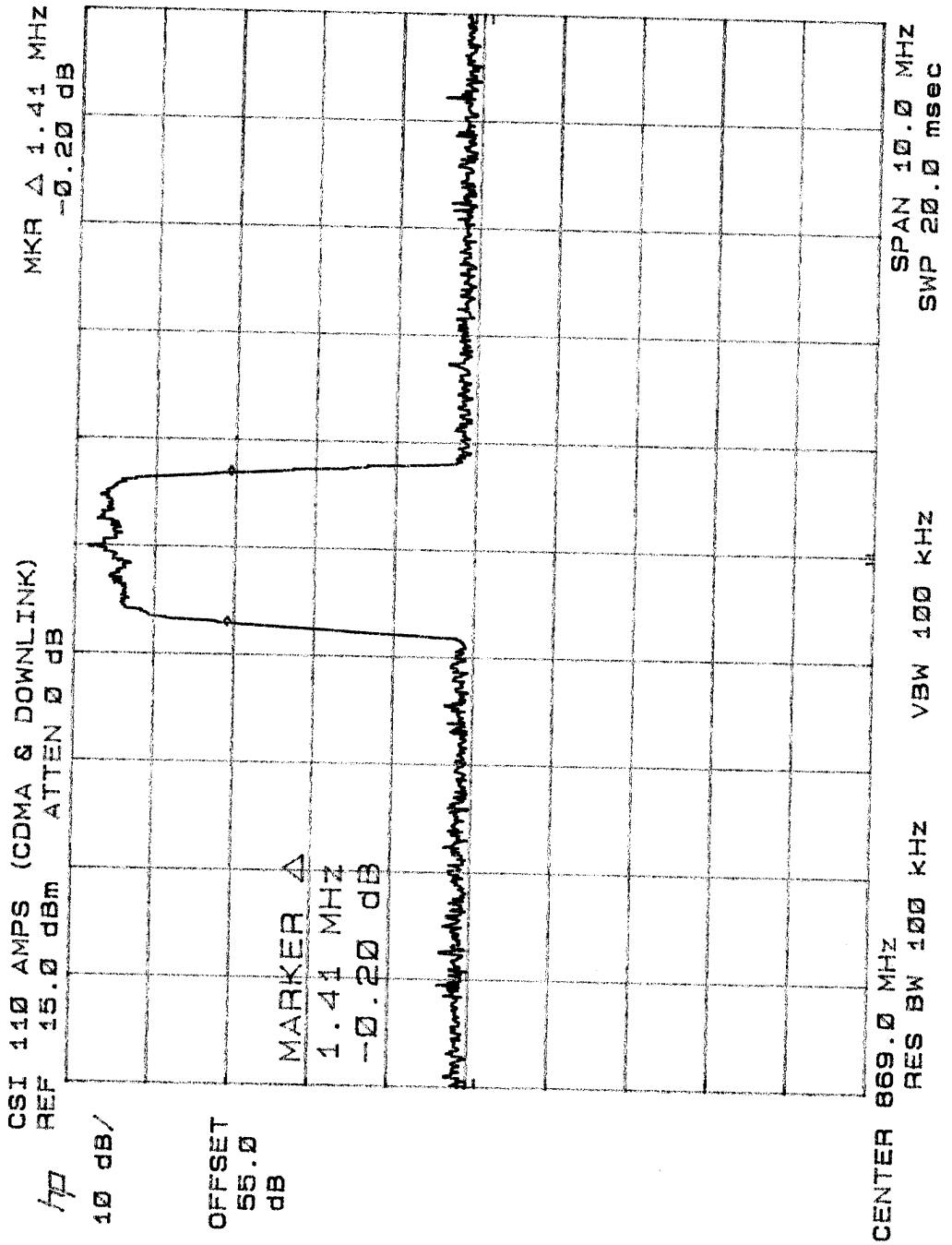
Included are plots of the digital modulation for low, middle and high channel showing the 20dB bandwidth.

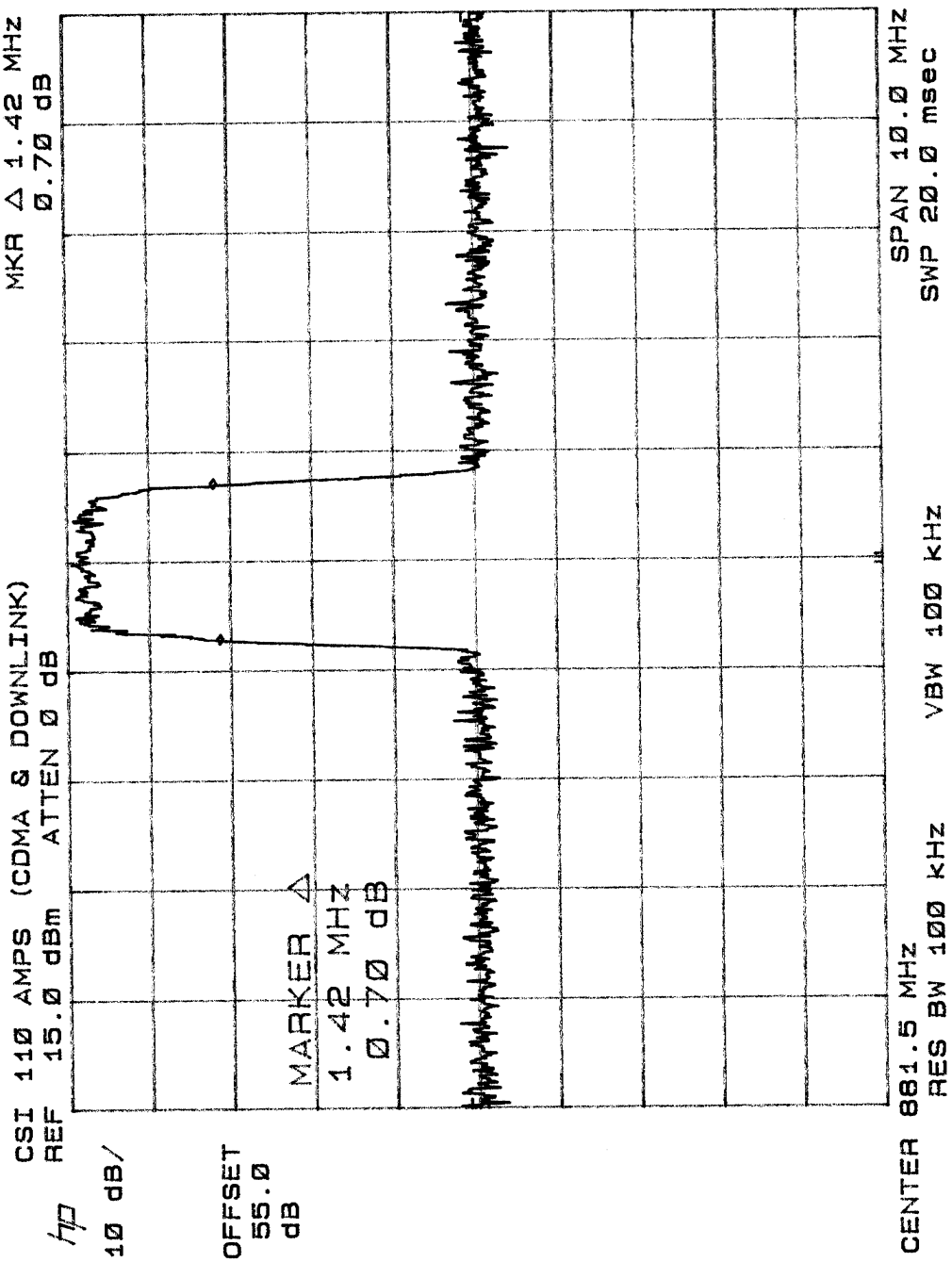
DOWNLINK

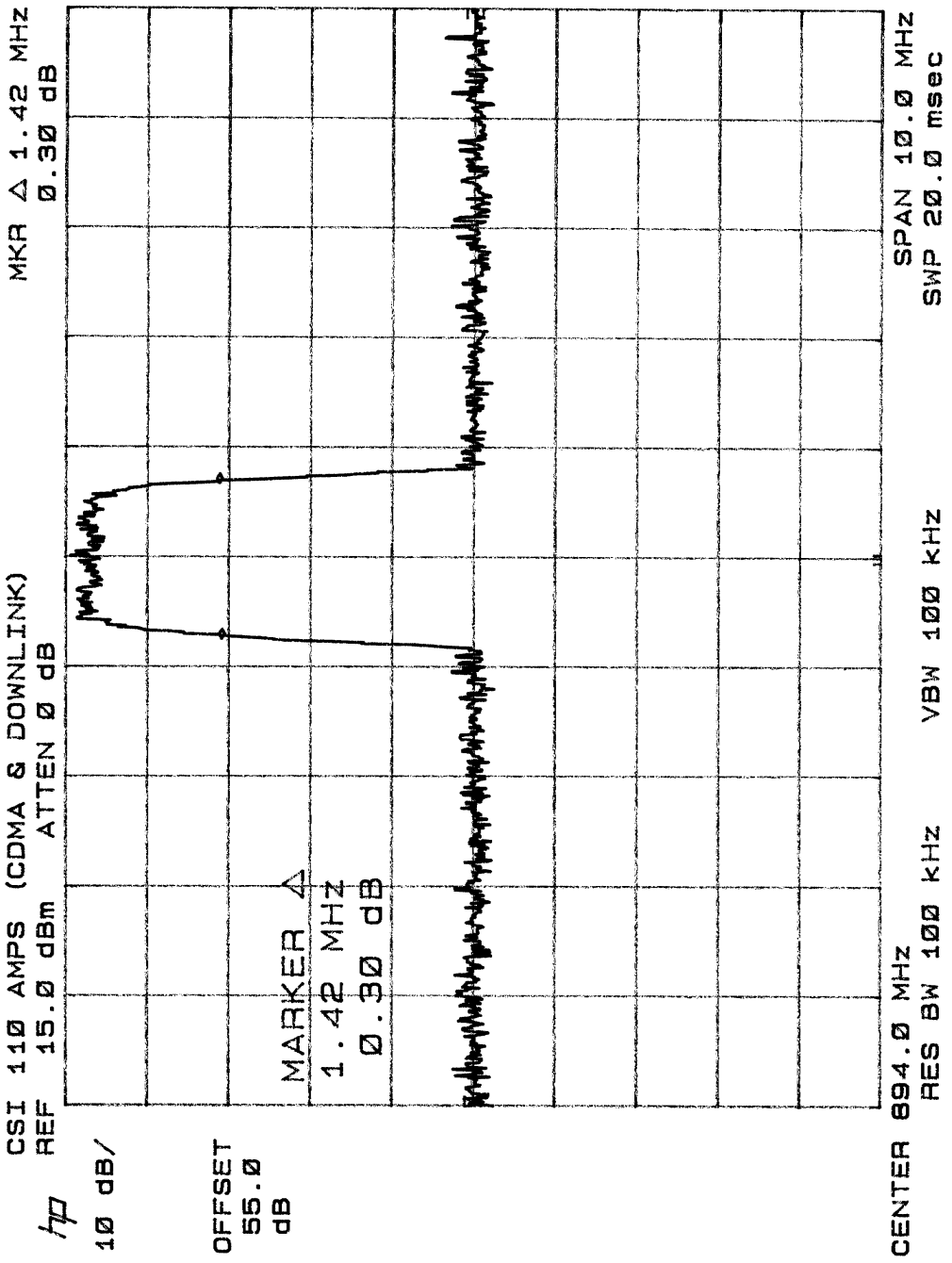
Modulation		
CDMA	Low	Page 30
	Middle	Page 31
	High	Page 32
GSM	Low	Page 36
	Middle	Page 37
	High	Page 38
TDMA	Low	Page 33
	Middle	Page 34
	High	Page 35

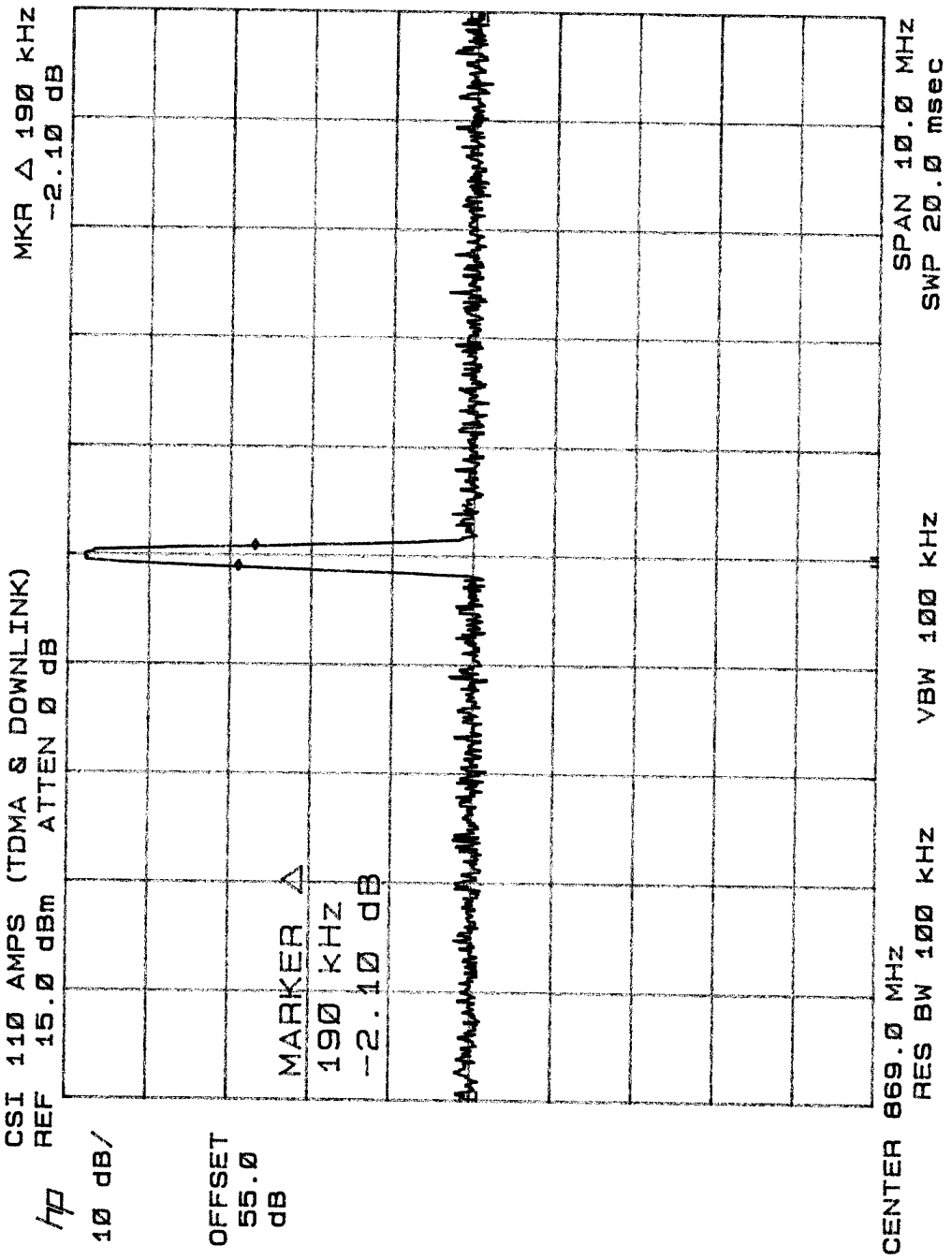
UPLINK

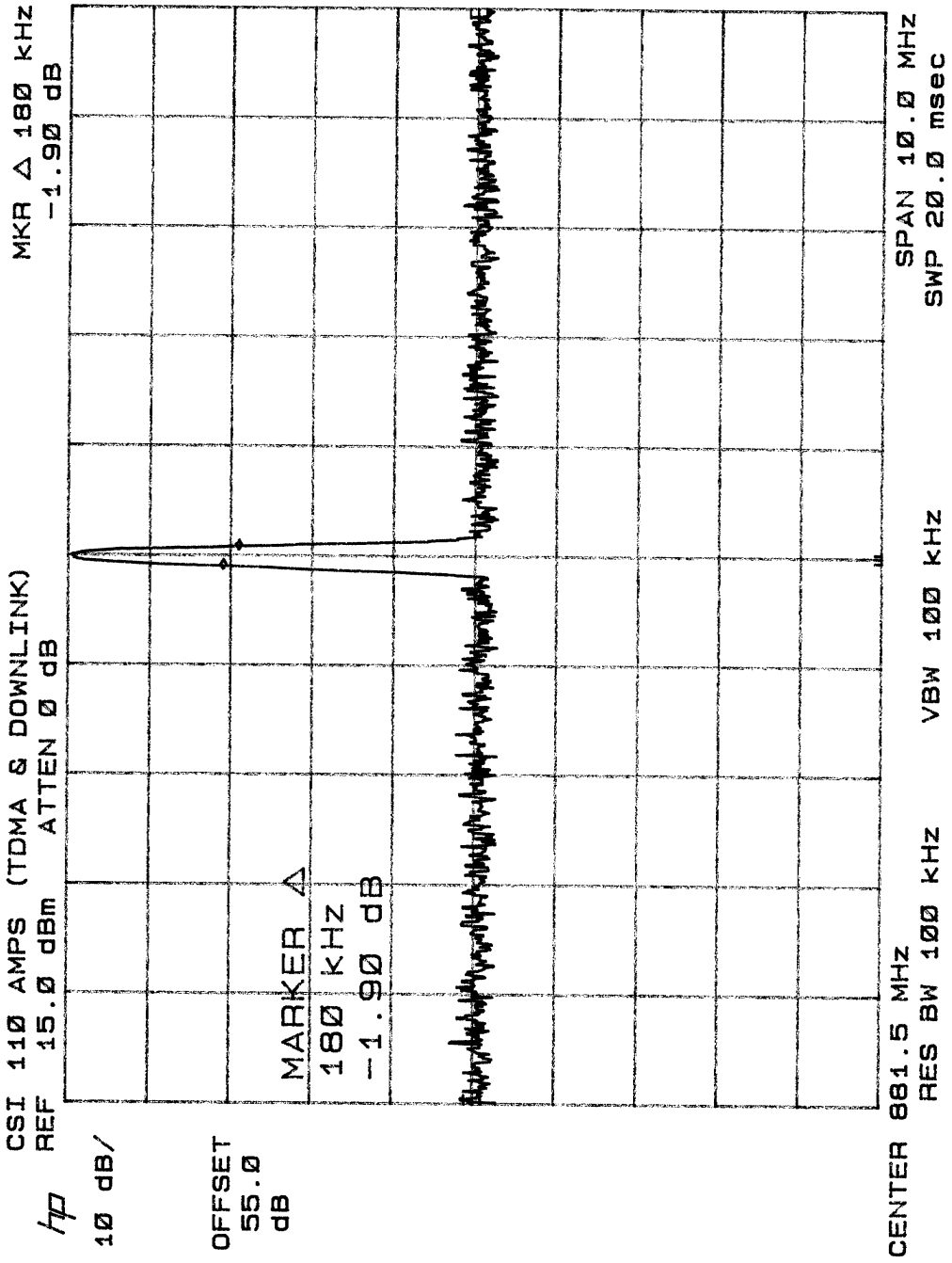
Modulation		
GSM	Low	Page 45
	Middle	Page 46
	High	Page 47
TDMA	Low	Page 42
	Middle	Page 43
	High	Page 44
CDMA	Low	Page 39
	Middle	Page 40
	High	Page 41

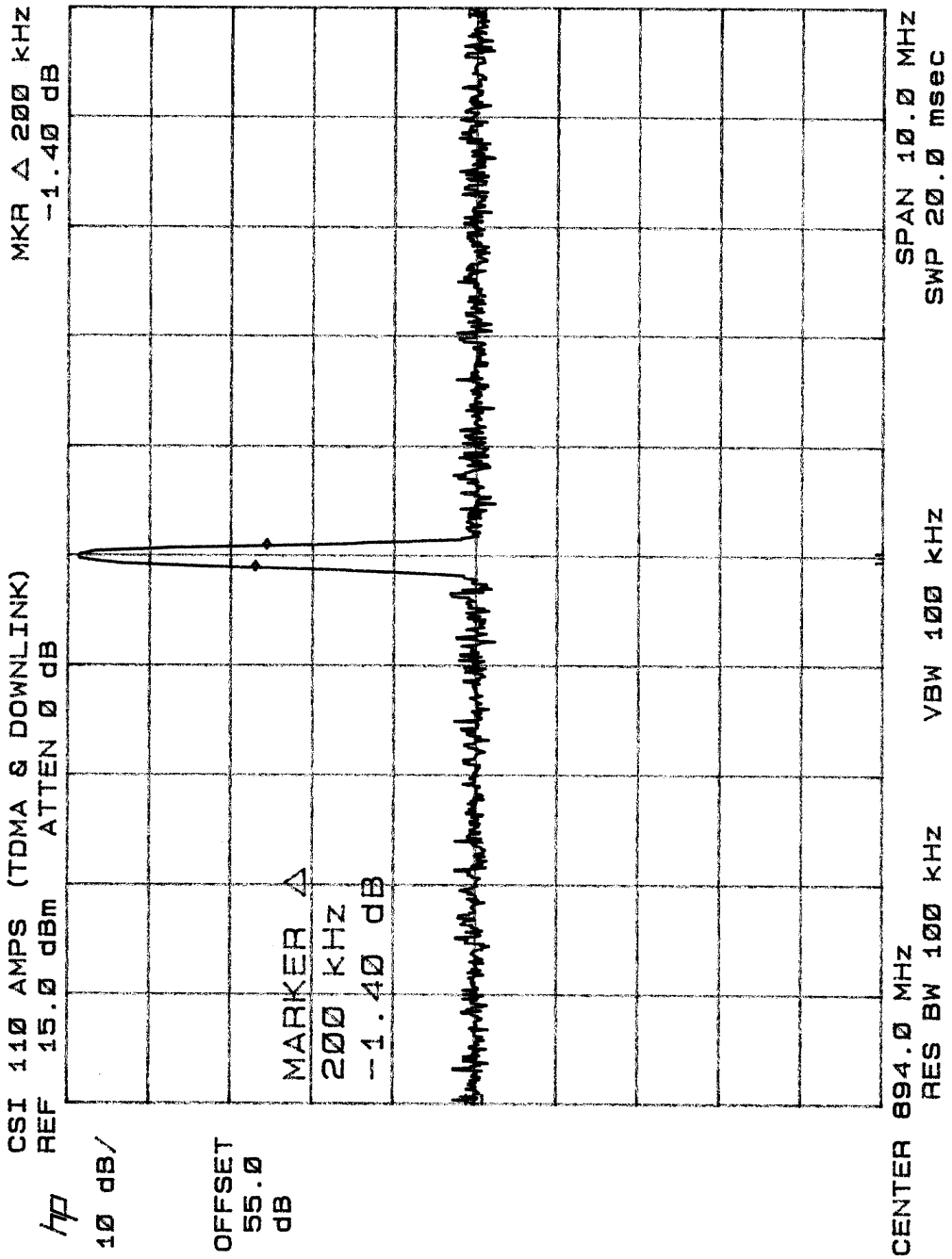

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ 1.41 MHz -0.20 dB
MKR Δ 1.41 MHz -0.20 dB
CENTER 869.0 MHz
RES BW 100 kHz VBW 100 kHz
SPAN 10.0 MHz SWP 20.0 msec

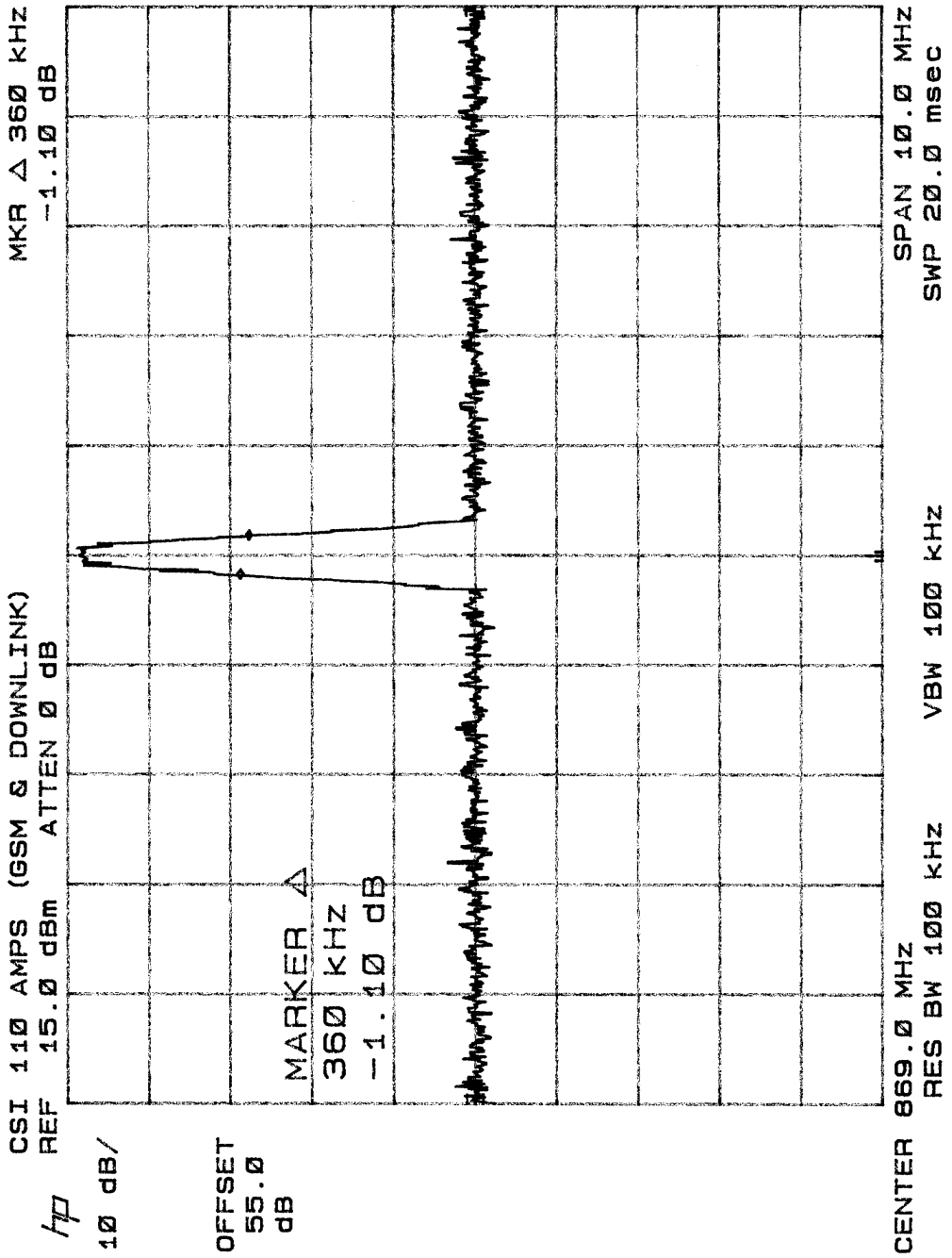

MKR Δ 1.42 MHz
0.70 dB
CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.42 MHz
0.70 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 881.5 MHz
RES BW 100 kHz

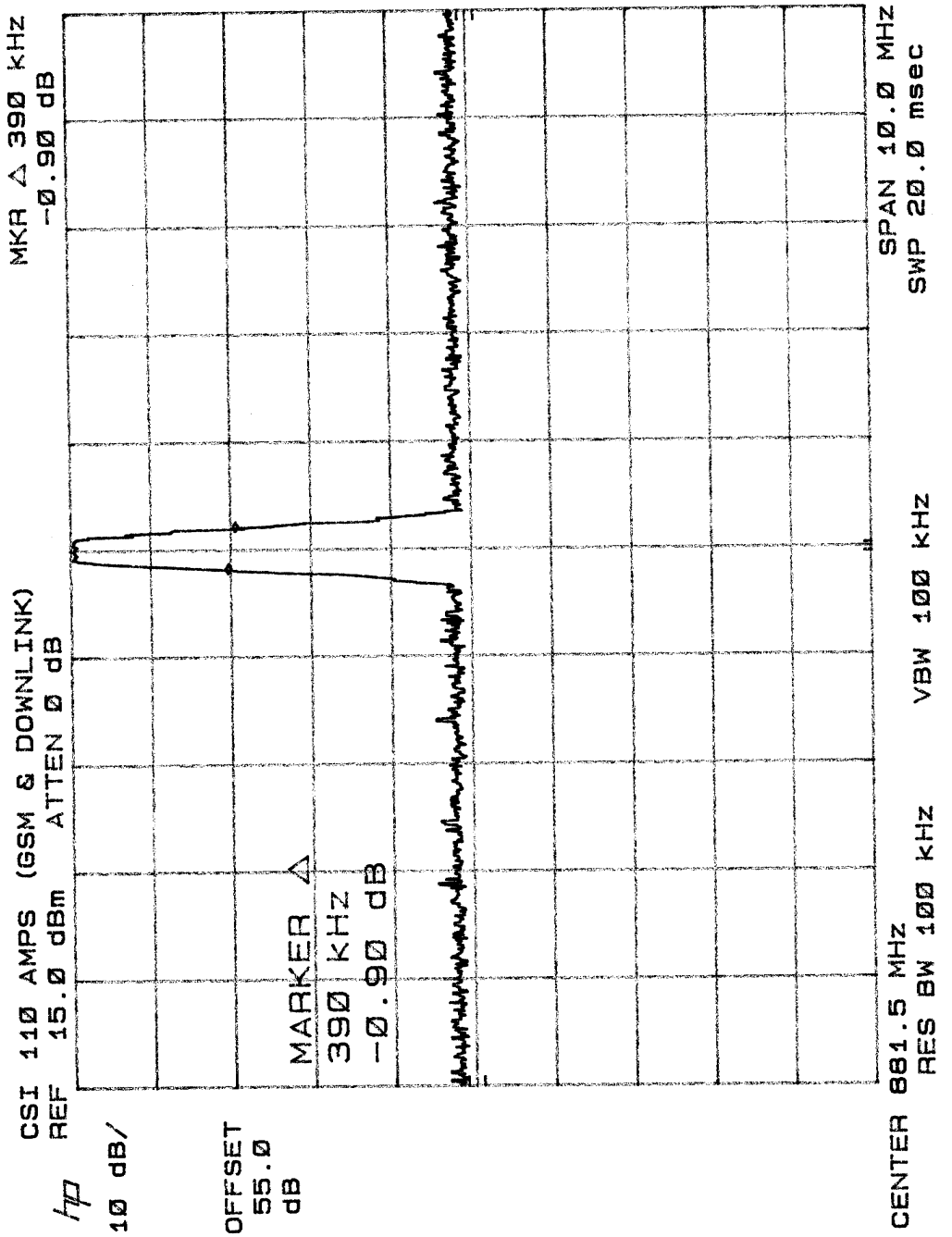

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 1.42 MHz
0.30 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.42 MHz
0.30 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

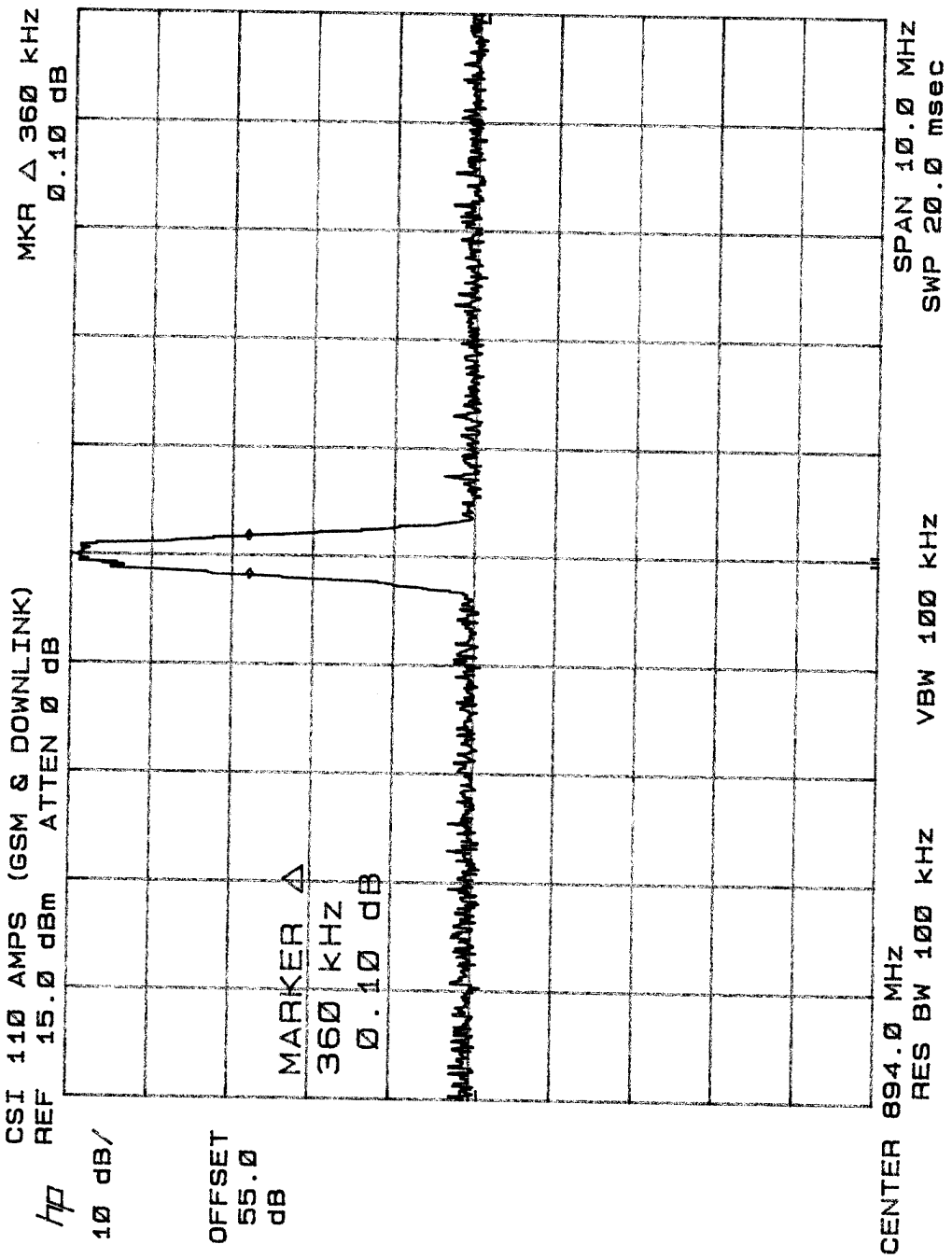

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 190 kHz
-2.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
190 kHz
-2.10 dB
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

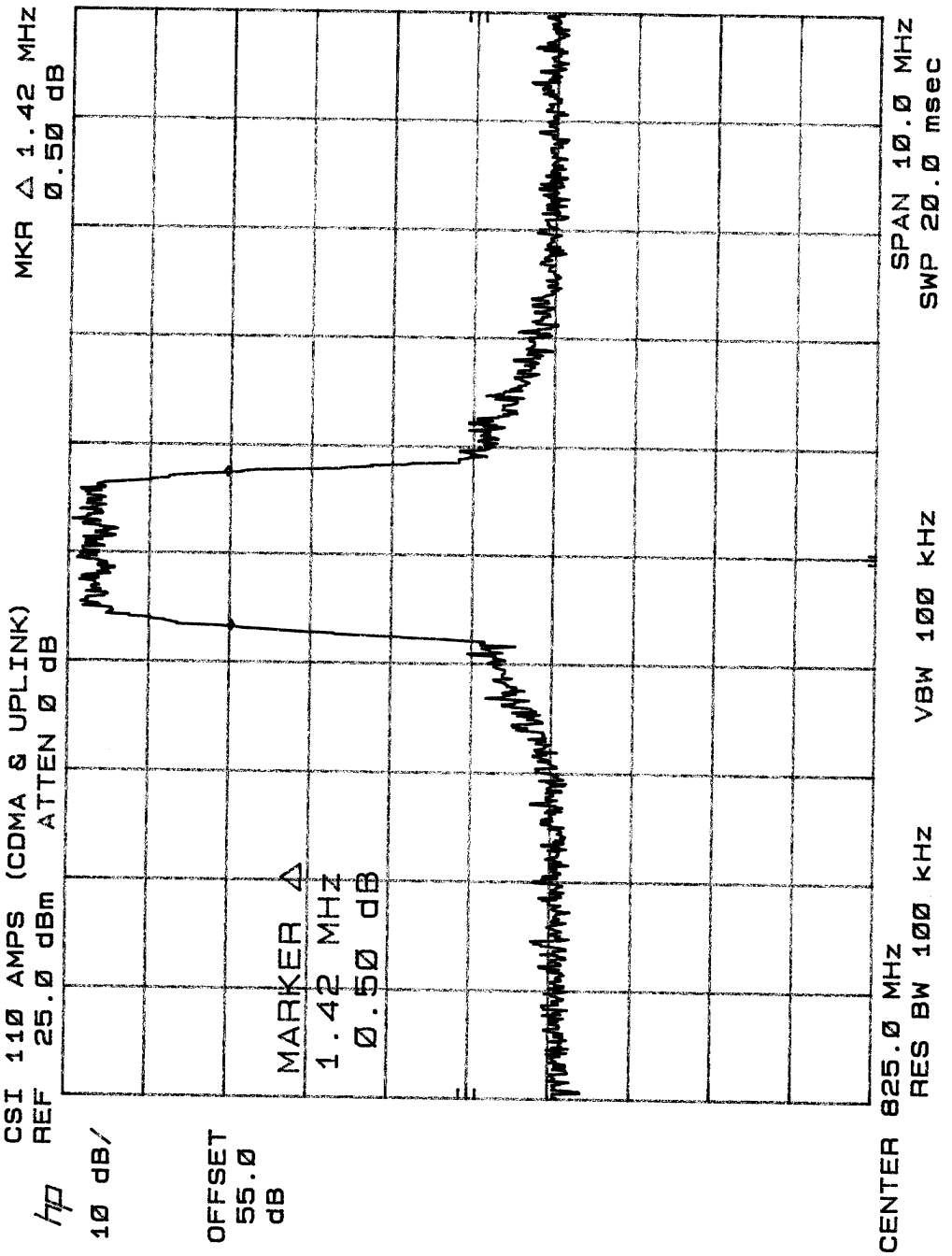

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 180 kHz
-1.90 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
180 kHz
-1.90 dB
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

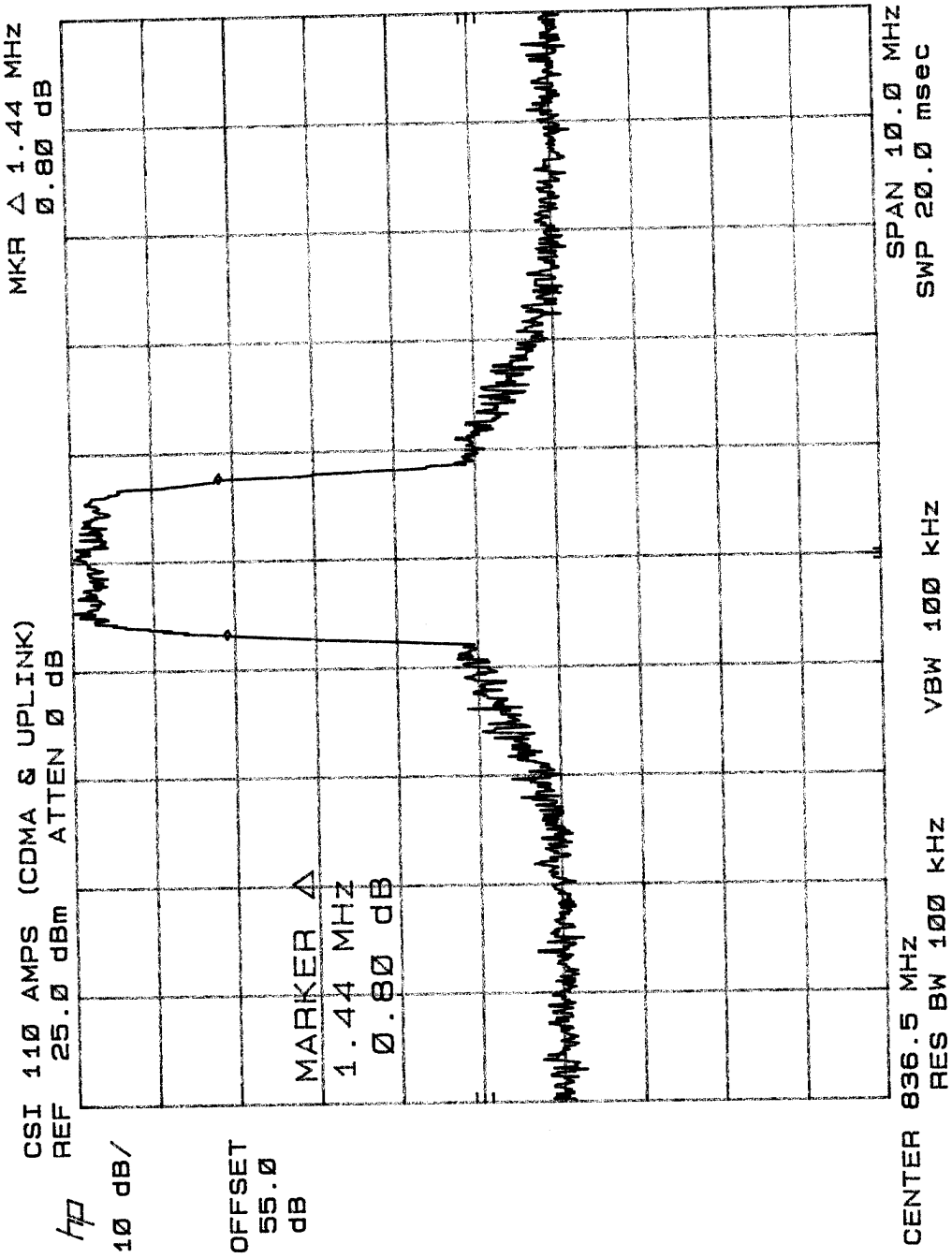

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
200 kHz
-1.40 dB
MKR Δ 200 kHz
-1.40 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

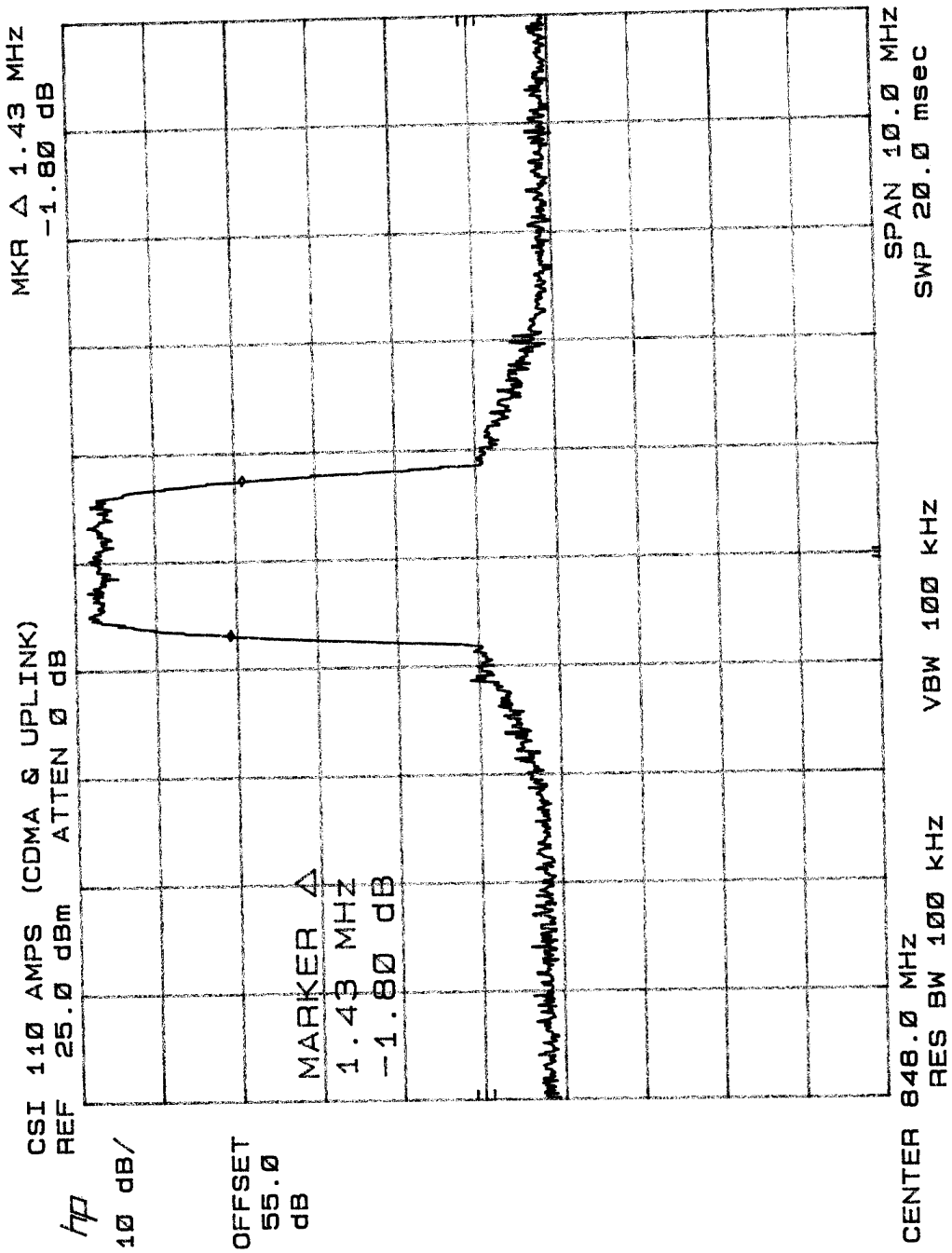

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 360 kHz
-1.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
360 kHz
-1.10 dB
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

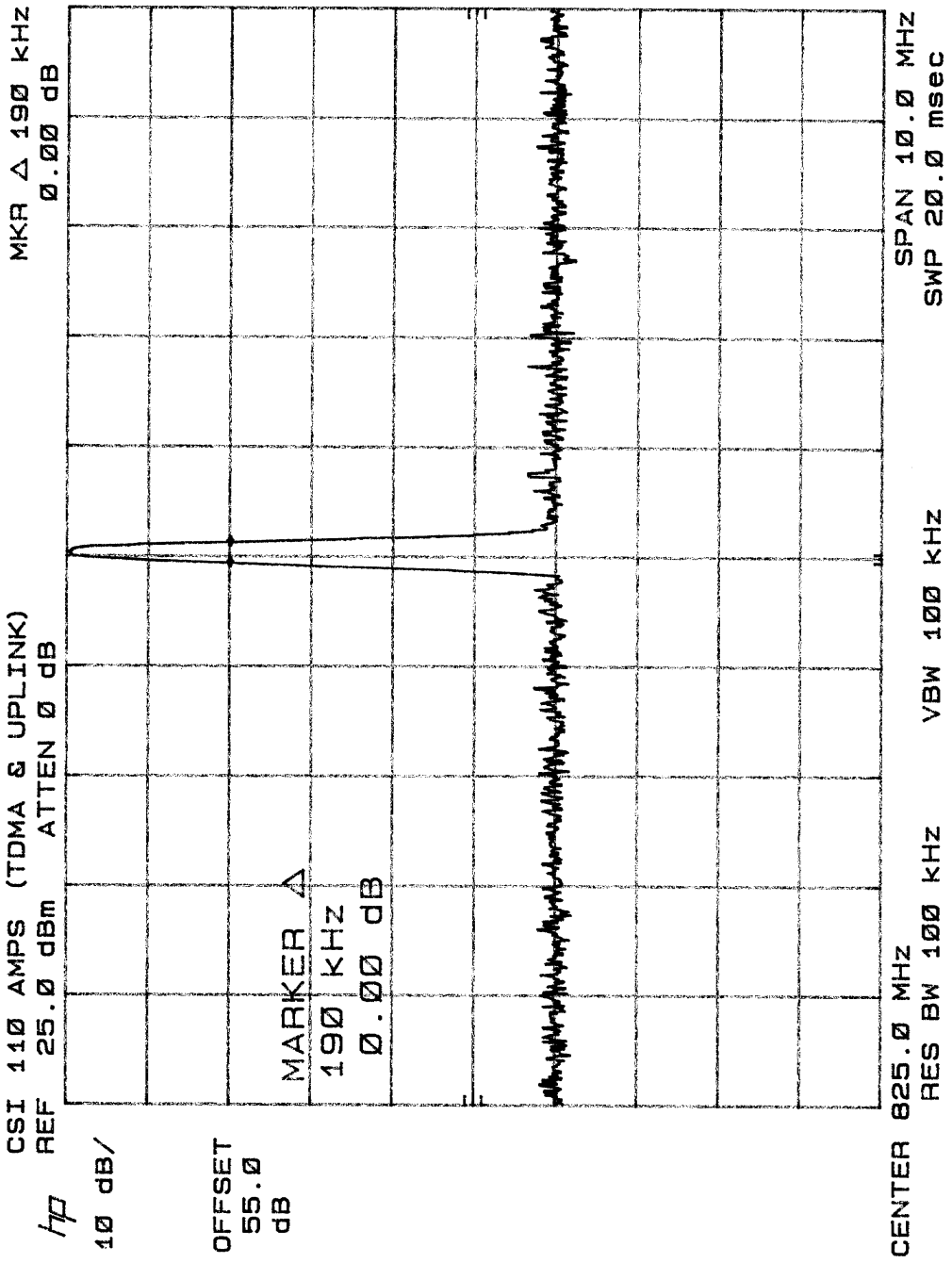

MKR Δ 390 kHz
-0.90 dB
CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
390 kHz
-0.90 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 881.5 MHz
RES BW 100 kHz

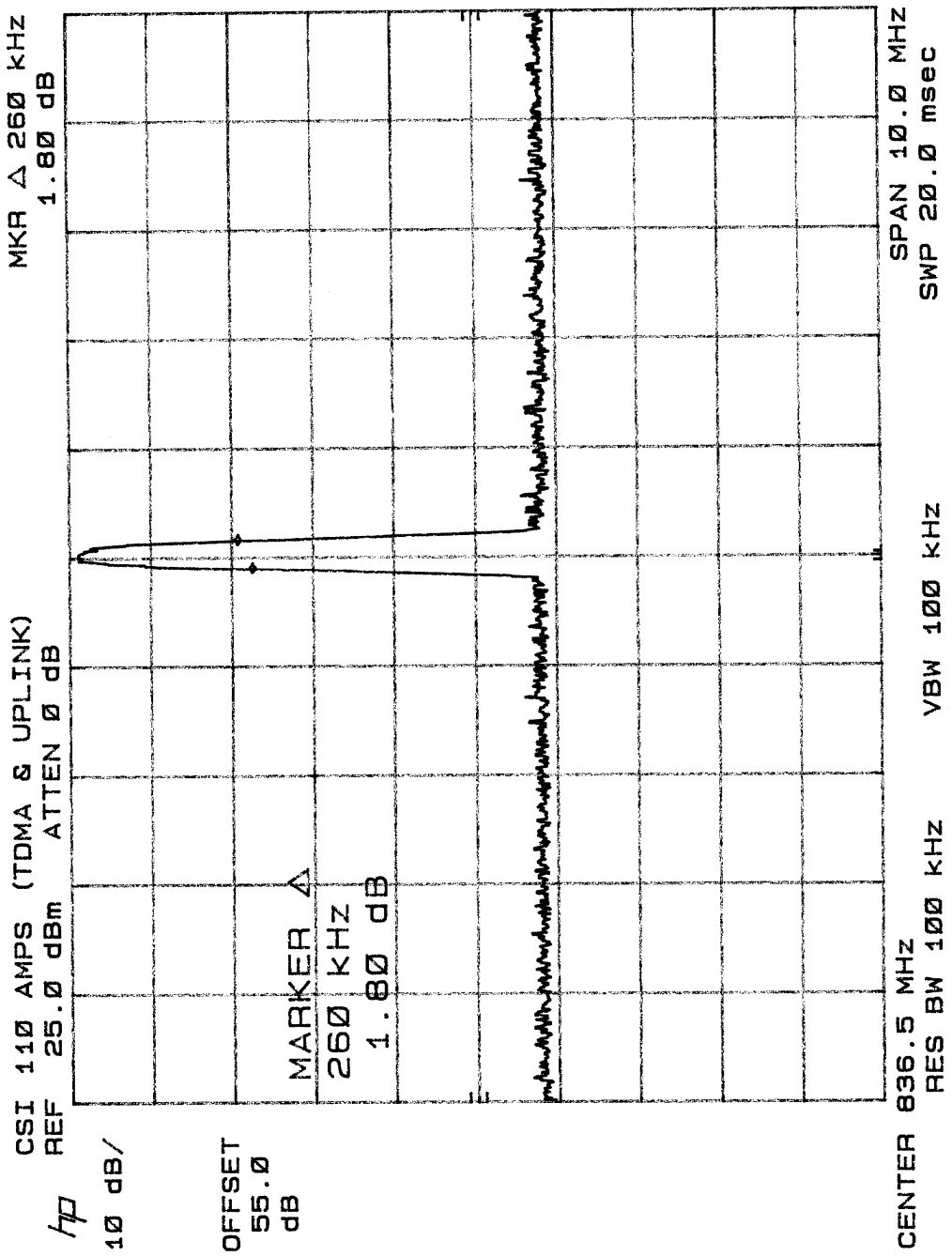

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 360 kHz
0.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
360 kHz
0.10 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

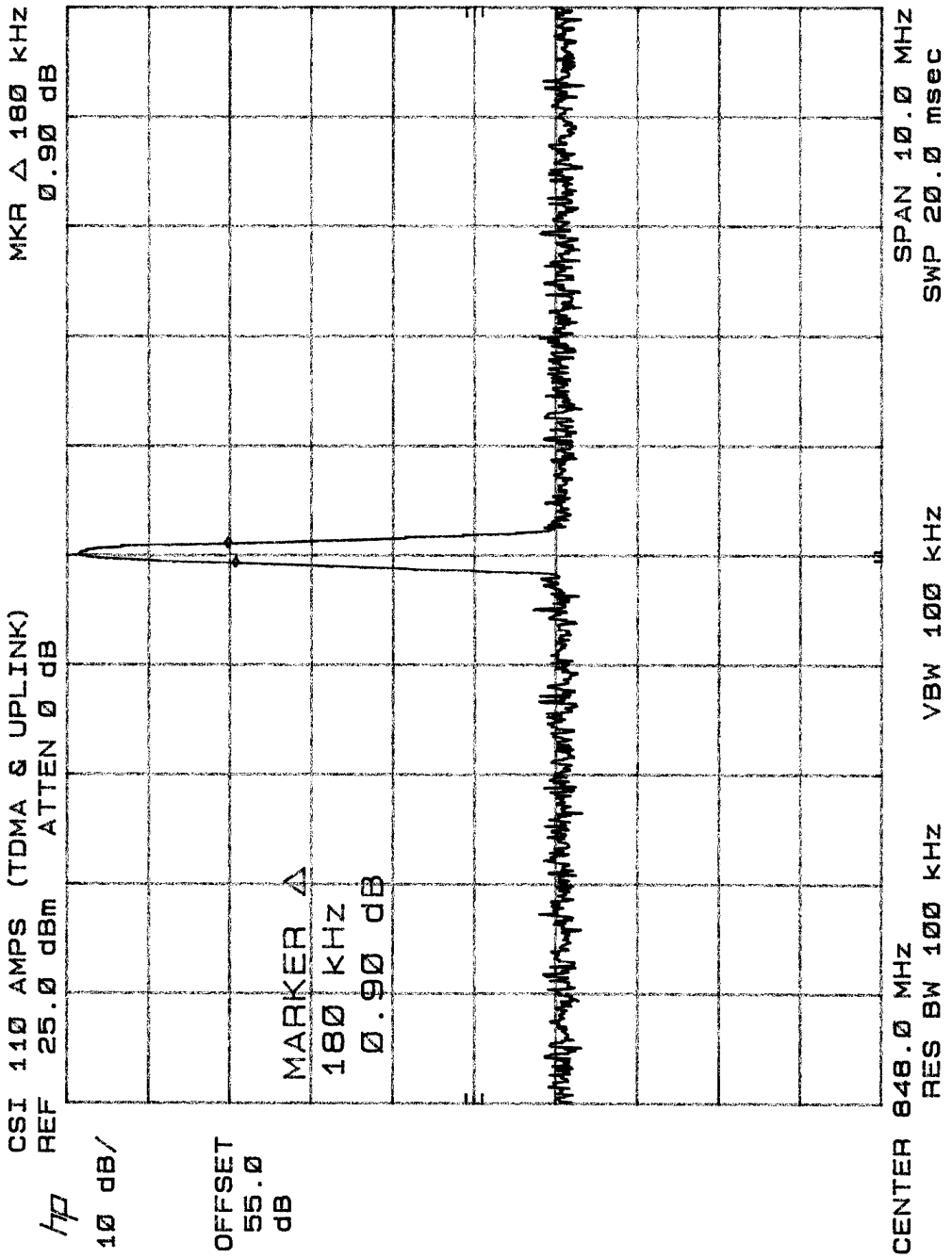

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ 1.42 MHz 0.50 dB
MKR Δ 1.42 MHz 0.50 dB
CENTER 825.0 MHz
RES BW 100 kHz VBW 100 kHz
SPAN 10.0 MHz SWP 20.0 msec

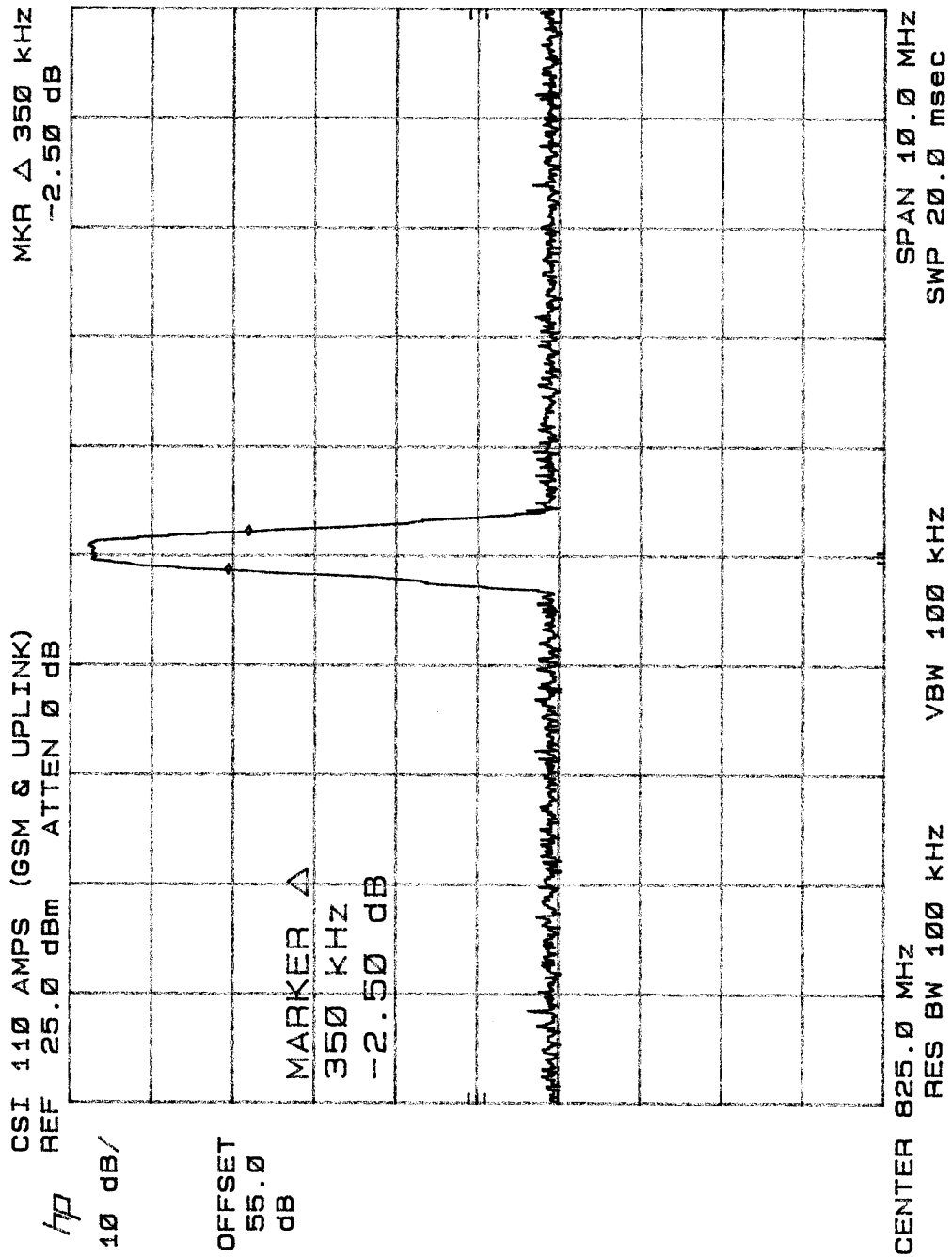

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ 1.44 MHz 0.80 dB
MKR Δ 1.44 MHz 0.80 dB
CENTER 836.5 MHz RES BW 100 kHz VBW 100 kHz SPAN 10.0 MHz SWP 20.0 msec

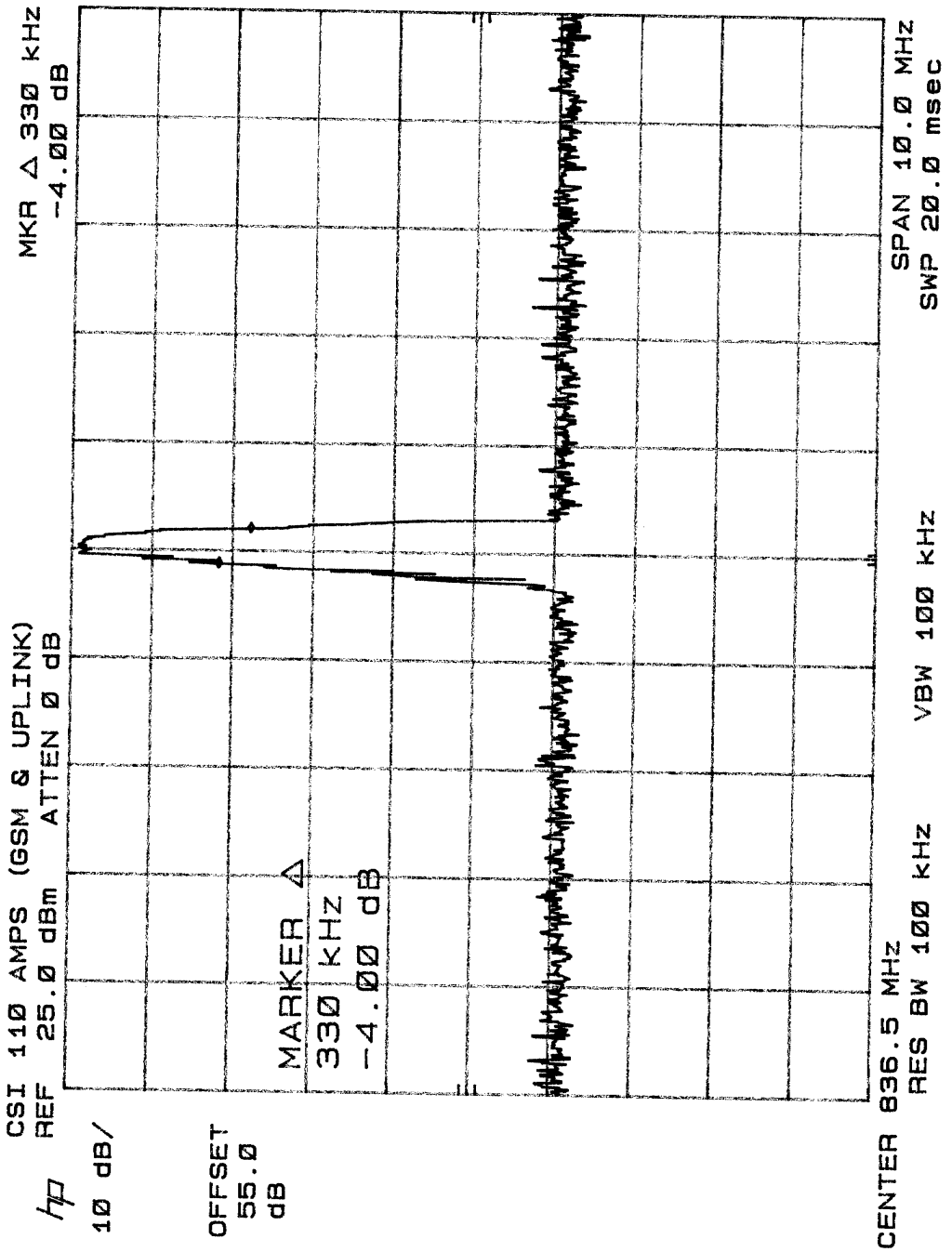

MKR Δ 1.43 MHz
-1.80 dB
CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
hp
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.43 MHz
-1.80 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 848.0 MHz
RES BW 100 kHz

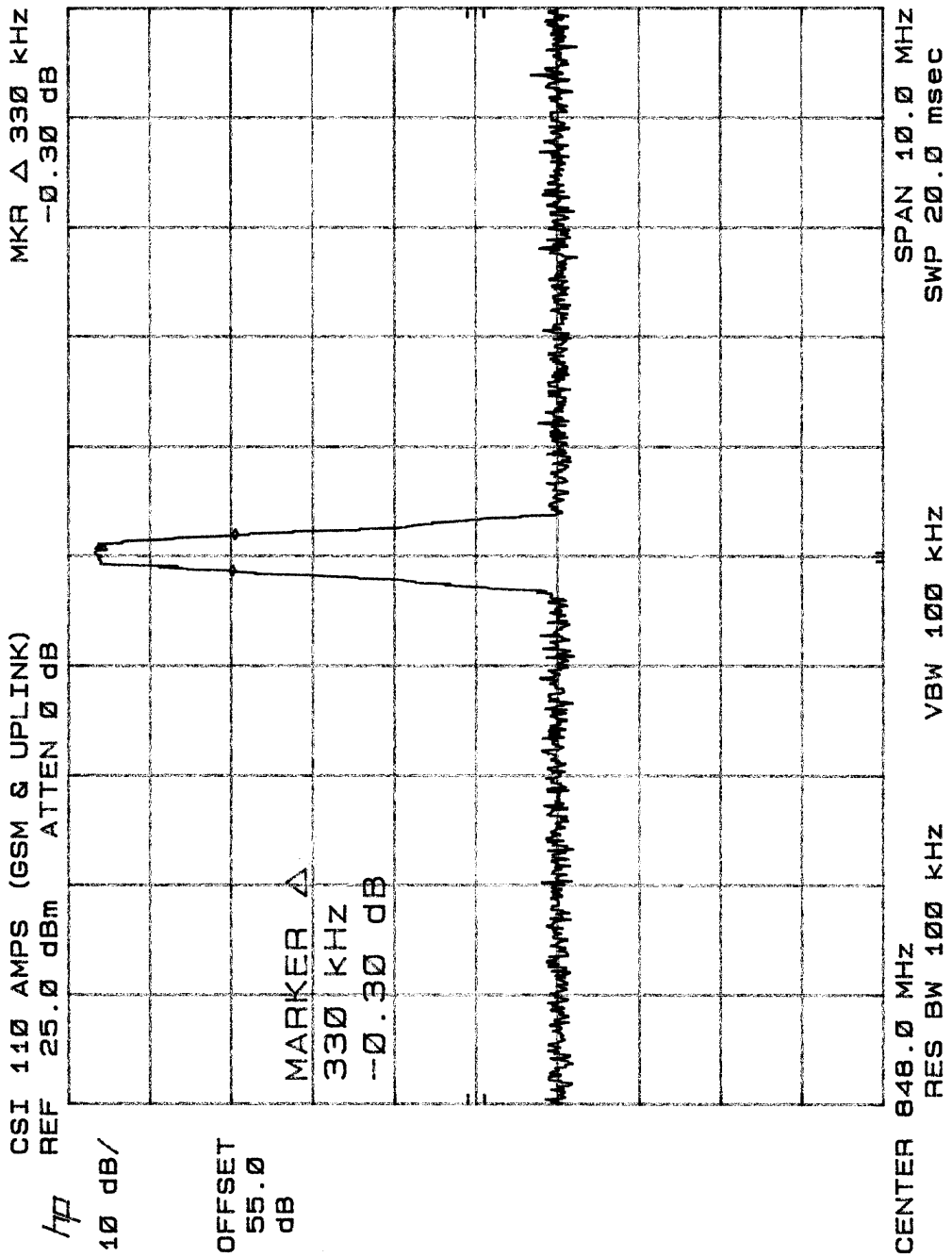

CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
190 kHz
0.00 dB
MKR Δ 190 kHz
0.00 dB
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


MKR Δ 260 kHz
1.80 dB
CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
260 kHz
1.80 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 836.5 MHz
RES BW 100 kHz


CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 180 kHz
0.90 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
180 kHz
0.90 dB
CENTER 848.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 350 kHz
-2.50 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
350 kHz
-2.50 dB
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
330 kHz
-4.00 dB
MKR Δ 330 kHz
-4.00 dB
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 330 kHz
-0.30 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
330 kHz
-0.30 dB
CENTER 848.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

3.3.0 Emission Limitations, Occupied Bandwidth

Requirements: FCC 2.1049, FCC 22.905 (All channels have a bandwidth of 40kHz)

3.3.1 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the spectrum was recorded in the frequency band ±50 KHz from the carrier frequency.

3.3.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

3.3.3 Test Results

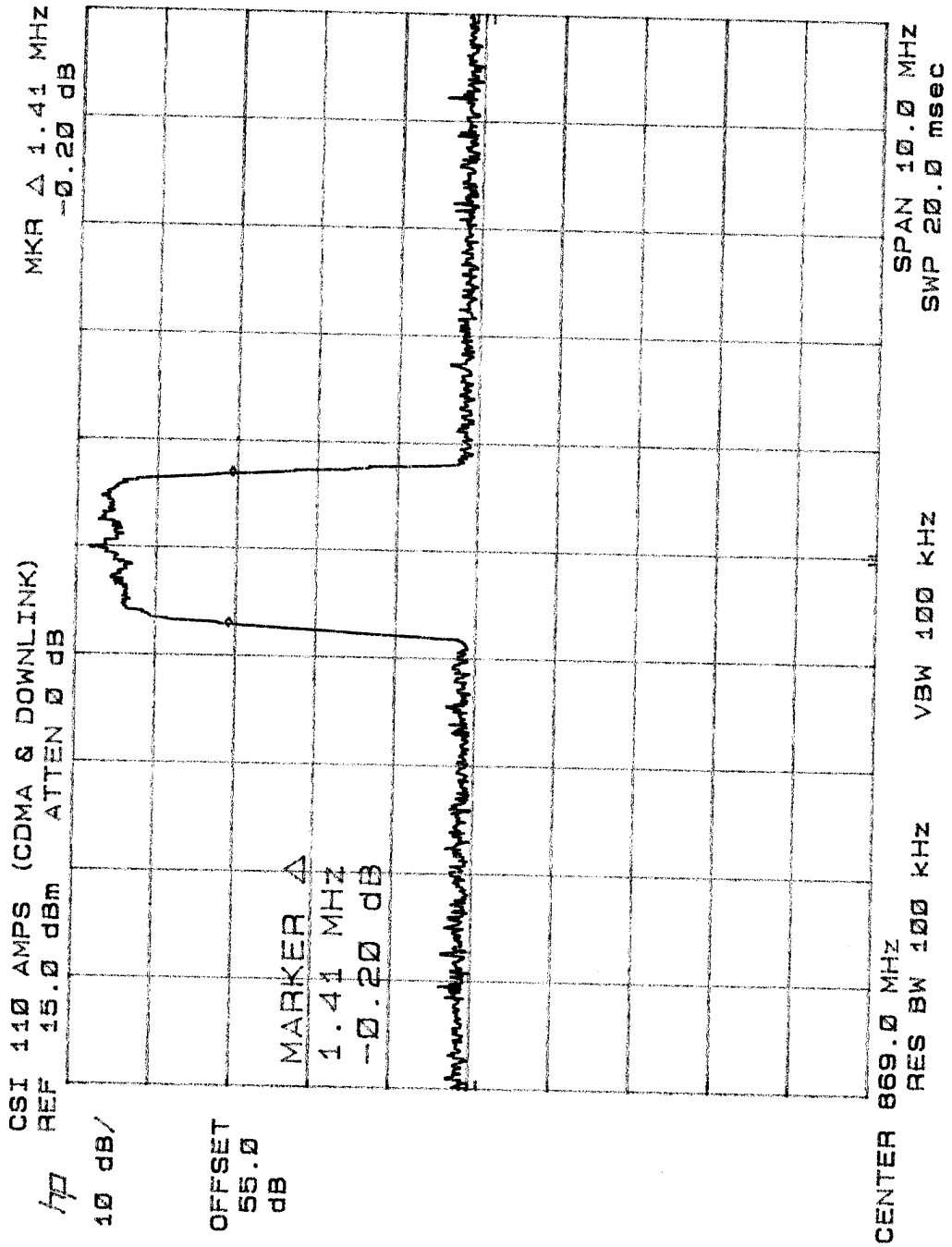
Refer to the attached Plots

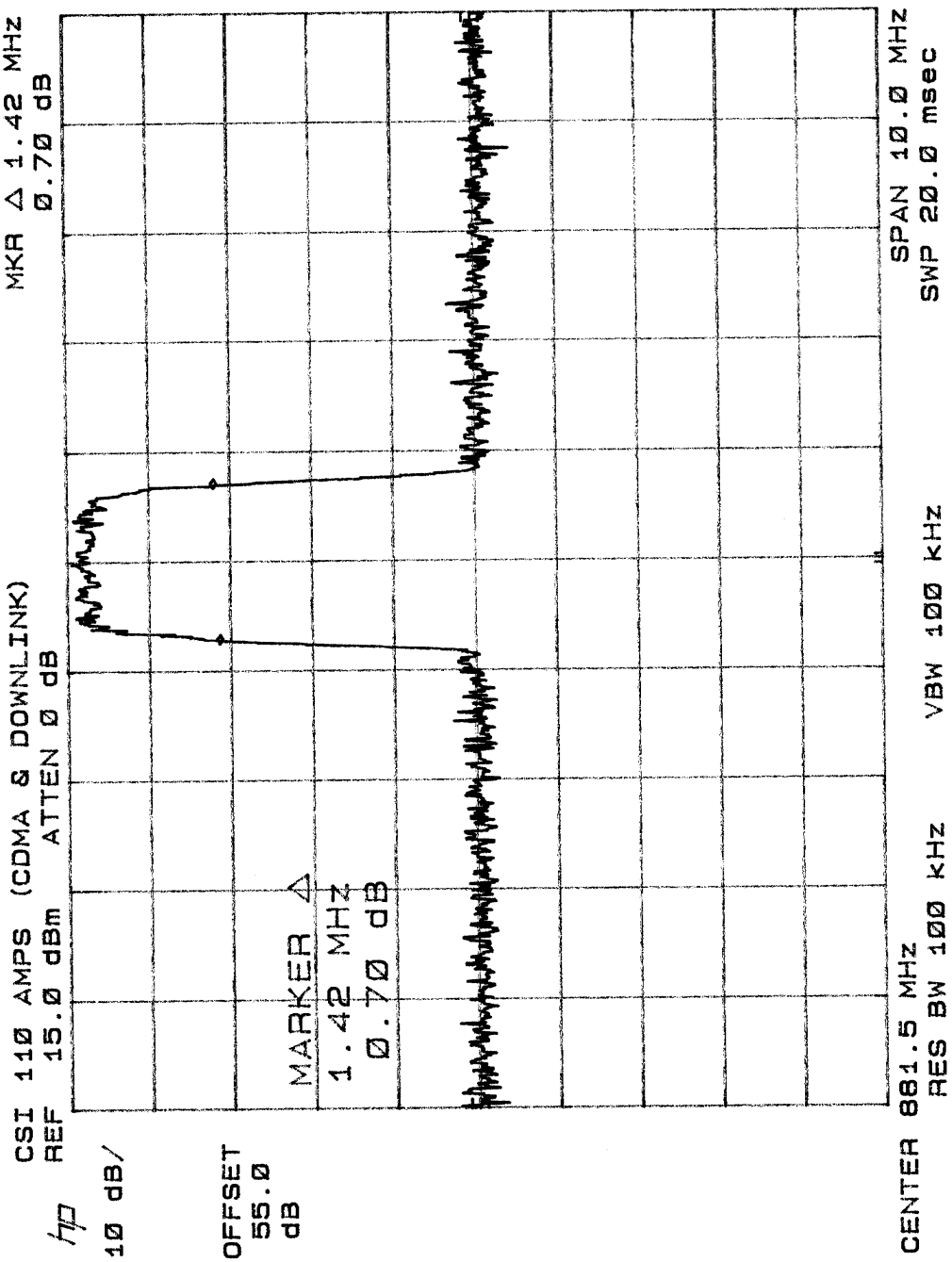
DOWNLINK

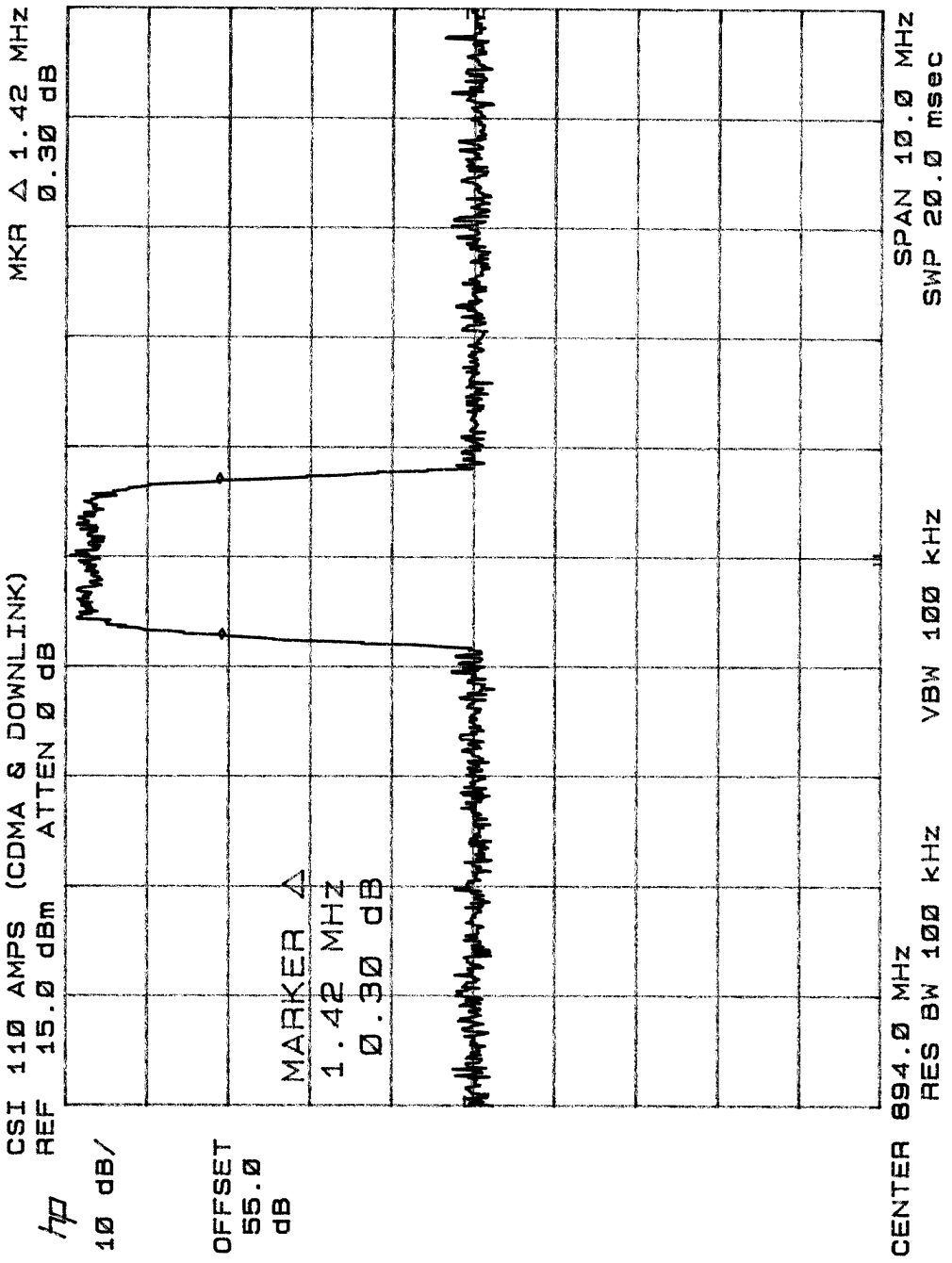
Occupied Bandwidth		
CDMA	Low	Page 49
	Middle	Page 50
	High	Page 51
GSM	Low	Page 55
	Middle	Page 56
	High	Page 57
TDMA	Low	Page 52
	Middle	Page 53
	High	Page 54

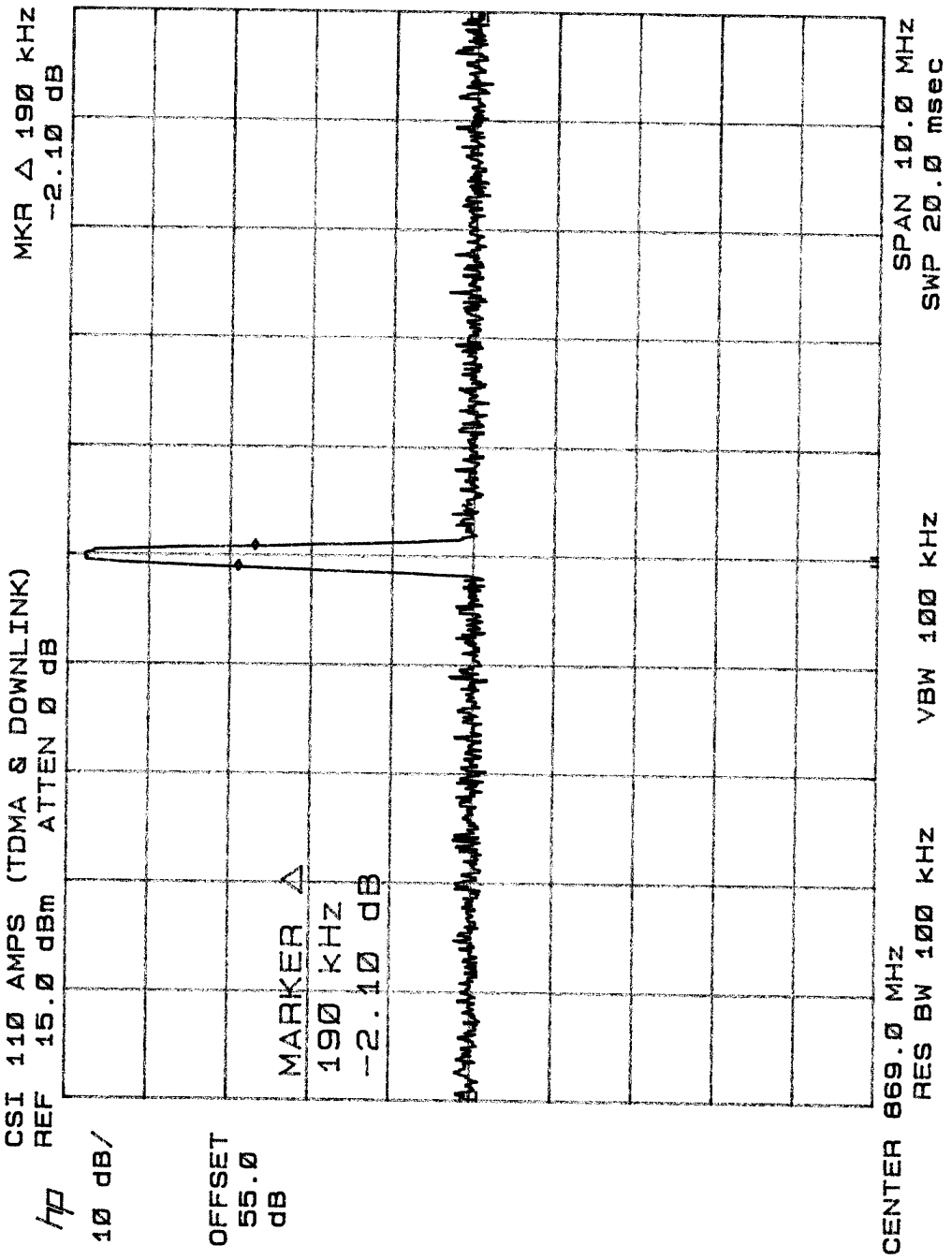
UPLINK

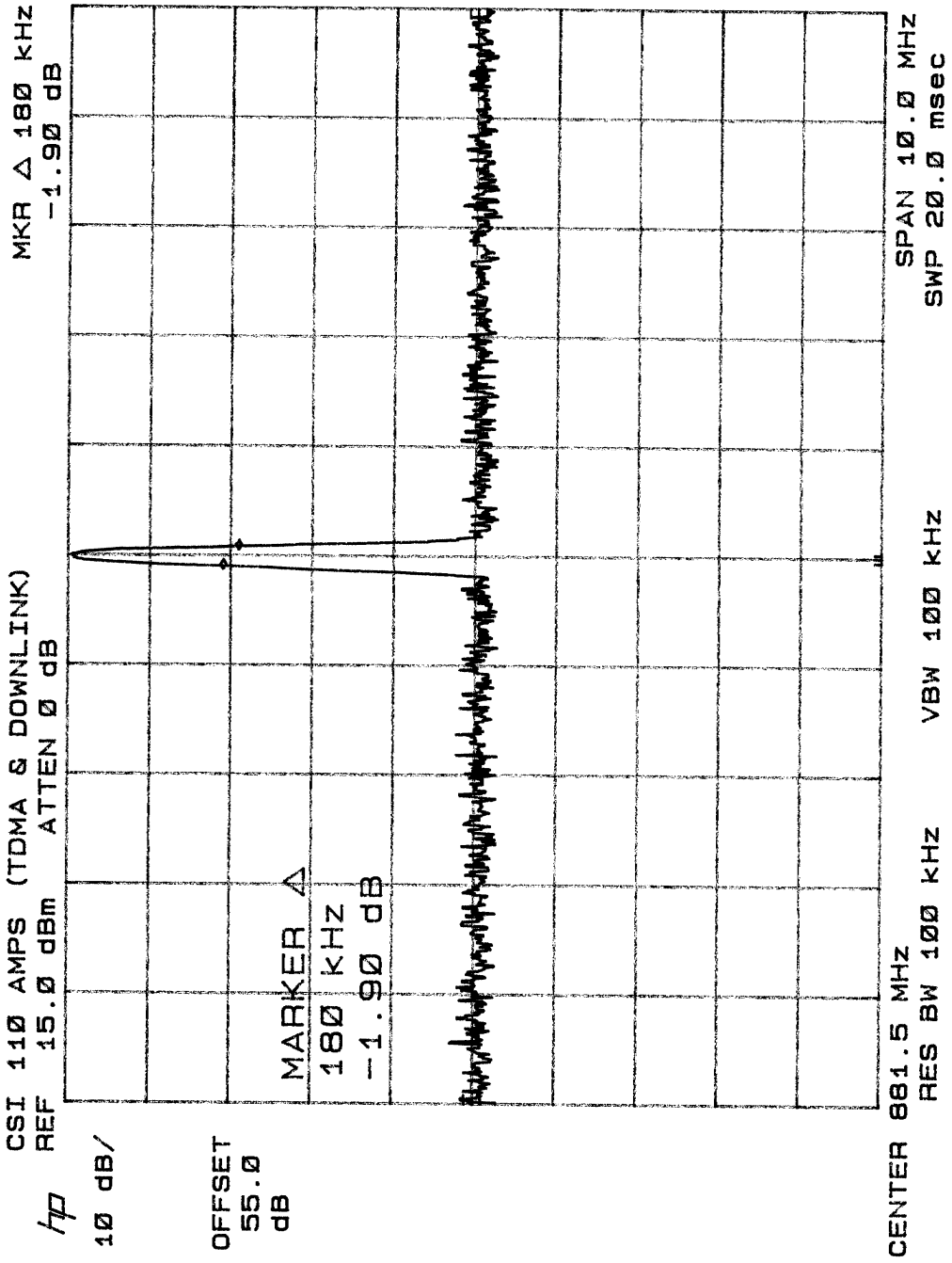
Occupied Bandwidth		
TDMA	Low	Page 64
	Middle	Page 65
	High	Page 66
GSM	Low	Page 61
	Middle	Page 62
	High	Page 63
CDMA	Low	Page 58
	Middle	Page 59
	High	Page 60

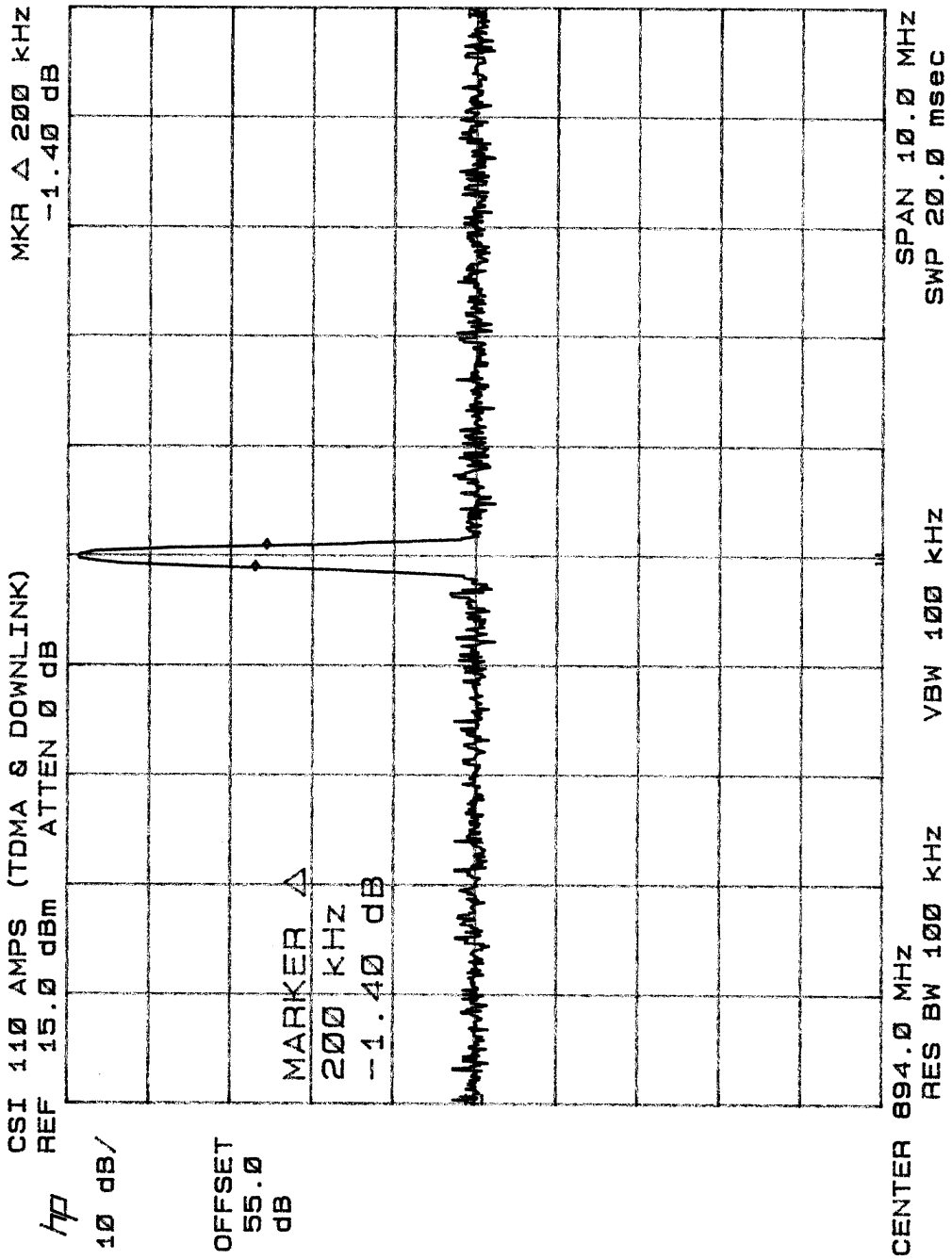

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
1.41 MHz
-0.20 dB
MKR Δ 1.41 MHz
-0.20 dB
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

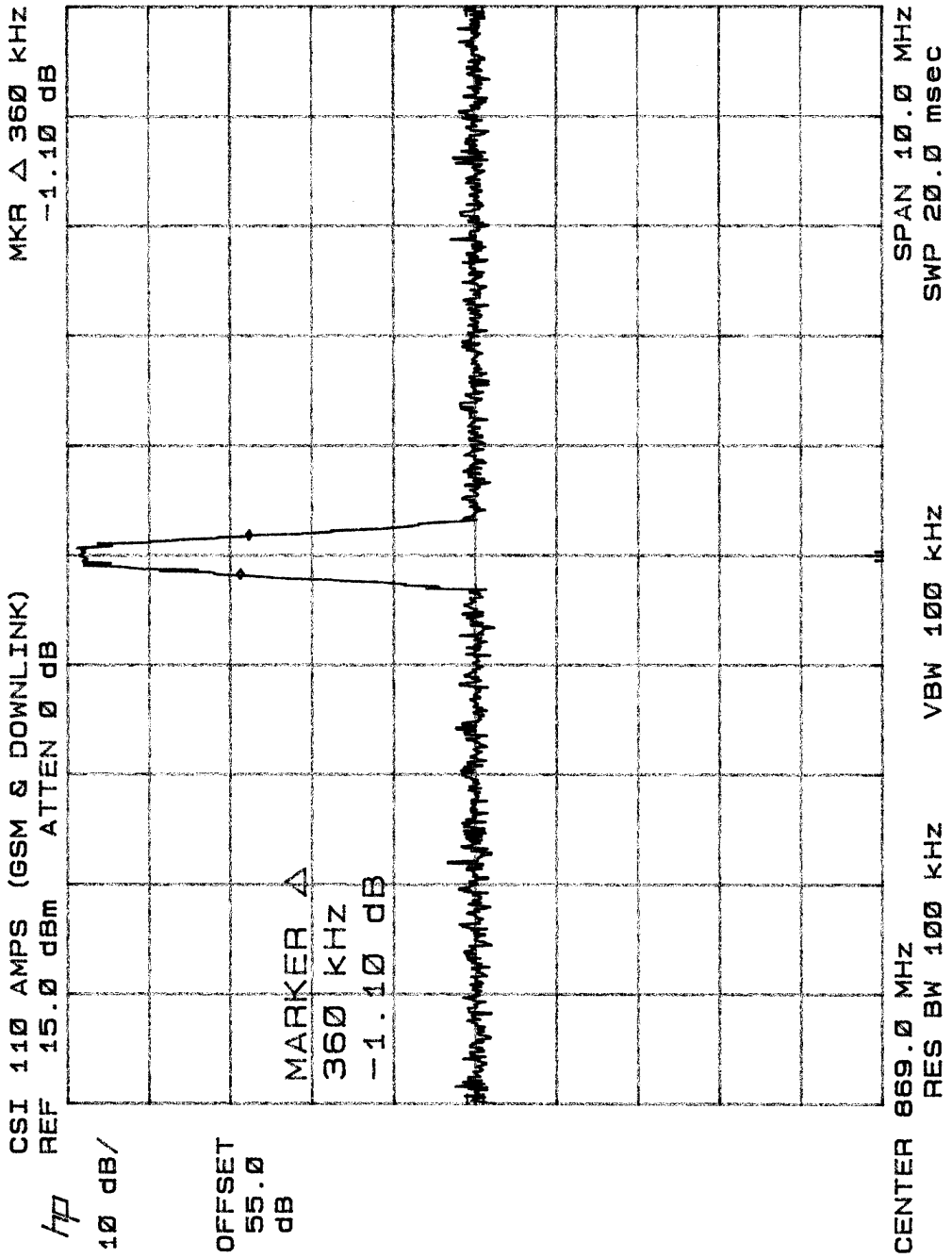

MKR Δ 1.42 MHz
0.70 dB
CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.42 MHz
0.70 dB
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

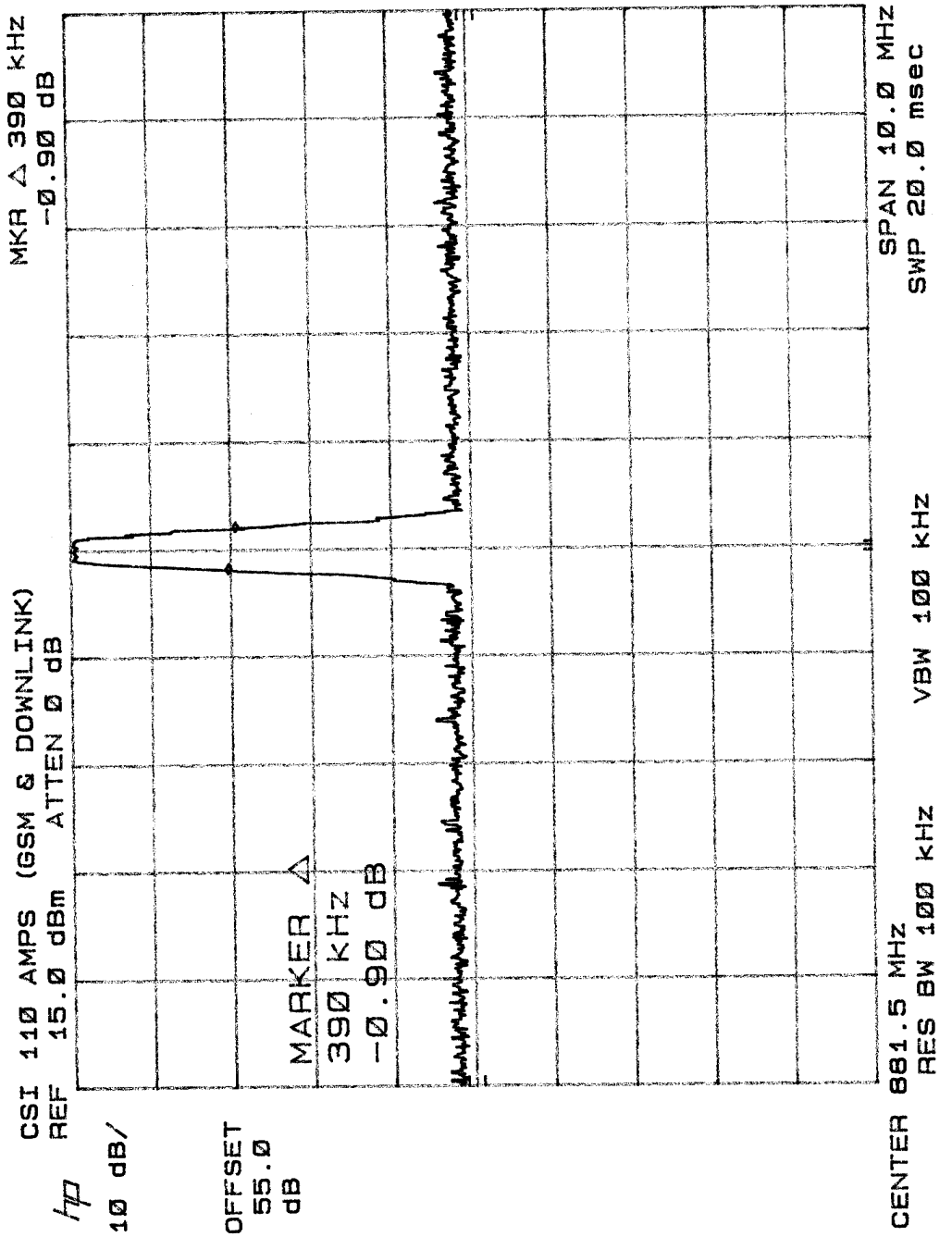

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 1.42 MHz
0.30 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.42 MHz
0.30 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

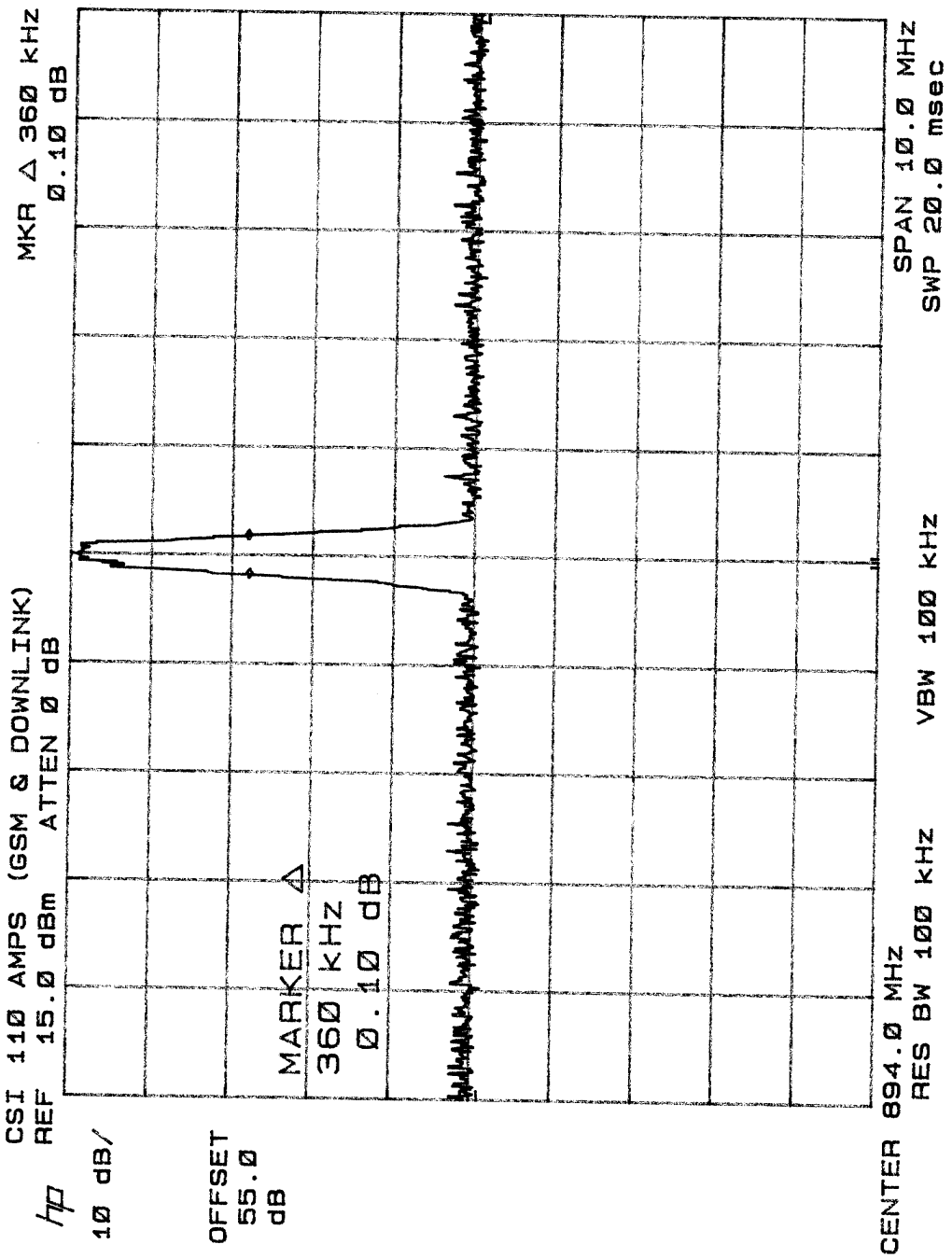

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 190 kHz
-2.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
190 kHz
-2.10 dB
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

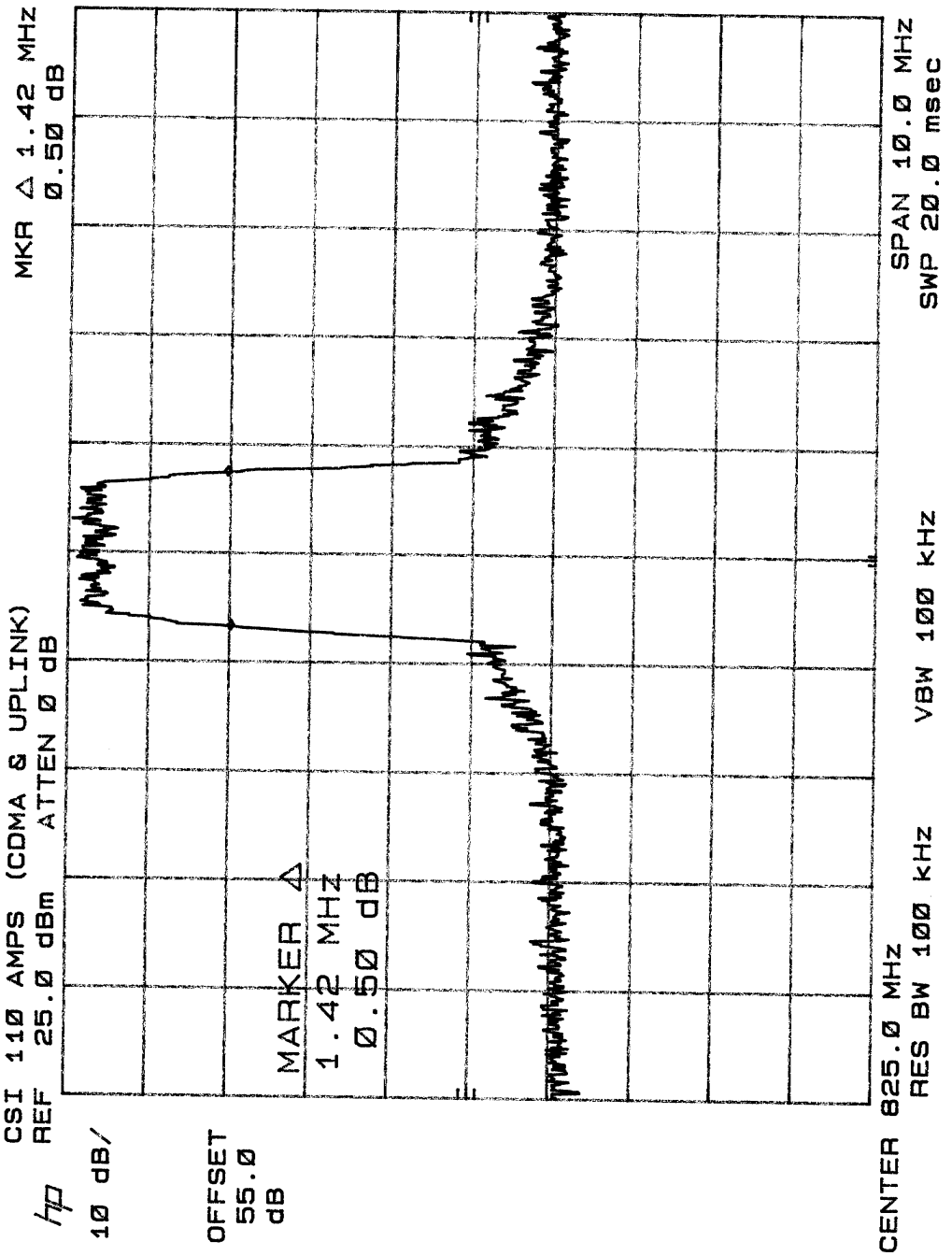

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 180 kHz
-1.90 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
180 kHz
-1.90 dB
CENTER 881.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

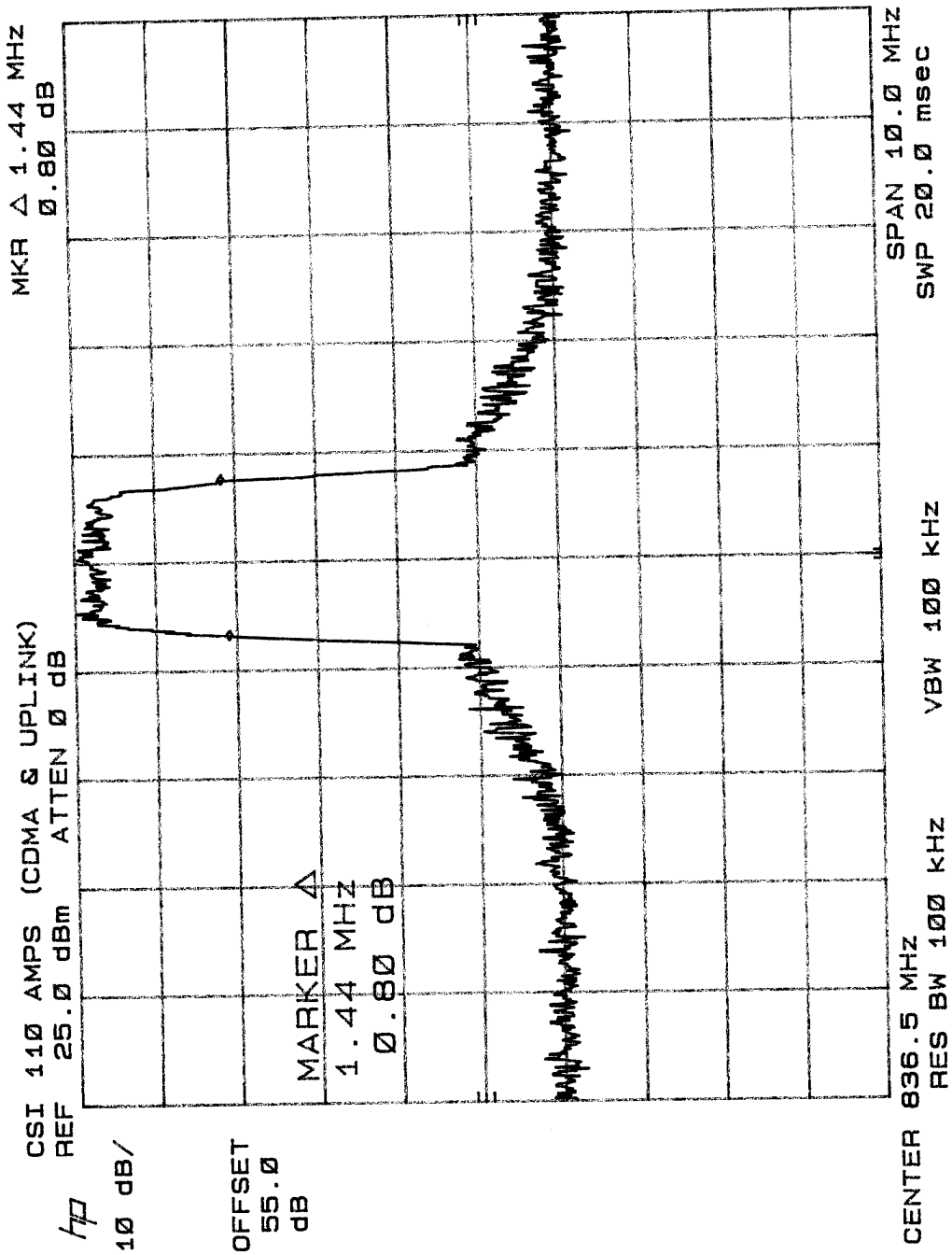

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
200 kHz
-1.40 dB
MKR Δ 200 kHz
-1.40 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

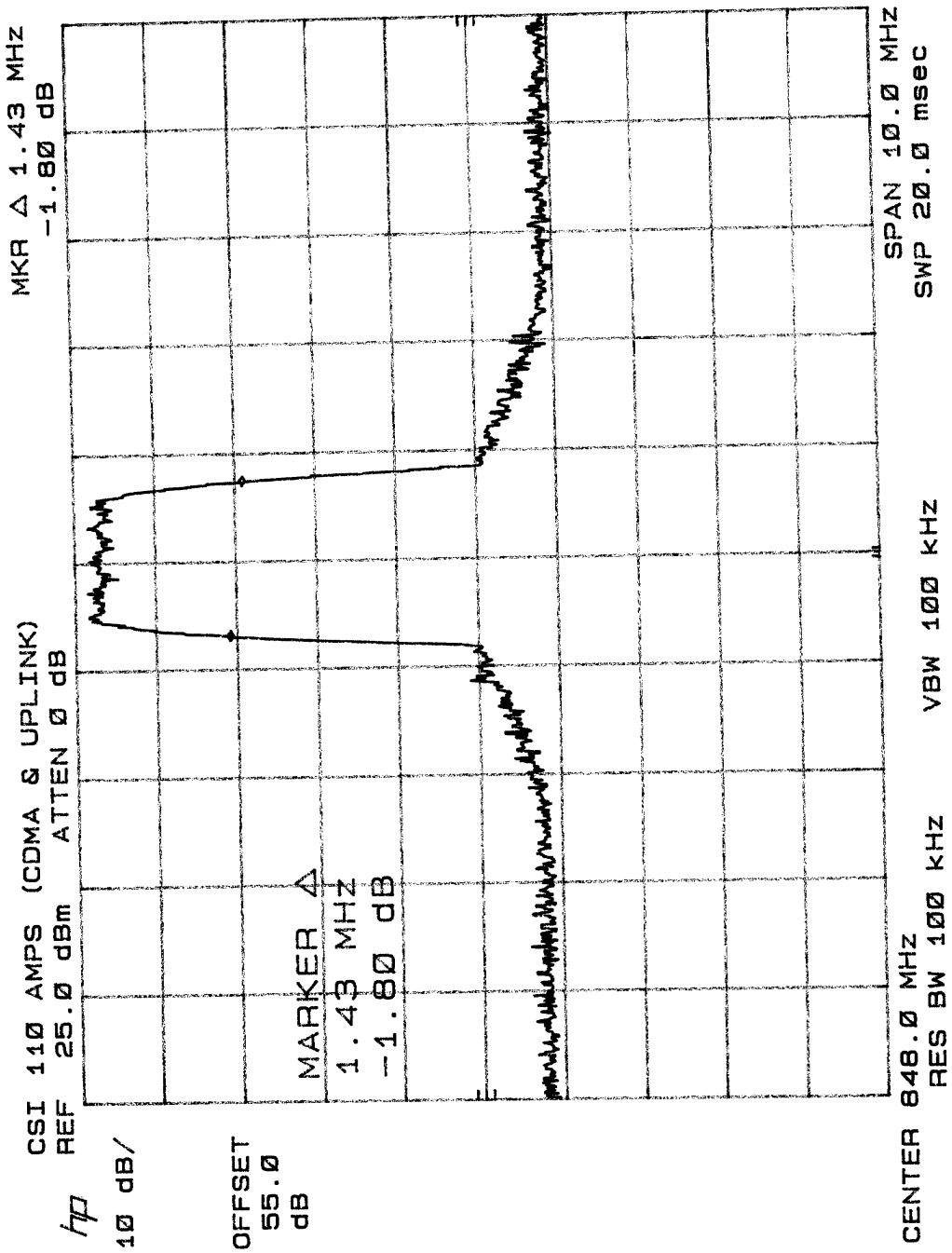

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 360 kHz
-1.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
360 kHz
-1.10 dB
CENTER 869.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

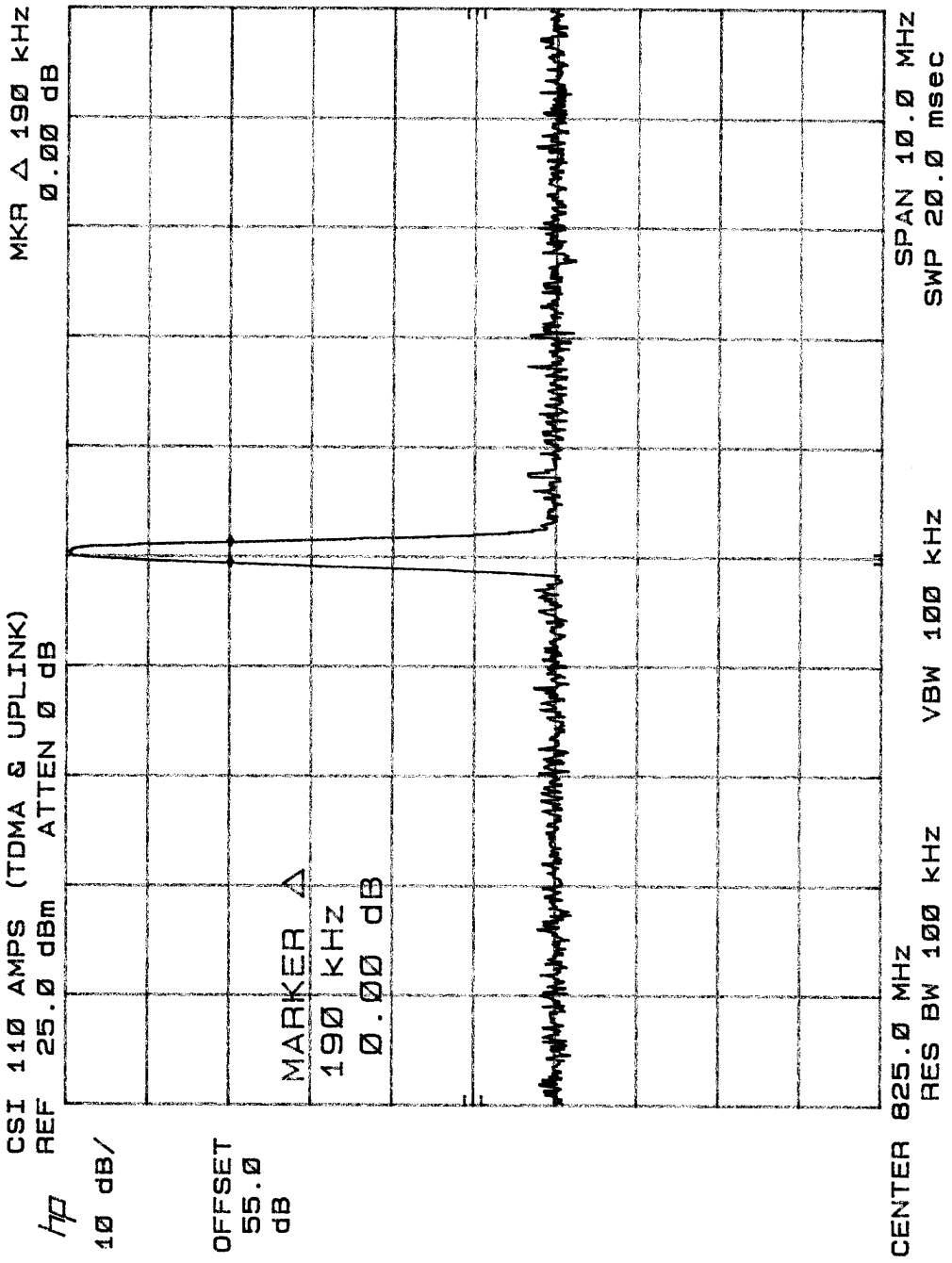

MKR Δ 390 kHz
-0.90 dB
CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
390 kHz
-0.90 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 881.5 MHz
RES BW 100 kHz

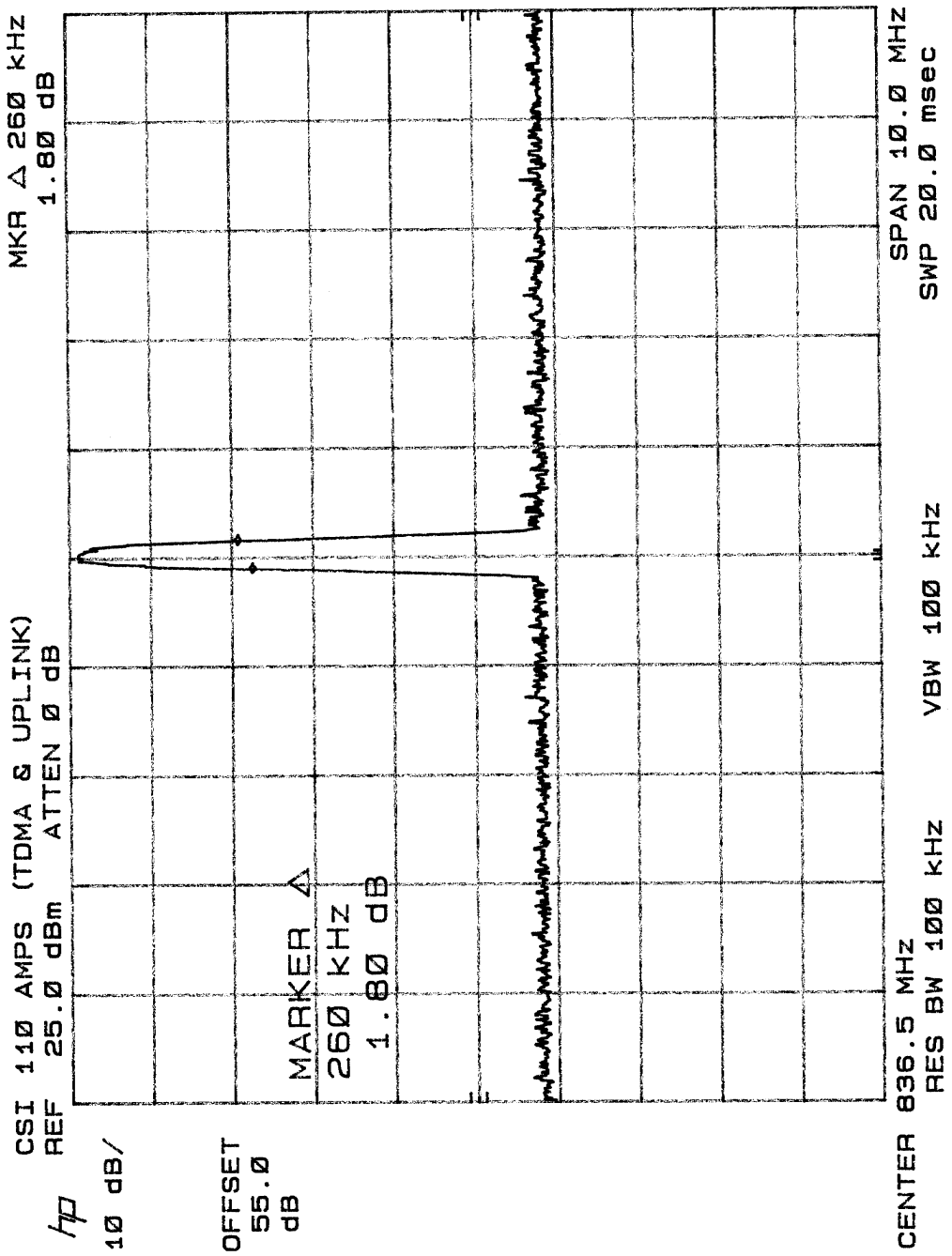

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR Δ 360 kHz
0.10 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
360 kHz
0.10 dB
CENTER 894.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

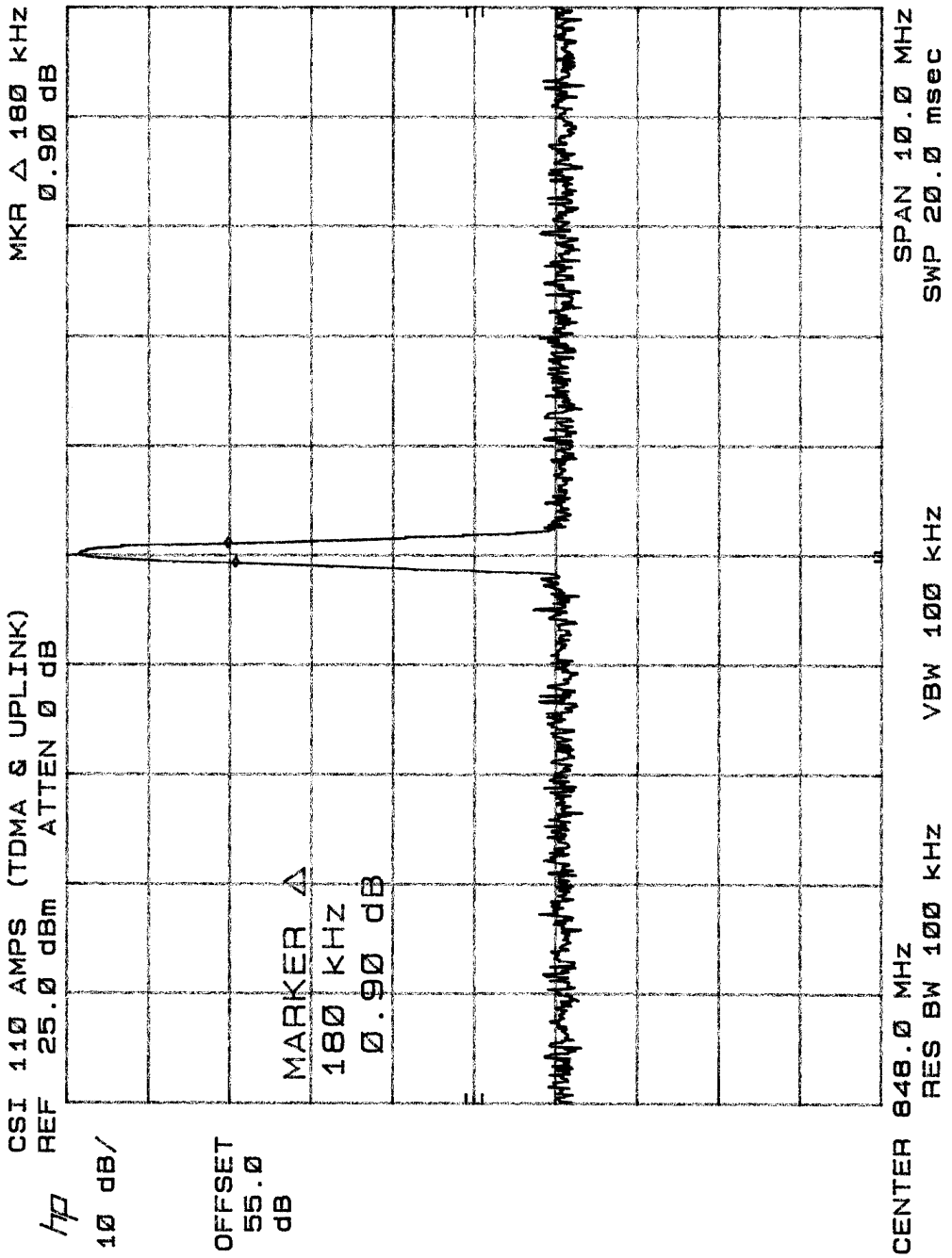

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ 1.42 MHz 0.50 dB
MKR Δ 1.42 MHz 0.50 dB
CENTER 825.0 MHz
RES BW 100 kHz VBW 100 kHz
SPAN 10.0 MHz SWP 20.0 msec

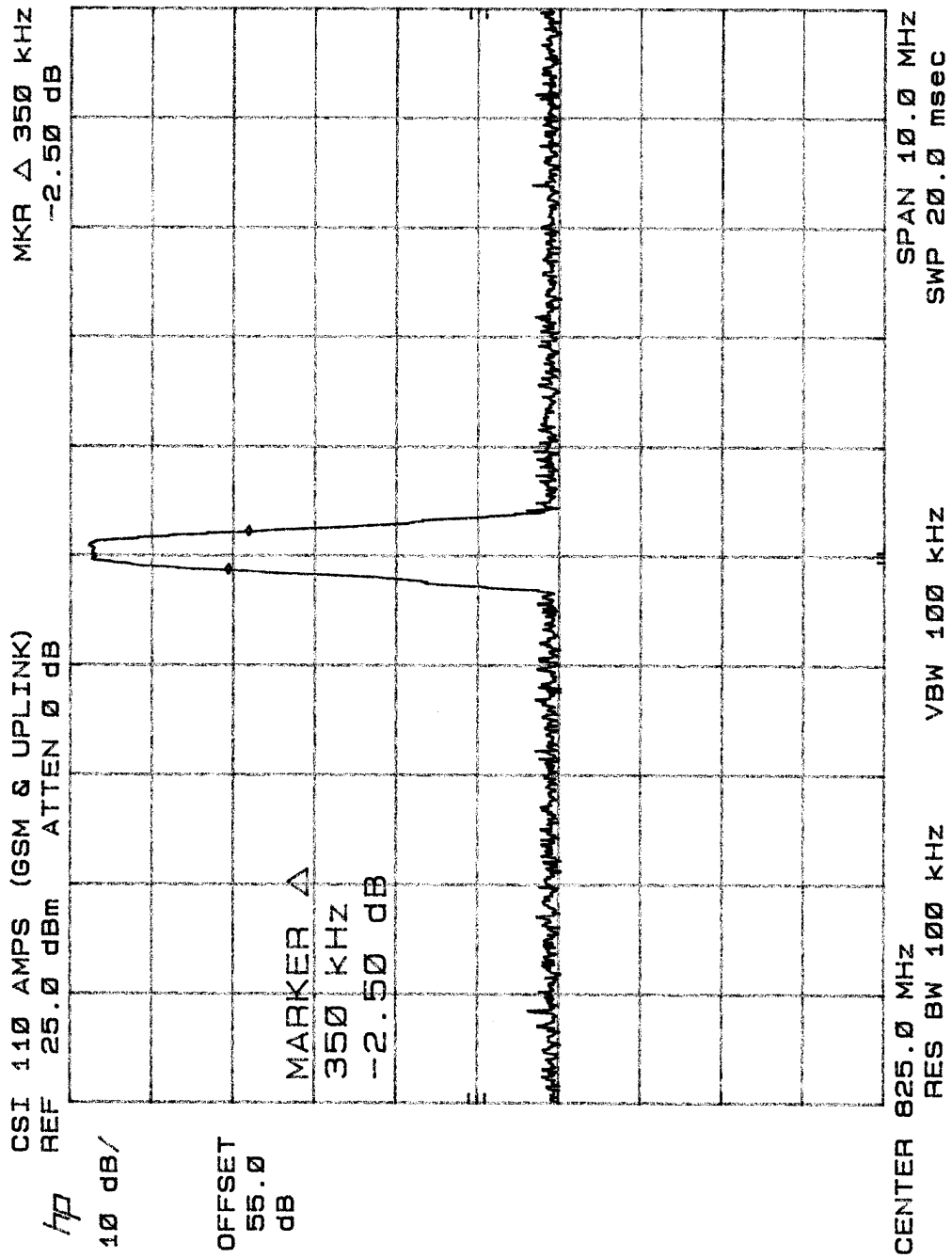

MKR Δ 1.44 MHz
0.80 dB
CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.44 MHz
0.80 dB
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

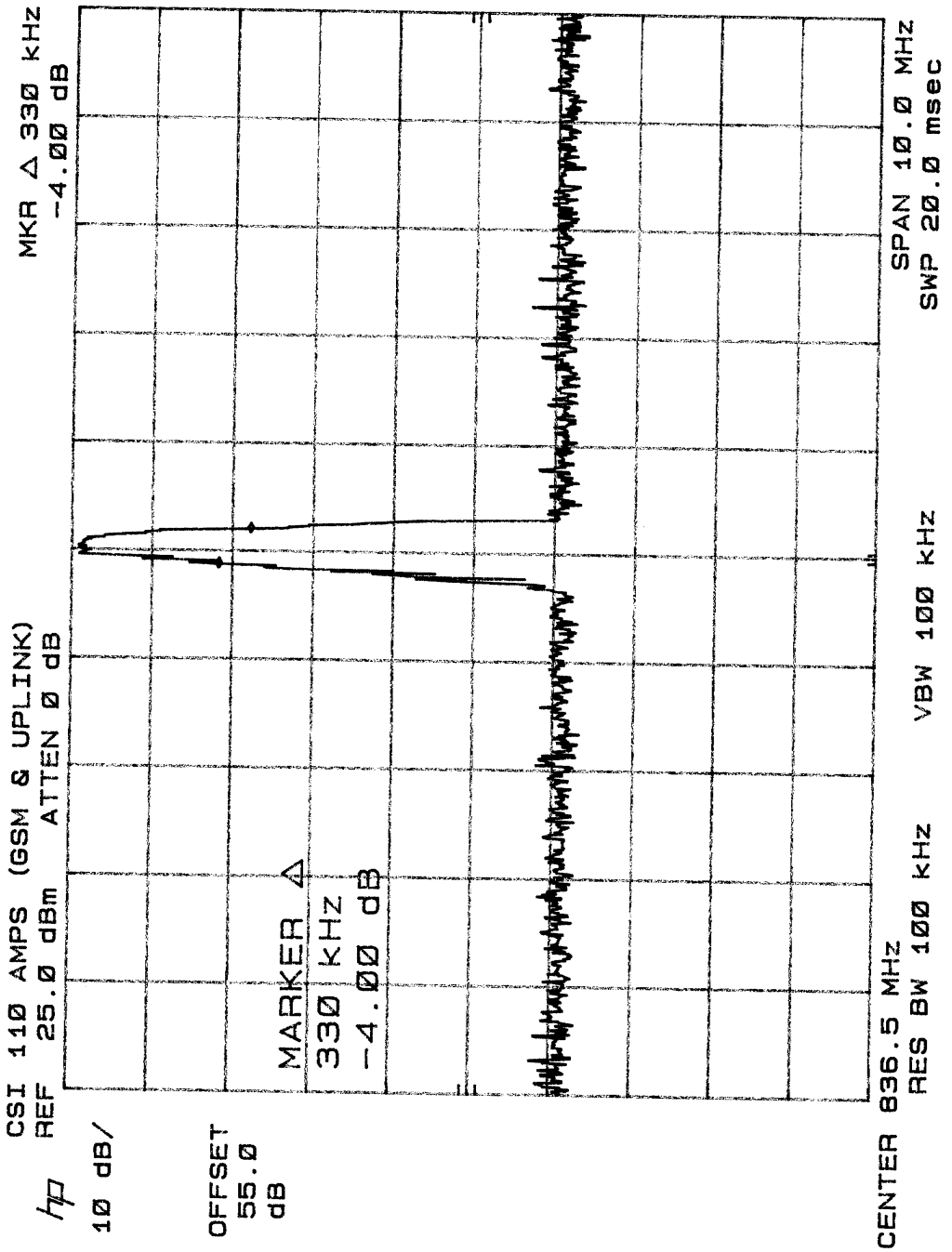

MKR Δ 1.43 MHz
-1.80 dB
CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
hp
10 dB/
OFFSET
55.0
dB
MARKER Δ
1.43 MHz
-1.80 dB
SPAN 10.0 MHz
SWP 20.0 msec
VBW 100 kHz
CENTER 848.0 MHz
RES BW 100 kHz

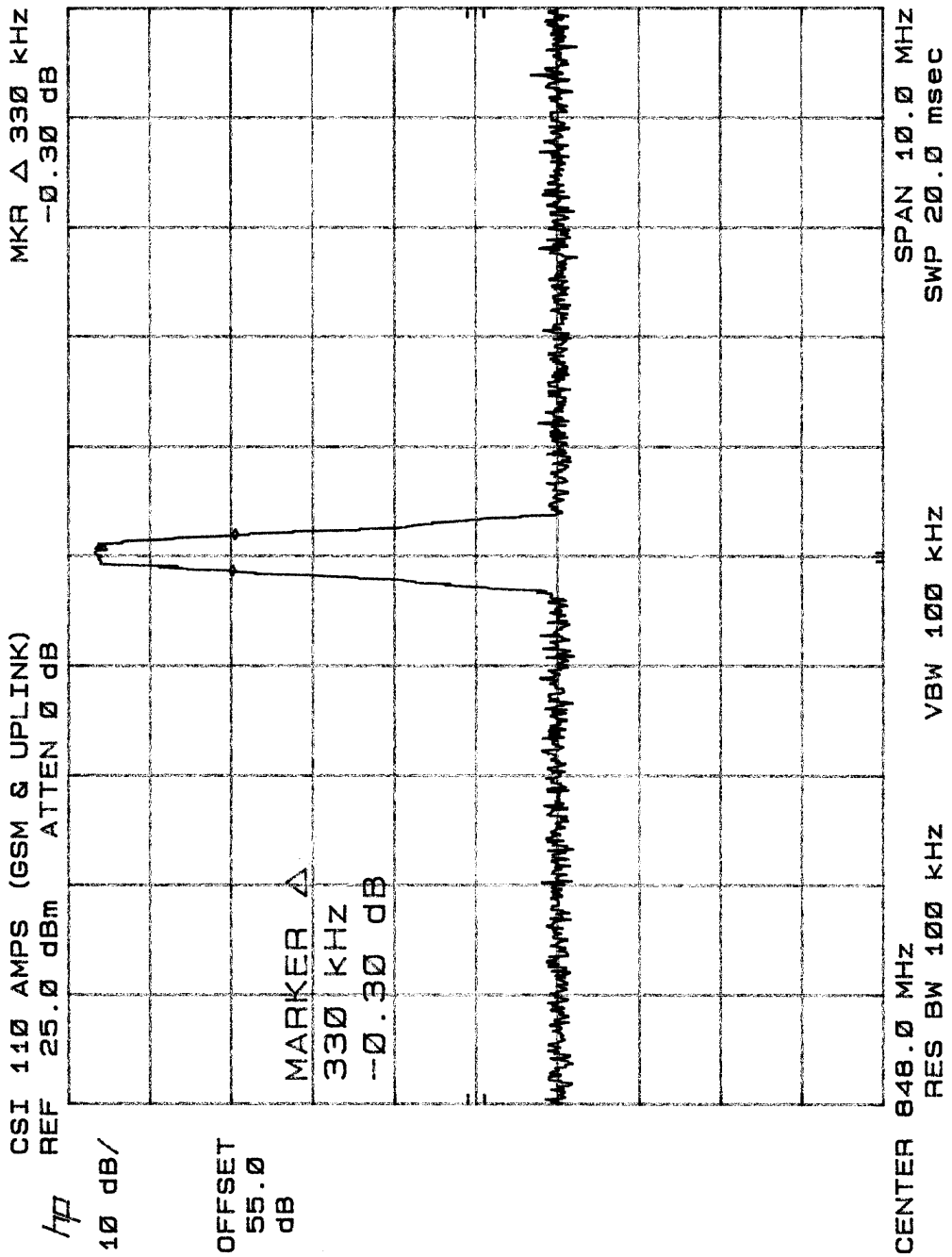

CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
190 kHz
0.00 dB
MKR Δ 190 kHz
0.00 dB
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 260 kHz
1.80 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
260 kHz
1.80 dB
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 180 kHz
0.90 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
180 kHz
0.90 dB
CENTER 848.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 350 kHz
-2.50 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
350 kHz
-2.50 dB
CENTER 825.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
MARKER Δ
330 kHz
-4.00 dB
MKR Δ 330 kHz
-4.00 dB
CENTER 836.5 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec


CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR Δ 330 kHz
-0.30 dB
10 dB/
OFFSET
55.0
dB
MARKER Δ
330 kHz
-0.30 dB
CENTER 848.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 10.0 MHz
SWP 20.0 msec

3.4.0 Out of Band Emissions at Antenna Terminals

Requirements : FCC 22.917

Out of Band Emissions:

The means power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range:

The mean power of any emissions apprearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not to exceed –80 dBm at the transmit antenna connector.

3.4.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

3.4.2 Test Equipment

HP 8566B Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

3.4.3 Test Results

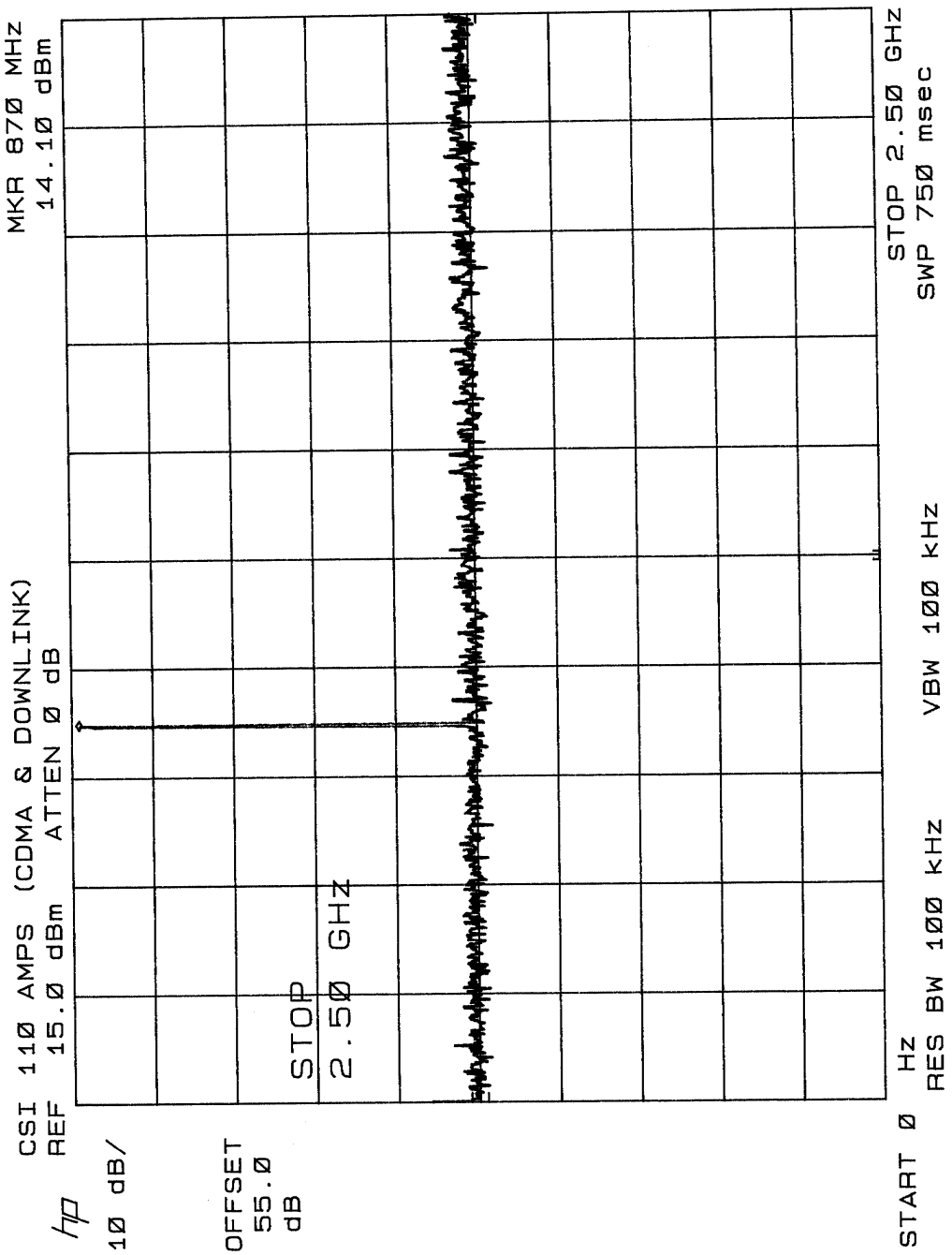
Refer to the attached plots.

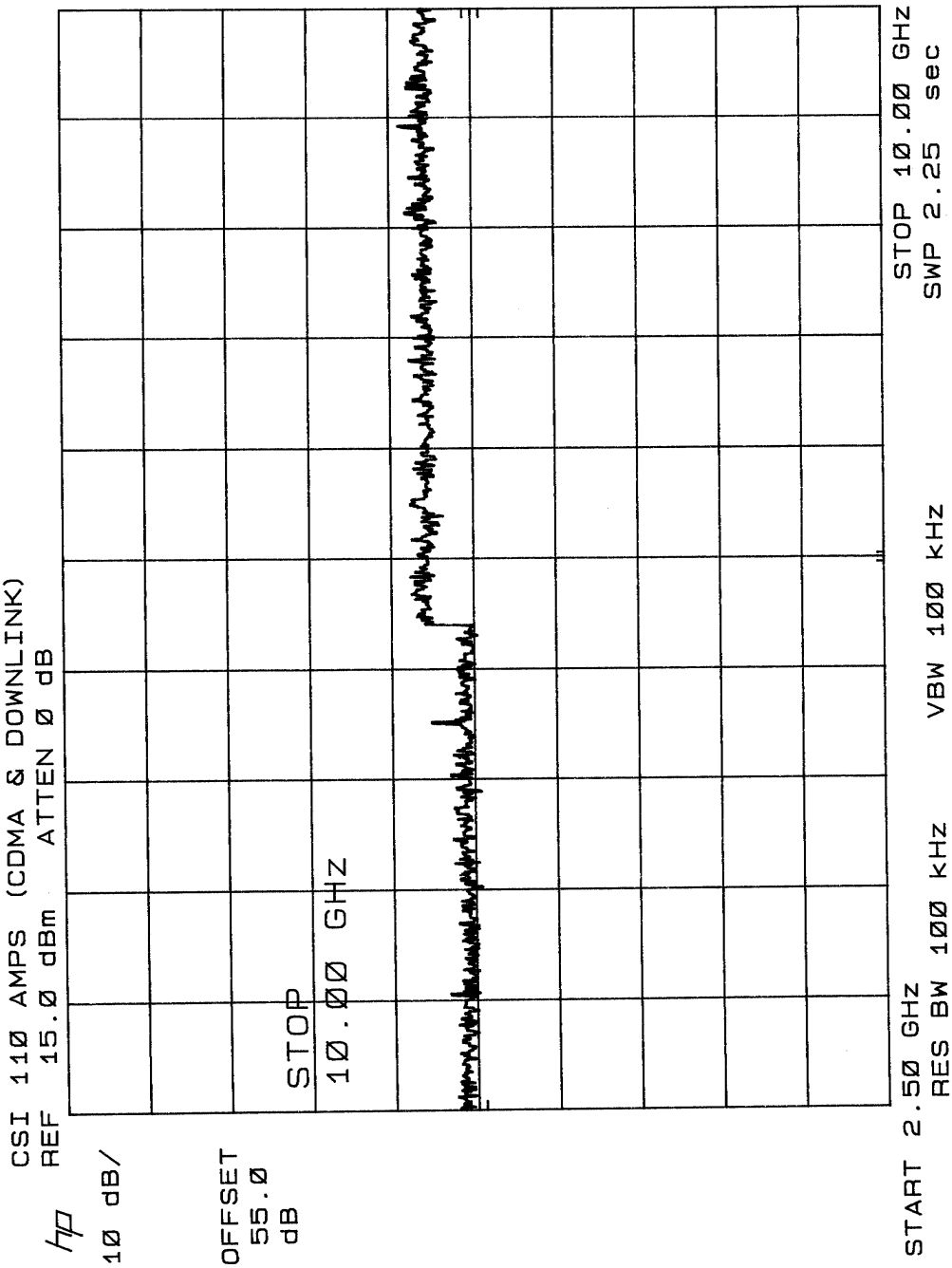
DOWNLINK

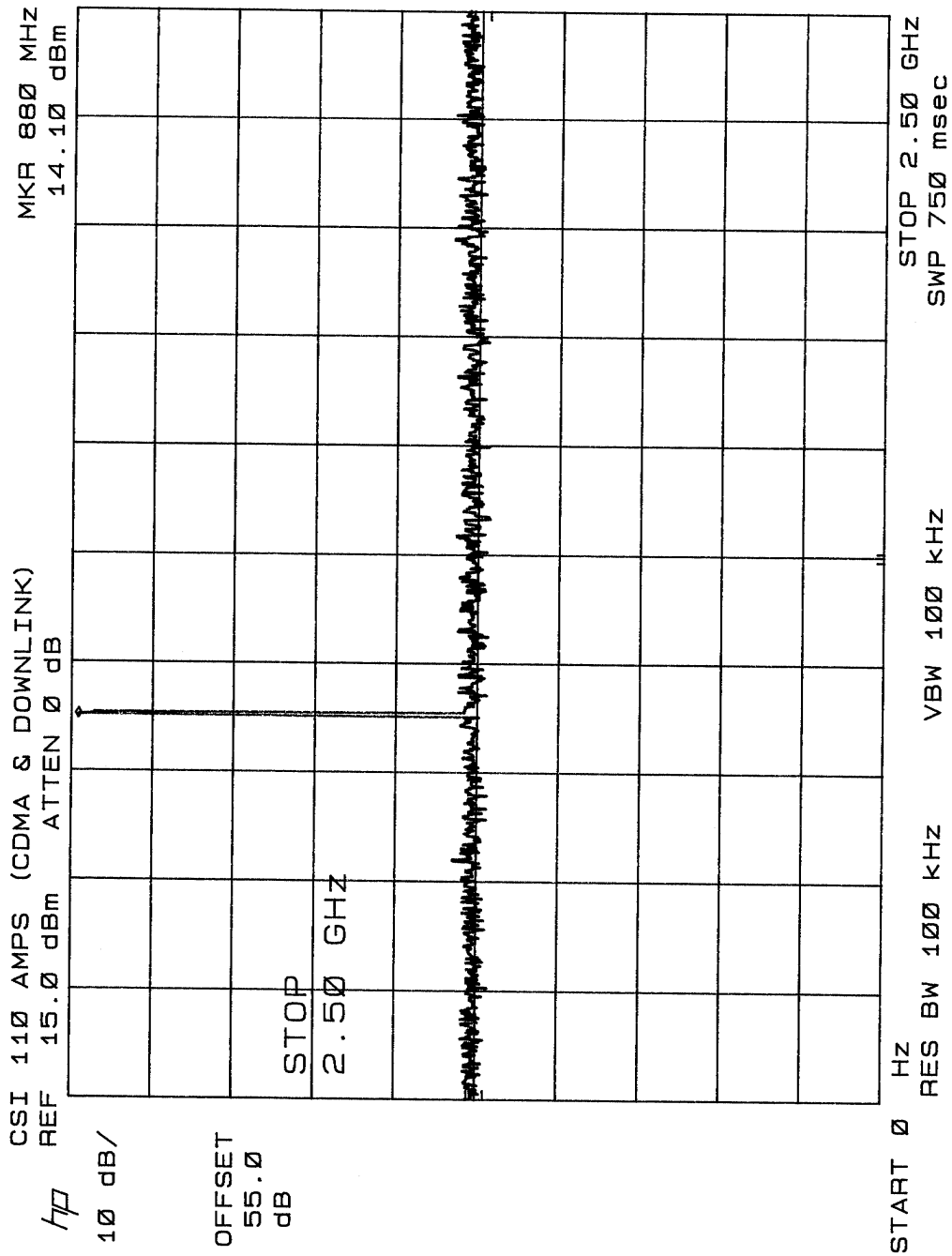
Out of Band Emissions at Antenna Terminals		
CDMA	Low	Page 68 –69
	Middle	Page 70-71
	High	Page 72-73

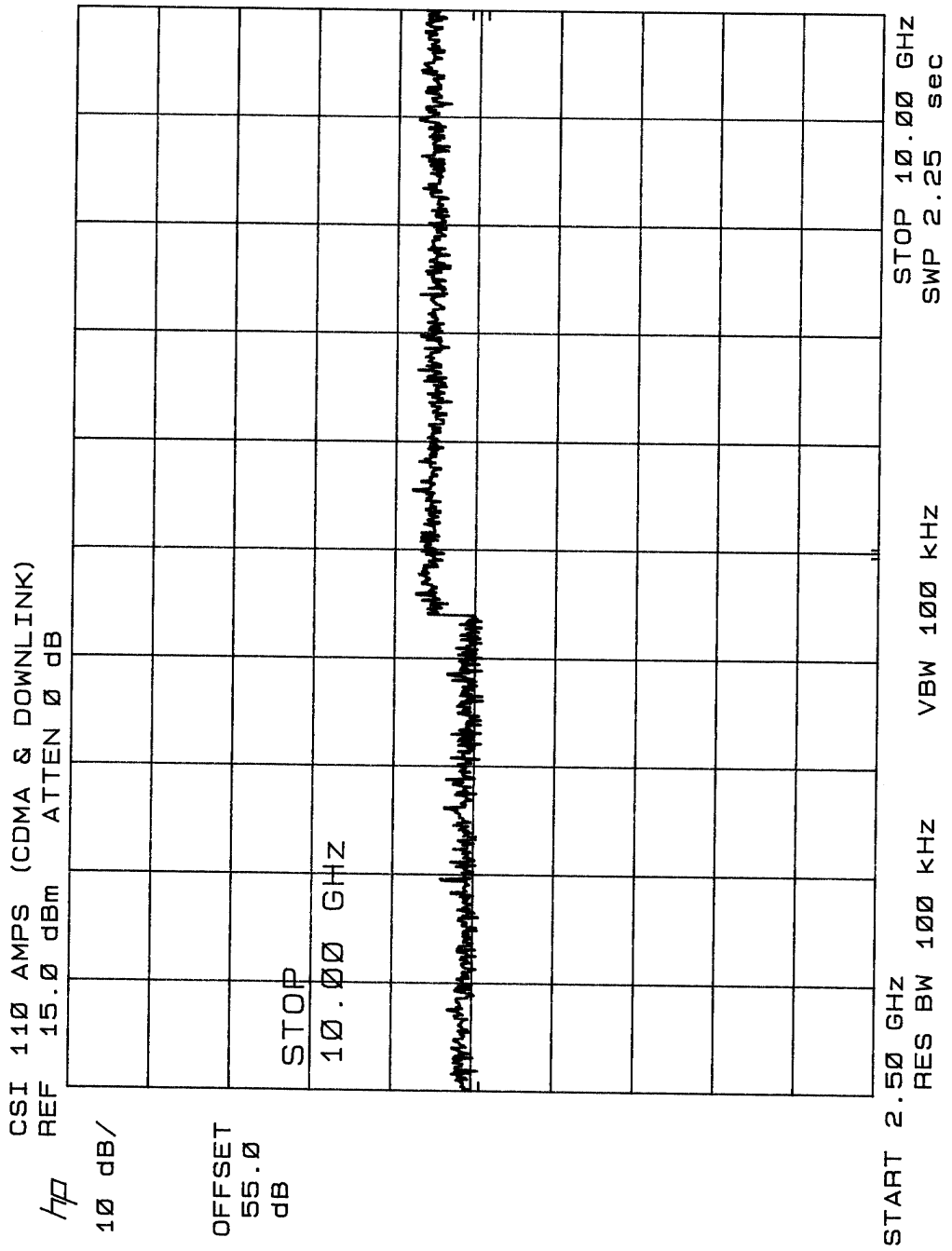
UPLINK

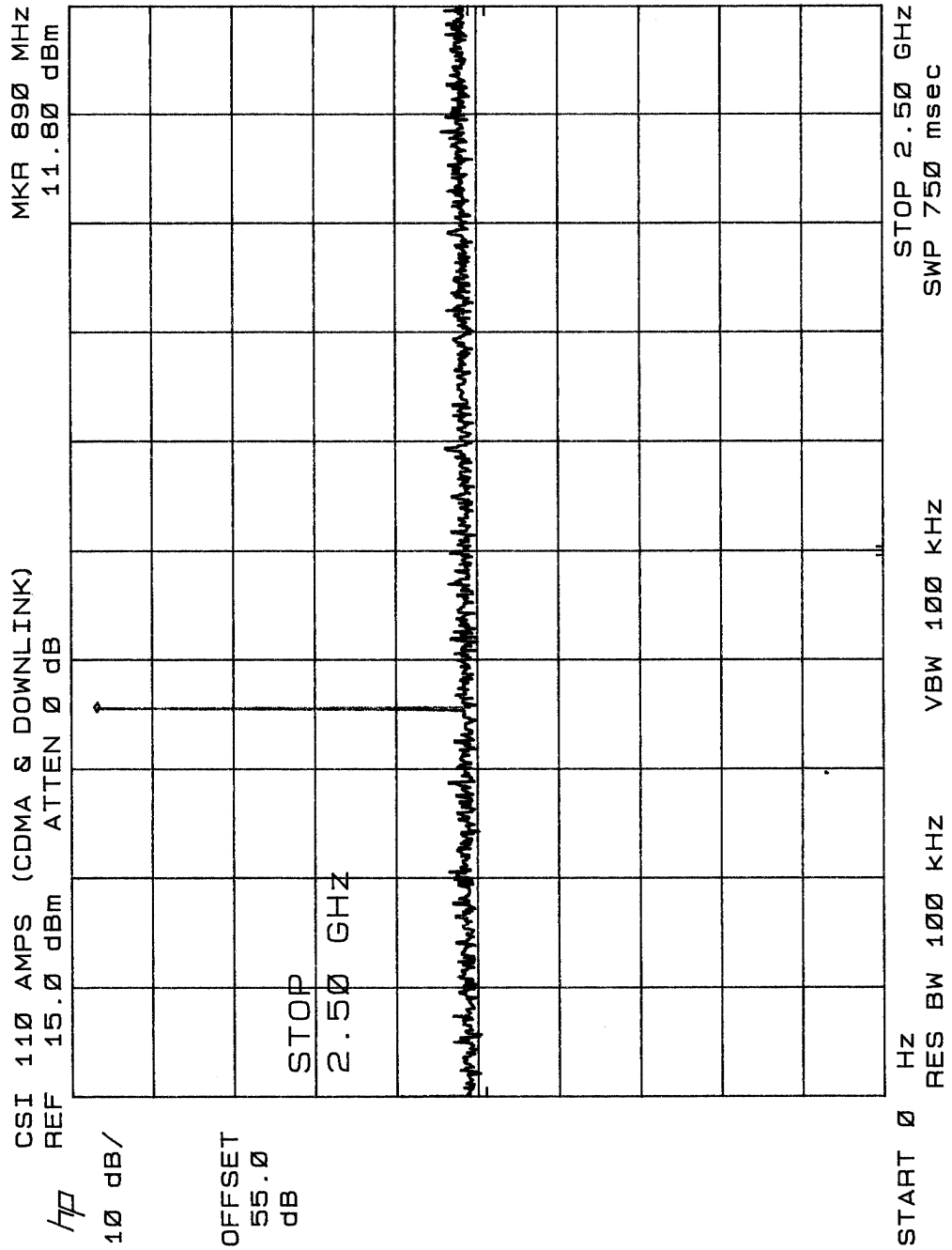
Out of Band Emissions at Antenna Terminals		
CDMA	Low	Page 74-75
	Middle	Page 76-77
	High	Page 78-79

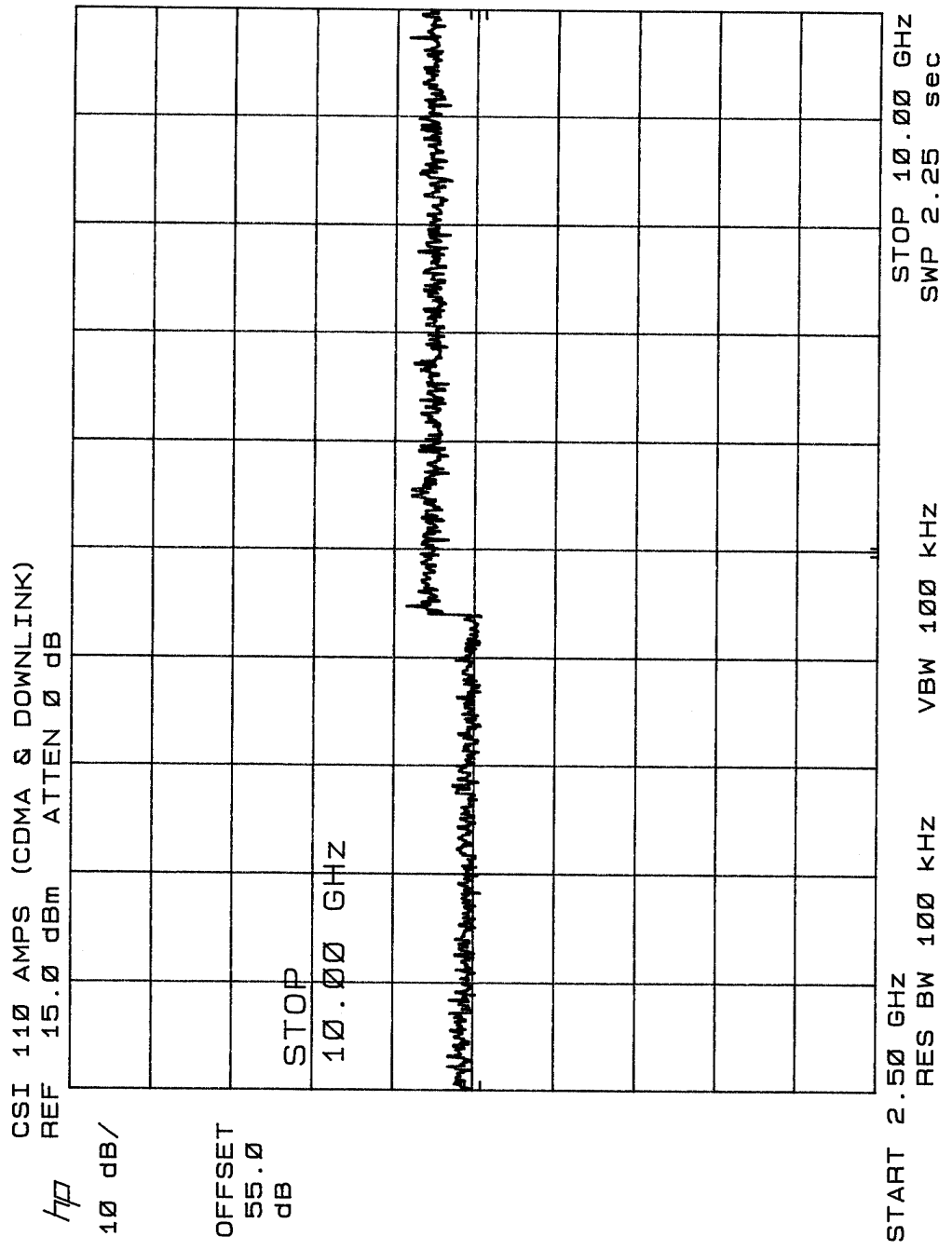

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 870 MHz
14.10 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

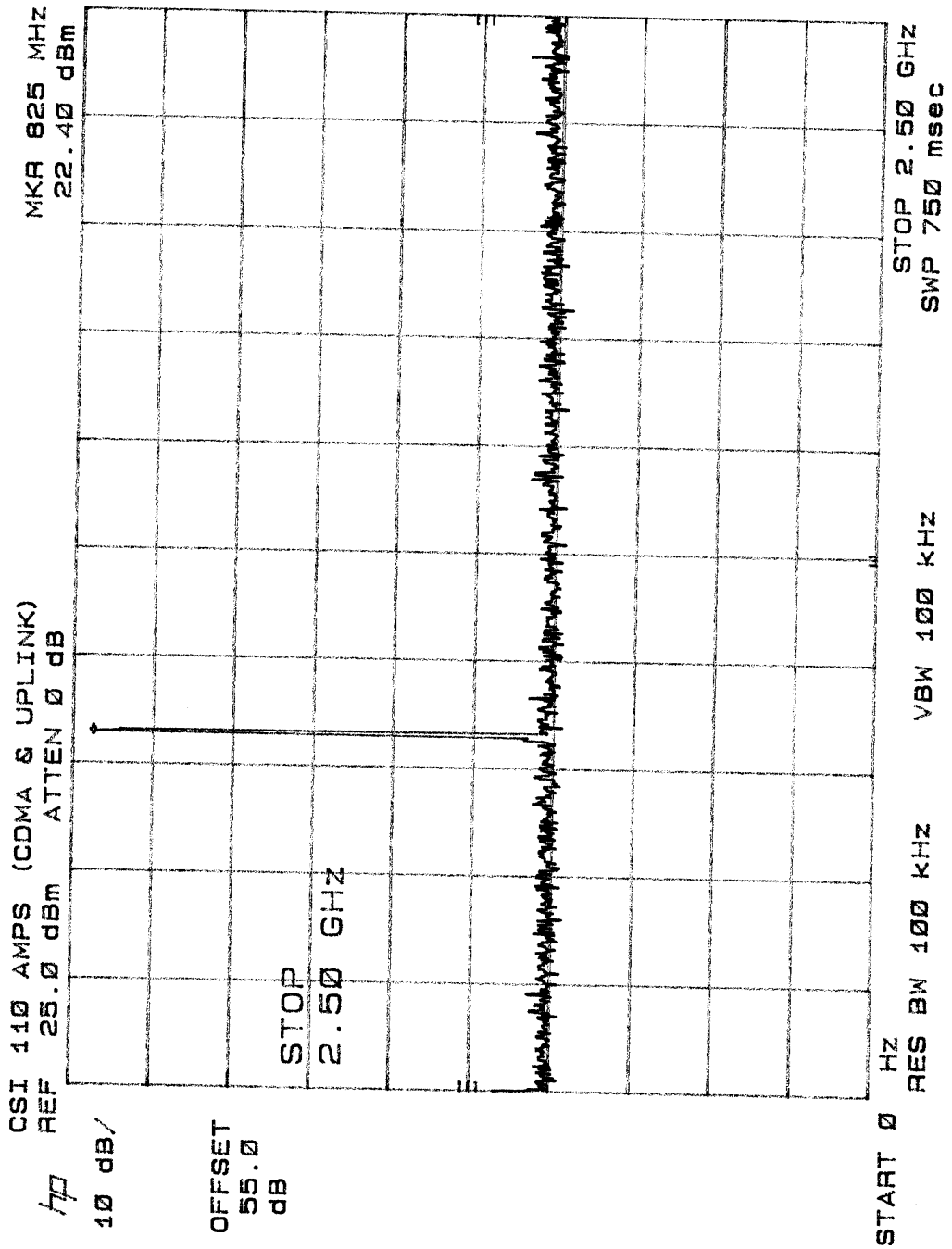

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

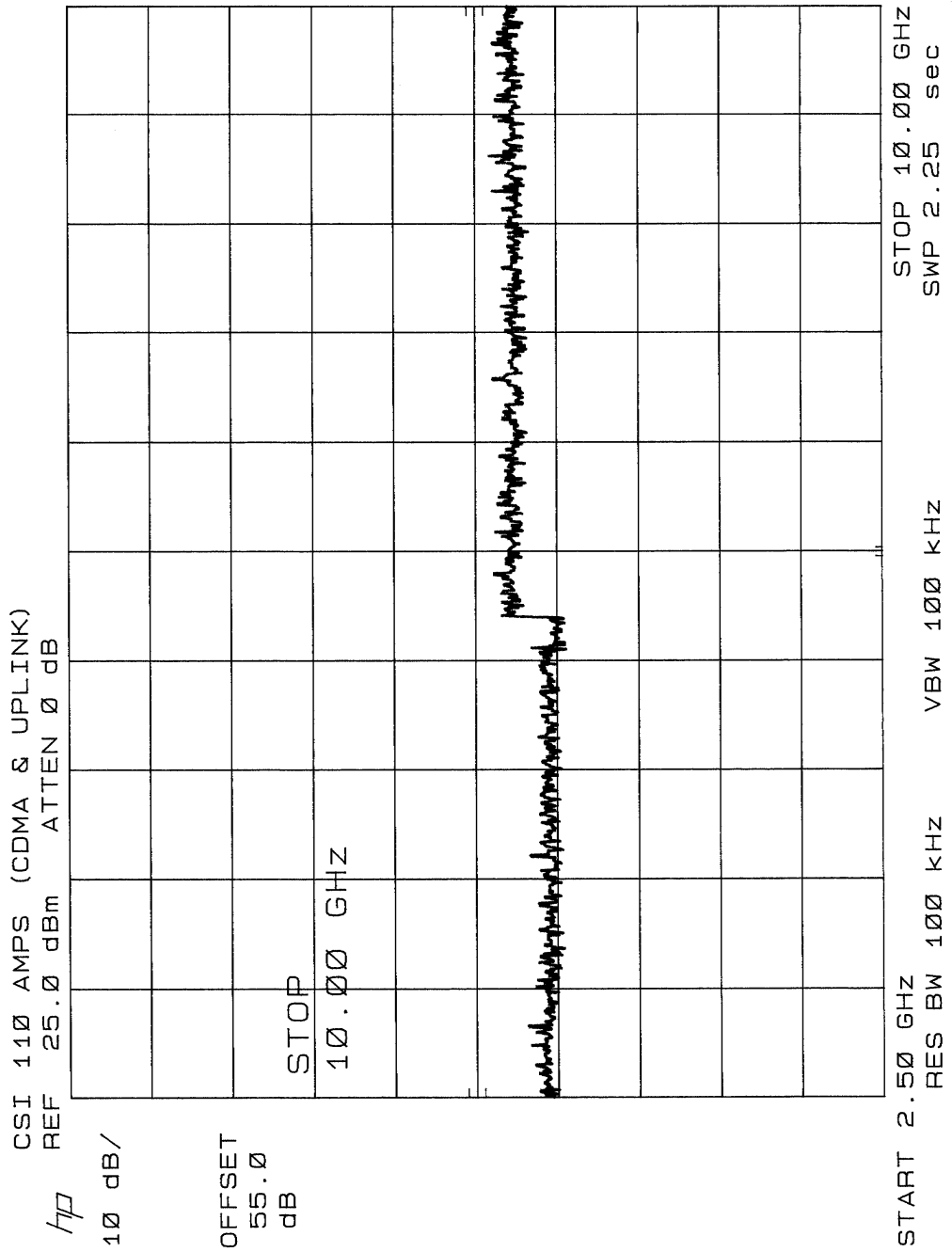

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 880 MHz
14.10 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

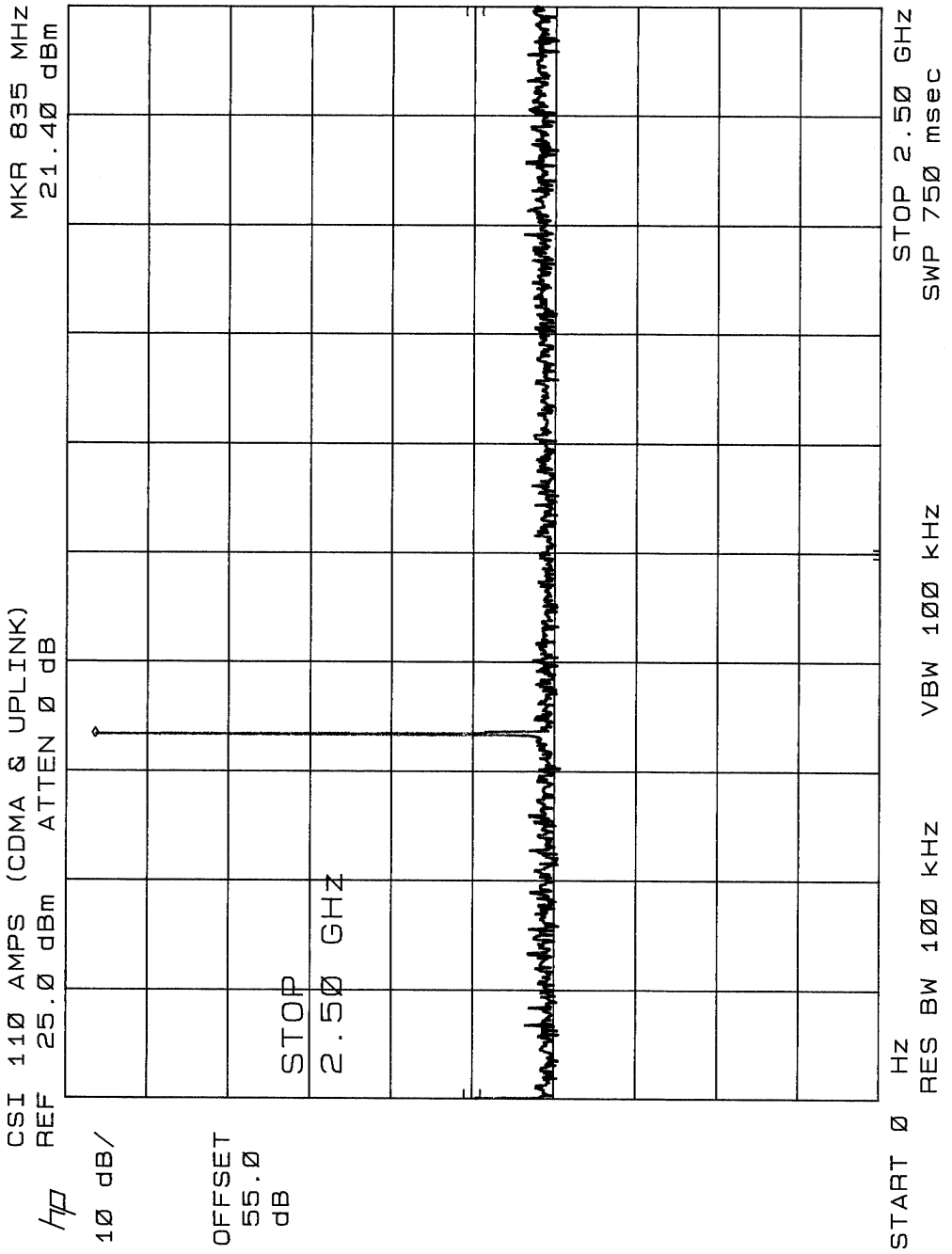

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

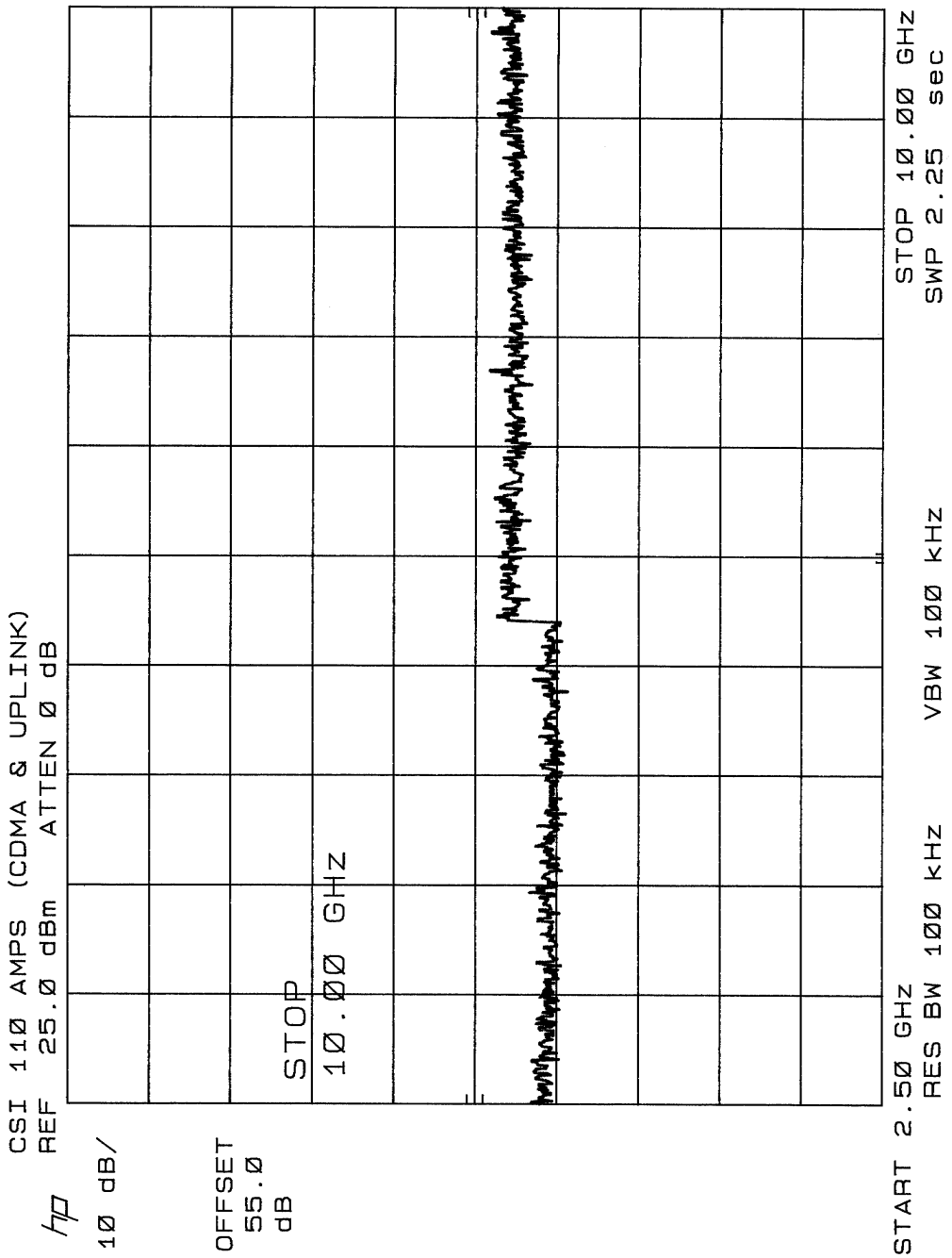

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 890 MHz
11.80 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

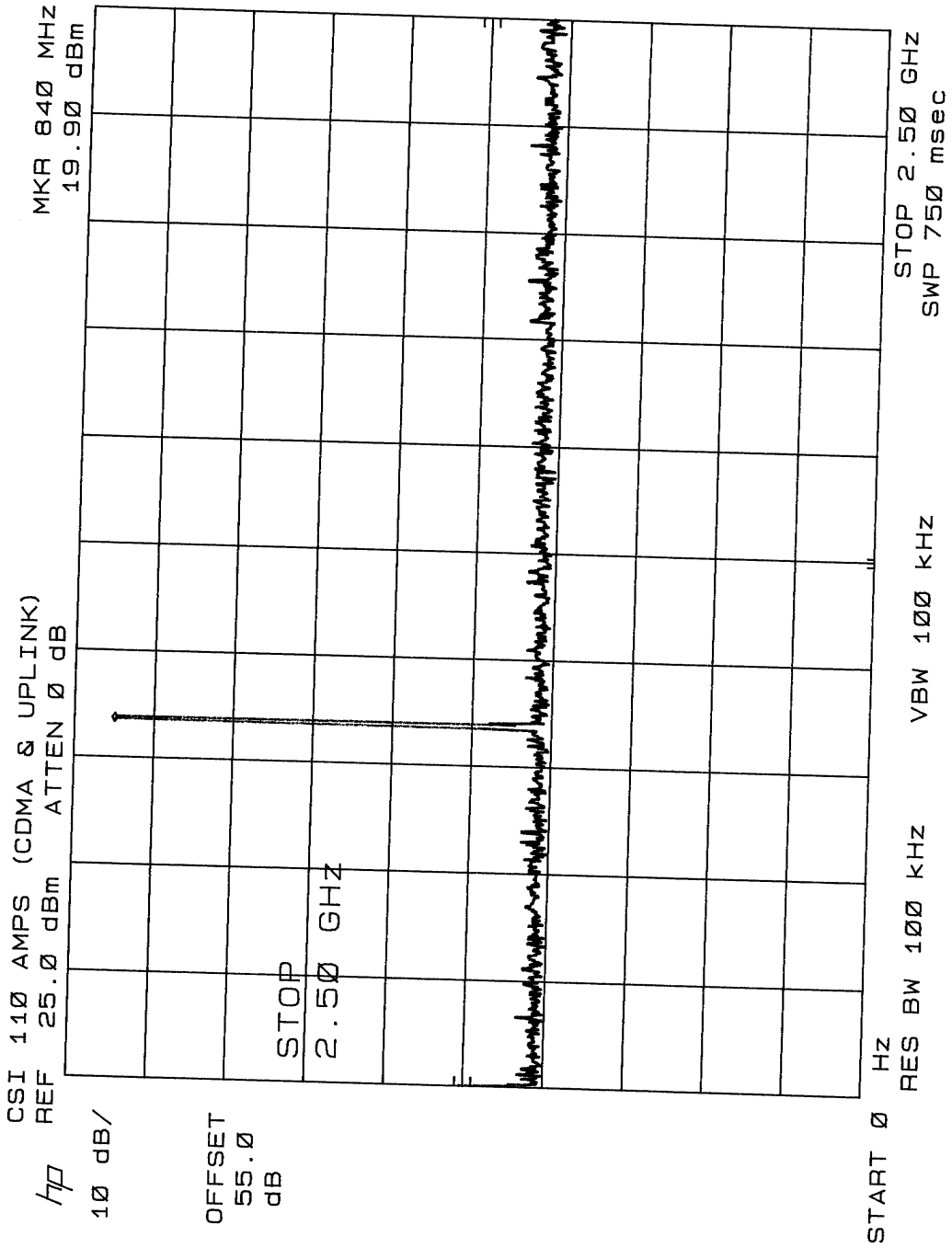

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.500 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec

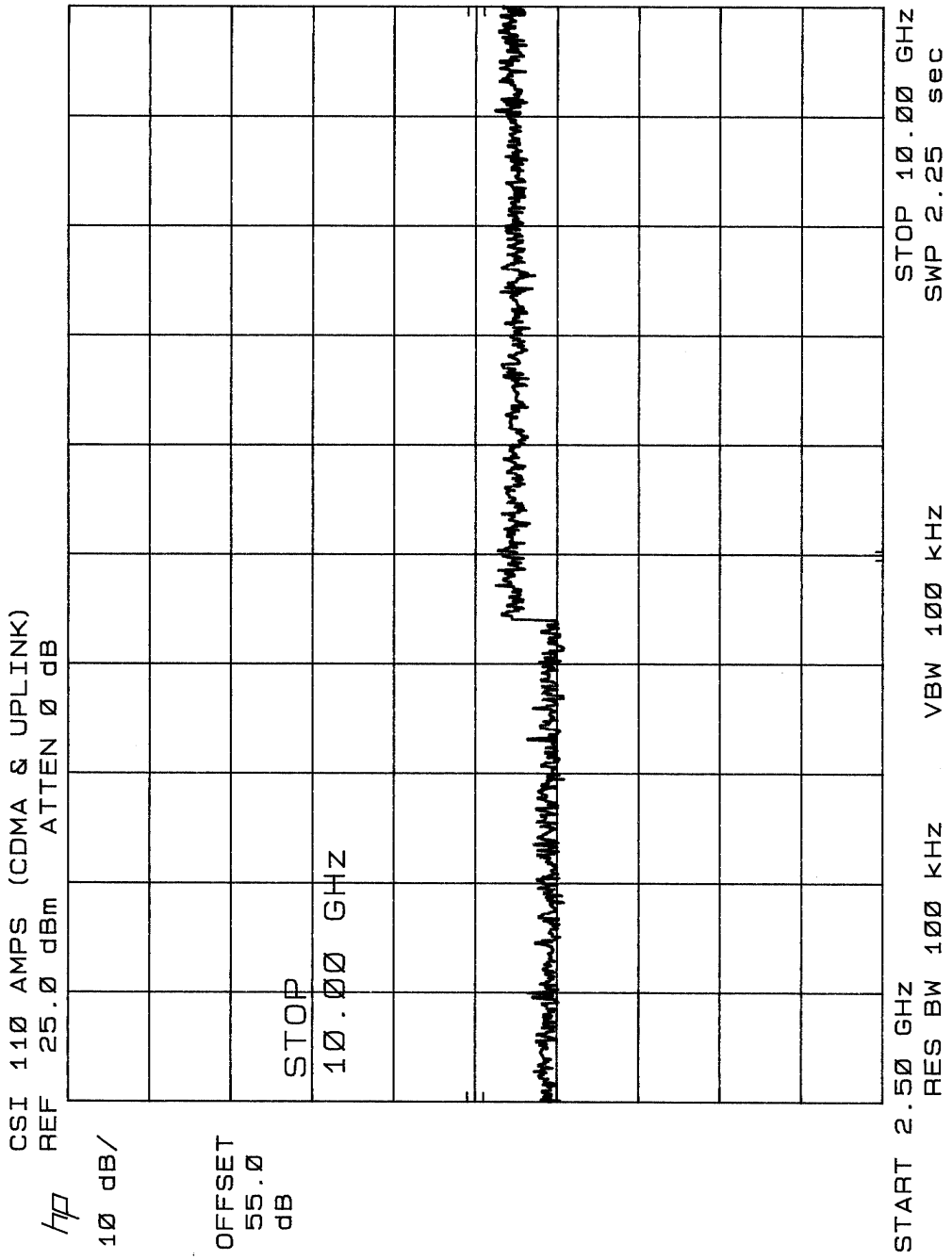

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 825 MHz
22.40 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.500 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 835 MHz
21.40 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.500 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.500 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.500 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 840 MHz
19.90 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.500 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec

3.5.0 Out of Band Emissions at Antenna Terminals (Two-Tone Test)

Requirements : IS-138A (3.4.4):
Intermodulation products must be attenuated below the rated power of the EUT by at least 43 +10log (P), or 60 dB, whichever is lesser attenuation. Equivalent to –13 dBm.

3.5.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic. Two input signals are equal in level (and can be raised equally), were send to the EUT.

3.5.2 Test Equipment

HP 8566B Spectrum Analyzer
HP 7470A Plotter
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Rohde & Schwarz SMIQ03B Signal Generator
Rohde & Schwarz AMIQ I/Q Modulation Generator

3.5.3 Test Results

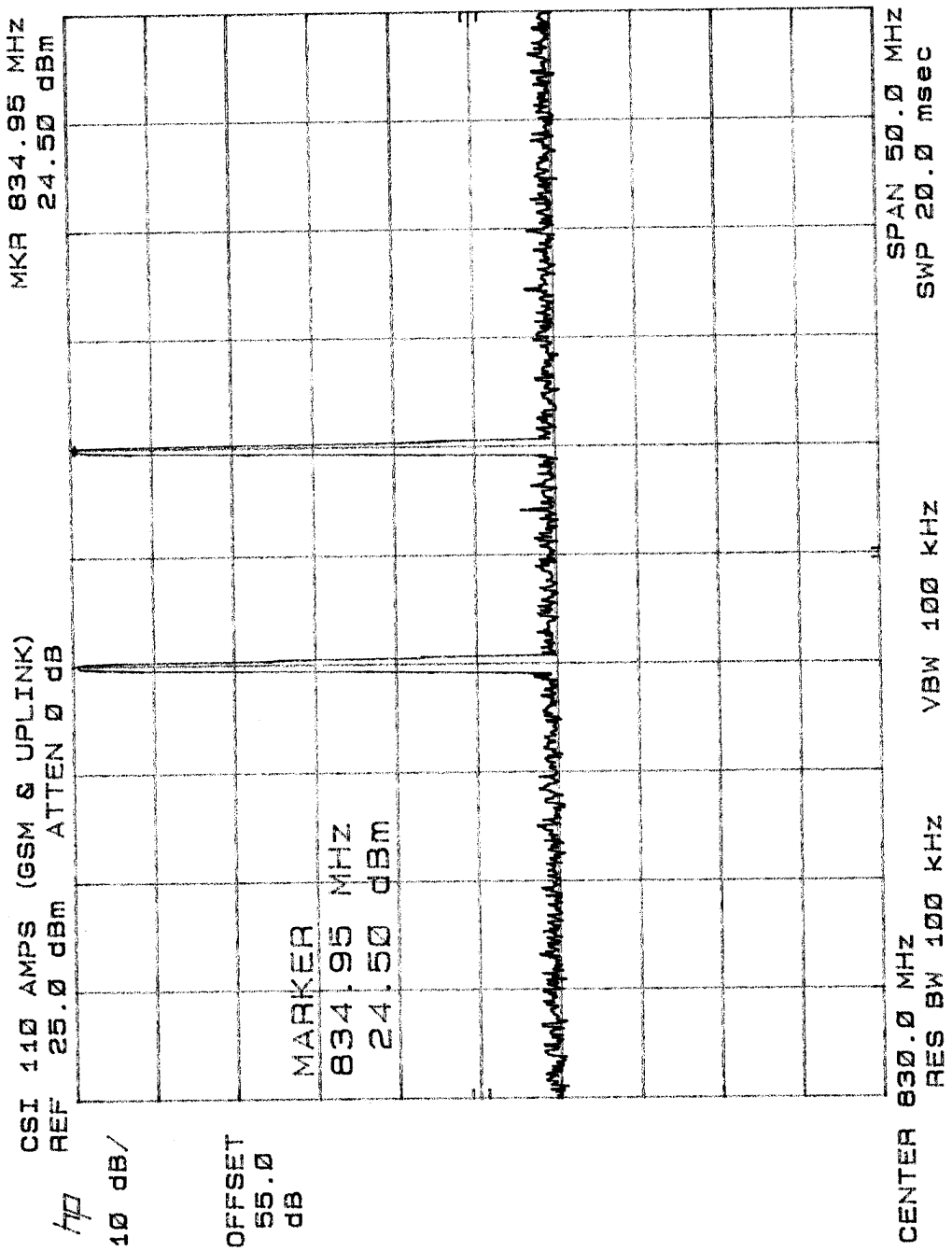
Refer to the attached plots.

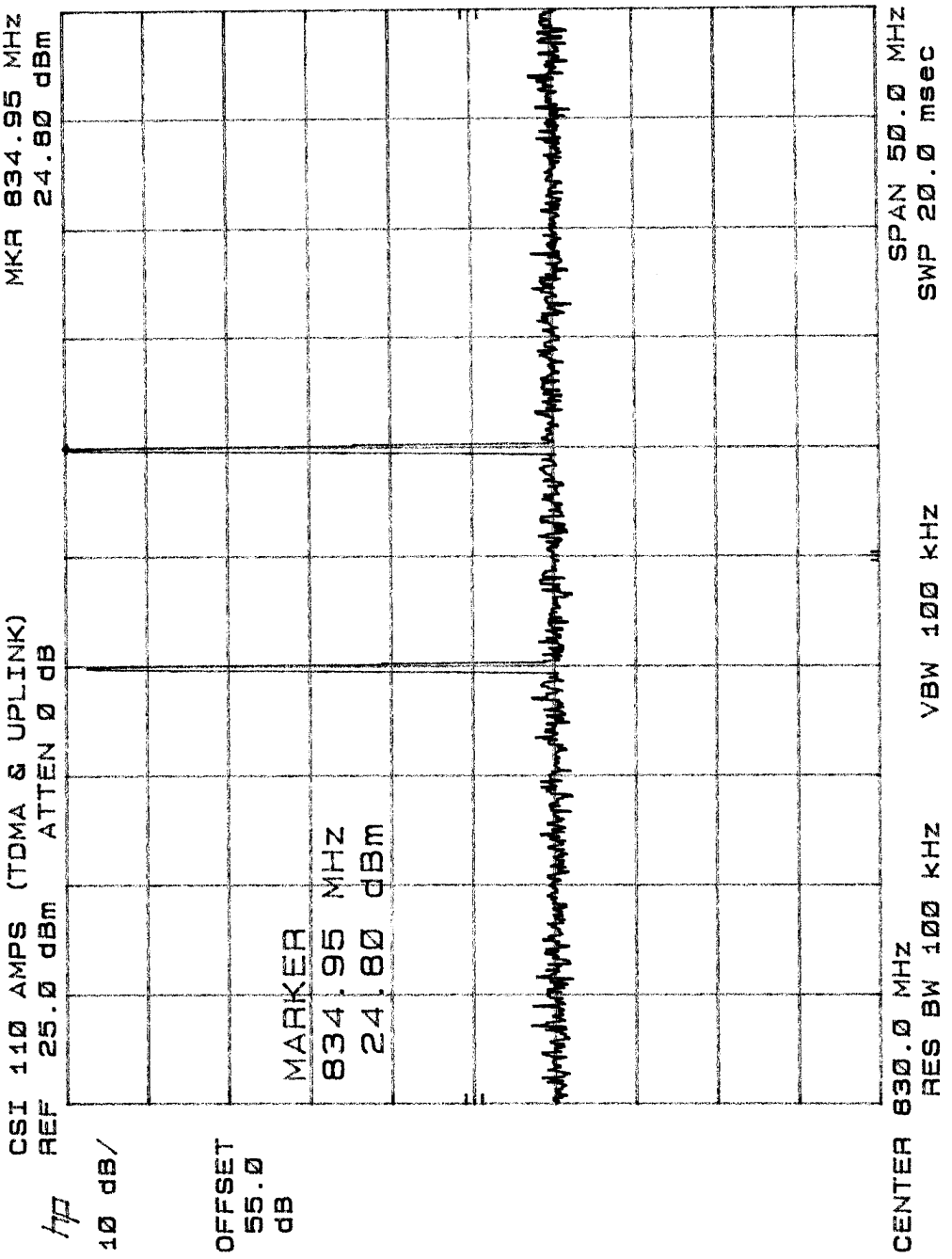
DOWNLINK

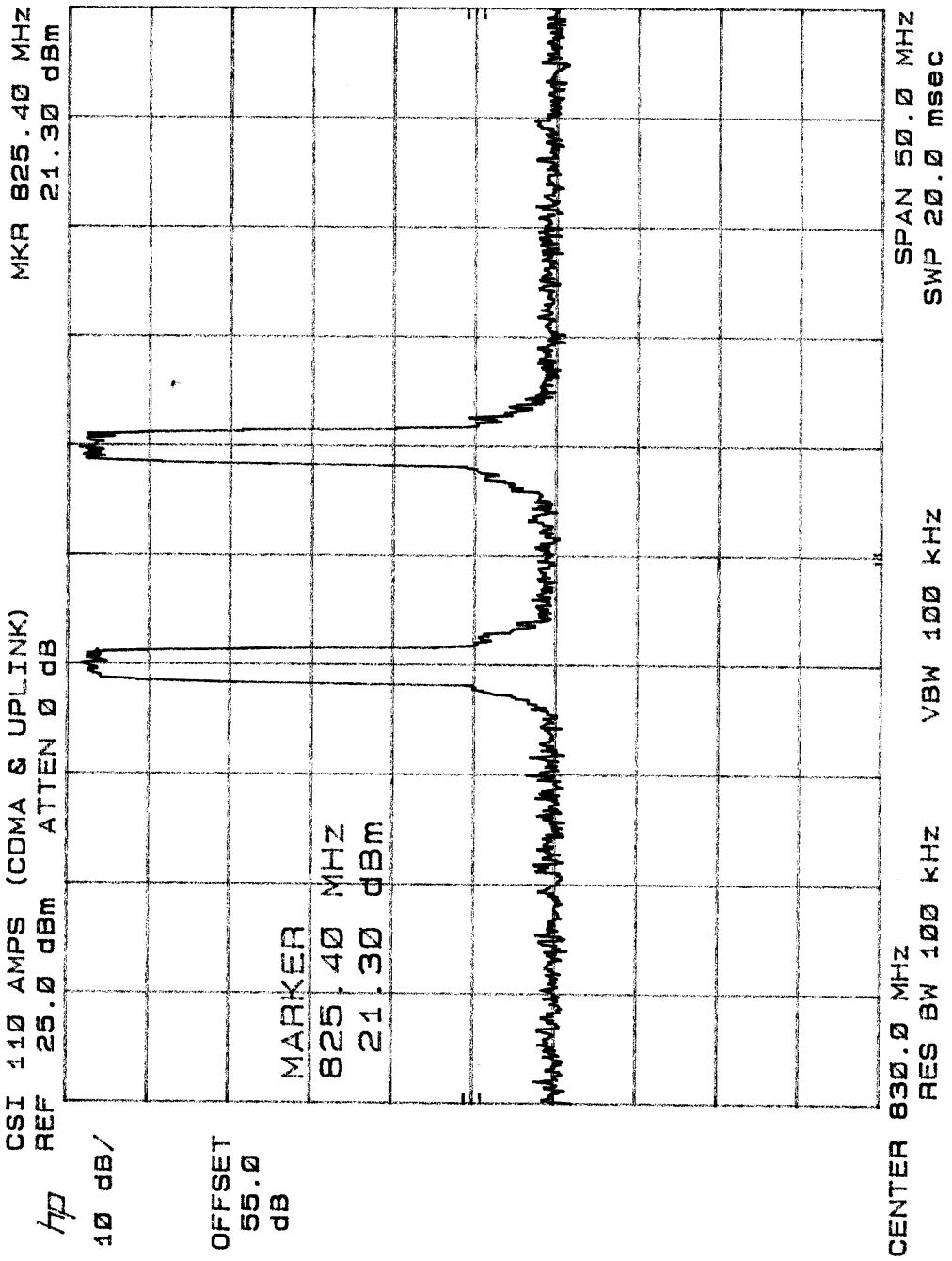
Out of Band Emissions at Antenna Terminals (Two-Tone Test)	
CDMA	Page 86 - 92
GSM	Page 84
TDMA	Page 85

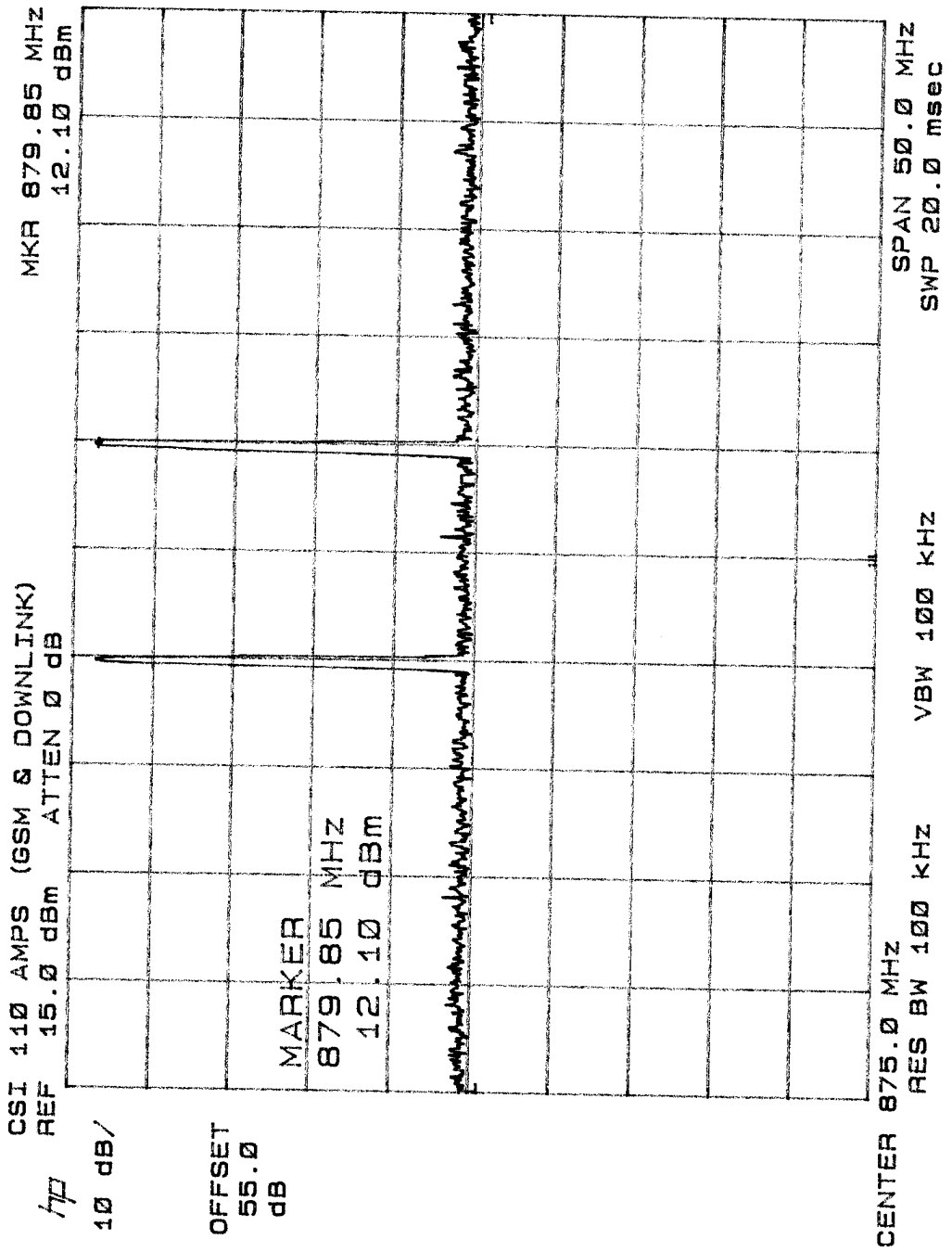
UPLINK

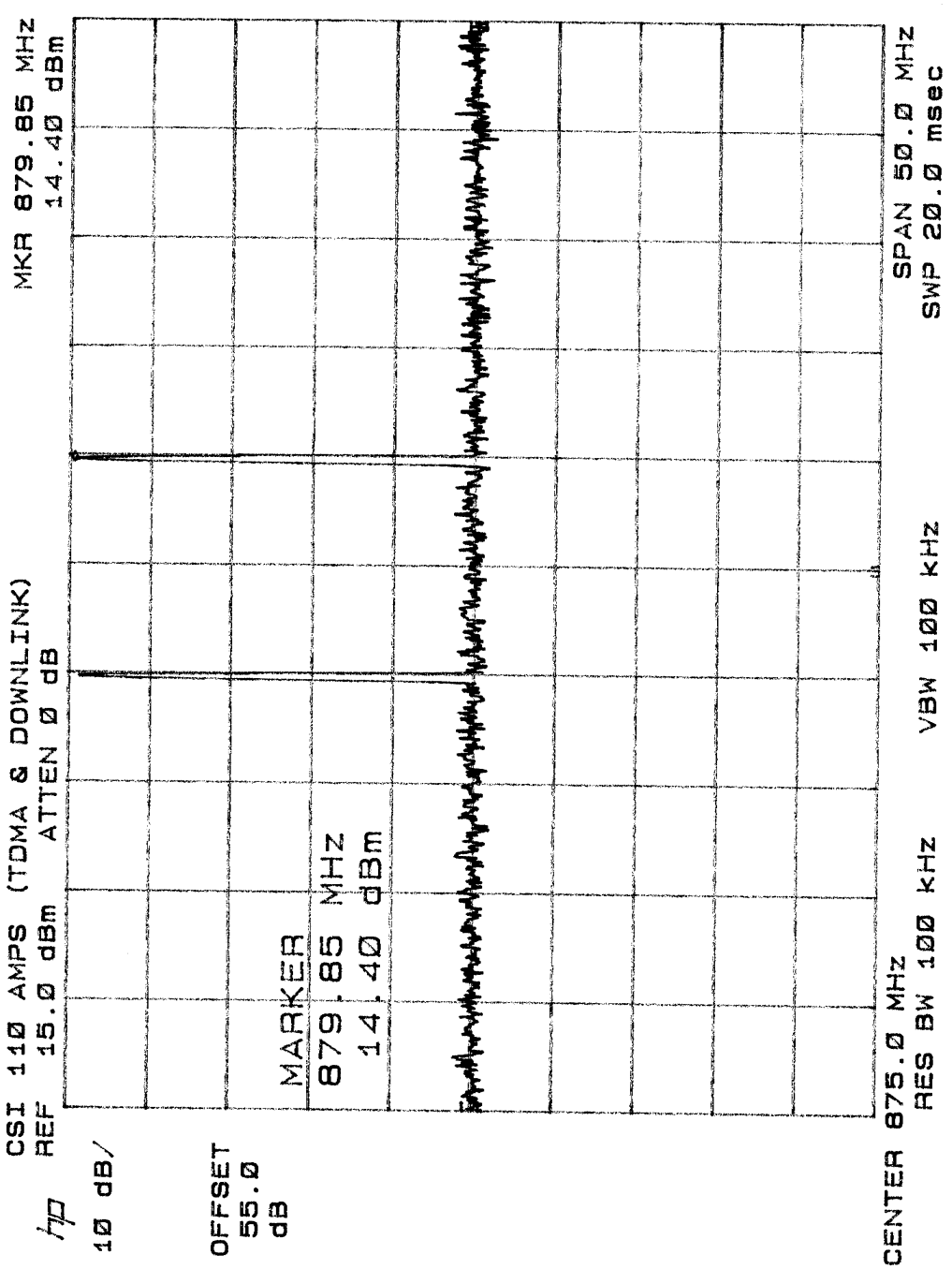
Out of Band Emissions at Antenna Terminals (Two-Tone Test)	
CDMA	Age 83, 93 - 98
GSM	Page 81
TDMA	Page 82

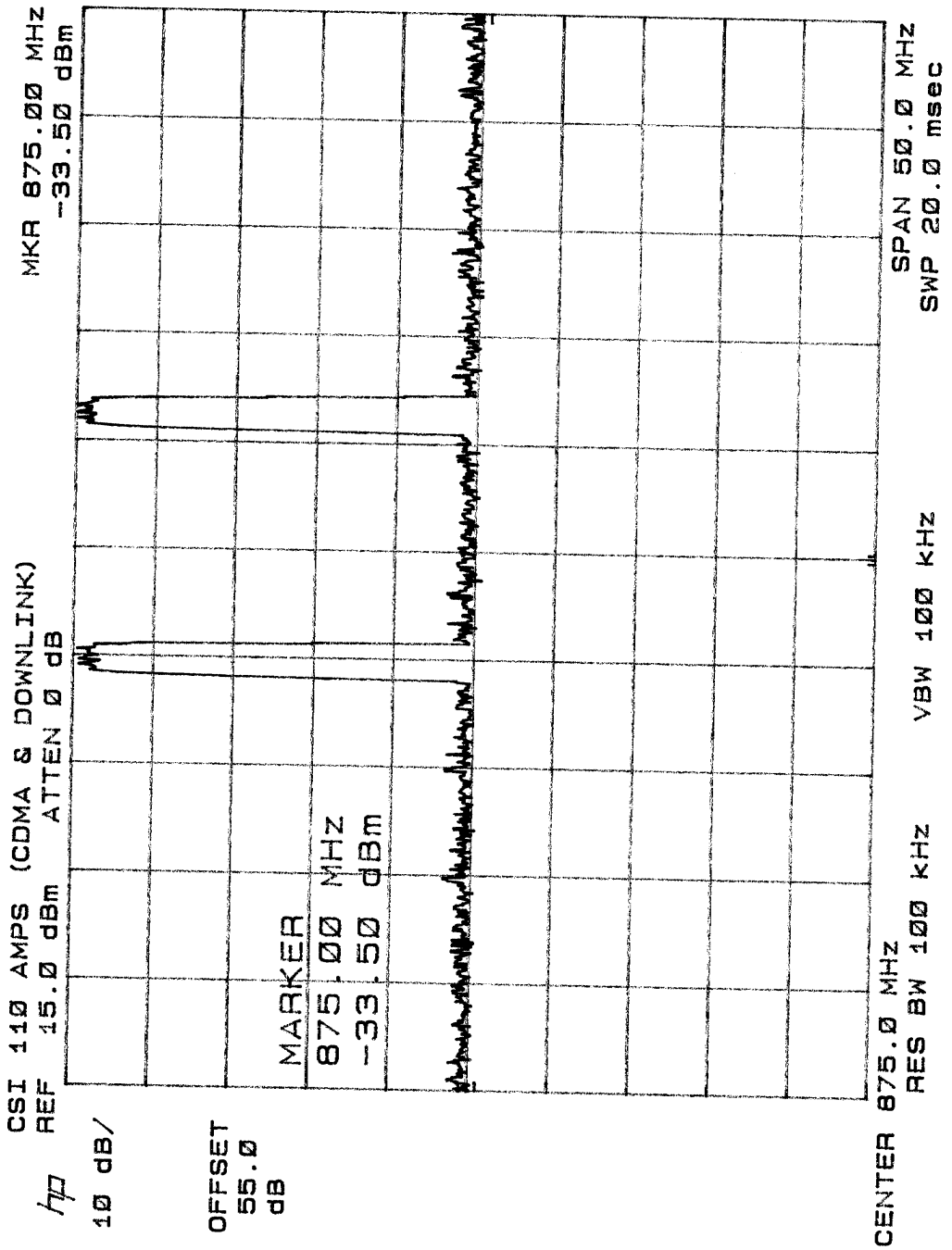

CSI 110 AMPS (GSM & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 834.95 MHz
24.50 dBm
10 dB/
OFFSET
55.0
dB
MARKER
834.95 MHz
24.50 dBm
CENTER 830.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

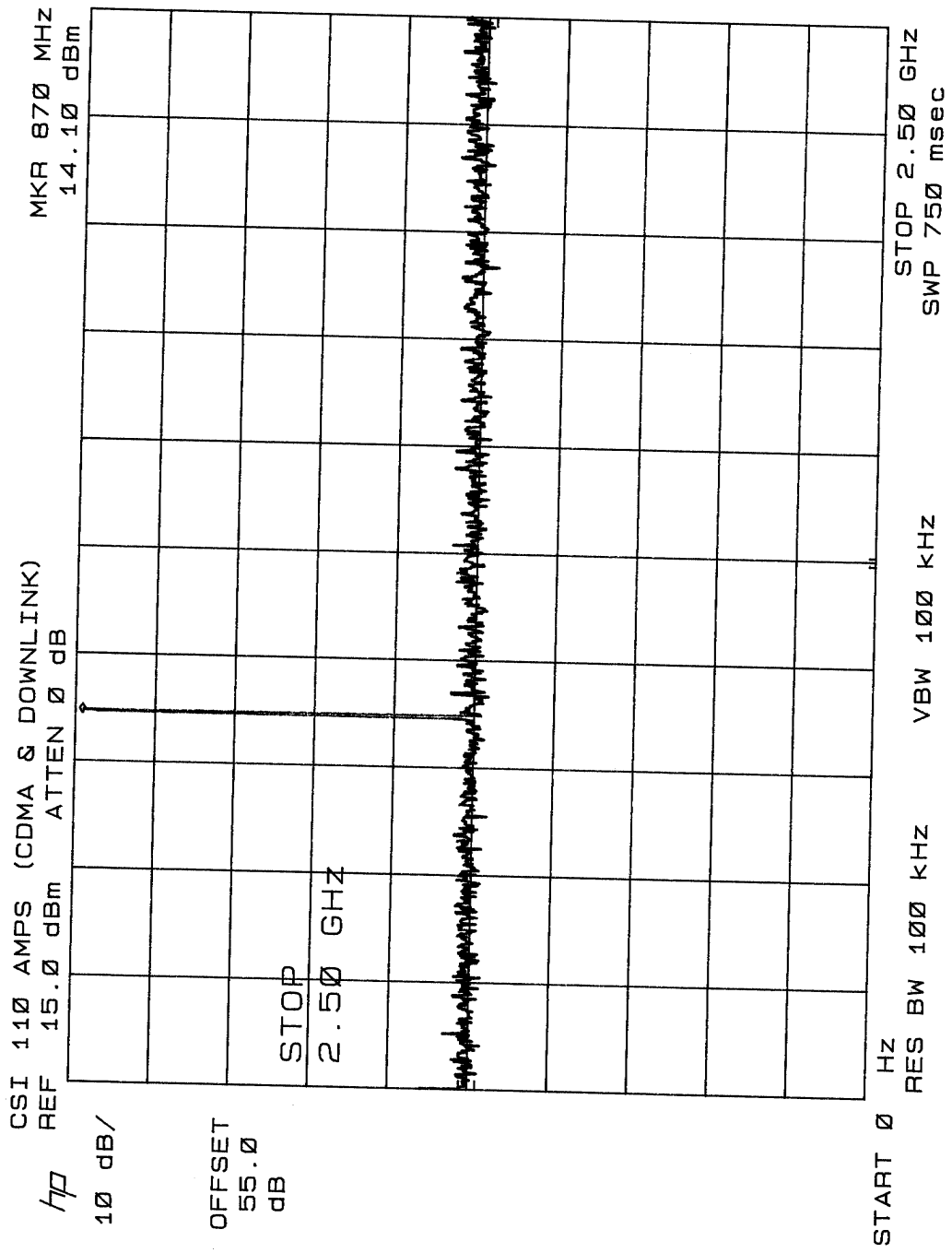

CSI 110 AMPS (TDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 834.95 MHz
24.80 dBm
10 dB/
OFFSET
55.0
dB
MARKER
834.95 MHz
24.80 dBm
CENTER 830.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

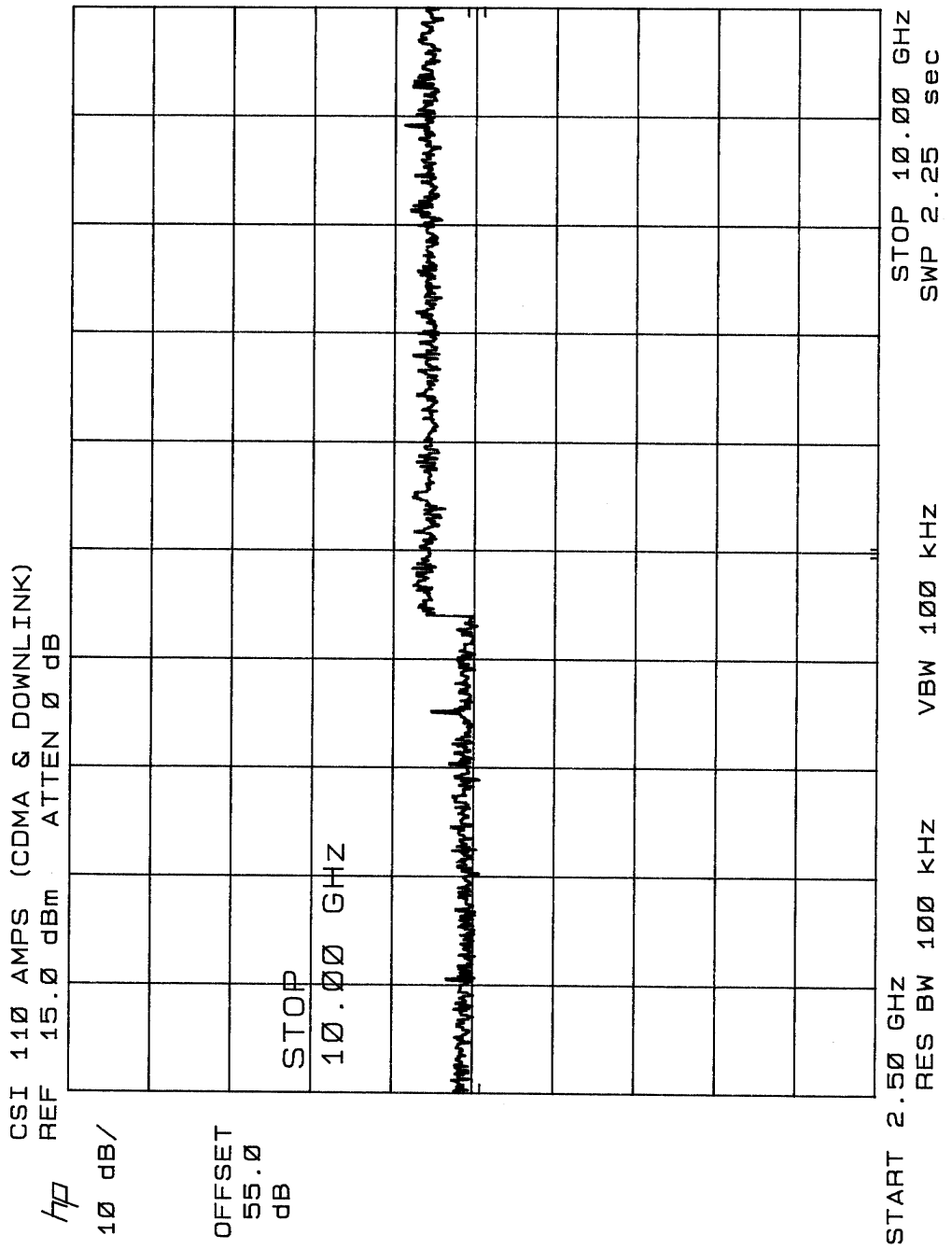

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 825.40 MHz
21.30 dBm
10 dB/
OFFSET
55.0
dB
MARKER
825.40 MHz
21.30 dBm
CENTER 830.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

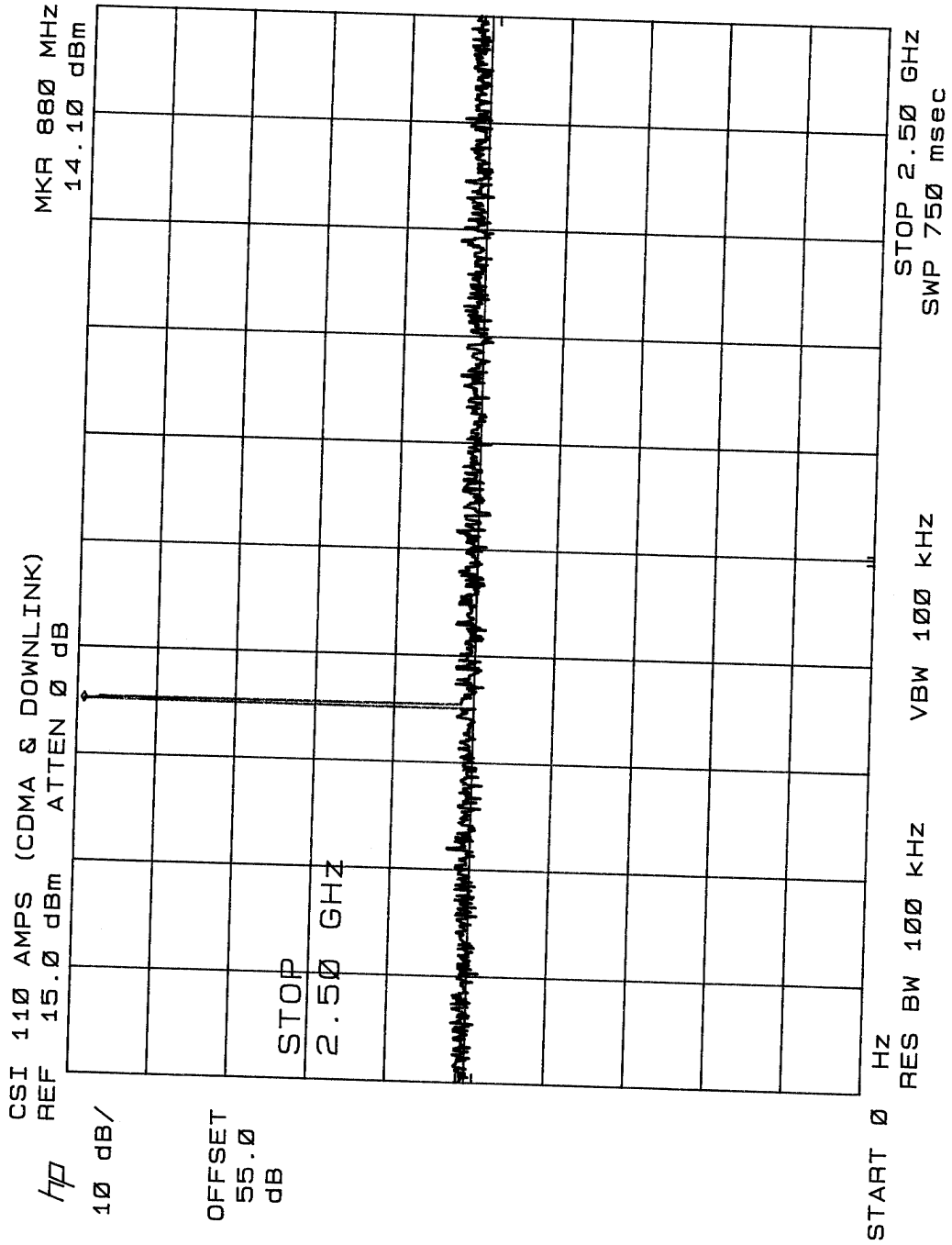

CSI 110 AMPS (GSM & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 879.85 MHz
12.10 dBm
10 dB/
OFFSET
55.0
dB
MARKER
879.85 MHz
12.10 dBm
CENTER 875.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

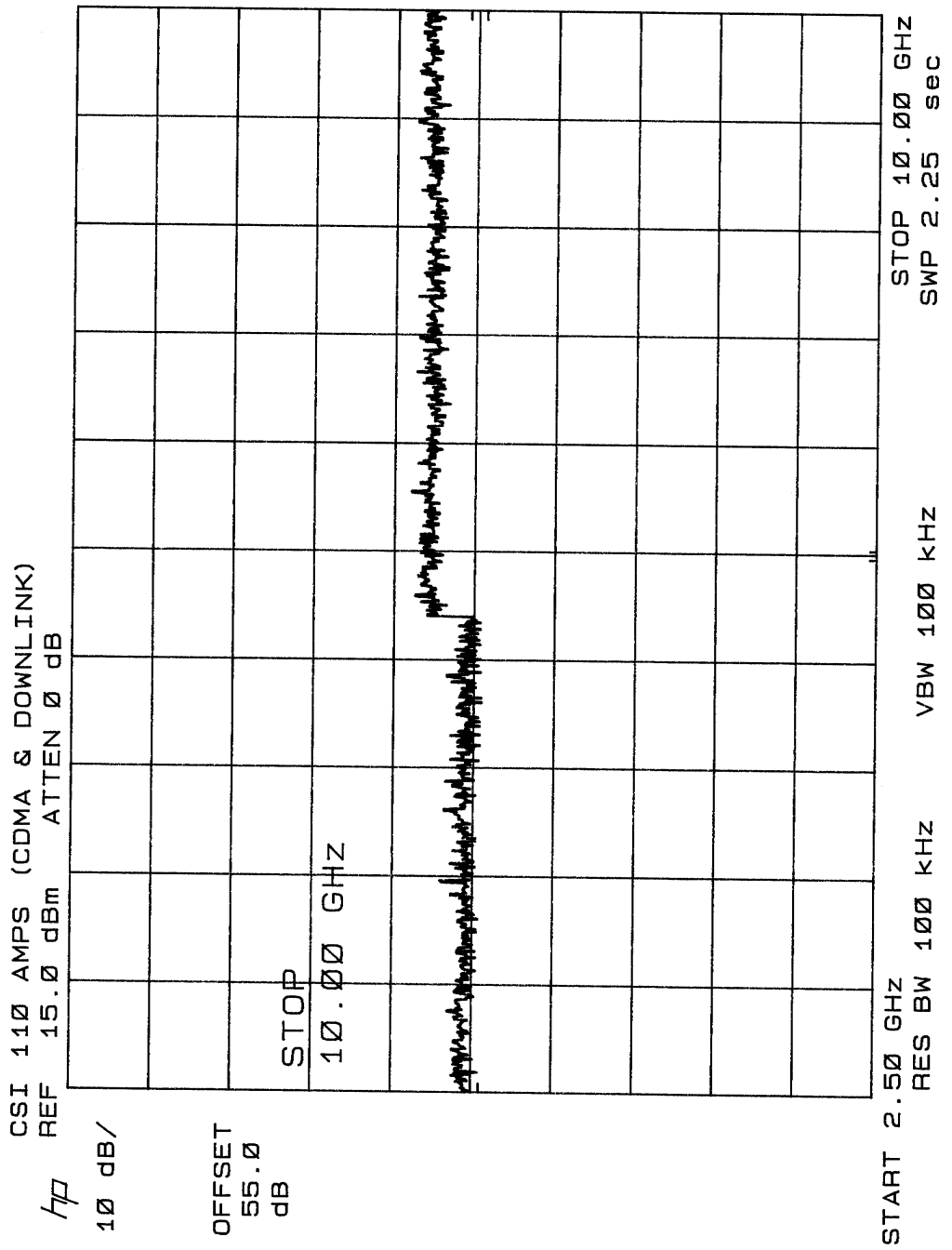

CSI 110 AMPS (TDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 879.85 MHz
14.40 dBm
10 dB/
OFFSET
55.0
dB
MARKER
879.85 MHz
14.40 dBm
CENTER 875.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

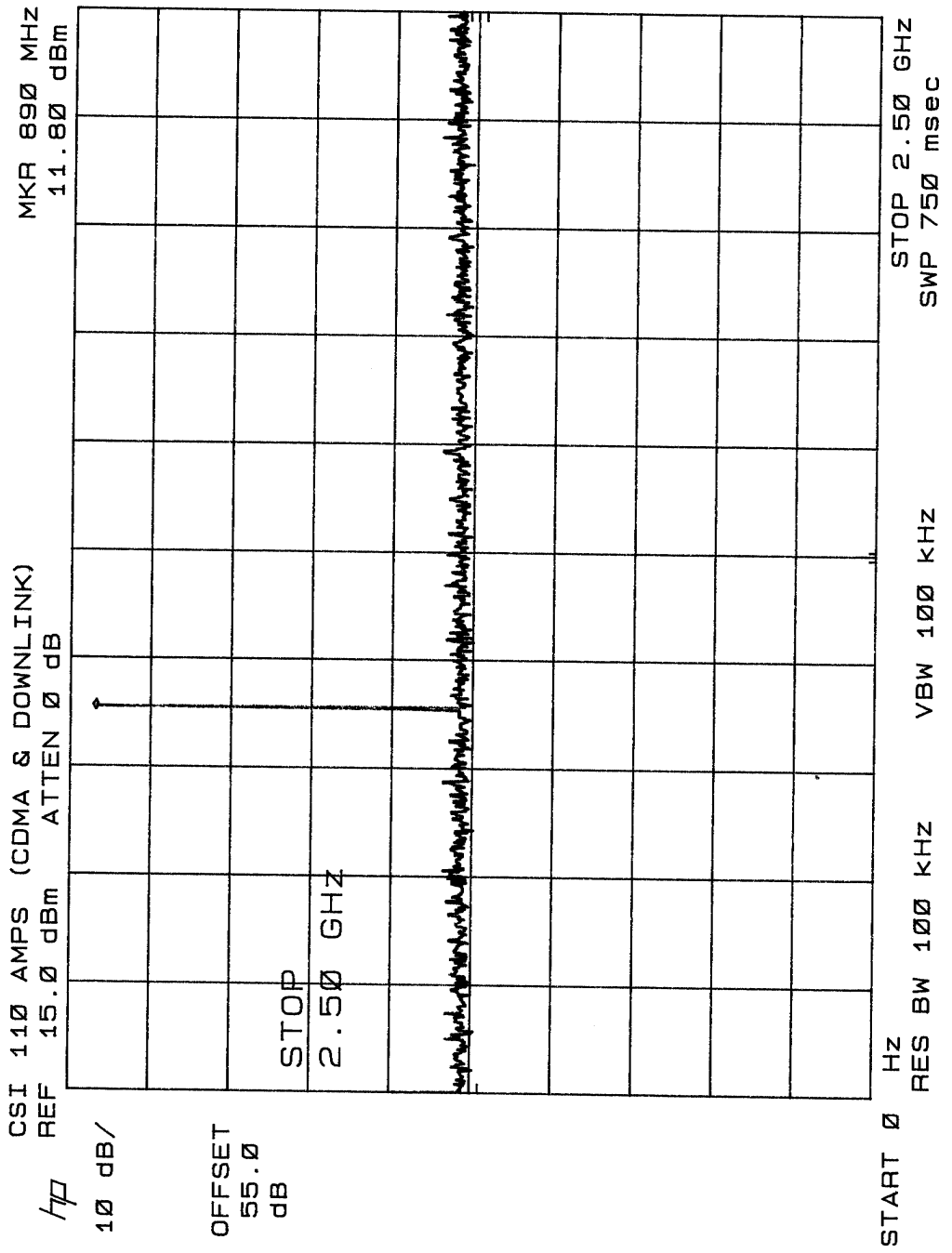

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 875.00 MHz
-33.50 dBm
10 dB/
OFFSET
55.0
dB
MARKER
875.00 MHz
-33.50 dBm
CENTER 875.0 MHz
RES BW 100 kHz
VBW 100 kHz
SPAN 50.0 MHz
SWP 20.0 msec

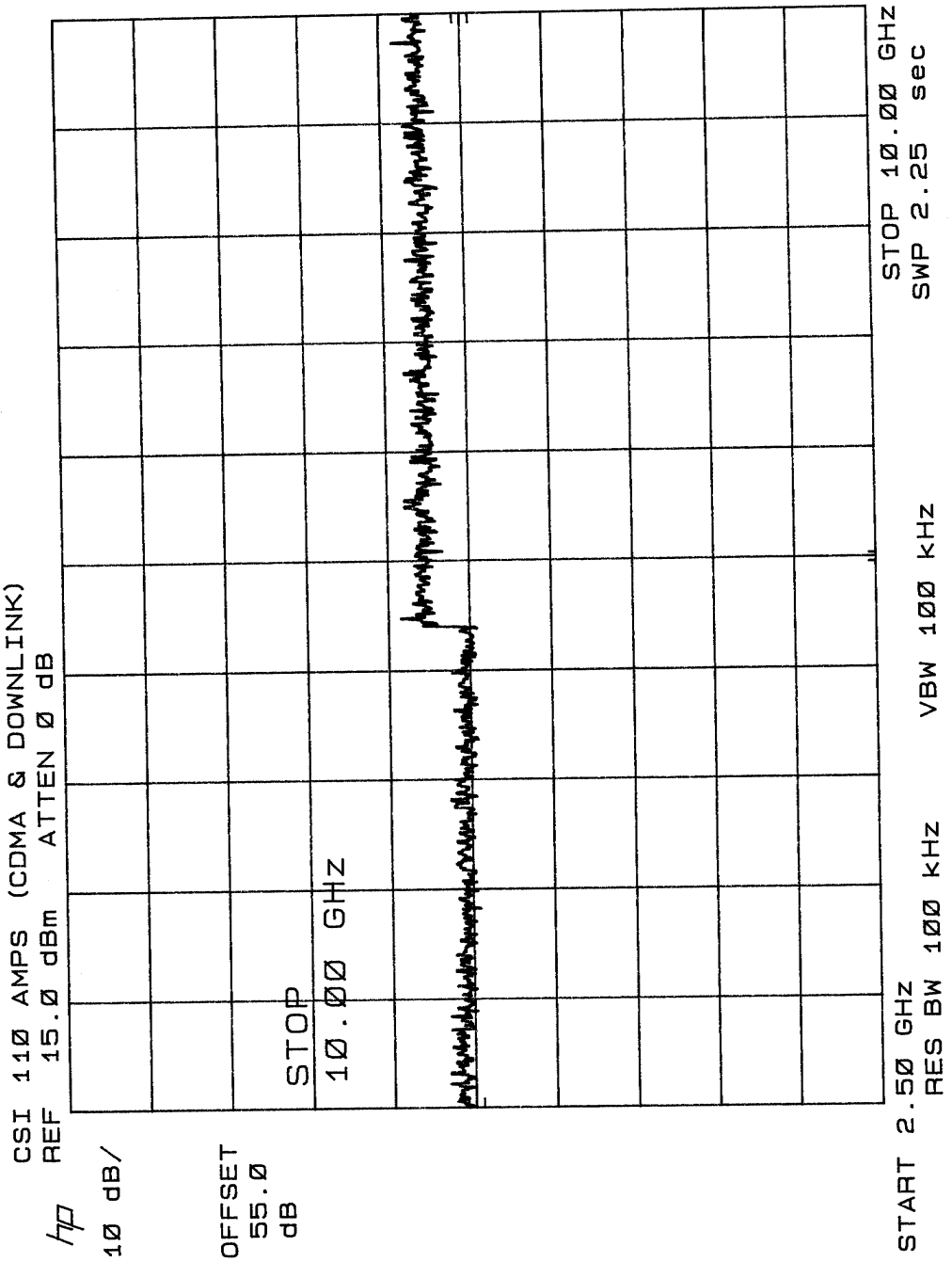

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 870 MHz
14.10 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.500 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

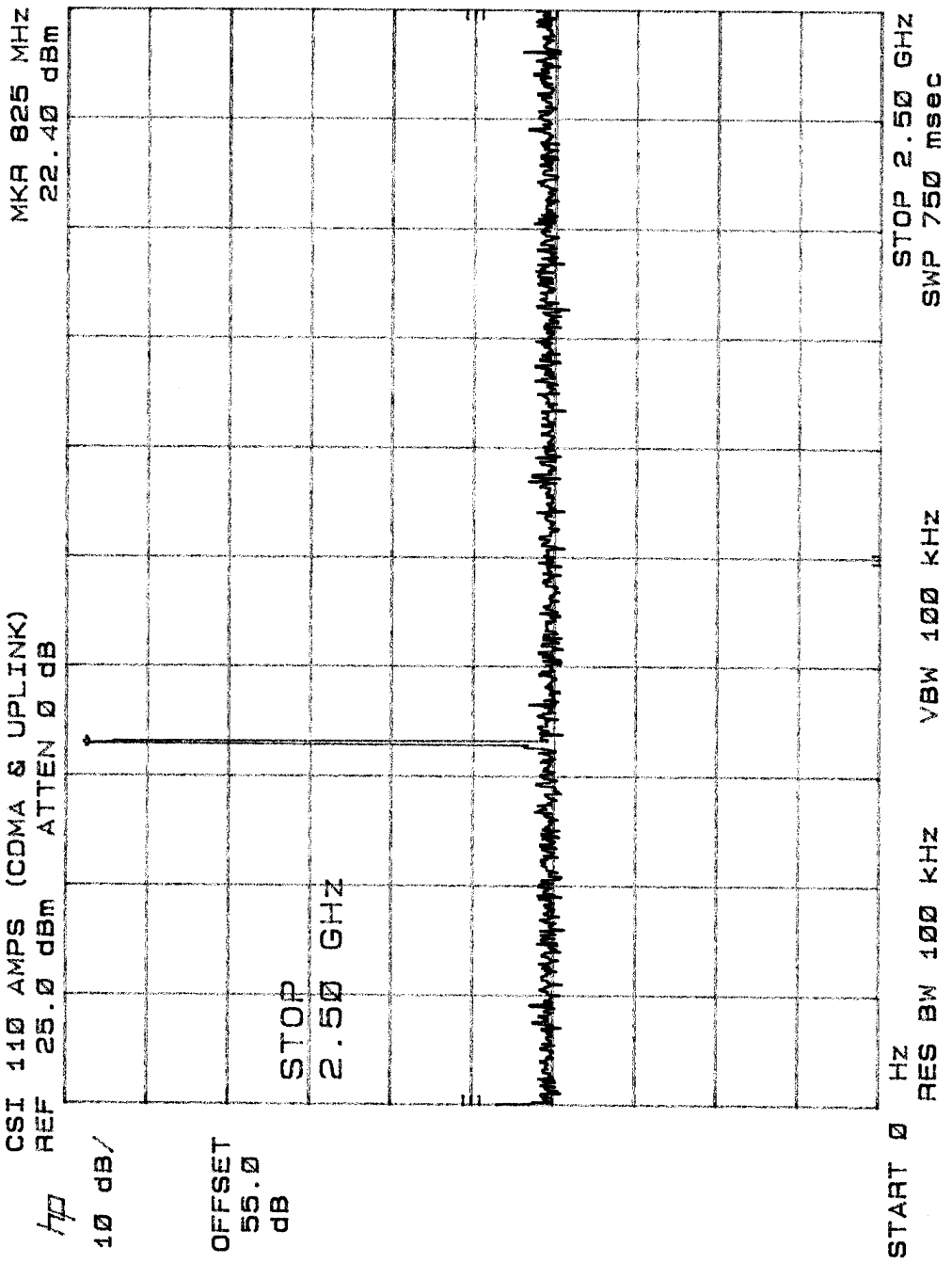

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

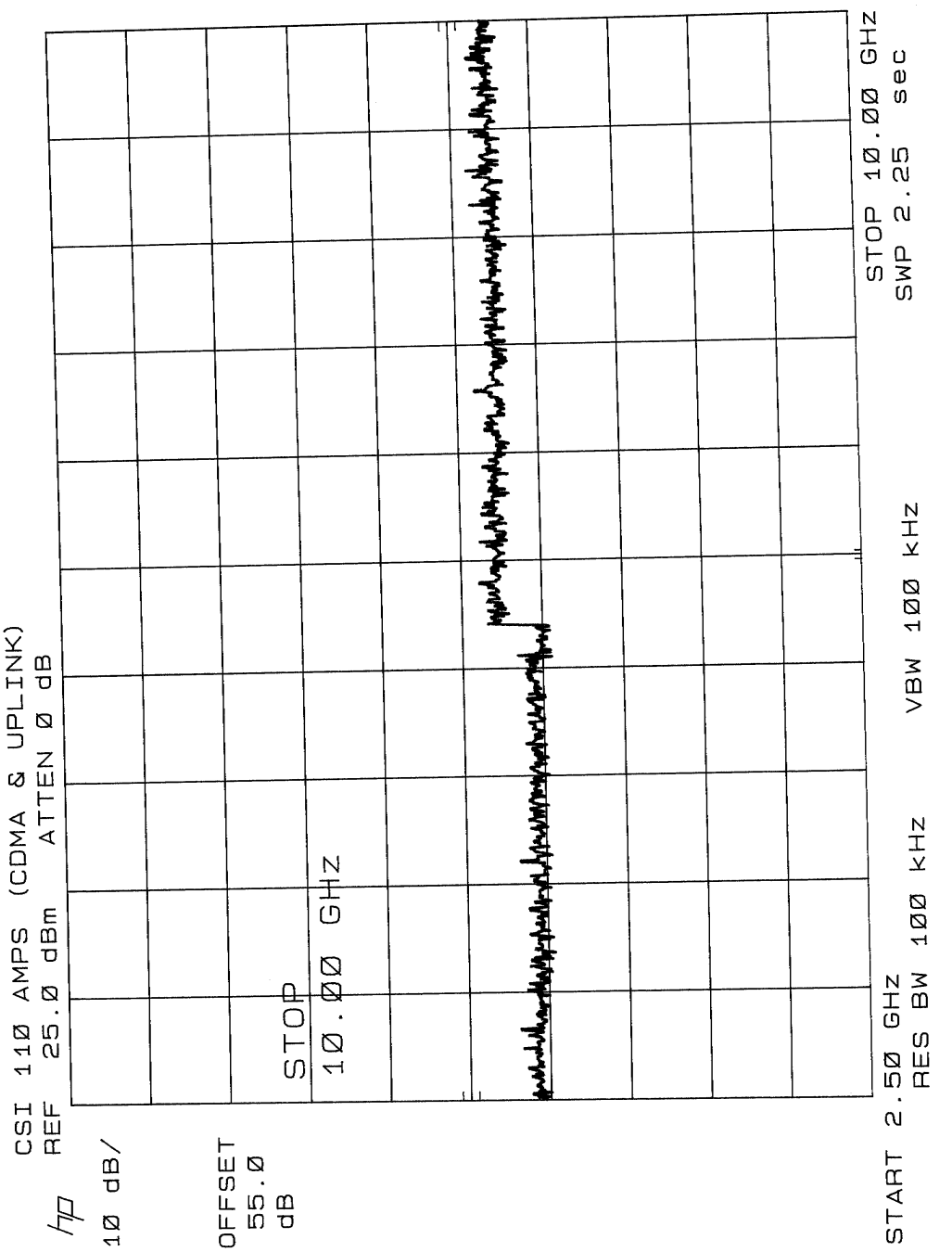

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 880 MHz
14.10 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

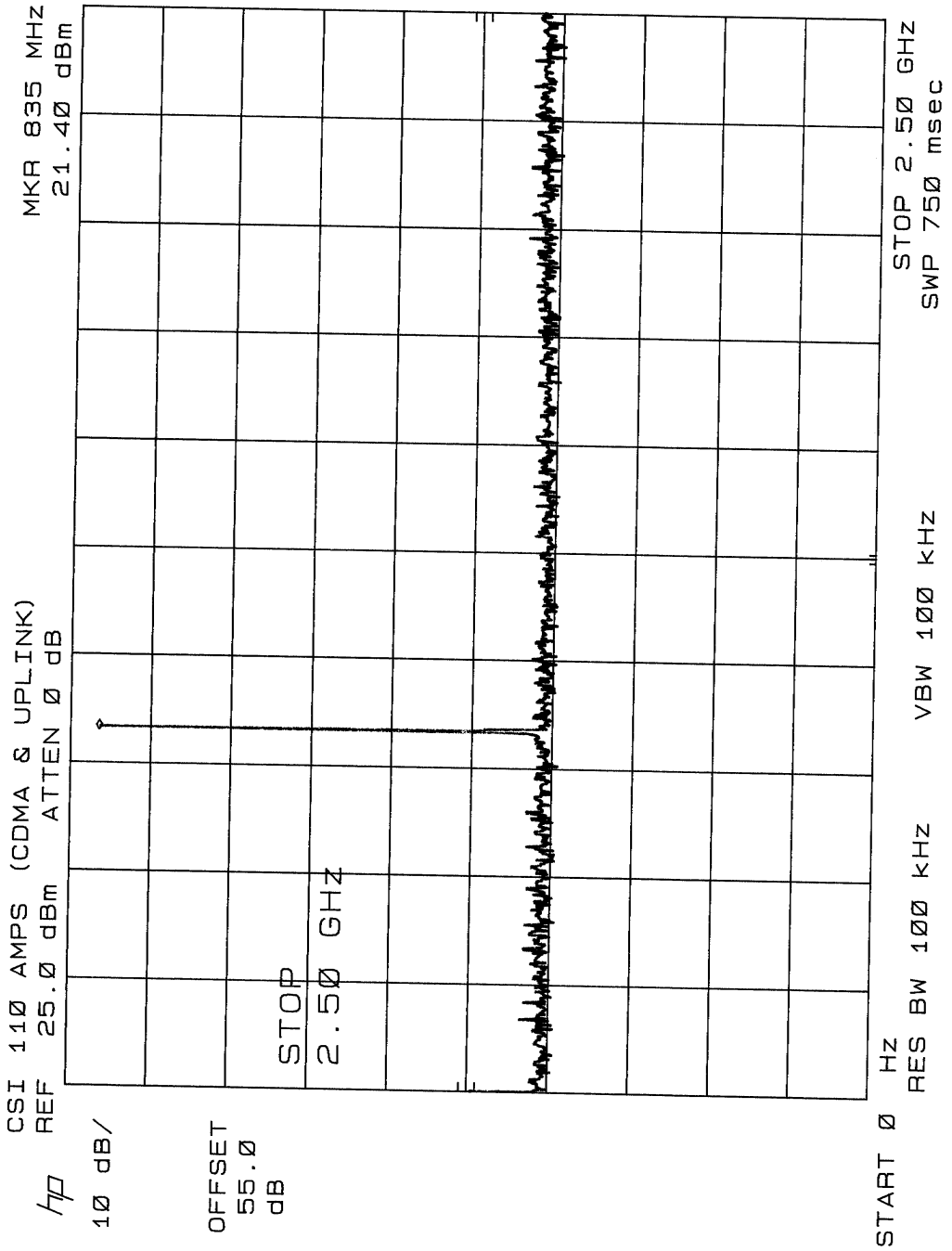

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

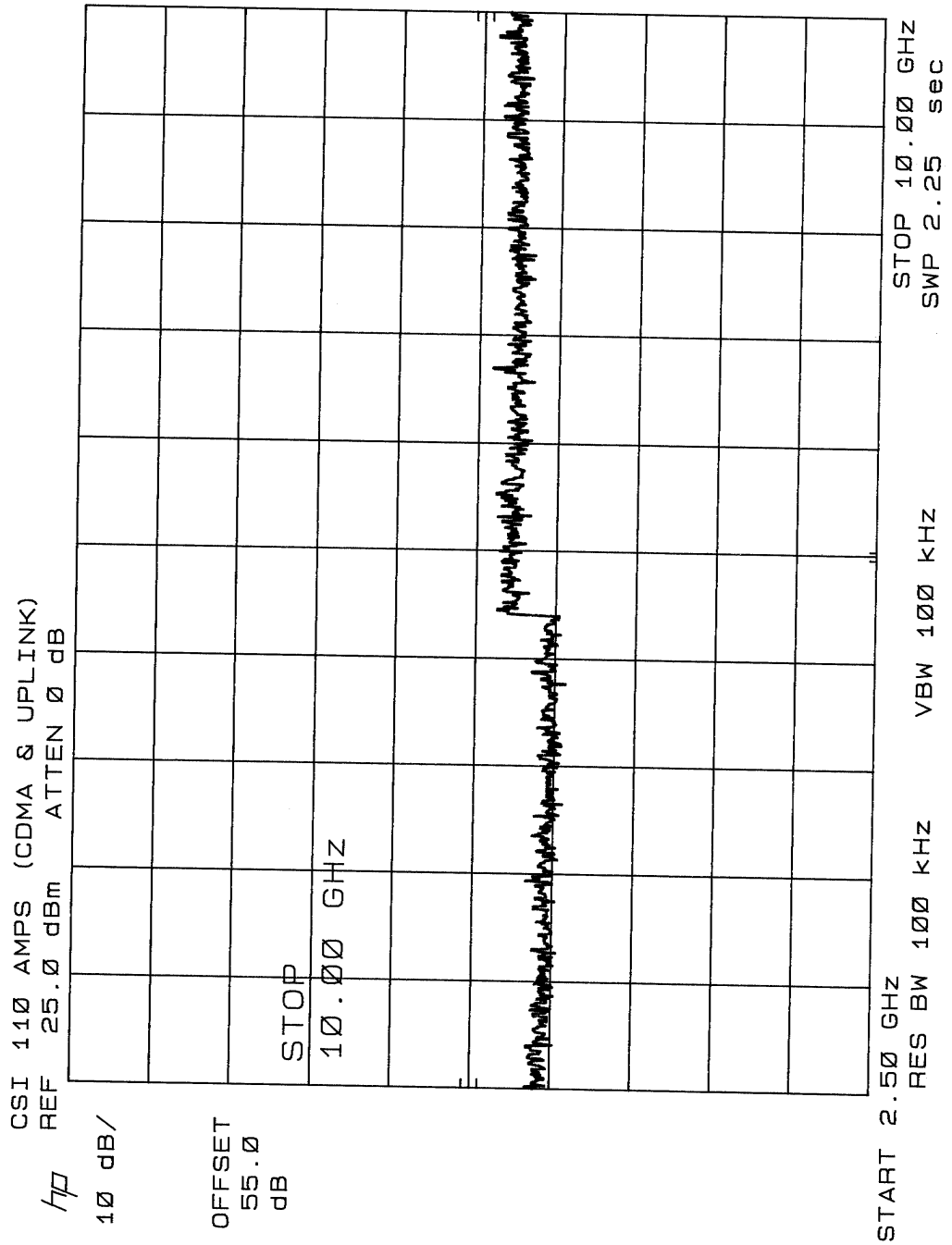

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
MKR 890 MHz
11.80 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec

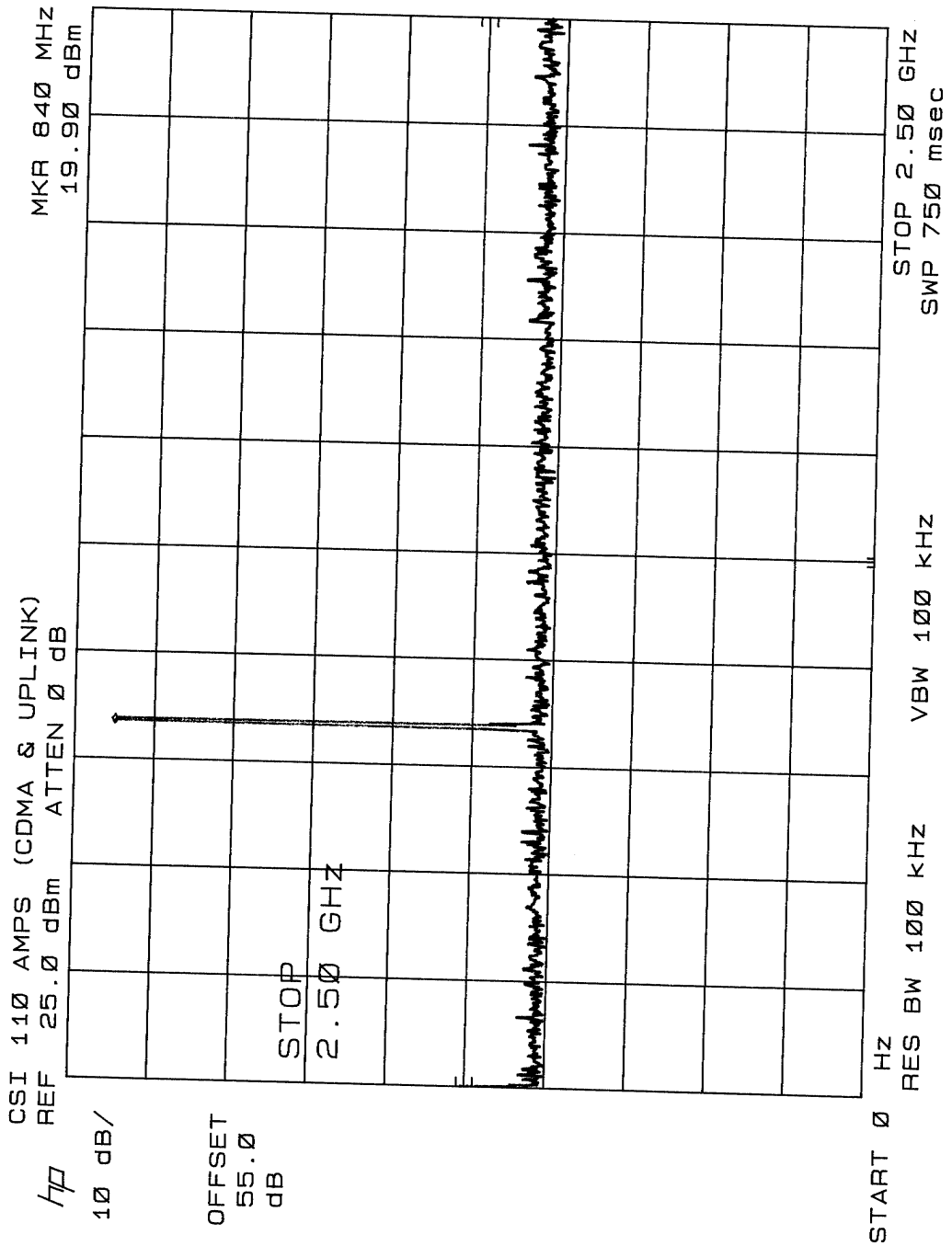

CSI 110 AMPS (CDMA & DOWNLINK)
REF 15.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec

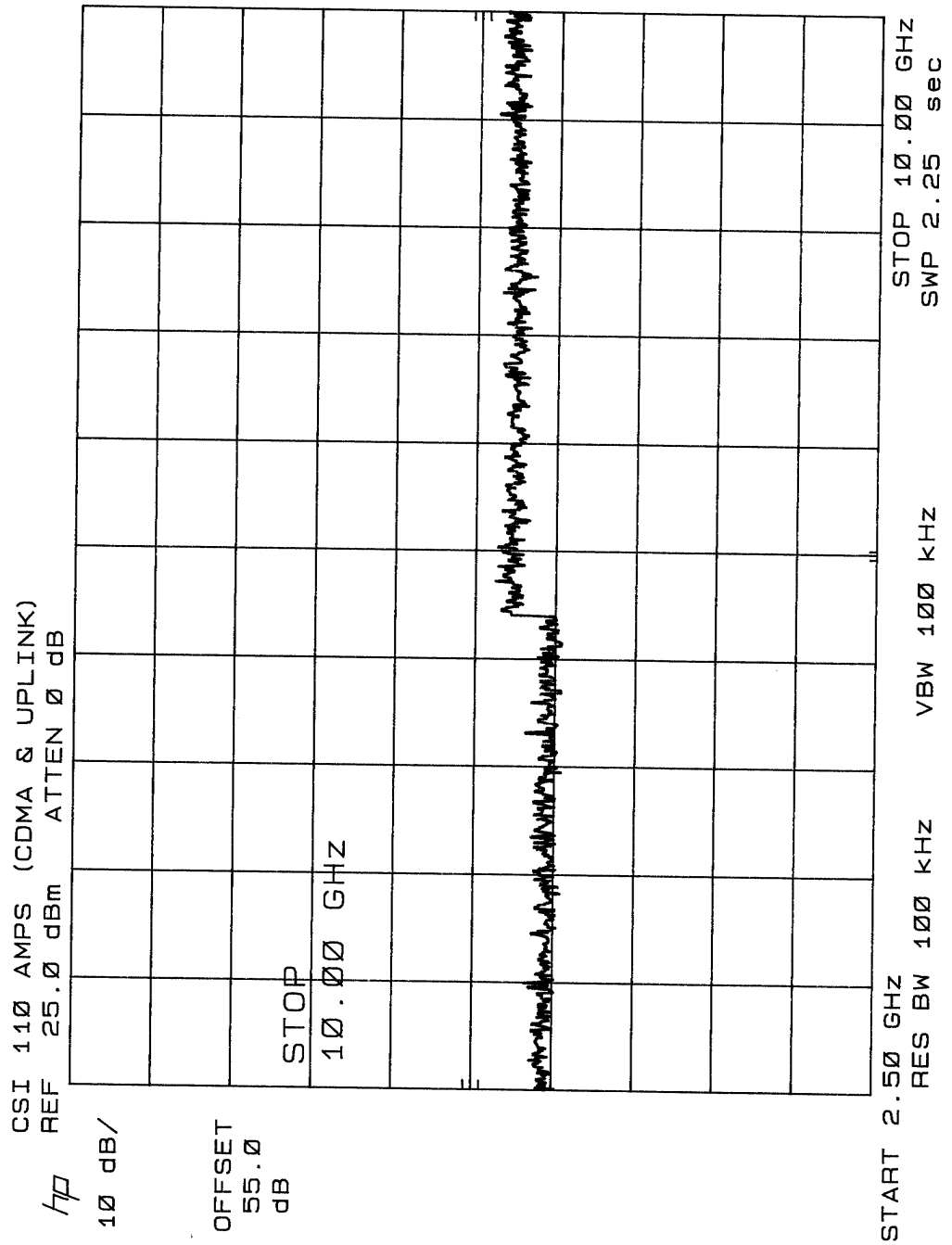

CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 825 MHz
22.40 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.50 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET 55.0 dB
STOP 10.00 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.00 GHz
SWP 2.25 sec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 835 MHz
21.40 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.500 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.500 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.500 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
MKR 840 MHz
19.90 dBm
10 dB/
OFFSET
55.0
dB
STOP
2.500 GHz
START 0 Hz
RES BW 100 kHz
VBW 100 kHz
STOP 2.50 GHz
SWP 750 msec


CSI 110 AMPS (CDMA & UPLINK)
REF 25.0 dBm ATTEN 0 dB
10 dB/
OFFSET
55.0
dB
STOP
10.000 GHz
START 2.50 GHz
RES BW 100 kHz
VBW 100 kHz
STOP 10.000 GHz
SWP 2.25 sec

3.6.0 Field Strength of Spurious Radiation (30 MHz-90000MHz)

Requirements: FCC2.1053

3.6.1 Test Procedure

The measurement antenna was placed at a distance of 3 meter from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonics of each of the three fundamental frequency (low, middle, and high channels) was investigated.

The spurious emissions attenuation was calculated as the difference between EIRP in dB(pW) at the fundamental frequency and at the spurious emissions frequency.

3.6.2 Test Equipment

A.H. System Horn Antenna

High Pass Filter

Preamplifier

Hewlett Packard HP8566B Spectrum Analyzer

Hewlett Packard HP 7470A Plotter

Rohde & Schwarz SMIQ03B Signal Generator

Rohde & Schwarz AMIQ I/Q Modulation Generator

3.6.3 Test Results

Refer to the attached data sheets.

3.6.3.a Final Scan, EUT was tested at 824MHz, Uplink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
825.9	110.0	180	2.0	V	22.9	3.7	19.5	117.1		
825.4	116.0	90	1.1	H	22.9	3.7	19.5	123.1		
2487.0	44.0	180	1.0	V	28.1	3.4	15.0	60.5	80.1	-19.7
2486.8	38.1	200	1.1	H	28.1	3.4	15.0	54.6	80.1	-25.6
1651.8	46.0	180	1.0	V	25.3	2.6	22.0	51.9	80.1	-28.2
1651.9	45.0	150	1.0	H	25.3	2.6	22.0	50.9	80.1	-29.2

3.6.3.b Final Scan, EUT was tested at 849 MHz, Uplink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
850.0	110.0	180	2.0	V	22.6	1.7	22.6	111.7		
850.0	116.0	180	1.0	H	22.6	1.7	22.6	117.7		
2549.9	45.0	180	1.8	V	29.0	3.7	15.0	62.7	74.7	-12.0
2549.9	42.2	90	1.0	H	29.0	3.7	15.0	59.9	74.7	-14.8
1699.9	47.0	90	1.0	H	25.3	2.6	22.0	52.9	74.7	-21.8
1700.0	46.0	180	1.8	V	25.3	2.6	22.0	51.9	74.7	-22.8

3.6.3.c Final Scan, EUT was tested at 836.5 MHz, Uplink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
836.5	109.0	90	1.0	H	22.6	2.5	19.5	114.6		
836.5	115.0	200	1.9	V	22.6	2.5	19.5	120.6		
2509.5	47.0	180	1.0	V	29.0	3.7	15.0	64.7	77.6	-12.9
2509.5	46.0	180	1.0	V	29.0	3.7	15.0	63.7	77.6	-13.9
1673.0	46.5	180	1.0	H	25.3	2.6	22.0	52.4	77.6	-25.2
1673.0	45.9	180	1.0	H	25.3	2.6	22.0	51.8	77.6	-25.8

3.6.3.d Final Scan, EUT was tested at 869 MHz, Downlink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
869.0	107.0	90	1.1	H	23.7	4.5	22.6	112.6		
869.0	117.0	90	1.0	V	23.7	4.5	22.6	122.6		
2607.0	46.2	180	1.0	V	29.0	3.7	15.0	63.9	79.6	-15.7
2607.0	46.0	180	1.0	H	29.0	3.7	15.0	63.7	79.6	-15.9
1738.0	49.0	160	1.4	V	25.3	2.6	22.0	54.9	79.6	-24.7
1738.0	47.0	125	1.5	H	25.3	2.6	22.0	52.9	79.6	-26.7

3.6.3.e Final Scan, EUT was tested at 894 MHz, Downlink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
894.0	112.0	120	1.0	H	24.8	2.7	19.8	119.7		
894.0	117.0	90	1.0	V	24.8	2.7	19.8	124.7		
2682.0	46.9	180	1.0	H	29.0	3.7	15.0	64.6	81.7	-17.1
2682.0	46.0	170	1.0	V	29.0	3.7	15.0	63.7	81.7	-18.0
1788.0	45.0	160	1.0	V	25.3	2.6	22.0	50.9	81.7	-30.8
1788.0	44.9	180	1.1	H	25.3	2.6	22.0	50.8	81.7	-30.9

3.6.3.f Final Scan, EUT was tested at 881.5 MHz, Downlink.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
881.5	106.8	90	1.0	H	24.4	4.4	22.4	113.2		
881.5	115.0	125	1.0	V	24.4	4.4	22.4	121.4		
2644.5	46.3	170	1.0	H	29.0	3.7	15.0	64.0	78.4	-14.4
2644.5	45.5	225	1.2	V	29.0	3.7	15.0	63.2	78.4	-15.2
1763.0	45.2	180	1.0	V	25.3	2.6	22.0	51.1	78.4	-27.3
1763.0	45.0	150	1.1	H	25.3	2.6	22.0	50.9	78.4	-27.5

3.7.0 Frequency Stability vs Temperature

Requirements: FCC 2.1055

3.7.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

3.7.2 Test Equipment

Temperature Chamber -50^0 to $+100^0$C
Hewlett Packard 5383A Frequency Counter
Goldstar DC Power Supply, GR303
Rohde & Schwarz ESVP Test Receiver

3.7.3 Test Results

N/A

3.8.0 Frequency Stability vs Voltage

Requirements: FCC 2.1055

Frequency Tolerance: ± 2.5 ppm

3.8.1 Test Procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

3.8.2 Test Equipment

Hewlett Packard 5883A Frequency Counter
DC Power Supply
Goldstar Rohde & Schwarz ESVPGR303 Test Receiver

3.8.3 Test Results

N/A

4 - CONDUCTED EMISSIONS TEST DATA

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

4.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4 - 1992 measurement procedure. The specification used was with FCC Class B limits.

4.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	450 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	100 kHz
Video Bandwidth	100 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

4.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (less than -4 dBµV). Quasi-peak readings are distinguished with a "**Qp**".

4.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Conducted margin for a Class B device and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

-4.5 dBµV at **0.450 MHz** in the **Line** mode power supply.

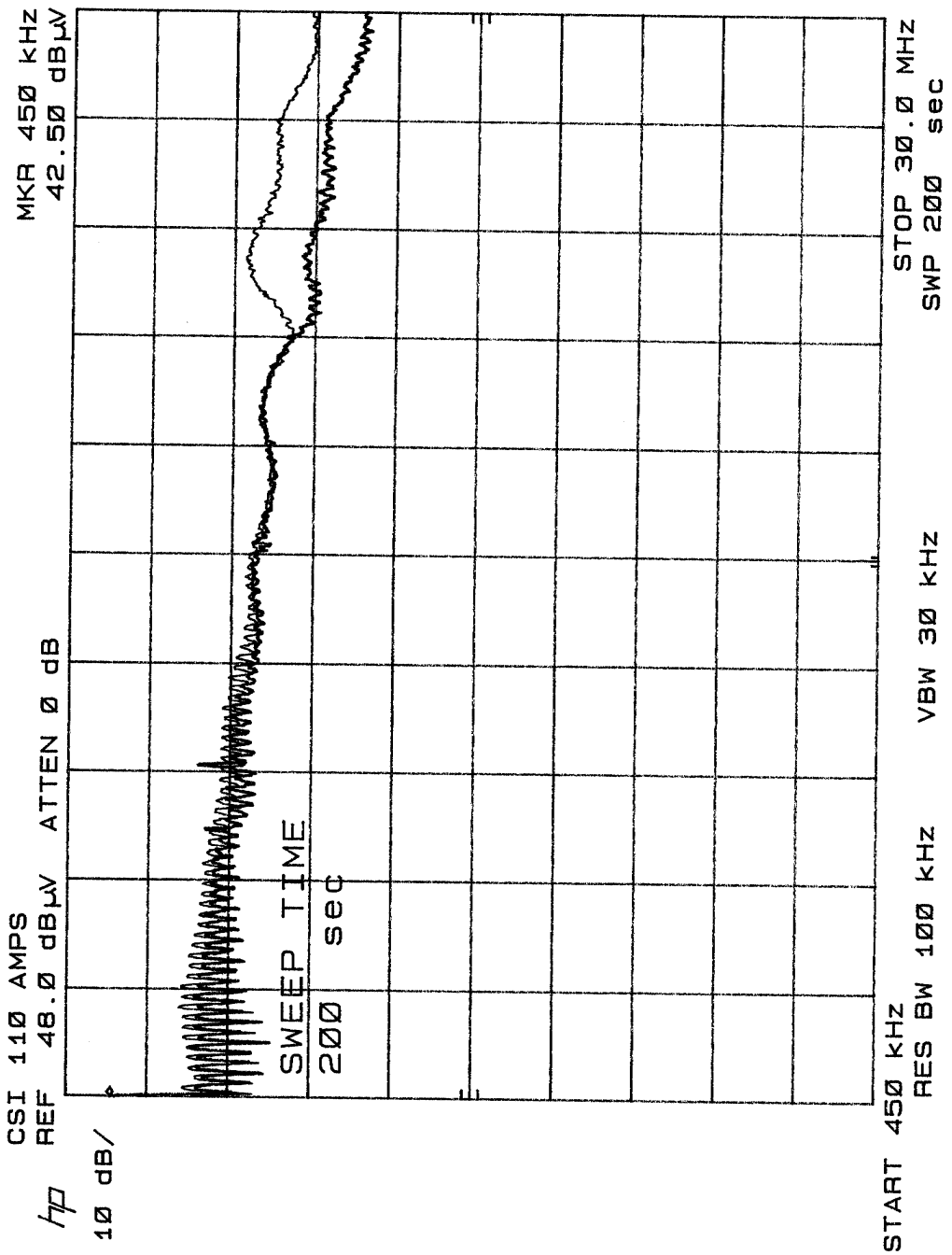
4.6 Conducted Emissions Test Data

4.6.1 Test Data, 0.45 - 30 MHz.

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBµV	Qp/Ave/Peak	Line/Neutral	dBµV	dB
0.450	43.5	QP	Line	48	-4.5
0.450	42.0	QP	Neutral	48	-6.0
2.900	34.0	QP	Line	48	-14.0
1.540	33.0	QP	Line	48	-15.0
9.490	32.0	QP	Neutral	48	-16.0
7.780	31.0	QP	Neutral	48	-17.0

4.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following Appendix of this report as reference.


MKR 450 kHz
42.50 dBµV
CSI 110 AMPS
REF 48.0 dBµV ATTEN 0 dB
10 dB/
SWEEP TIME
200 sec
START 450 kHz
RES BW 100 kHz
VBW 30 kHz
STOP 30.0 MHz
SWP 200 sec

Appendix A – AGENCY AUTHORIZATION LETTER

Cellular Specialties 670 N. Commercial St. Manchester NH 03101
Ph: 603-626-6677 Fax: 603-626-6042

17 January 2000

FEDERAL COMMUNICATIONS COMMISSIONS
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Subject: Agent Authorization

To whom it may concern:

Cellular Specialties, Inc. hereby authorizes Bay Area Compliance Laboratory Corporation to act on its behalf in all matters relating to application for equipment authorization, including the signing of all documents relating to these matters. All acts carried out by Bay Area Compliance Laboratory Corporation on our behalf shall have the same effect as our own action.

Sincerely,

Fred Goodrich, President
Cellular Specialties, Inc.