Percomm Inc.

OMNIDATA-PT1005-A

Report of Measurements

Per

CFR47, FCC Part 15, Subpart B and FCC Part 24 Subpart D

Revision 1.1

August 14, 2002

Approvals		
Written By:	Craig Long	8/14/02 Date
Checked by	Robert Stirling, P.Eng.	8/14/02 Date

Protocol Labs, Abbotsford B.C., Canada
FCC Registration Number 96437
Industry Canada Registration Number IC3384

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FCC CFR47 Part 15/B Report of Measurements

Testing Details

TESTED BY: Robert Stirling

TEST CONDITIONS: Temperature and Humidity: 26°C, 60%

TEST VOLTAGE: 12 VDC

Test Facilities

Protocol Labs
28945 McTavish Rd.
Abbotsford B.C., Canada, V4X 2E7

FCC Registration Number 96437
Industry Canada Registration Number IC3384

Test Equipment List:

EMISSIONS

Device	Model Number	Serial No.	Last Cal.	Next Cal
Antenna	EMCO 3141 Bilog	1127	09/13/01	09/13/02
Antenna	EMCO 3105	2024	09/10/01	09/10/02
Spectrum Analyzer	Hewlett Packard 8566B	2241A02102	01/10/02	01/10/03
RF-Preselector	Hewlett Packard 85685A	3107A01222	01/10/02	01/10/03
Quasi-Peak Adapter	Hewlett Packard 85650A	2043A00240	01/10/02	01/10/03
Power Meter	Marconi 6960B	237087/007	02/11/02	02/11/03
Power Sensor	Marconi	961823/002	02/11/02	02/11/03
Tower	Rhientech Labs	Custom	N/A	N/A
Turntable	Protocol	Custom	N/A	N/A

Equipment Under Test:

THE TEST SYSTEM:

EUT	REFLEX Telemetry Device	
Manufacturer	Percomm Inc.	
Model Name	OMNIDATA	
Model Number	PT1005-A	
Serial Number	50608	
Antenna Type		
Manufacturer	Radiall/Larson	
Part Numbers	SPWH 20918	
Coaxial Cable		
Part Number	RG142	
Auxiliary Equipment		
Manufacturer	Percomm Inc..	
Part Number	Carrier Board (Mechanical Mounting)	
Serial Number	N/A	
Test Software	BIT	Rev. R30
	LTMENU_RPT	Rev. R34

TEST SETUP: The EUT was setup as it would be set up in the field.

CABLING:

Cable	Name	Ferrite	Shielded
Antenna Cable	Cable from EUT to antenna	No	No
Power Cable	DC Power cable Going at a 12 VDC Battery	No	No

TEST SUMMARY

Test	Standard	Description	Result
Conducted Emissions	FCC15.207 Class B Limits	The Conducted Emissions are measured on the phase and Neutral Power lines in the 0.15 - 30.0 MHz range.	Not Required (Not directly connected to power mains)
Radiated Emissions	FCC15.109 15.209 Class B Limits	The Radiated Emissions are measured above 30 MHz.	Complies
Maximum Power	FCC 2.1033/ 2.1046/ 24.132a 7 Watts ERP	Maximum Power Rating	Complies
Radiated Spurious	FCC 2.103/ 2.1053/ 24.133	The radiated emissions are measured up to the 10^{th} Harmonic	Complies
Spurious Emissions at Antenna Terminal	FCC 2.1035/ 2.1051/ 24.132	The radiated emissions are measured in the 30-1000Mhz range	Complies

MODIFICATIONS: This unit requires no modifications for it to pass.

CONCLUSION: OMNIDATA-PT1005-A tested complies with the requirements of FCC CFR47 part 15/B and FCC Part 24 subpart D

Part 1 - Radiated Emission Testing

DATE: July 4, 2002

TEST STANDARD: FCC CFR47, Part 15, Subpart B section 15.109/ 15.209 Class B
FCC Part 24 Subpart D

DEVICE DESCRIPTIONS: Refer to the Equipment Under Test Section, above, for EUT Descriptions.

TEST SETUP: The equipment was set up in a 3 meter open field test site. Emissions in both horizontal and vertical polarization's were measured while rotating the EUT on a turntable to maximize the emissions signal strength and the results recorded on the attached plots.

CABLING DETAILS: The EUT was set up using the manufacturer's specified normal cabling configuration.

CABLE DESCRIPTIONS

Cable	Name	Ferrite	Shielded
Antenna Cable	Cable from EUT to antenna	No	No
Power Cable	DC Power cable Going at a 12 VDC Battery	No	No

MINIMUM STANDARD: Class B Limits:

Frequency (MHz)	Maximum Field Strength dBuV/m at 3m
30 - 88	39.0
88 - 216	43.5
216 - 960	46.5
960 - up	49.5

MEASUREMENT DATA: See Appendix B for Plots, The blue trace represents all emissions, including ambient noise. 'All Suspects' are marked in purple. FCC Class B limits are marked in solid purple.

EMISSIONS DATA: See Table 1 in Appendix B for corresponding frequencies.

PERFORMANCE: Complies.

Part 2 - Spurious Emission Testing

DATE:	July 4, 2002
TEST STANDARD	FCC CFR47, Part 2, 103, and 1053, and Part 24, Subpart D 133
DEVICE DESCRIPTIONS:	Refer to the Equipment Under Test Section, above, for EUT Descriptions.
TEST SETUP:	The equipment was set up at a 3 m measurement distance, and. Spurious emissions we measured in both horizontal and vertical polarizations with signal strength and the results recorded on the attached graph and tables.
CABLING DETAILS:	The EUT was Set up using the manufacturer's specified normal cabling configuration.
MINIMUM STANDARD	Spurious Attenuation = 43 + 10logl0(Power)dB .Power is specified in Watts. (Nomimal 1 W Power)
MEASUREMENT DATA:	See Appendix B for Graphs and Data
EMISSIONS DATA:	See Table 2 Spurious Emissions in Appendix B, for corresponding frequencies.
MEASUREMENT PROCEDURE:	A bilog and horn antenna located 3 meters away from the transmitter picks up any signal radiated from the transmitter. A spectrum analyzer covering the necessary frequency range is used to detect and measure any radiation picked up by the antenna. The testing procedure is repeated for both horizontal and vertical polarizations of the receiving antenna. Relative signal strength is indicated on the spectrum analyzer connected to this antenna., and the cable losses, amplifier gain and antenna correction factor are added to calculate the signal strength. Actual measurements are recorded on the attached graphs.
PERFORMANCE:	Complies.

Part 3 - Conducted Emission at the Antenna Terminal

DATE:	July 4, 2002
TEST STANDARD	FCC CFR47, Part 2 1035 and 1051 FCC Part 24 Subpart D 24.132
DEVICE DESCRIPTIONS:	Refer to the Equipment Under Test Section, above, for EUT Descriptions.
TEST SETUP:	Data on the spurious emissions at the antenna terminals is presented in the form of spectrum analyzer plots, which illustrates the magnitude of spurious frequencies. A 21 dB attenuator is connected to the RF connector to provide the suitable antenna load. Then the 21 dB attenuator is connected to the Spectrum Analyzer and measurements are made using the transmit carrier frequency.
MINIMUM STANDARD:	Spurious Attenuation = 43 + 10log 10(Power)dB .Power is specified in Watts. (Nomimal 1 W Power)
MEASUREMENT DATA:	See Appendix B for Plots,and Measurement data
EMISSIONS DATA:	See Tables 3, 4 and 5 in Appendix B for corresponding measurements.
PERFORMANCE:	Complies.

Part 4 - Radiated Power Measurements

DATE:	July 4, 2002
TEST STANDARD	FCC CFR47, Part 15, Subpart B section 15.109 Class B FCC Part 24 Subpart D 132 and Part: 2.1033/ 2.1046
DEVICE DESCRIPTIONS:	Refer to the Equipment Under Test Section, above, for EUT Descriptions.
MEASUREMENT PROCEDURE	The radiated RF power output is measured with the transmitter adjusted to the maximum output setting. And a 21 dB attenuator and cable losses are accounted for to obtain the final measurement. The 21 dB attenuator is connected to the unit's RF connector to supply a good 50 ohm load for the transmitter. The attenuator is then connected to a Marconi 6960B Power Meter via a 6912 Power Sensor. The unit is placed into Transmitter on test mode. The amplitude of the RF power out is measured on the power meter.
MINIMUM STANDARD:	7 Watts Maximum
EMISSIONS DATA:	See Table 6 in Appendix B for corresponding measurements.
PERFORMANCE:	Complies.

Appendix A: Photos

Emissions Test Setup Front View

Emissions Test Setup Rear View

Appendix B: Measurement Data and Plots

Measurement Data

Table 1: Total Radiated Emissions

Frequency (MHz)	Pol	Height (cm)	Angle (deg)	Un Corr Pk (dB)	Tot Corr (dB)	Peak (dBuV/m)	DelLim-Pk (dB)
30.009244	Vert	100	0	10.30	8.35	18.65	-20.35
33.190543	Vert	100	0	11.40	7.11	18.51	-20.49
55.243899	Vert	100	0	9.50	6.64	18.14	-20.86
110.616980	Vert	100	0	9.50	9.12	18.62	-24.88
165.917116	Vert	100	0	8.10	11.88	19.98	-23.52
276.487913	Vert	100	0	11.80	13.68	25.48	-20.92
980.494229	Vert	100	0	4.70	28.75	33.45	-16.05

Table 2: Radiated Spurious Emissions 901.5 MHz

Harmonic	Frequency (MHz)	Polarity	Uncor Pk (dBuV)	Tot Corr (dB)	Peak (dbuV/m)	Limit (dBuV/m)	Delta Lim (dB)	Signal (dBc)
1st	901.50	Vert	84.20	39.80	124.00	81		
1st	901.50	Horz	78.40	39.80	118.20	81		
2nd	1803.00	Vert	27.10	47.90	75.00	81	-6.00	-49.00
2nd	1803.00	Horz	21.70	47.90	69.60	81	-11.40	-54.40
3rd	2704.50	Vert	9.20	7.28	16.48	81	-64.52	-107.52
3rd	2704.50	Horz	10.30	7.28	17.58	81	-63.42	-106.42
4th	3606.00	Vert	10.50	14.64	25.14	81	-55.86	-98.86
4th	3606.00	Horz	7.90	14.64	22.54	81	-58.46	-101.46
5th	4507.50	Vert	9.90	18.82	28.72	81	-52.28	-95.28
5th	4507.50	Horz	10.60	18.82	29.42	81	-51.58	-94.58
6th	5409.00	Vert	10.40	22.44	32.84	81	-48.16	-91.16
6th	5409.00	Horz	9.40	22.44	31.84	81	-49.16	-92.16

(No other measurable spurious emissions)

Table 3: Conducted Spurious Emissions 901.0 MHz

Harmonic	Frequency (MHz)	Uncor Pk (dBuV)	Tot Corr (dB)	Peak (dbuV/m)	Limit (dBuV/m)	Delta Lim (dB)	Signal (dBc)
1st	901.00	116.5	21.1	137.6			
2nd	1802.00	38.7	21.3	60	94.6	-34.6	-77.6
3rd	2703.00	30.6	21.4	52	94.6	-42.6	-85.6
4th	3604.00	24.8	21.5	46.3	94.6	-48.3	-91.3
5th	4505.00	23	21.55	44.55	94.6	-50.05	-93.05
6th	5406.00	12.4	21.7	34.1	94.6	-60.5	-103.5

(No other measurable spurious emissions)

Table 4: Conducted Spurious Emissions 901.5 MHz

Harmonic	Frequency (MHz)	Uncor Pk (dBuV)	Tot Corr (dB)	Peak (dbuV/m)	Limit (dBuV/m)	Delta Lim (dB)	Signal (dBc)
1st	901.50	116.7	21.1	137.8			
2nd	1803.00	38.2	21.3	59.5	94.8	-35.3	-78.3
3rd	2704.50	42.4	21.4	63.8	94.8	-31	-74
4th	3606.00	24.4	21.5	45.9	94.8	-48.9	-91.9
5th	4507.50	22.1	21.55	43.65	94.8	-51.15	-94.15
6th	5409.00	12.7	21.7	34.4	94.8	-60.4	-103.4

(No other measurable spurious emissions)

Table 5: Conducted Spurious Emissions 902.0 MHz

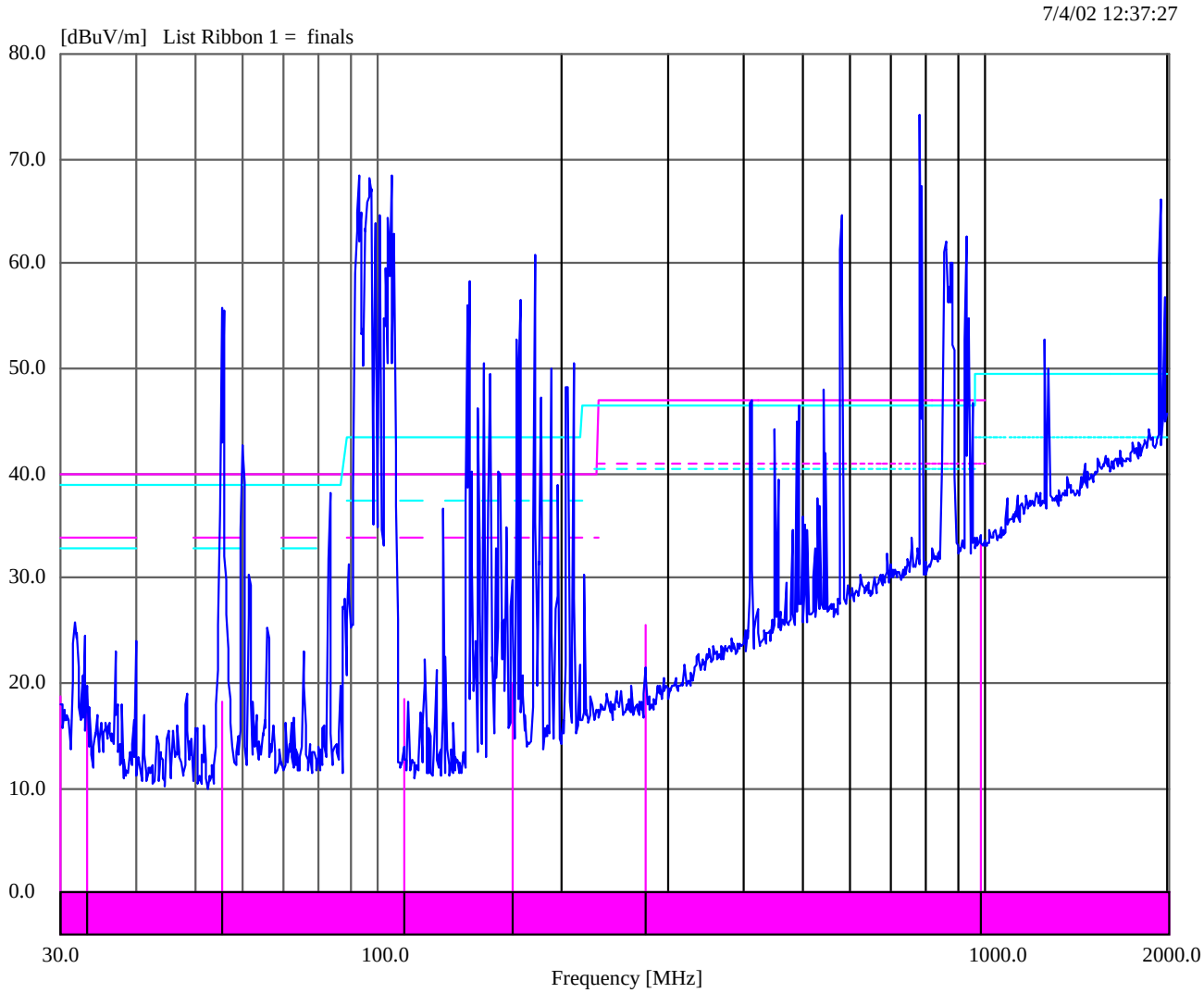
Harmonic	Frequency (MHz)	Uncor Pk (dBuV)	Tot Corr (dB)	Peak (dbuV/m)	Limit (dBuV/m)	Delta Lim (dB)	Signal (dBc)
1st	902	116	21.1	137.1			
2nd	1804	38.3	21.3	59.6	94.1	-34.5	-77.5
3rd	2706	34.5	21.4	55.9	94.1	-38.2	-81.2
4th	3608	25.1	21.5	46.6	94.1	-47.5	-90.5
5th	4510	15.8	21.55	37.35	94.1	-56.75	-99.75
6th	5412	12.5	21.7	34.2	94.1	-59.9	-102.9

(No other measurable spurious emissions)

Table 6: Conducted Peak Power

Frequency (MHz)	Uncor Power (dBm)	Tot Corr (dB)	Peak (dBm)	Peak (mW)
901.00	17.52	12.0	29.52	895.4
901.50	17.45	12.0	29.45	881.0
902.00	17.45	12.0	29.45	881.0

Emissions Plots



FCC Limit

10 dB below FCC Limit

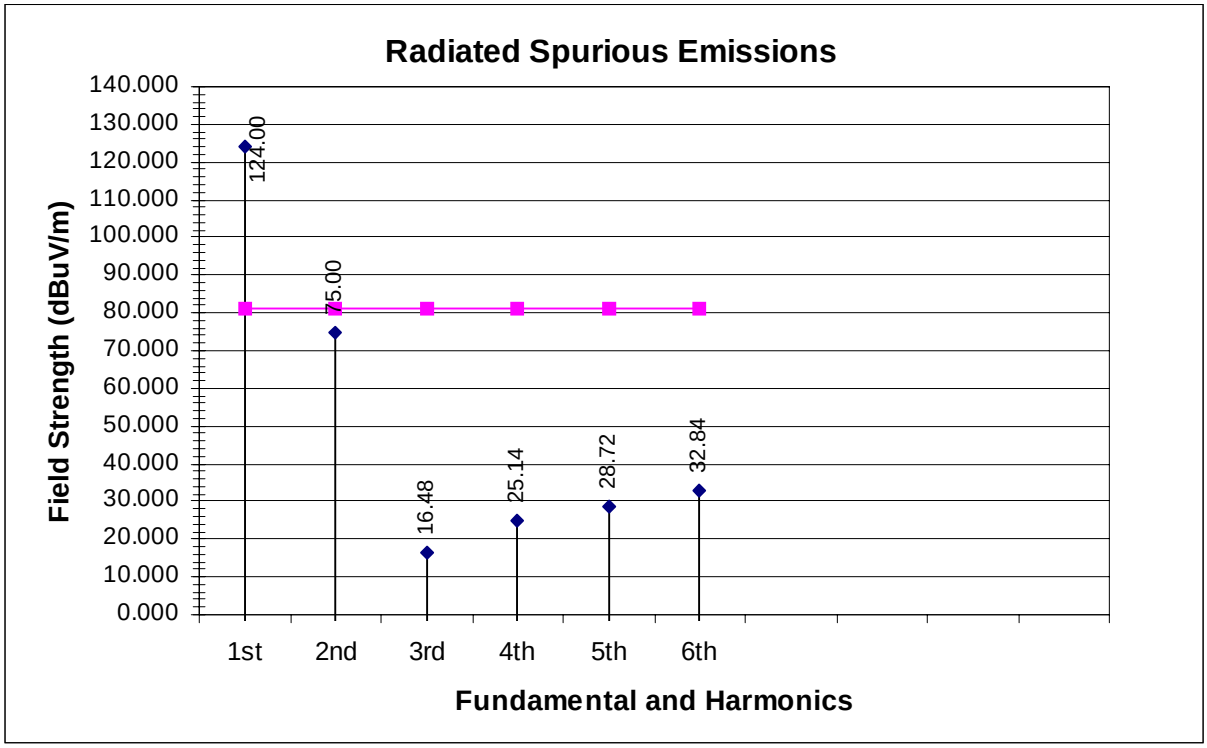
CISPR Limit

10 dB below CISPR Limit

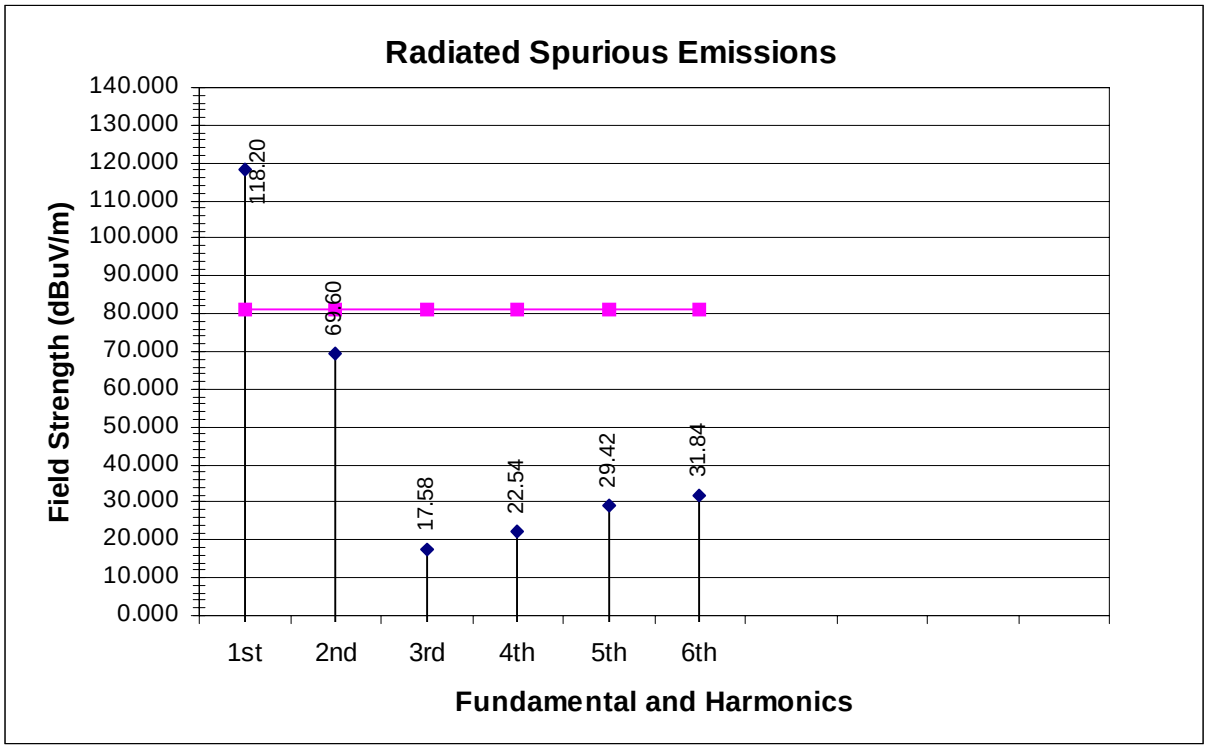
(Dark Blue Traces) All Emissions including ambient noise.

(Vertical Pink Line) – Markings of each Suspect Frequency
("X") – indicates Quasi-Peak

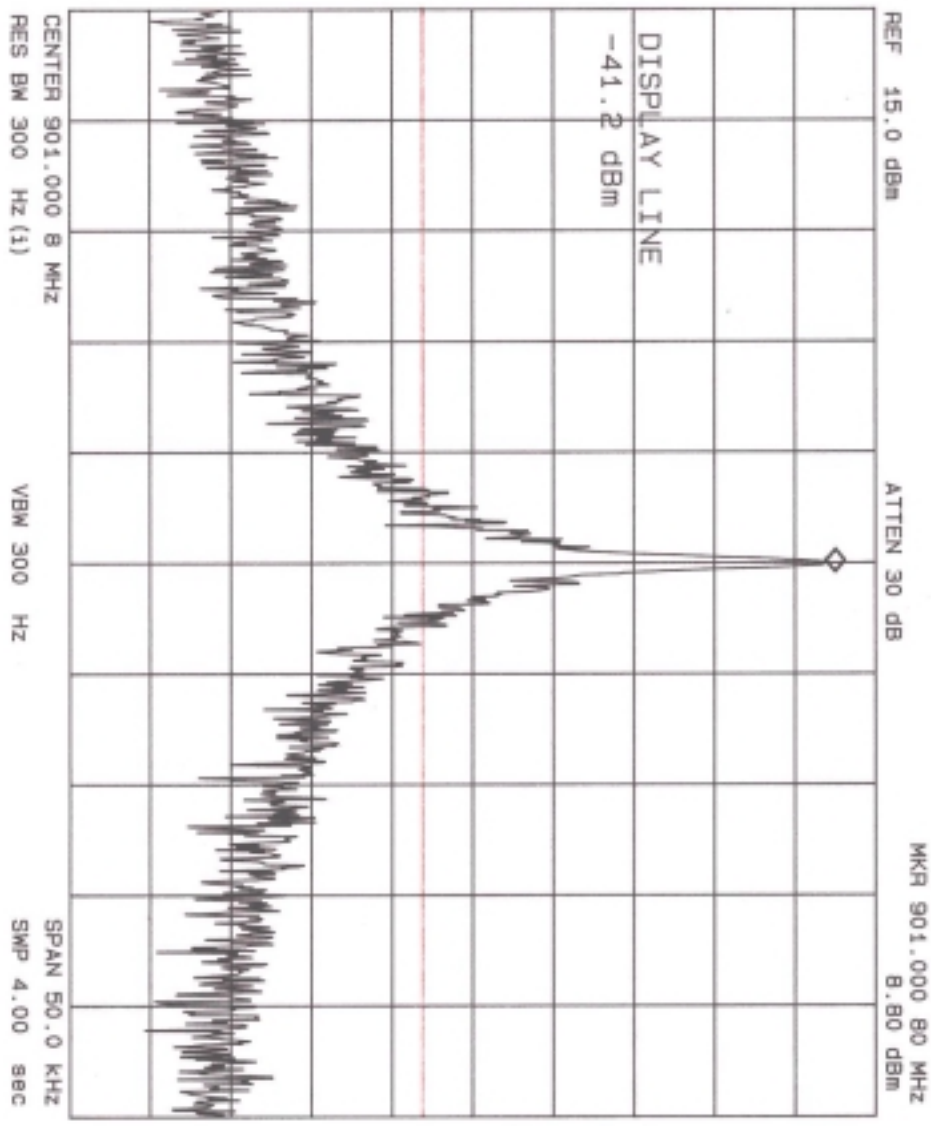
Plot 1 Radiated Emission



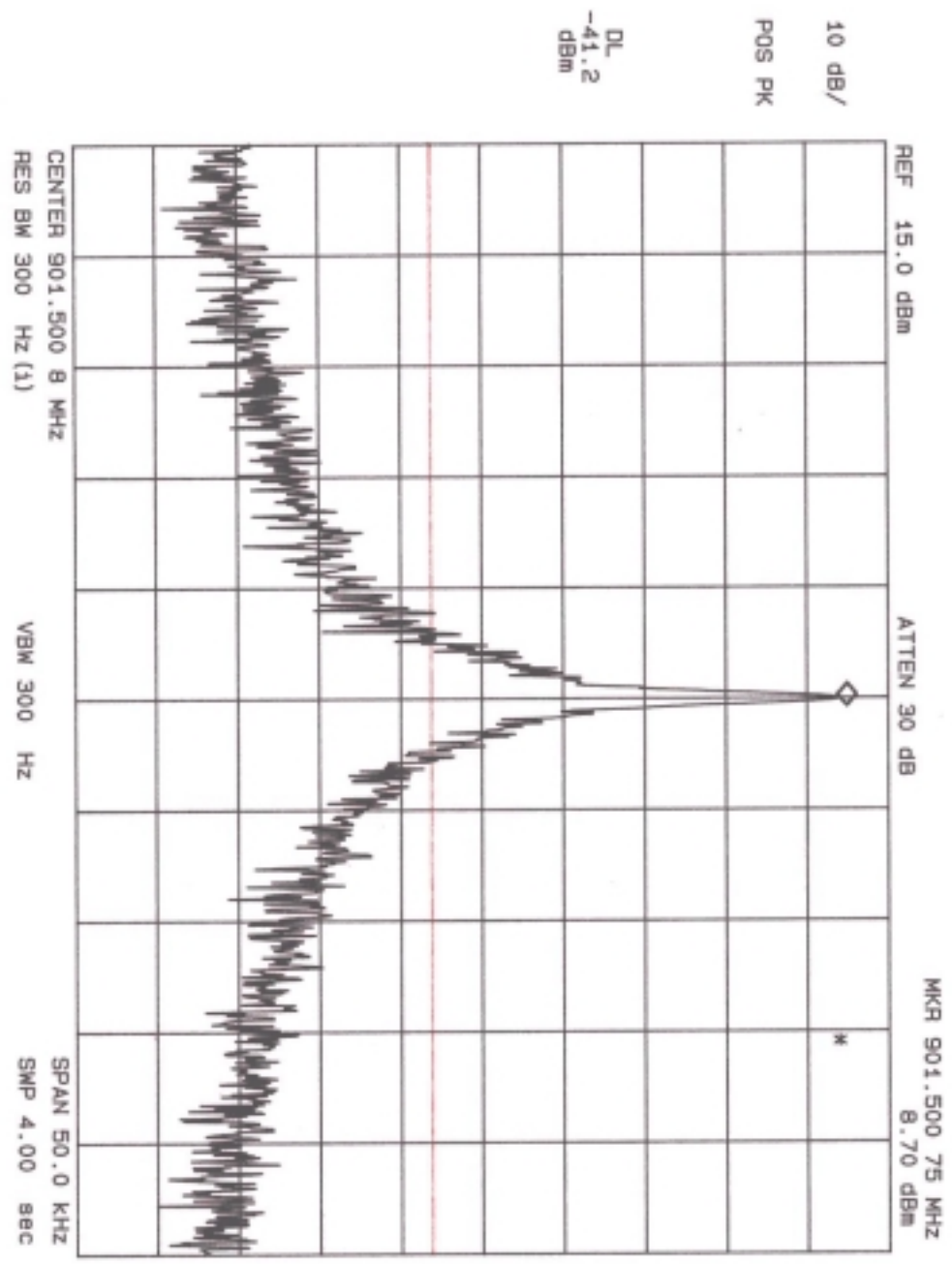
Plot 2 Vertical Radiated Spurious mid Channel (901.5 MHz)



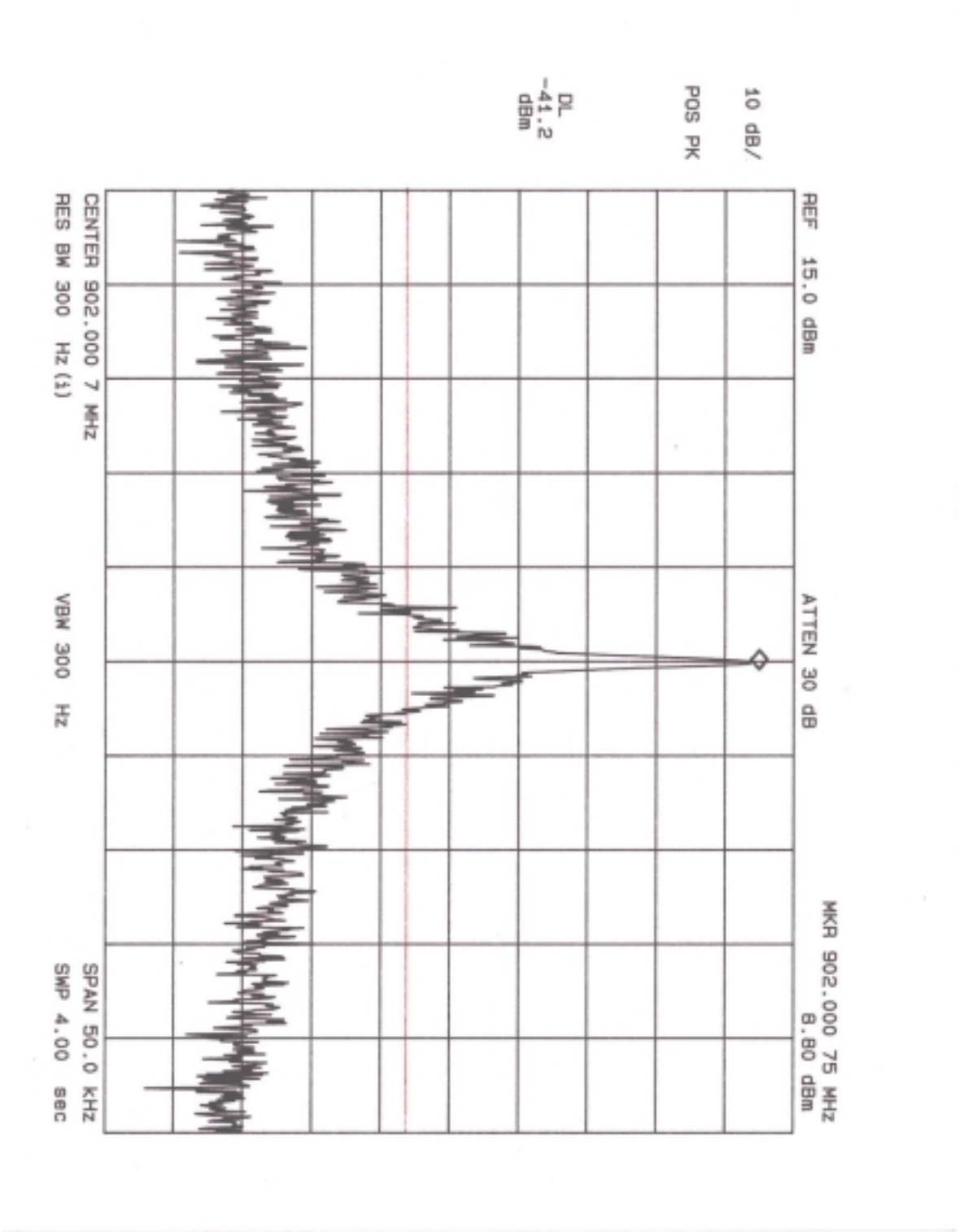
Plot 3 Horizontal Radiated Spurious mid Channel (901.5 MHz)



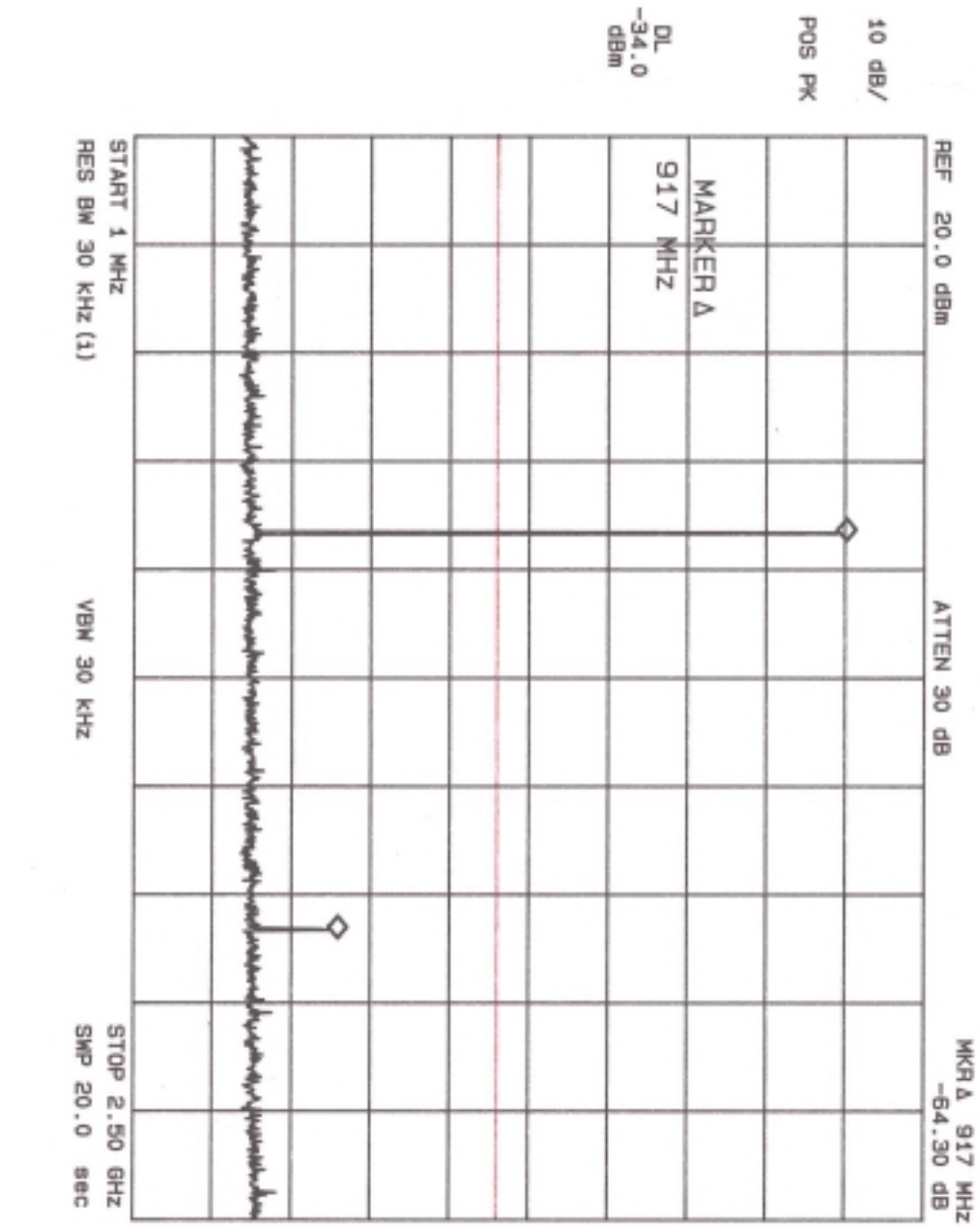
Plot 4 901.0 Bandedge



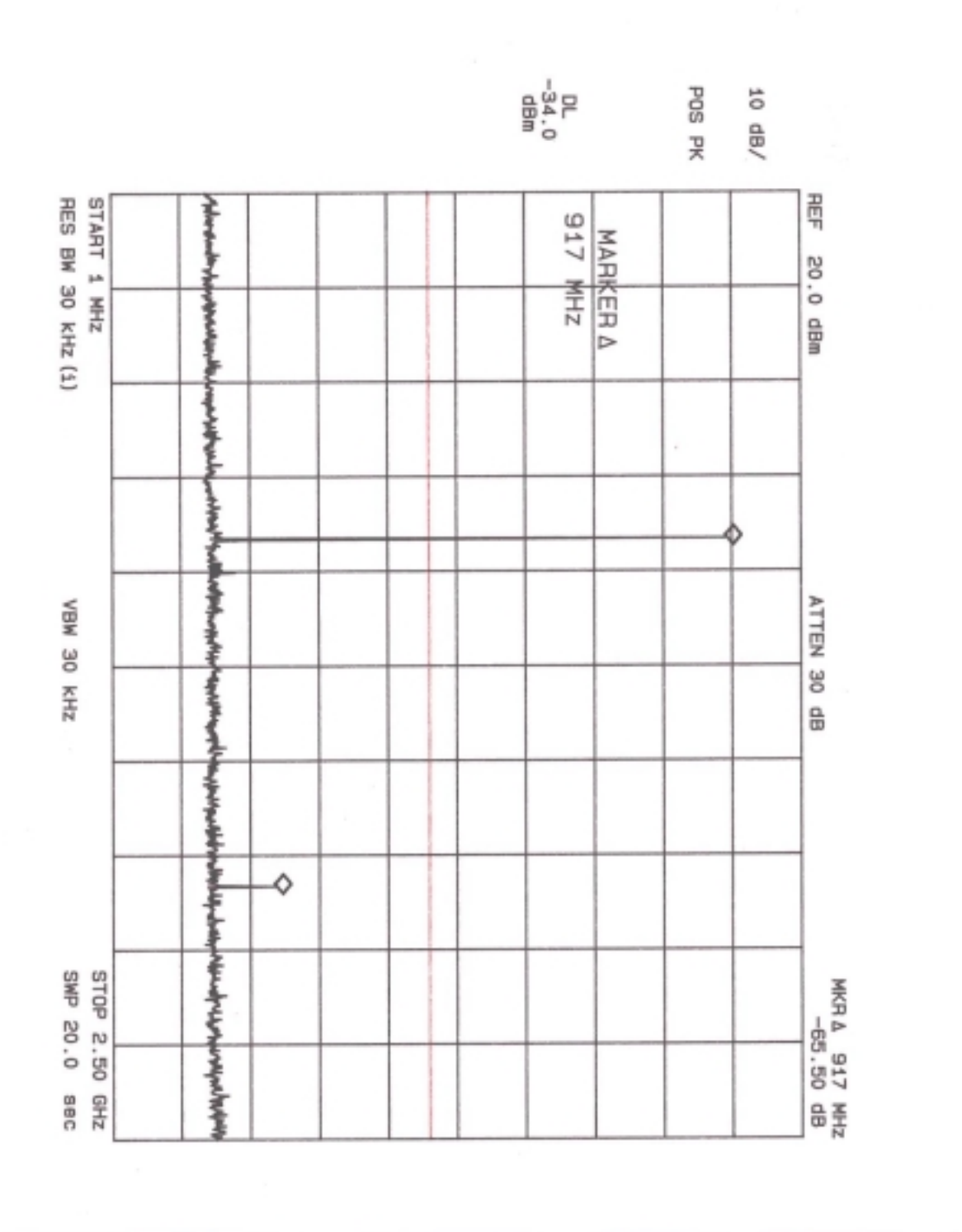
Plot 5 901.5 Bandedge



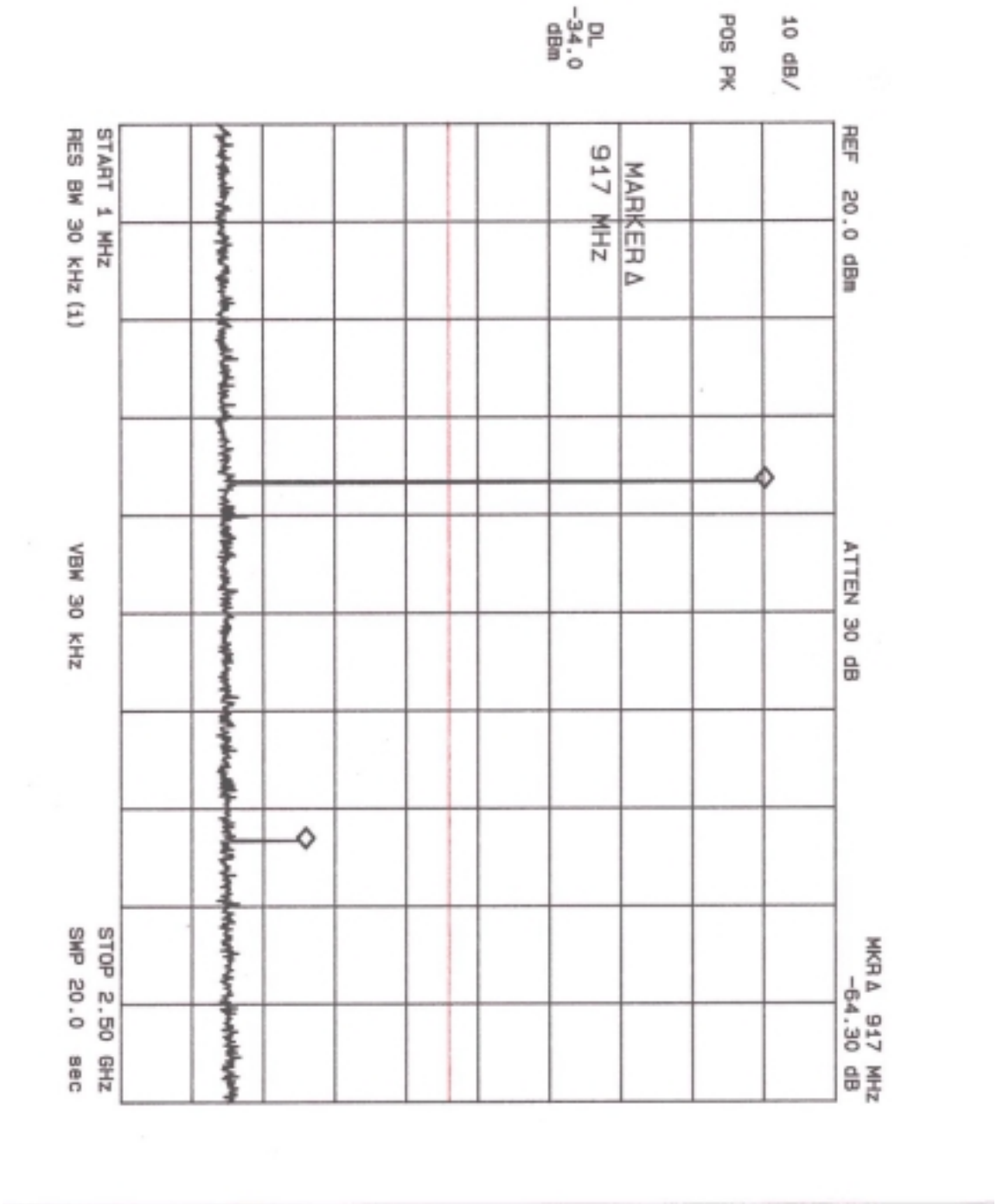
Plot 6 902.0 Bandedge



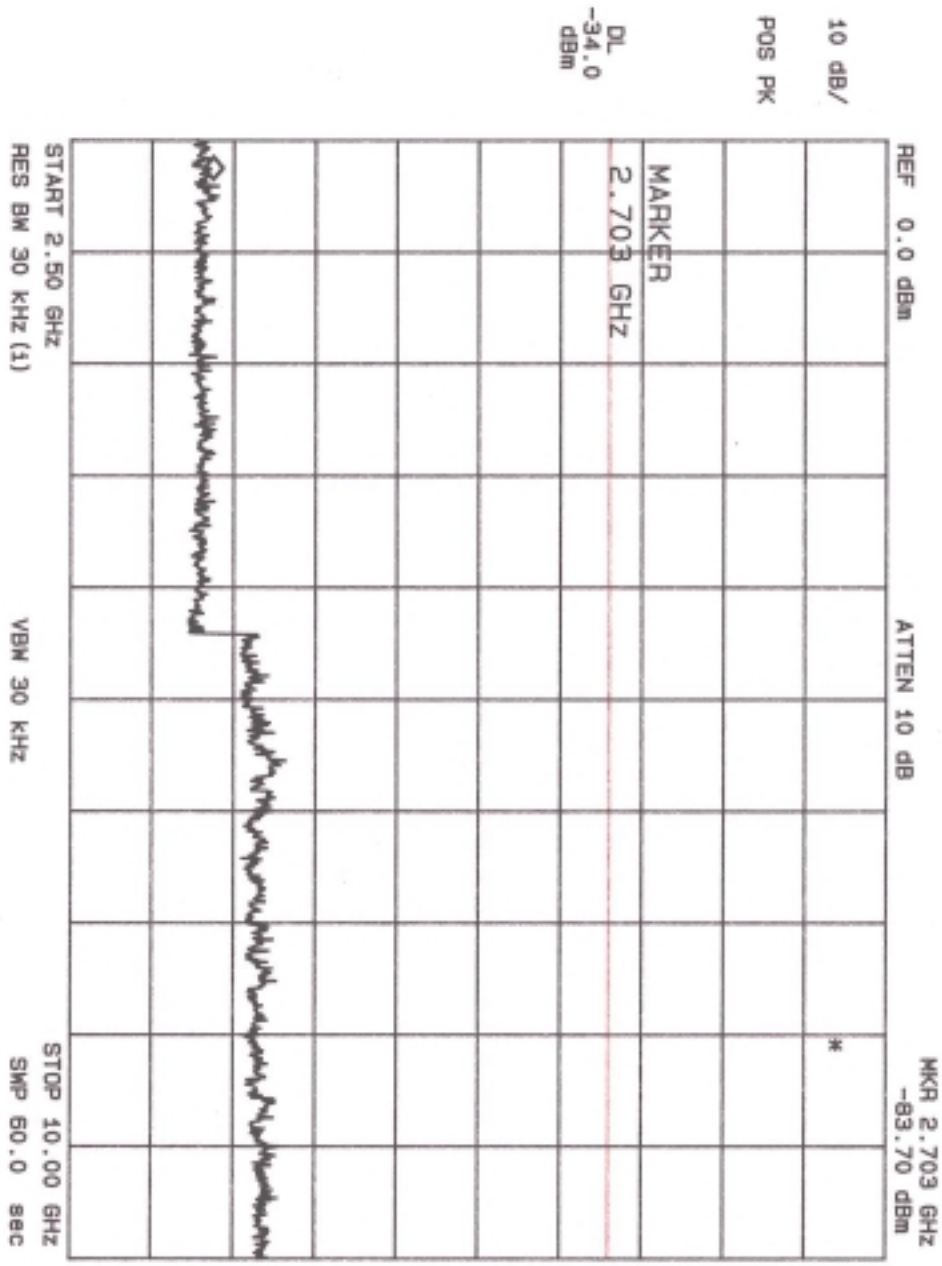
Plot 7 901.0 Low Band Spurious



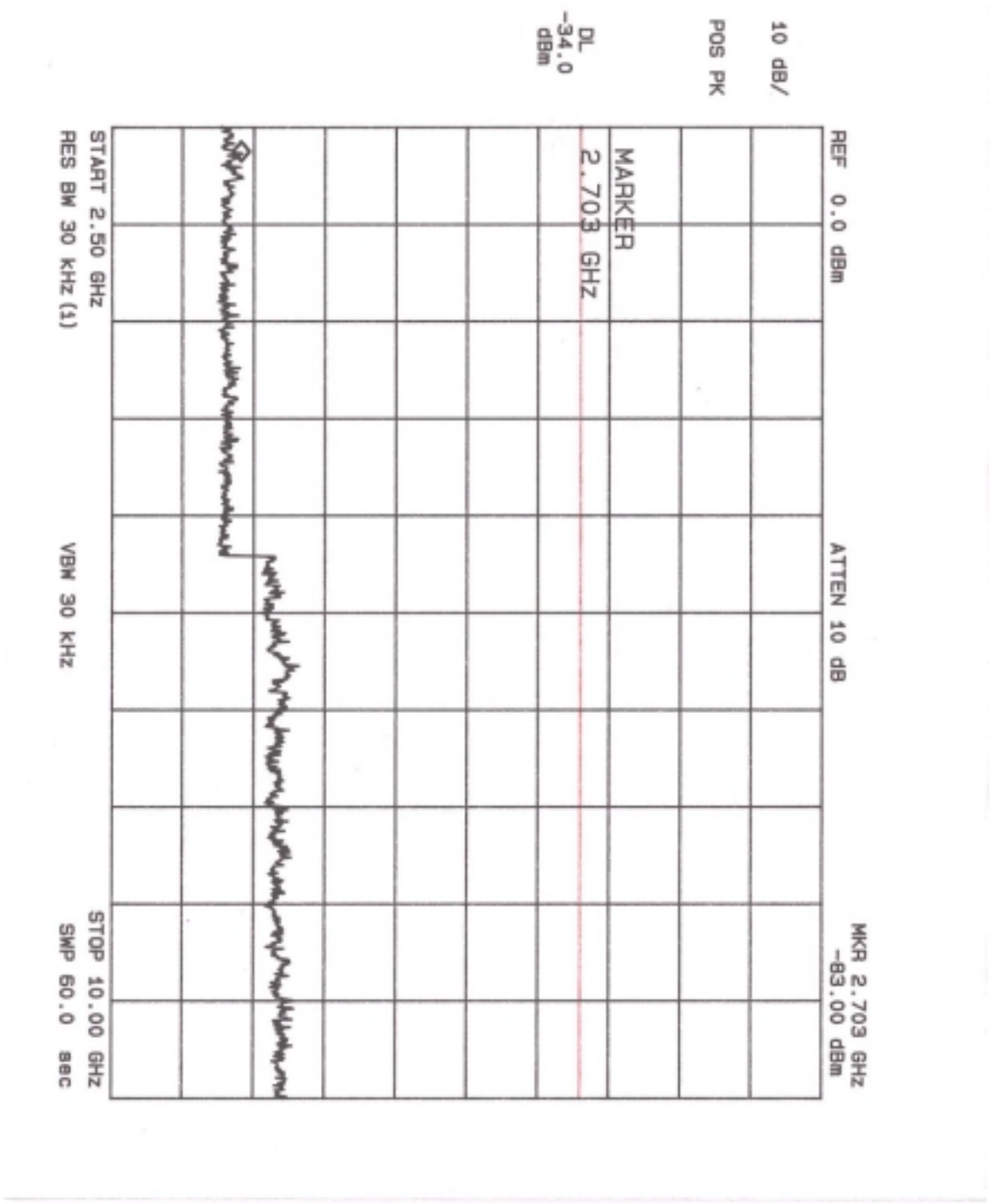
Plot 8 901.5 Low Band Spurious



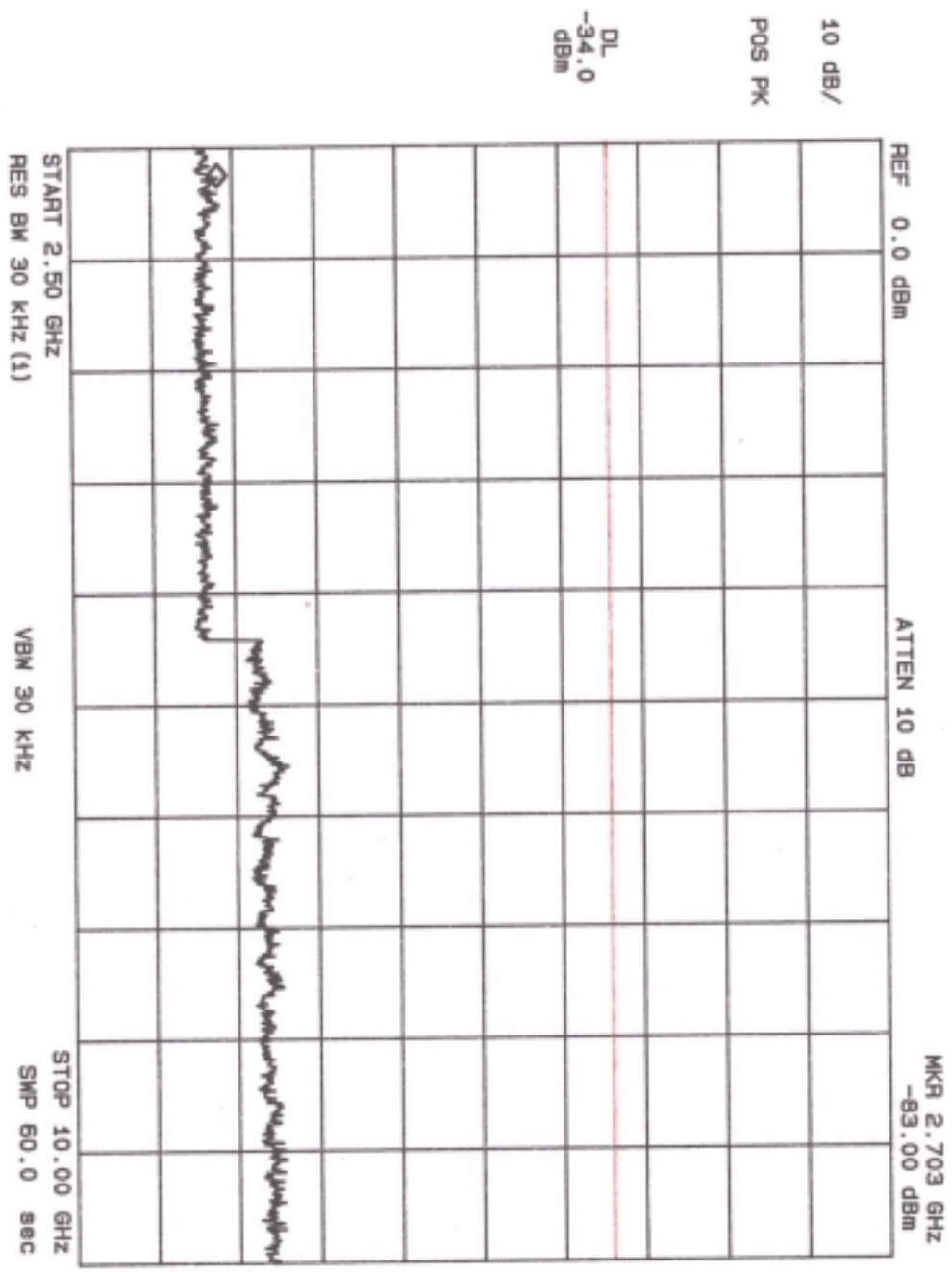
Plot 9 902.0 Low Band Spurious



Plot 10 901.0 High Band Spurious



Plot 11 901.5 High Band Spurious



Plot 12 902.0 High Band Spurious