

EMC EMISSION - TEST REPORT

Test Report No.

B907201

Issue Date

09 March 1999

Model / Serial No.

990017 / 101

Product Type

Radio Frequency Fueling Payment System

Client

CrossLink, Inc.

Manufacturer

CrossLink, Inc

License holder

CrossLink, Inc

Address

5665 Flatiron Pkwy

Boulder, CO 80301

Test Criteria Applied

FCC Part 15 15.247C

Test Start Date:

03 Mar 1999

Test End Date:

05 Mar 1999

Test Result

PASS FAIL

Test Report Project No.

BC1G907201

Total Pages including
Appendices

115


Reviewed By : Felix J. Chavez


Reviewed By : Shawn Singh

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EMISSIONS TEST REGULATIONS :

The tests were performed according to following regulations :

■ - Federal Communication Commission part 15	<input type="checkbox"/> - Class A	■ - Class B
■ - Federal Communication Commission part 15, Subpart C	■ - 15.207	■ - 15.247

All tests performed according to ANSI C63.4.

Emission Test Results:

Conducted emissions 450 kHz - 30 MHz

Test Result	■ - PASS	<input type="checkbox"/> - FAIL	<input type="checkbox"/> - Not Applicable
Passing Margin	<u>9.3</u> dB		at <u>9.13</u> MHz
Remarks:	<hr/>		

Radiated emissions (electric field) 30 MHz - 1000 MHz (Unintentional Radiator)

Test Result	■ - PASS	<input type="checkbox"/> - FAIL	<input type="checkbox"/> - Not Applicable
Passing Margin	<u>1.1</u> dB		at <u>791.9</u> MHz
Remarks:	<hr/>		

Radiated emissions (electric field) 2406.1 MHz - 24801 MHz (Intentional Radiator)

Test Result	■ - PASS	<input type="checkbox"/> - FAIL	<input type="checkbox"/> - Not Applicable
Passing Margin	<u>2.2</u> dB		at <u>4884.1</u> MHz
Remarks:	<hr/>		

GENERAL REMARKS:

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

Test-setup photo(s)
Radiated Emissions



Test-setup photo(s)
Radiated Emissions



Test-setup photo(s):
Conducted Emissions



Test Equipment Used



Colorado Test Equipment

10-Mar-99

Report: B9072 Date: 03-05 Mar 99 Signature: Shawn Singl
 Temp: 21.9°C Rel. Humd.: 118% Atmo. Pressure: 79.5 kPa

Location	Tests	Manufacturer	Model Number	Serial Number	Description	Cal Date	Cal Due
PW		A.H Systems	SAS-200-510	116	Log Periodic Antenna		
PW	R	AH Systems	SAS-200/510	705	Log Periodic Antenna (300-1800 MHz)	06-Jul-98	06-Jul-99
PW	(R)	AH Systems	SAS-200/512	104	Log Periodic Antenna (200-1500 MHz)	13-Jul-98	13-Jul-99
PW	(R)	AvAntek	AFT97-8434-10	1007	RF Pre-Amplifier (4-8 GHz)	19-Nov-98	19-Nov-99
PW	(R)	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	19-Nov-98	19-Nov-99
PW	R C	California Instr.	850T-1	68458	Oscillator (45-5000 Hz)		
PW	R C	California Instr.	9000TCA/3-1	50666+	Power Source 9KVA (45-5000 Hz, 0-280VAC)		
PW	R C	Compaq	470A	23605277B504	Monitor - PW Testbed		
PW	R C	Compaq	DeskPro 575	g545HSY20483	Computer for PW Testbed		
PW	R	Compliance Desig	none	RD-1	Roberts Dipole Ant. Set (30-1000 MHz)	03-Mar-97	02-Mar-00
PW		EMCO	1070-4	9206-1681	Antenna tower with manual polarization		
PW		EMCO	1080/1081	9206-1636	2 meter dia. wood turntable		
PW		EMCO	3104C	3519	Biconical Antenna	01-Feb-99	01-Feb-00
PW	R	EMCO	3104C	9203-4508	Biconical antenna	19-Jun-98	19-Jun-99
PW	R	EMCO	3108	2149	Biconical Dipole Antenna (30-300 MHz)	19-Jun-98	19-Jun-99
PW	(R)	EMCO	3108	7059203-2457	Biconical Dipole Antenna (30-300 MHz)	06-Jul-98	06-Jul-99
PW	(R)	EMCO	3115	3886	Dbl Ridged Horn Antenna (1-18 GHz)	20-Feb-98	22-Mar-99
PW	-3, R	EMCO	3146	9203-3376	Log Periodic Antenna	18-Jun-98	18-Jun-99
PW	C	EMCO	3825/2	9202-1945	LISN	15-Jul-98	15-Jul-99
PW	(C)	EMCO	3825/2	9202-1946	LISN	23-Jul-98	23-Jul-99
PW	R	EMCO	4610	9205-1199	Royce field site source		
PW	C	EMCO	4620	9110-1015	Conducted noise source		
PW	R	EMCO	6502	9205-2738	Magnetic loop	30-Oct-97	29-Oct-00
PW	R	EMCO	7405	9203-2175	Near field probe set		
PW	CISPR14	Fischer	F-201	141	Absorbing Clamp (30-300 MHz)	05-Mar-98	05-Mar-99
PW	C	Fischer	F-33-1	356	Current Probe (10 kHz - 250 MHz)	04-May-98	04-May-99
PW		Gishard	600-1040 mb	002	Altimeter		
PW	R	Hewlett Packard	11940A	2650A04527	Close field probe		
PW	R	Hewlett Packard	11940A	2650A04563	Close field probe		
PW	R	Hewlett Packard	11941A	2807A02957	Close field probe		
PW	(C)	Hewlett Packard	11947A	2820A00277	Transient Limiter	19-Nov-98	19-Nov-99
PW	C	Hewlett Packard	11947A	3107A01975	Transient Limiter	17-Jun-98	17-Jun-99
PW	(R)	Hewlett Packard	11970A	3003A07640	Harmonic Mixer	27-Feb-98	29-Mar-99
PW	(R)	Hewlett Packard	11970K	2332A01280	Harmonic Mixer	27-Feb-98	29-Mar-99
PW	(R)	Hewlett Packard	11975A	2738A01557	Amplifier	27-Feb-98	29-Mar-99
PW		Hewlett Packard	8444A	2325A07899	Tracking Generator (1-1200 MHz)	19-Nov-98	19-Nov-99
PW	R	Hewlett Packard	8445B	2034A03223	Pre-Selector	24-Jun-98	24-Jun-99
PW	(R) C	Hewlett Packard	8447D	2727A05399	Amplifier (30-1000 MHz)	18-Nov-98	18-Nov-99
PW	(R) C, RE101, CISP	Hewlett Packard	85650A	2043A00256	Quasi Peak Adapter (set 1)	17-Jun-98	17-Jun-99
PW	R, C, RE101, CISP	Hewlett Packard	85650A	2811A01300	Quasi Peak Adapter	23-Nov-98	23-Nov-99
PW	R, C, RE101, CISP	Hewlett Packard	85662A	2318A04983	Display Section (set 1)	17-Jun-98	17-Jun-99
PW	(R) C,	Hewlett Packard	85662A	2403A08749	Display Section	01-Apr-98	01-Apr-99
PW	R, C	Hewlett Packard	8566B	2115A00853	Spectrum Analyzer (dc-22 GHz)	11-Mar-98	11-Mar-99
PW	(R) C, RE101, CISP	Hewlett Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	01-Apr-98	01-Apr-99
PW	R, C, RE101, CISP	Hewlett Packard	8568B	2304A02508	Spectrum Analyzer (set 1) (dc-1.8 GHz)	17-Jun-98	17-Jun-99
PW		Hewlett Packard	8590	2722A02036	Spectrum Analyzer		
PW	RE101, -8, -9, -11	Hewlett Packard	8594E	3223A00145	Spectrum Analyzer	22-Jan-99	22-Jan-00
PW	C	HP	11947A	3107A01984	Transient Limiter	29-Oct-98	29-Oct-99
PW		JFW	50FH-003-100N	9825	Attenuator		
PW		JFW	50FHB-003-5	00363	Attenuator	19-Nov-98	19-Nov-99
PW	R	Mini-Circuits	ZHL-1042J	D020698-14	RF Pre-Amplifier (10-4200 MHz)	13-Feb-98	13-Feb-99
PW		Mini-Circuits	ZHL-1042J(SMA)	D082098-3	Amplifier	23-Sep-98	23-Sep-99

Location	Tests	Manufacturer	Model Number	Serial Number	Description	Cal Date	Cal Due
PW	C	Polarad Electronics	ESH3-Z2	357.881J.32	Transient Limiter		
PW		Radio Shack	63-867	005	Temperature / Humidity Indicator		
PW	C R	Rhode & Schwartz	ESHS 30	842806/001	EMI Test Receiver	26-Oct-98	26-Oct-99
PW	C	Rhode & Schwarz	ESH2-Z5	830364/002	LISN 50 ohm/50uH 3 line (1kHz - 30 MHz)	23-Feb-98	23-Feb-99
PW	C	Rhode & Schwarz	ESH3	872318/036	Low Frequency Receiver (9 kHz - 30 MHz)	03-Sep-98	03-Sep-99
PW	R	Rhode & Schwarz	HFH2-Z2	880665/042	Loop Antenna (10 kHz - 30 MHz)	08-Feb-98	08-Feb-99
PW	C	Schwarzbeck	NNLK 8129	8129126	LISN	27-Oct-98	27-Oct-99
PW	C	Schwarzbeck	TK 9416	TUV-600	Conducted Line Probe (150 kHz - 30 MHz)	04-Apr-98	04-Apr-99
PW		Shaffner	NSG 431	1426	ESD Tester		
PW	C	Solar	8028-50-TS-24-	8305121	LISN	23-Feb-98	23-Feb-99
PW	C	Solar	8028-50-TS-24-	8305122	LISN (10 kHz - 30 MHz)	23-Feb-98	23-Feb-99
PW	R	Systron Donner	DBD-520-15	1	Antenna 18-26 ghz		
PW	R	Systron Donner	DBE-520-15	2	antenna-26 to 40 ghz		
PW		Tensor	4105	2020	Ridged Guide Antenna	11-Jun-98	11-Jun-99
PW		Transjonic	T-100	147	Ion Meter		
PW		TUV PS	LPS-1	1	P/S for Loop Antenna		
PW		WaveTek	DM5XL	60206553	Hand Held Multimeter		
PW		Weinschel	2-3dB	BC5530	Attenuator	19-Nov-98	19-Nov-99
PW		Weinschel	2-3dB	BC5539	Attenuator	19-Nov-98	19-Nov-99
PW		Weinschel	2-6B	BC6492	Attenuator	19-Nov-98	19-Nov-99
PW		Weinschel	2-6dB	BC6487	Attenuator	19-Nov-98	19-Nov-99

Appendix A

Transmitter Data Sheets



SPREAD SPECTRUM INTENTIONAL RADIATOR DATA 15.247C FREQUENCY HOPPER

Miscellaneous Measurements:	<u>FCC Specification</u>	<u>Measurement</u>
1) Number of hopping channels	=>75	75
2) 20 dB BW of hopping channels	1 MHz	340 kHz
3) separation of hopping channels	> 25 kHz or 20 dB BW	401 kHz

Tx Mode: Conducted Measurements (direct connection to antenna port)

	dBm	MHz	dBm	MHz	dBm	MHz
1) Fundamental highest output power level	25.07	@ 2406.1	25.62	@ 2428.2	26.4	@ 2480.1
2) 2nd through 10th harmonics	20 dB < Fund.		All harmonics are greater than 20 dB below fundamental.			See Plots

Tx Mode: Radiated Measurements

Range	Specification	Measurement dBuV/m @ MHz	Measurement dBuV/m @ MHz	Delta dB
2nd harmonic (4812-4961 MHz)	54 dBuV/m	67.5	4960.3	-6.5
3rd harmonic (7218-7441 MHz)	54 dBuV/m	62.3	7440.5	-11.7
4th harmonic (9624-9921 MHz)	20 dB down	62.9	9920.7	-47.5
5th harmonic (12030-12401 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
6th harmonic (14436-14882 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
7th harmonic (16842-17362 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		
8th harmonic (19248-19842 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
9th harmonic (21654-22322 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
10th harmonic (24061-24802 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		

Minimum Passing Margin:

SPREAD SPECTRUM INTENTIONAL RADIATOR DATA SHEET

Miscellaneous Measurements:

- 1) Number of hoppers
- 2) 20 dB BW of hopper
- 3) separation of hoppers

Tx Mode: Conducted Measurements (direct connection to antenna port)

1) Fundamental highest output power level < 1 Watt (30 dBm)
 2) 2nd through 10th harmonics 20 dB < Fund.

Radiated Measurements

Range	Specification	Measurement	Measurement	Delta
	dBuV/m @ MHz	dBuV/m @ MHz	dBuV/m @ MHz	dB
2nd harmonic (4812.4961 MHz)	54 dBuV/m	69.3	4960.2	4960.2
3rd harmonic (7218.7441 MHz)	54 dBuV/m	61.1	7284.5	41.1
4th harmonic (9624.9921 MHz)	20 dB down	58.2	9624.7	38.2
5th harmonic (12030.12401 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.	9624.7	-30.6
6th harmonic (14436.14882 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
7th harmonic (16842.17362 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		
8th harmonic (19248.19842 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
9th harmonic (21654.22322 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
10th harmonic (24061.24802 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		

Minimum Passing Margin: -4.7 dB

Date: 5-Mar-99 **Measured @** 2441.9 MHz
EUT: 990017(A1, A2, B1, B2 Antennas)
Customer: Jack Pyne

Miscellaneous Measurements:
1) 6 dB bandwidth
2) Power density
FCC Specification
=>500 kHz
8 dBm

Tx Mode: Conducted Measurements (direct connection to antenna port)

1) Fundamental highest output power level < 1 Watt (30 dBm)
 2) 2nd through 10th harmonics 20 dB < Fund.

22.56 @ 2442.4
 All harmonics are greater than 20 dB below fundamental. See Plots

Range	Specification	Measurement dBuV/m @ MHz	Average Measurement dBuV/m @ MHz	Delta dB
2nd harmonic (4884.3 MHz)	54 dBuV/m	63.1	4884.3	51.4
3rd harmonic (7326.3 MHz)	54 dBuV/m	55.2	7326.3	43.5
4th harmonic (9768.5 MHz)	20 dB down	52.6	9768.5	40.9
5th harmonic (12210.7 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
6th harmonic (14652.9 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
7th harmonic (17095 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		
8th harmonic (19537.2 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
9th harmonic (21979.3 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.		
10th harmonic (24421.5 MHz)	20 dB down	No emissions were found above the receiver's noise floor.		

Minimum Passing Margin: -2.6 dB

SPREAD SPECTRUM INTENTIONAL RADIATOR DATA 15.247C DIRECT SEQUENCE
B9072-3.XLS

Page 1

Date: 5-Mar-99
EUT: 990017(KA, KB Antennas)
Customer: Jack Pyme

Miscellaneous Measurements:	<u>FCC Specification</u>	<u>Measurement</u>
1) 6 dB bandwidth 2) Power density	=>500 kHz 8 dBm	10 MHz -22 dBm

Tx Mode: Conducted Measurements (direct connection to antenna port)

- 1) Fundamental highest output power level < 1 Watt (30 dBm)
20 dB < Fund.
- 2) 2nd through 10th harmonics

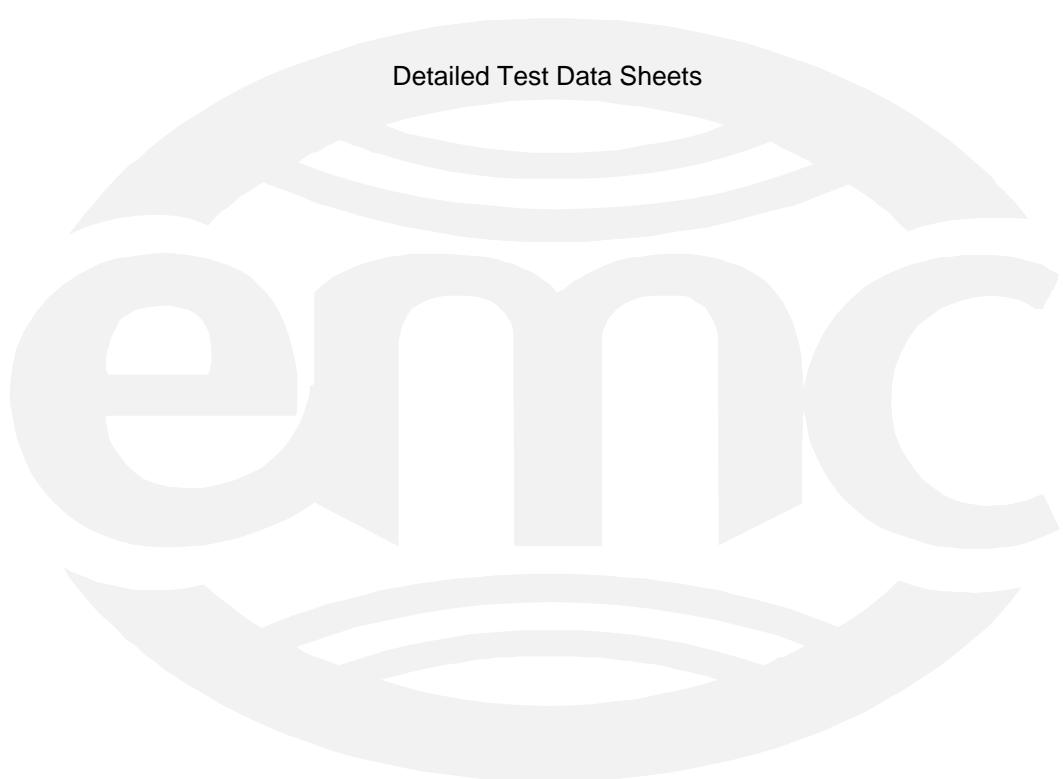
Tx Mode: Radiated Measurements

Calculated Averaging Factor: -11.7 dB (20*Log(duty cycle))
Max Averaging Factor Allowed: -20 dB
Averaging Factor Applied: -11.7 dB
Fundamental Field Strength: 104.9 dBuV/m @ 2442.5 MHz

Range	Specification	Peak	Average	Measurement	Delta
		dBm	MHz	dBuV/m @ MHz	dB
2nd harmonic (4884.3 MHz)	54 dBuV/m	63.5	4884.1	51.8	4884.1
3rd harmonic (7326.3 MHz)	54 dBuV/m	54.2	7326.3	42.5	7326.3
4th harmonic (9768.5 MHz)	20 dB down	54.8	9768.5	43.1	9768.5
5th harmonic (12210.7 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.			-11.5
6th harmonic (14652.9 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.			-30.1
7th harmonic (17095 MHz)	20 dB down	No emissions were found above the receiver's noise floor.			
8th harmonic (19537.2 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.			
9th harmonic (21979.3 MHz)	54 dBuV/m	No emissions were found above the receiver's noise floor.			
10th harmonic (24421.5 MHz)	20 dB down	No emissions were found above the receiver's noise floor.			
Minimum Passing Margin:		-2.2 dB			

Appendix B

Detailed Test Data Sheets



T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 1

Date 03/03/99 Page 1

Engineer FJC JiglTech: S S Shawn SingL

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

Four antennas A1, A2, B1, and B2 are enclosed within one enclosure.

Below readings are with A2/ antenna. Peak readings. All readings are maximized.

SS
Direct sequence is fixed at 2442.1 MHz. Hopping at ^{Mid SS} few channel.

Horn antenna vertical polarization.

355 deg/1.74 m

2428.1	92.2	30.5	3.3	126	--	V	--
2442.1	88.65	30.5	3.4	122.	--	V	--

Horizontal

14 deg/1.53 m

2428.1	82.65	30.5	3.3	116.	--	H	--
--------	-------	------	-----	------	----	---	----

Above frequency was remeasured below.

309 deg/1.57 m

2428.1	84.9	30.5	3.3	118.	--	H	--
2442.0	80.25	30.5	3.4	114.	--	H	--
311 deg/1.05 m							
4856.3	20.85	34.8	5	60.7	--	H	--
7284.5	13	37.8	5.7	56.5	--	H	--
4884.3	20.35	34.9	5	60.3	--	H	--
7326.3	8.85	37.9	5.7	52.5	--	H	--

Vertical polarization.

337 deg/1.4 m

4856.3	22.8	34.8	5	62.6	--	V	--
4884.1	19	34.9	5	58.9	--	V	--
7284.4	13.85	37.8	5.7	57.4	--	V	--
7326.3	10.25	37.9	5.7	53.9	--	V	--

Above readings were max at 1.16 m

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 1

Date 03/03/99 Page 2

Engineer FSCTech: S S Shawn Singh

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

354 deg/1.1 m

9712.6	9.55	39.2	6.4	55.1	--	V	--
9768.5	7.05	39.1	6.4	52.6	--	V	--

No emissions were found above the receiver's noise floor to 10th harmonic.

Horizontal polarization.

299 deg/1.2 m

9712.6	9.6	39.2	6.4	55.2	--	H	--
9768.5	4.75	39.1	6.4	50.3	--	H	--

No emissions were found above the receiver's noise floor to 10th harmonic.

Above readings are at Mid channel.

Below readings are at low channel.

Vertical polarization.

355 deg/1.6 m

2406.2	93.05	30.4	3.3	126.	--	V	--
--------	-------	------	-----	------	----	---	----

Horizontal

305 deg/1.5 m

2406.2	85.05	30.4	3.3	118.	--	H	--
--------	-------	------	-----	------	----	---	----

299 deg/1.05 m

4812.4	18.6	34.7	5	58.3	--	H	--
7218.4	11.5	37.7	5.7	54.9	--	H	--

Vertical polarization.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 1

Date 03/03/99 Page 3

Engineer ELTech: S S Shawn Singh

Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
------------------	---------------	--------------	-------------	-----------------	-----------	------------------	-------	-------

334 deg/1.3 m

7218.4	11.2	37.7	5.7	54.6	--	V	--
4812.3	17.3	34.7	5	57	--	V	--

351 deg/1.16 m

9624.7	25.15	39.2	6.4	70.7	--	V	--
--------	-------	------	-----	------	----	---	----

Horizontal polarization.

Above reading was with wrong amplifier offset. Deleted from summary list.
Remeasured below.

9624.7	11.05	39.2	6.4	56.6	--	V	--
9624.7	12.6	39.2	6.4	58.2	--	H	--

Below readings are with high channel.

16 Deg, 1.52 M

2480.2	84.05	30.6	3.4	118.	--	H	--
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Vertical

353 deg, 1.87 M

2480.2	94.3	30.6	3.4	128.	--	V	--
--------	------	------	-----	------	----	---	----

342 Deg, 1.28 M

4960.3	26.2	35.1	5	66.3	--	V	--
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342 Deg, 1 M

7440.5	16.9	38.1	5.8	60.8	--	V	--
--------	------	------	-----	------	----	---	----

Horizontal

290 deg, 1.17 M

7440.5	17.25	38.1	5.8	61.1	--	H	--
--------	-------	------	-----	------	----	---	----

313 Deg, 1.38M

4960.3	28.8	35.1	5	68.9	--	H	--
--------	------	------	---	------	----	---	----

293 deg, 1.22 M

9920.7	15.15	39.1	6.5	60.7	--	H	--
--------	-------	------	-----	------	----	---	----

Vertical

357 deg, 1.13 M

9920.7	16.55	39.1	6.5	62.1	--	V	--
--------	-------	------	-----	------	----	---	----

No emissions were found above the receivers noise floor to 10th harmonic
in vertical or horizontal polarizations

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 1

Date 03/03/99 Page 4

Engineer FJCTech: S S Shawn Singh

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N: RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Figure_____

Report B9072 Run 1
 Date 03/03/99 Page 5
 Engineer ELA
 Tech: S S Shawn Sing
 Requester _____

Measurement Summary

Frequency MHz	----- Final ----- dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.2	126.8	218776	--	V --		
2428.1	126	199526	--	V --		
2442.1	122.5	133352	--	V --		
2480.2	128.3	260016	--	V --		
4812.4	58.3	822.24	--	H --		
4856.3	62.6	1348.9	--	V --		
4884.1	58.9	881.04	--	V --		
4884.3	60.3	1035.1	--	H --		
4960.3	68.9	2786.1	--	H --		
7218.4	54.9	555.90	--	H --		
7284.4	57.4	741.31	--	V --		
7326.3	53.9	495.45	--	V --		
7440.5	61.1	1135.0	--	H --		
9624.7	58.2	812.83	--	H --		
9712.6	55.2	575.44	--	H --		
9768.5	52.6	426.57	--	V --		
9920.7	62.1	1273.5	--	V --		

File B9072 Run 1

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 2

Date 03/03/99 Page 1

Engineer FSC JoeTech: SMB BBRequester BB

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
Continuation of Run 1. EUT is now Antenna A2.								
Vertical polarization								
2 deg, 1.62 M								
2441.9	89.5	30.5	3.4	123.	--	V	--	
351 deg, 1.65 M								
2480.1	94.4	30.6	3.4	128.	--	V	--	
Horizontal								
294 deg, 1.65 M								
2480.1	85.8	30.6	3.4	119.	--	H	--	
297 deg, 1.7 M								
2442.0	81.55	30.5	3.4	115.	--	H	--	
315 deg, 1.21 M								
4884.4	17.8	34.9	5	57.7	--	H	--	
295 deg, 1.21 M								
4960.4	27.2	35.1	5	67.3	--	H	--	
292 deg, 1.27 M								
7440.4	15.65	38.1	5.8	59.5	--	H	--	
7326.3	9.2	37.9	5.7	52.8	--	V	--	
Disregard above reading								
7326.3	9.45	37.9	5.7	53.1	--	H	--	
Vertical								
7326.3	9	37.9	5.7	52.6	--	V	--	
343 Deg, 1.05 M								
7440.4	16.5	38.1	5.8	60.4	--	V	--	
291 deg, 1.18 M								
4960.2	27.2	35.1	5	67.3	--	V	--	
334 deg, 1.36 M								
4884.4	21.2	34.9	5	61.1	--	V	--	
9768.1	4.9	39.1	6.4	50.5	--	V	--	
322 deg, 1.17 M								
9920.7	17.3	39.1	6.5	62.9	--	V	--	
Horizontal								
298 deg, 1.53 M								
9920.6	16.25	39.1	6.5	61.8	--	H	--	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 2

Date 03/03/99 Page 2

Engineer FCC AgeTech: SMB SD

Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
9768.5	4.8	39.1	6.4	50.4	--	V	--	
above reading was taken in the horizontal polarization.								
All above readings taken at high channel								
No emissions were found above the receivers noise floor to 10th harmonic								
Below readings are with mid channel								
334 deg, 1.41 M								
2428.1	82.05	30.5	3.3	115.	--	H	--	
Vertical								
350 deg, 1.1 M								
2428.1	93.35	30.5	3.3	127.	--	V	--	
335 deg, 1.3 M								
4856.3	18.75	34.8	5	58.6	--	V	--	
335 deg, 1.5 M								
7284.3	13.55	37.8	5.7	57.1	--	V	--	
Horizontal								
311 Deg, 1.1 M								
7284.4	12.35	37.8	5.7	55.9	--	H	--	
298 deg, 1.27 M								
4856.2	17.2	34.8	5	57	--	H	--	
300 deg, 1.08 M								
9712.6	10.6	39.2	6.4	56.2	--	H	--	
Vertical								
352 Deg, 1.18 M								
9712.6	10.55	39.2	6.4	56.1	--	V	--	
The following data taken at low channel								
6 Deg, 2.03 M								
2406.1	93.05	30.4	3.3	126.	--	V	--	
Horizontal								
315 deg, 1.2 M								
2406.1	83.15	30.4	3.3	116.	--	H	--	
286 deg, 1.12 M								
4812.2	18.8	34.7	5	58.5	--	H	--	
239 deg, 1.54 M								
7218.9	10.8	37.7	5.7	54.2	--	H	--	
vertical								
290 deg, 1.27 M								
7218.7	12.45	37.7	5.7	55.8	--	V	--	
341 Deg, 1.2 M								
4812.4	19.6	34.7	5	59.3	--	V	--	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N: RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Report B9072 Run 2

Date 03/03/99 Page 3

Engineer SL 196Tech: SMB SBRequester SB

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

317 deg, 1.1 M

9624.6 13.3 39.2 6.4 58.9 -- V --

290 deg, 1.28 M

Horizontal

290 deg, 1.28 M

9624.6 13.8 39.2 6.4 59.4 -- H --

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N: RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, Tecom P/N: 505117B (SARA antenna)

Figure _____

Report B9072 Run 2
 Date 03/03/99 Page 4
 Engineer FJC
 Tech: SMB AB
 Requester AB

Measurement Summary

Frequency MHz	Final dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.1	126.8	218776	--	V	--	
2428.1	127.1	226464	--	V	--	
2441.9	123.4	147910	--	V	--	
2480.1	128.4	263026	--	V	--	
4812.2	58.5	841.39	--	H	--	
4812.4	59.3	922.57	--	V	--	
4856.3	58.6	851.13	--	V	--	
4884.4	61.1	1135.0	--	V	--	
4960.4	67.3	2317.3	--	H	--	
7218.7	55.8	616.59	--	V	--	
7218.9	54.2	512.86	--	H	--	
7284.3	57.1	716.14	--	V	--	
7284.4	55.9	623.73	--	H	--	
7326.3	53.1	451.85	--	H	--	
7440.4	60.4	1047.1	--	V	--	
9624.6	59.4	933.25	--	H	--	
9712.6	56.2	645.65	--	H	--	
9768.1	50.5	334.96	--	V	--	
9768.5	50.4	331.13	--	V	--	
9920.7	62.9	1396.3	--	V	--	

File B9072 Run 2

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 3
 Date 03/04/99 Page 1
 Engineer JL
 Tech: SMB JL
 Requester JL

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		
Continuation of Run 1. EUT is now Antenna B1								
13 deg, 1.53 M								
2406.2	94	30.4	3.3	127.	--	V	--	
338 deg, 1.36 M								
2441.9	89.2	30.5	3.4	123.	--	V	--	
Above readings are Horn/Vertical horizontal								
320 Deg, 1.12 M								
2441.5	81.5	30.5	3.4	115.	--	H	--	
324 deg, 1.2 M								
2406.2	85.1	30.4	3.3	118.	--	H	--	
310 deg, 1.4 M								
4812.2	20.7	34.7	5	60.4	--	H	--	
296 deg, 1.14 M								
4884.1	21.7	34.9	5	61.6	--	H	--	
306 deg, 1.13 M								
7218.4	10.9	37.7	5.7	54.3	--	H	--	
302 Deg, 1.27 M								
7326.3	8.4	37.9	5.7	52	--	H	--	
Vertical								
296 deg, 1.47 M								
7326.3	11.55	37.9	5.7	55.2	--	V	--	
307 Deg, 1.31 M								
7218.5	12.8	37.7	5.7	56.2	--	V	--	
347 deg, 1.3 M								
4812.4	19.55	34.7	5	59.2	--	V	--	
336 deg, 1.2 M								
4884.4	21.95	34.9	5	61.9	--	V	--	
326 deg, 1.16 M								
9624.5	10.7	39.2	6.4	56.3	--	V	--	
Horizontal								
300 deg, 1.65 M								
9624.8	12	39.2	6.4	57.6	--	H	--	
298 deg, 1.08 M								
9768.3	5.35	39.1	6.4	50.9	--	H	--	
Vertical								
Vertical, 304 deg, 1.1 M								
9768.3	7	39.1	6.4	52.6	--	V	--	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 3

Date 03/04/99 Page 2

Engineer ELJTech: SMB SBRequester SB

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

Horizontal

The following readings are Mid Channel

339 deg, 1.68 M

2428.1 83.35 30.5 3.3 117. -- H --

Vertical

351 Deg, 1 M

2428.1 95.8 30.5 3.3 129. -- V --

340 deg, 1.39 M

4856.3 23.5 34.8 5 63.3 -- V --

313 deg, 1.09 M

7284.3 15.75 37.8 5.7 59.3 -- V --

Horizontal

313 Deg, 1.06 M

7284.5 15.4 37.8 5.7 58.9 -- H --

300 deg, 1.36 M

4856.5 21.6 34.8 5 61.4 -- H --

298 deg, 1.52 M

9712.6 9.3 39.2 6.4 54.9 -- H --

Vertical

10 Deg, 1 M

9712.6 9.65 39.2 6.4 55.2 -- V --

The following readings are High channel

354 deg, 1.27 M

2480.1 96.85 30.6 3.4 130. -- V --

Horizontal

322 deg, 1.13

2480.1 85.7 30.6 3.4 119. -- H --

288 deg, 1.16 M

4960.3 27.35 35.1 5 67.5 -- H --

309 deg, 1.08 M

7440.5 14.75 38.1 5.8 58.6 -- H --

Vertical

310 deg, 1.74 M

7440.5 16.3 38.1 5.8 60.2 -- V --

297 deg, 1.25 M

4960.3 24.85 35.1 5 65 -- V --

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 3

Date 03/04/99 Page 3

Engineer JLJTech: SMB JLJRequester JLJ

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		
361	Deg, 1.7	M						
9920.7	16.75	39.1	6.5	62.3	--	V	--	
Horizontal								
299	deg, 1.55	M						
9920.6	16.25	39.1	6.5	61.8	--	H	--	
No emissions were found above the receivers noise floor to 10th harmonic								

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Figure _____

Report B9072 Run 3

Date 03/04/99 Page 4

Engineer FL TgkTech: SMB ARequester 9

Measurement Summary

Frequency MHz	----- Final ----- dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.2	127.7	242660	--	V	--	
2428.1	129.6	301995	--	V	--	
2441.5	115.4	588843	--	H	--	
2441.9	123.1	142889	--	V	--	
2480.1	130.9	350751	--	V	--	
4812.2	60.4	1047.1	--	H	--	
4812.4	59.2	912.01	--	V	--	
4856.3	63.3	1462.1	--	V	--	
4856.5	61.4	1174.8	--	H	--	
4884.1	61.6	1202.2	--	H	--	
4884.4	61.9	1244.5	--	V	--	
4960.3	67.5	2371.3	--	H	--	
7218.5	56.2	645.65	--	V	--	
7284.3	59.3	922.57	--	V	--	
7284.5	58.9	881.04	--	H	--	
7326.3	55.2	575.44	--	V	--	
7440.5	60.2	1023.2	--	V	--	
9624.5	56.3	653.13	--	V	--	
9624.8	57.6	758.57	--	H	--	
9712.6	55.2	575.44	--	V	--	
9768.3	52.6	426.57	--	V	--	
9920.7	62.3	1303.1	--	V	--	

File B9072 Run 3

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 4

Date 03/04/99 Page 1

Engineer FJCTech: SMB SB

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

Continuation of Run 1, Antenna B2, High channel, horn/vertical

359 deg, 1.54 M

2480.2 96.85 30.6 3.4 130. -- V --

356 deg, 1.52 M

2441.9 91.45 30.5 3.4 125. -- V --

Horizontal

315 deg, 1.84 M

2442.2 80.6 30.5 3.4 114. -- H --

322 deg, 1.57 M

2480.2 85.95 30.6 3.4 120 -- H --

299 Deg, 1.2 M

4960.3 27.1 35.1 5 67.2 -- H --

298 deg, 1.18 M

4884.3 23.2 34.9 5 63.1 -- H --

308 deg, 1.13 M

7440.5 18.45 38.1 5.8 62.3 -- H --

322 Deg, 1 M

7326.3 9.8 37.9 5.7 53.4 -- H --

vertical

339 deg, 1.09 M

7326.3 8.95 37.9 5.7 52.6 -- V --

340 Deg, 1.07 M

7440.5 16.9 38.1 5.8 60.8 -- V --

336 deg, 1.74 M

4884.2 22.3 34.9 5 62.2 -- V --

336 deg, 1.93 M

4960.3 24.8 35.1 5 64.9 -- V --

293 deg, 1.89 M

9920.7 16.65 39.1 6.5 62.2 -- V --

353 Deg, 1.41 M

9768.3 6.85 39.1 6.4 52.4 -- V --

horizontal

306 deg, 1.18 M

9768.3 6.45 39.1 6.4 52 -- H --

297 deg, 1.6 M

9920.7 16.95 39.1 6.5 62.5 -- H --

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 4

Date 03/04/99 Page 2

Engineer FL91Tech: SMB SBRequester SB

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
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The following readings are Mid channel

329 deg, 1.59 M

2428.1 85.3 30.5 3.3 119. -- H --

vertical

358 deg, 1.54 M

2428.1 96.65 30.5 3.3 130. -- V --

338 deg, 1.2 M

4856.3 24.3 34.8 5 64.1 -- V --

318 deg, 1.6 M

7284.5 15.25 37.8 5.7 58.8 -- V --

316 deg, 1.16 M

Horizontal

7284.5 12.6 37.8 5.7 56.1 -- H --

298 deg, 1.34 M

4856.3 21.35 34.8 5 61.2 -- H --

292 deg, 1.24 M

9712.6 9.3 39.2 6.4 54.9 -- H --

Vertical

311 deg, 1.2 M

9712.7 10.4 39.2 6.4 56 -- V --

The following readings are Low Channel

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Report B9072 Run 4
 Date 03/04/99 Page 3
 Engineer FL
 Tech: SMB SB
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
<hr/>								
350 deg, 1.52 M								
<hr/>								
2406.2	95.5	30.4	3.3	129.	--	V	--	
horizontal								
315 deg, 1.29 M								
<hr/>								
2406.2	85.05	30.4	3.3	118.	--	H	--	
293 deg, 1.33 M								
<hr/>								
4812.4	20.65	34.7	5	60.3	--	H	--	
300 deg, 1.1 M								
<hr/>								
7218.4	13.4	37.7	5.7	56.8	--	H	--	
vertical								
339 deg, 1.15 M								
<hr/>								
7218.4	14.1	37.7	5.7	57.5	--	V	--	
336 deg, 1.1 M								
<hr/>								
4812.4	21.75	34.7	5	61.4	--	V	--	
355 deg, 1.6 M								
<hr/>								
9624.5	12.1	39.2	6.4	57.7	--	V	--	
Horizontal								
311 deg, 1.4 M								
<hr/>								
9624.6	11.3	39.2	6.4	56.9	--	H	--	
No emissions were found above the receivers noise floor to 10th harmonic								

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101, Tecom P/N: 505117B (SARA Antenna)

Figure_____

Report B9072 Run 4
 Date 03/04/99 Page 4
 Engineer J. C. Jones
 Tech: SMB SB
 Requester _____

Measurement Summary

Frequency MHz	----- Final ----- dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.2	129.2	288403	--	V	--	
2428.1	130.4	331130	--	V	--	
2441.9	125.3	184077	--	V	--	
2442.2	114.5	530884	--	H	--	
2480.2	130.9	350751	--	V	--	
4812.4	61.4	1174.8	--	V	--	
4856.3	64.1	1603.2	--	V	--	
4884.3	63.1	1428.8	--	H	--	
4960.3	67.2	2290.8	--	H	--	
7218.4	57.5	749.89	--	V	--	
7284.5	58.8	870.96	--	V	--	
7326.3	53.4	467.73	--	H	--	
7440.5	62.3	1303.1	--	H	--	
9624.5	57.7	767.36	--	V	--	
9712.6	54.9	555.90	--	H	--	
9712.7	56	630.95	--	V	--	
9768.3	52.4	416.86	--	V	--	
9920.7	62.5	1333.5	--	H	--	

File B9072 Run 4

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
3 Meter Antenna Distance
Equipment Under Test:
CrossLink, Inc. RF_FPS1
RF Fueling Payment System
Notes: 8 Vdc, S/N: 101, K

Report B9072 Run 6
Date 03/05/99 Page 1
Engineer Filage.
Tech: S S Shawn Singh
Requester

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
------------------	---------------	--------------	-------------	-----------------	-----------	------------------	-------	-------

Below readings are with KA antenna.

Horn antenna, vertical polarization.

343 deg/1.23 m

2406.1	73.05	30.4	3.3	106.	--	V	--
2442.4	65.55	30.5	3.4	99.4	--	V	--

Horizontal polarization.

0 deg/1.37 m	2442.4	68.45	30.5	3.4	102.	--	H	--
350 deg/1.1 m	2406.2	74.5	30.4	3.3	108.	--	H	--

See RUN 8

4812.1 30.35 34.7 5 70 -- H --
7218.1 11.3 37.7 5.7 54.7 -- H --

7326.3	10.6	37.9	5.7	54.2	--	H	--
26 deg/1.12 m							
4884.1	22.35	34.9	5	62.2	--	H	--

Vertical polarization.

0 deg/1.06 m
4884.1 20.7 34.9 5 60.6 -- V --
0 deg/1.37 m

See RUN 8

4812.4 29.9 34.7 5 69.6 -- V --

0 deg/1.2 m
7218.2 11.15 37.7 5.7 54.5 -- V --
7326.3 9.45 37.8 5.7 53.1 -- V --

0	deg/1	m									
9624.5	9.95	39.2	6.4	55.5	--	V	--				
9768.3	8.05	39.1	6.4	53.6	--	V	--				

Horizontal polarization.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 6
 Date 03/05/99 Page 2
 Engineer Flax
 Tech: S S Shawn Singh
 Requester _____

Frequency MHz	Level dBuV	Level dB	Factor dB	Cable dBuV/m	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
9768.3	9.2	39.1	6.4	54.8	--	H	--		
9624.5	9.4	39.2	6.4	55	--	H	--		

Above readings were with low channel, and fixed direct sequence.

Below readings are with mid channel.

9712.6 8.75 39.2 6.4 54.3 -- H --

Vertical polarization.

0 deg/1 m

9712.6 9.4 39.2 6.4 55 -- V --

24 deg/1 m

7284.5 13.2 37.8 5.7 56.7 -- V --

0 deg/1.37 m

4856.3 23.6 34.8 5 63.4 -- V --

Horizontal polarization.

34 deg/1.1 m

4856.3 23.45 34.8 5 63.3 -- H --

7284.5 11 37.8 5.7 54.5 -- H --

350 deg/1.1 m

2428.1 38.25 30.5 3.3 72 -- H --

Vertical polarization.

Above reading was taken with wrong S.A. offset. Remeasured below.

2428. 72.45 30.5 3.3 106. -- H --

343 deg/1.2 m

2428.1 69.45 30.5 3.3 103. -- V --

High channel

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 6
 Date 03/05/99 Page 3
 Engineer Eliza
 Tech: S S Shawn Singh
 Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

The following readings are High channel

26 deg, 1.6 M								
2480.2	69.05	30.6	3.4	103.	--	V	--	
horizontal								
356 deg, 1.1 M								
2480.2	72.15	30.6	3.4	106.	--	H	--	
33 Deg, 1.1 M								
4960.2	29.2	35.1	5	69.3	--	H	--	
285 deg, 1.4 M								
7440.3	12.7	38.1	5.8	56.6	--	H	--	
vertical								
32 Deg, 1.9 M								
7440.5	14.3	38.1	5.8	58.2	--	V	--	
0 deg, 1.16 M								
4960.2	26.4	35.1	5	66.5	--	V	--	
31 Deg, 1.2 M								
9920.9	12.25	39.1	6.5	57.8	--	V	--	
horizontal								
299 deg, 1.88 M								
9920.5	10.4	39.1	6.5	56	--	H	--	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Figure_____

Report B9072 Run 6
 Date 03/05/99 Page 4
 Engineer PLJ
 Tech: S S Shawn S. Engle
 Requester _____

Measurement Summary

Frequency MHz	Final dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.2	108.2	257039	--	H	--	
2428.1	106.2	204173	--	H	--	
2442.4	102.3	130316	--	H	--	
2480.2	106.2	204173	--	H	--	
4812.1	70	3162.2	--	H	--	SS See RUN 8
4812.4	69.6	3019.9	--	V	--	SS See RUN 8
4856.3	63.4	1479.1	--	V	--	
4884.1	62.2	1288.2	--	H	--	
4960.2	69.3	2917.4	--	H	--	
7218.1	54.7	543.25	--	H	--	
7284.5	56.7	683.91	--	V	--	
7326.3	54.2	512.86	--	H	--	
7440.3	56.6	676.08	--	H	--	
7440.5	58.2	812.83	--	V	--	
9624.5	55.5	595.66	--	V	--	
9712.6	55	562.34	--	V	--	
9768.3	54.8	549.54	--	H	--	
9920.5	56	630.95	--	H	--	
9920.9	57.8	776.24	--	V	--	

File B9072 Run 6

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 7

Date 03/05/99 Page 1

Engineer PL gTech: SMB SBRequester SB

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
------------------	---------------	--------------	-------------	-----------------	-----------	------------------	-------	-------

Below readings are with KB antenna.

Horn antenna, vertical polarization.

10 deg/1.3 m								
22 deg, 1.3 M								
2406.1 74.6	30.4	3.3	108.	--	V	--		
25 deg, 1.3 M								
2442.5 69.55	30.5	3.4	103.	--	V	--		
Horizontal								
355 deg, 1.63 M								
2442.5 71.05	30.5	3.4	104.	--	H	--		
2 Deg, 1.1 M								
2406.1 75.1	30.4	3.3	108.	--	H	--		
122 deg, 1.06 M								
<u>4812.1</u> 33.7	<u>34.7</u>	<u>5</u>	<u>73.4</u>	<u>H</u>			<u>SEE RUN 8</u>	
180 deg, 1.3 M								
7218.6 9.65	37.7	5.7	53	--	H	--		
0 deg, 1 M								
7327.2 11.1	37.9	5.7	54.7	--	H	--		
Disregard above reading								
150 deg, 1.2 M								
7326.3 10	37.9	5.7	53.6	--	H	--		
37 deg, 1 M								
4884.1 23.65	34.9	5	63.5	--	H	--		
Vertical								
323 Deg, 1 M								
4884.1 19.8	34.9	5	59.7	--	V	--		
6 deg, 1.5 M								
<u>4812.4</u> 32.75	<u>34.7</u>	<u>5</u>	<u>72.4</u>	<u>--</u>	<u>V</u>	<u>--</u>	<u>SEE RUN 9</u>	
0 deg, 1.5 M								
7218.5 12.65	37.7	5.7	56	--	V	--		
340 deg, 1.2 M								
7326.3 10.1	37.9	5.7	53.7	--	V	--		
0 deg, 1 M								
9768.3 9.2	39.1	6.4	54.8	--	V	--		
60 deg, 1.33 M								
9624.7 12.65	39.2	6.4	58.2	--	V	--		

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

3 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. RF_FPS1

RF Fueling Payment System

Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 7

Date 03/05/99 Page 2

Engineer ELTech: SMB SB

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height		

300 deg, 1.1 M

Horizontal

9624.6 11.95 39.2 6.4 57.5 -- H --

0 deg, 1.2 M

9768.2 8.3 39.1 6.4 53.9 -- H --

Above readings are Low Channel

The following readings are mid channel

27 deg, 1.4 M

2428.0 72.8 30.5 3.3 106. -- H --

0 deg, 1.5 M

2428.0 73 30.5 3.3 106. -- V --

4 Deg, 1.8 M

4856.3 27.75 34.8 5 67.6 -- V --

80 deg, 1 M

7284.5 17.55 37.8 5.7 61.1 -- V --

277 deg, 1.4 M

Horizontal

7284.1 11.35 37.8 5.7 54.9 -- H --

43 deg, 1.1 M

4856.3 29.05 34.8 5 68.9 -- H --

270 deg, 1.5 M

9712.6 10.4 39.2 6.4 56 -- H --

Vertical

333 deg, 1.4 M

9712.5 10.65 39.2 6.4 56.2 -- V --

The following readings are High channel

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 7
 Date 03/05/99 Page 3
 Engineer FLJ
 Tech: SMB SB
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
<hr/>								
350 deg, 1.15 M								
2480.2	70.95	30.6	3.4	105	--	V	--	
Horizontal								
347 deg, 1.1 M								
2480.1	74.5	30.6	3.4	108.	--	<u>V</u>	<u>H</u>	<u>SB</u>
28 deg, 1 M								
4960.2	27.25	35.1	5	67.4	--	H	--	
270 deg, 1.2 M								
7440.4	9.95	38.1	5.8	53.8	--	H	--	
Vertical								
7 deg, 1.2 M								
7440.5	12	38.1	5.8	55.9	--	V	--	
6 deg, 1.1 M								
4960.2	25.25	35.1	5	65.4	--	V	--	
62 deg, 1.35 M								
9920.6	12.05	39.1	6.5	57.6	--	V	--	
Horizontal								
310 deg, 1.38 M								
9920.6	11.8	39.1	6.5	57.4	--	H	--	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Figure _____

Report B9072 Run 7

Date 03/05/99 Page 4

Engineer KLJTech: SMB SRequester SB

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height	Delta	Delta
2406.1	108.8	275423	--	H	--	
2428.0	106.8	218776	--	V	--	
2442.5	104.9	175792	--	H	--	
2480.1	108.5	266072	--	V	--	
4812.1	73.4	4677.3	--	H	--	
4812.4	72.4	4168.6	--	V	--	<i>SEE RUN 8 SB</i>
4856.3	68.9	2786.1	--	H	--	
4884.1	63.5	1496.2	--	H	--	
4960.2	67.4	2344.2	--	H	--	
7218.5	56	630.95	--	V	--	
7218.6	53	446.68	--	H	--	
7284.1	54.9	555.90	--	H	--	
7284.5	61.1	1135.0	--	V	--	
7326.3	53.7	484.17	--	V	--	
7440.5	55.9	623.73	--	V	--	
9624.7	58.2	812.83	--	V	--	
9712.5	56.2	645.65	--	V	--	
9768.2	53.9	495.45	--	H	--	
9768.3	54.8	549.54	--	V	--	
9920.6	57.6	758.57	--	V	--	

File B9072 Run 7

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Report B9072 Run 8
 Date 03/05/99 Page 1
 Engineer FL age
 Tech: SMB SP
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta	Delta
------------------	---------------	--------------	-------------	-----------------	-----------	------------------	-------	-------

KA antenna, Horizontal polarization, different cable between antenna and output

140 deg, 1.3 M
 4812.4 24.45 34.7 5 64.1 -- H --

vertical

149 deg, 1.25 M
 4812.3 22.35 34.7 5 62 -- V --

Switching to KB antenna with same new cable

150 deg, 1.25 M
 4812.3 19.9 34.7 5 59.6 -- V --

horizontal

134 deg, 1.66 M
 4812.3 29.65 34.7 5 69.3 -- H --

Rechecked emissions. No higher emissions were found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 3 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. RF_FPS1
 RF Fueling Payment System
 Notes: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA, KB antennas

Figure_____

Report B9072 Run 8
 Date 03/05/99 Page 2
 Engineer FJC JJC
 Tech: SMB B
 Requester _____

Measurement Summary

Frequency MHz	----- Final ----- dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta	Delta
4812.3	69.3	2917.4	--	H	--	
4812.4	64.1	1603.2	--	H	--	

File B9072 Run 8

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 10 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101

Report B9072 Run 5
 Date 03/04/99 Page 1
 Engineer SLJ
 Tech: DMD Am
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC A	Delta
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Bicon antenna, vertical polarization, initial height 1m.

0 Deg

36.828	6.7	13.7	1	21.4	--	V	--	-17.7
42	6.9	12.9	1	20.9	--	V	--	-18.2
44.328	7.35	12.6	1	21	--	V	--	-18.1
50.346	10.45	12.4	1.1	24	--	V	--	-15.1
62.891	14.75	10.6	1.2	26.5	--	V	--	-12.6
63.191	14.95	10.5	1.2	26.7	--	V	--	-12.4
65.981	15.6	10.1	1.3	27	--	V	--	-12.1
108.81	7.4	10.9	1.7	19.9	--	V	--	-23.6
109.15	6	10.9	1.7	18.6	--	V	--	-24.9
111.98	7	11.2	1.7	19.9	--	V	--	-23.6
113.34	6.3	11.3	1.7	19.3	--	V	--	-24.2
197.97	11.85	14.4	2.3	28.6	--	V	--	-14.9

90 Deg

50.346	11.7	12.4	1.1	25.3	--	V	--	-13.8
111.98	8.25	11.2	1.7	21.1	--	V	--	-22.4
113.34	7.45	11.3	1.7	20.5	--	V	--	-23
50.04	8.3	12.5	1.1	21.9	--	V	--	-17.2
49.59	8.45	12.5	1.1	22	--	V	--	-17.1
50.97	8.8	12.4	1.1	22.3	--	V	--	-16.8
63.211	14.05	10.5	1.2	25.8	--	V	--	-13.3
63.631	14.65	10.5	1.2	26.3	--	V	--	-12.8
115.35	8	11.5	1.7	21.2	--	V	--	-22.3
116.49	7.55	11.6	1.7	20.8	--	V	--	-22.7
117.59	8.1	11.6	1.7	21.5	--	V	--	-22
118.71	7.35	11.7	1.7	20.8	--	V	--	-22.7

180 Deg

63.451	14.9	10.5	1.2	26.6	--	V	--	-12.5
197.97	13.3	14.4	2.3	30	--	V	--	-13.5
131.97	10.25	12.3	1.8	24.4	--	V	--	-19.1

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 10 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101

Report B9072 Run 5
 Date 03/04/99 Page 2
 Engineer FLY
 Tech: DMD DMD
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC A	Delta
<hr/>								
270 Deg								
49.59	10.2	12.5	1.1	23.8	--	V	--	-15.3
50.04	9.9	12.5	1.1	23.5	--	V	--	-15.6
50.346	14.1	12.4	1.1	27.7	--	V	--	-11.4
50.97	11.05	12.4	1.1	24.5	--	V	--	-14.6
63.191	15.9	10.5	1.2	27.7	--	V	--	-11.4
63.451	16.25	10.5	1.2	28	--	V	--	-11.1
63.631	16.3	10.5	1.2	28	--	V	--	-11.1
65.981	17.65	10.1	1.3	29	--	V	--	-10.1

Below frequencies were maximized between 30 and 200 MHz.

230 Deg / 1m

63.631 17.51 10.5 1.2 29.2 -- V -- -9.9

270 Deg / 2.2m

65.981 19.36 10.1 1.3 30.7 -- V -- -8.4

Cables were maximized.

Bicon antenna, horizontal polarization, initial height 2.5m.

0 Deg

No higher emissions found.

90 Deg

No higher emissions found.

180 Deg

No higher emissions found.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 10 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101

Report B9072 Run 5
 Date 03/04/99 Page 3
 Engineer SLA
 Tech: DMD DMD
 Requester _____

Frequency MHz	Level dBuV	Factor dB	Cable dB	Final dBuV/m	Az deg	Polar\ Height	Delta FCC A	Delta
------------------	---------------	--------------	-------------	-----------------	-----------	------------------	----------------	-------

270 Deg

197.97	15.7	14.4	2.3	32.4	--	H	--	-11.1
--------	------	------	-----	------	----	---	----	-------

Below frequencies were maximized between 30 and 200 MHz.

62 Deg / 2.6m

197.98	17.94	14.4	2.3	34.7	--	H	--	-8.8
--------	-------	------	-----	------	----	---	----	------

Cables maximized.

~~60 Deg / 2.6m~~

Taken by mistake. DMD

197.98	14.75	14.4	2.3	31.5	--	H	--	12
--------	-------	------	-----	------	----	---	----	----

Log antenna, vertical polarization, initial height 1m.

0 Deg

230.97	6.4	11	2.6	20	--	V	--	-26.4
255.22	3.2	11.9	2.8	17.9	--	V	--	-28.5
263.96	10.3	12.3	2.8	25.4	--	V	--	-21
329.97	3.25	14.5	3.2	21	--	V	--	-25.4
416.57	2.65	15.6	3.6	21.8	--	V	--	-24.6
461.97	5.65	16.8	3.7	26.2	--	V	--	-20.2
791.97	7.05	21.5	5.1	33.6	--	V	--	-12.8
923.98	3.3	23.1	5.7	32.1	--	V	--	-14.3

90 Deg

791.97	9.1	21.5	5.1	35.7	--	V	--	-10.7
395.97	6.45	15.3	3.5	25.2	--	V	--	-21.2
428.97	8.5	15.8	3.6	27.9	--	V	--	-18.5
429.27	5.05	15.8	3.6	24.5	--	V	--	-21.9
527.97	4.25	18	4	26.3	--	V	--	-20.1
593.97	4.75	18.9	4.3	28	--	V	--	-18.4
692.97	5.25	21.5	4.7	31.4	--	V	--	-15

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

10 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101

Report B9072 Run 5

Date 03/04/99 Page 4

Engineer FLYTech: DMD DM

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height	FCC A	
725.97	6.15	21.2	4.8	32.2	--	V	--	-14.2

180 Deg

395.97	10.7	15.3	3.5	29.5	--	V	--	-16.9
527.97	6.45	18	4	28.5	--	V	--	-17.9
692.97	7.35	21.5	4.7	33.5	--	V	--	-12.9
725.97	6.95	21.2	4.8	33	--	V	--	-13.4

270 Deg

263.96	13.05	12.3	2.8	28.2	--	V	--	-18.2
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Below frequencies were maximized between 200 and 1000 MHz.

73 Deg / 3.4m

692.97	13.83	21.5	4.7	40	--	V	--	-6.4
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87 Deg / 3.6m

791.97	18.74	21.5	5.1	45.3	--	V	--	-1.1
--------	-------	------	-----	------	----	---	----	------

Cables were manipulated for both maximizations.

Log antenna, horizontal polarization, initial height 2.5m.

0 Deg

725.97	9.05	21.2	4.8	35.1	--	^H V	--	-11.3
659.97	9.45	20.5	4.5	34.5	--	H	--	-11.9
725.97	10.55	21.2	4.8	36.6	--	H	--	-9.8

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

10 Meter Antenna Distance

Equipment Under Test:

CrossLink, Inc. M/N RF_FPS1

RF Fueling Payment System

Notes: 8VDC, S/N 101

Report B9072 Run 5

Date 03/04/99 Page 5

Engineer JLCTech: DMD JMD

Requester _____

Frequency	Level	Factor	Cable	Final	Az	Polar\	Delta	Delta
MHz	dBuV	dB	dB	dBuV/m	deg	Height	FCC A	

90 Deg

No higher emissions found.

180 Deg

263.96	18.8	12.3	2.8	33.9	--	H	--	-12.5
296.97	6.95	14.2	3.1	24.2	--	H	--	-22.2

270 Deg

No higher emissions found.

Below frequencies were maximized between 200 and 1000 MHz.

237 Deg / 1.3m

659.97	16.7	20.5	4.5	41.7	--	H	--	-4.7
--------	------	------	-----	------	----	---	----	------

234 Deg / 4m

725.97	12.85	21.2	4.8	38.9	--	H	--	-7.5
--------	-------	------	-----	------	----	---	----	------

Cables were manipulated for both maximizations.

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site

Figure_____

Report B9072 Run 5

10 Meter Antenna Distance

Date 03/04/99 Page 6

Equipment Under Test:

Engineer SLA

CrossLink, Inc. M/N RF_FPS1

Tech: DMD DMD

RF Fueling Payment System

Requester _____

Notes: 8VDC, S/N 101

Measurement Summary

Frequency MHz	Final dBuV/m	Final uV/m	Azimuth deg	Polar\ Height	Delta FCC A	Delta
36.828	21.4	11.748	--	V --	-17.7	
42	20.9	11.091	--	V --	-18.2	
44.328	21	11.220	--	V --	-18.1	
49.59	23.8	15.488	--	V --	-15.3	
50.04	23.5	14.962	--	V --	-15.6	
50.346	27.7	24.266	--	V --	-11.4	
50.97	24.5	16.788	--	V --	-14.6	
62.891	26.5	21.134	--	V --	-12.6	
63.191	27.7	24.266	--	V --	-11.4	
63.451	28	25.118	--	V --	-11.1	
63.631	29.2	28.840	--	V --	-9.9	
65.981	30.7	34.276	--	V --	-8.4	
108.81	19.9	9.8855	--	V --	-23.6	
109.15	18.6	8.5113	--	V --	-24.9	
111.98	21.1	11.350	--	V --	-22.4	
113.34	20.5	10.592	--	V --	-23	
115.35	21.2	11.481	--	V --	-22.3	
116.49	20.8	10.964	--	V --	-22.7	
117.59	21.5	11.885	--	V --	-22	
118.71	20.8	10.964	--	V --	-22.7	
131.97	24.4	16.595	--	V --	-19.1	
197.98	34.7	54.325	--	H --	-8.8	
230.97	20	10	--	V --	-26.4	
255.22	17.9	7.8523	--	V --	-28.5	
263.96	33.9	49.545	--	H --	-12.5	
296.97	24.2	16.218	--	H --	-22.2	
329.97	21	11.220	--	V --	-25.4	
395.97	29.5	29.853	--	V --	-16.9	
416.57	21.8	12.302	--	V --	-24.6	
428.97	27.9	24.831	--	V --	-18.5	
429.27	24.5	16.788	--	V --	-21.9	
461.97	26.2	20.417	--	V --	-20.2	
527.97	28.5	26.607	--	V --	-17.9	
593.97	28	25.118	--	V --	-18.4	
659.97	41.7	121.61	--	H --	-4.7	
692.97	40	100	--	V --	-6.4	
725.97	38.9	88.104	--	H --	-7.5	
791.97	45.3	184.07	--	V --	-1.1	

T U V P R O D U C T S E R V I C E

RADIATED EMISSIONS

PW1 Test Site
 10 Meter Antenna Distance
 Equipment Under Test:
 CrossLink, Inc. M/N RF_FPS1
 RF Fueling Payment System
 Notes: 8VDC, S/N 101

Figure_____

Report B9072 Run 5
 Date 03/04/99 Page 7
 Engineer FSL & je
 Tech: DMD DMD
 Requester _____

Measurement Summary (Cont'd)

Frequency MHz	----- Final ----- dBuV/m	uV/m	Azimuth deg	Polar\ Height	Delta FCC A	Delta
923.98	32.1	40.271	--	V	--	-14.3

Minimum Passing Margin for FCC A is 1.1 dB at 791.97 MHz

File B9072 Run 5

TUV PRODUCT SERVICE
Conducted Emissions

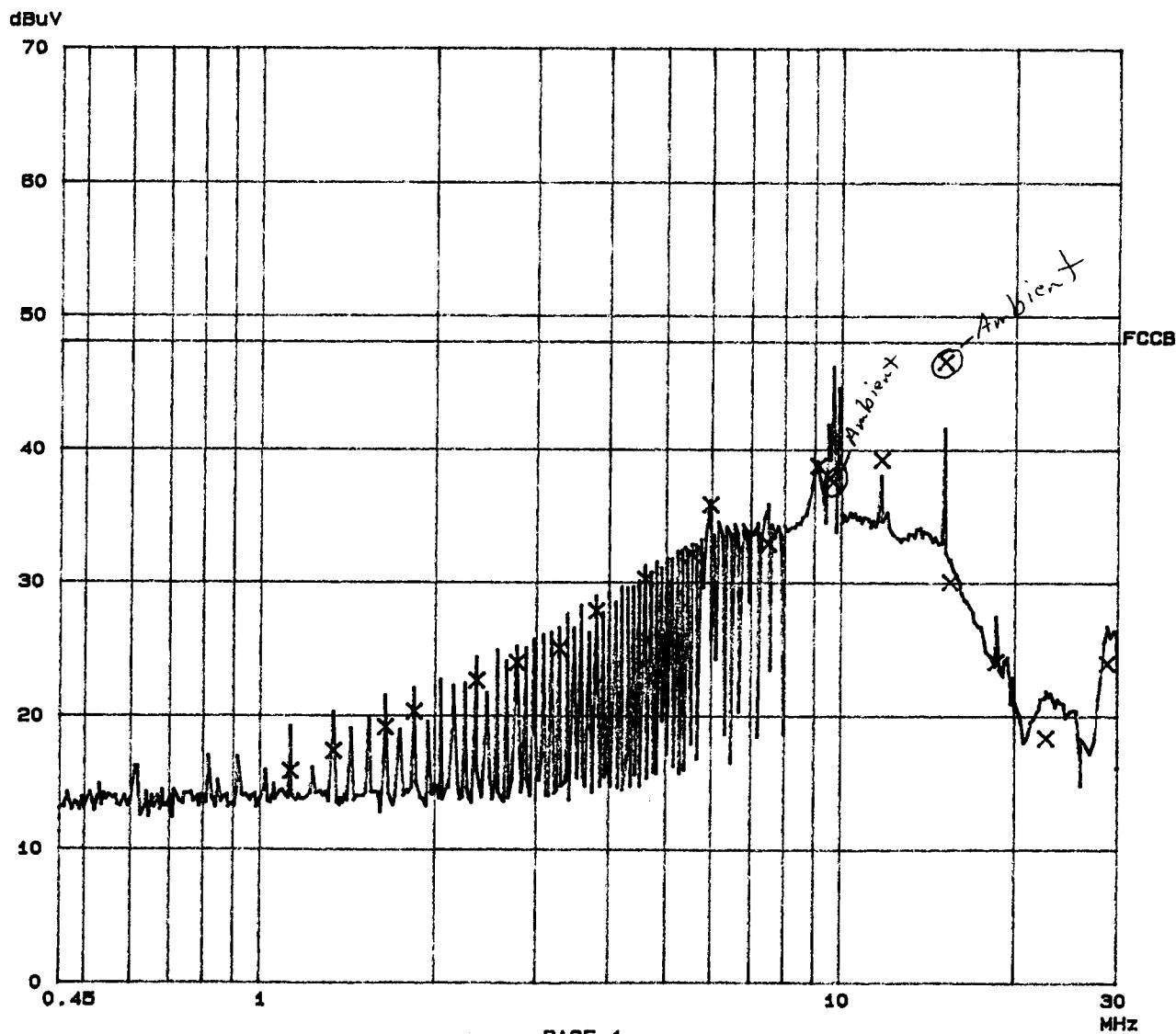
05. Mar 99 20:25

EUT: RF Fueling System
Manuf: CrossLink, Inc.
Op Cond: 120 V / 60 Hz
Operator: Line 1
Dan Dillon Don Dillon file.
Test Spec: FCC pt. 15 B
Comment: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA
Tecom P/N: 505117B (SARA antenna)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRange
450k	30M	5k	10k	PK	20ms	AUTO	LN OFF	60dB

Final Measurement: x GP	Transducer	No.	Start	Stop	Name
Meas Time: 1 s		3	9k	30M	11947A_7
Subranges: 25					
Acc Margin: 30dB					



PAGE 1

TUV PRODUCT SERVICE

05. Mar 98 20:25

Conducted Emissions

EUT: RF Fueling System
 Manuf: CrossLink, Inc. *Line*
 Op Cond: 120 V / 60 Hz *120V*
 Operator: Dan Dillon *Dan Dillon* *FCL*
 Test Spec: FCC pt. 15 B
 Comment: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA
 Tecom P/N: 505117B (SARA antenna)

Scan Settings (1 Range)

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

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
1.13000	15.8	48.0
1.33500	17.3	48.0
1.84000	19.1	48.0
1.84500	20.3	48.0
2.36000	22.5	48.0
2.77000	23.9	48.0
3.28000	24.8	48.0
3.79500	27.8	48.0
4.81500	30.2	48.0
5.54000	32.0	48.0
5.95000	35.7	48.0
7.49000	32.8	48.0
9.13000	38.7	48.0
9.70000	37.5	48.0
11.75000	39.2	48.0
15.44000	46.5	48.0
15.48000	30.0	48.0
18.57000	24.0	48.0
22.67000	18.3	48.0
28.82500	23.9	48.0

* limit exceeded

TUV PRODUCT SERVICE

05. Mar 99 18:36

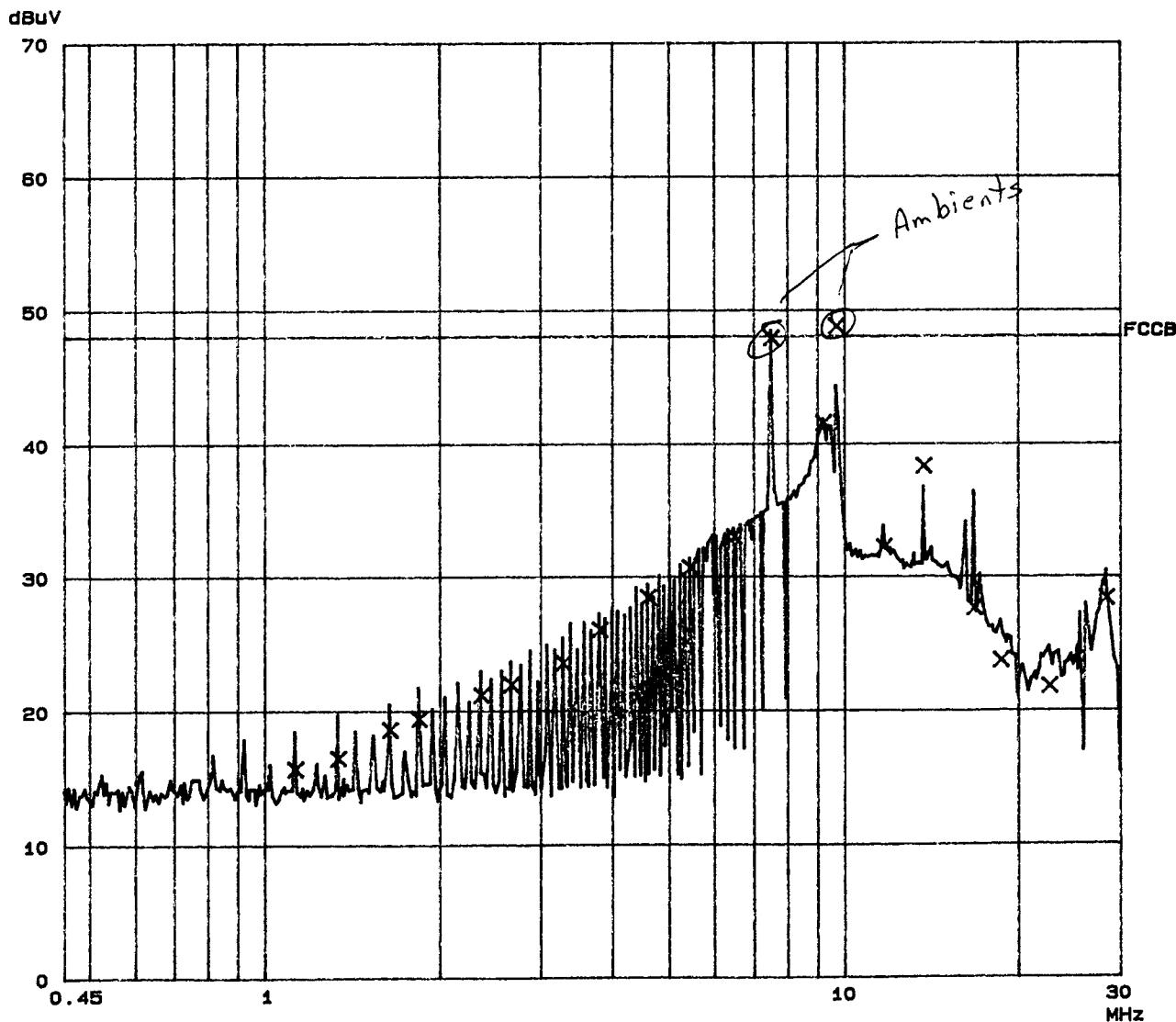
Conducted Emissions

EUT: RF Fueling System
 Manuf: CrossLink, Inc.
 Op Cond: 120 V / 60 Hz Neutral
 Operator: Dan Dillon *Dan Dillon*
 Test Spec: FCC pt. 15 B
 Comment: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA
 Tecom P/N: 505117B (SARA antenna)

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450K	30M	5K	10K	PK	20ms	AUTO	LN OFF	60dB

Final Measurement:	QP	Transducer	No.	Start	Stop	Name
			3	9K	30M	11947A_7
Meas Time:	1 s					
Subranges:	25					
Acc Margin:	30dB					



PAGE 1

TUV PRODUCT SERVICE
Conducted Emissions

05. Mar 99 18:36

EUT: RF Fueling System
Manuf: CrossLink, Inc.
Op Cond: 120 V / 60 Hz Neutral
Operator: Dan Dillon *Dan Dillon*
Test Spec: FCC pt. 15 B
Comment: 8 Vdc, S/N: 101, KEYFOB P/N: 505097BR KA
Tecom P/N: 505117B (SARA antenna)

Scan Settings (1 Range)

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

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
1.13000	15.6	48.0
1.33500	16.4	48.0
1.84000	18.6	48.0
1.84500	19.4	48.0
2.38000	21.1	48.0
2.88500	21.9	48.0
3.28000	23.5	48.0
3.79500	26.0	48.0
4.81500	28.4	48.0
5.43500	30.6	48.0
6.48000	32.9	48.0
7.54000	47.8	48.0
9.23000	41.5	48.0
9.70000	40.7*	48.0
11.69000	32.1	48.0
13.74000	38.3	48.0
18.81500	27.6	48.0
18.88500	23.7	48.0
22.88500	21.8	48.0
28.41000	28.3	48.0

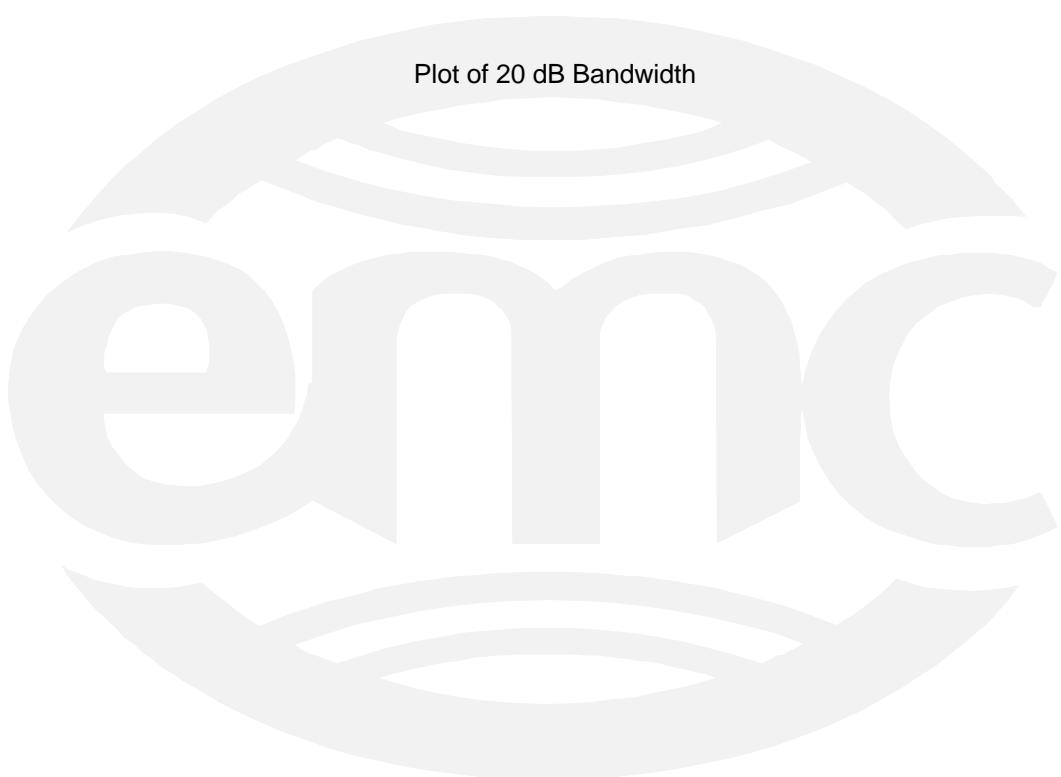
} Ambients

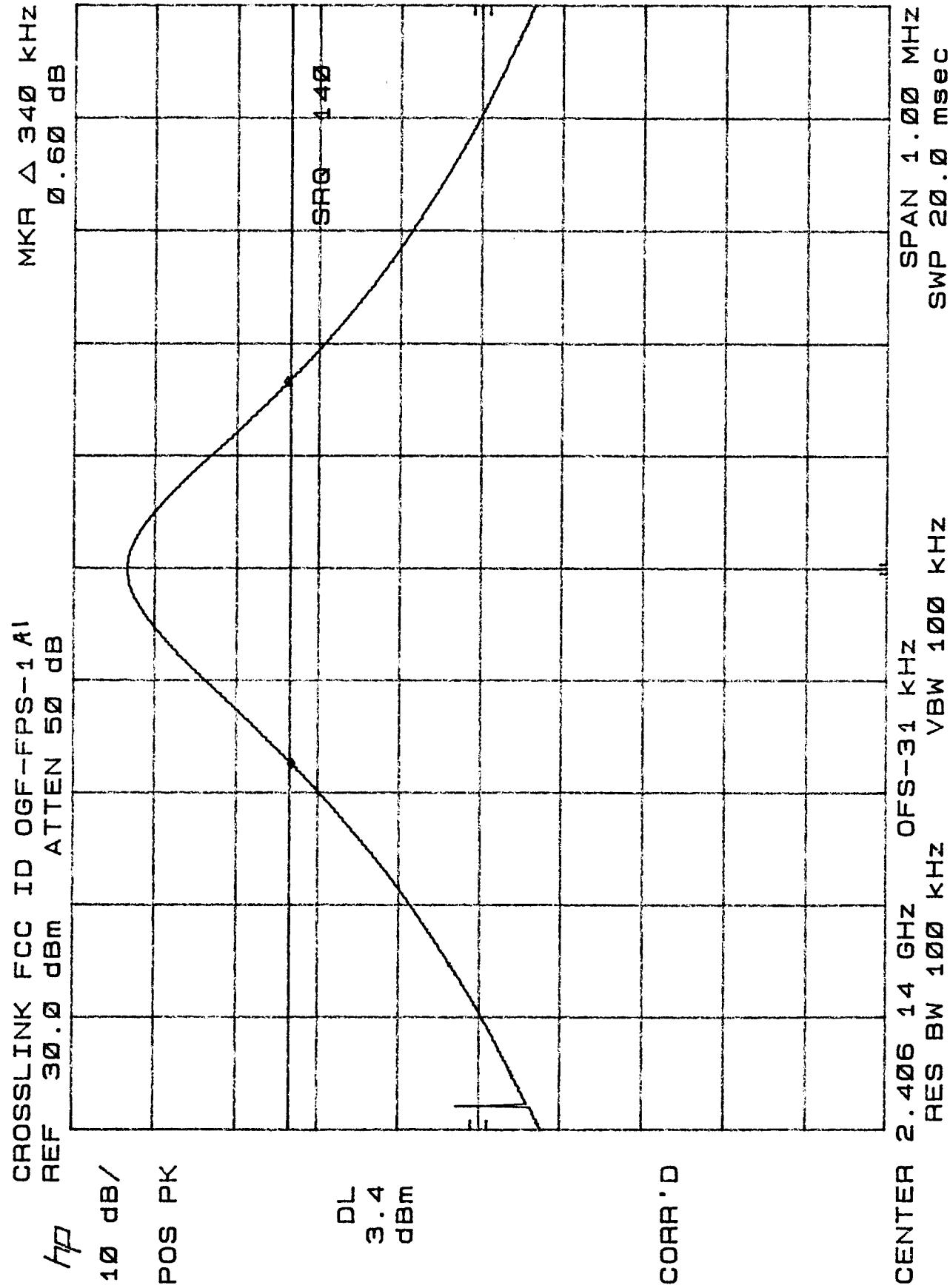
* limit exceeded

PAGE 2

Appendix C

Plot of 20 dB Bandwidth

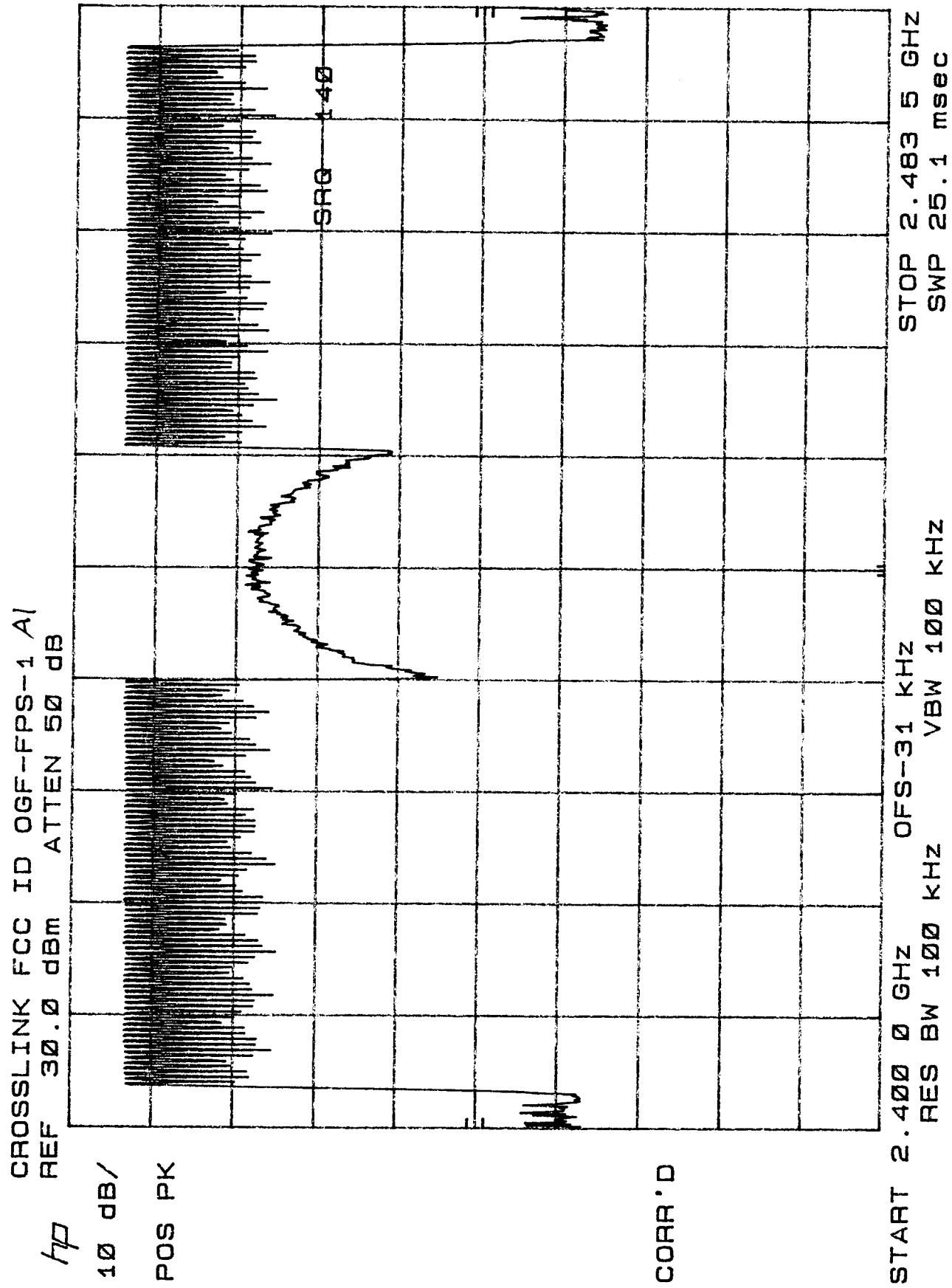




Appendix D

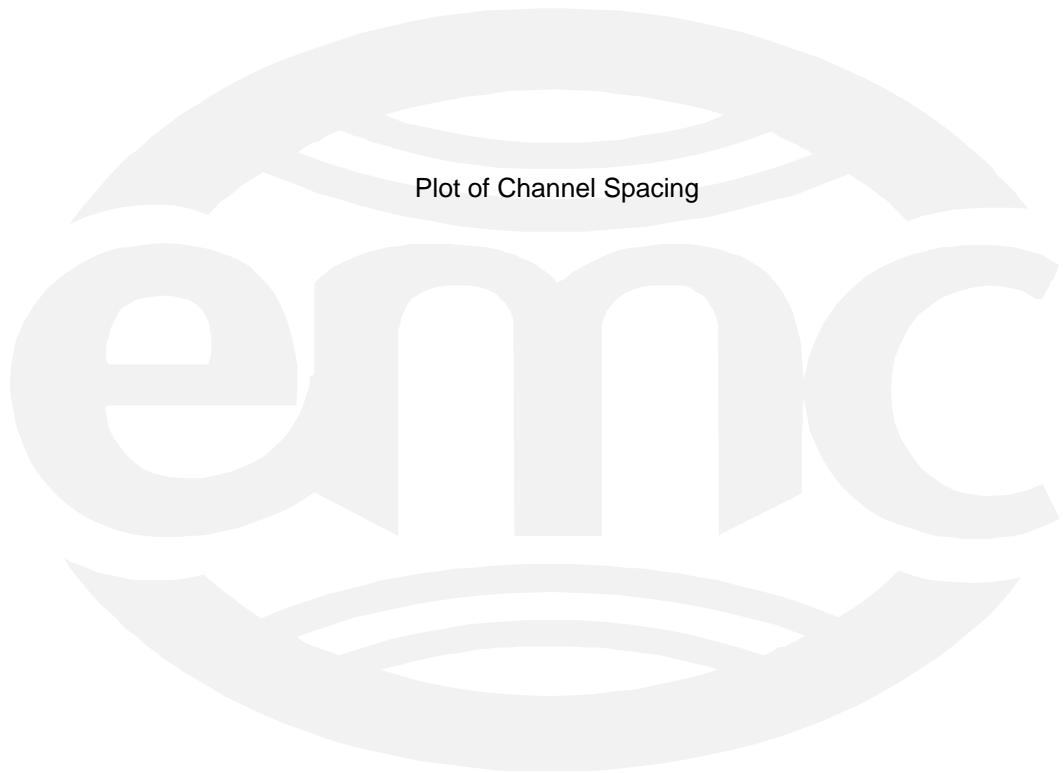
Plot of Nominal Channel Band Occupancy



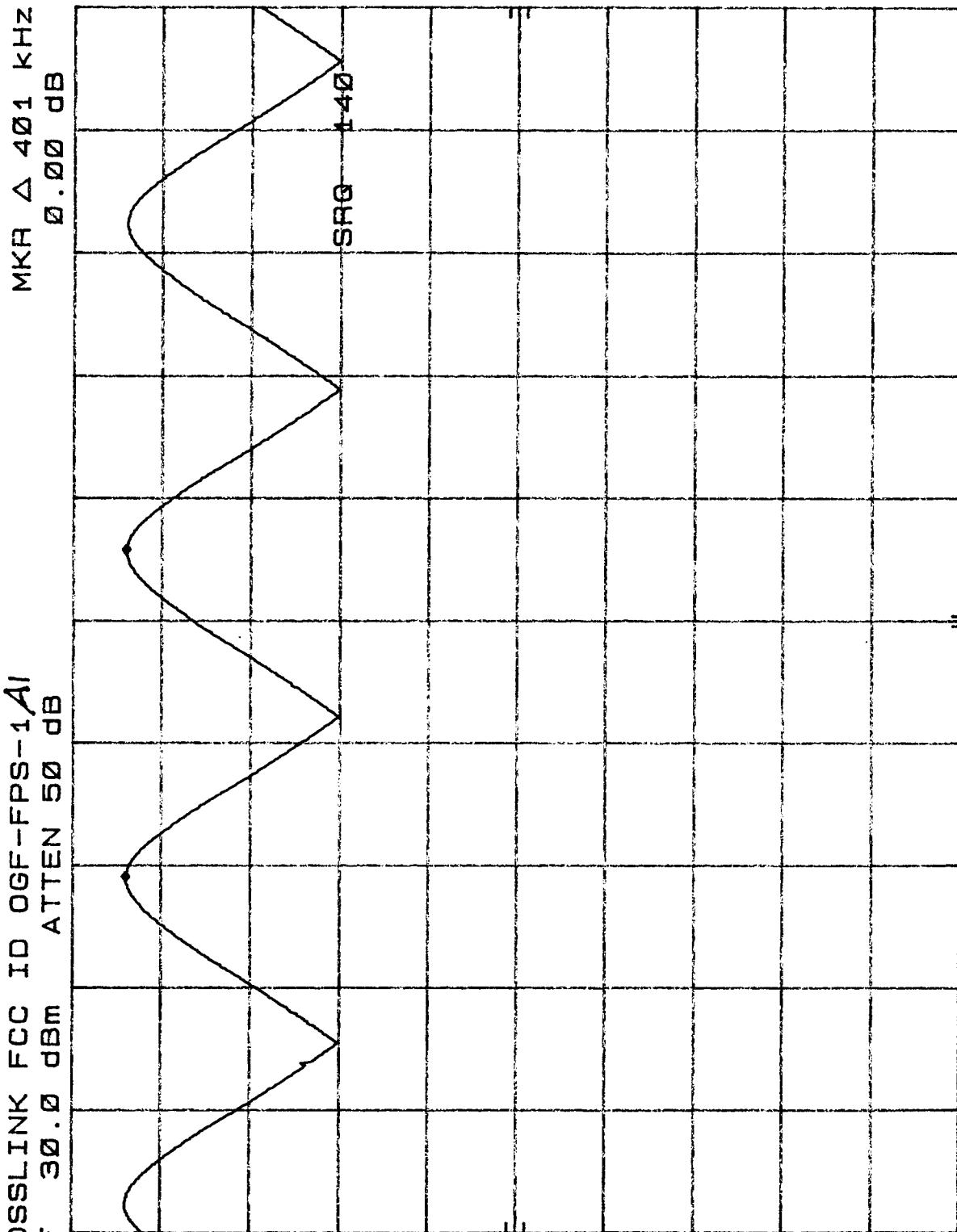


Appendix E

Plot of Channel Spacing

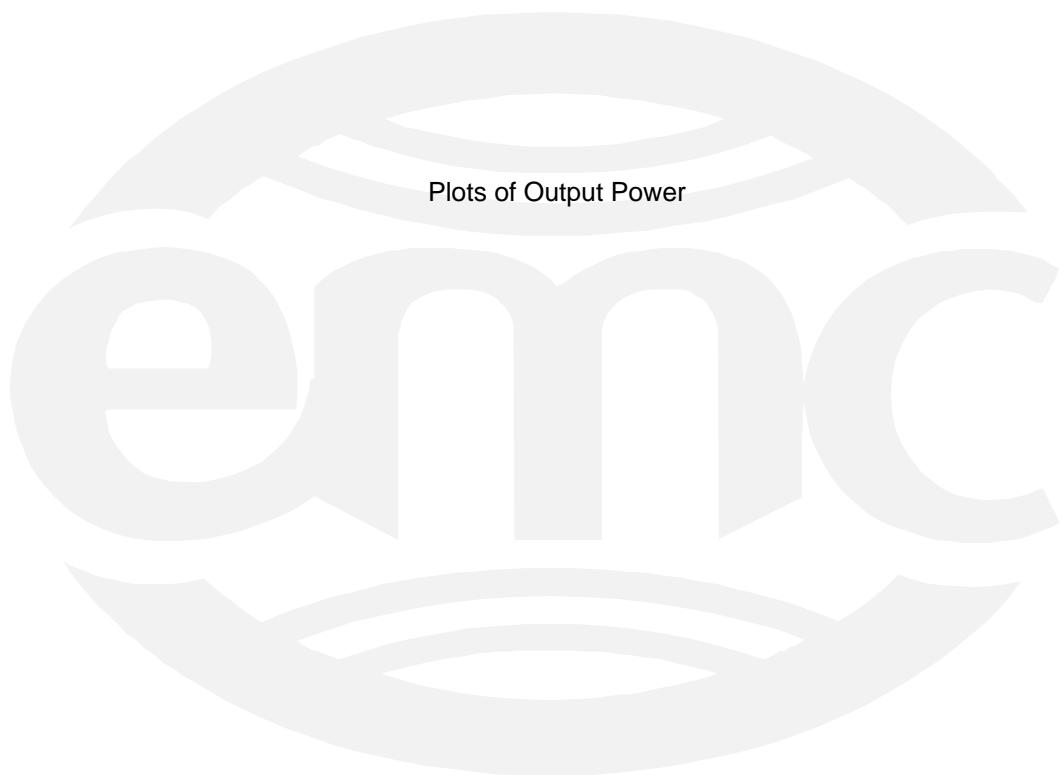


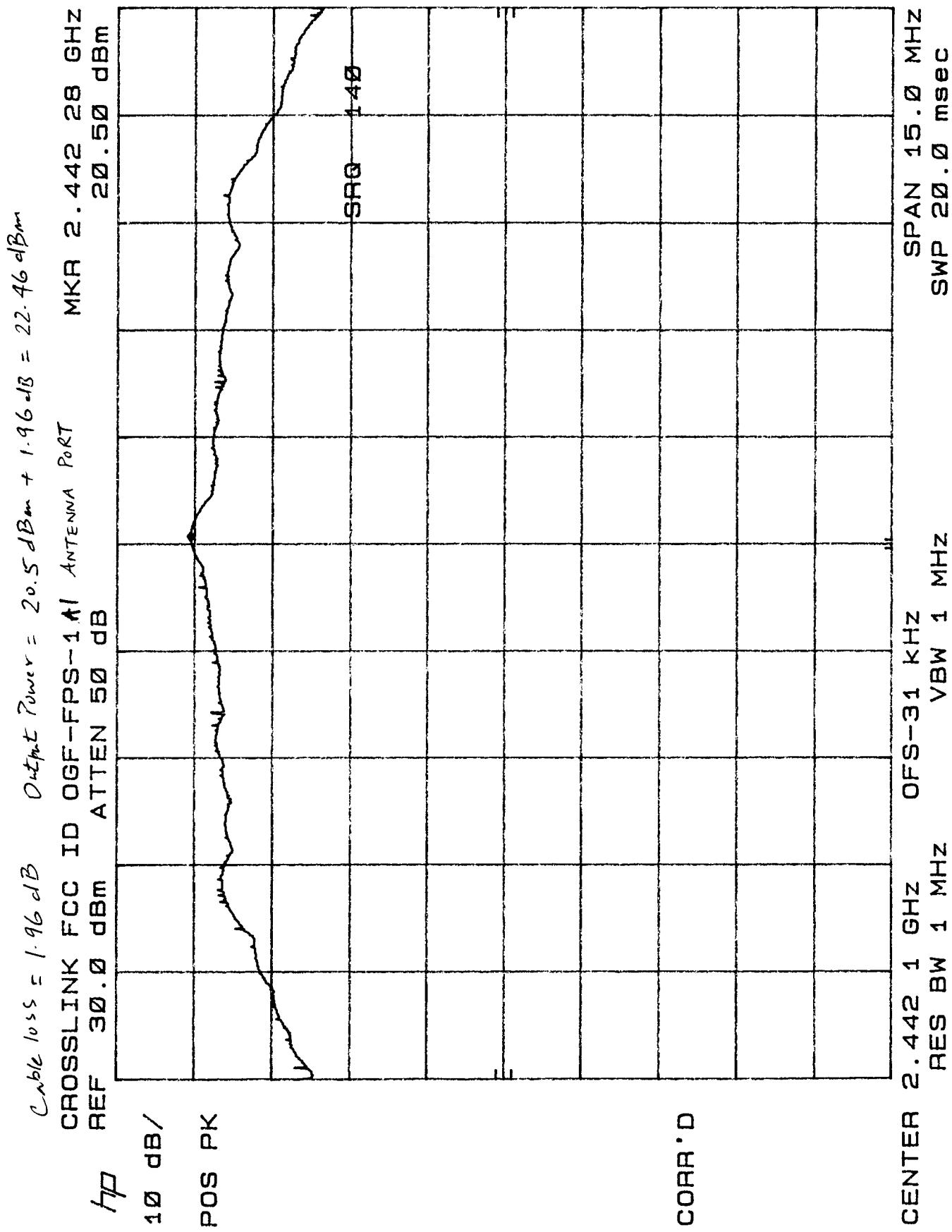
CROSSLINK FCC ID OGF-FPS-1 A1
 REF 30.0 dBm ATTEN 50 dB
 10 dB/
 POS PK



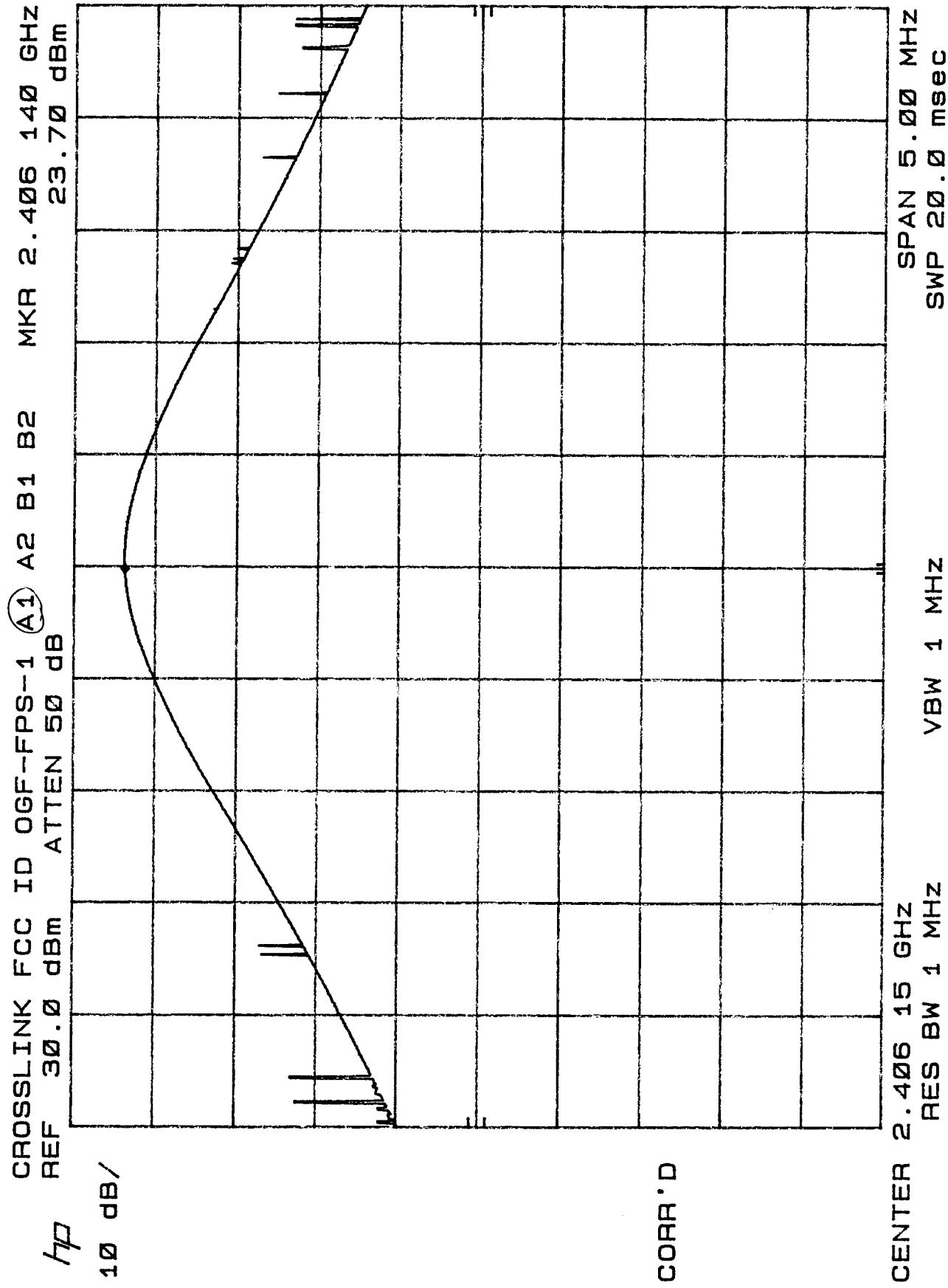
CENTER 2.464 GHz OFS-31 kHz
 RES BW 100 kHz VBW 100 kHz
 SPAN 1.50 MHz
 SWP 20.0 msec

Appendix F

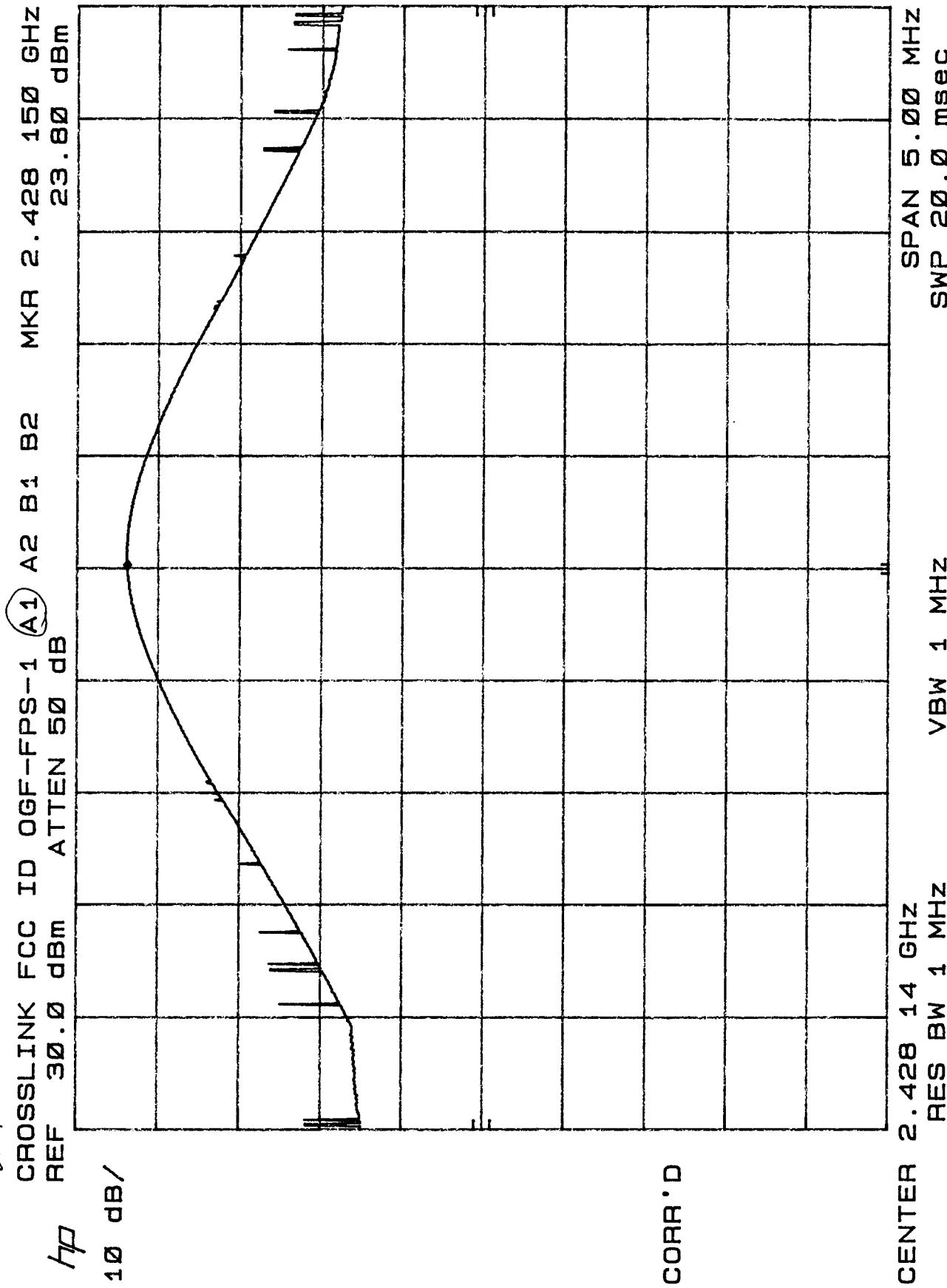




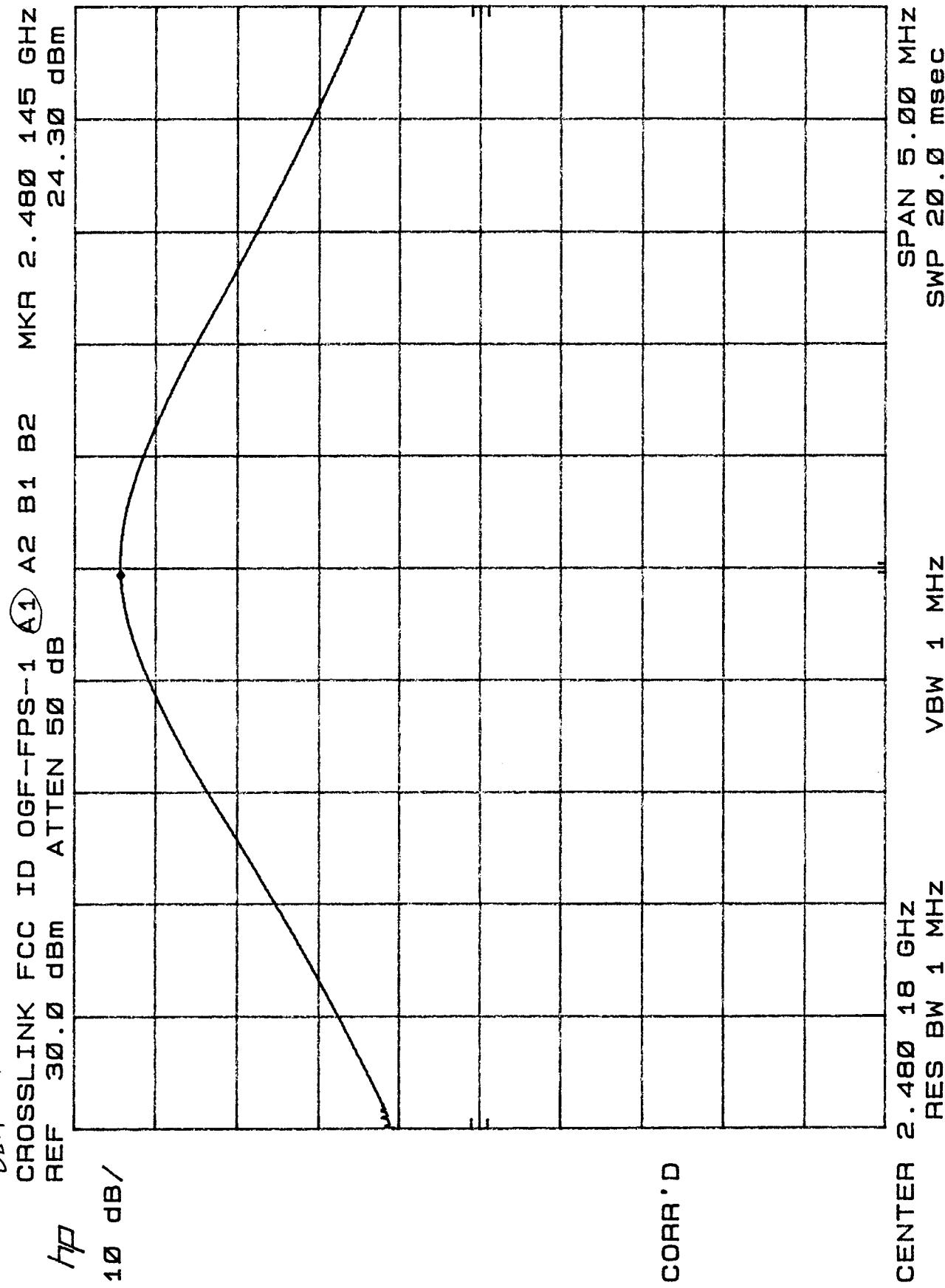
$$\text{Output Power} = 23.7 \text{ dBm} + 1.37 \text{ dB}(\text{c.l.}) = 25.07 \text{ dBm}$$



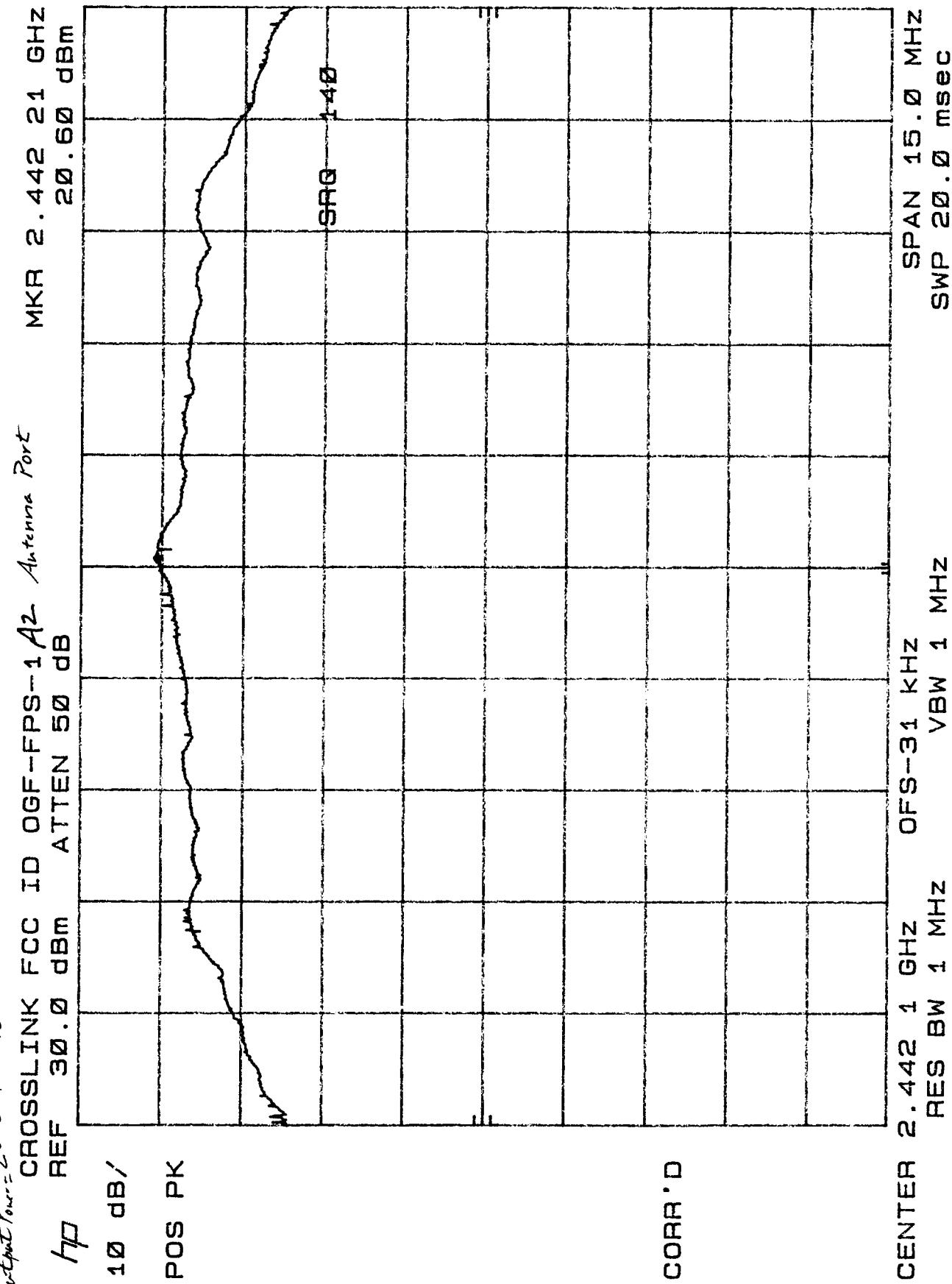
$$\text{Output Power} = 23.8 + 1.82 = 25.62 \text{ dBm}$$



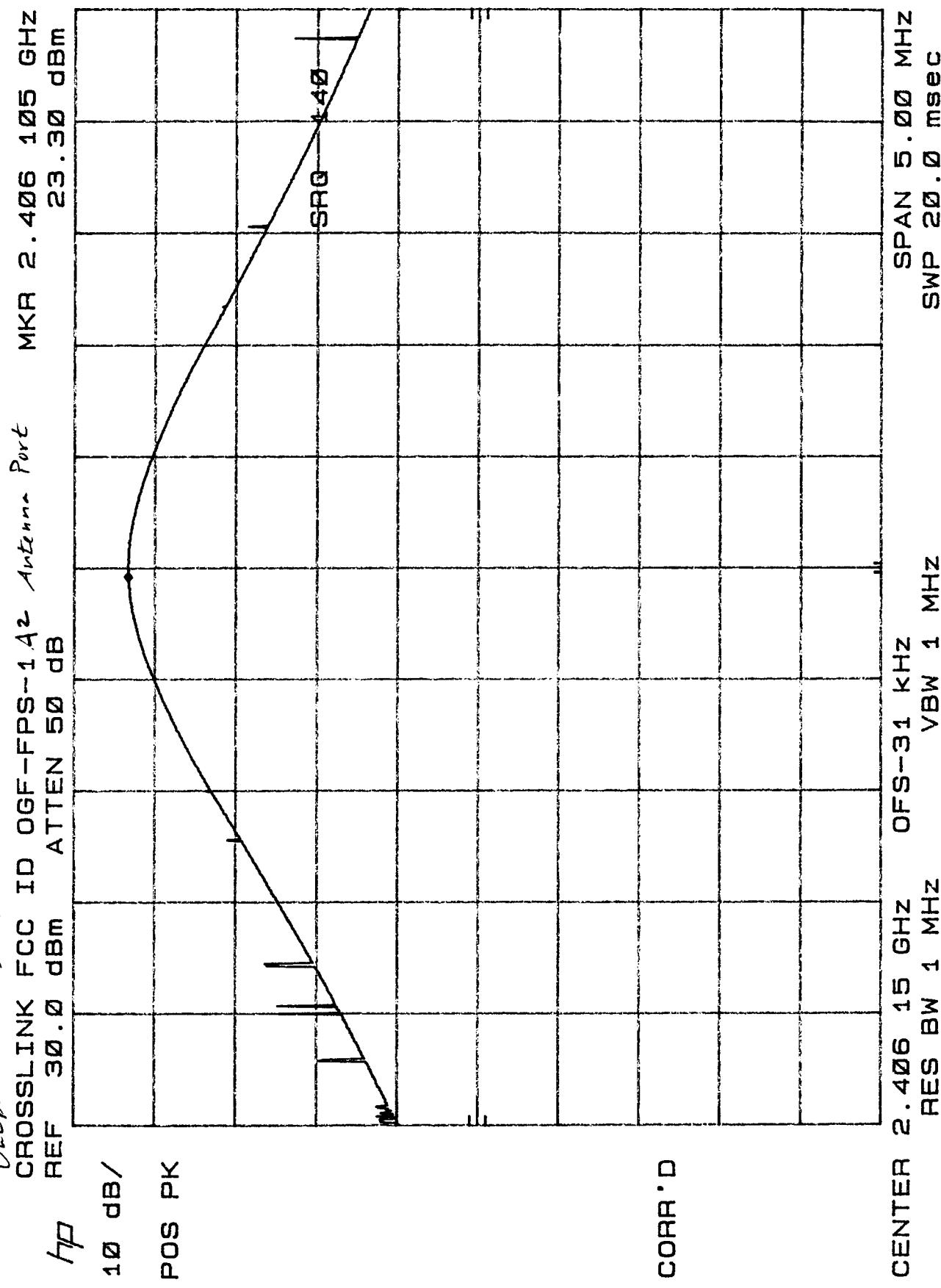
$$\text{Output Power} = 24.3 + 2.1 = 26.4 \text{ dBm}$$



$$\text{Output Power} = 20.6 + 1.96 = 22.56 \text{ dBm}$$

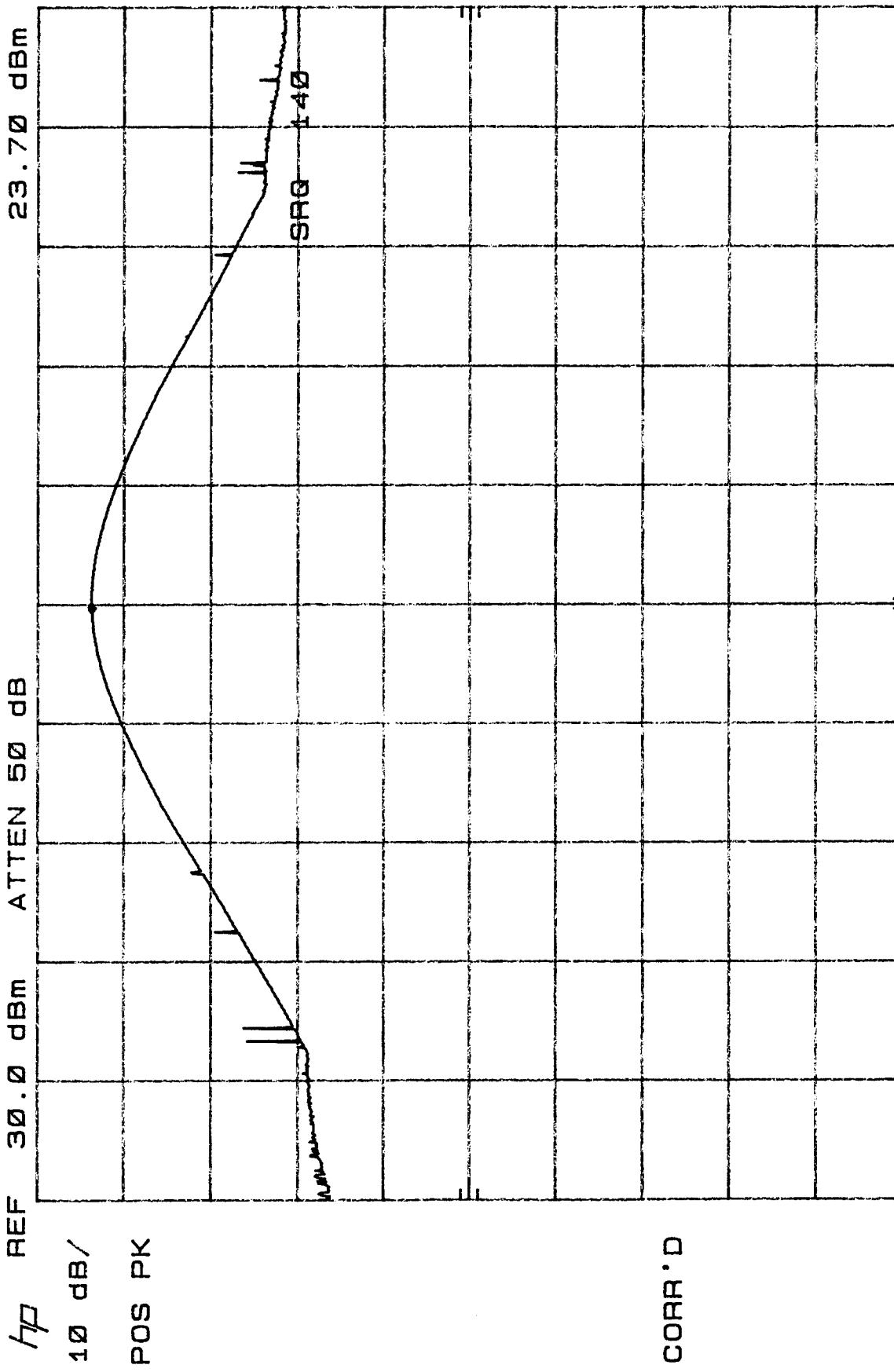


Output Power = $23.3 + 1.37 = 24.67 \text{ dBm}$



$$\text{Output Power} = 23.7 + 1.82 = 25.52 \text{ dBm}$$

CROSSLINK FCC ID OGF-FPS-1 A2 Antenna Port
REF 30.0 dBm ATTEN 50 dB

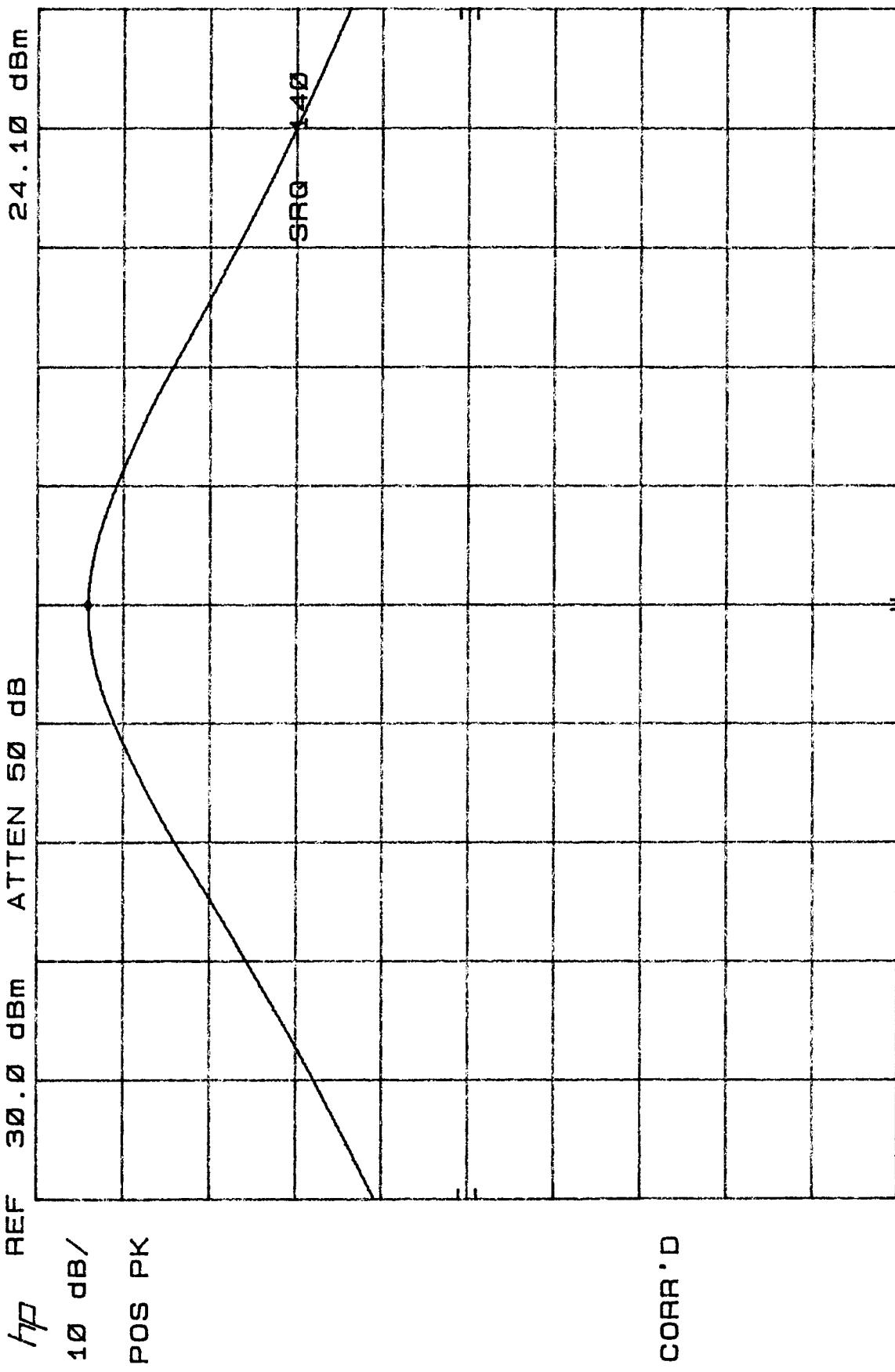


CENTER 2.42814 GHz OFS-31 kHz
RES BW 1 MHz VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

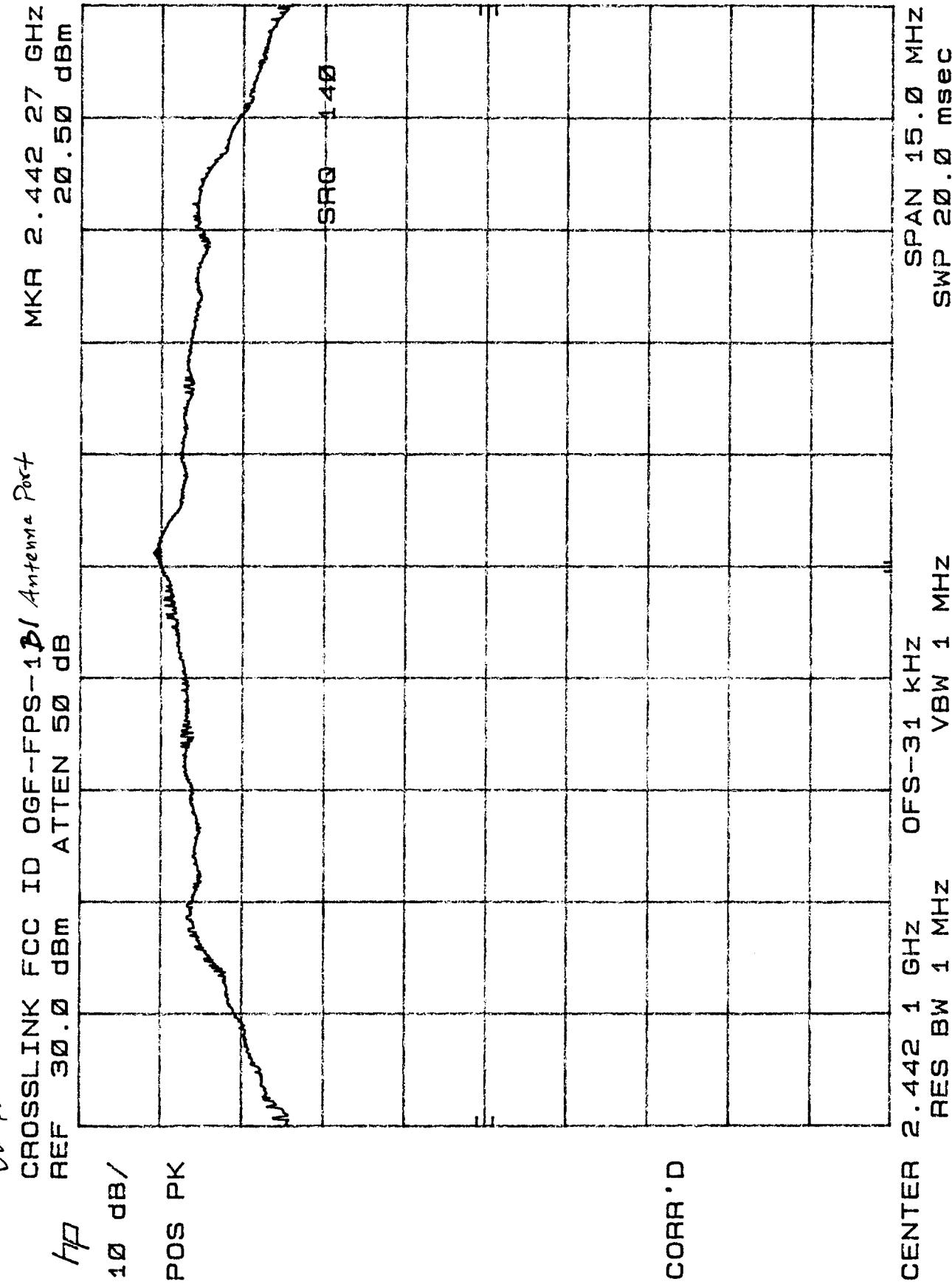
$$\text{Output Power} = 24.1 + 2.1 = 26.2 \text{ dBm}$$

CROSSLINK FCC ID OGF-FPS-1 A2 Antenna Port
REF 30.0 dBm ATEN 50 dB



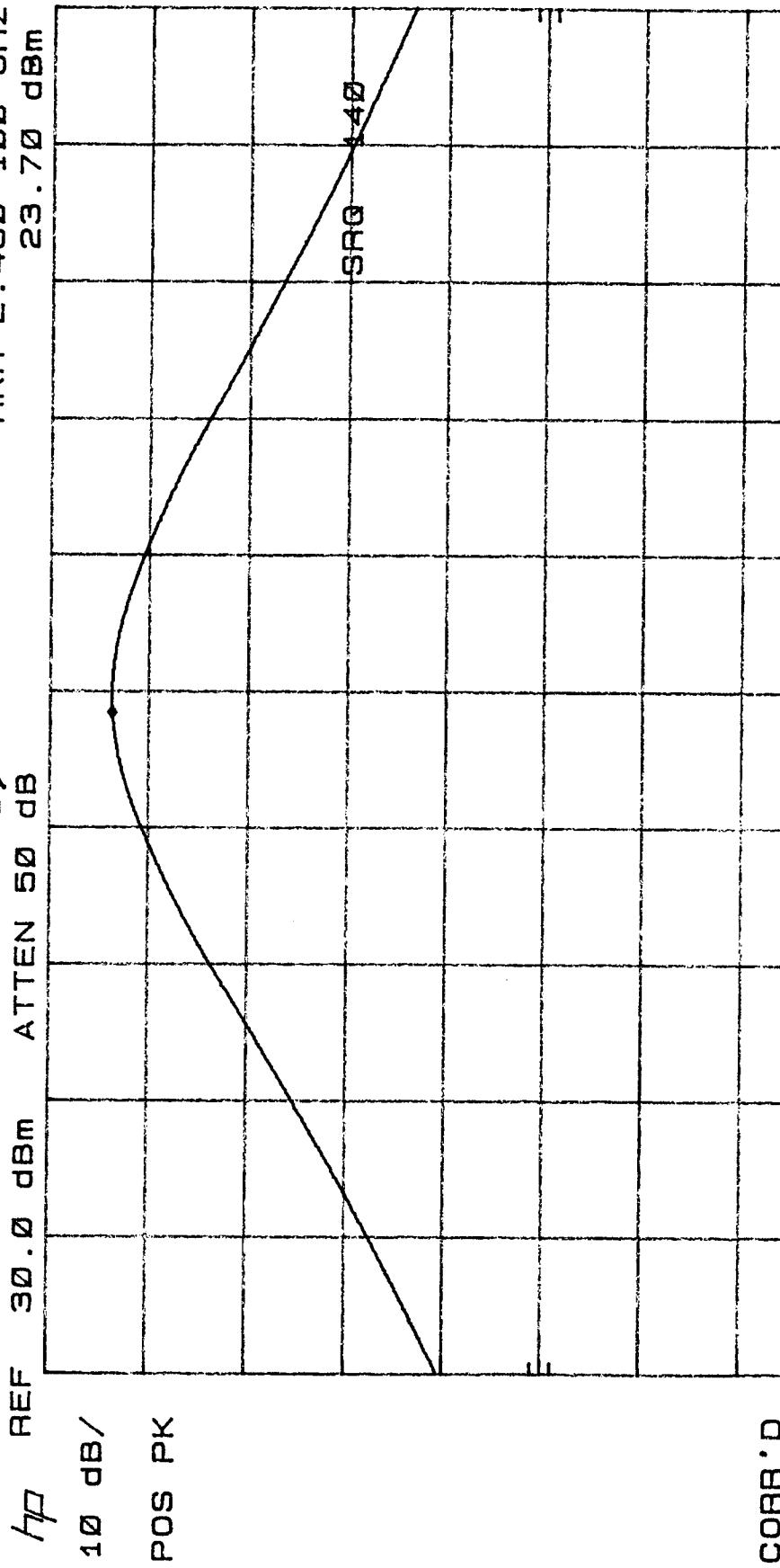
SPAN 5.00 MHz
SWP 20.0 msec

$$\text{Output Power} = 20.5 + 1.96 = 22.46 \text{ dBm}$$



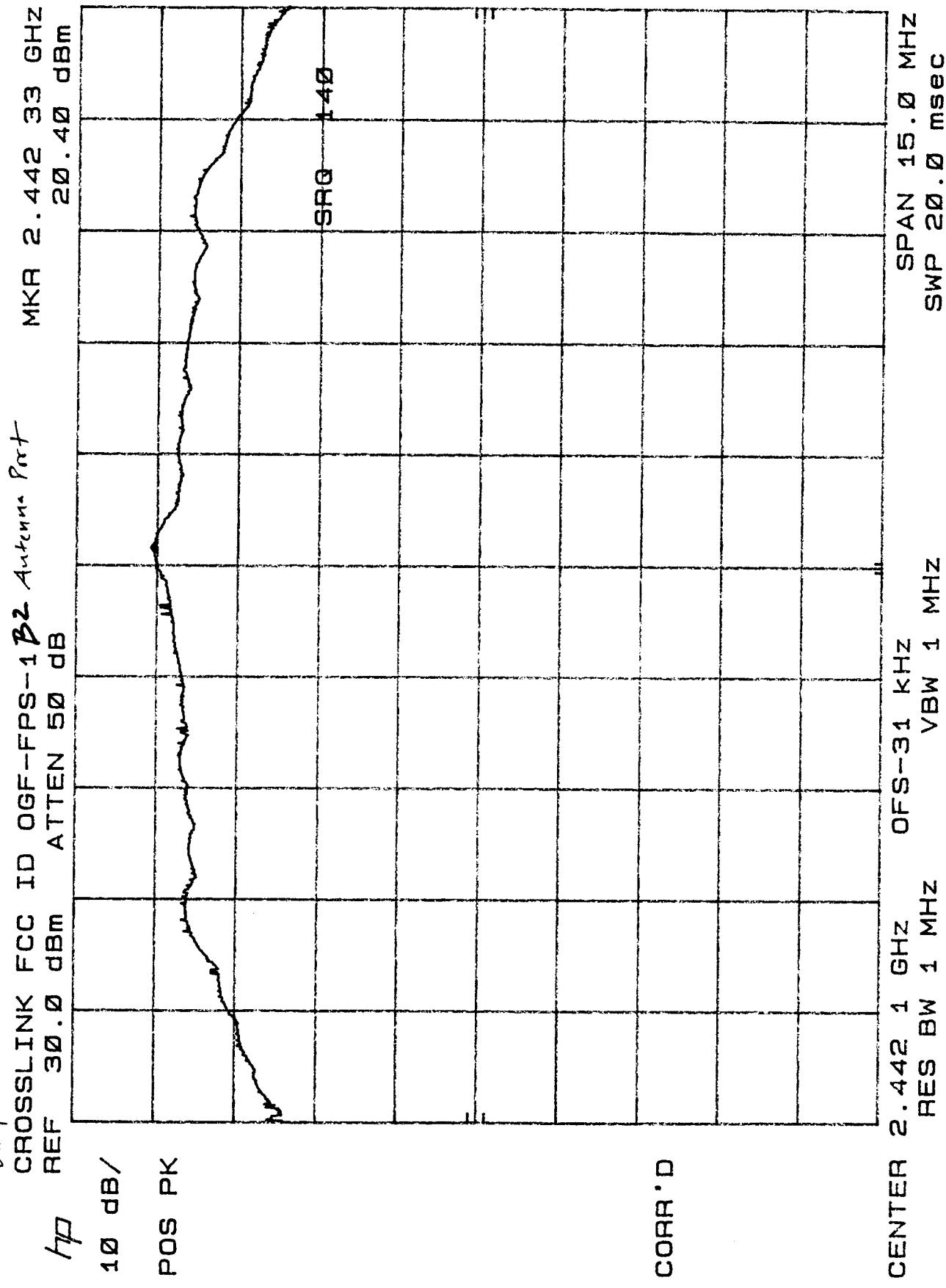
$$\text{Output Power} = 23.7 + 2.1 = 25.8 \text{ dBm}$$

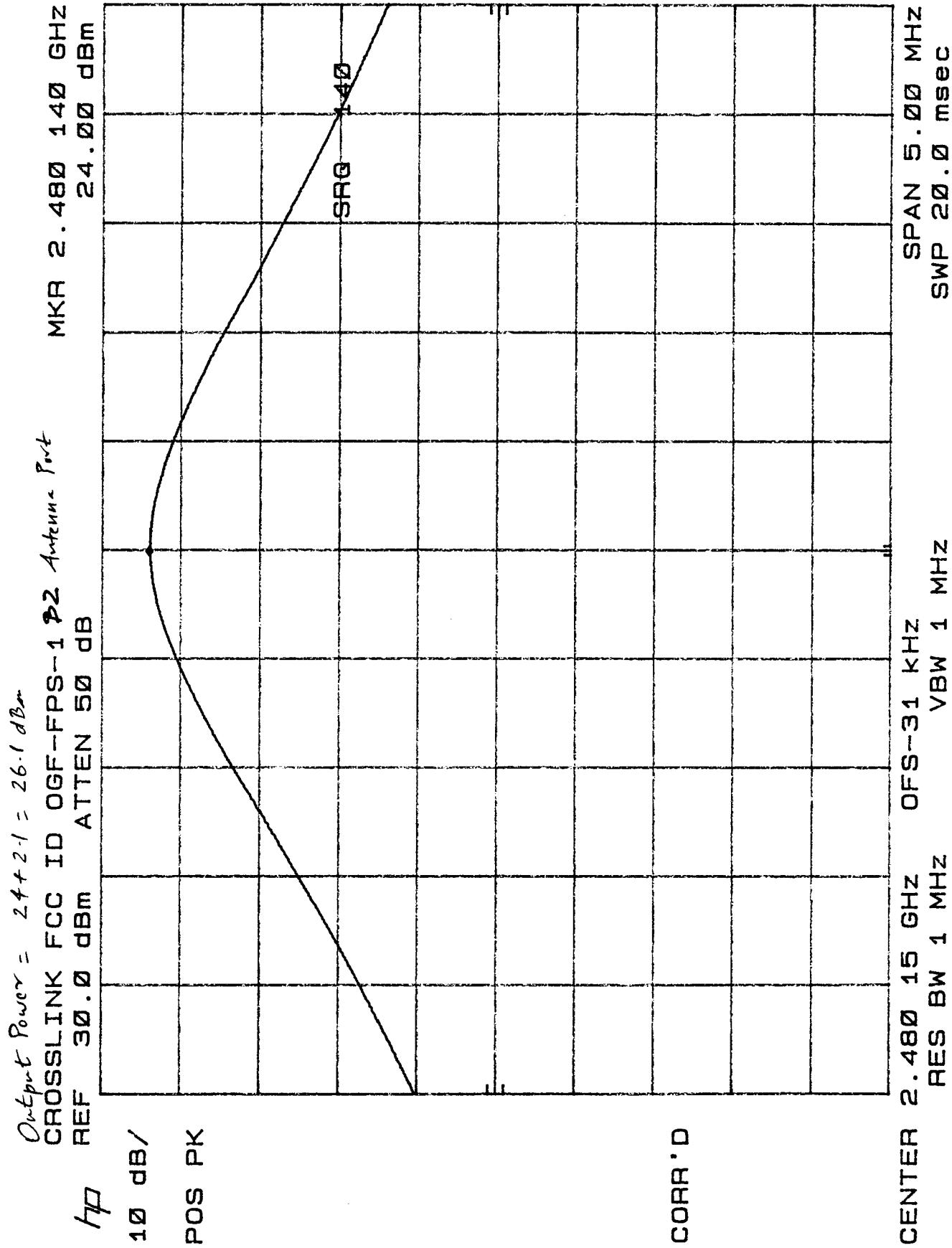
CROSSLINK FCC ID OGF-FPS-1B1 Antenna Port
REF 30.0 dBm ATEN 50 dB



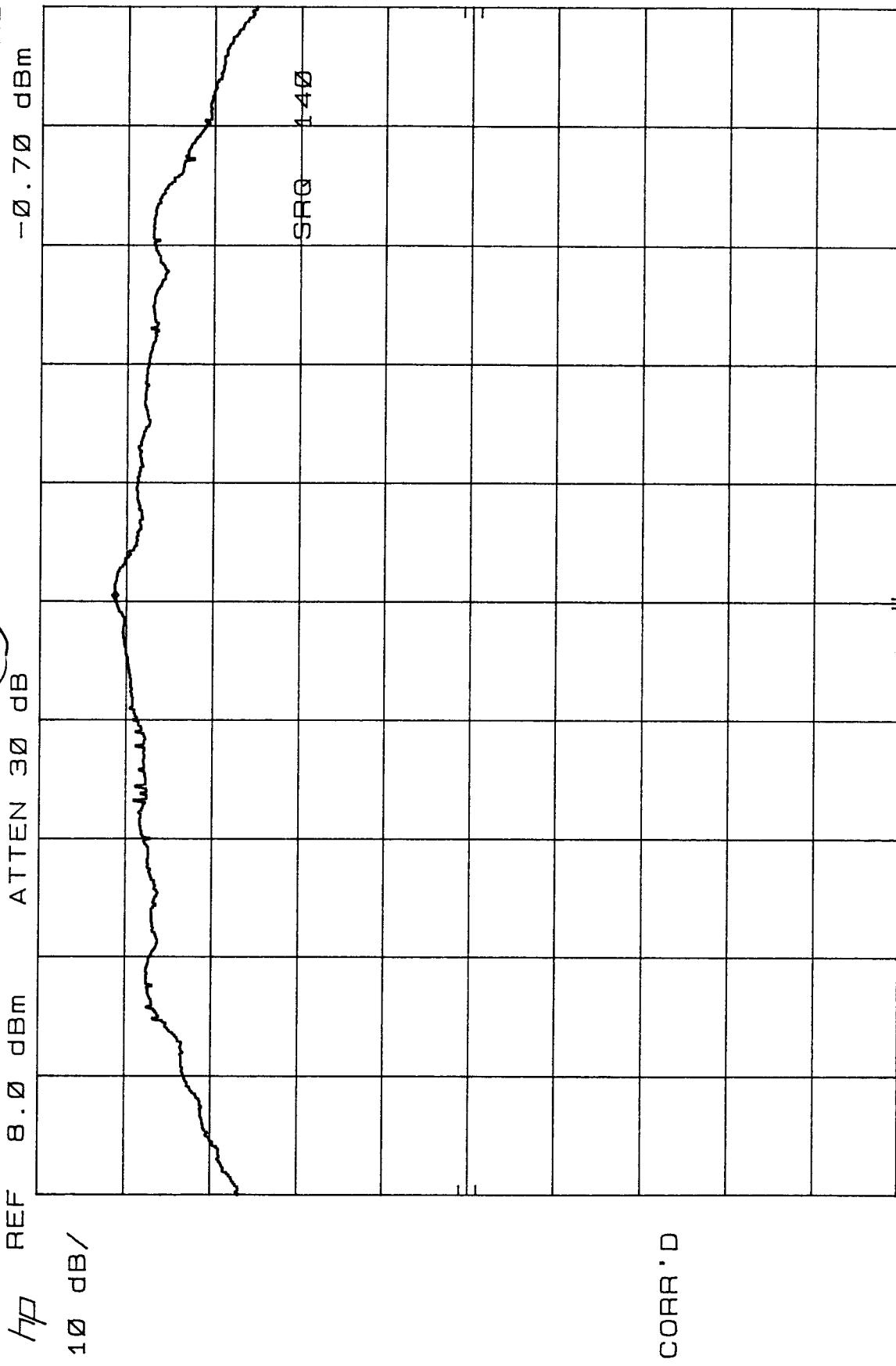
SPAN 5.00 MHz
SWP 20.0 msec

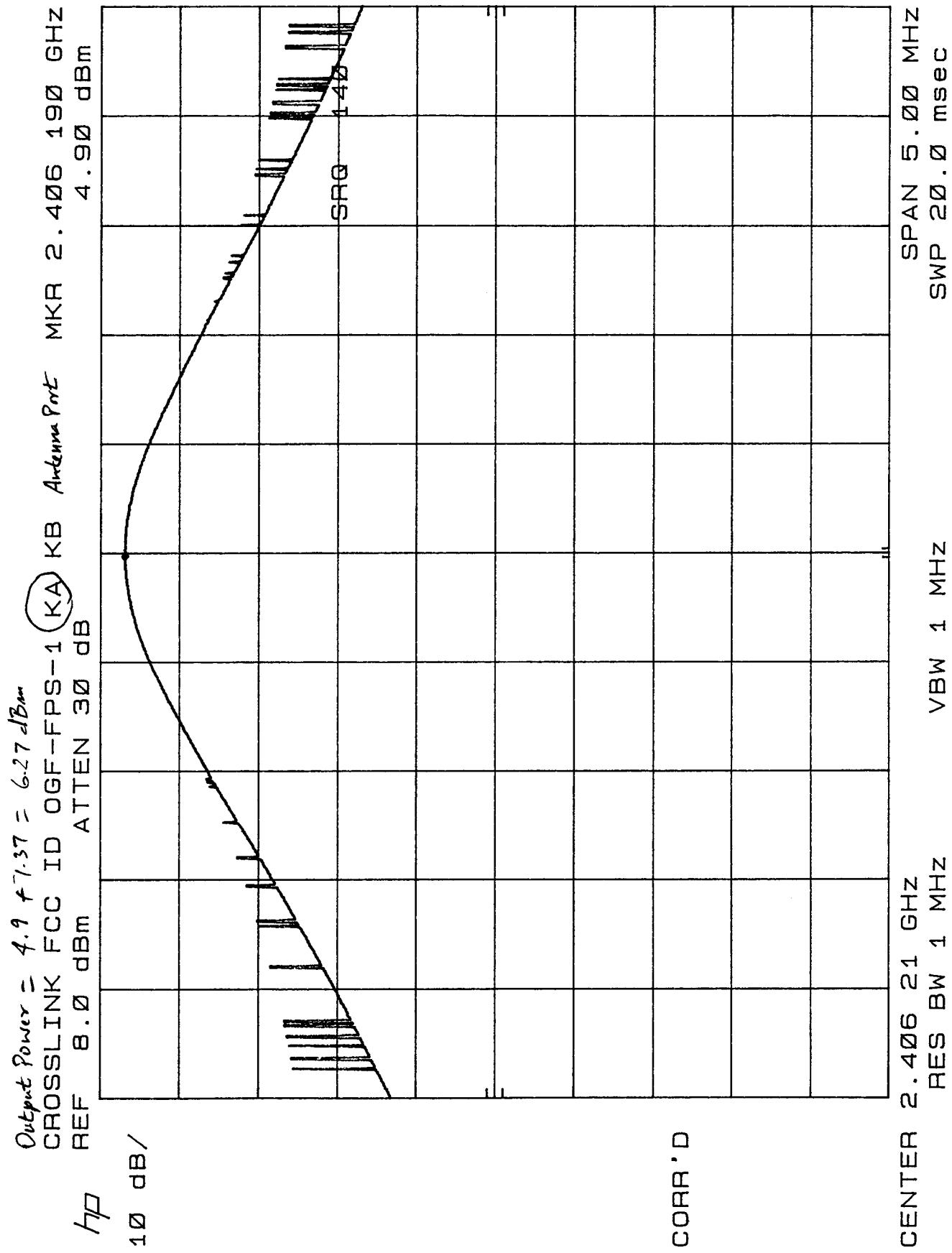
$$\text{Output Power} = 20.4 + 1.96 = 22.36 \text{ dBm}$$

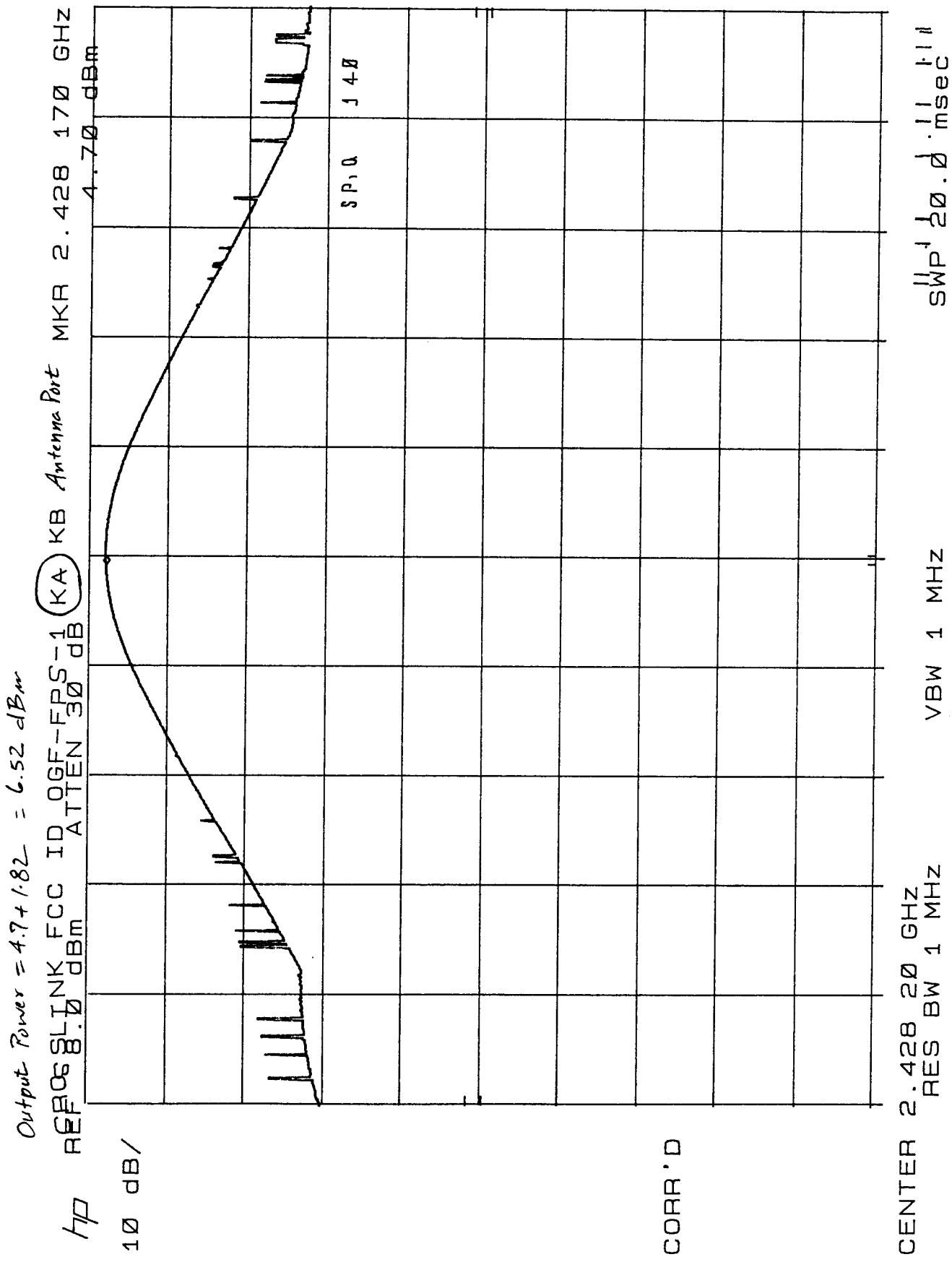




Output Power = $-0.7 + 1.96 = 1.26 \text{ dBm}$
 CROSSLINK FCC ID OGF-FPS-1 (KA) KB Antenna Port
 REF 8.0 dBm ATTEN 30 dB







FCC ID: OGF-FPS-1
TÜV PRODUCT SERVICE INC

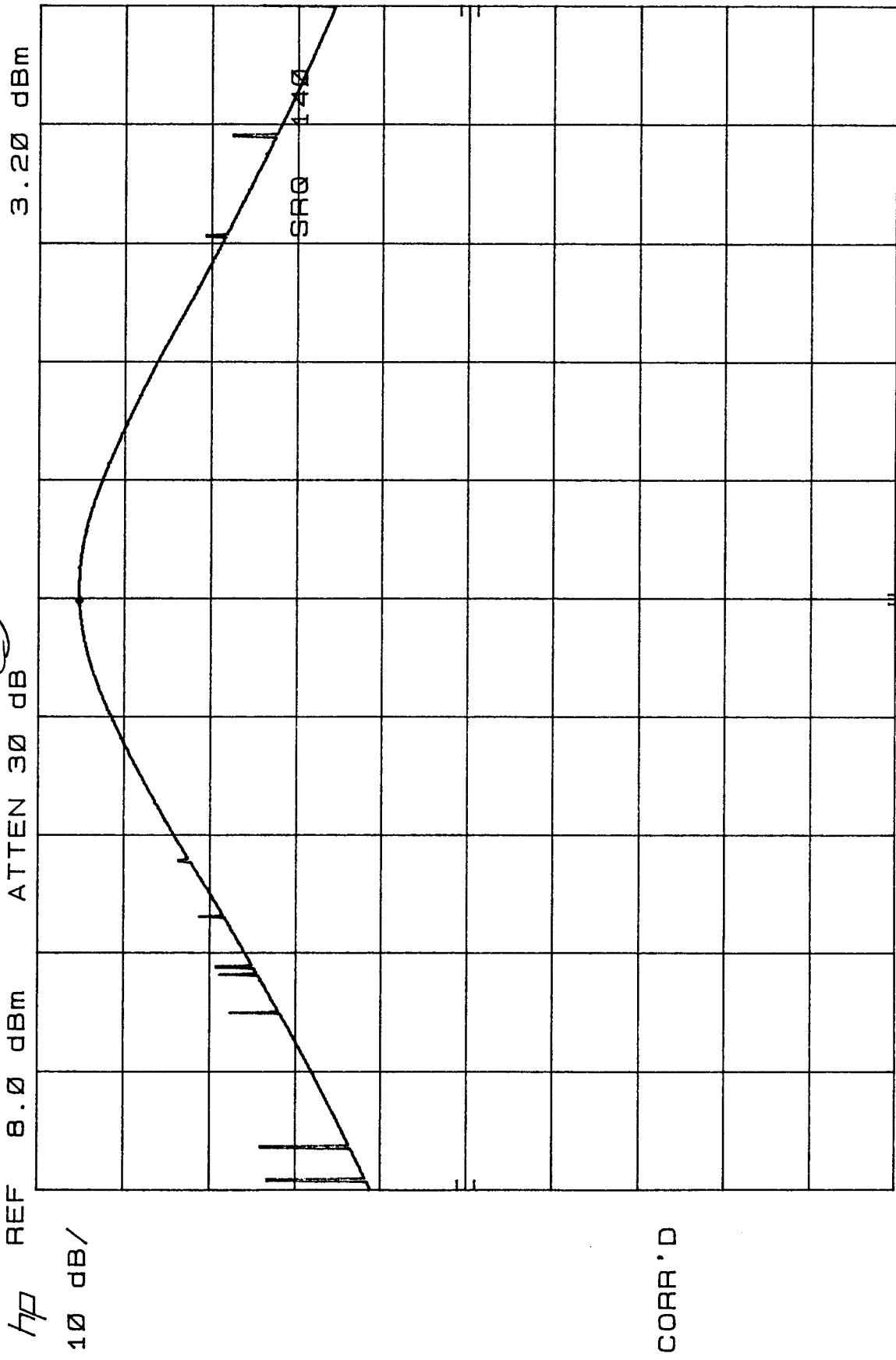
40 Meadow Road

File No. BC1G907201, Page F16 of F21
Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

File No. BC1G907201 , Page F16 of F21

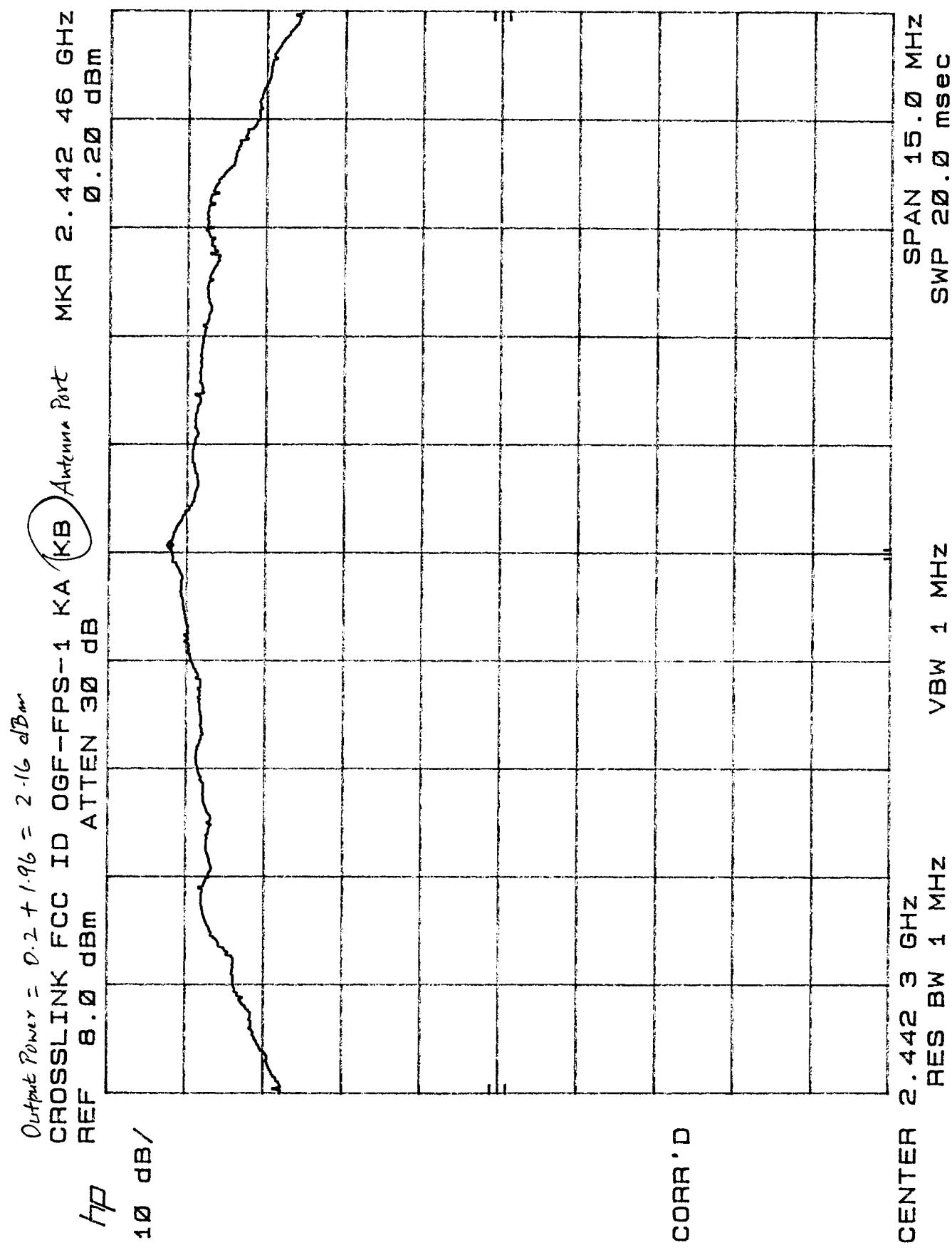
$$\text{Output Power} = 3.2 + 2.1 = 5.1 \text{ dBm}$$

CROSSLINK FCC ID OGF-FPS-1 **(KA)** **KB** Antenna Port MKR 2.480 165 GHz
REF 8.0 dBm ATTEN 30 dB



CORR 'D'

CENTER 2.480 18 GHz
RES BW 1 MHz
SPAN 5.00 MHz
SWP 20.0 msec
VBW 1 MHz



FCC ID: OGF-FPS-1

TÜV PRODUCT SERVICE INC

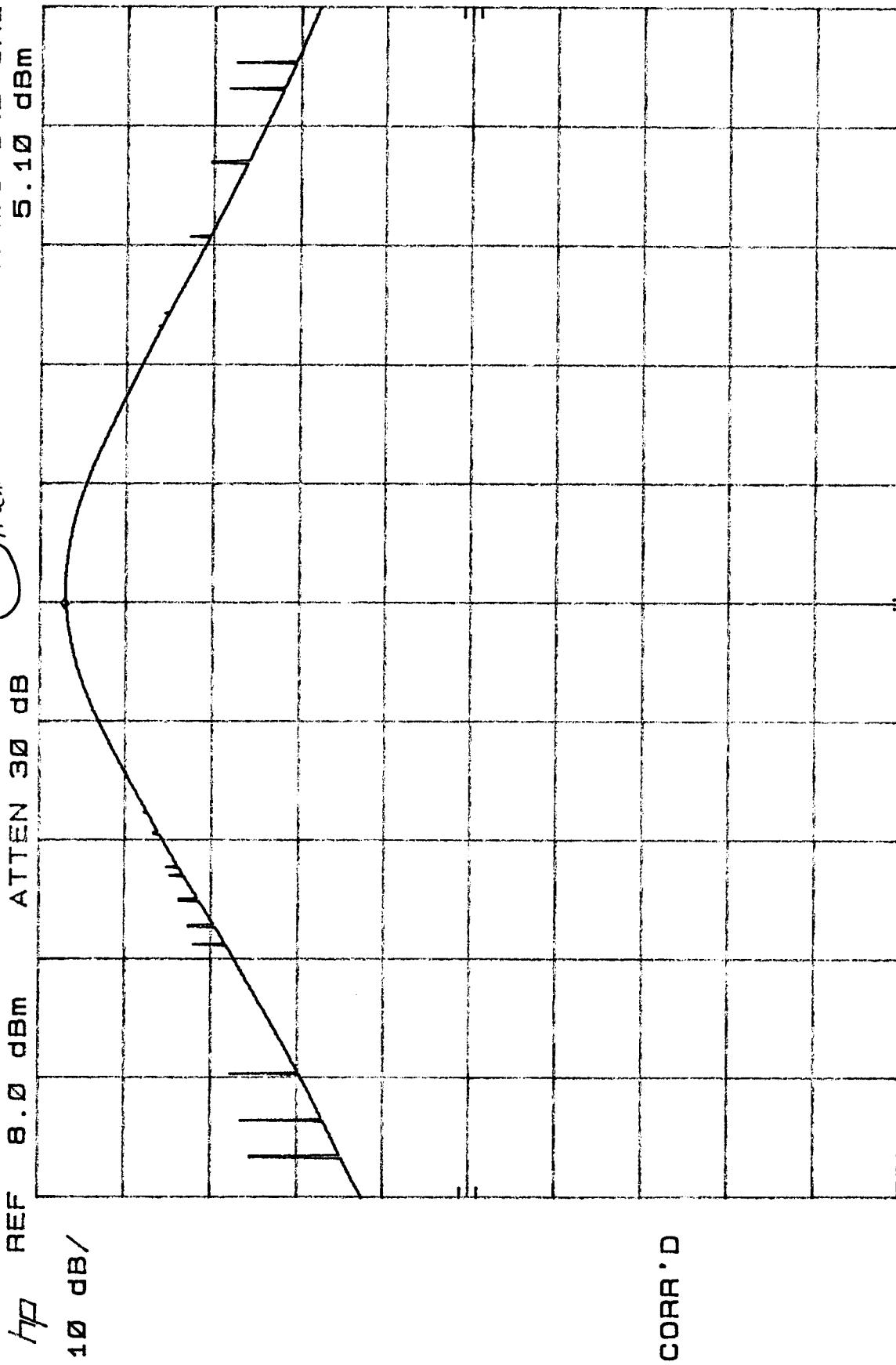
40 Meadow Road

Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

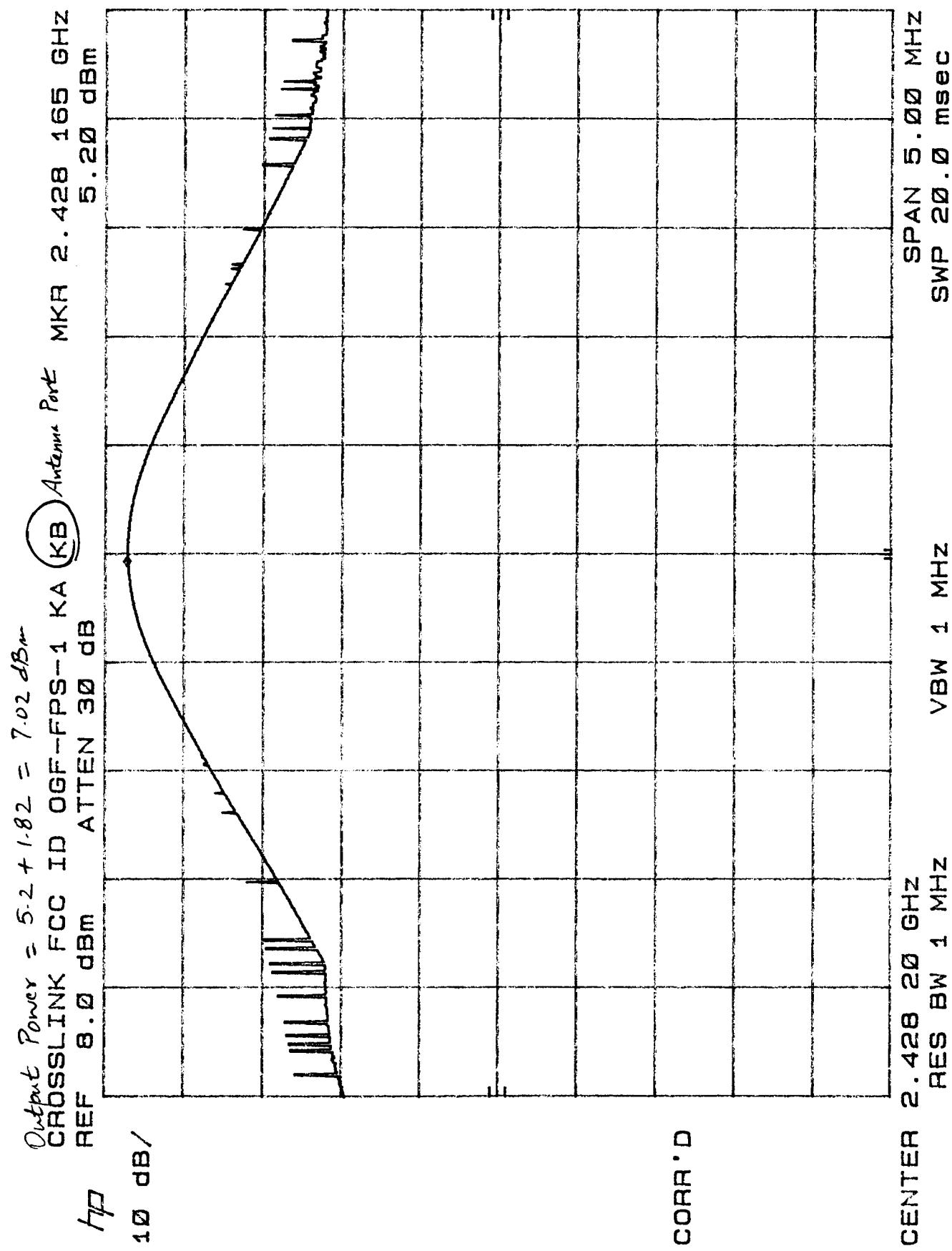
File No. BC1G907201 , Page F18 of F21

$$\text{Output Power} = 5.1 + 1.37 = 6.47$$

CROSSLINK FCC ID OGF-FPS-1 KA (KB) Antenna Port MKA 2.406 140 GHz
REF 8.0 dBm ATTN 30 dB

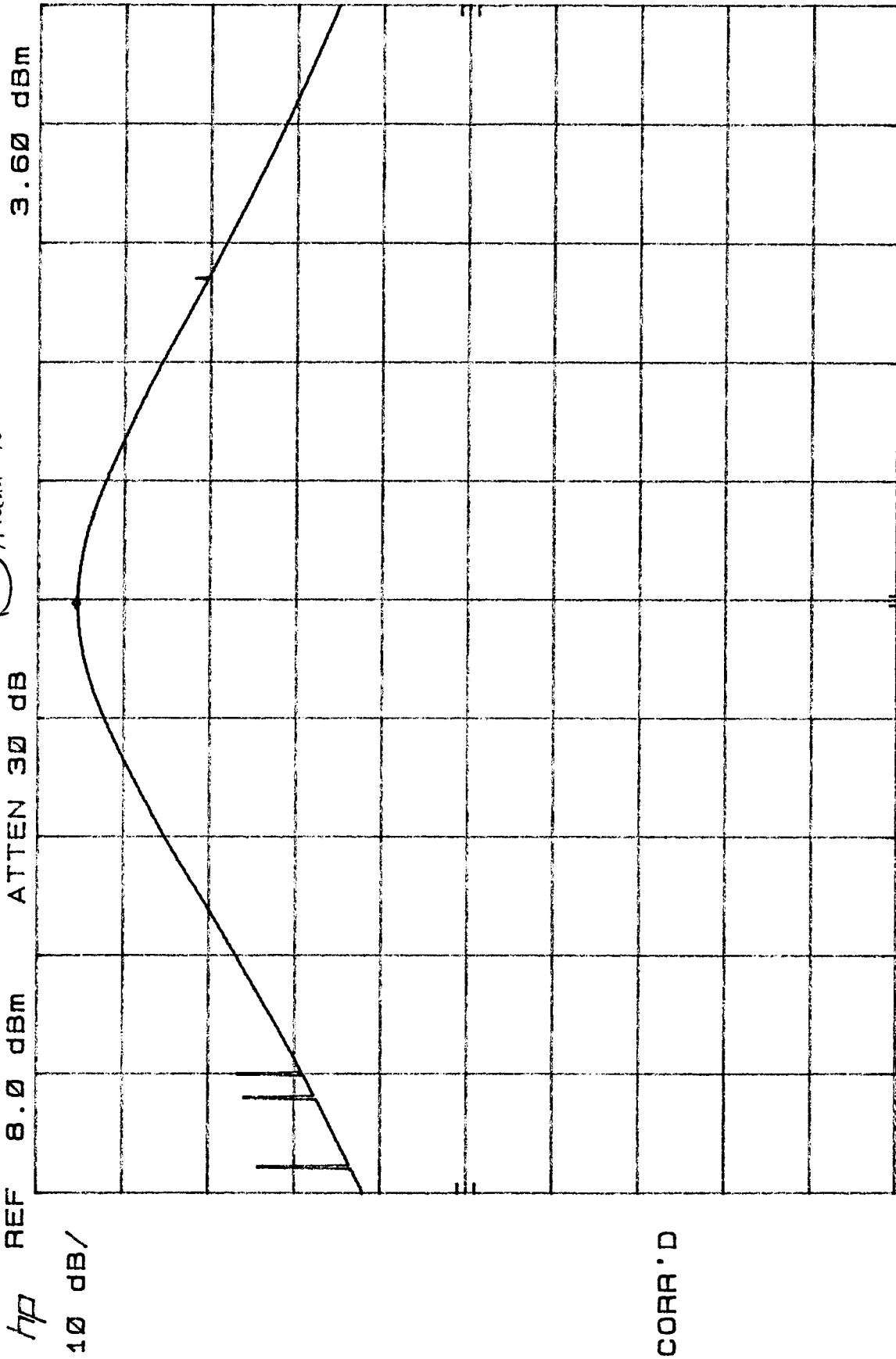


File No. BC1G907201 , Page F19 of F21
CENTER 2.406 15 GHz
RES BW 1 MHz VBW 1 MHz
SPAN 5.00 MHz
SWP 20.0 msec



$$\text{Output Power} = 3.6 + 2.1 = 5.7 \text{ dBm}$$

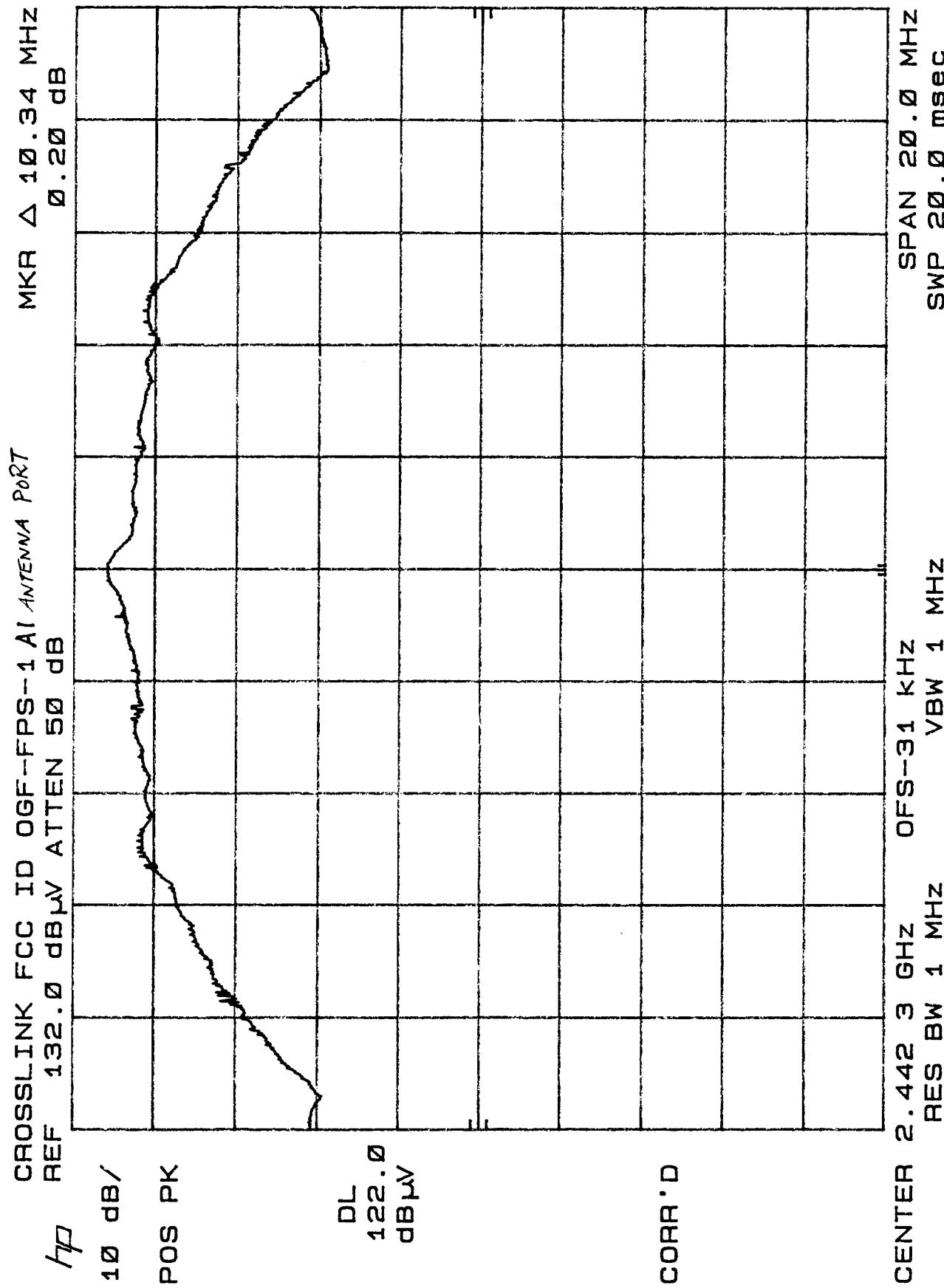
CROSSLINK FCC ID OGF-FPS-1 KA (KB) Antenna Port MKA 2.480 210 GHz
REF 8.0 dBm ATTEN 30 dB

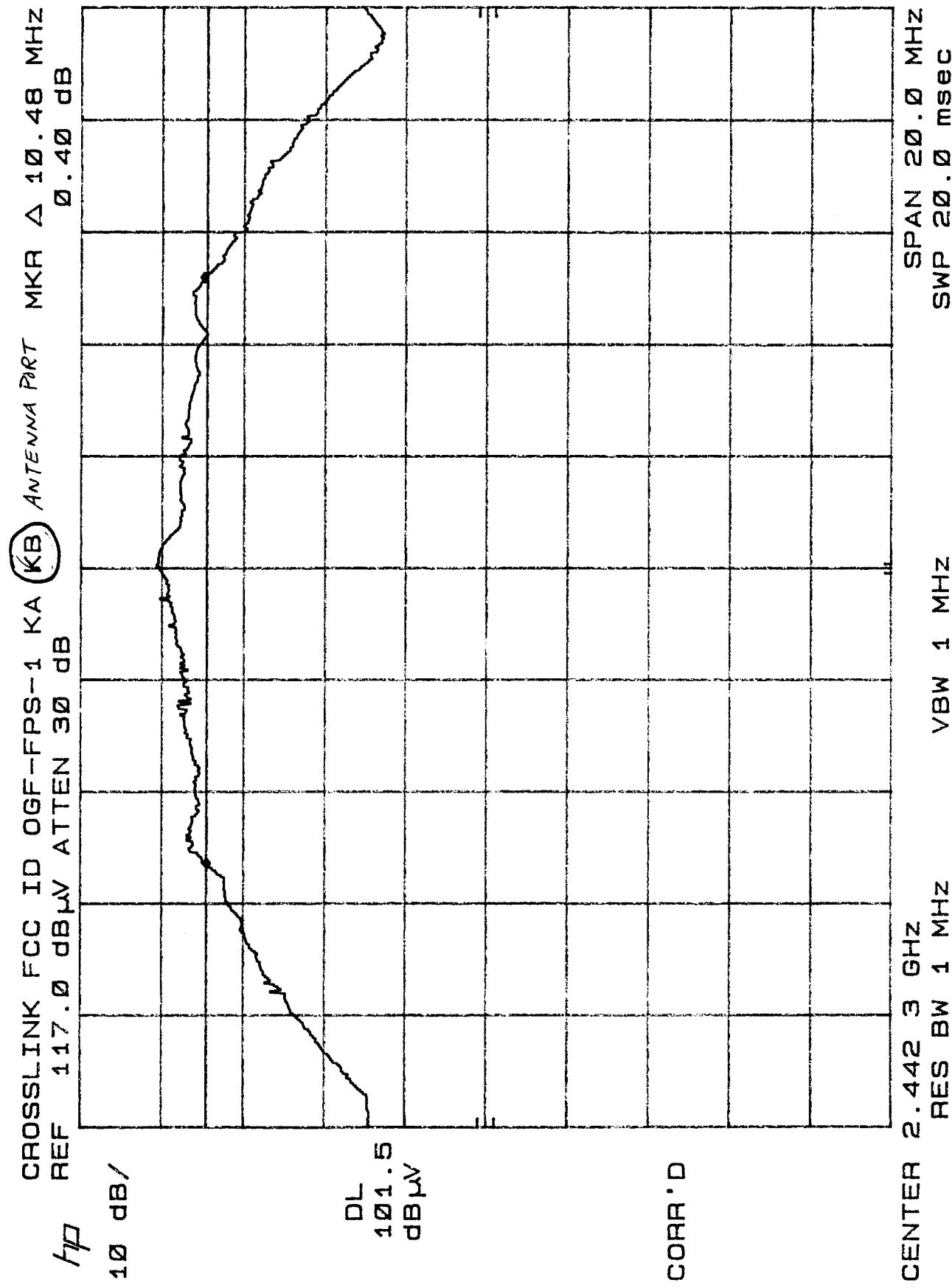


SPAN 5.00 MHz
SWP 20.0 msec

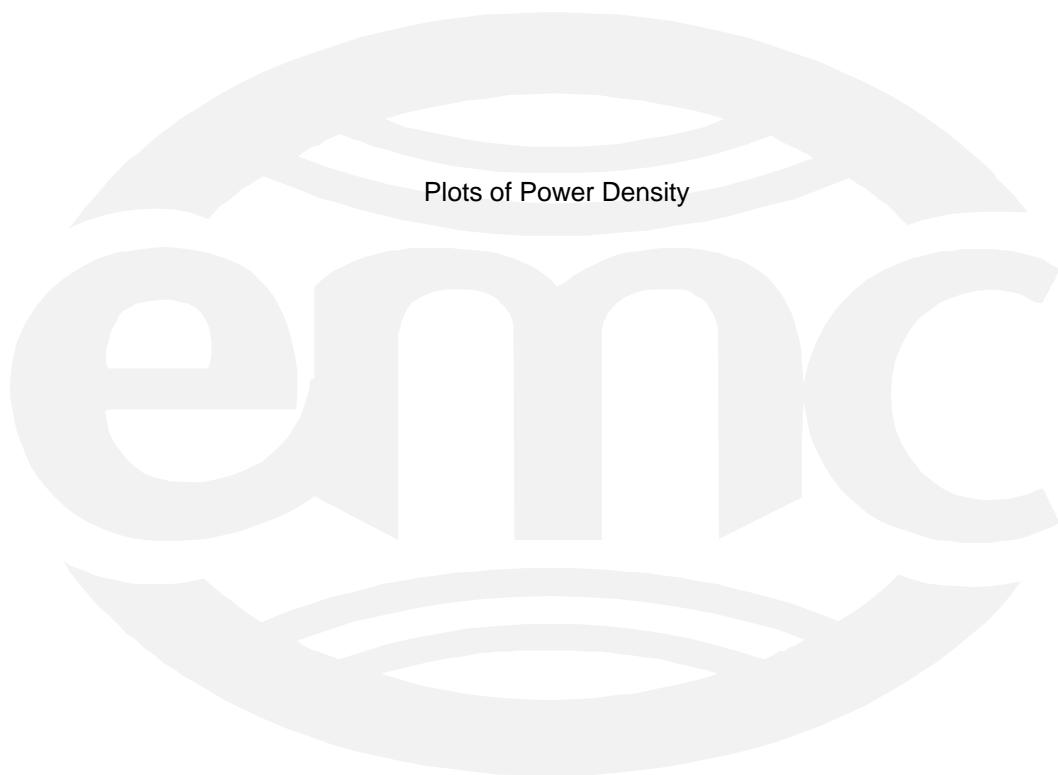
Appendix G

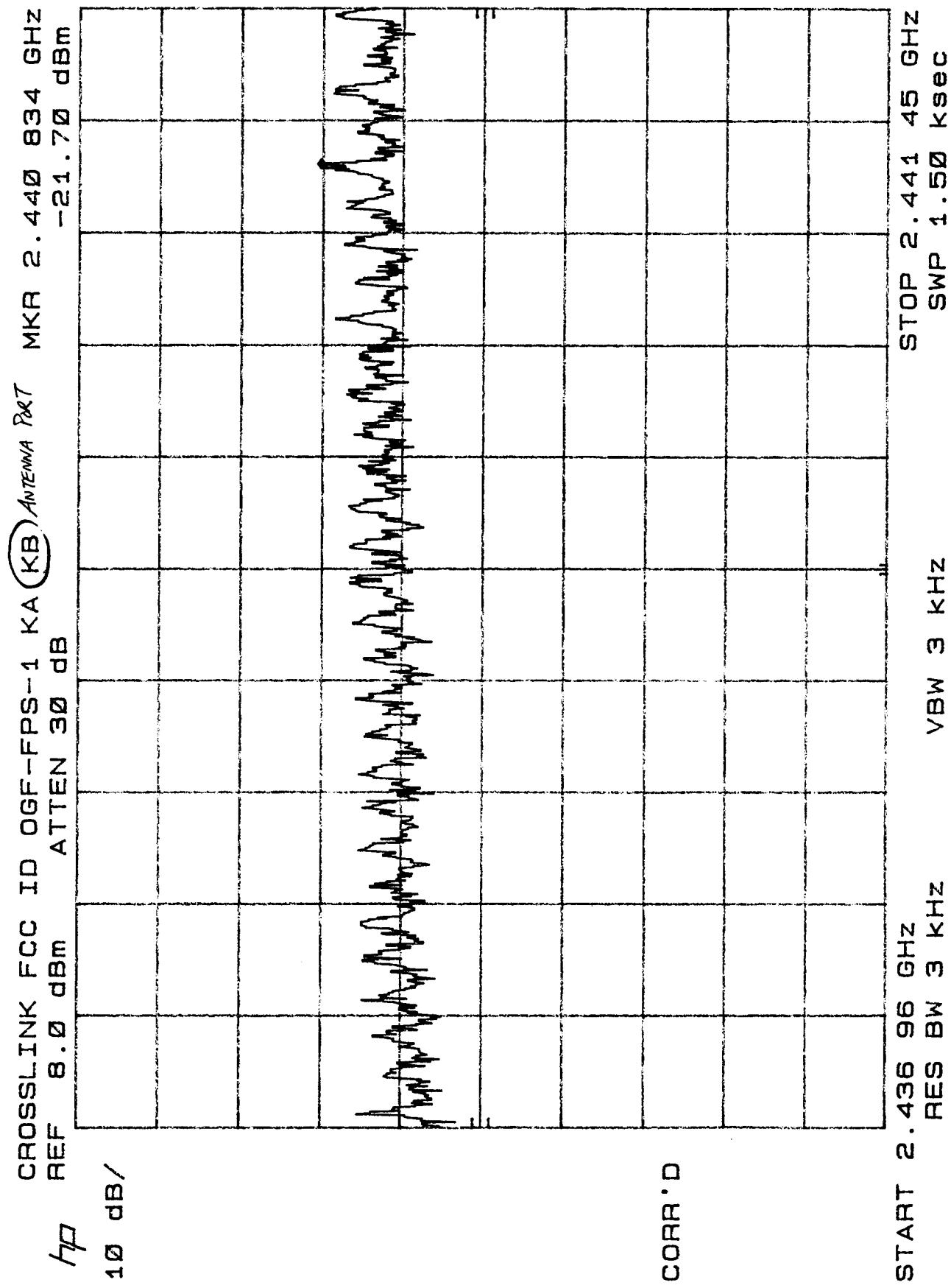


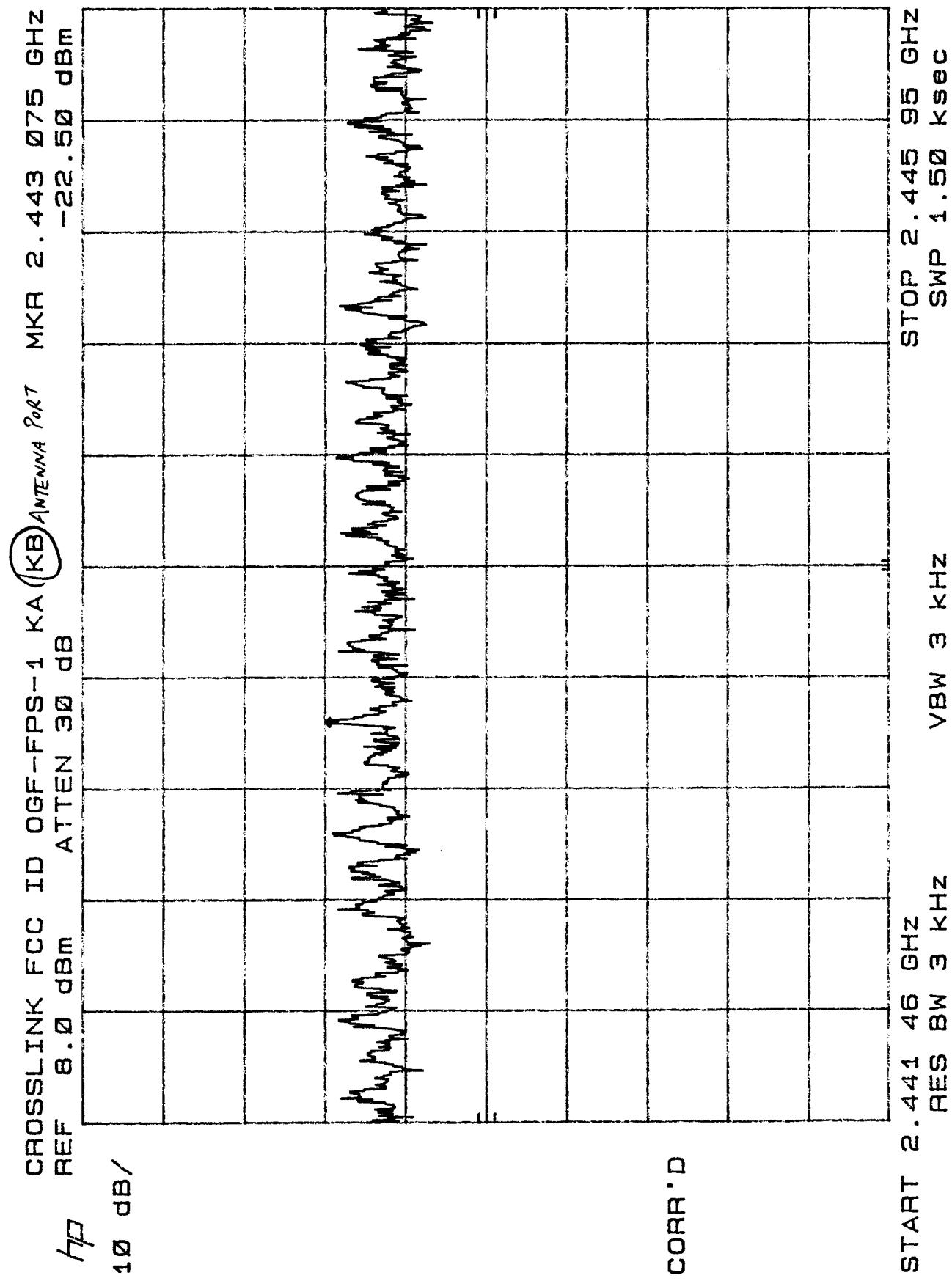


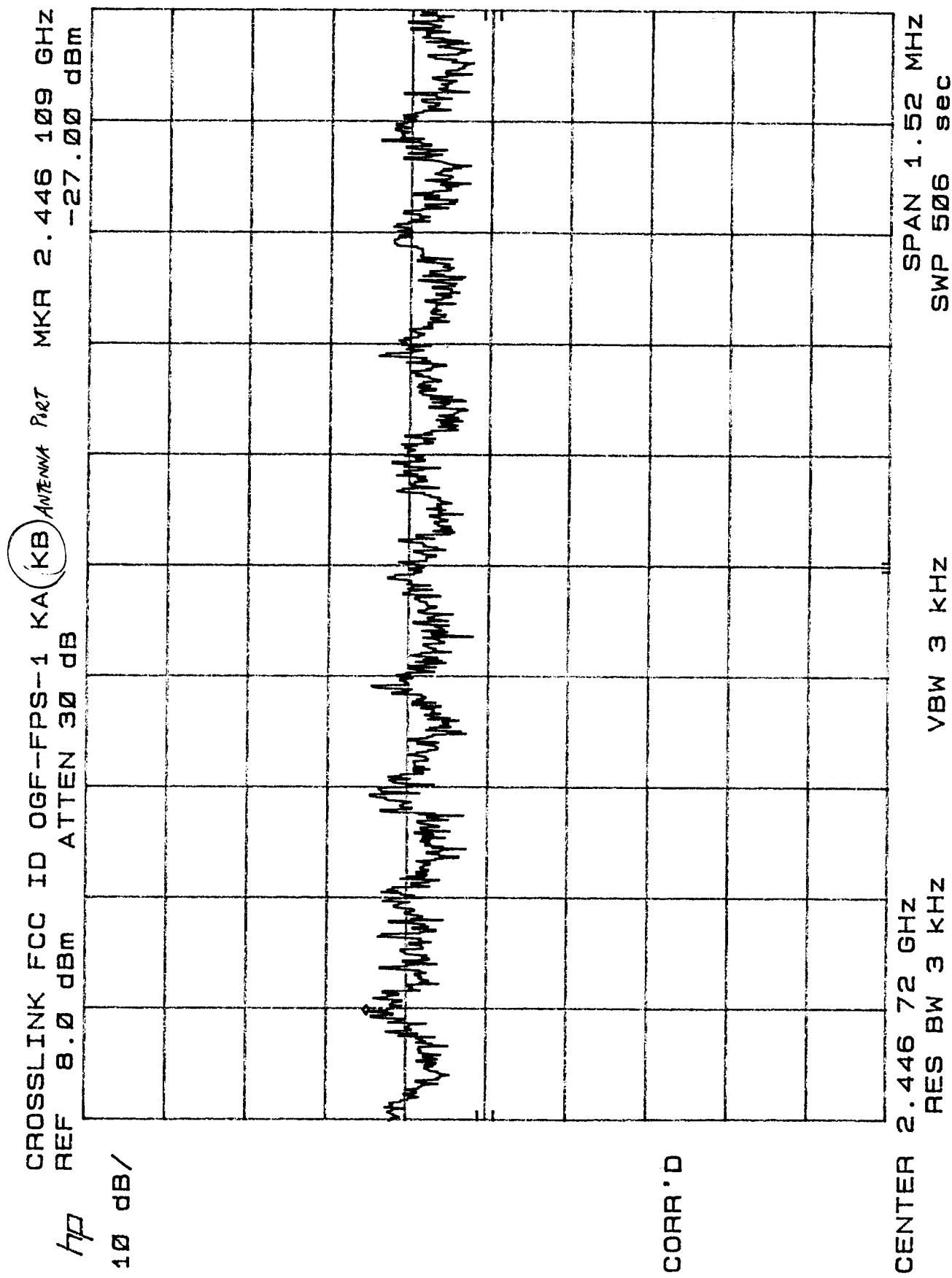


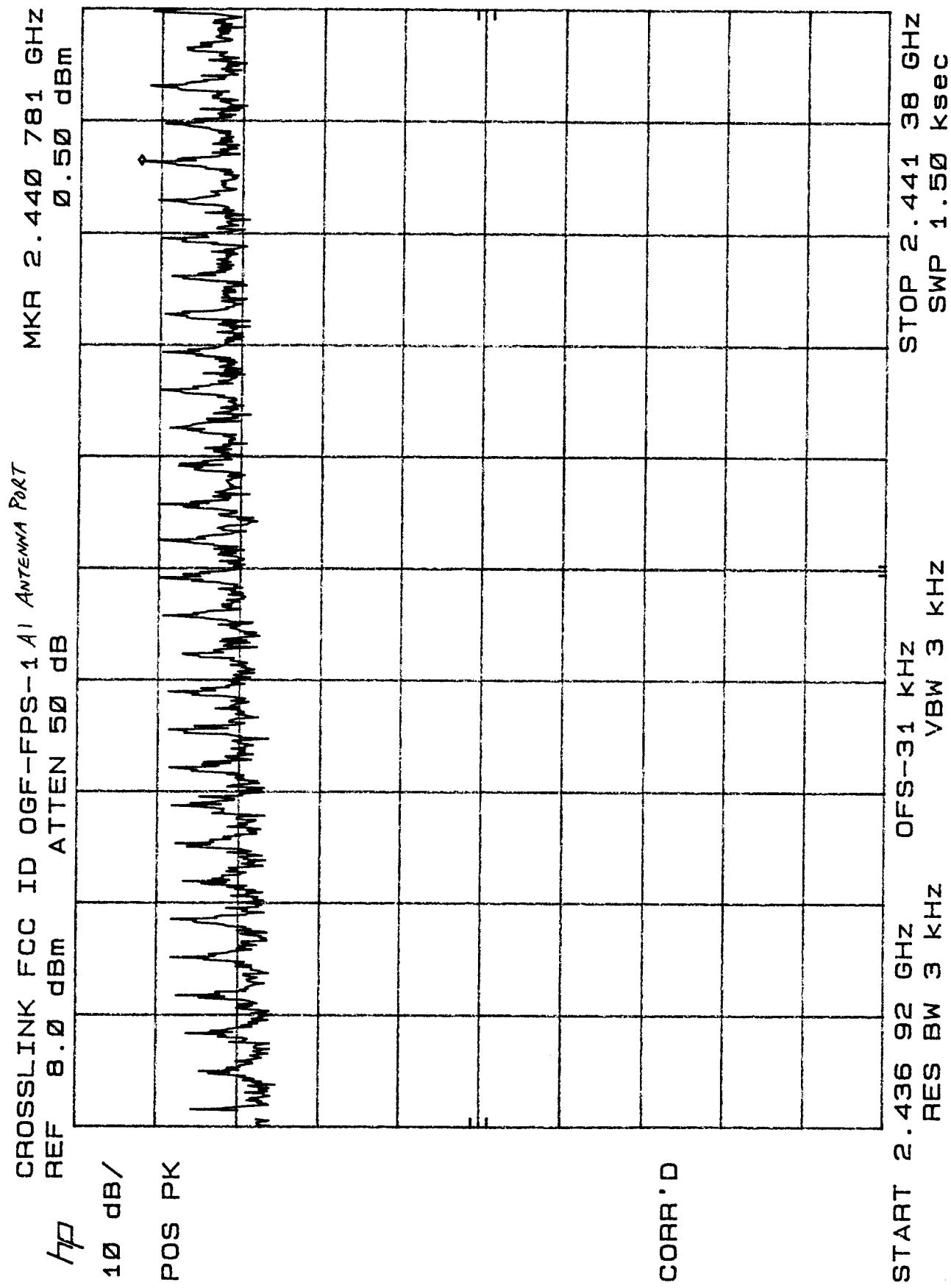
Appendix H

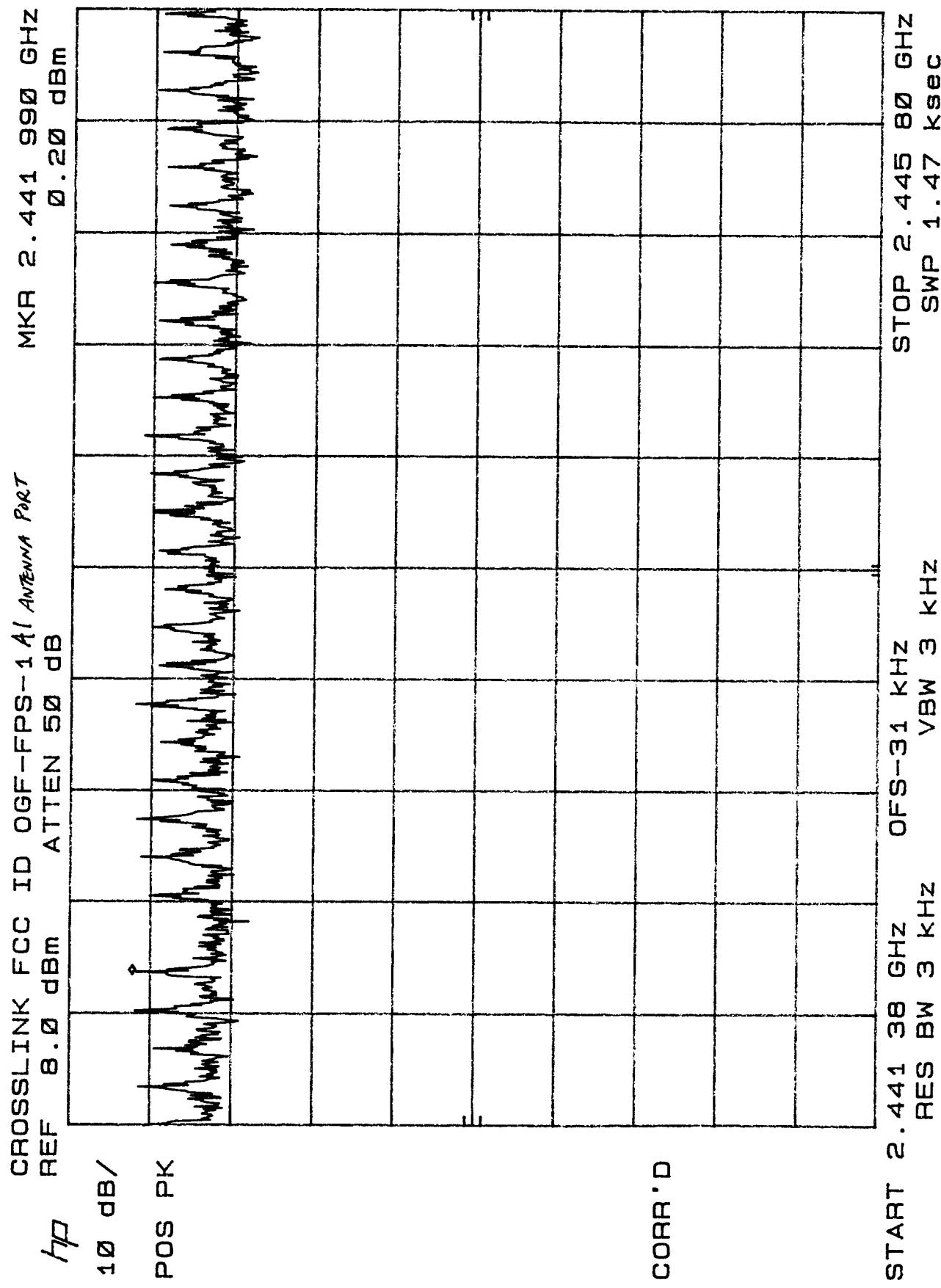


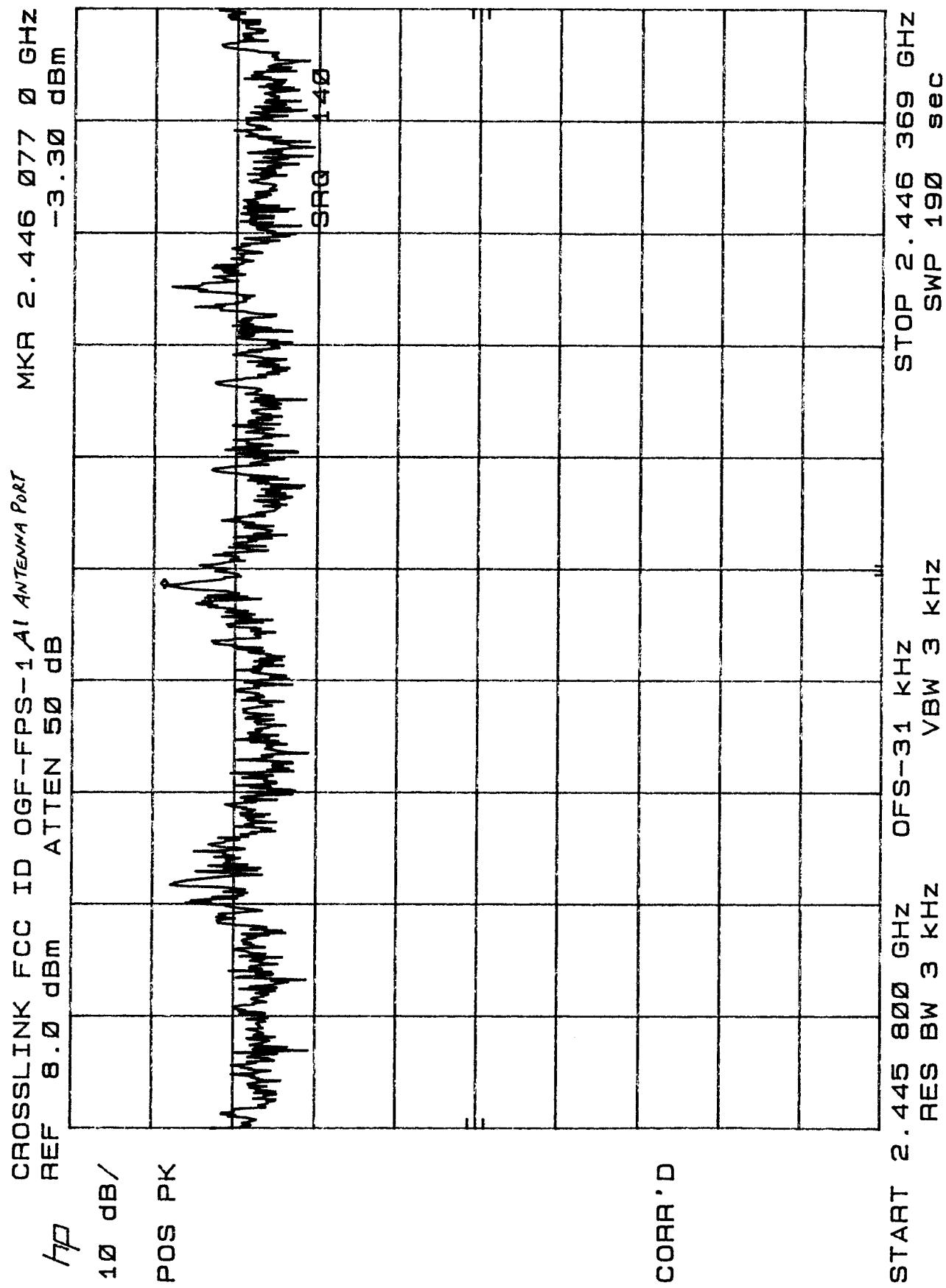






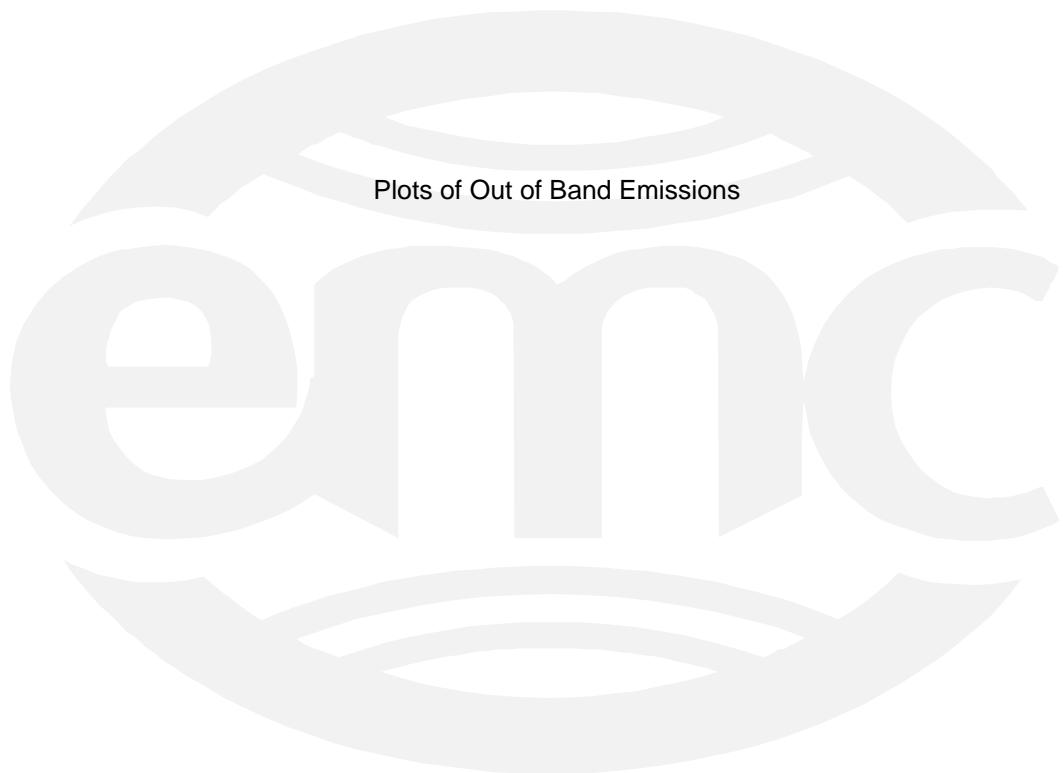


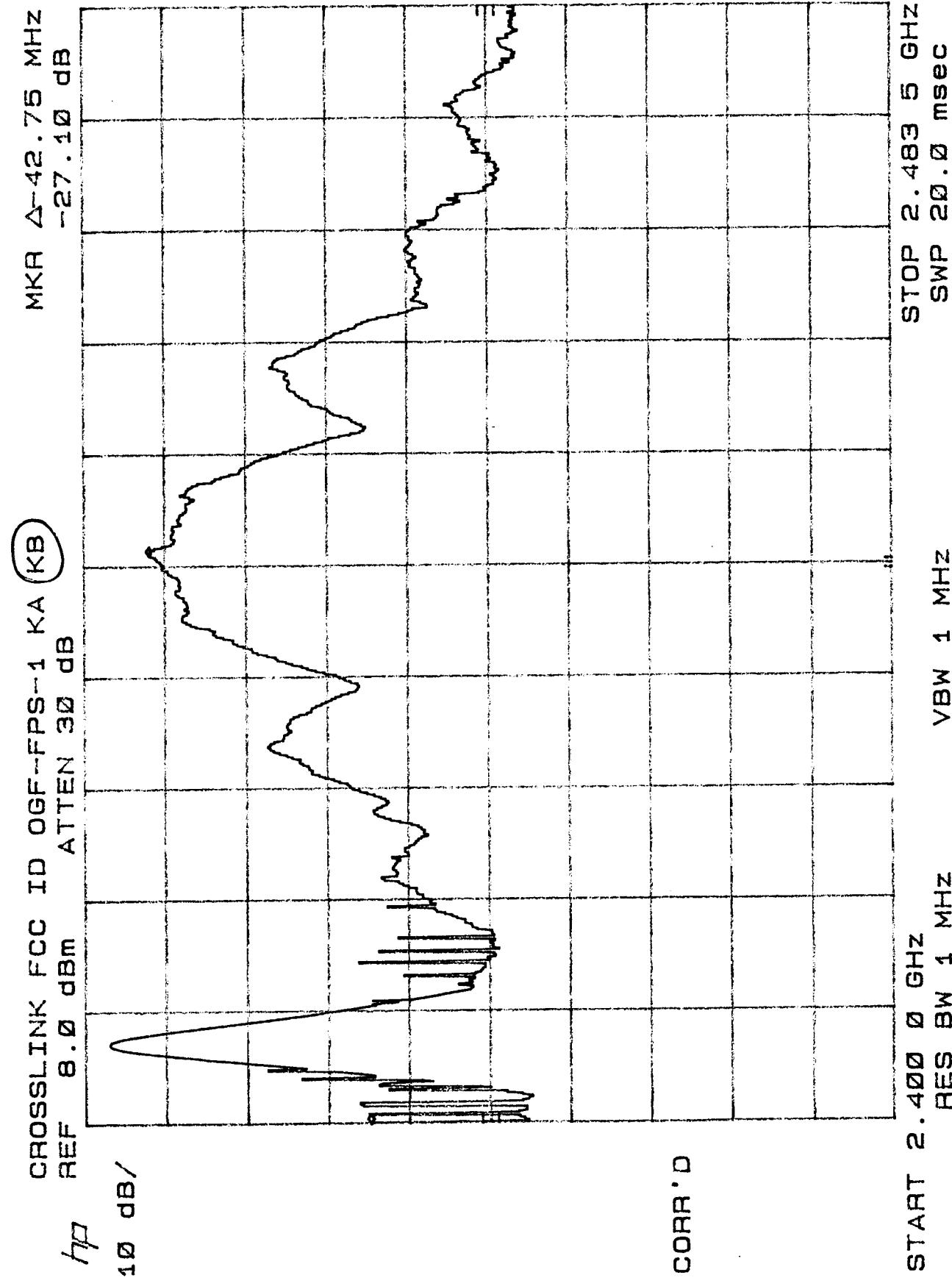




Appendix I

Plots of Out of Band Emissions

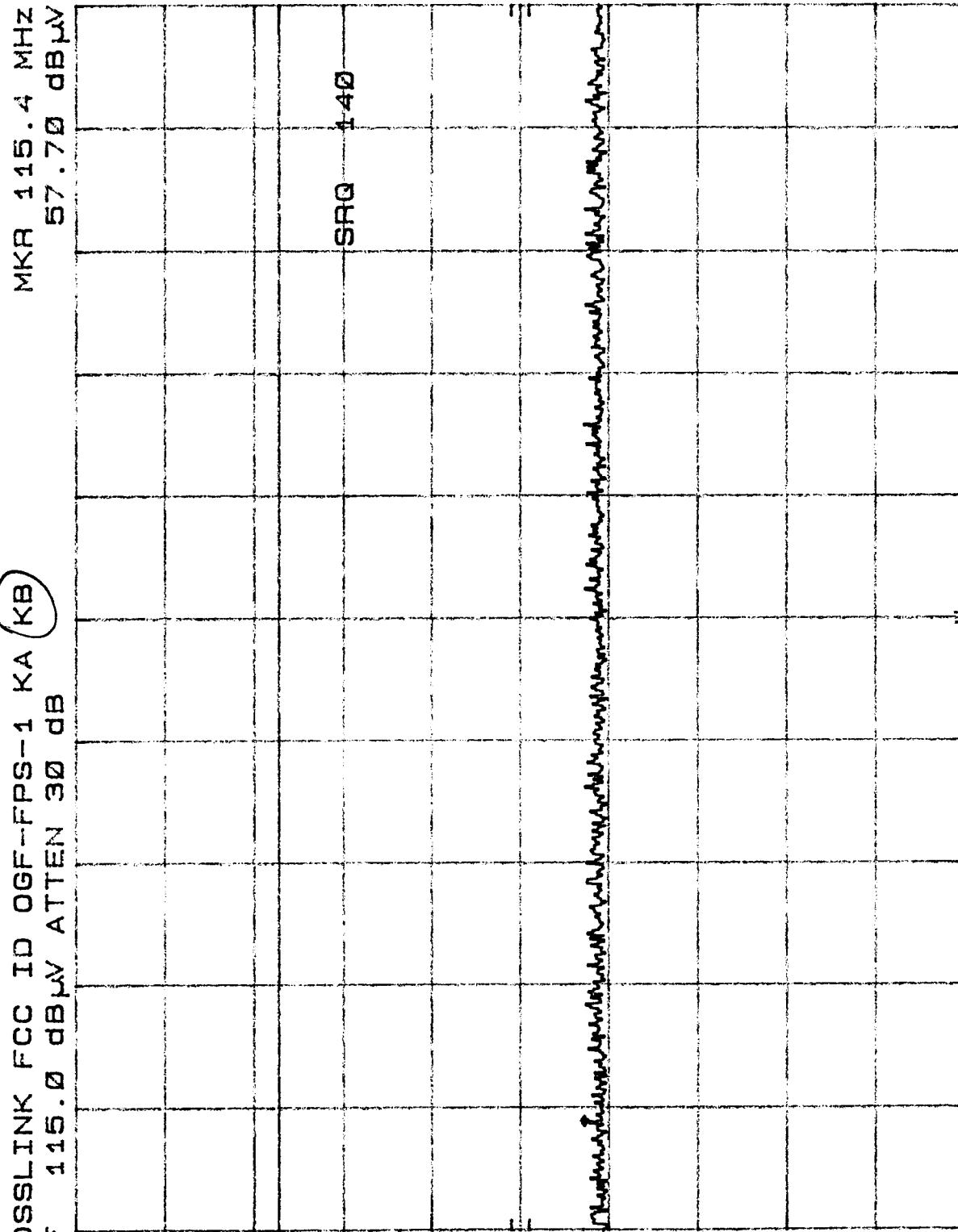




CROSSLINK FCC ID OGF-FPS-1 KA KB

REF 115.0 dB μ V ATTEN 30 dB

10 dB/
Hz



DL
92.2
dB μ V

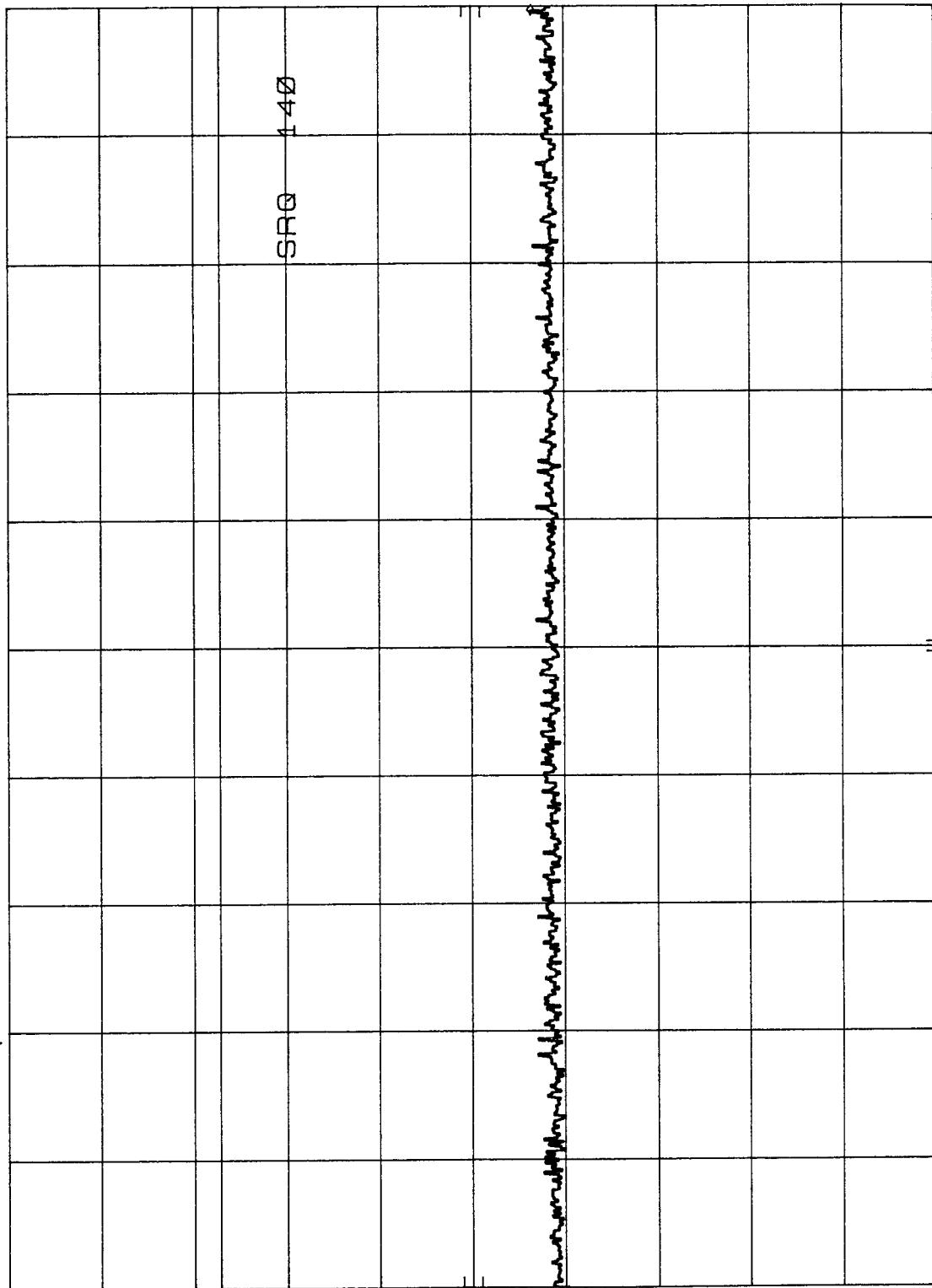
CORR 'D'

START 30 MHz
RES BW 1 MHz
VBW 1 MHz
STOP 1.000 GHz
SWP 24.3 msec

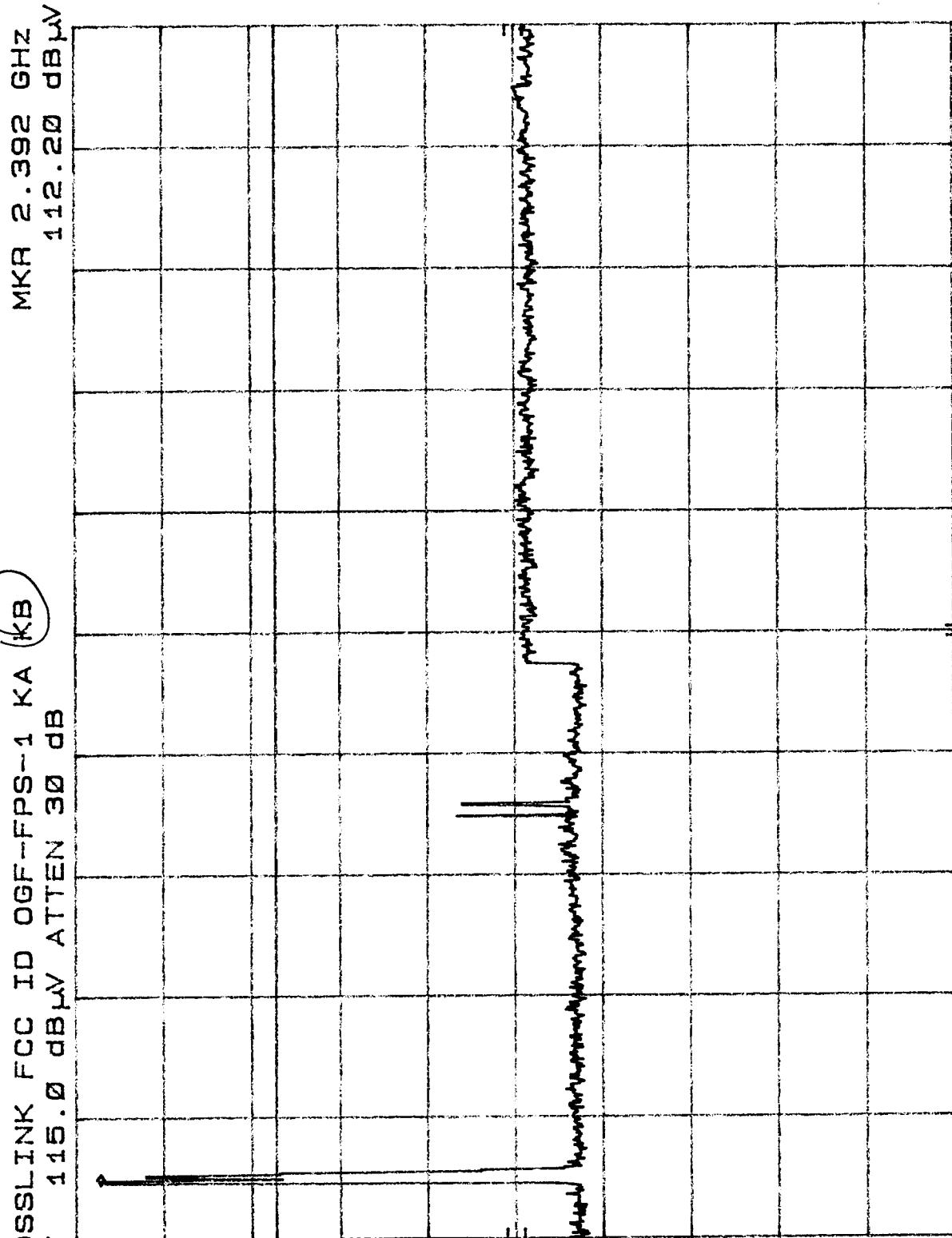
(KB)

CROSSLINK FCC ID OGF-FPS-1 KA (KB)
REF 115.0 dB μ V ATTEN 30 dB

10 dB/
10 dB/



CROSSLINK FCC ID OGF-FPS-1 KA (KB)
REF 115.0 dB μ V ATTN 30 dB



10 dB/ μ

DL
92.2
dB μ V

CORR 'D'

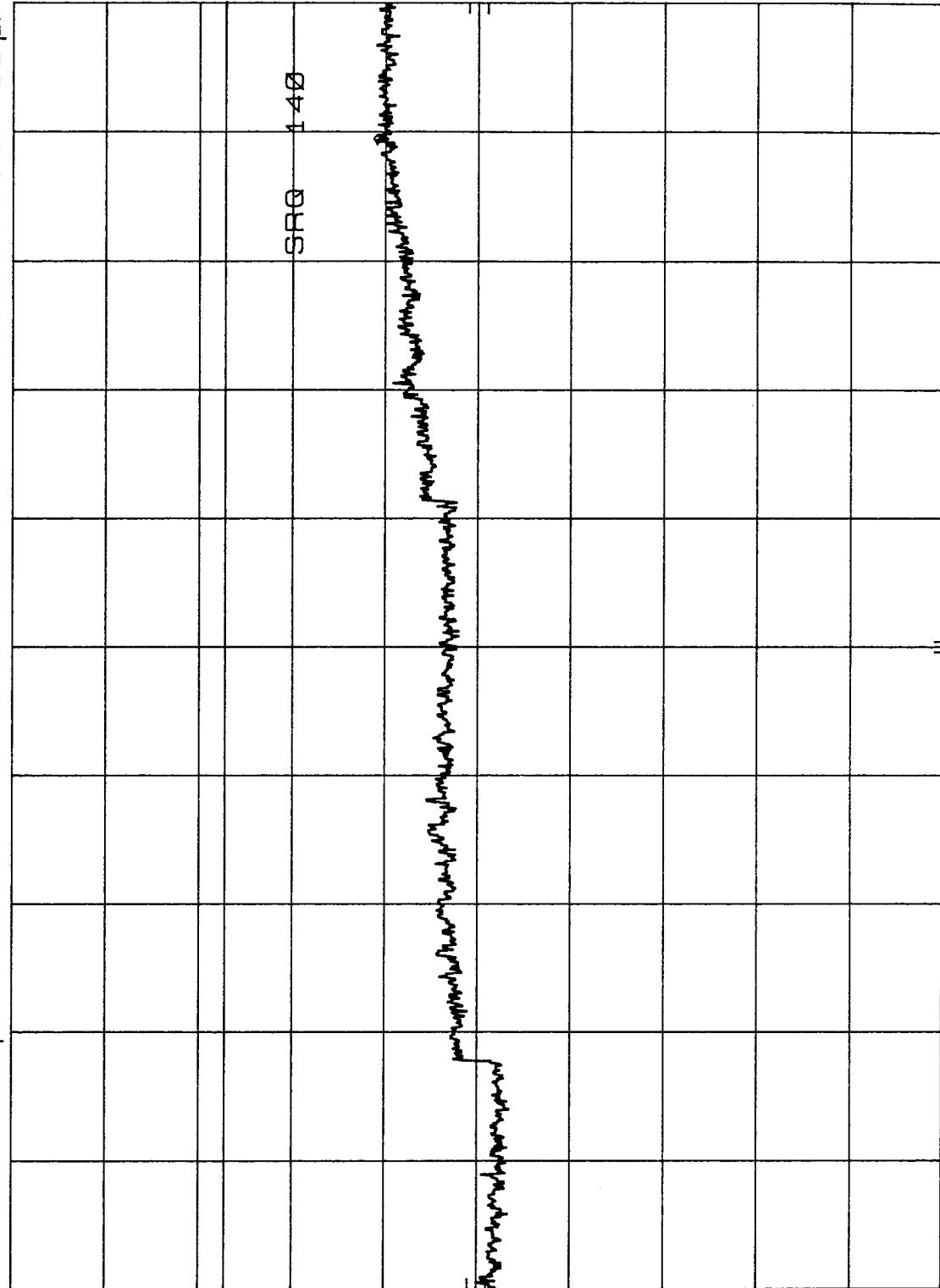
START 2.00 GHz
RES BW 1 MHz
VBW 1 MHz
STOP 10.00 GHz
SWP 200 msec

CROSSLINK

FCC ID OGF-FPS-1 KA (KB)
REF 115.0 dB μ V ATTN 30 dB

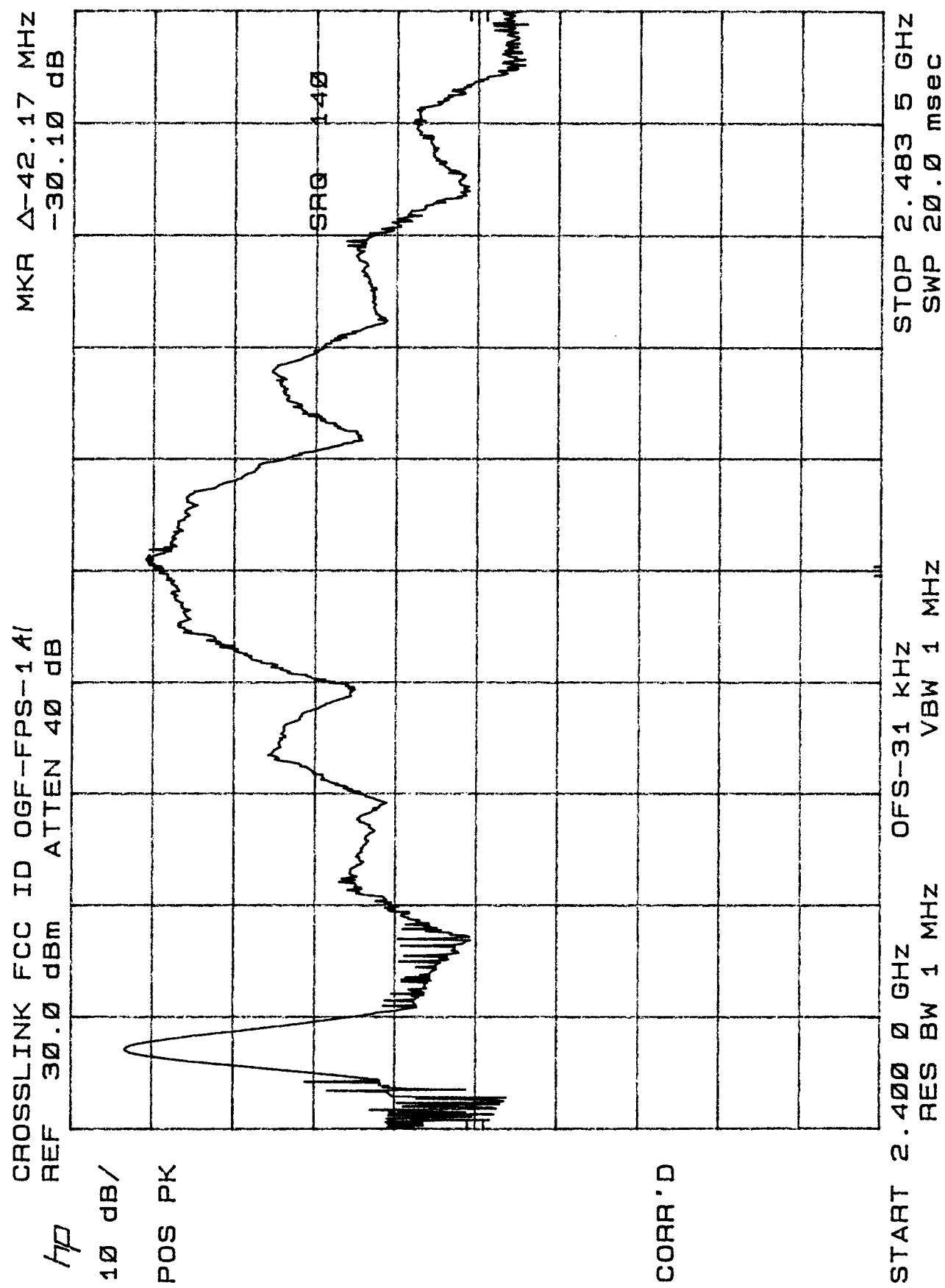
MKR 22.50 GHz
75.90 dB μ V

μ /
10 dB/



DL
92.2
dB μ V

CORR 'D'



CROSSLINK FCC ID OGF-FPS-1 A/

REF 30.0 dBm ATTEN 40 dB

MKR 642.1 MHz

-37.70 dBm

10 dB/

POS PK

DL
0.4
dBm

CORR'D

START 30 MHz RES BW 1 MHz OFS-31 kHz VBW 1 MHz

STOP 1.000 GHz SWP 24.3 msec

CROSSLINK FCC ID OGF-FPS-1 A/
REF 30.0 dBm ATTEN 40 dB

MKR 1.256 GHz
-38.20 dBm

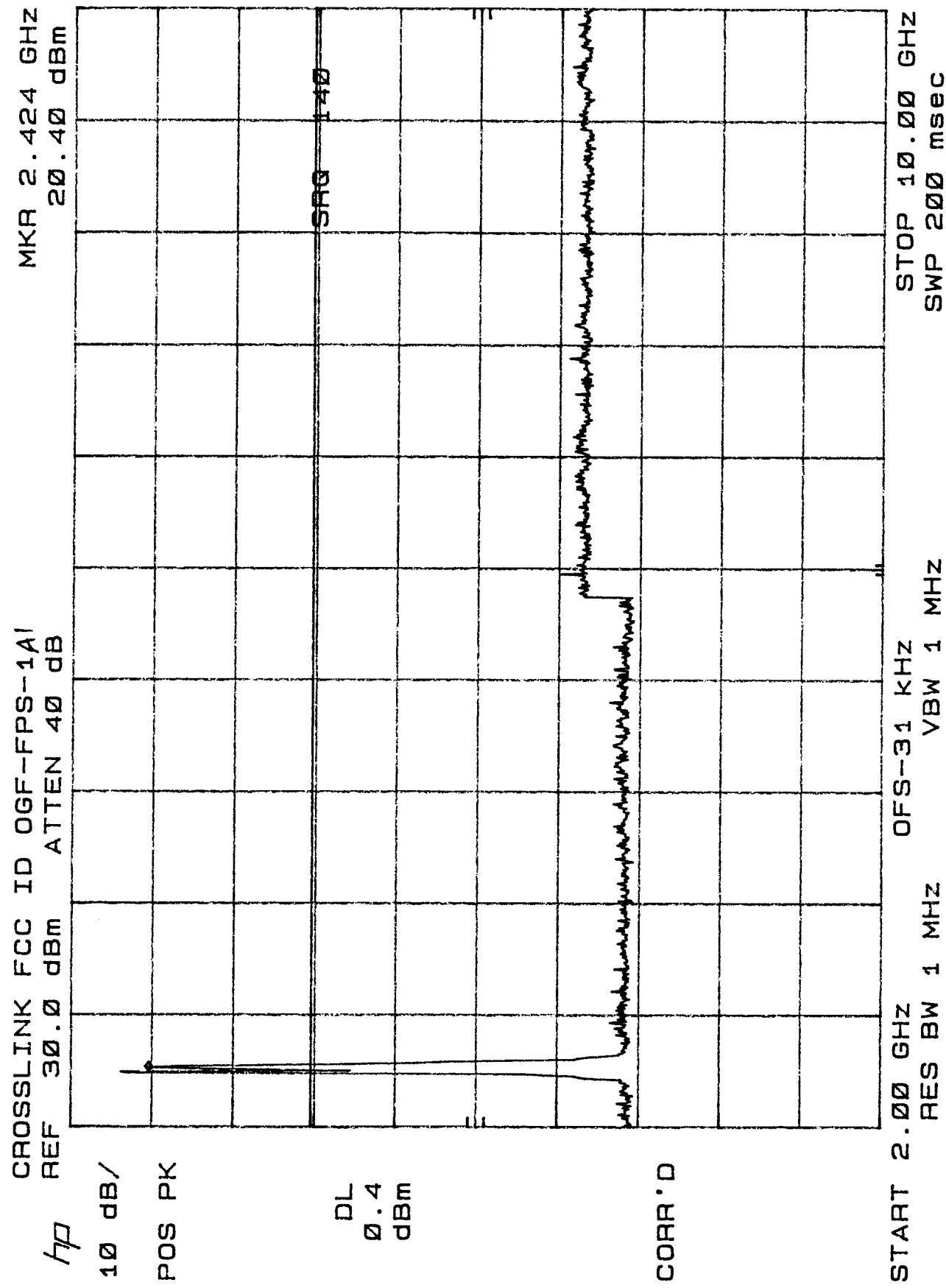
10 dB/
POS PK

DL
0.4
dBm

CORR'D

START 1.00 GHz
RES BW 1 MHz
OFS-31 kHz
VBW 1 MHz

STOP 2.00 GHz
SWP 25.0 msec

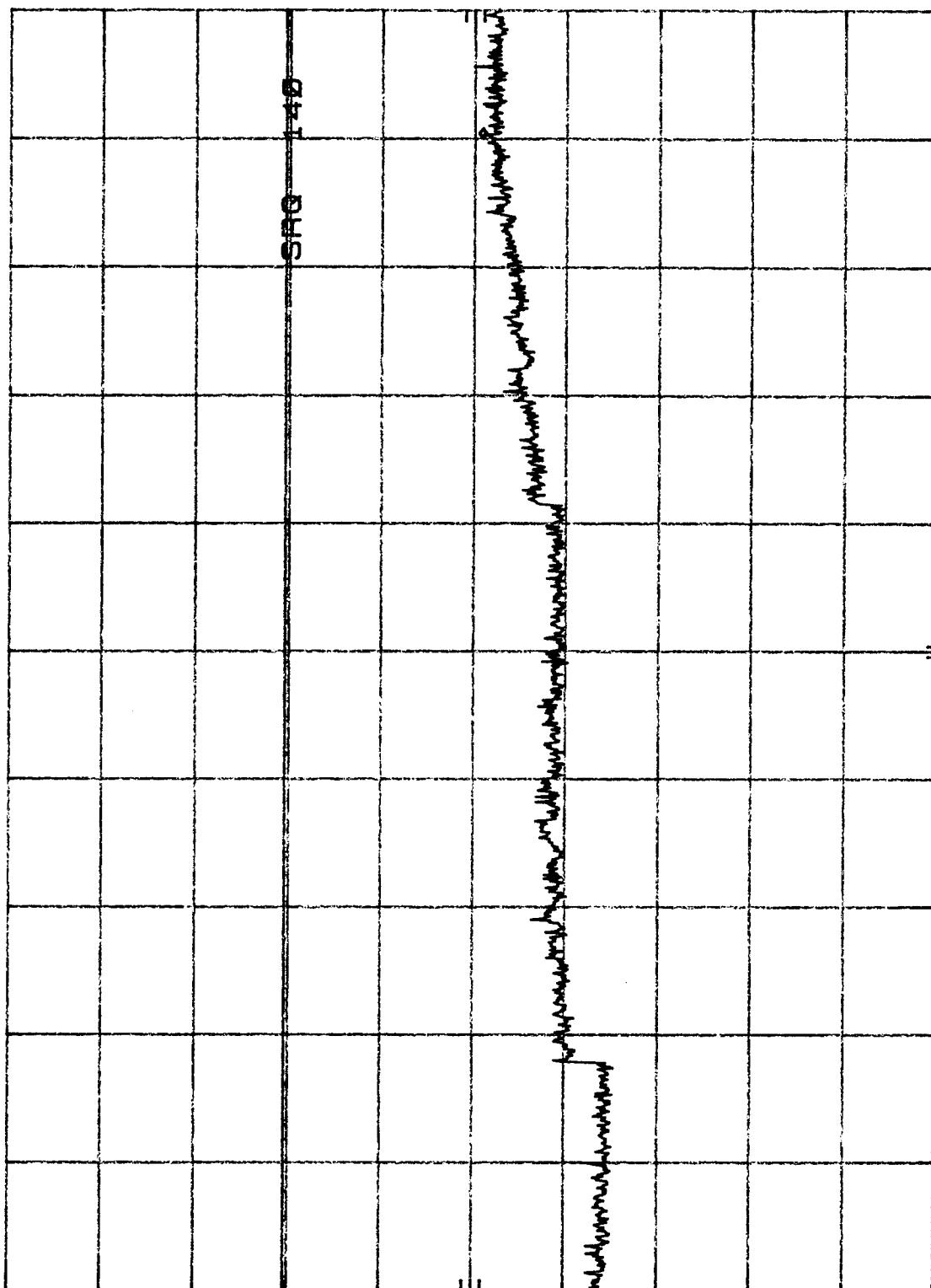


CROSSLINK FCC ID OGF-FPS-141

REF 30.0 dBm ATTEN 40 dB

MKA 22.63 GHz
-20.90 dBm

10 dB/
POS PK



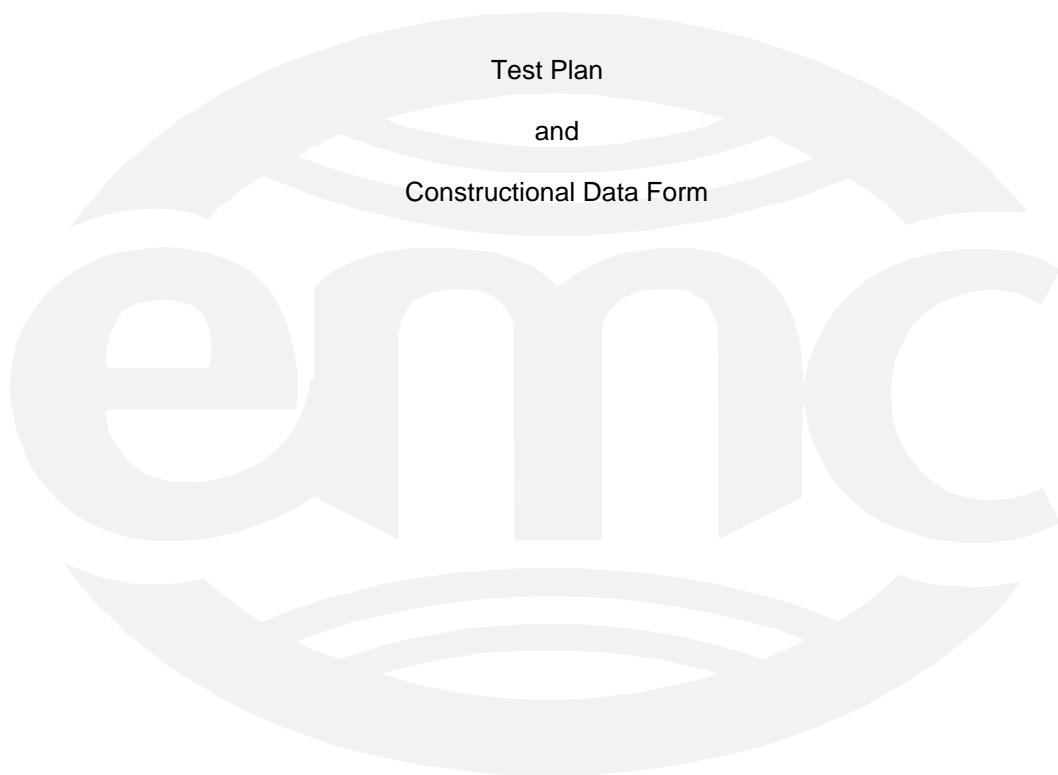
DL
0.4
dBm

CORR'D

STOP 23.9 GHz
SWP 350 msec

START 10.0 GHz
RES BW 1 MHz
OFS-31 kHz
VBW 1 MHz

Appendix J



Test Plan

for Electromagnetic Compatibility Testing



General Information (if you need assistance completing this form contact your TÜV Product Service representative.)

Company: Cross Link Quote Number: _____
Contact: JACK PYNE Phone: (business hrs) (303) 473.9232
E-mail Address: jpyne@crosslinkinc.com Phone: (after hrs) n/n

Product Description

Description: Radio Frequency Fueling Payment System
Model Number: 990017 Serial Number: 601

Test Objective

EMC Directive 89/336/EEC (EMC)
 Machinery Directive 89/392/EEC (EMC)
 Medical Device Directive 93/42/EEC (EMC)
 FCC Part _____ (list) Vehicle Directive 72/245/EEC (EMC)
 FDA Reviewers Guidance for Premarket
Notification Submissions (EMC)
 Other _____ (list)

Attendance

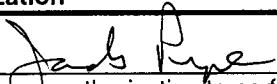
Test will be: Attended by the customer Unattended by the customer

Failure

If a failure occurs, TÜV Product Service should:

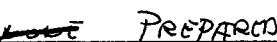
Call contact listed above, if not available then stop testing.
 Continue testing to complete test series.
 Continue testing to define corrective action.
 Stop testing.

Authorization

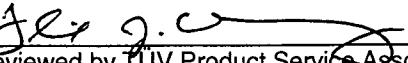

Customer authorization to perform tests

3/4/99

Date


Test Plan Prepared By (please print)

Date


Reviewed by TÜV Product Service Associate

3/14/99

Date

Test Plan

for Electromagnetic Compatibility Testing



Equipment Under Test Transportation

Transportation between sites by customer.
 Other (consult your TÜV Product Service representative)

Dimensions and Weight

Length 30 " Width 12 "
Height 6 " Weight 10 165

Facilities

Power Requirements

230 VAC 50 Hz Single Phase _____ Amps
 400 VAC 50 Hz Three Phase _____ Amps per phase
 120 VAC 60 Hz Single Phase _____ Amps
 208 VAC 60 Hz Three Phase _____ Amps per phase
 9 VDC _____ Amps
 Battery VDC Expected life _____ hours
 Other _____

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

Other

Air _____ cfm _____ psi Water _____ gpm _____ psi
 Other _____ (describe)

Test Plan Attachments

Constructional Data Form (CDF) * The CDF is required for all test plans.
 Applicable (attached)

Immunity Test Plan Details
 Applicable (attached) N/A

Emissions Test Plan Details
 Applicable (attached) N/A

On Site Test Plan Details
 Applicable (attached) N/A

Constructional Data Form for Electromagnetic Compatibility Testing



A completed form helps ensure that product testing will go smoothly. Add attachments as necessary for additional documentation. For additional help, please contact your TÜV Product Service Representative.

Applicant -- Enter company information pertaining to the location where the product is manufactured and for the manufacturer's contact soliciting the testing.

Company: CROSS LINK Inc.
Address: 5665 FLATIRON PKWY
BOULDER CO. 80301
Phone: 303 473 9232 Fax: 303 473 9666
Contact: JACK PYNE Position: VP

General Equipment Description -- Indicate which attachments you are providing with this document. It is recommended that you provide those listed.

Type of Equipment: 2.45 GHz TRANSMITTER Model No.: 990017

Serial No.: 101 FCC ID No.: OGF-FPS-1

General description: THE RF-FPS IS A RADIO FREQUENCY
FUELING PAYMENT SYSTEM USED FOR AUTOMATIC
IDENTIFICATION AND APPROVAL FOR GASOLINE
PURCHASES

Product Variant/Options: _____

Attachments: (only required for certification)

External Photographs Product Literature High Level Bill of Materials

Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99

Signature of Applicant: Jack Pyne

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Author: B. Dill
Revised: 20 March 1997

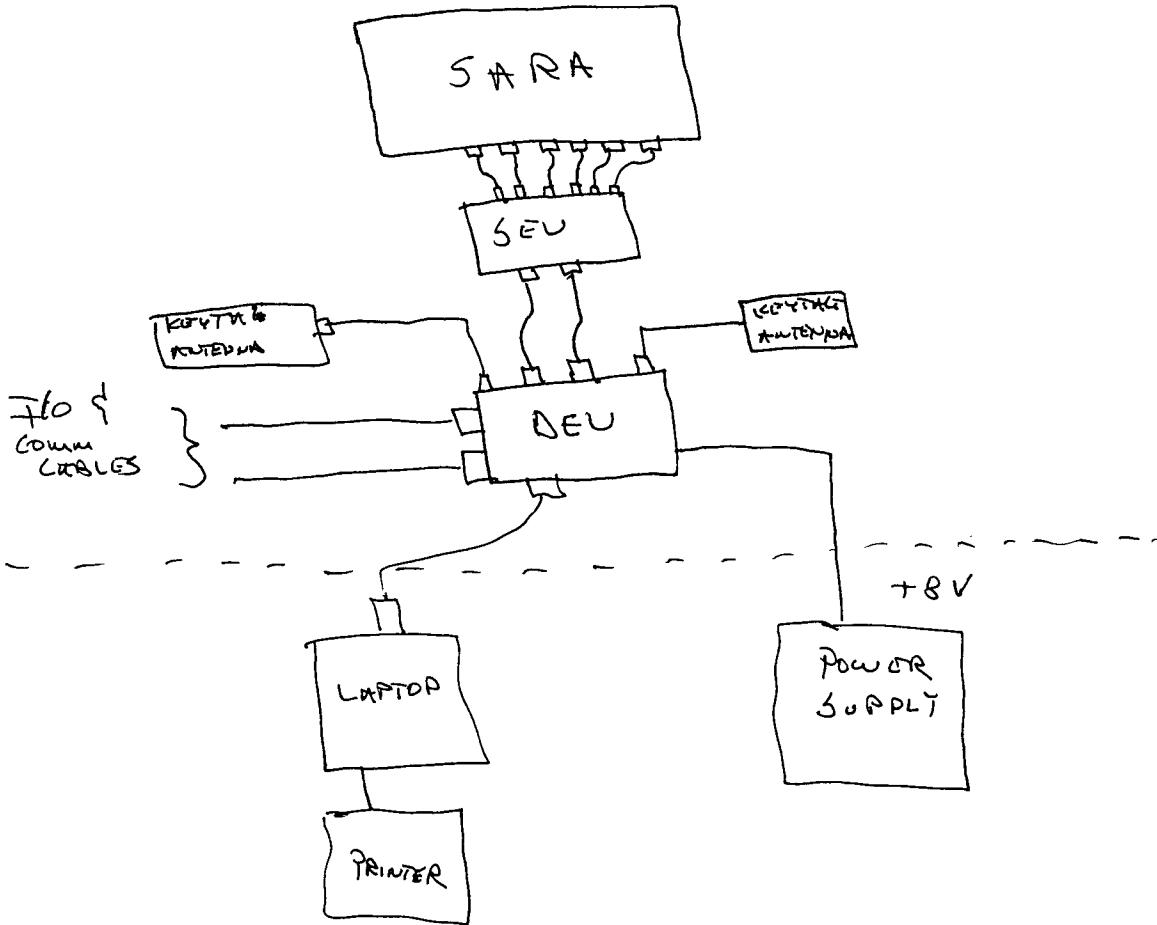
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Constructional Data Form for Electromagnetic Compatibility Testing



System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99

Signature of Applicant:

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Author: B. Dill
Revised: 20 March 1997

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FCC ID: OGF-FPS-1

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40 Meadow Road

Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

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Constructional Data Form for Electromagnetic Compatibility Testing



Installation and Environmental Conditions (describe) -- Describe the intended installation. Include details such as power connection and system grounding approaches. Describe the intended operating environment, include details such as humidity, cooling, heating and hazardous environments. Attaching a copy of an Installation manual is recommended for proper documentation of your system. Please indicate.

THE RFPS IS PROFESSIONALLY INSTALLED BY
GASOLINE DISPENSER TECHNICIANS. DETAILED
INSTRUCTIONS ARE PROVIDED BY THE
DISPENSER MANUFACTURER. -- NOT CROSSLINK.
POWER IS FURNISHED BY THE POWER SUPPLY
MADE BY THE DISPENSER MANUFACTURER.
ISO DRAWINGS OF HOW THE RFPS
IS INSTALLED INTO A TOKheim Premier
Series Dispenser have been provided

Installation manual/instructions (attached, only required for certification)

Power Requirements -- Indicate your system power requirements for the equipment to be tested.

Rated Voltage 78 to +12V Rated Input Power 11W PEAK

Protection Class -- Indicate your product's protection class. Contact your TÜV Product Service representative and is only required for certification.

Type: REVERSE DIODE SEPARATE Class: REGRULATORS THROUGHOUT

Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99 Signature of Applicant: Josh Payne

Constructional Data Form

for Electromagnetic Compatibility Testing



I/O Ports and Cables

Indicate all interface cables which can be attached to the equipment even if they are not sold as part of your system. Describe the port (e.g., Parallel, Serial, SCSI), list its type (e.g., AC, DC, Signal, Control) and number of ports/cables of type. Indicate if the I/O port is to be exercised during testing. List the type of transmission and if the cable is an EUT assembly-to-assembly interconnection cable (PC to printer, to modem). Indicate whether the cable is shielded or not, type of shield (e.g. Braid, Foil) and how terminated (e.g. 360 degree to conductive shell, pigtail) at both ends of the cable. If a cable can have a typical length of ≥ 3.0 meters, then it is required to test with a cable of at least 3.0 meters.

I/O Ports and Cables

Description:	<u>Power Cable, I/O Lines</u>	
Type of Port:	<u>DB-15 Connector</u> # of ports/cables of type _____	
Exercised during testing?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Assembly \leftrightarrow Assembly Interconnect	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Cable shielded:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Shield Type (describe)	_____	
Termination: (describe)	_____	
Transmission Type:	<input checked="" type="checkbox"/> Analog	<input checked="" type="checkbox"/> Digital
Length of cable: 1m Maximum:	Tested: _____	

I/O Ports and Cables

Description:	<u>Com Port Cable</u>	
Type of Port:	<u>RS-485</u> # of ports/cables of type _____	
Exercised during testing?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Assembly \leftrightarrow Assembly Interconnect	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Cable shielded:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Shield Type (describe)	_____	
Termination: (describe)	_____	
Transmission Type:	<input type="checkbox"/> Analog	<input checked="" type="checkbox"/> Digital
Length of cable: 1m Maximum:	Tested: _____	

I/O Ports and Cables

Description:	<u>Modem 10mm Cable</u>	
Type of Port:	<u>RS-232</u> # of ports/cables of type _____	
Exercised during testing?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Assembly \leftrightarrow Assembly Interconnect	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Cable shielded:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Shield Type (describe)	_____	
Termination: (describe)	_____	
Transmission Type:	<input type="checkbox"/> Analog	<input type="checkbox"/> Digital
Length of cable: 1m Maximum:	Tested: _____	

Date and sign each page of the CDF. Original signatures must be present on each page.

Date:	<u>3/4/99</u>	Signature of Applicant:	<u>Jack Payne</u>
-------	---------------	-------------------------	-------------------

Constructional Data Form for Electromagnetic Compatibility Testing



EUT configurations -- Provide a technical description of all possible EUT configurations. Specify if more than one configuration is to be tested.

TEST CONFIGURATION DOCUMENTED BY PHOTOS

EUT Software and Operation Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. Consult with your TÜV Product Service Representative when typical operating modes are not practical. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. This pattern must be sent to the parallel port device, serial port device, and must be write/read/verified to each storage device. Monitors must display the H pattern, typically in white letters on a black background. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing.

General Description: A TEST PROGRAM CALLED HOST. BIN
(describe) IS LOADED INTO THE CPU BOARD. THIS PROGRAM ALLOWS
A SPECIFIC ANTENNA PAIR TO BE SELECTED &
TRANSMITS "IDENTIFY" COMMAND REPEATEDLY BUT THE
TX PORT

Software Revision Level: REVISION DATED 3/4/99
(list and describe)

Operating modes to be THE REPEATED "IDENTIFY" OPERATIONS ARE
tested: (list and describe)

RF ASPECTS OF THE RF-FPS

Operation manual/instructions (attached)

Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99

Signature of Applicant:

UEMC0902.doc, Revision 1.0
Author: B. Dill
Revised: 20 March 1997

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FCC ID: OGF-FPS-1

TÜV PRODUCT SERVICE INC

40 Meadow Road

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Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev. No. 1.0

Constructional Data Form for Electromagnetic Compatibility Testing



System, Subsystem, Major Subassemblies or Internal Peripherals -- List and describe all system, subsystem, major subassemblies and all internal peripherals. This should include such things as an external monitor, parallel interface peripheral, serial interface peripheral, internal disk drives or internal circuit boards. It is recommended that circuit diagrams, assembly and subassembly drawings be attached. Please indicate.

Description	Model #	Serial #	FCC ID #
RF-FPS 1	990017	101	OGF-FPS-1
DISPUSER ELECTRONICS UNIT	970015	006	—
SMART ELECTRONICS UNIT	970039	003	—
SINGLE Aperture Receiver ANTENNA	505117B	n/a	—
ROTATING ANTENNA 505097BR	505097BR	n/a	
<input checked="" type="checkbox"/> Technical Drawings attached			

Interfacing Equipment and/or Simulators (which are not part of the EUT) -- List and Describe all equipment or peripherals that will be connected to the EUT. For FCC testing a minimum configuration is required. If you have questions about this minimum configuration contact your TÜV Product Service representative.

Description	Model #	Serial #	FCC ID #
POWER SUPPLY	320126-4	—	—
LAPTOP COMPUTER	MICRON NBK001231-00	51097 00211871	JBQ1000PC

Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99

Signature of Applicant:

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Author: B. Dill
Revised: 20 March 1997

Constructional Data Form for Electromagnetic Compatibility Testing



EMC System Details -- List all frequencies and sub-harmonics which are 10kHz or above for such things as oscillators, horizontal line rate of monitors, and clock rates of incorporated OEM assemblies. List all power supplies. Indicate switching frequencies. List power line filters and indicate the manufacturer, model and location on EUT. Indicate all components used for high frequency noise reduction. (e.g., ceramic capacitor, 0.01μF, 1 ea. at C12 - C20).

Oscillator Frequencies

Frequency	Sub-harmonics	EUT Location	Description of Use
66 MHz		INSIDE DEV	CLOCKING FOR CPU
16 MHz		INSIDE DEV	CLOCKING FOR MICROCONTROLLER
3.8464 MHz		INSIDE DEV	BAND RATE GENERATOR
9.5375 MHz		INSIDE DEV	PROVIDE CHIPPING RATE FOR DSSS

Power Supply

Frequency	Manufacturer	Model #	Serial #	Type (list frequency)
	TOKHEIM	320126-4	—	LIN/EA

Power Line Filters

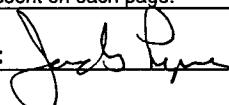
Manufacturer	Model #	Qty	Location on EUT
DELTA ELECTRONICS	100KA45	1	IN POWER SUPPLY 130X

Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Location on EUT

Date and sign each page of the CDF. Original signatures must be present on each page.

Date: 3/4/99

Signature of Applicant: 

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Revised: 20 March 1997

Constructional Data Form for Electromagnetic Compatibility Testing



Other EMI Critical Construction Detail -- Indicate any other measures taken to reduce high frequency noise, (e.g., grounding the circuit board on the right rear corner with 0.25" braid, 3 inches long to the chassis).

THE SEU'S DEVS ARE SHIELDED PACKAGES

Description of Enclosure -- Describe the principle materials of the enclosure (e.g., plastic, plastic with shielding material, metal, metal with specific shielding contact points, metal with paint on all surfaces).

Date and sign each page of the CDF. Original signatures must be present on each page.

Date:

3/4/99

Signature of Applicant:

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Author: B. Dill
Revised: 20 March 1997

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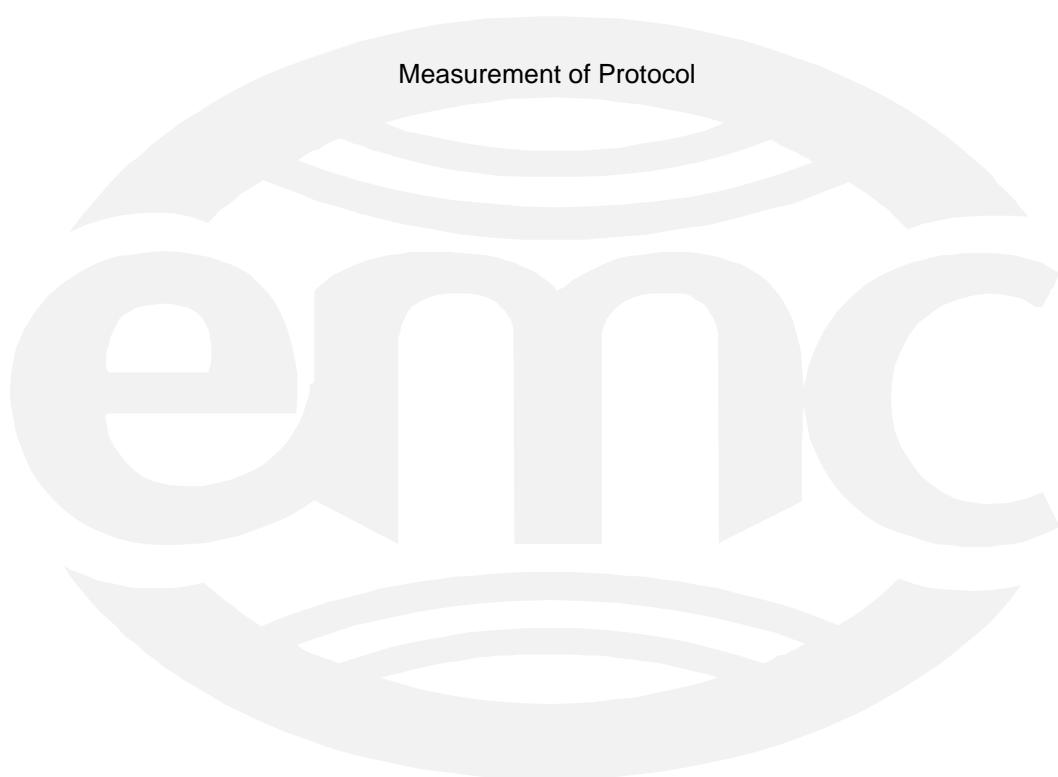
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40 Meadow Road

Pinewood Springs, Lyons, CO 80540 Tel: 303 786 7999 Fax: 303 449 3004 Rev.No 1.0

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Appendix K



Measurement of Protocol

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ± 4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

RADIATED EMISSIONS

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

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor & Cable (dB)	=	Final (dB μ V/m)	-	FCC B Limit (dB μ V/m)	=	Delta FCC B (dB)
32.21	13.9	+	16.3	=	30.2	-	40.0	=	-9.8

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with **ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."**

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with $50\ \Omega/50\ \mu\text{H}$ (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor **and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room.** In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 24802 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and peak or quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Average field strength levels were computed from the peak readings and duty cycle of the transmitter. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.