



FCC Parts 24 Class II Permissive Change Test Report

For
Sharp Labs of America

Performed on the

CDMA/AMPS Cellular and PCS (CDMA) Telephone
Model: TQ-CX1
FCC ID: APYHRO00022

Job Number: 3007055 & 3007754
Date of Test: August 29 to 31, 2001

Report #: 30070552

Total No of Pages Contained in this Report 40.



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FCC Part 24 Class II Permissive Change, Ver 9/01

Tested by:	Suresh Kondapalli	Review Date: 09/27/01
Reviewed by:	David Chernomordik, Ph.D. EMC Technical Manager	Review Date: 9/27/01





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1.0 Introduction

1.1 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
2.1046	RF Power Output	Complies	4
22.913, 24.232	ERP, EIRP	Complies	8
2.1051, 22.917(e)	Out of Band Emissions at Antenna Terminals	Complies	10
2.1053	Field Strength of Spurious Radiation	Complies	33
15.107	Line Conducted Emissions	Not Applicable	*
2.1091, 2.1093	Specific Absorption Rate	Complies	**

* Not Applicable as EUT is battery Operated,

** Separate Report

Tested By: 
Suresh Kondapalli

09/27/01
Date

Approved By: 
David Chernomordik

9/27/01
Date

1.2 Product Description

The EUT is a dual band CDMA and AMPS cellular radio telephone.

For more information, please refer to the original application.

1.3 The following Changes were made

Duplexer Model # QPMD-311, manufactured by Agilent Technologies Inc is replaced by Duplexer Model # DFYK91G88LDNAA-TT1 manufactured by Murata.

The memory module LRS 1330 manufactured by Sharp Inc is replaced by Memory module LRS 1359 manufactured by Sharp Inc.

These components can effect the performance of PCS band (CDMA) only

2.0 RF Power Output, FCC 2.1046

2.1 Test Procedure

The transmitter output was connected to a calibrated coaxial attenuator, 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 antenna port was determined by adding the value of the attenuator to the spectrum analyzer reading.

An HP power meter was also used to measure the RF power.

Tests were performed at three frequencies (low, middle, and high channels) and on all power levels, which can be setup on the transmitters.

2.2 Test Equipment

Hewlett Packard 8481A Power Sensor, 435B Power Meter
Hewlett Packard HP8566B Spectrum Analyzer, 100 Hz - 22 GHz
Tektronix 2784 Spectrum Analyzer, 100 Hz - 40 GHz

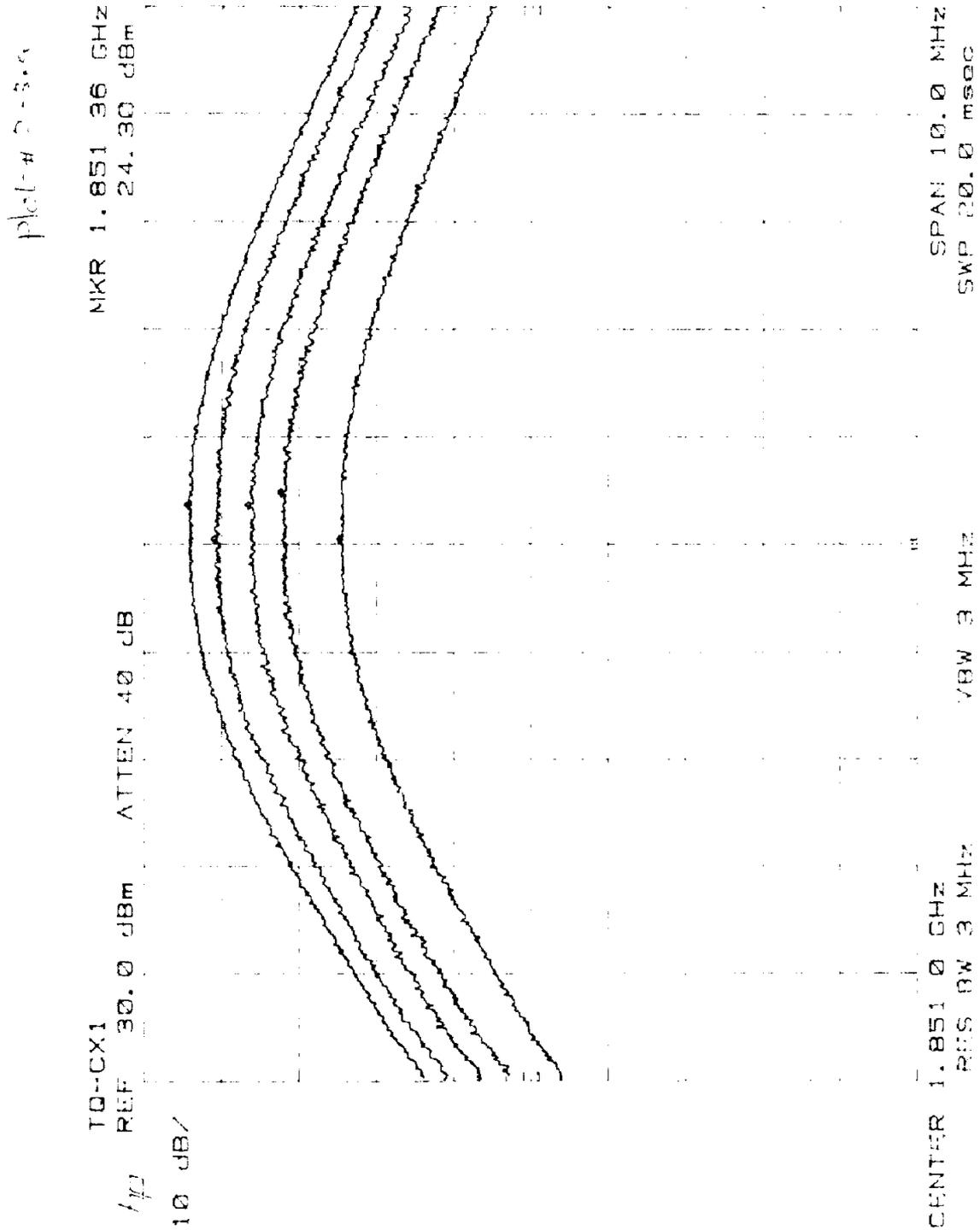
2.3 Test Results

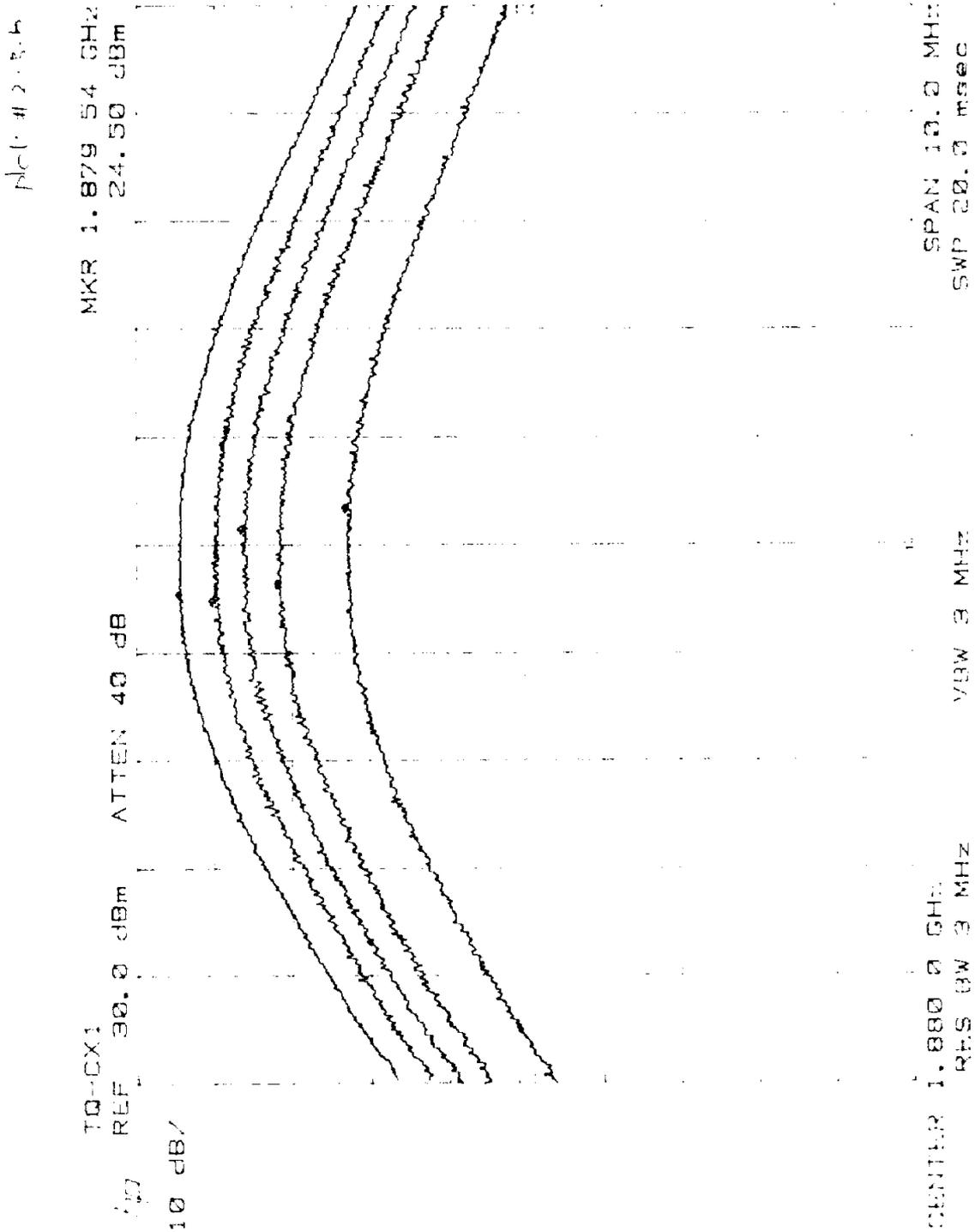
Frequency (MHz)	Measured Power (dBm)
1851.2 (CDMA)	25.2*
1880.0 (CDMA)	24.3*
1908.75 (CDMA)	25.0*

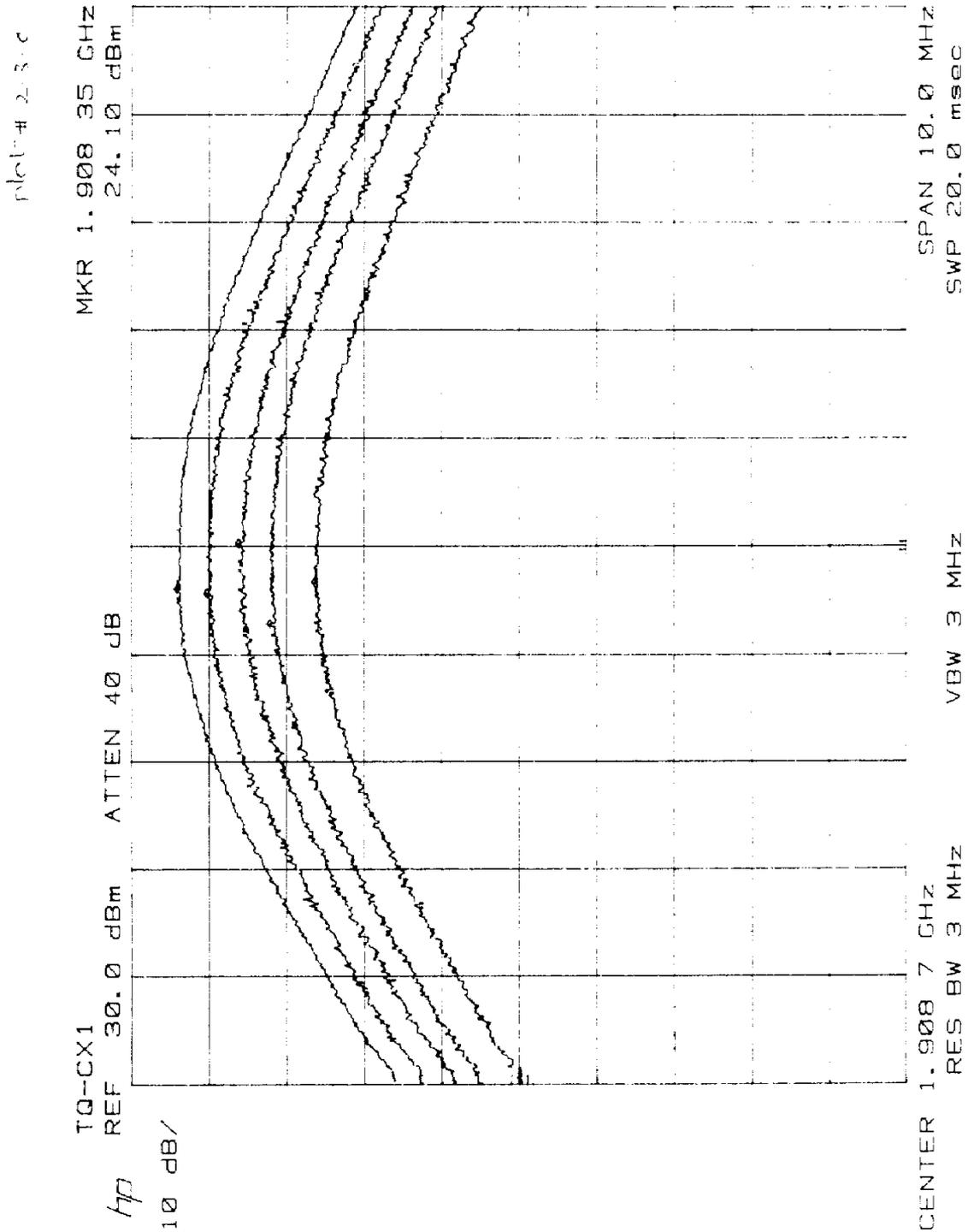
*Measurements made with a peak power meter

For more details refer to the attached plots:

PCS Band (CDMA Mode)	
Plot Number	Description
2.3.a	Low Channel
2.3.b	Middle Channel
2.3.c	High Channel







3.0 Radiated Power

FCC 24.232

The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

3.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on an open test site. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. During the measurement, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz (for frequencies below 1 GHz) and 1 MHz (for frequencies above 1 GHz).

Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. The spectrum analyzer reading was recorded and the field strength (E in dBuV/m) was calculated.

EIRP in frequency band 1851.25-1910 MHz was measured using a substitution method. The EUT was replaced by a horn antenna (1851.25-1910 MHz) connected to a signal generator. The spectrum analyzer reading was recorded and EIRP was calculated as follows:

Where E_1 & E_2 are spectrum analyzer readings in dBuV/m when measured field strength from EUT & generator accordingly; V_g is the generator output in dBm; G is the transmitting antenna gain.

3.2 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
EMCO 3148 Log Periodic Antenna
EMCO 3115 Horn Antenna
Rohde & Schwarz SMH 44 signal generator

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3.3 Test Results

Field Strength of fundamental

Frequency MHz	Antenna Polarity	Detector	SA Reading dB(μV)	Antenna Factor dB(1/m)	Cable Loss dB	Field Strength dB(μV/m)
CDMA Mode						
1851.2	V	Peak	98.4	26.7	3.1	128.2
1880.0	V	Peak	96.8	26.7	3.1	126.6
1908.75	V	Peak	97.2	26.7	3.1	127.0

Radiated Power (Substitution Method)

Frequency MHz	Antenna Polariz.	Field Strength (EUT) dBμV/m	Field Strength (Sig. Gen. + horn ant.) dBμV/m	Signal Generator output + ant. gain* dBm	EIRP dBm
CDMA Mode					
1851.2	V	128.2	118.7	17.0	26.5
1879.9	V	126.6	118.7	17.0	24.9
1908.75	V	127.0	118.8	17.0	25.2

*Antenna gain equals 7.0 dBi



**4.0 Out of Band Emissions at Antenna Terminals , FCC 22.917(e), 22.917(f),
24.238(a)**

Out of Band Emissions:

The mean 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 appearing 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.

4.1 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

4.2 Test Equipment

HP 8566B Spectrum Analyzer
Leader LFG-1300S Function Generator
Leader LMV-182 AC Millivoltmeter



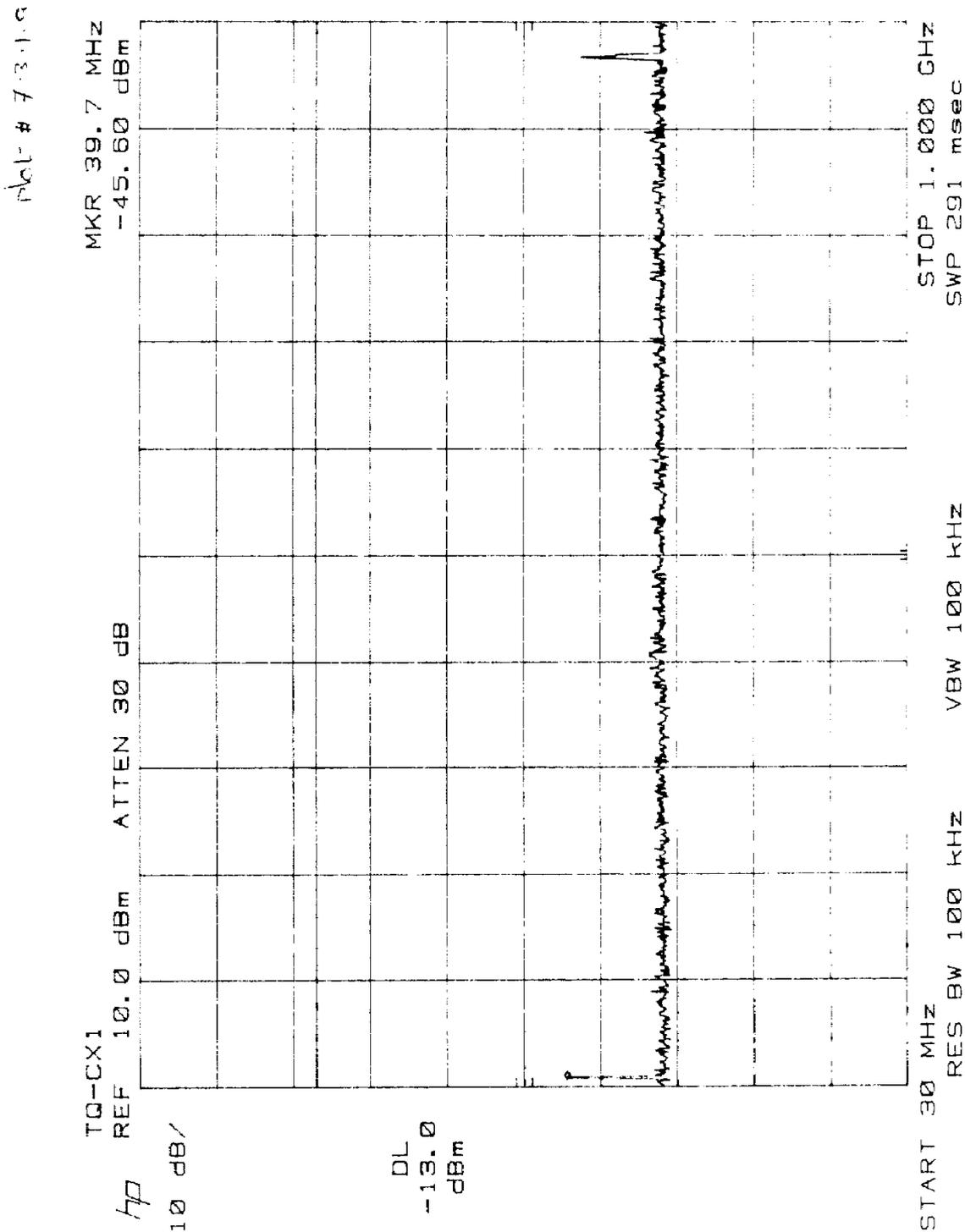
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2001
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4.3 Test Results

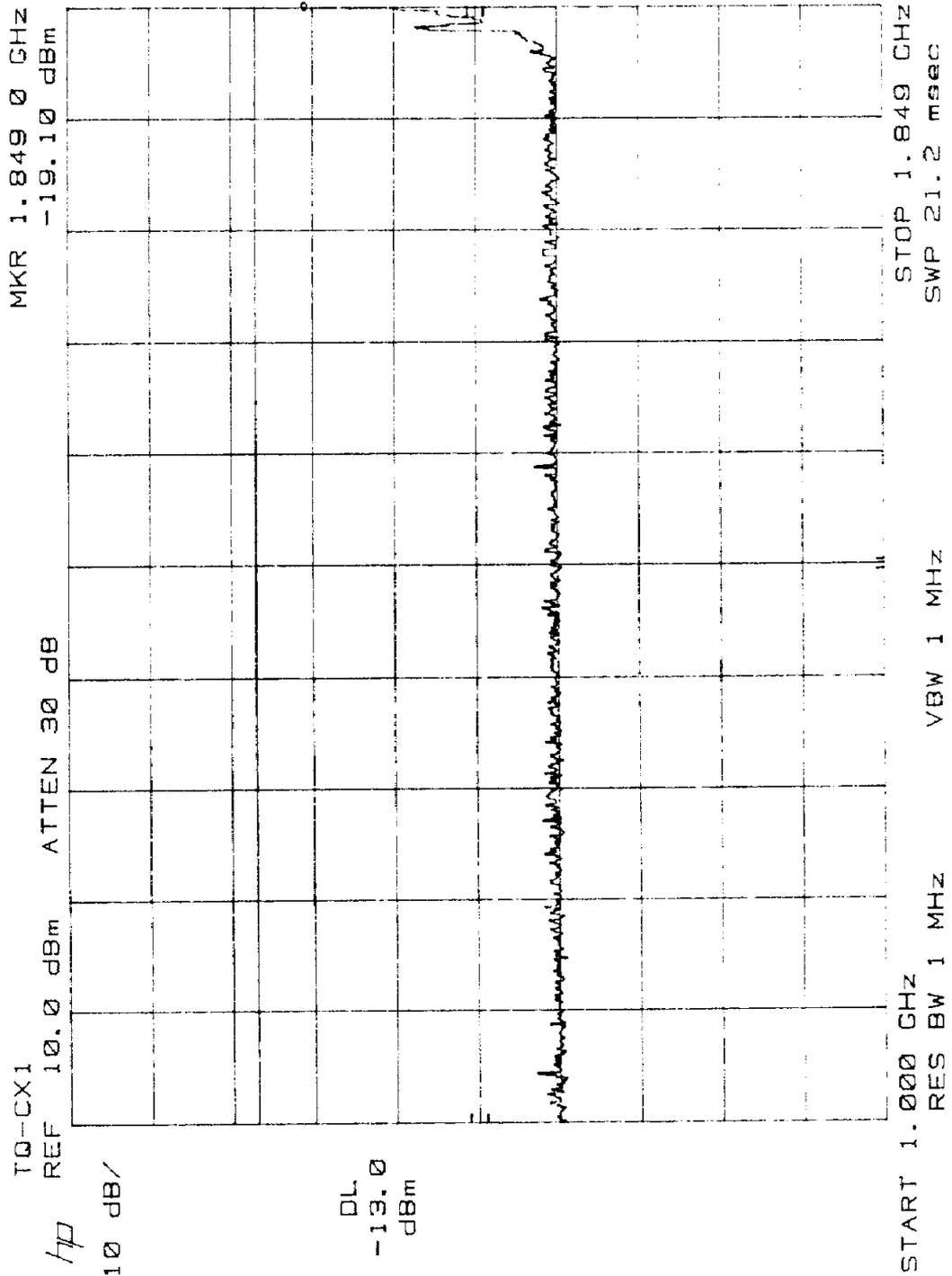
Complies Refer to the attached plots.

PCS Band CDMA Mode	
Plot Number	Description
7.3.1.a - 7.3.1.g	Low Channel and Band edge
7.3.2.a - 7.3.2.e	Middle Channel
7.3.3.a - 7.3.3.h	High Channel and Band edge



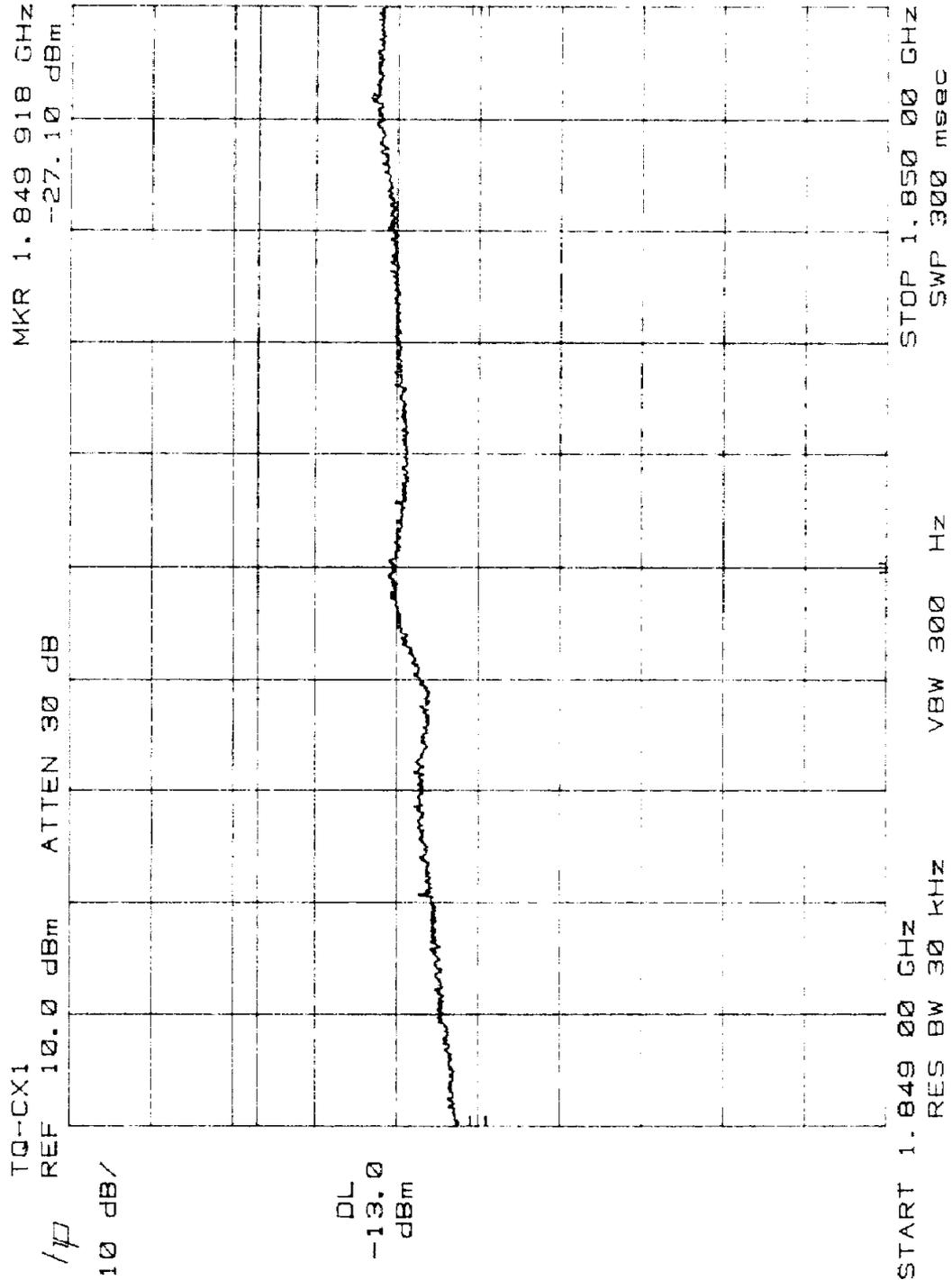


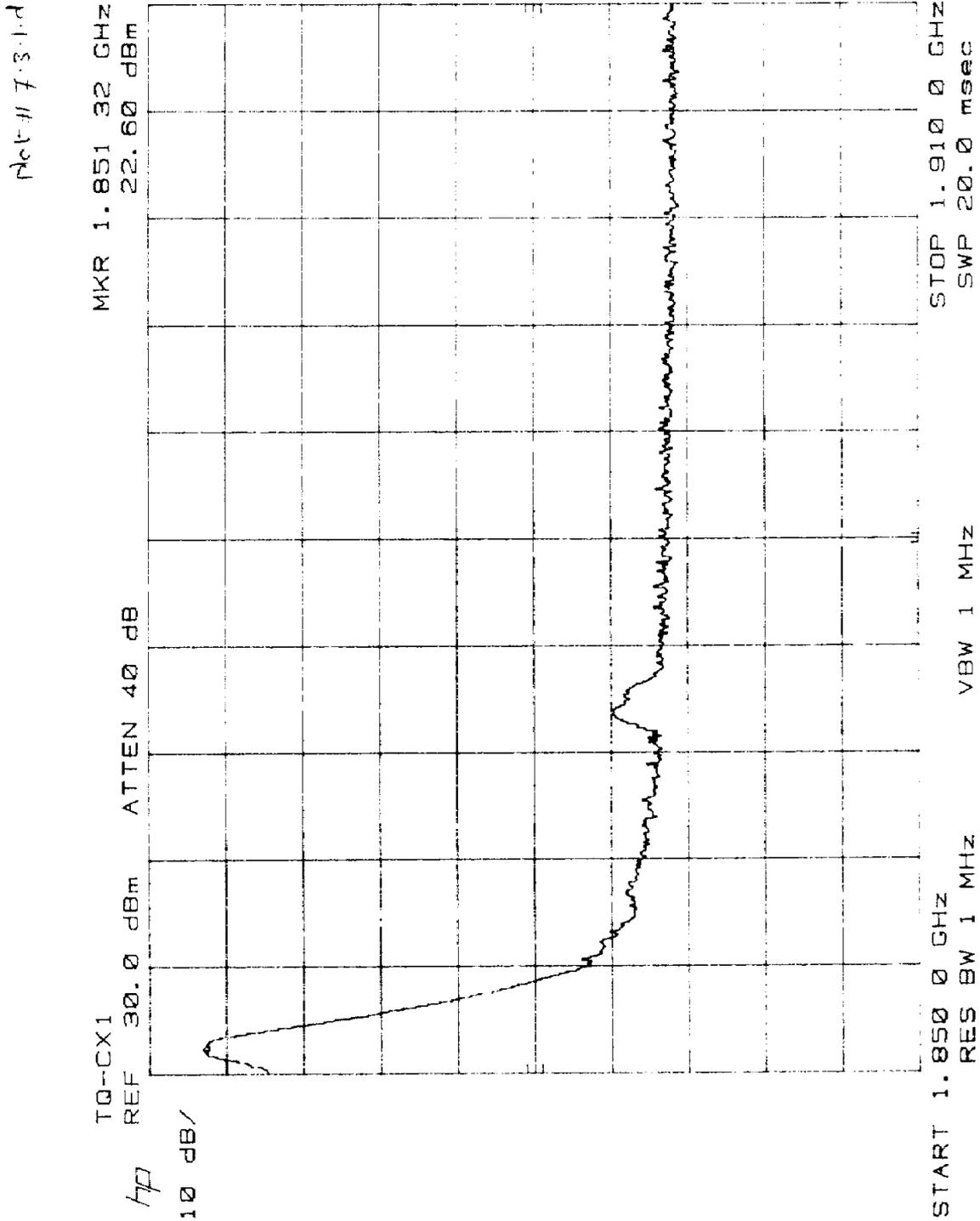
Plot # 7.315





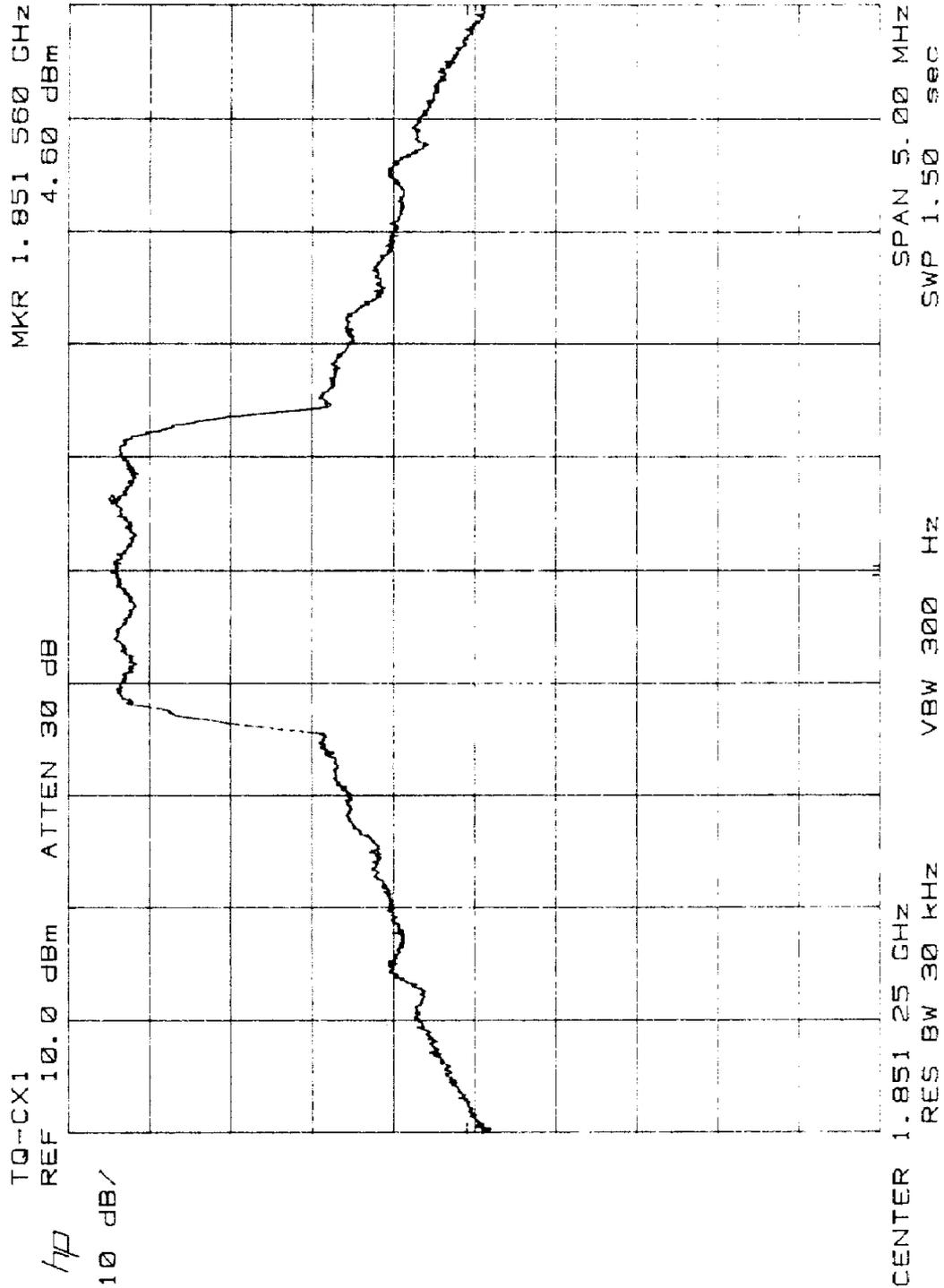
Plot # 731c



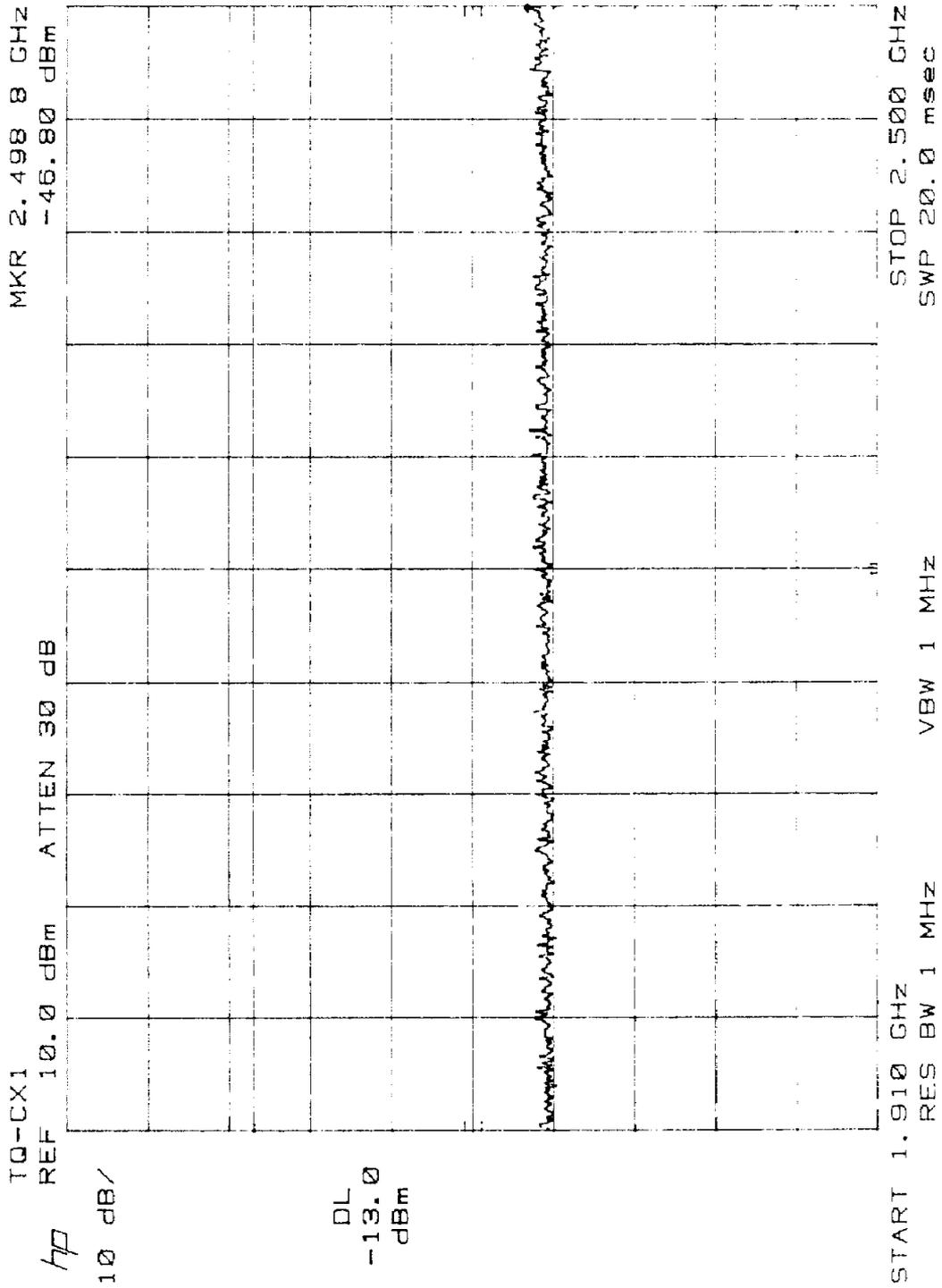




Plot # 7.3.1.0

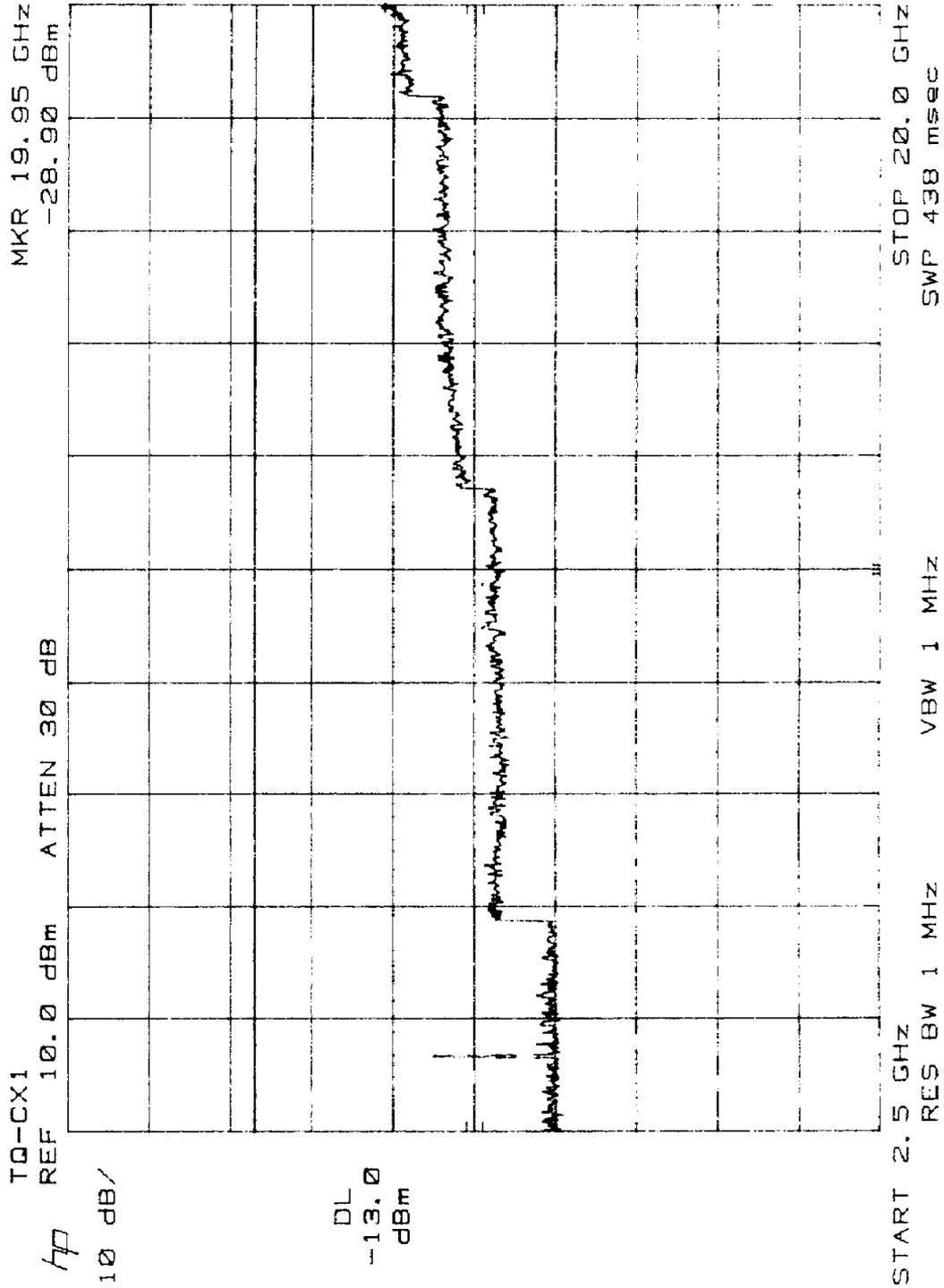


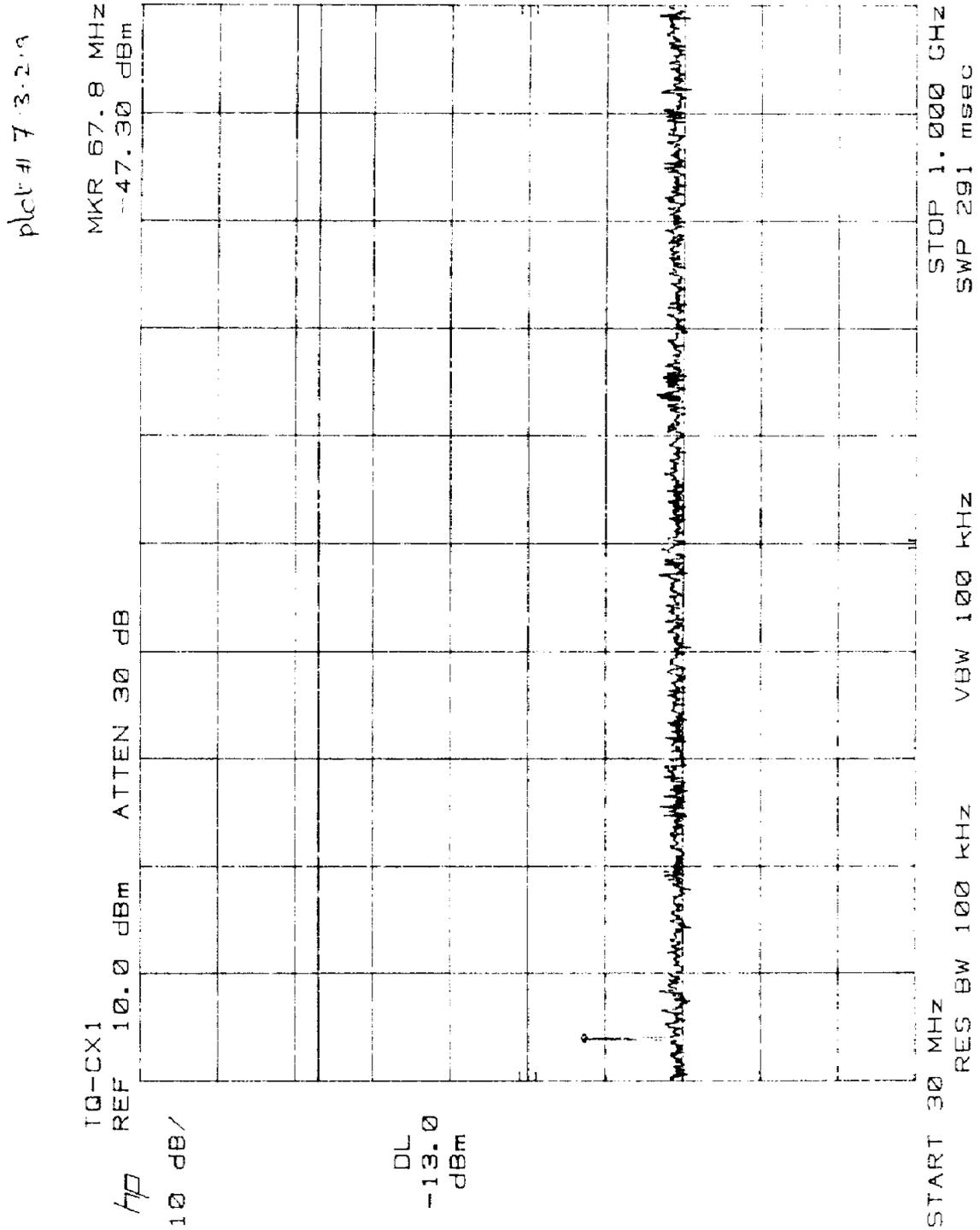
plot # 7314

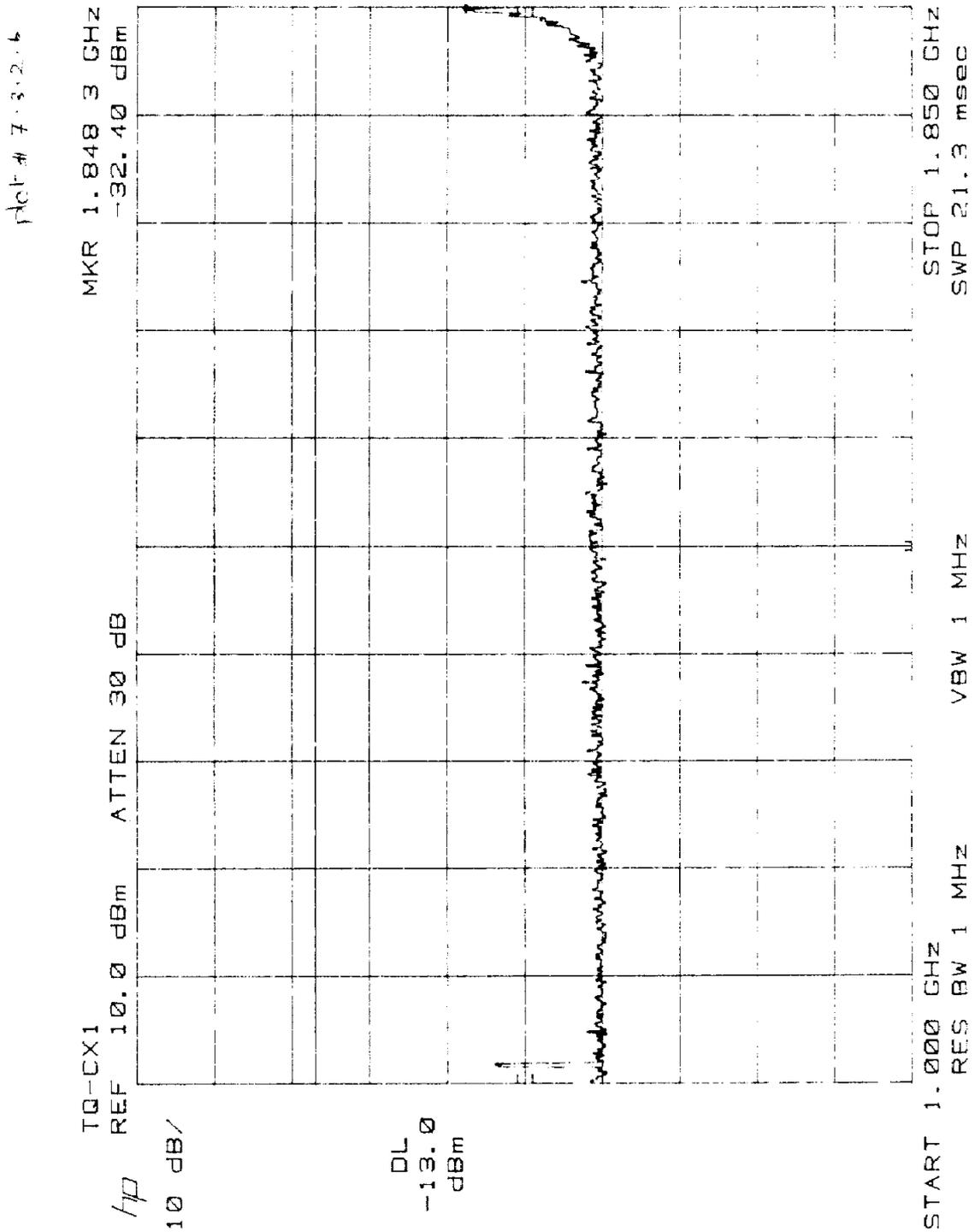


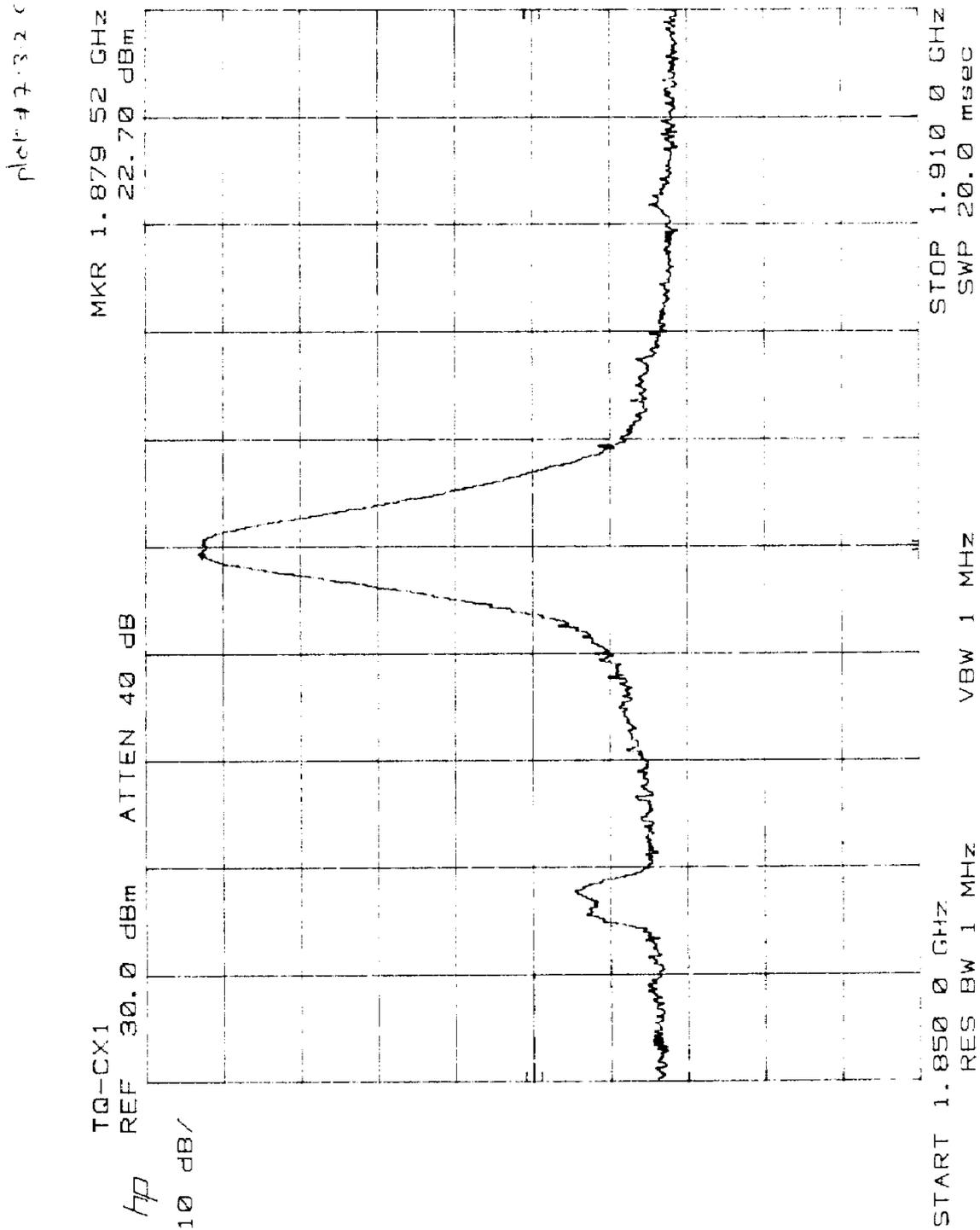


plot # 73119



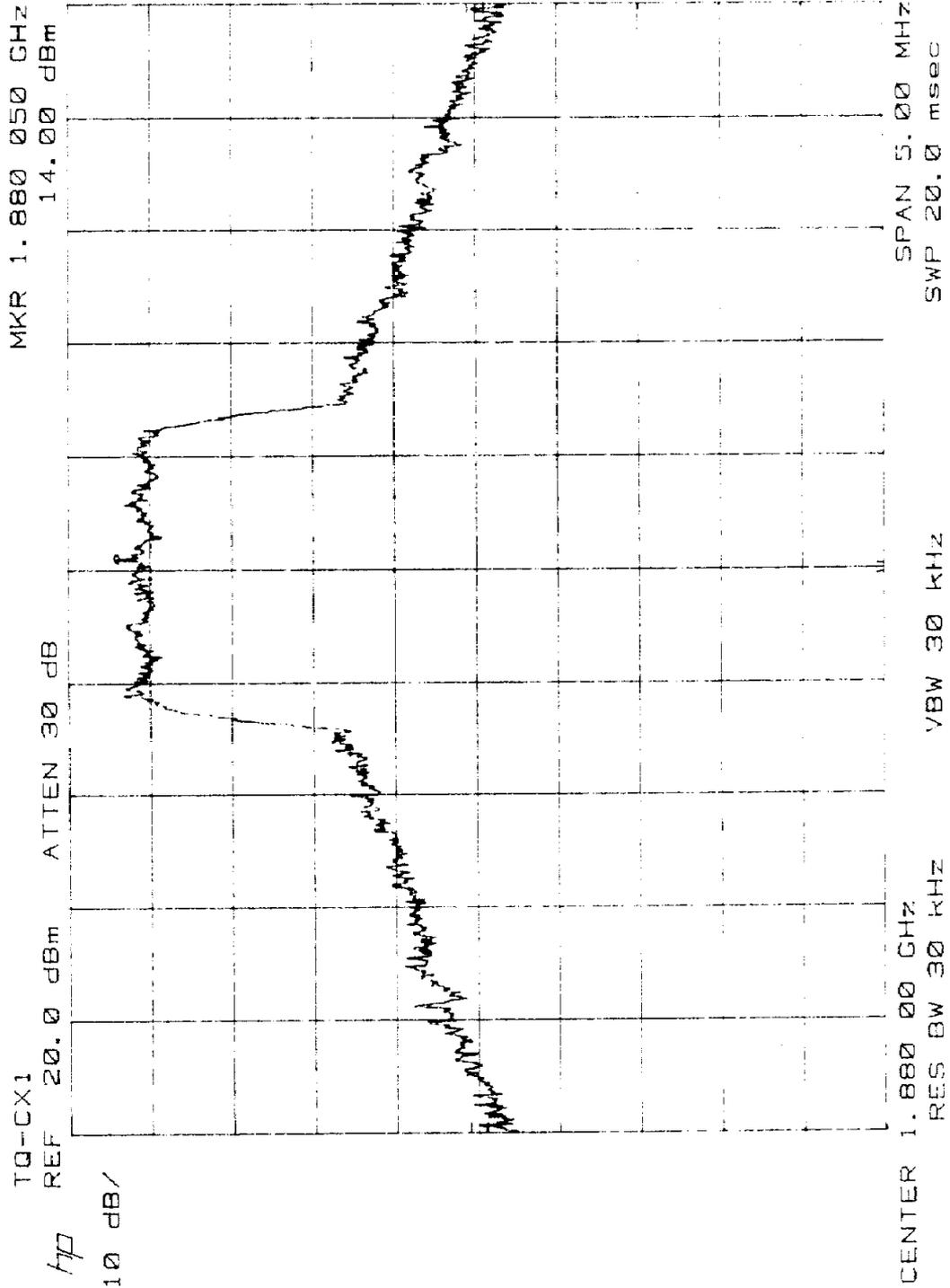






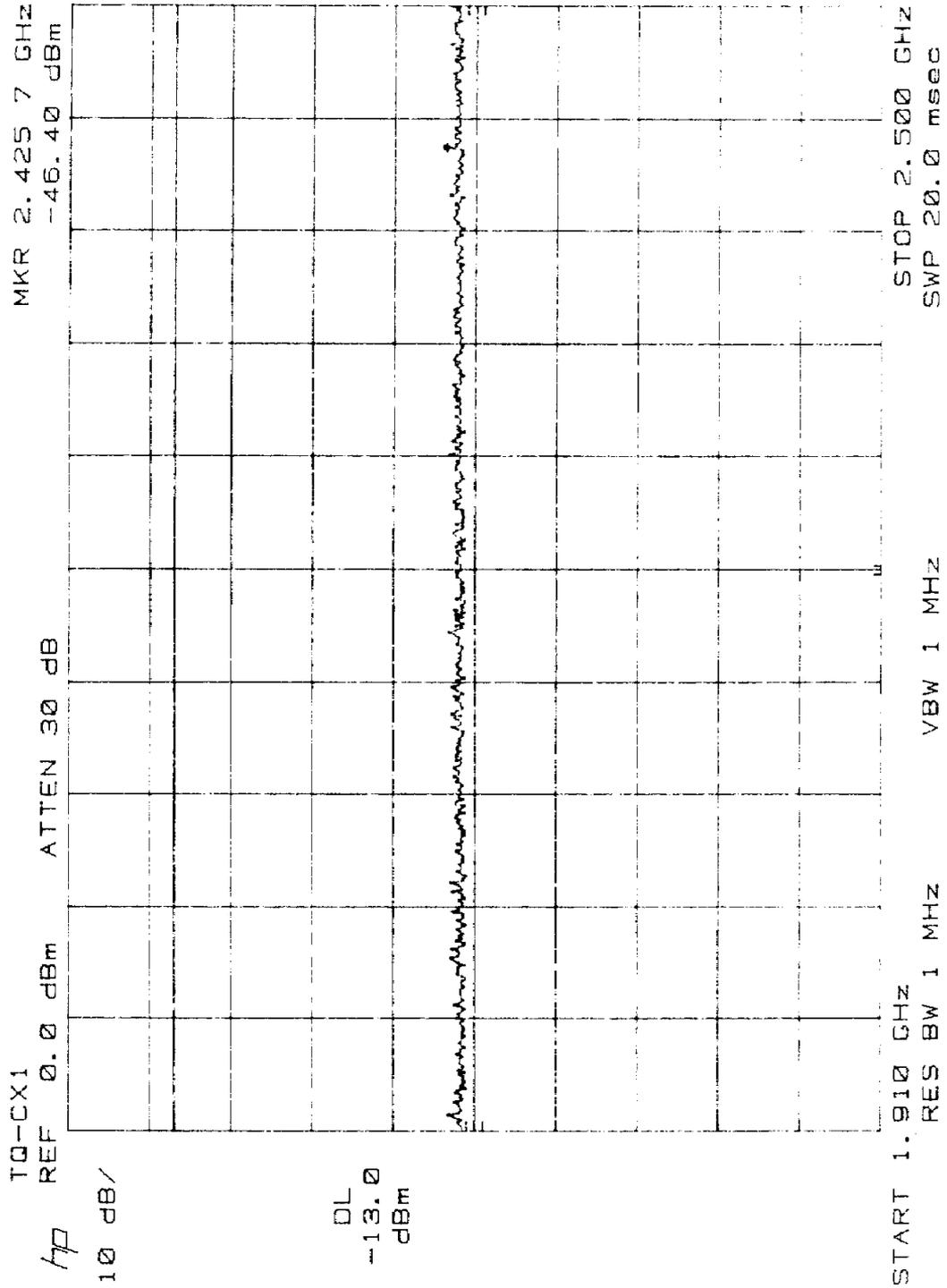


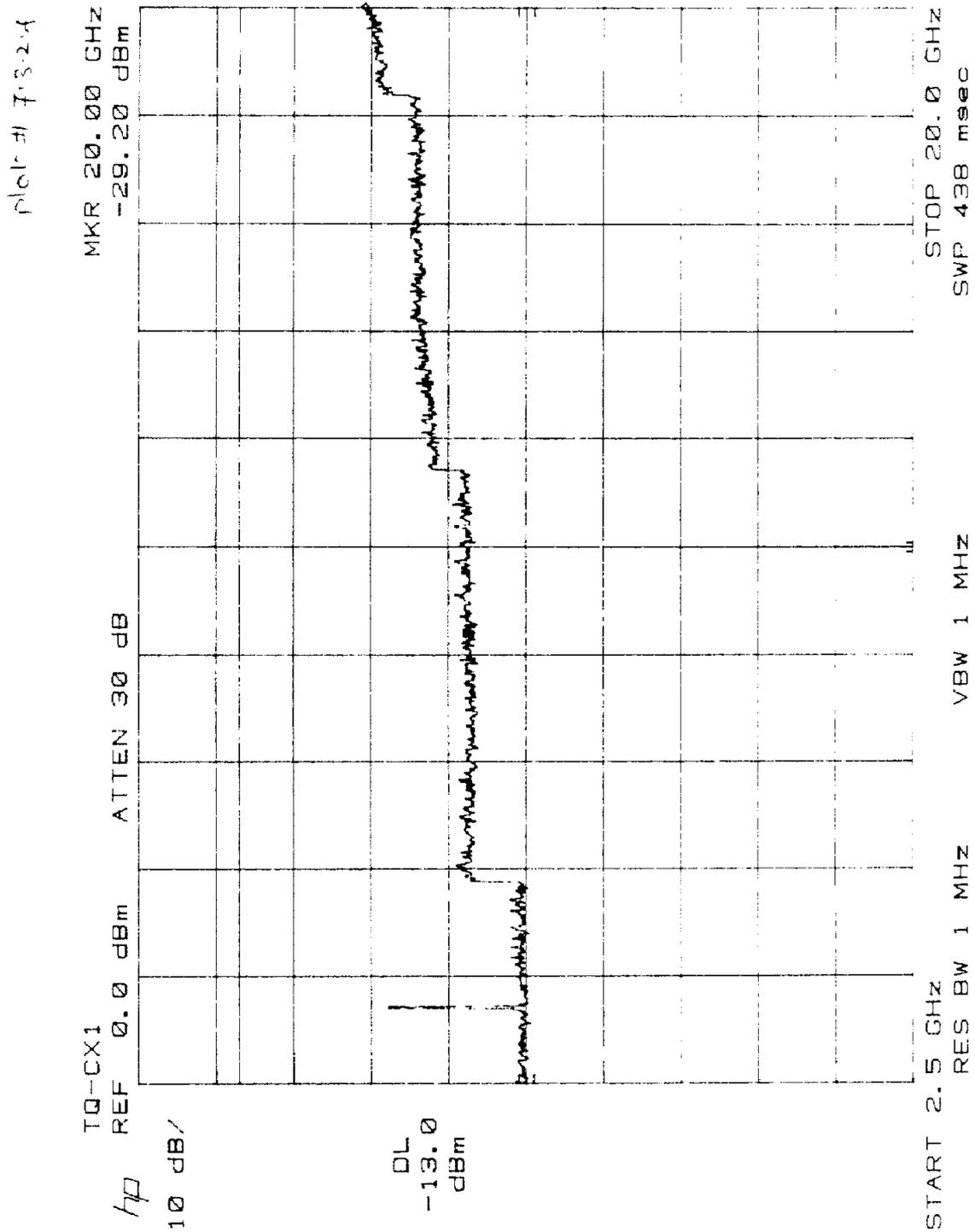
pkt # 7.3.2.d

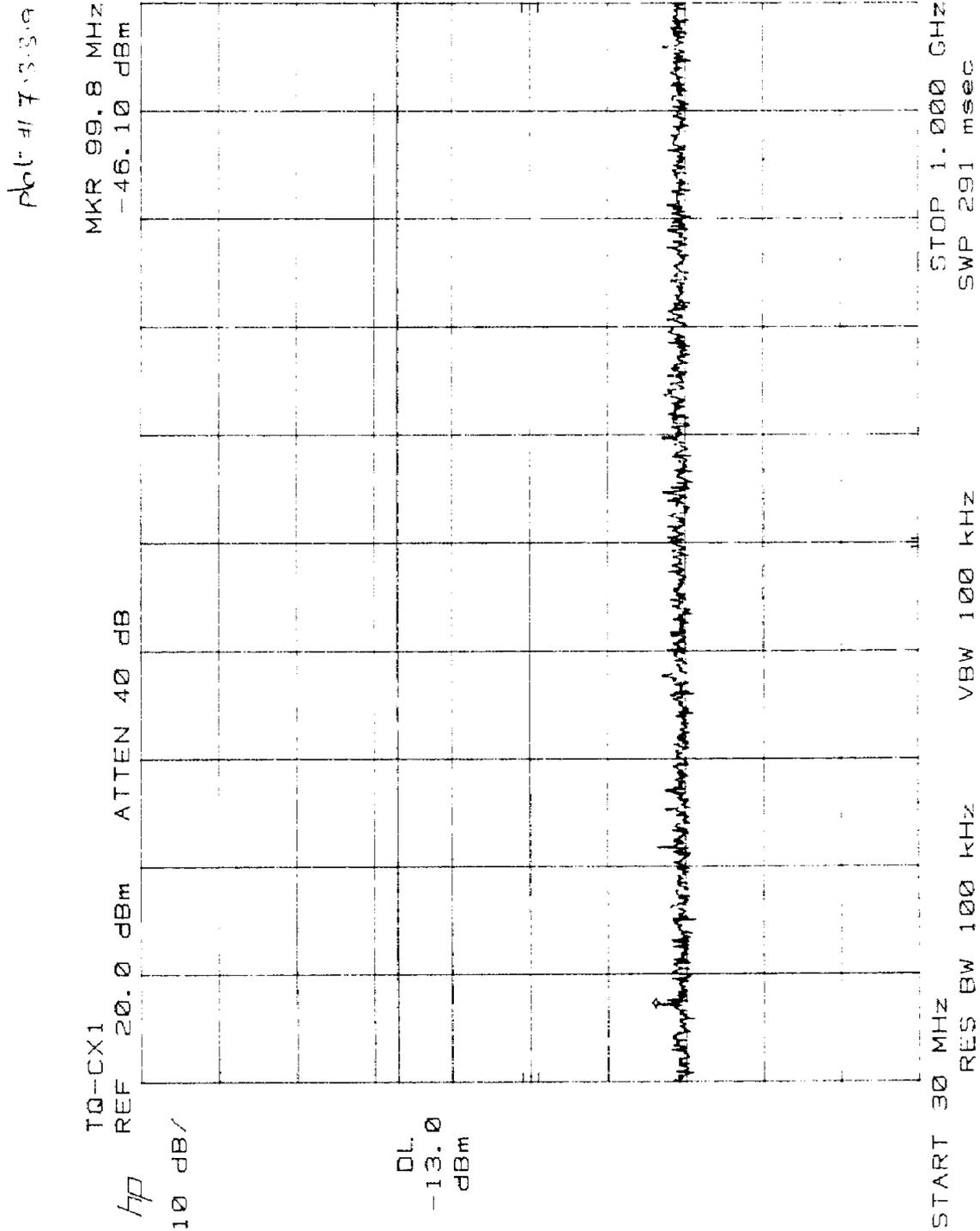




plot # 7.3.2 c

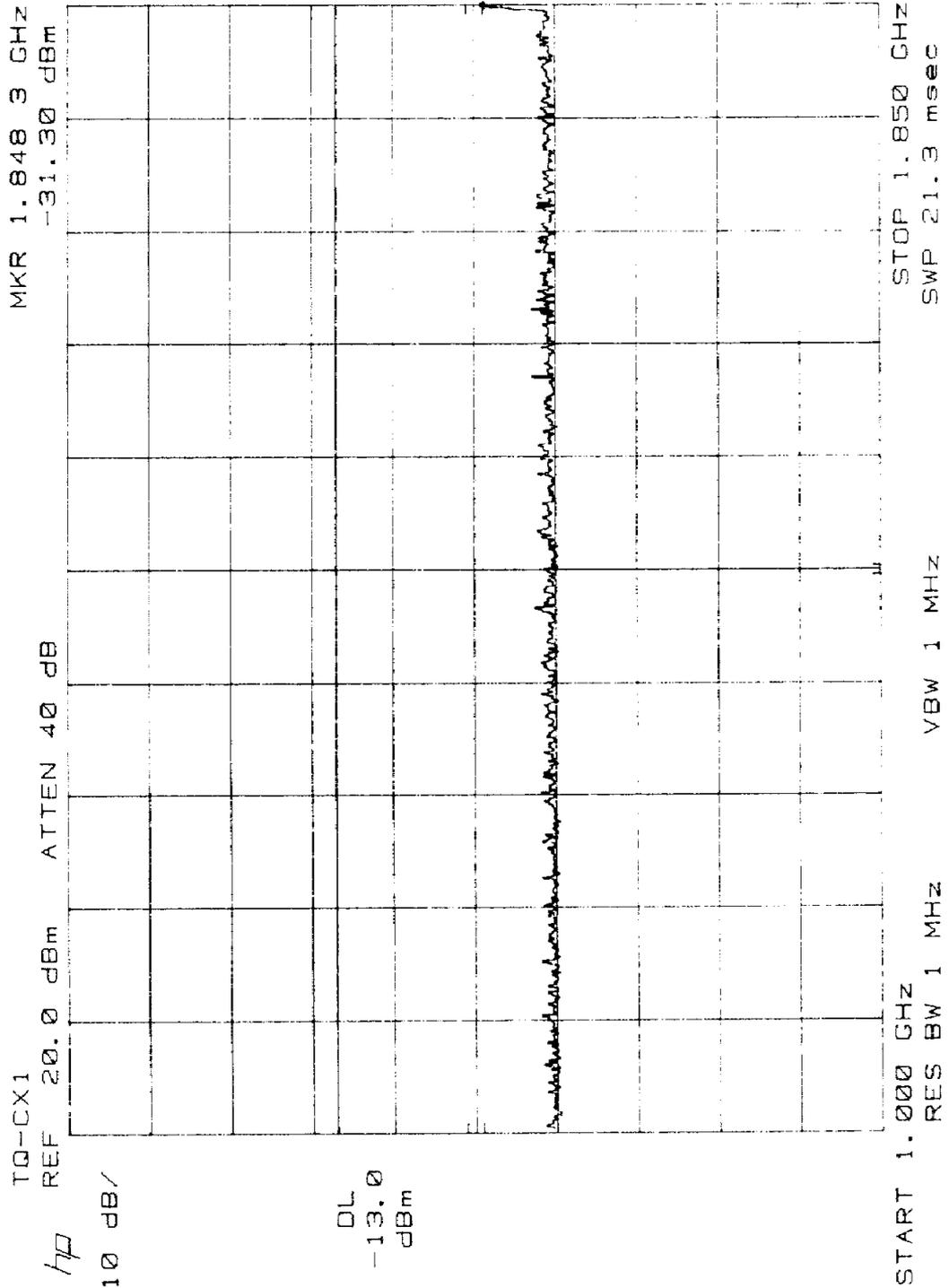


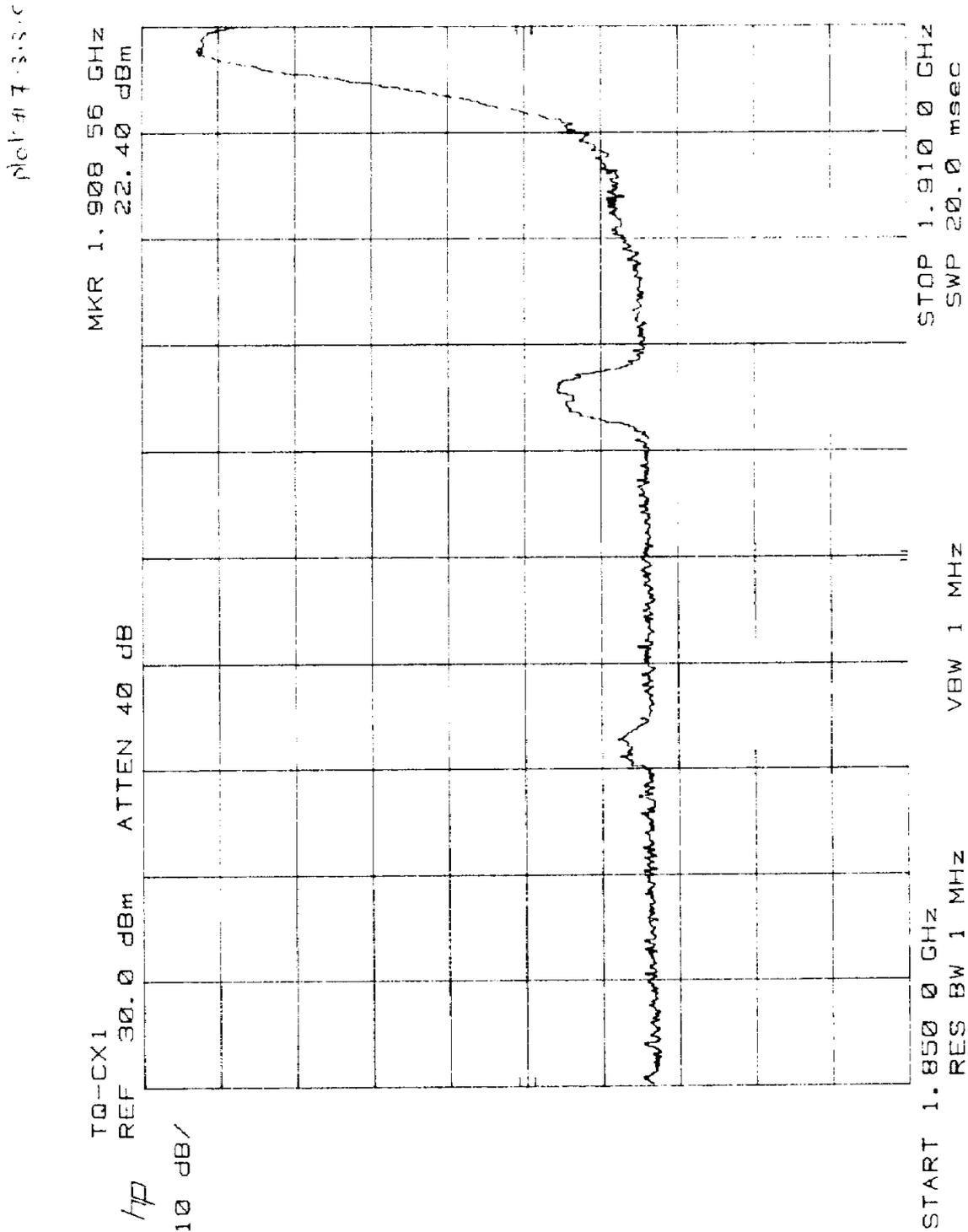






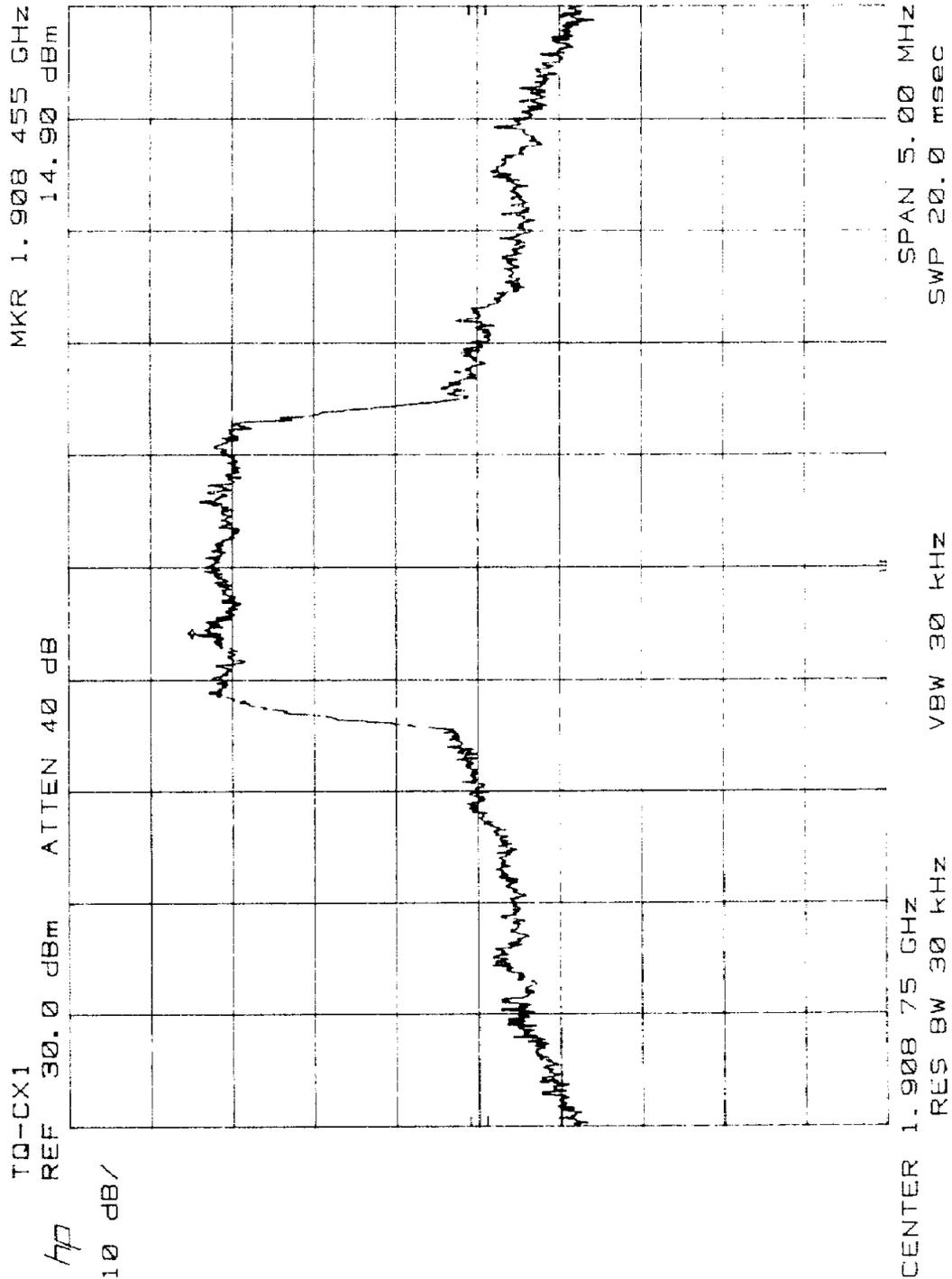
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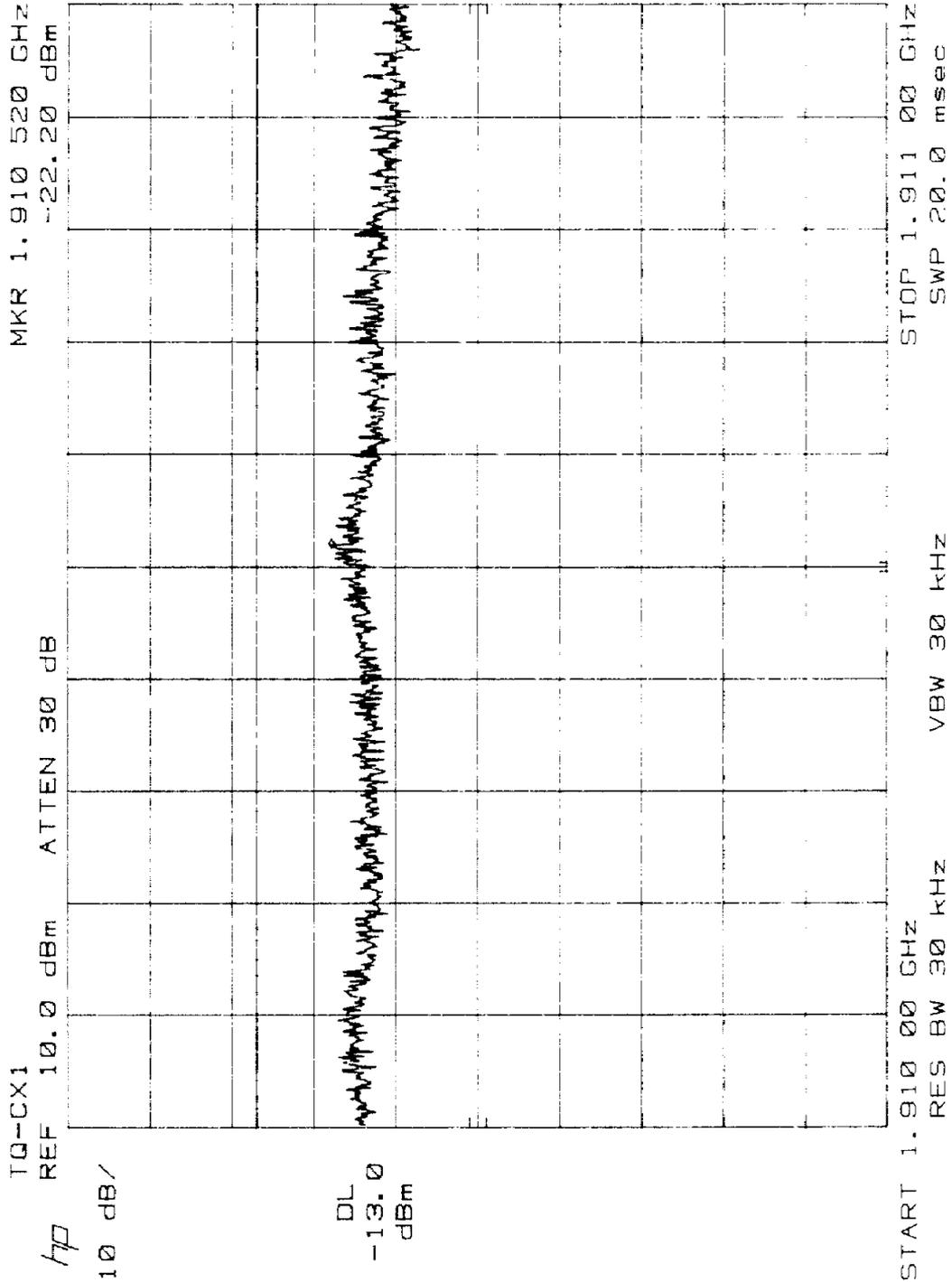


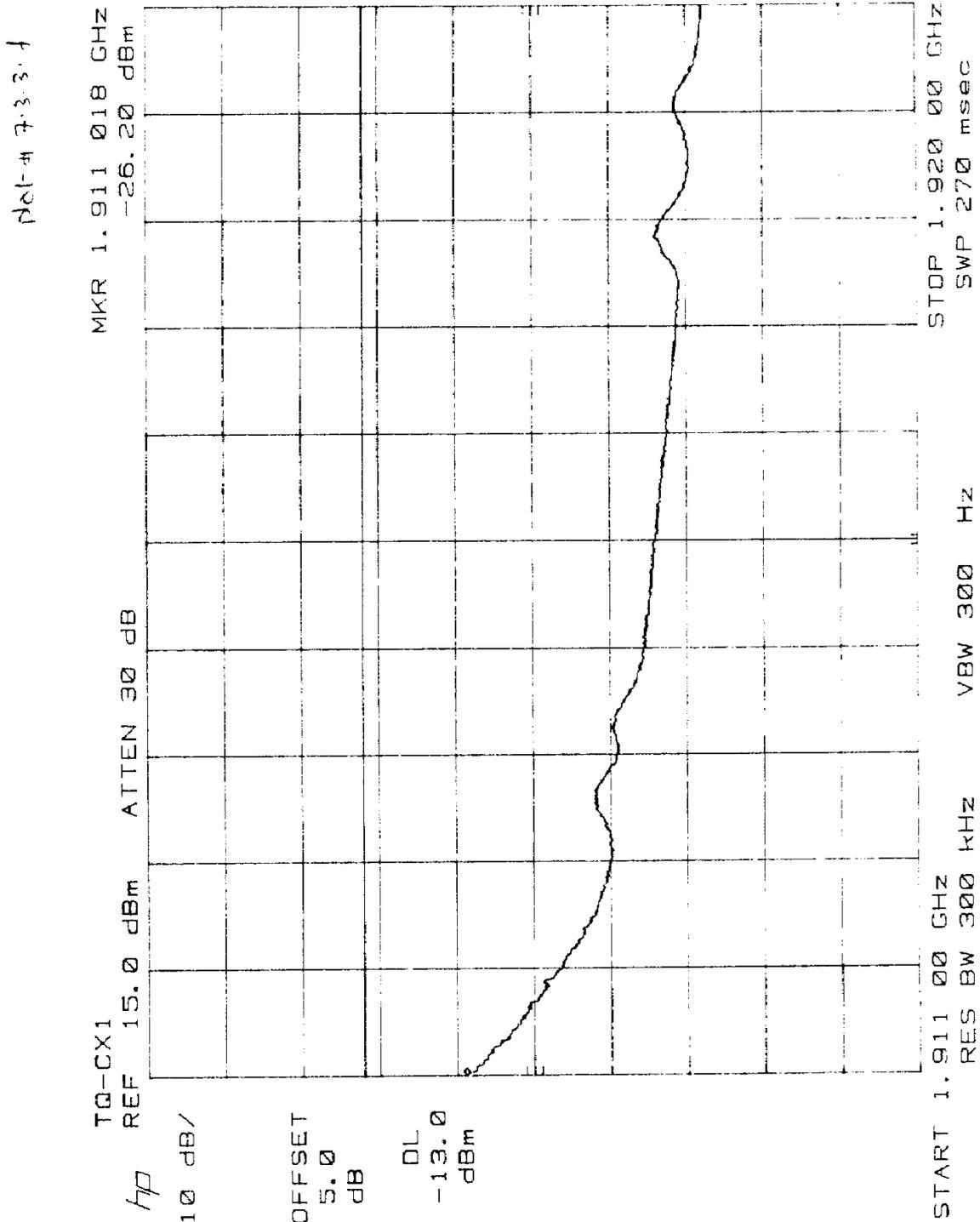
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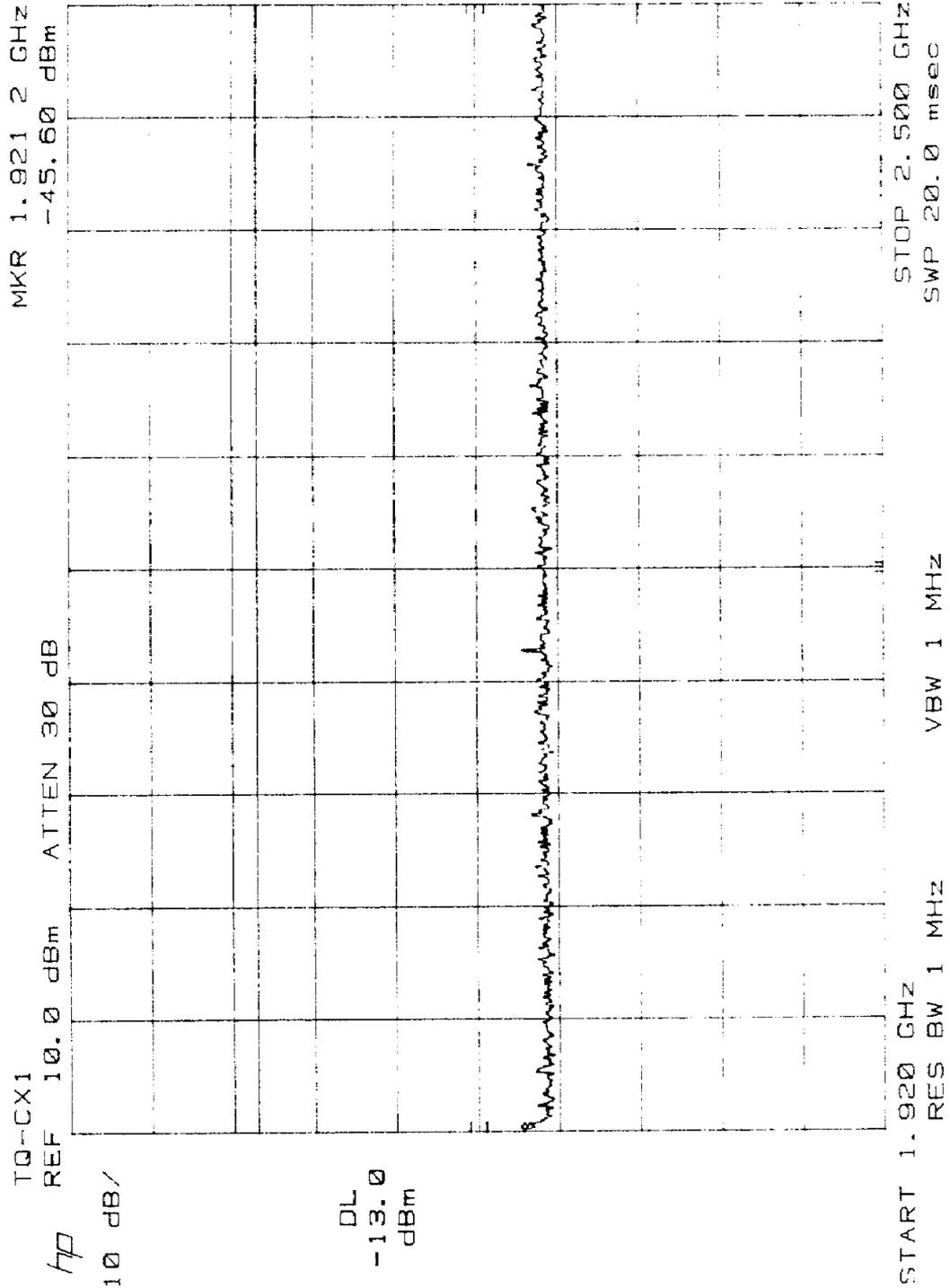
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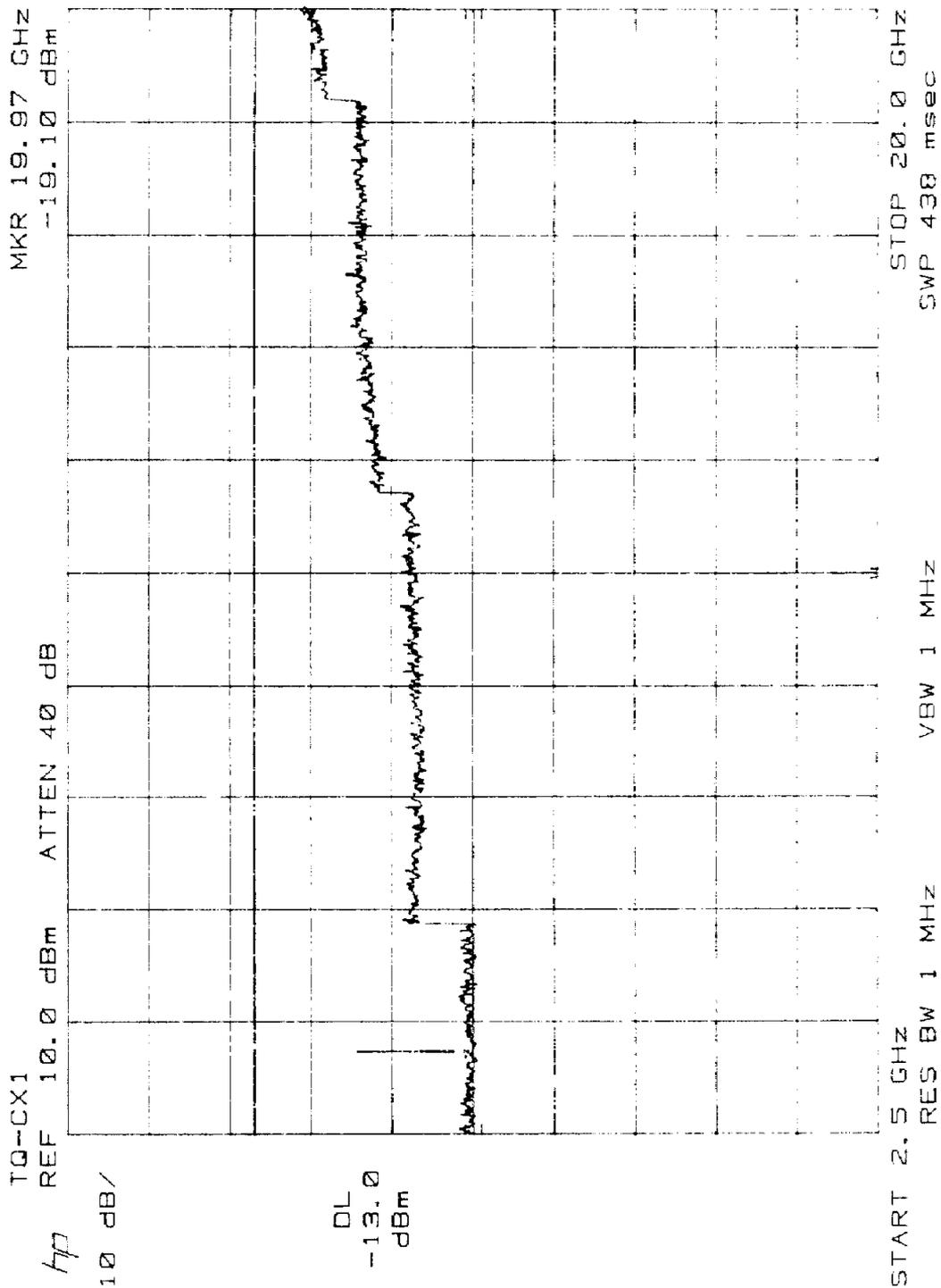




det # 7.3.5.g



pk1-# 7.3.3.h



5.0 Field Strength of Spurious Radiation, FCC 2.1053

5.1 Test Procedure

The measurement antenna was placed at a distance of 3 meters 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 harmonic of each of the three fundamental frequency (low, middle, and high channels) was investigated.

The spurious emissions attenuation was calculated as the difference between Field strength in dBuV/m at the fundamental frequency (See Section 3) and at the spurious emissions frequency.

5.2 Test Equipment

EMCO 3115 Horn Antenna
HP 8566B Spectrum Analyzer
Tektronix 2782 Spectrum Analyzer
Low Pass Filter
Preamplifier

Sharp Labs, CDMA/AMPS Cellular Phone
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5.3 Test Results

Test Result: Complies, refer to the attached
--

Data Sheet No	Description
8.3.a	Radiated Emissions FCC 15B
8.3.b	Radiated Emissions, Harmonics PCS Band Low Channel
8.3.c	Radiated Emissions, Harmonics PCS Band Mid Channel
8.3.d	Radiated Emissions, Harmonics PCS Band High Channel
8.3.e	Radiated Emission of Harmonics by Substitution Method

Sharp Labs, CDMA/AMPS Cellular Phone
2001
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Date of Test: August 29 to 31,

#8.3.a

**Radiated Emissions
Test Data**

Company:	Sharp Labs Inc	Model #:	TQ-CX1	Standard	FCC § 15B
EUT:	Tri_mode Cell Phone	S/N #:		Limits	2
Project #:	3007055	Test Date:	Aug 30,2001	Test Distance	3 meters
Test Mode:	Receive Mode	Engineer:	Suresh k	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	1	7	2	5	0	0	3	0	0	0
Model:	EMCO 3143	EMLPA- 25	EMCO 3143	CDI_P950	None	None	Site 3 10m	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
38.40	29.3	Peak	1	5	V	7.7	18.4	1.5	0.0	20.1	40.0	-19.9
57.60	36.6	Peak	1	5	H	5.0	18.5	2.1	0.0	25.2	40.0	-14.8
211.20	31.0	Peak	1	5	V	10.4	19.5	3.3	0.0	25.2	43.5	-18.3
249.60	24.8	Peak	1	5	V	11.1	19.6	3.7	0.0	20.0	46.0	-26.0
441.60	25.4	Peak	1	5	V	15.9	17.7	4.8	0.0	28.4	46.0	-17.6
463.87	32.9	Peak	1	5	V	16.2	17.0	4.9	0.0	37.0	46.0	-9.0
960.00	27.1	Peak	1	5	V	22.5	9.4	6.4	0.0	46.6	54.0	-7.4
176.10	44.0	Peak	1	5	V	9.1	18.3	3.2	0.0	38.0	43.5	-5.5

Notes:

- a) D.C.F.:Distance Correction Factor
- b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
- c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
- d) Negative signs (-) in Margin column signify levels below the limits.
- e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

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#8.3.b

Radiated Emissions Test Data			
Company:	Sharp Labs Inc	Model #:	TQ-CX1
EUT:	Tri mode Cellular Phone	S/N or FCC #:	
Project #:	3007055	Test Date:	August 30, 2001
Test Mode:	TX @ 1851.25 MHz CDMA	Engineer:	Suresh K.

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	8	21	5	8	10	0	21
Model:	EMCO 3115	EMCO 3115	3160-9	CDI_P950	CDI_P1000	AFT18855	None	Gm_M+L

Frequency	Reading	Detect or	Ant.	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	Net
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(μV/m)
1851.25	98.4	Peak	8	0	V	26.7	0.0	3.1	128.2
1851.25	87.3	Ave.	8	0	V	26.7	0.0	3.1	117.1
3702.50	36.5	Peak	8	0	V	33.0	0.0	2.7	72.2
3702.50	27.5	Ave.	8	0	V	33.0	0.0	2.7	63.2
5553.75	49.0	Peak	8	8	V	36.6	28.3	3.7	61.0
5553.75	40.0	Ave.	8	8	V	36.6	28.3	3.7	52.0
7405.00	55.1	Peak	8	8	V	37.0	28.0	4.3	68.4
7404.00	42.7	Ave.	8	8	V	37.0	28.0	4.3	56.0
9256.25	36.5	Peak	8	8	V	39.7	27.0	4.7	53.9
9256.25	24.9	Ave.	8	8	V	39.7	27.0	4.7	42.3
11107.50	47.9	Peak	8	10	V	40.2	39.9	5.6	53.8
11107.50	35.2	Ave.	8	10	V	40.2	39.9	5.6	41.1
12958.75	40.1	Peak	8	10	V	41.6	39.1	6.0	48.6
12958.75	29.1	Ave.	8	10	V	41.6	39.1	6.0	37.6
14810.00	38.4	Peak	8	10	V	41.3	37.4	6.8	49.1
14810.00	26.4	Ave.	8	10	V	41.3	37.4	6.8	37.1
16661.25	39.1	Peak	8	10	V	40.8	39.4	7.2	47.7
16661.25	26.4	Ave.	8	10	V	40.8	39.4	7.2	35.0
18512.50	36.0	Peak	21	10	V	40.2	36.1	7.6	47.7
18512.50	24.5	Ave.	21	10	V	40.2	36.1	7.6	36.2

Notes:	a) O.C.F.: Other Correction Factor
	b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
	c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
	d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
	e) Negative signs (-) in Margin column signify levels below the limits.

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#8.3.C

Radiated Emissions Test Data

Company:	Sharp Labs	Model #:	TQ-CX1
EUT:	Tri mode Phone	S/N or FCC #:	
Project #:	3007055	Test Date:	August 30, 2001
Test Mode:	TX @ 1880 MHz	Engineer:	Suresh K

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	8	21	5	8	10	0	21
Model:	EMCO 3115	EMCO 3115	3160-9	CDI_P95 0	CDI_P1000	AFT18855	None	Gm_M+L

Frequency	Reading	Detector	Ant.	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	Net
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(μV/m)
1880.00	96.8	Peak	8	0	V	26.7	0.0	3.1	126.6
1880.00	86.4	Ave.	8	0	V	26.7	0.0	3.1	116.2
3760.00	31.0	Peak	8	0	V	33.0	0.0	2.7	66.7
3760.00	19.6	Ave.	8	0	V	33.0	0.0	2.7	55.3
5640.00	51.1	Peak	8	8	V	36.6	28.3	3.7	63.1
5640.00	42.7	Ave.	8	8	V	36.6	28.3	3.7	54.7
7520.00	38.3	Peak	8	8	V	37.8	28.0	4.6	52.7
7520.00	26.9	Ave.	8	8	V	37.8	28.0	4.6	41.3
9400.00	36.5	Peak	8	8	V	39.7	27.3	4.7	53.6
9400.00	24.9	Ave.	8	8	V	39.7	27.3	4.7	42.0
11280.00	47.9	Peak	8	10	V	40.2	39.9	5.6	53.8
11280.00	35.2	Ave.	8	10	V	40.2	39.9	5.6	41.1
13160.00	40.1	Peak	8	10	V	41.5	39.2	6.1	48.5
13160.00	29.1	Ave.	8	10	V	41.5	39.2	6.1	37.5
15040.00	38.4	Peak	8	10	V	41.7	38.3	6.8	48.6
15040.00	26.4	Ave.	8	10	V	41.7	38.3	6.8	36.6
16920.00	39.1	Peak	8	10	V	40.8	39.4	7.2	47.7
16920.00	26.4	Ave.	8	10	V	40.8	39.4	7.2	35.0
18800.00	36.0	Peak	21	10	V	40.2	36.1	7.6	47.7
18800.00	24.5	Ave.	21	10	V	40.2	36.1	7.6	36.2

- Notes:**
- a) O.C.F.: Other Correction Factor
 - b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
 - c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
 - d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
 - e) Negative signs (-) in Margin column signify levels below the limits.

#8.3.D

Radiated Emissions Test Data

Company:	Sharp Labs	Model #:	TQ-CX1
EUT:	Tri mode Phone	S/N or FCC #:	
Project #:	3007055	Test Date:	August 30, 2001
Test Mode:	TX @ 1908.75 MHz	Engineer:	Suresh K

	Antenna Used			Pre-Amp Used			Cable Used	
Number:	8	8	21	5	8	10	0	21
Model:	EMCO 3115	EMCO 3115	3160-9	CDI_P95 0	CDI_P1000	AFT18855	None	Gm_M+L

Frequency	Reading	Detector	Ant.	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	Net
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB(μV/m)
1908.75	97.2	Peak	8	0	V	26.7	0.0	2.2	126.1
1908.75	86.4	Ave.	8	0	V	26.7	0.0	2.2	115.3
3817.50	31.0	Peak	8	0	V	33.0	0.0	2.7	66.7
3817.50	19.5	Ave.	8	0	V	33.0	0.0	2.7	55.2
5726.25	47.3	Peak	8	8	V	36.6	28.3	3.7	59.3
5726.25	38.2	Ave.	8	8	V	36.6	28.3	3.7	50.2
7635.00	39.7	Peak	8	8	V	37.8	27.8	4.6	54.3
7635.00	27.7	Ave.	8	8	V	37.8	27.8	4.6	42.3
9543.75	37.8	Peak	8	8	V	38.5	27.3	5.0	54.0
9453.75	25.8	Ave.	8	8	V	39.7	27.3	4.7	42.9
11452.50	47.9	Peak	8	10	V	40.2	39.9	5.6	53.8
11452.50	35.2	Ave.	8	10	V	40.2	39.9	5.6	41.1
13361.25	40.1	Peak	8	10	V	41.5	39.2	6.1	48.5
13361.25	29.1	Ave.	8	10	V	41.5	39.2	6.1	37.5
15270.00	38.4	Peak	8	10	V	41.7	38.3	6.8	48.6
15270.00	26.4	Ave.	8	10	V	41.7	38.3	6.8	36.6
17178.75	39.1	Peak	8	10	V	42.0	38.8	7.5	49.8
17178.75	26.4	Ave.	8	10	V	42.0	38.8	7.5	37.1
19087.50	36.0	Peak	21	10	V	40.2	36.1	7.7	47.8
19087.50	24.5	Ave.	21	10	V	40.2	36.1	7.7	36.3

Notes:	a) O.C.F.:Other Correction Factor
	b) Insert. Loss = Cable A + Cable B + Cable C + Transducer.
	c) Net = Reading + Antenna Factor - Pre-Amp + Insert. Loss.
	d) Attn. = Field Strength (Fundamental) - Field Strength (Harmonics).
	e) Negative signs (-) in Marg n column signify levels below the limits.

#8.3.E

Spurious Emissions Attenuation Measured by Substitution Method

Company: Sharp Labs EUT: Tri mode Cell Phone Model: TQ-CX1 PCS Band CDMA

Frequency	Field from EUT	Signal Generator Level required to generate same field as EUT; dBm	ERP	Attenuation	Limit	Margin
MHz	dBuv/m		dBm	dBm	dB	
1851.25	128.2		26.5	-		
3702.50	72.2	-34.30	-29.4	55.9	38.19	-17.7
5553.75	61.0	-45.30	-39.80	66.30	38.19	-28.1
7405.00	68.4	-37.10	-31.10	57.60	38.19	-19.4
9256.25	53.9	-52.90	-46.90	73.40	38.19	-35.2

Frequency	Field from EUT	Signal Generator Level required to generate same field as EUT; dBm	ERP	Attenuation	Limit	Margin
MHz	dBuv/m		DBm	dBm	dB	
1880.00	126.6		24.9	-		
3760.00	66.7	-39.80	-34.9	59.8	38.19	-21.6
5640.00	63.1	-43.20	-37.70	62.60	38.19	-24.4
7520.00	52.7	-52.80	-46.80	71.70	38.19	-33.5
9400.00	53.6	-53.20	-47.20	72.10	38.19	-33.9

Frequency	Field from EUT	Signal Generator Level required to generate same field as EUT; dBm	ERP	Attenuation	Limit	Margin
MHz	dBuv/m		DBm	dBm	dB	
1908.75	127.0		25.2	-		
3817.50	66.7	-39.80	-34.9	60.1	38.19	-21.9
5726.25	59.3	-47.00	-41.50	66.70	38.19	-28.5
7635.00	54.3	-51.20	-45.20	70.40	38.19	-32.2
9543.75	54.0	-52.80	-46.80	72.00	38.19	-33.8

Sharp Labs, CDMA/AMPS Cellular Phone
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6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 3007055 & 3007754	SS	September 22, 2001	Original document