

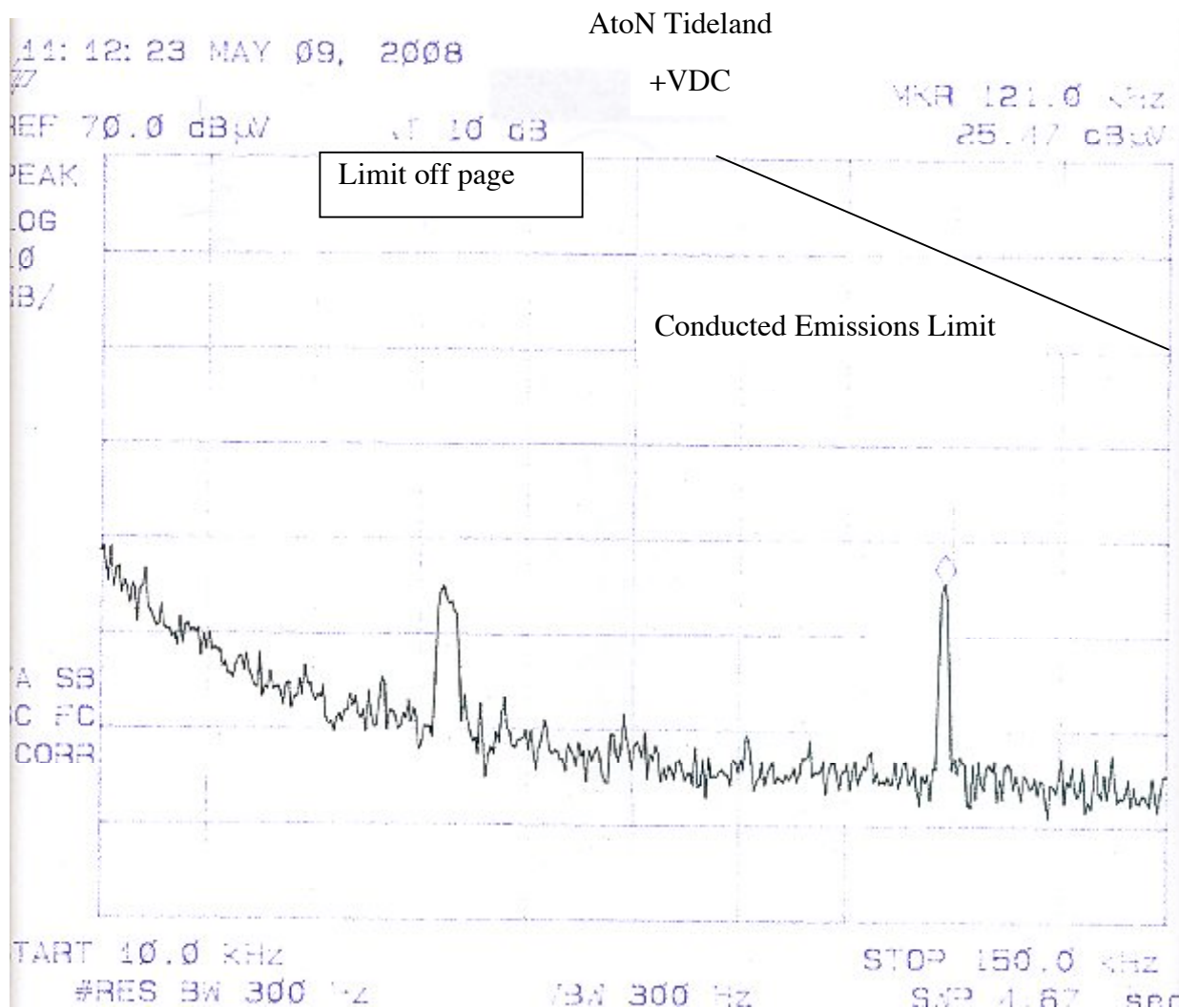


Photograph 7 – Conducted Immunity

X. EMC Measurement Results Cont'd:

1. Conducted Emissions – Data.

Frequency range: 10 kHz to 150 kHz Limit: 96 dBuV decreasing to 50 dBuV

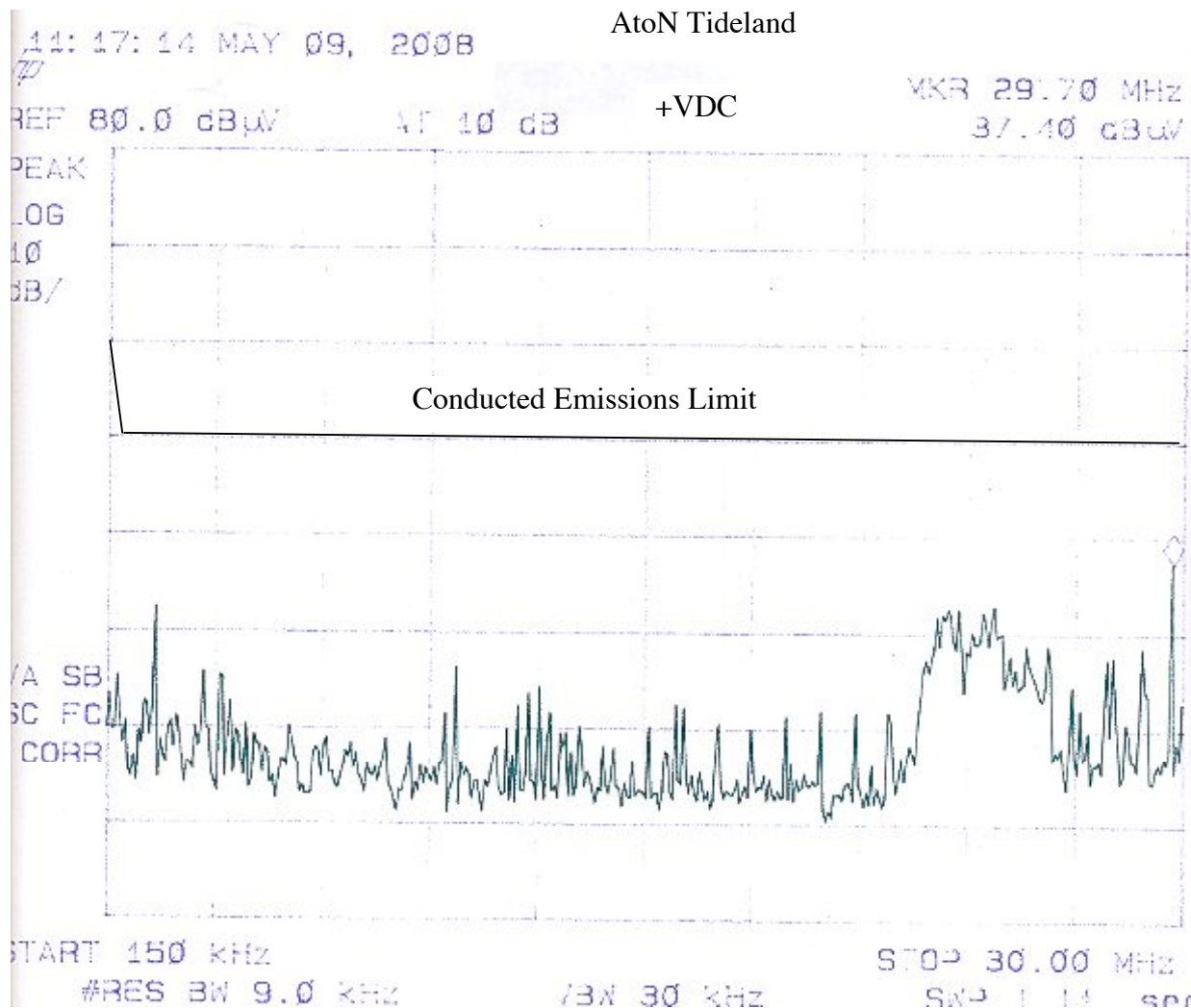


X. EMC Measurement Results Cont'd:

1. Conducted Emissions – Data Cont'd.

Frequency range: 150 kHz to 350 kHz, Limit: 60 dBuV decreasing to 50 dBuV

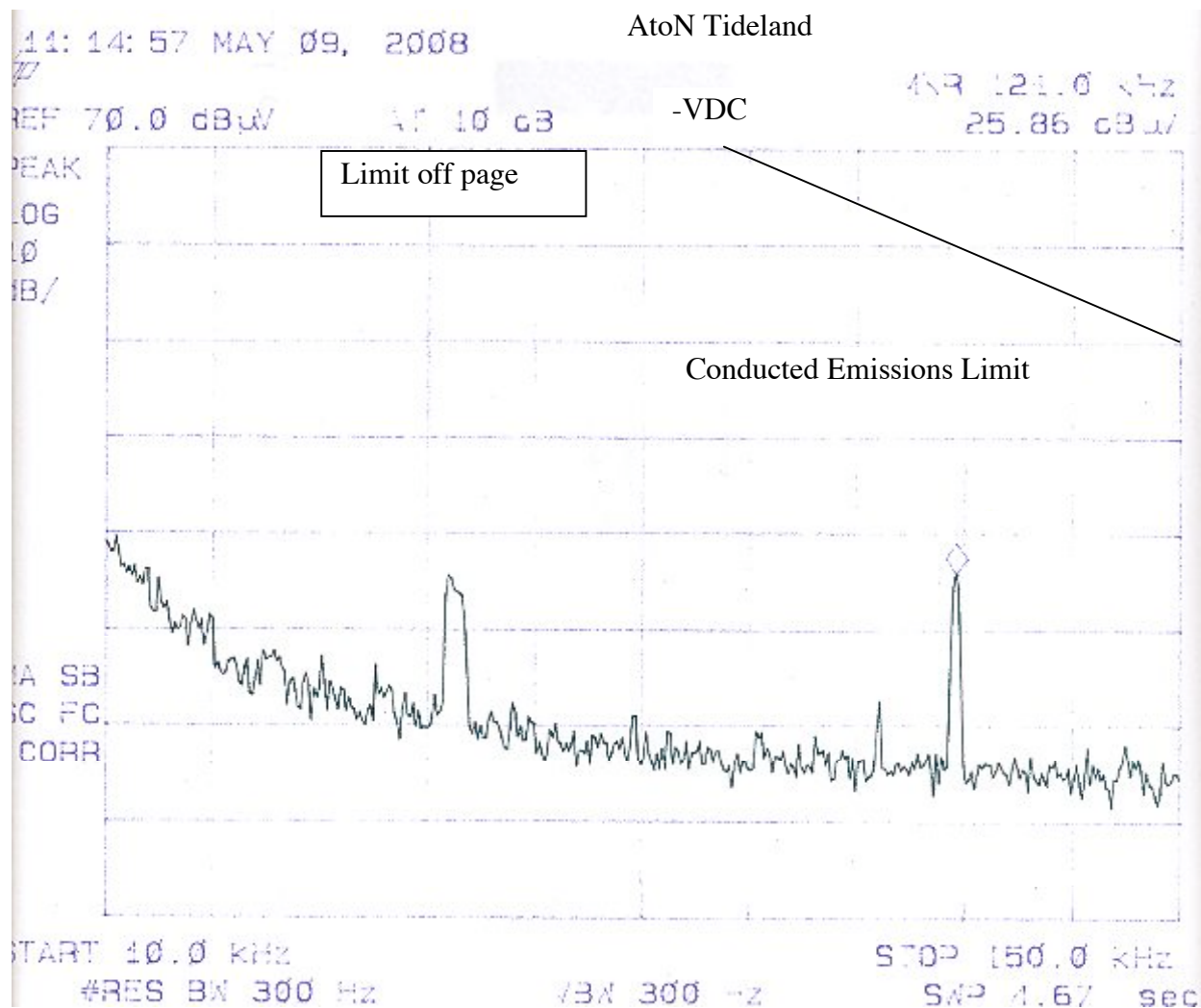
Frequency range: 0.35 MHz to 30 MHz, Limit: 50 dBuV



X. EMC Measurement Results Cont'd:

1. Conducted Emissions – Data Cont'd.

Frequency range: 10 kHz to 150 kHz Limit: 96 dBuV decreasing to 50 dBuV

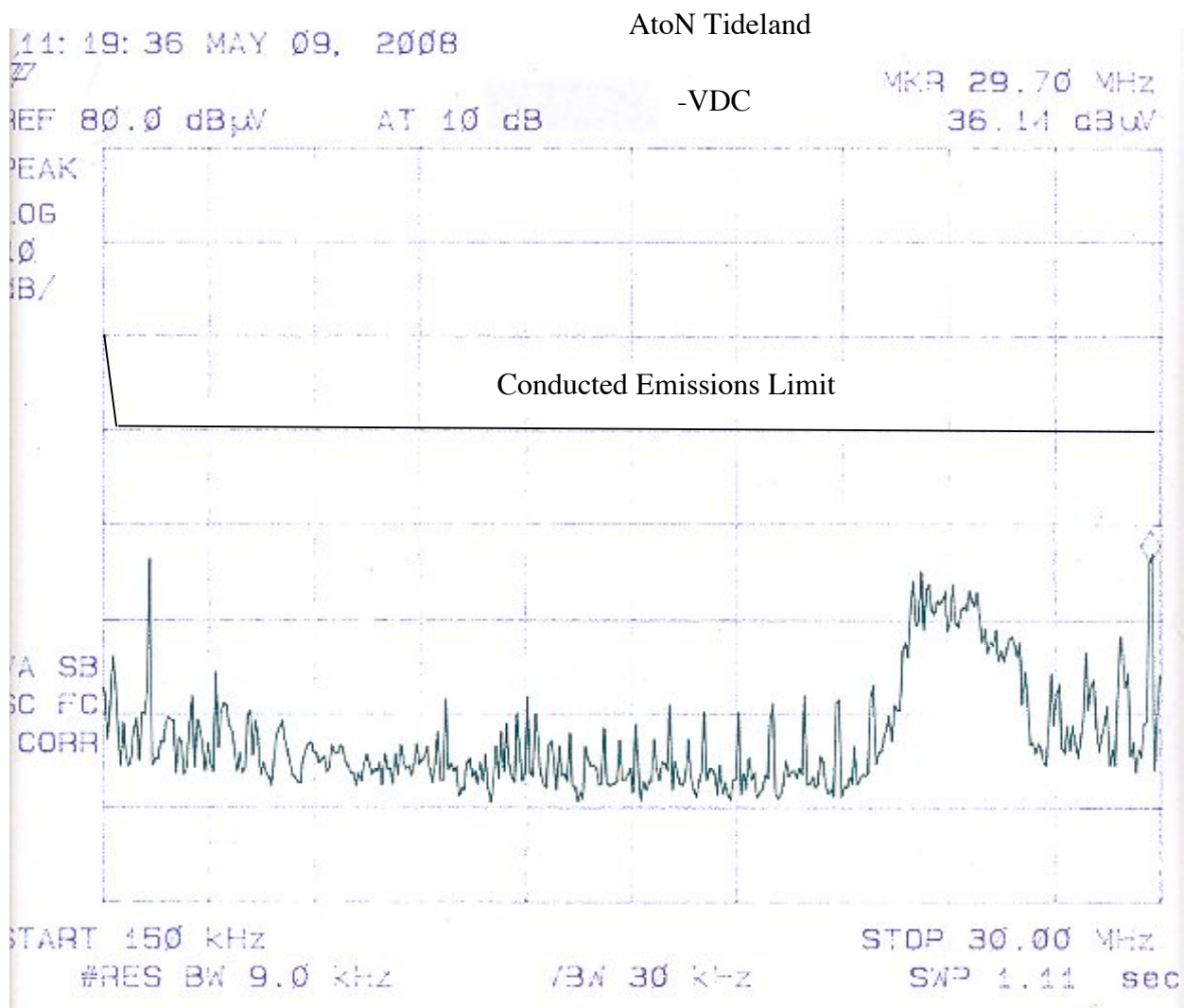


X. EMC Measurement Results Cont'd:

1. Conducted Emissions – Data Cont'd.

Frequency range: 150 kHz to 350 kHz, Limit: 60 dBuV decreasing to 50 dBuV

Frequency range: 0.35 MHz to 30 MHz, Limit: 50 dBuV



X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Correction Factors.

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following pages contain the spectrum analyzer output with the corrected specification limits superimposed. The black pen is the ambient condition, and the other color identifies EUT emissions.

Frequency MHz	3m limit dBuV/m	Antenna dB	Amp dB	Cable dB	Delta dB	Corrected Limit dBuV/m
30	54	19.4	22	1	1.6	55.6
50	54	15.6	22	1	5.4	59.4
75	54	8.2	22	1	12.8	66.8
90	54	9.4	22	2	10.6	64.6
110	54	9.3	22	2	10.7	64.7
125	54	9.2	22	2	10.8	64.8
155	54	9.2	22	2	10.8	64.8
166	54	9.6	22	2	10.4	64.4
300	54	15.2	22	4	2.8	56.8
500	54	16.8	21	5	-0.8	53.2
850	54	20.9	21	7	-9.9	47.1
900	54	22.7	20	7	-11.2	44.3
2000	54	26.8	19	8	-15.8	38.2

Table 1 – Corrected CE Limit

X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Correction Factors at Ambient Frequencies.

The table below describes the correction factors necessary to apply the limit to the spectrum analyzer output. The following pages contain the spectrum analyzer output with the corrected specification limits superimposed. The black pen is the ambient condition, and the other color identifies EUT emissions. Measurements were made at nearer distances to reduce FM, local transmitter, restricted band and cell ambient below the limit threshold.

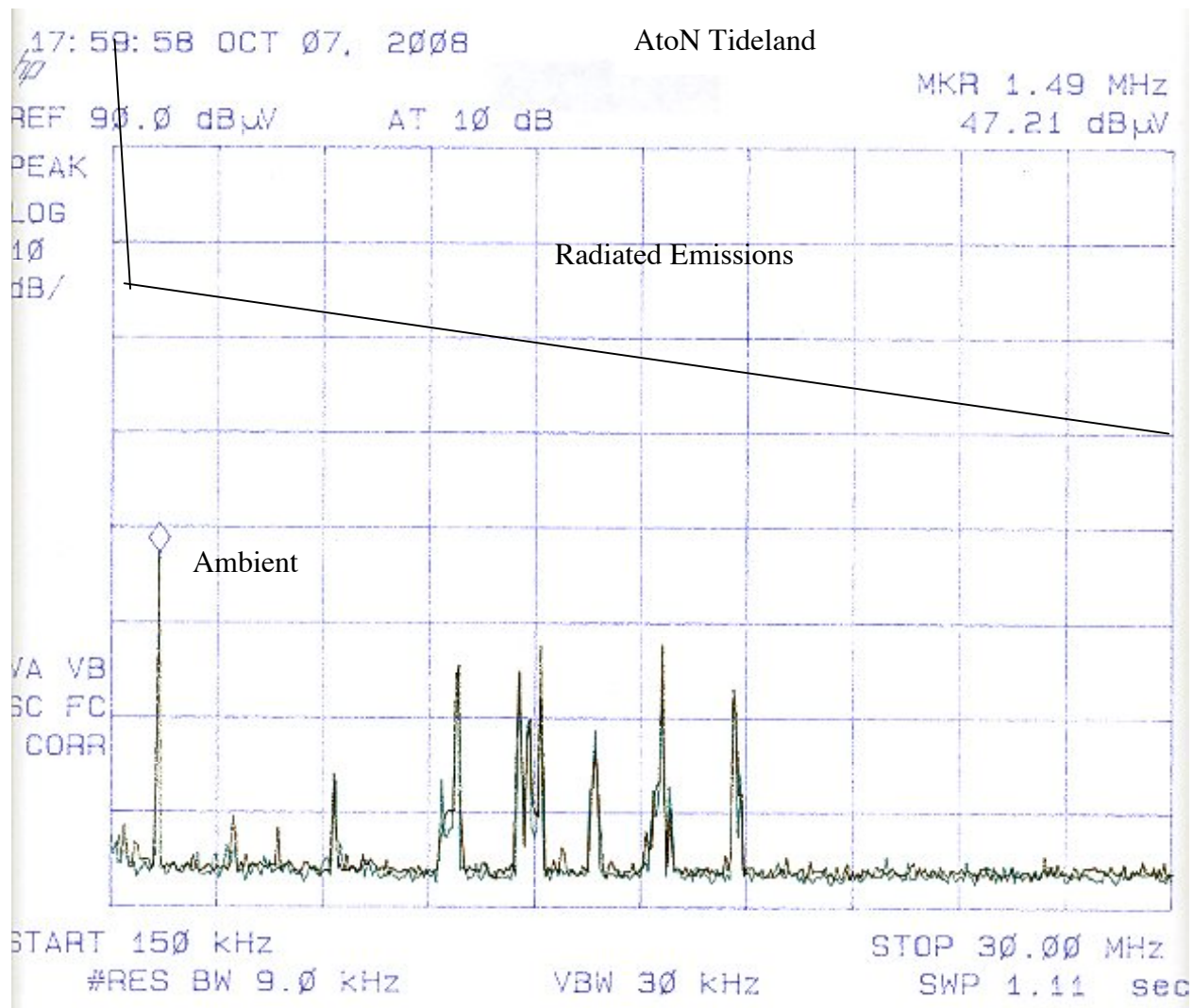
Frequency kHz	Limit @ 1m * dBuV/m	Antenna dB	Correction ** dB	Delta dB	Corrected Limit dBuV/m
150	90.5	41	51.5	10.5	101
300	62.5	39	51.5	12.5	75
30000	44.5	37	51.5	14.5	59
* 10.5 dB distance correction $\rightarrow 1\text{m limit} = 3\text{m lim} + 20 \log (3/1)$ ** 51.5 dB, H- to E-field correction in free space $\rightarrow 20 \log (377\Omega)$					

Frequency MHz	Limit @ 1m * dBuV/m	Antenna dB	Amp dB	Cable dB	Delta dB	Corrected Limit dBuV/m
90	64.5	9.4	22	2	10.6	75.1
92.5**	74	9.6	22	2	10.4	84.4
110	64.5	9.2	22	2	10.8	75.3
156	34.5	9.2	22	2	10.8	45.3
165	34.5	9.6	22	2	10.4	44.9
850	64.5	21.7	20	8	-9.7	54.8
900	64.5	22.1	20	8	-10.1	54.4
* 10.5 dB distance correction $\rightarrow 1\text{m limit} = 3\text{m lim} + 20 \log (3/1)$ for FM, Restricted and Cell ** 20 dB distance correction $\rightarrow 0.3\text{m limit} = 3\text{m lim} + 20 \log (3/0.1)$ for Local Transmitter						

Tables 2-1 & 2-2 – Corrected CE Limit

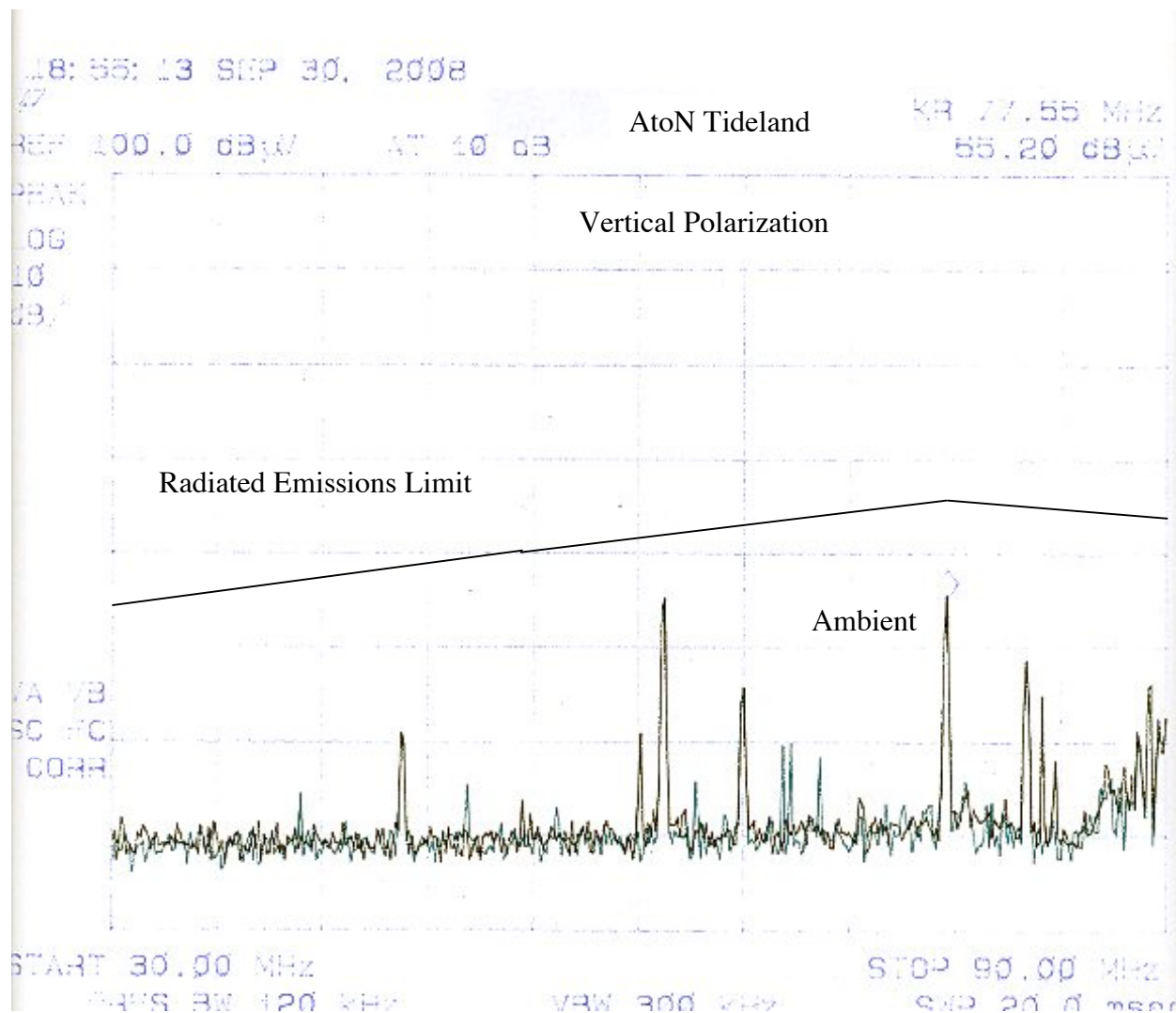
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data.



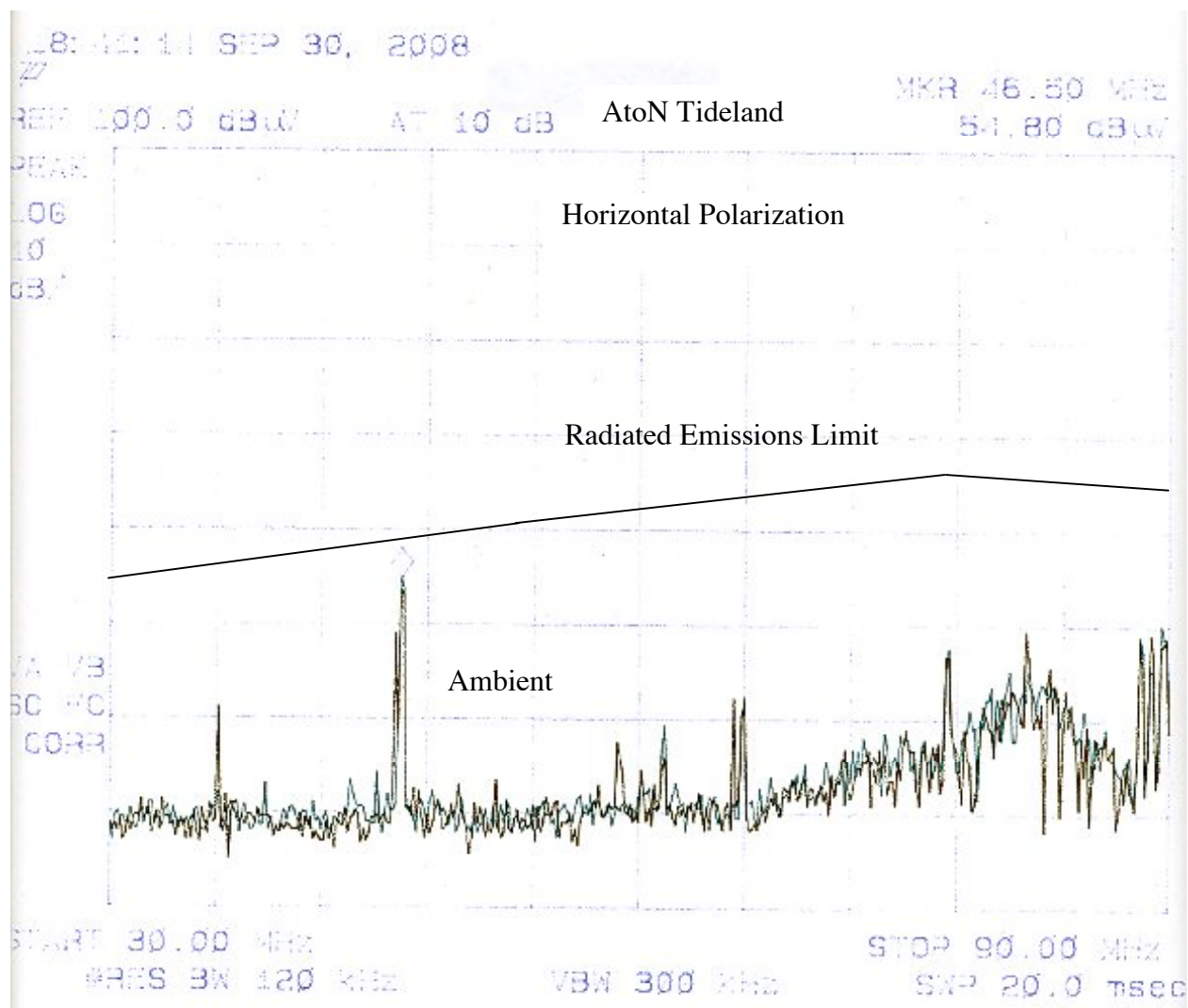
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



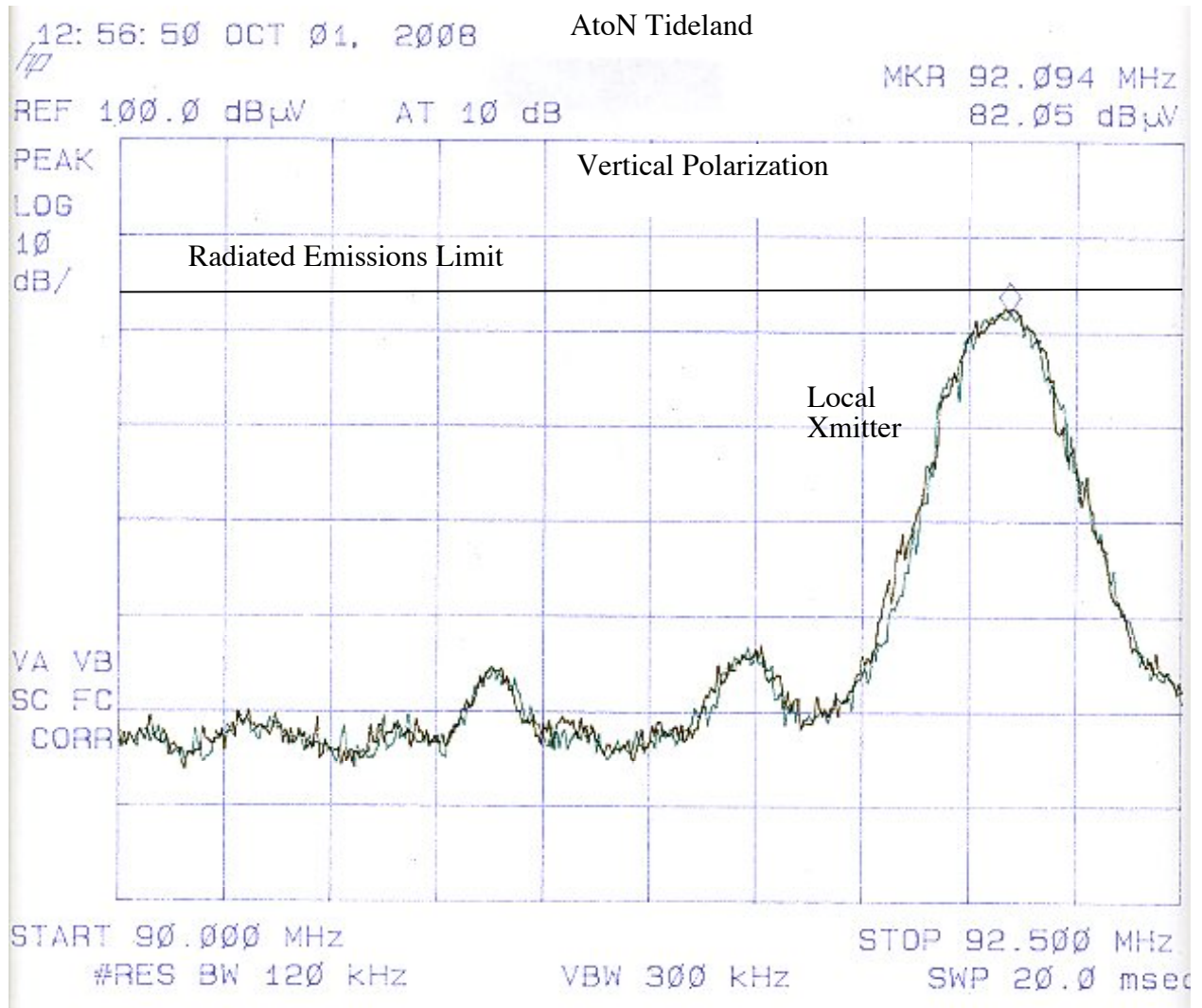
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



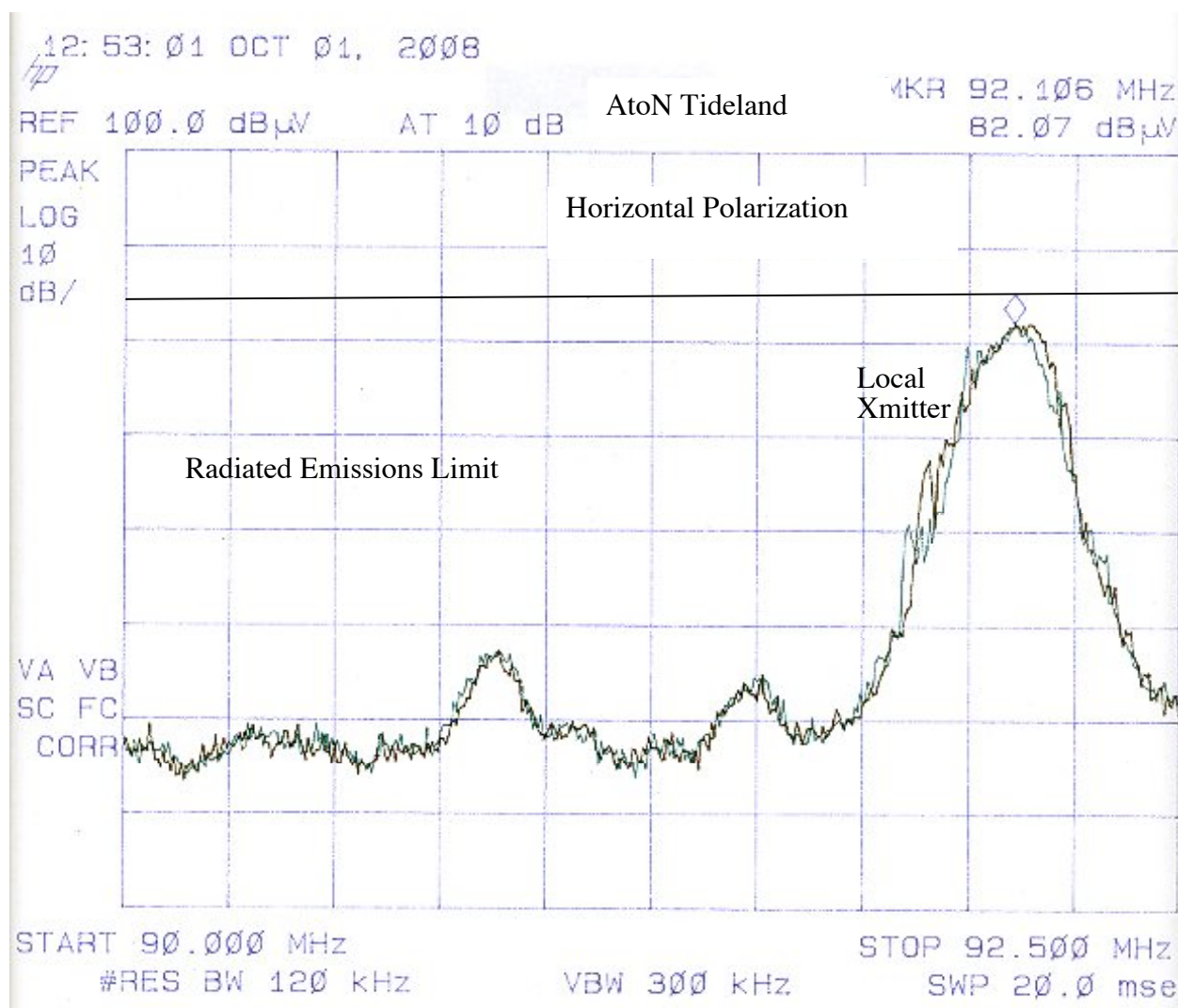
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



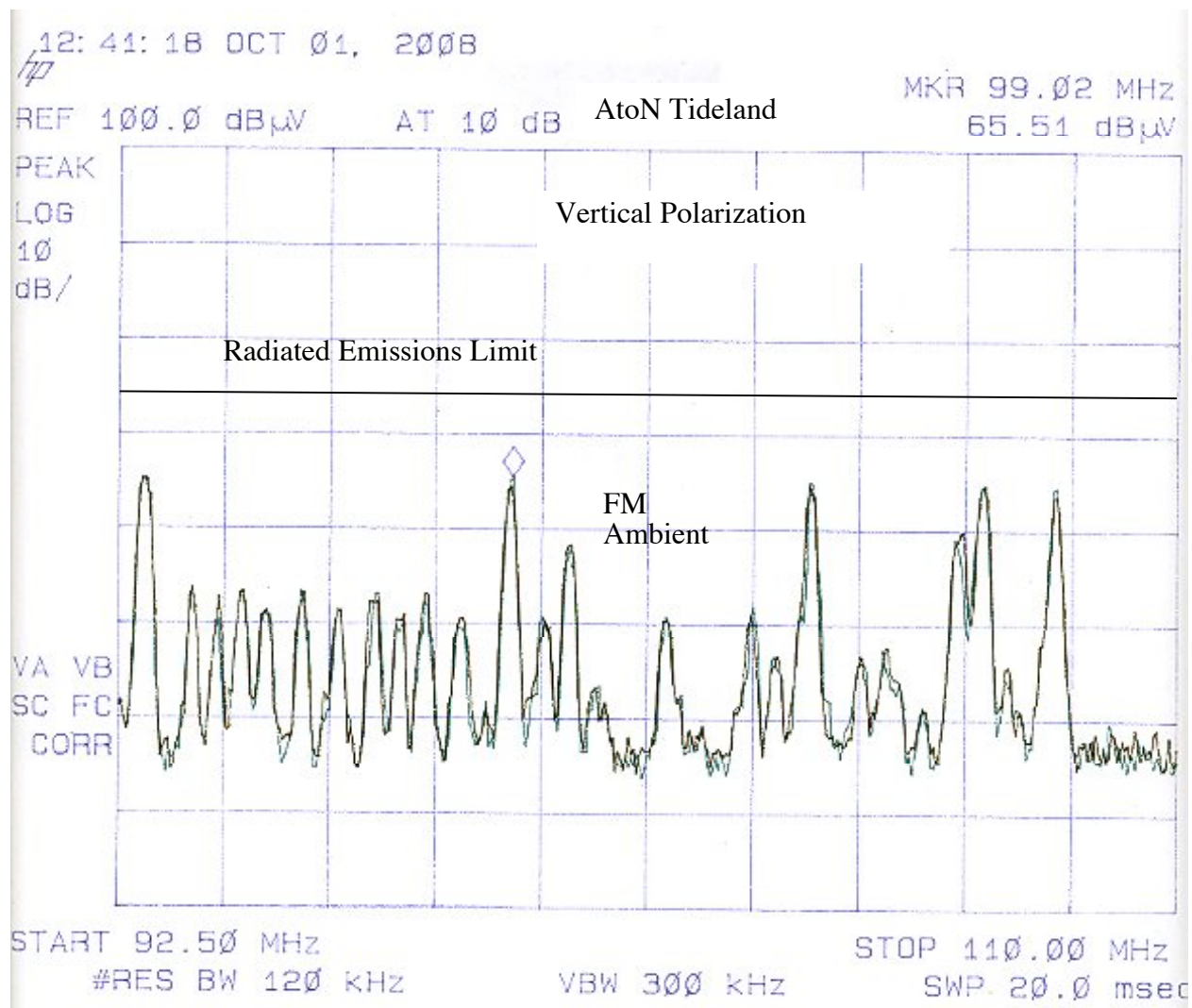
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



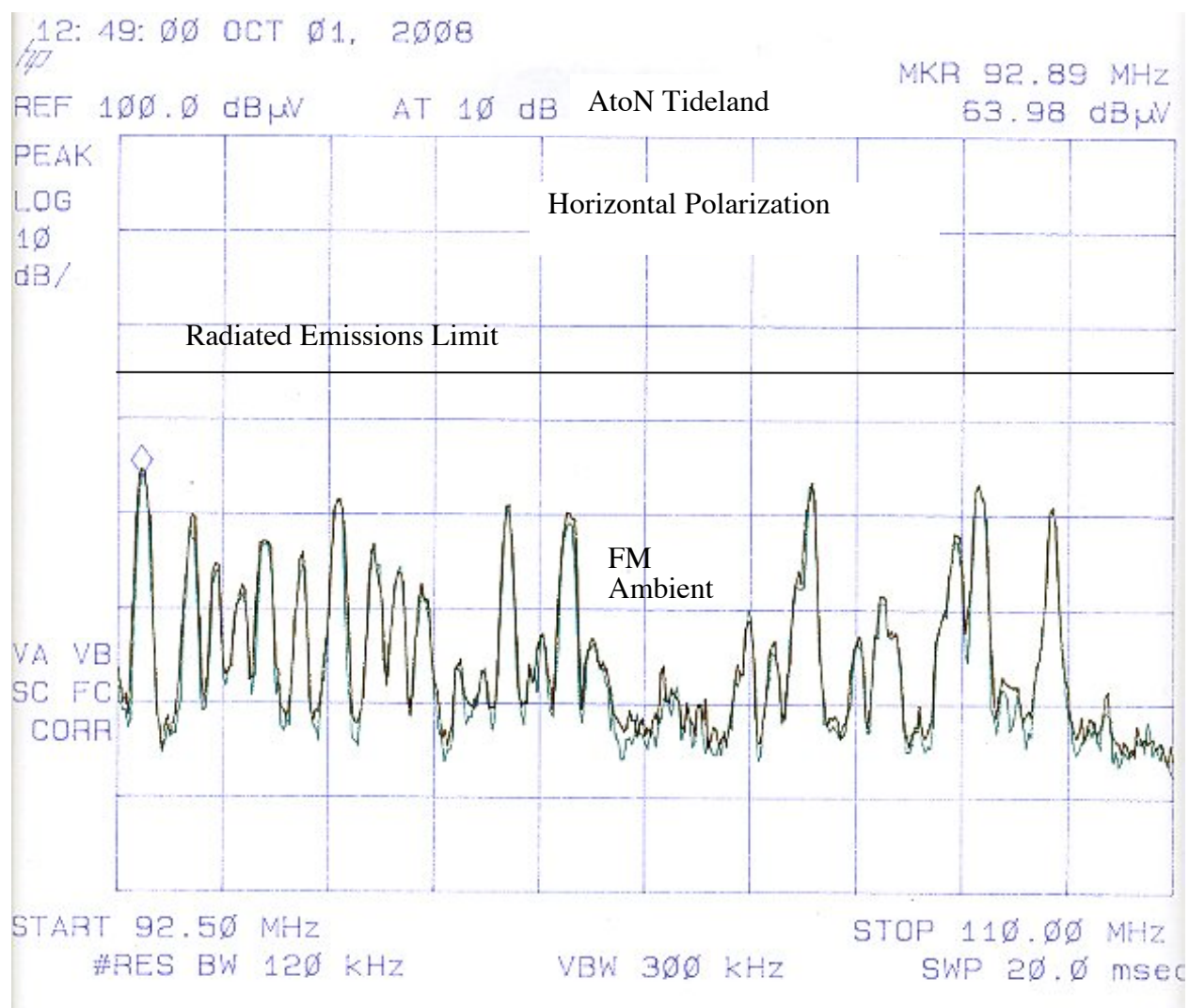
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



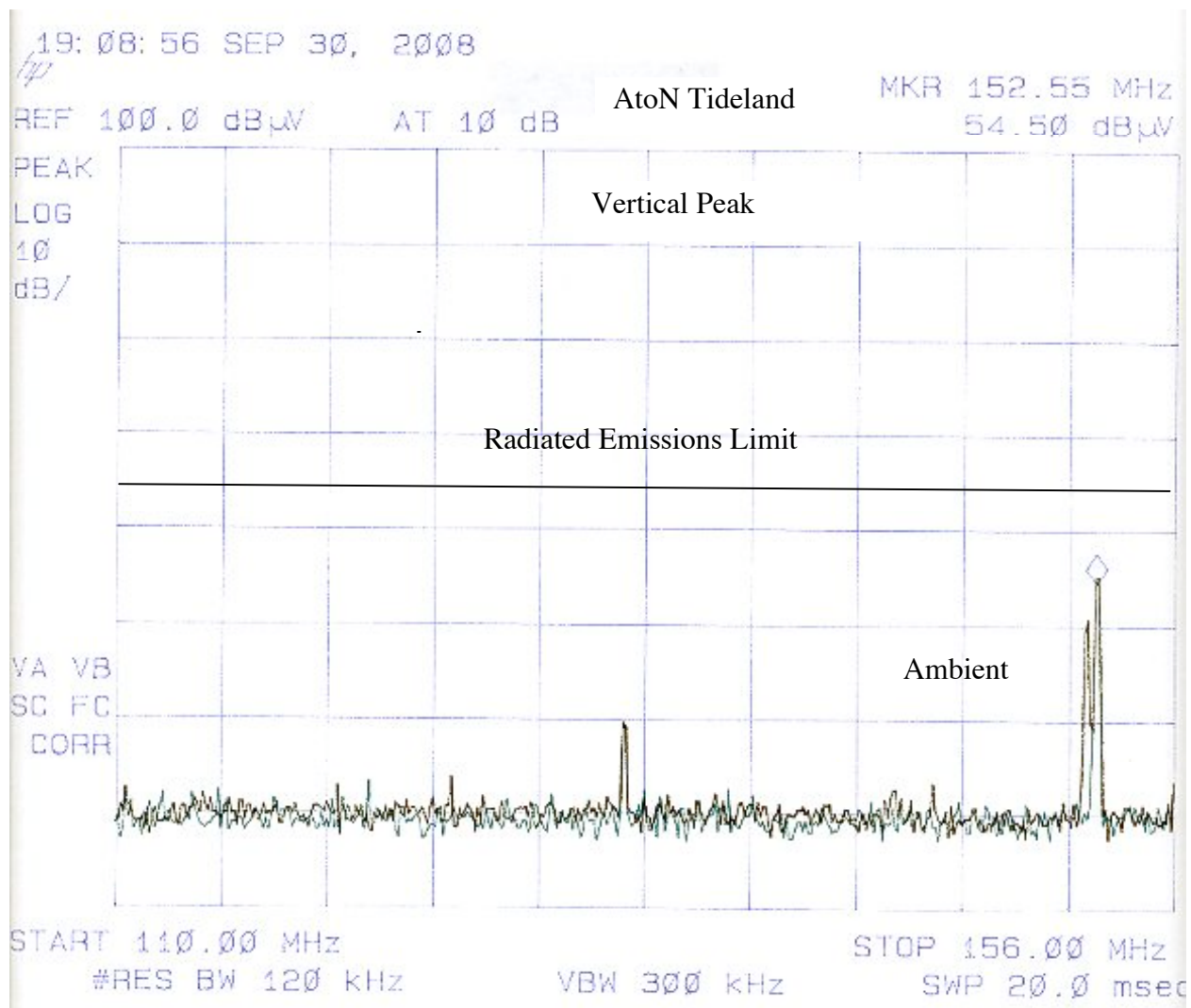
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



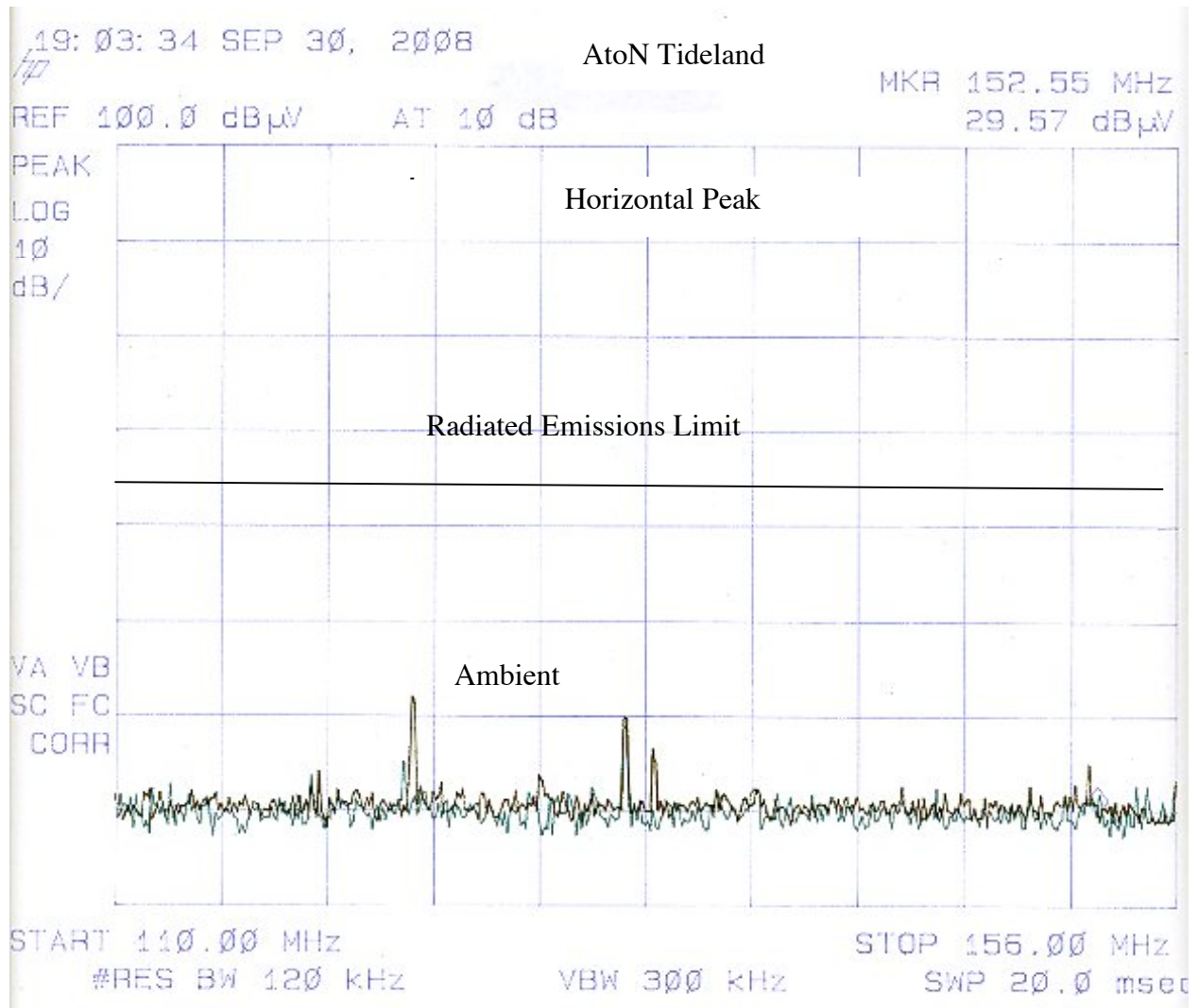
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



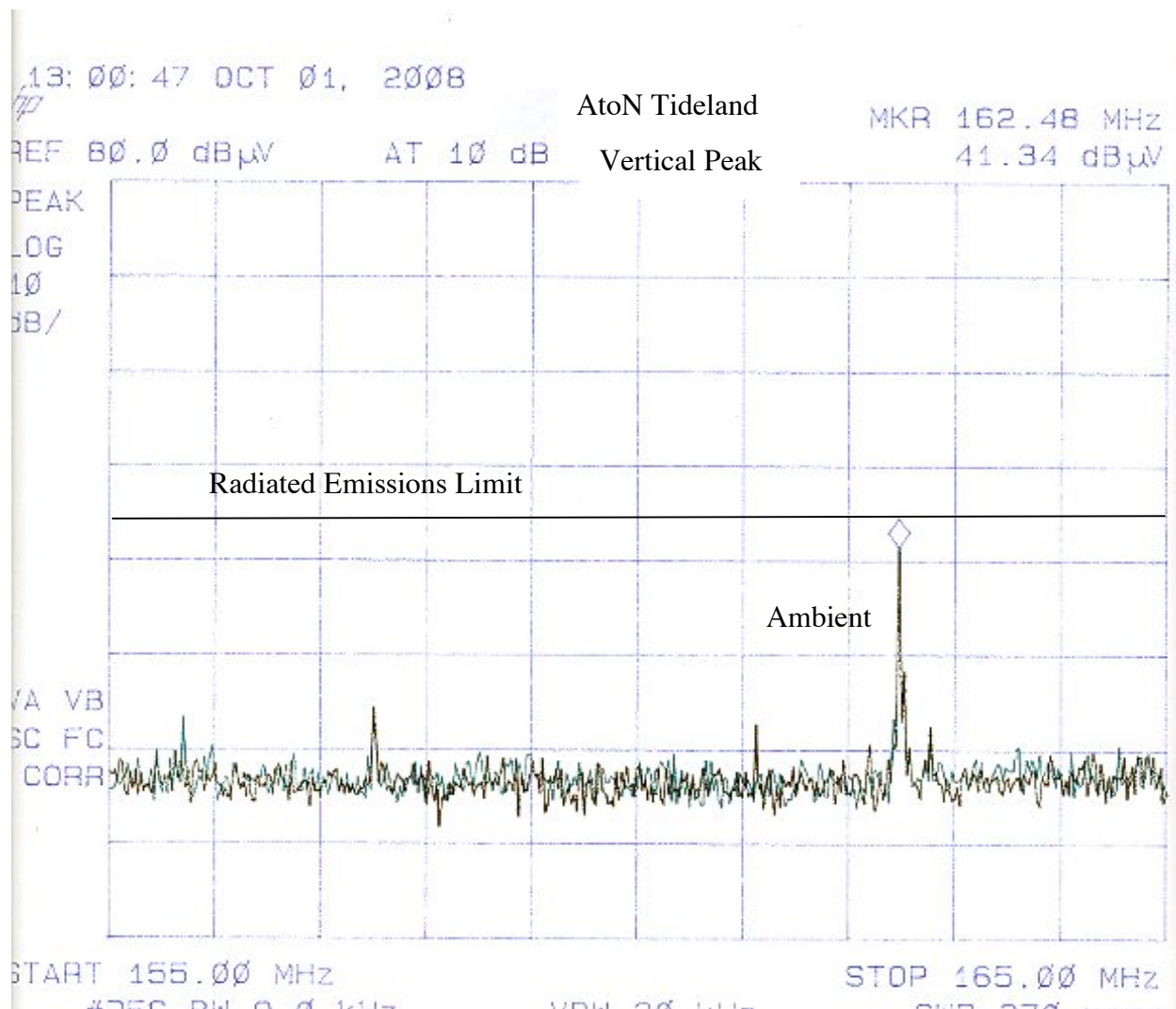
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



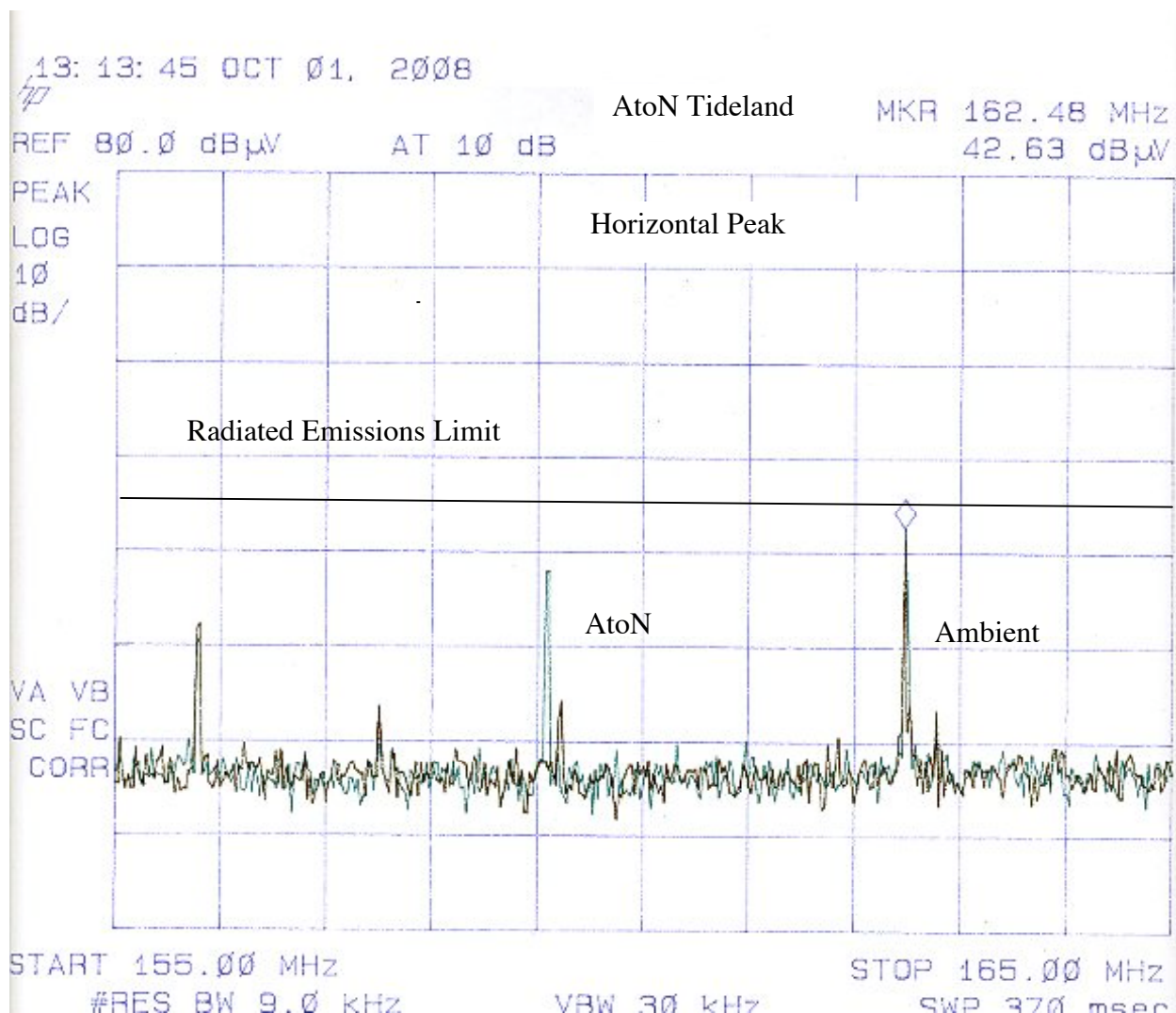
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



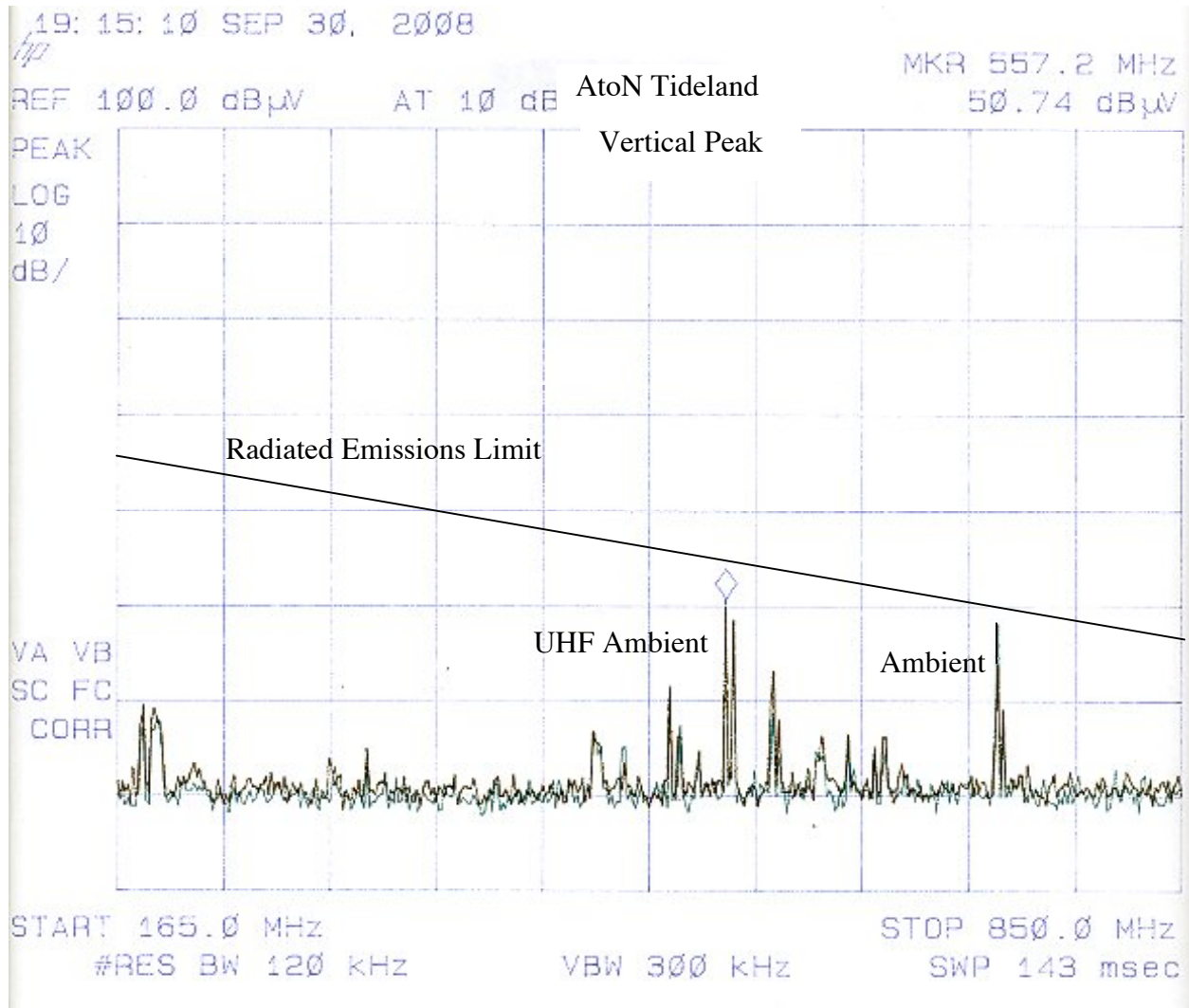
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



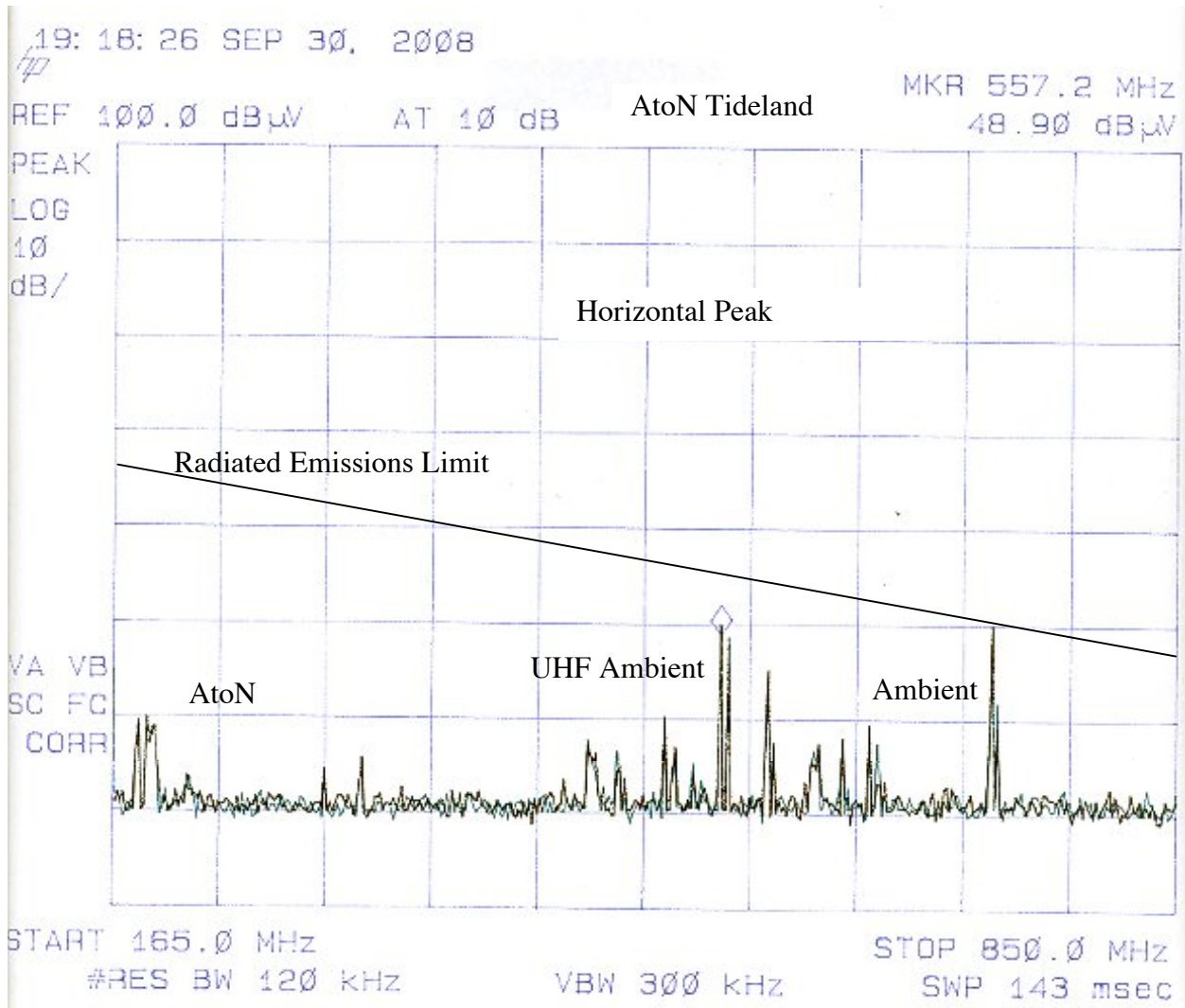
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



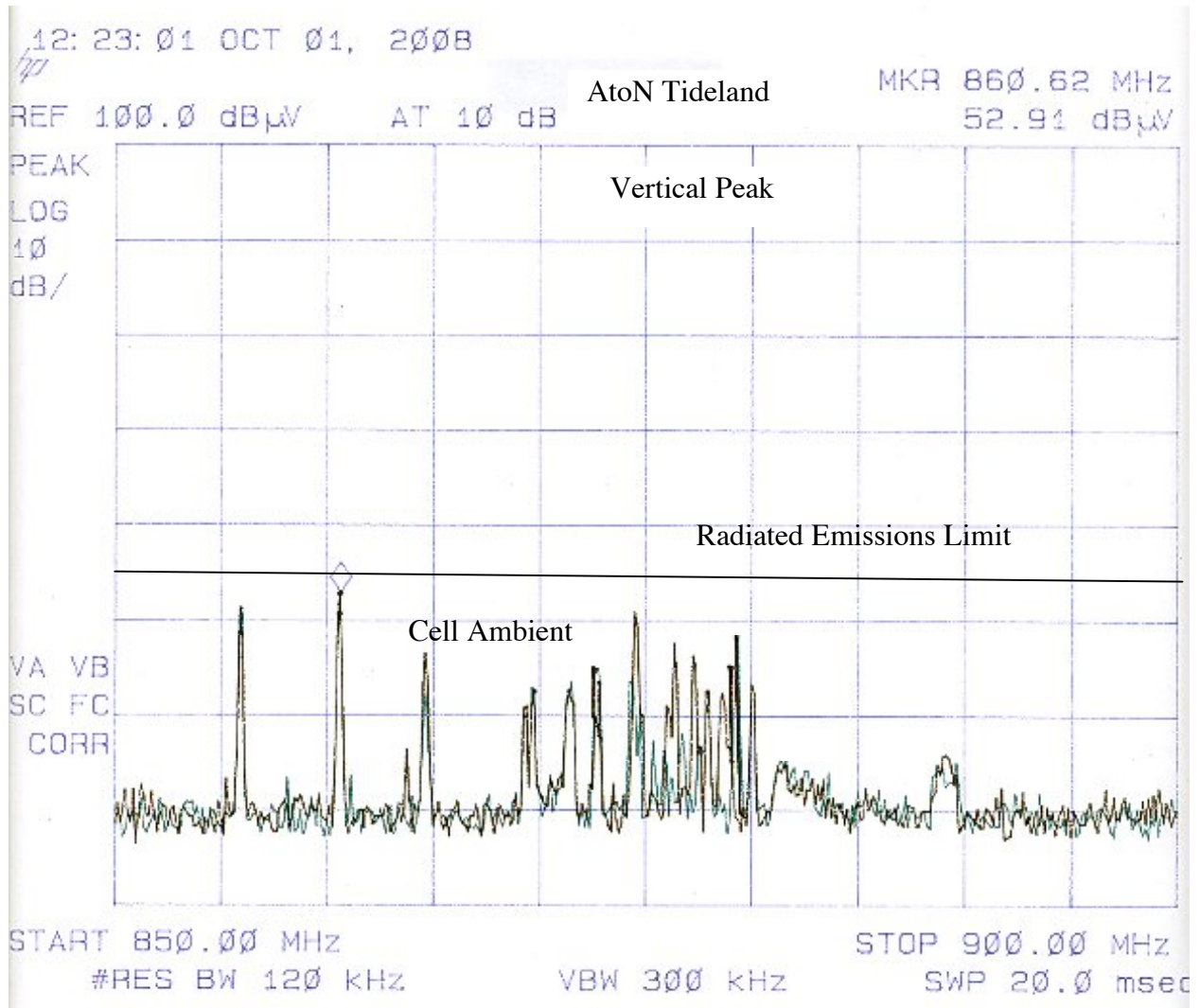
X. EMC Measurement Results Cont'd:

1. Radiated Emissions – Data Cont'd.



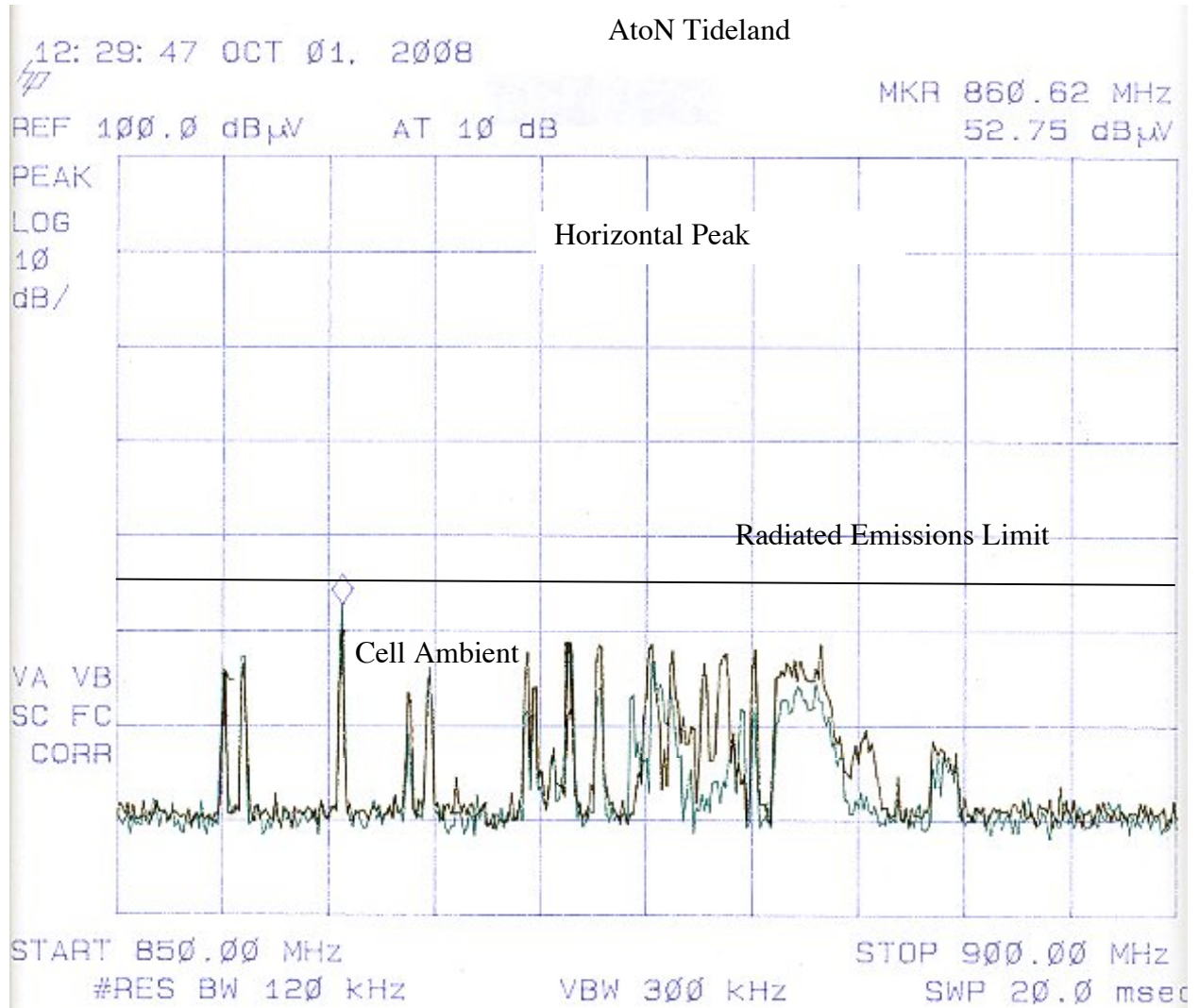
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



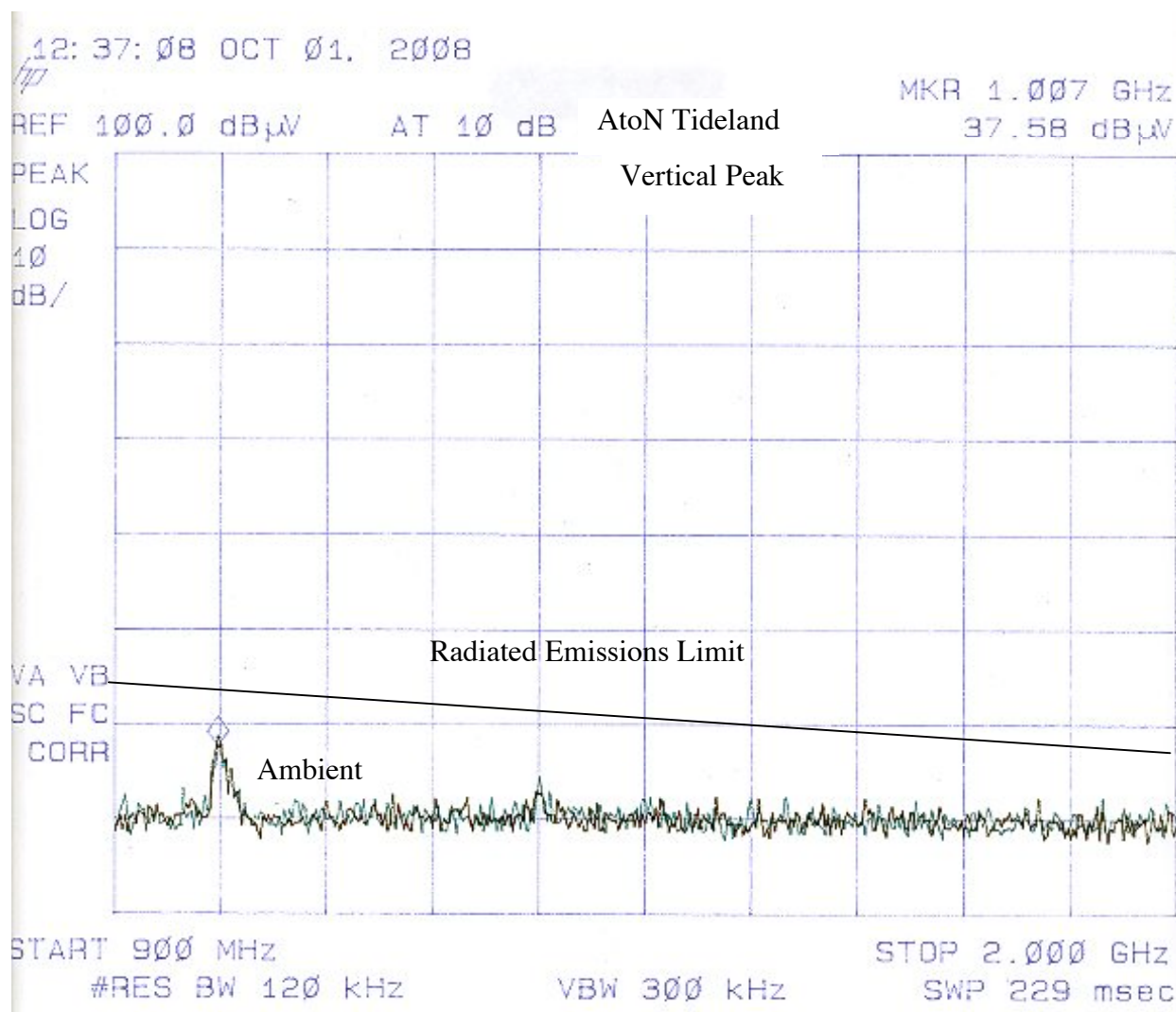
X. EMC Measurement Results Cont'd:

1. Radiated Emissions – Data Cont'd.



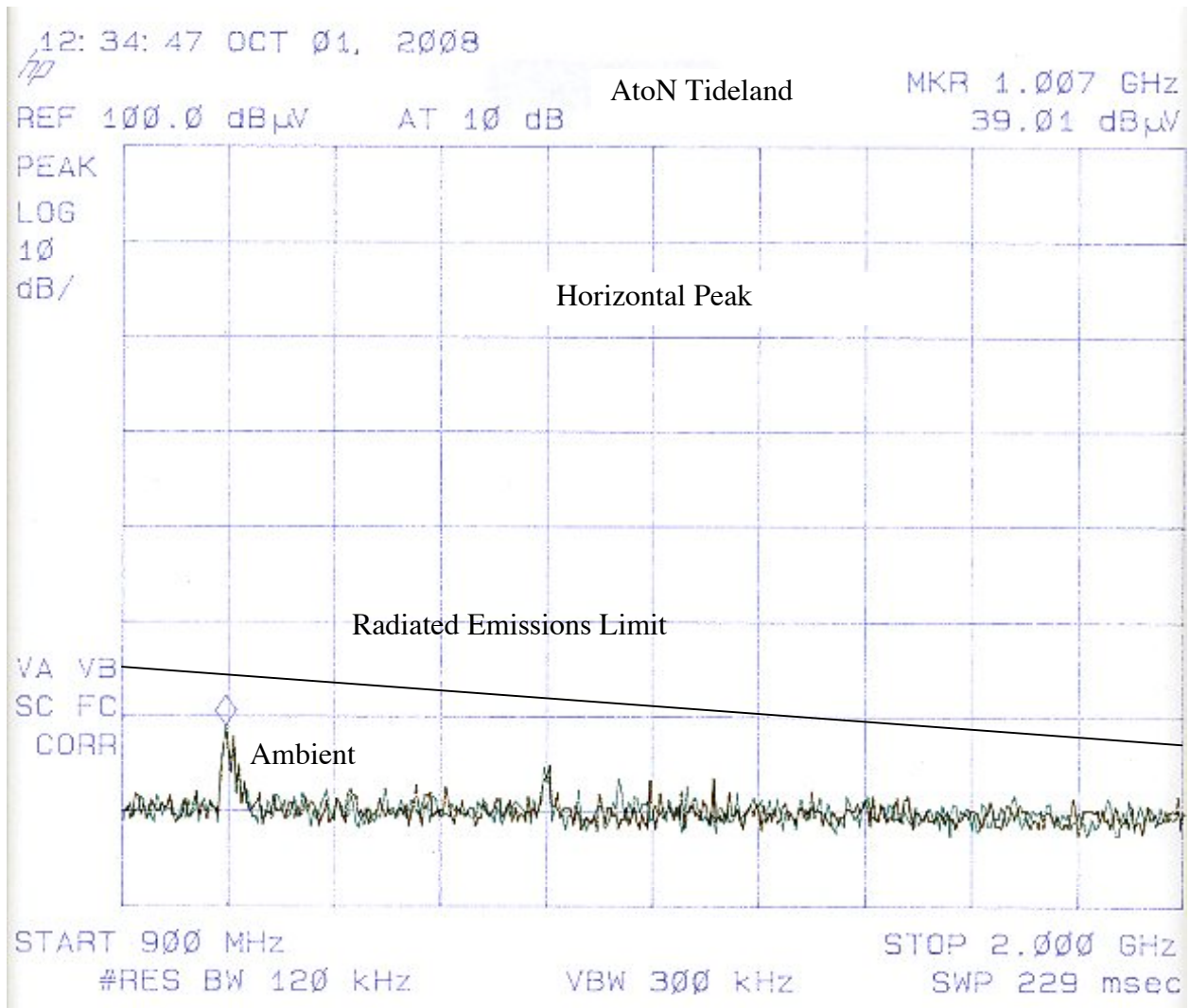
X. EMC Measurement Results Cont'd:

2. Radiated Emissions – Data Cont'd.



X. EMC Measurement Results Cont'd:

1. Radiated Emissions – Data Cont'd.



X. EMC Measurement Results Cont'd:

2. Conducted Immunity – Power Line Data.

The system exhibits no susceptibility to conducted signals amplitude modulated at 400 Hz, 80%, applied directly to the power lines: 3 V swept from 150 kHz to 80 MHz and 10 V at discrete frequencies. Frequencies listed are samples; sweep rate is <1.5 decade/s and dwell > EUT response time. The following page contains the spectrum analyzer output from device calibration.

Frequency (MHz)	Voltage	Evaluation	Criteria	Criteria Req'd	Criteria Met
0.150	3	PC Display	No Degradation	A	A
0.500	3	PC Display	No Degradation	A	A
1	3	PC Display	No Degradation	A	A
2	10	PC Display	No Degradation	A	A
3	10	PC Display	No Degradation	A	A
4	10	PC Display	No Degradation	A	A
5	3	PC Display	No Degradation	A	A
6.2	10	PC Display	No Degradation	A	A
8.2	10	PC Display	No Degradation	A	A
10	3	PC Display	No Degradation	A	A
12.6	10	PC Display	No Degradation	A	A
15	3	PC Display	No Degradation	A	A
16.5	10	PC Display	No Degradation	A	A
18.8	10	PC Display	No Degradation	A	A
20	3	PC Display	No Degradation	A	A
22	10	PC Display	No Degradation	A	A
25	10	PC Display	No Degradation	A	A
30	3	PC Display	No Degradation	A	A
40	3	PC Display	No Degradation	A	A
50	3	PC Display	No Degradation	A	A
70	3	PC Display	No Degradation	A	A
80	3	PC Display	No Degradation	A	A

Table 3-1 – Conducted Immunity Power Line Results - Transmitter and Both Receivers

X. EMC Measurement Results Cont'd:

2. Conducted Immunity – Signal Data.

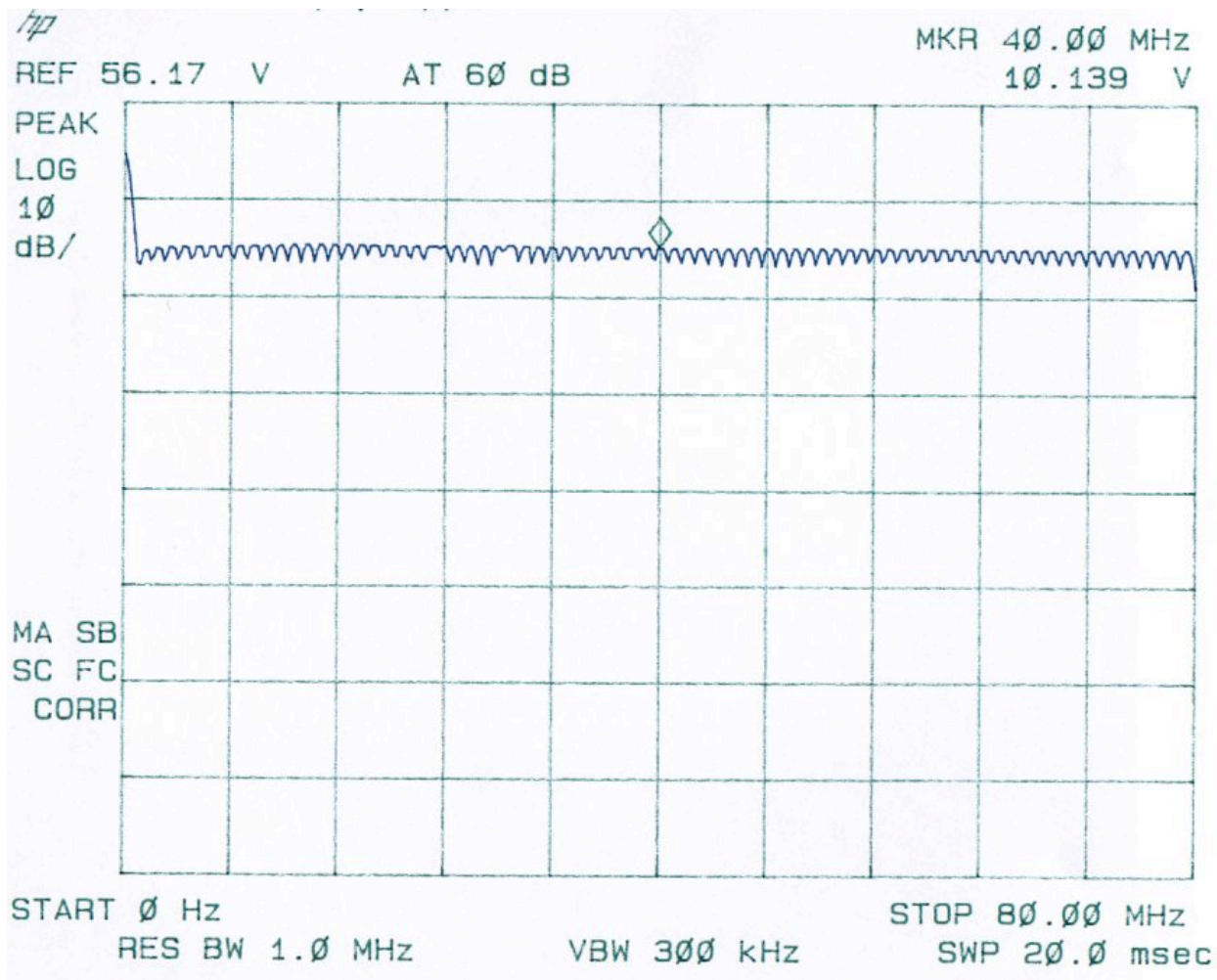
The system exhibits no susceptibility to conducted signals amplitude modulated at 400 Hz, 80%, applied directly to the signal lines: 3 V swept from 150 kHz to 80 MHz and 10 V at discrete frequencies. Frequencies listed are samples; sweep rate is <1.5 decade/s and dwell > EUT response time. The following page contains the spectrum analyzer output from device calibration.

Frequency (MHz)	Voltage	Evaluation	Criteria	Criteria Req'd	Criteria Met
0.150	3	PC Display	No Degradation	A	A
0.500	3	PC Display	No Degradation	A	A
1	3	PC Display	No Degradation	A	A
2	10	PC Display	No Degradation	A	A
3	10	PC Display	No Degradation	A	A
4	10	PC Display	No Degradation	A	A
5	3	PC Display	No Degradation	A	A
6.2	10	PC Display	No Degradation	A	A
8.2	10	PC Display	No Degradation	A	A
10	3	PC Display	No Degradation	A	A
12.6	10	PC Display	No Degradation	A	A
15	3	PC Display	No Degradation	A	A
16.5	10	PC Display	No Degradation	A	A
18.8	10	PC Display	No Degradation	A	A
20	3	PC Display	No Degradation	A	A
22	10	PC Display	No Degradation	A	A
25	10	PC Display	No Degradation	A	A
30	3	PC Display	No Degradation	A	A
40	3	PC Display	No Degradation	A	A
50	3	PC Display	No Degradation	A	A
70	3	PC Display	No Degradation	A	A
80	3	PC Display	No Degradation	A	A

Table 3-2 – Conducted Immunity Signal Line Results - Transmitter and Both Receivers

X. EMC Measurement Results Cont'd:

2. Conducted Immunity – Calibration.



Applied High-Frequency Conducted Immunity Voltage

X. EMC Measurement Results Cont'd:

2. Conducted Immunity – EUT Power Exposure - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.3 162.025 MHz

Total PER (<5%) 0%

Total Messages Sent: 1457

Number of Messages Expected: 1457

Messages Received: 1457

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 1000.000000

Valid Test Packets: 855

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 1000.000000

Valid Test Packets: 862

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32 VDM,1,1,,A,1?

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 15%

Total test Packets Sent: 1000.000000

Valid Test Packets: 852

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32 VDM,1,1,,A,1?

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 16%

Total test Packets Sent: 1000.000000

Valid Test Packets: 840

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32 VDM,1,1,,A

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 17%

Total test Packets Sent: 1000.000000

Valid Test Packets: 838

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 17%

Total test Packets Sent: 1000.000000

Valid Test Packets: 833

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

2. Conducted Immunity – EUT Signal Exposure - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.3 162.025 MHz

Total PER (<5%) 0%

Total Messages Sent: 1435

Number of Messages Expected: 1436

Messages Received: 1432

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 1000.000000

Valid Test Packets: 855

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 16%

Total test Packets Sent: 1000.000000

Valid Test Packets: 840

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32 VDM,1,1,,A,1?

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 9%

Total test Packets Sent: 1000.000000

Valid Test Packets: 911

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32 VDM,1,1,,A,1?

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 15%

Total test Packets Sent: 1000.000000

Valid Test Packets: 851

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32 VDM,1,1,,A

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 16%

Total test Packets Sent: 1000.000000

Valid Test Packets: 835

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 15%

Total test Packets Sent: 1000.000000

Valid Test Packets: 848

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

2. Conducted Immunity – Post-Test - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.3 162.025 MHz

Total PER (<5%) 0%

Total Messages Sent: 549

Number of Messages Expected: 549

Messages Received: 549

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 171

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 171

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 171

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 19%

Total test Packets Sent: 200.000000

Valid Test Packets: 161

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.3 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 16%

Total test Packets Sent: 200.000000

Valid Test Packets: 166

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

3. Radiated Immunity – Data.

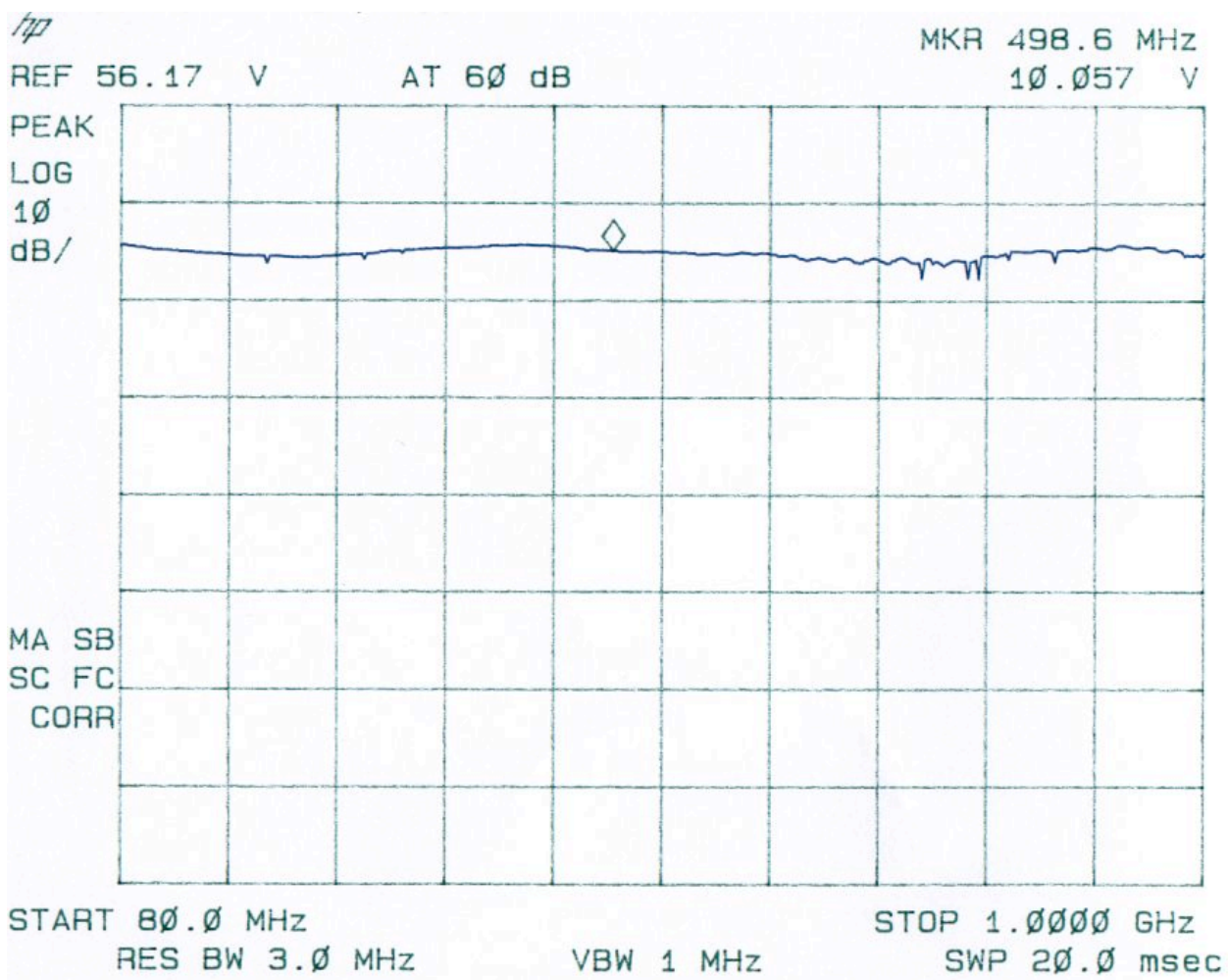
The system exhibits no susceptibility to 10-V/m radiated electric fields, amplitude modulated at 400 Hz, 80%, from 80 MHz to 2 GHz. Frequencies listed are samples; sweep rate is <1.5 decade/s and dwell > EUT response time. The following page contains the spectrum analyzer output from device calibration.

Frequency (MHz)	Voltage (V)	Evaluation	Criteria	Criteria a Req'd	Criteria a Met
80	10	PC Display	No Degradation	A	A
100	10	PC Display	No Degradation	A	A
120	10	PC Display	No Degradation	A	A
140	10	PC Display	No Degradation	A	A
160	10	PC Display	No Degradation	A	A
180	10	PC Display	No Degradation	A	A
200	10	PC Display	No Degradation	A	A
250	10	PC Display	No Degradation	A	A
300	10	PC Display	No Degradation	A	A
350	10	PC Display	No Degradation	A	A
400	10	PC Display	No Degradation	A	A
500	10	PC Display	No Degradation	A	A
600	10	PC Display	No Degradation	A	A
700	10	PC Display	No Degradation	A	A
800	10	PC Display	No Degradation	A	A
1000	10	PC Display	No Degradation	A	A
1200	10	PC Display	No Degradation	A	A
1400	10	PC Display	No Degradation	A	A
1600	10	PC Display	No Degradation	A	A
1800	10	PC Display	No Degradation	A	A
2000	10	PC Display	No Degradation	A	A

Table 4 – Radiated Immunity Results - Transmitter and Both Receivers

X. EMC Measurement Results Cont'd:

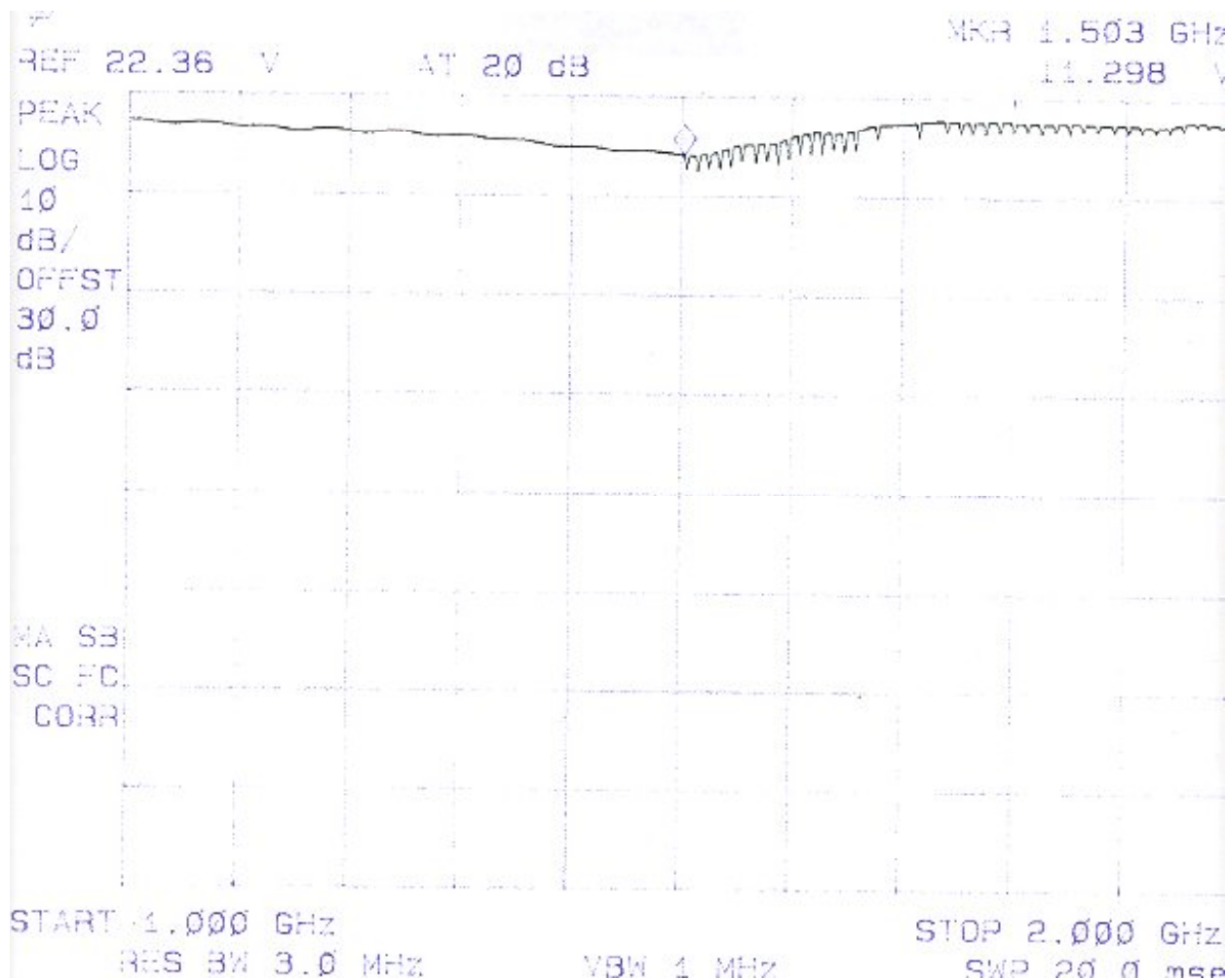
3. Radiated Immunity – Calibration.



Applied Radiated Immunity Voltage

X. EMC Measurement Results Cont'd:

3. Radiated Immunity – Calibration.



Applied Radiated Immunity Voltage

X. EMC Measurement Results Cont'd:

3. Radiated Immunity – EUT Exposure - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.4 162.025 MHz
Total PER (<5%) 0%
Total Messages Sent: 1367
Number of Messages Expected: 1368
Messages Received: 1367

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz
Packet Error Rate (<20%) 0%
Total test Packets Sent: 200.000000
Valid Test Packets: 198
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 170
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 2%
Total test Packets Sent: 200.000000
Valid Test Packets: 196
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 171
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 7%
Total test Packets Sent: 200.000000
Valid Test Packets: 185
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

3. Radiated Immunity – Post-Test - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.4 162.025 MHz

Total PER (<5%) 0%

Total Messages Sent: 613

Number of Messages Expected: 613

Messages Received: 613

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz

Packet Error Rate (<20%) 7%

Total test Packets Sent: 200.000000

Valid Test Packets: 185

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 0%

Total test Packets Sent: 200.000000

Valid Test Packets: 198

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 15%

Total test Packets Sent: 1000.000000

Valid Test Packets: 848

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz

Packet Error Rate (<20%) 13%

Total test Packets Sent: 1000.000000

Valid Test Packets: 865

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 7%

Total test Packets Sent: 200.000000

Valid Test Packets: 185

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

4. Transient Immunity – Data.

The system exhibits acceptable susceptibility to 0.5/1-kV transients applied capacitively to the signal and power lines. One-kV transients are 15 ms in duration, delivered in 5-kHz bursts every 300 ms.

The following page contains the applied waveform output from device calibration.

Level	Voltage	Application Port	Polarity and Duration	Spec.	Result
1	500	Clamp Power/Signal	Plus/3 Minutes	B	B
2	1000	Clamp Power/Signal	Plus/3 Minutes	B	B
1	500	Clamp Power/Signal	Minus/3 Minutes	B	B
2	1000	Clamp Power/Signal	Minus/3 Minutes	B	B

Table 5 – Transient Immunity Results - Transmitter

Level	Voltage	Application Port	Polarity and Duration	Spec.	Result
1	500	Clamp Power/Signal	Plus/3 Minutes	B	A
2	1000	Clamp Power/Signal	Plus/3 Minutes	B	A
1	500	Clamp Power/Signal	Minus/3 Minutes	B	A
2	1000	Clamp Power/Signal	Minus/3 Minutes	B	A

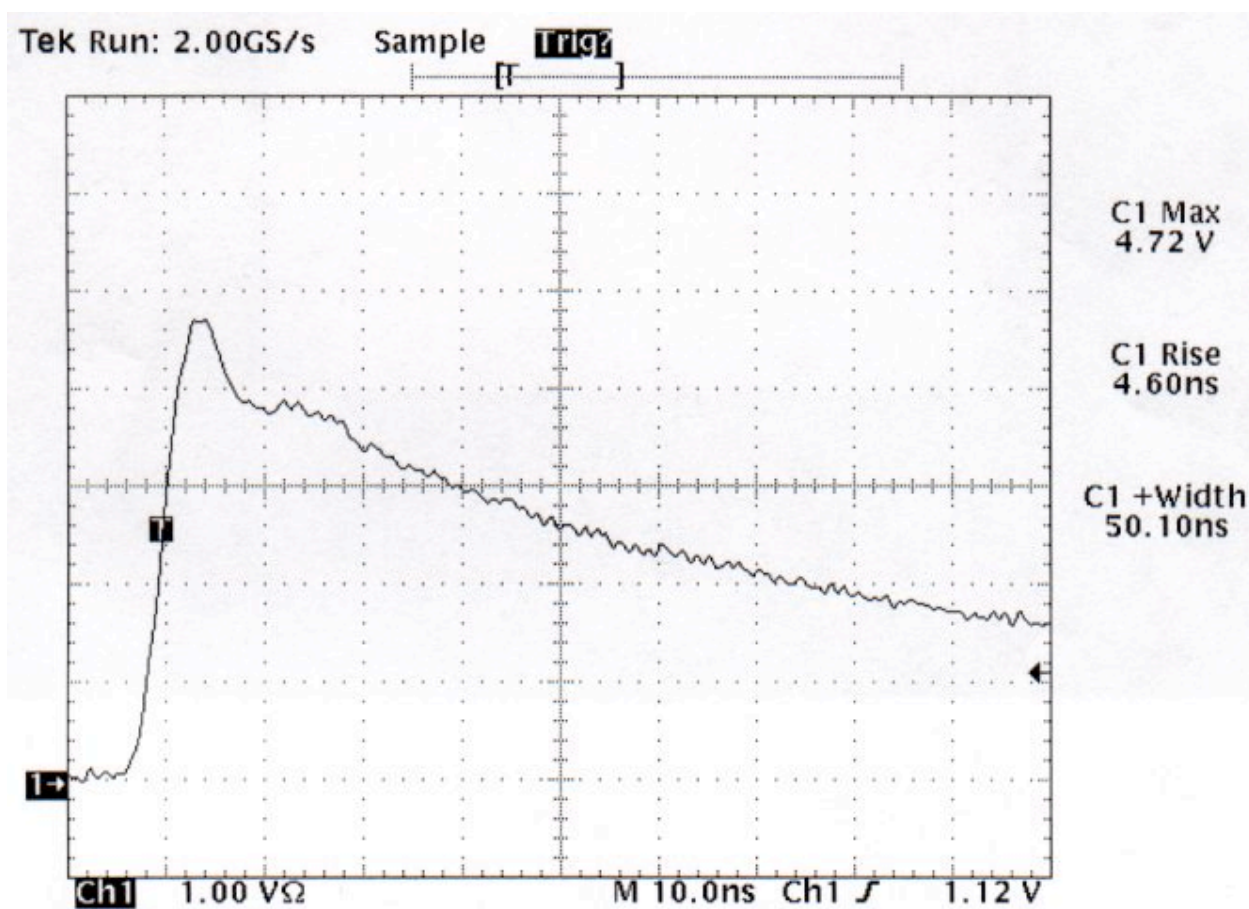
Table 6 – Transient Immunity Results - Receiver 1

Level	Voltage	Application Port	Polarity and Duration	Spec.	Result
1	500	Clamp Power/Signal	Plus/3 Minutes	B	A
2	1000	Clamp Power/Signal	Plus/3 Minutes	B	A
1	500	Clamp Power/Signal	Minus/3 Minutes	B	A
2	1000	Clamp Power/Signal	Minus/3 Minutes	B	A

Table 7 – Transient Immunity Results - Receiver 2

X. EMC Measurement Results Cont'd:

4. Transient Immunity – Calibration.



Applied Electrical Fast Transient Waveform

X. EMC Measurement Results Cont'd:

4. Transient Immunity – EUT Exposure - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.5 162.025 MHz

Total PER (<5%) 5%

Total Messages Sent: 303

Number of Messages Expected: 303

Messages Received: 287

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 170

VDM,1,1,,B,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*31

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 11%

Total test Packets Sent: 1000.000000

Valid Test Packets: 893

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 1000.000000

Valid Test Packets: 857

VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

4. Transient Immunity – Post-Test - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.4 162.025 MHz
Total PER (<5%) 0%
Total Messages Sent: 512
Number of Messages Expected: 512
Messages Received: 512
Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 171
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 171
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 170
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 15%
Total test Packets Sent: 200.000000
Valid Test Packets: 179
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.4 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 13%
Total test Packets Sent: 200.000000
Valid Test Packets: 173
VDM,1,1,,A,1?KESgd1C<Mn7ciKqI:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

5. ESD – Data.

The unit exhibits no susceptibility to 6-kV contact/8-kV air discharges, applied singly or repetitively, and directly or indirectly. The relative humidity during unit testing was measured to be between 30% and 60%.

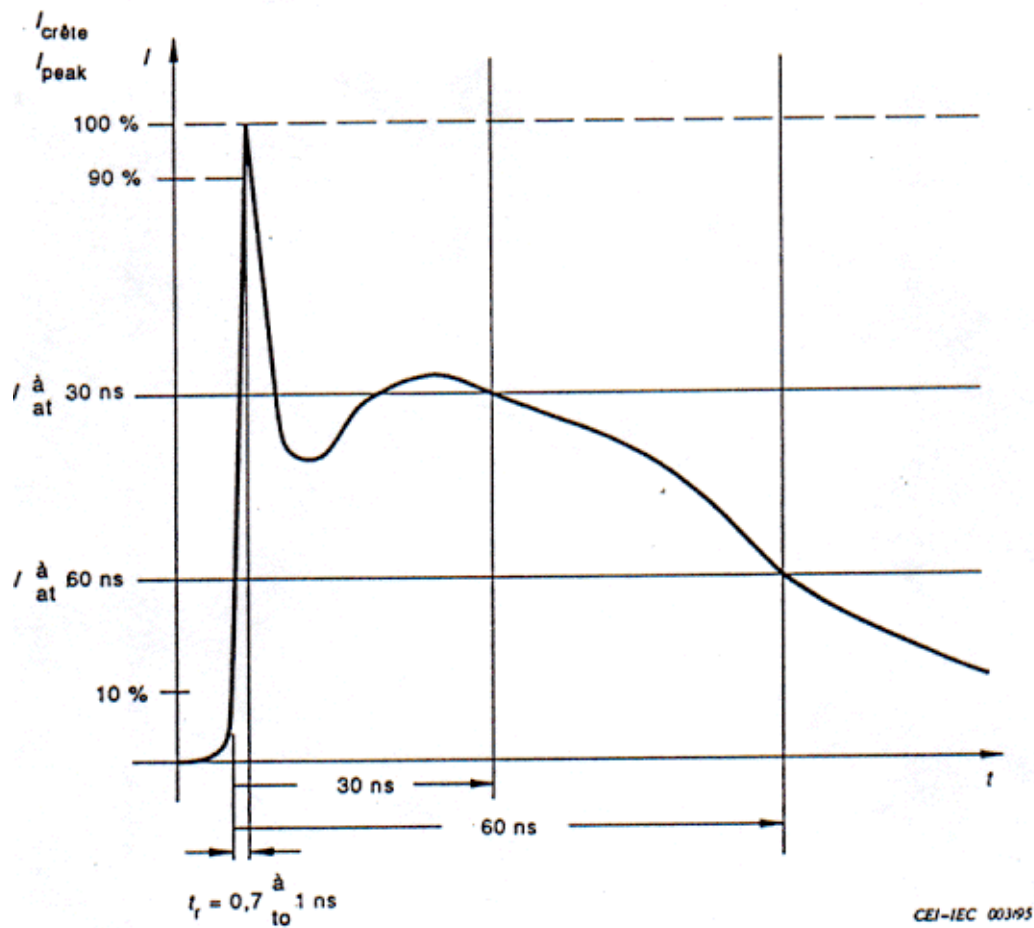
The following page contains the applied waveform output from device calibration.

Level	Voltage	Application Point	Contact/Air	Spec.	Result
1	2	Enclosure	Contact	B	A
2	4	Enclosure	Contact	B	A
x	6	Enclosure	Contact	B	A
1	2	Enclosure	Air	B	A
2	4	Enclosure	Air	B	A
3	8	Enclosure	Air	B	A
1	2	Coupling Plane	Contact	B	A
2	4	Coupling Plane	Contact	B	A
x	6	Coupling Plane	Contact	B	A
1	2	Coupling Plane	Air	B	A
2	4	Coupling Plane	Air	B	A
3	8	Coupling Plane	Air	B	A
1	2	Connector	Contact	B	A
2	4	Connector	Contact	B	A
x	6	Connector	Contact	B	A
1	2	Connector	Air	B	A
2	4	Connector	Air	B	A
3	8	Connector	Air	B	A

Table 8 – ESD Immunity Results

X. EMC Measurement Results Cont'd:

5. ESD – Waveform.



Applied ESD Event

X. EMC Measurement Results Cont'd:

5. ESD Immunity – EUT Exposure - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.5 162.025 MHz
Total PER (<5%) 0%
Total Messages Sent: 387
Number of Messages Expected: 388
Messages Received: 387

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 200.000000
Valid Test Packets: 172
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz
Packet Error Rate (<20%) 11%
Total test Packets Sent: 1000.000000
Valid Test Packets: 893
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz
Packet Error Rate (<20%) 14%
Total test Packets Sent: 1000.000000
Valid Test Packets: 857
VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

X. EMC Measurement Results Cont'd:

6. ESD Immunity – Post-Test - Packet Error Test Program Output.

Specification: Packet Error Rate $\leq 20\%$ at -101 dBm signal input.

Transmitter Performance Check IEC 60945 Section 10.5 162.025 MHz

Total PER (<5%) 0%

Total Messages Sent: 480

Number of Messages Expected: 480

Messages Received: 480

Received Message Data Stored Separately

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz

Packet Error Rate (<20%) 11%

Total test Packets Sent: 200.000000

Valid Test Packets: 177

VDM,1,1,,B,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*31

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 1 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 200.000000

Valid Test Packets: 172

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz - 500 Hz

Packet Error Rate (<20%) 11%

Total test Packets Sent: 1000.000000

Valid Test Packets: 893

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32

Receiver 2 Performance Check IEC 60945 Section 10.5 162.025 MHz + 500 Hz

Packet Error Rate (<20%) 14%

Total test Packets Sent: 1000.000000

Valid Test Packets: 857

VDM,1,1,,A,1?KESgd1C<Mn7ciKql:V;m?qmfOP,0*32