



## **FCC CLASS II PERMISSIVE CHANGE TEST REPORT**

for

**IntelliSense**  
**(C&K Systems, Inc.)**  
625 Coolidge Drive  
Folsom, CA 95630

**FCC ID: C2DLWSN-30-DX**

June 29, 2001

**WLL PROJECT #: 6386X**

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# **FCC CLASS II PERMISSIVE CHANGE TEST REPORT**

for

**IntelliSense (C & K Systems, Inc.)**

**FCC ID: C2DLWSN-30-DX**

## **1.0 Introduction**

This report has been prepared on behalf of IntelliSense (C & K Systems, Inc.) to support the attached Class II Permissive Change. The test and application are submitted for an Intentional Radiator under Section 15.247 of the FCC Rules and Regulations. The Equipment Under Test was an IntelliSense (C & K Systems, Inc.) Direct Sequence Spread Spectrum Transmitter, SN931 Outdoor Spread Spectrum Transmitter.

All measurements herein were performed according to the 1992 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and field Strength Instrumentation. Calibration checks are made periodically to verify proper performance of the measuring instrumentation.

All measurements were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The results of this test report relate only to the item tested. This report shall not be used to claim product endorsement by NVLAP or any agency of the US Government. The measurement uncertainty of the data contained herein is  $\pm 2.3$  dB. Refer to Appendix A for Statement of Measurement Uncertainty.

### **1.1 Summary**

The IntelliSense (C & K Systems, Inc.) Direct Sequence Spread Spectrum Transmitter complies with the limits for an Intentional Radiator under Section 15.247.

## **2.0 Description of Equipment Under Test (EUT)**

The IntelliSense (C & K Systems, Inc.) Direct Sequence Spread Spectrum Transmitter, SN931 Outdoor Spread Spectrum Transmitter is a 923.58 MHz low power spread spectrum transmitter used for residential security systems. The unit is designed to transmit a signal to a receiver/control panel when a magnetic contact is tripped. The unit contains a permanently attached (soldered) internal antenna and is powered via two 3.6V lithium batteries. The device transmits 7.6 ms "on" pulse followed by a 250ms blank, or "off" pulse.

The transmitter board used in the unit is the same board used in a previously approved C&K Systems transmitter, FCC ID: C2DLWSN-30-DX. The changes to the unit are an addition of a small daughter board containing 3 reed switches to detect movement of a door or window which has a magnet attached to it. Also, the unit is housed in a new polycarbonate enclosure for outdoor use. All of the radiated emissions testing were performed on this unit. New photographs depicting the changes have been for addition to the certification file.

*IntelliSense (C & K Systems, Inc.)*

*FCC ID: C2DLWSN-30-DX*

*WLL Project #: 6386X*

## **2.1 On-board Oscillators**

The IntelliSense (C & K Systems, Inc.) SN931 Direct Sequence Spread Spectrum Transmitter contains a 14.660 MHz oscillator.

## **3.0 Test Configuration**

To complete the test configuration required by the FCC, the SN931 Direct Sequence Spread Spectrum Transmitter was tested all orthogonal planes.

### **3.1 Testing Algorithm**

The transmitter was powered on and setup to continuously transmit. Worst-case emissions are recorded in the data tables. Since no changes were made to the original PCB, only radiated spurious emissions testing and the 20dBc test were performed.

### **3.2 Conducted Emissions Testing**

Conducted emissions testing was not performed, as the unit is battery powered.

### **3.3 Radiated Emissions Testing**

The EUT was placed on an 80 cm high 1 x 1.5 meters non-conductive motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Biconical, log periodic, and horn broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak for frequencies below 1000 MHz and peak for frequencies above 1000 MHz. For frequencies below 1000 MHz, the measurement bandwidth on the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. For frequencies above 1000 MHz, the resolution bandwidth on the spectrum analyzer system was set to 1 MHz and the video bandwidth on the spectrum analyzer system was set to 1 MHz for peak measurements.

#### **3.3.1 Radiated Data Reduction and Reporting**

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are grouped into a composite antenna factor (AFc) and are supplied in the AFc column of Tables 1 and 2. The AFc in dB/m is algebraically added to the Spectrum Analyzer Voltage in dBμV to obtain the Radiated Electric Field in dBμV/m.

Since the FCC limits above 1 GHz are average levels, the peak spectrum analyzer reading is corrected using the duty cycle of the pulse modulated signal (over the worst case 0.1 second interval). The duty cycle factor (AFd) is added to the spectrum analyzer level to convert the peak level to an average level (Section 15.35). This level is then compared with the FCC limit. For emissions below 1 GHz, the FCC limits are in quasi-peak and the duty cycle factor is not used since the measurements are taken using a quasi-peak detector.

Example:

Duty Cycle:  $AF_d = 7.6 \text{ ms on-time} / 100 \text{ ms} = 7.6\% = -22.38 \text{ dB}$  (Maximum 20dB correction used for duty cycle)

Spectrum Analyzer Voltage:  $V_{dB} \text{ V}$

Composite Antenna Factor:  $AF_{cdB/m}$

Electric Field:  $E_{dB} \text{ V/m} = V_{dB} \text{ V} + AF_{cdB/m} = AF_{ddB}$

To convert to linear units:  $E \text{ V/m} = \text{antilog} (E_{dB} \text{ V/m} / 20)$

Data are recorded in Table 1. Emissions data are given for all three orthogonal positions: X=Flat, Y=Horizontal, Z = Vertical

**Table 1: FCC Part 15.247(c) 3M Radiated Emissions Data**

Client: INTELLISENSE (C & K SYSTEMS, INC.)  
 Job#: 6386X  
 Model: SN 931 Outdoor Spectrum  
 Test Engineer: John Lam  
 Date: April 20, 2001  
 Tx frequency: 923.58 Mhz  
 Clock: 14.66 MHz

Peak Measurements

| Frequency | Polarity | Azimuth | Antenna | SA Level | AFc   | E-Field | E-Field | Limit  | Margin    |
|-----------|----------|---------|---------|----------|-------|---------|---------|--------|-----------|
| MHz       | H/V      | Degree  | Height  | (QP)     |       |         |         |        |           |
|           |          |         | m       | dBuV     | dB/m  | dBuV/m  | uV/m    | uV/m   | dB        |
| X         |          |         |         |          |       |         |         |        |           |
| 960.21    | V        | 270.00  | 1.25    | 9.50     | 29.0  | 38.5    | 84.6    | 500.0  | -15.4     |
| 960.21    | H        | 202.00  | 1.0     | 16.5     | 29.0  | 45.5    | 189.4   | 500.0  | -8.4      |
| 967.54    | V        | 180.00  | 1.25    | 10.50    | 29.2  | 39.7    | 96.2    | 500.0  | -14.3     |
| 967.54    | H        | 202.00  | 1.0     | 19.1     | 29.2  | 48.3    | 258.9   | 500.0  | -5.7      |
| Y         |          |         |         |          |       |         |         |        |           |
| 960.21    | V        | 270.00  | 1.60    | 14.30    | 29.0  | 43.3    | 147.0   | 500.0  | -10.6     |
| 960.21    | H        | 202.00  | 1.0     | 14.4     | 29.0  | 43.4    | 148.7   | 500.0  | -10.5     |
| 967.54    | H        | 225.00  | 1.0     | 15.5     | 29.2  | 44.7    | 171.1   | 500.0  | -9.3      |
| 967.54    | V        | 180.00  | 1.60    | 16.30    | 29.2  | 45.5    | 187.6   | 500.0  | -8.5      |
| Z         |          |         |         |          |       |         |         |        |           |
| 960.21    | V        | 0.00    | 1.00    | 11.20    | 29.0  | 40.2    | 102.9   | 500.0  | -13.7     |
| 960.21    | H        | 90.00   | 1.0     | 15.9     | 29.0  | 44.9    | 176.8   | 500.0  | -9.0      |
| 967.54    | V        | 338.00  | 1.00    | 12.90    | 29.2  | 42.1    | 126.8   | 500.0  | -11.9     |
| 967.54    | H        | 225.00  | 1.0     | 15.5     | 29.2  | 44.7    | 171.1   | 500.0  | -9.3      |
| X         |          |         |         |          |       |         |         |        |           |
| 1216.80   | V        | 180-22  | 1.0     | 57.50    | -10.9 | 46.6    | 213.2   | 5000.0 | -27.4     |
| 1231.44   | V        | 202.00  | 1.0     | 73.33    | -10.8 | 62.5    | 1336.5  | 5000.0 | -11.5     |
| 1539.30   | V        | 248.00  | 1.0     | 59.20    | -8.7  | 50.5    | 335.8   | 5000.0 | -23.5     |
| 2770.83   | V        | 22.00   | 1.0     | 58.5     | -4.8  | 53.7    | 483.9   | 5000.0 | -20.3     |
| 3694.44   | V        | 135.00  | 1.0     | 64.0     | -3.6  | 60.4    | 1045.0  | 5000.0 | -13.6     |
| 4603.62   | V        | 225.00  | 1.0     | 55.0     | -2.7  | 52.3    | 411.6   | 5000.0 | -21.7     |
| 4618.05   | V        | 225.00  | 1.0     | 57.2     | -2.7  | 54.5    | 531.0   | 5000.0 | -19.5     |
| 4926.80   | V        | 0.00    | 1.0     | 46.8     | -2.4  | 44.4    | 166.0   | 5000.0 | -29.6 amb |

| Frequency | Polarity | Azimuth | Antenna<br>Height | SA Level<br>(QP) | AFc   | E-Field | E-Field | Limit  | Margin    |
|-----------|----------|---------|-------------------|------------------|-------|---------|---------|--------|-----------|
| MHz       | H/V      | Degree  | m                 | dBuV             | dB/m  | dBuV/m  | uV/m    | uV/m   | dB        |
| 5406.00   | V        | 0.00    | 1.0               | 48.3             | -2.0  | 46.3    | 206.1   | 5000.0 | -27.7 amb |
| 7388.64   | V        | 180.00  | 1.0               | 57.0             | 2.2   | 59.2    | 912.0   | 5000.0 | -14.8     |
| 8312.22   | V        | 0.00    | 1.0               | 43.0             | 2.2   | 45.2    | 182.0   | 5000.0 | -28.8 amb |
| 9384.00   | V        | 0.00    | 1.0               | 43.3             | 2.7   | 46.0    | 199.1   | 5000.0 | -28.0 amb |
| 1216.80   | H        | 225.00  | 1.0               | 58.0             | -10.9 | 47.1    | 225.8   | 5000.0 | -26.9     |
| 1231.44   | H        | 270.00  | 1.0               | 73.8             | -10.8 | 63.0    | 1410.8  | 5000.0 | -11.0     |
| 1539.30   | H        | 225.00  | 1.0               | 68.0             | -8.7  | 59.3    | 924.8   | 5000.0 | -14.7     |
| 2770.83   | H        | 68.00   | 1.0               | 56.0             | -4.8  | 51.2    | 362.9   | 5000.0 | -22.8     |
| 3694.44   | H        | 135.00  | 1.0               | 61.8             | -3.6  | 58.2    | 813.9   | 5000.0 | -15.8     |
| 4603.62   | H        | 225.00  | 1.0               | 55.3             | -2.7  | 52.6    | 427.5   | 5000.0 | -21.4     |
| 4618.05   | H        | 225.00  | 1.0               | 53.0             | -2.7  | 50.3    | 327.4   | 5000.0 | -23.7     |
| 4926.80   | H        | 0.00    | 1.0               | 48.0             | -2.4  | 45.6    | 189.9   | 5000.0 | -28.4 amb |
| 5406.00   | H        | 0.00    | 1.0               | 46.8             | -2.0  | 44.8    | 172.8   | 5000.0 | -29.2 amb |
| 7388.64   | H        | 180.00  | 1.0               | 53.0             | 2.2   | 55.2    | 575.4   | 5000.0 | -18.8     |
| 8312.22   | H        | 0.00    | 1.0               | 44.5             | 2.2   | 46.7    | 216.3   | 5000.0 | -27.3 amb |
| 9384.00   | H        | 180.00  | 1.0               | 48.0             | 2.7   | 50.7    | 342.0   | 5000.0 | -23.3 amb |
| Y         |          |         |                   |                  |       |         |         |        |           |
| 1216.80   | V        | 22.00   | 1.0               | 62.20            | -10.9 | 51.3    | 366.2   | 5000.0 | -22.7     |
| 1231.44   | V        | 22.00   | 1.0               | 79.00            | -10.8 | 68.2    | 2567.2  | 5000.0 | -5.8      |
| 1539.30   | V        | 135.00  | 1.0               | 60.33            | -8.7  | 51.7    | 382.4   | 5000.0 | -22.3     |
| 2770.83   | V        | 180.00  | 1.0               | 56.25            | -4.8  | 51.4    | 373.5   | 5000.0 | -22.5     |
| 3694.44   | V        | 0.00    | 1.0               | 61.50            | -3.6  | 57.9    | 783.6   | 5000.0 | -16.1     |
| 4603.62   | V        | 180.00  | 1.0               | 55.00            | -2.7  | 52.3    | 411.6   | 5000.0 | -21.7     |
| 4618.05   | V        | 0.00    | 1.0               | 57.20            | -2.7  | 54.5    | 531.0   | 5000.0 | -19.5     |
| 4926.80   | V        | 0.00    | 1.0               | 45.90            | -2.4  | 43.5    | 149.1   | 5000.0 | -30.5 amb |
| 5541.36   | V        | 180.00  | 1.0               | 50.00            | -1.9  | 48.1    | 252.8   | 5000.0 | -25.9     |
| 7388.64   | V        | 90.00   | 1.0               | 54.0             | 2.2   | 56.2    | 645.7   | 5000.0 | -17.8     |
| 8312.22   | V        | 0.00    | 1.0               | 45.0             | 2.2   | 47.2    | 229.1   | 5000.0 | -26.8 amb |
| 9384.00   | V        | 0.00    | 1.0               | 46.00            | 2.7   | 48.7    | 271.7   | 5000.0 | -25.3 amb |
| 1216.80   | H        | 180.00  | 1.0               | 53.00            | -10.9 | 37.1    | 71.4    | 5000.0 | -36.9     |
| 1231.44   | H        | 225.00  | 1.0               | 66.50            | -10.8 | 55.7    | 608.8   | 5000.0 | -18.3     |
| 1539.30   | H        | 180.00  | 1.0               | 59.83            | -8.7  | 51.2    | 361.0   | 5000.0 | -22.8     |
| 2770.83   | H        | 158.00  | 1.0               | 61.83            | -4.8  | 57.0    | 710.0   | 5000.0 | -17.0     |

| Frequency | Polarity | Azimuth | Antenna<br>Height | SA Level<br>(QP) | AFc   | E-Field | E-Field | Limit  | Margin    |
|-----------|----------|---------|-------------------|------------------|-------|---------|---------|--------|-----------|
| MHz       | H/V      | Degree  | m                 | dBuV             | dB/m  | dBuV/m  | uV/m    | uV/m   | dB        |
| 3694.44   | H        | 315.00  | 1.0               | 60.83            | -3.6  | 57.2    | 725.4   | 5000.0 | -16.8     |
| 4603.62   | H        | 315.00  | 1.0               | 55.50            | -2.7  | 52.8    | 436.0   | 5000.0 | -21.2     |
| 4618.05   | H        | 315.00  | 1.0               | 56.50            | -2.7  | 53.8    | 489.9   | 5000.0 | -20.2     |
| 4926.80   | H        | 202.00  | 1.0               | 48.00            | -2.4  | 45.6    | 189.9   | 5000.0 | -28.4     |
| 5541.36   | H        | 315.00  | 1.0               | 51.00            | -1.9  | 49.1    | 283.6   | 5000.0 | -24.9     |
| 7388.64   | H        | 202.50  | 1.0               | 51.0             | 2.2   | 53.2    | 457.1   | 5000.0 | -20.8     |
| 8312.22   | H        | 0.00    | 1.0               | 44.2             | 2.2   | 46.4    | 208.2   | 5000.0 | -27.6 amb |
| 9384.00   | H        | 0.00    | 1.0               | 48.00            | 2.7   | 50.7    | 342.0   | 5000.0 | -23.3 amb |
| Z         |          |         |                   |                  |       |         |         |        |           |
| 1216.80   | V        | 45.00   | 1.0               | 51.83            | -10.9 | 40.9    | 111.0   | 5000.0 | -33.1     |
| 1231.44   | V        | 45.00   | 1.0               | 67.83            | -10.8 | 57.0    | 709.5   | 5000.0 | -17.0     |
| 1539.30   | V        | 202.00  | 1.0               | 56.50            | -8.7  | 47.8    | 246.1   | 5000.0 | -26.2     |
| 2770.83   | V        | 90.00   | 1.0               | 55.83            | -4.8  | 51.0    | 355.8   | 5000.0 | -23.0     |
| 3694.44   | V        | 225.00  | 1.0               | 60.17            | -3.6  | 56.6    | 672.4   | 5000.0 | -17.4     |
| 4603.62   | V        | 315.00  | 1.0               | 49.00            | -2.7  | 46.3    | 206.3   | 5000.0 | -27.7     |
| 4618.05   | V        | 0.00    | 1.0               | 44.00            | -2.7  | 41.3    | 116.2   | 5000.0 | -32.7 amb |
| 4926.80   | V        | 0.00    | 1.0               | 44.30            | -2.4  | 41.9    | 124.0   | 5000.0 | -32.1 amb |
| 5541.36   | V        | 248.00  | 1.0               | 47.20            | -1.9  | 45.3    | 183.1   | 5000.0 | -28.7     |
| 7388.64   | V        | 180.00  | 1.0               | 55.5             | 2.2   | 57.7    | 767.4   | 5000.0 | -16.3     |
| 8312.22   | V        | 0.00    | 1.0               | 46.3             | 2.2   | 48.5    | 266.1   | 5000.0 | -25.5 amb |
| 9384.00   | V        | 0.00    | 1.0               | 46.67            | 2.7   | 49.4    | 293.5   | 5000.0 | -24.6 amb |
| 1216.80   | H        | 315.00  | 1.0               | 56.20            | -10.9 | 45.3    | 183.5   | 5000.0 | -28.7     |
| 1231.44   | H        | 315.00  | 1.0               | 72.70            | -10.8 | 61.9    | 1243.0  | 5000.0 | -12.1     |
| 1539.30   | H        | 315.00  | 1.0               | 64.00            | -8.7  | 55.3    | 583.5   | 5000.0 | -18.7     |
| 2770.83   | H        | 315.00  | 1.0               | 63.50            | -4.8  | 58.7    | 860.5   | 5000.0 | -15.3     |
| 3694.44   | H        | 270.00  | 1.0               | 63.00            | -3.6  | 59.4    | 931.3   | 5000.0 | -14.6     |
| 4603.62   | H        | 338.00  | 1.0               | 54.80            | -2.7  | 52.1    | 402.2   | 5000.0 | -21.9     |
| 4618.05   | H        | 180.00  | 1.0               | 53.00            | -2.7  | 50.3    | 327.4   | 5000.0 | -23.7     |
| 4926.80   | H        | 0.00    | 1.0               | 48.50            | -2.4  | 46.1    | 201.1   | 5000.0 | -27.9 .   |
| 5541.36   | H        | 180.00  | 1.0               | 50.00            | -1.9  | 48.1    | 252.8   | 5000.0 | -25.9     |
| 7388.64   | H        | 180.00  | 1.0               | 56.7             | 2.2   | 58.9    | 881.0   | 5000.0 | -15.1     |
| 8312.22   | H        | 0.00    | 1.0               | 46.0             | 2.2   | 48.2    | 257.0   | 5000.0 | -25.8 amb |
| 9384.00   | H        | 0.00    | 1.0               | 47.00            | 2.7   | 49.7    | 304.8   | 5000.0 | -24.3 amb |

Average Measurements Above 1 GHz

| Frequency | Polarity | Azimuth | Antenna<br>Height | SA Level<br>(PEAK) | Afd   | AFc   | E-Field | E-Field | Limit | Margin |
|-----------|----------|---------|-------------------|--------------------|-------|-------|---------|---------|-------|--------|
| MHz       | H/V      | Degree  | m                 | dBuV               | dB    | dB/m  | dBuV/m  | uV/m    | uV/m  | dB     |
| X         |          |         |                   |                    |       |       |         |         |       |        |
| 1216.80   | V        | 180-22  | 1.0               | 57.50              | -20.0 | -10.9 | 26.6    | 21.3    | 500.0 | -27.4  |
| 1231.44   | V        | 202.00  | 1.0               | 73.33              | -20.0 | -10.8 | 42.5    | 133.6   | 500.0 | -11.5  |
| 1539.30   | V        | 248.00  | 1.0               | 59.20              | -20.0 | -8.7  | 30.5    | 33.6    | 500.0 | -23.5  |
| 2770.83   | V        | 22.00   | 1.0               | 58.5               | -20.0 | -4.8  | 33.7    | 48.4    | 500.0 | -20.3  |
| 3694.44   | V        | 135.00  | 1.0               | 64.0               | -20.0 | -3.6  | 40.4    | 104.5   | 500.0 | -13.6  |
| 4603.62   | V        | 225.00  | 1.0               | 55.0               | -20.0 | -2.7  | 32.3    | 41.2    | 500.0 | -21.7  |
| 4618.05   | V        | 225.00  | 1.0               | 57.2               | -20.0 | -2.7  | 34.5    | 53.1    | 500.0 | -19.5  |
| 4926.80   | V        | 0.00    | 1.0               | 46.8               | -20.0 | -2.4  | 24.4    | 16.6    | 500.0 | -29.6  |
| 5406.00   | V        | 0.00    | 1.0               | 48.3               | -20.0 | -2.0  | 26.3    | 20.6    | 500.0 | -27.7  |
| 7388.64   | V        | 180.00  | 1.0               | 57.0               | -20.0 | 2.2   | 39.2    | 91.2    | 500.0 | -14.8  |
| 8312.22   | V        | 0.00    | 1.0               | 43.0               | -20.0 | 2.2   | 25.2    | 18.2    | 500.0 | -28.8  |
| 9384.00   | V        | 0.00    | 1.0               | 43.3               | -20.0 | 2.7   | 26.0    | 19.9    | 500.0 | -28.0  |
| 1216.80   | H        | 225.00  | 1.0               | 58.0               | -20.0 | -10.9 | 27.1    | 22.6    | 500.0 | -26.9  |
| 1231.44   | H        | 270.00  | 1.0               | 73.8               | -20.0 | -10.8 | 43.0    | 141.1   | 500.0 | -11.0  |
| 1539.30   | H        | 225.00  | 1.0               | 68.0               | -20.0 | -8.7  | 39.3    | 92.5    | 500.0 | -14.7  |
| 2770.83   | H        | 68.00   | 1.0               | 56.0               | -20.0 | -4.8  | 31.2    | 36.3    | 500.0 | -22.8  |
| 3694.44   | H        | 135.00  | 1.0               | 61.8               | -20.0 | -3.6  | 38.2    | 81.4    | 500.0 | -15.8  |
| 4603.62   | H        | 225.00  | 1.0               | 55.3               | -20.0 | -2.7  | 32.6    | 42.8    | 500.0 | -21.4  |
| 4618.05   | H        | 225.00  | 1.0               | 53.0               | -20.0 | -2.7  | 30.3    | 32.7    | 500.0 | -23.7  |
| 4926.80   | H        | 0.00    | 1.0               | 48.0               | -20.0 | -2.4  | 25.6    | 19.0    | 500.0 | -28.4  |
| 5406.00   | H        | 0.00    | 1.0               | 46.8               | -20.0 | -2.0  | 24.8    | 17.3    | 500.0 | -29.2  |
| 7388.64   | H        | 180.00  | 1.0               | 53.0               | -20.0 | 2.2   | 35.2    | 57.5    | 500.0 | -18.8  |
| 8312.22   | H        | 0.00    | 1.0               | 44.5               | -20.0 | 2.2   | 26.7    | 21.6    | 500.0 | -27.3  |
| 9384.00   | H        | 180.00  | 1.0               | 48.0               | -20.0 | 2.7   | 30.7    | 34.2    | 500.0 | -23.3  |
| Y         |          |         |                   |                    |       |       |         |         |       |        |
| 1216.80   | V        | 22.00   | 1.0               | 62.20              | -20.0 | -10.9 | 31.3    | 36.6    | 500.0 | -22.7  |
| 1231.44   | V        | 22.00   | 1.0               | 79.00              | -20.0 | -10.8 | 48.2    | 256.7   | 500.0 | -5.8   |
| 1539.30   | V        | 135.00  | 1.0               | 60.33              | -20.0 | -8.7  | 31.7    | 38.2    | 500.0 | -22.3  |
| 2770.83   | V        | 180.00  | 1.0               | 56.25              | -20.0 | -4.8  | 31.4    | 37.3    | 500.0 | -22.5  |

*IntelliSense (C & K Systems, Inc.)*

**FCC ID: C2DLWSN-30-DX**

**WLL Project #: 6386X**

| Frequency | Polarity | Azimuth | Antenna<br>Height | SA Level<br>(PEAK) | Afd   | AFc   | E-Field | E-Field | Limit | Margin |
|-----------|----------|---------|-------------------|--------------------|-------|-------|---------|---------|-------|--------|
| MHz       | H/V      | Degree  | m                 | dBuV               | dB    | dB/m  | dBuV/m  | uV/m    | uV/m  | dB     |
| 3694.44   | V        | 0.00    | 1.0               | 61.50              | -20.0 | -3.6  | 37.9    | 78.4    | 500.0 | -16.1  |
| 4603.62   | V        | 180.00  | 1.0               | 55.00              | -20.0 | -2.7  | 32.3    | 41.2    | 500.0 | -21.7  |
| 4618.05   | V        | 0.00    | 1.0               | 57.20              | -20.0 | -2.7  | 34.5    | 53.1    | 500.0 | -19.5  |
| 4926.80   | V        | 0.00    | 1.0               | 45.90              | -20.0 | -2.4  | 23.5    | 14.9    | 500.0 | -30.5  |
| 5541.36   | V        | 180.00  | 1.0               | 50.00              | -20.0 | -1.9  | 28.1    | 25.3    | 500.0 | -25.9  |
| 7388.64   | V        | 90.00   | 1.0               | 54.0               | -20.0 | 2.2   | 36.2    | 64.6    | 500.0 | -17.8  |
| 8312.22   | V        | 0.00    | 1.0               | 45.0               | -20.0 | 2.2   | 27.2    | 22.9    | 500.0 | -26.8  |
| 9384.00   | V        | 0.00    | 1.0               | 46.00              | -20.0 | 2.7   | 28.7    | 27.2    | 500.0 | -25.3  |
| 1216.80   | H        | 180.00  | 1.0               | 53.00              | -20.0 | -10.9 | 37.1    | 71.4    | 500.0 | -16.9  |
| 1231.44   | H        | 225.00  | 1.0               | 66.50              | -20.0 | -10.8 | 35.7    | 60.9    | 500.0 | -18.3  |
| 1539.30   | H        | 180.00  | 1.0               | 59.83              | -20.0 | -8.7  | 31.2    | 36.1    | 500.0 | -22.8  |
| 2770.83   | H        | 158.00  | 1.0               | 61.83              | -20.0 | -4.8  | 37.0    | 71.0    | 500.0 | -17.0  |
| 3694.44   | H        | 315.00  | 1.0               | 60.83              | -20.0 | -3.6  | 37.2    | 72.5    | 500.0 | -16.8  |
| 4603.62   | H        | 315.00  | 1.0               | 55.50              | -20.0 | -2.7  | 32.8    | 43.6    | 500.0 | -21.2  |
| 4618.05   | H        | 315.00  | 1.0               | 56.50              | -20.0 | -2.7  | 33.8    | 49.0    | 500.0 | -20.2  |
| 4926.80   | H        | 202.00  | 1.0               | 48.00              | -20.0 | -2.4  | 25.6    | 19.0    | 500.0 | -28.4  |
| 5541.36   | H        | 315.00  | 1.0               | 51.00              | -20.0 | -1.9  | 29.1    | 28.4    | 500.0 | -24.9  |
| 7388.64   | H        | 202.50  | 1.0               | 51.0               | -20.0 | 2.2   | 33.2    | 45.7    | 500.0 | -20.8  |
| 8312.22   | H        | 0.00    | 1.0               | 44.2               | -20.0 | 2.2   | 26.4    | 20.8    | 500.0 | -27.6  |
| 9384.00   | H        | 0.00    | 1.0               | 48.00              | -20.0 | 2.7   | 30.7    | 34.2    | 500.0 | -23.3  |
| Z         |          |         |                   |                    |       |       |         |         |       |        |
| 1216.80   | V        | 45.00   | 1.0               | 51.83              | -20.0 | -10.9 | 20.9    | 11.1    | 500.0 | -33.1  |
| 1231.44   | V        | 45.00   | 1.0               | 67.83              | -20.0 | -10.8 | 37.0    | 71.0    | 500.0 | -17.0  |
| 1539.30   | V        | 202.00  | 1.0               | 56.50              | -20.0 | -8.7  | 27.8    | 24.6    | 500.0 | -26.2  |
| 2770.83   | V        | 90.00   | 1.0               | 55.83              | -20.0 | -4.8  | 31.0    | 35.6    | 500.0 | -23.0  |
| 3694.44   | V        | 225.00  | 1.0               | 60.17              | -20.0 | -3.6  | 36.6    | 67.2    | 500.0 | -17.4  |
| 4603.62   | V        | 315.00  | 1.0               | 49.00              | -20.0 | -2.7  | 26.3    | 20.6    | 500.0 | -27.7  |
| 4618.05   | V        | 0.00    | 1.0               | 44.00              | -20.0 | -2.7  | 21.3    | 11.6    | 500.0 | -32.7  |
| 4926.80   | V        | 0.00    | 1.0               | 44.30              | -20.0 | -2.4  | 21.9    | 12.4    | 500.0 | -32.1  |
| 5541.36   | V        | 248.00  | 1.0               | 47.20              | -20.0 | -1.9  | 25.3    | 18.3    | 500.0 | -28.7  |
| 7388.64   | V        | 180.00  | 1.0               | 55.5               | -20.0 | 2.2   | 37.7    | 76.7    | 500.0 | -16.3  |
| 8312.22   | V        | 0.00    | 1.0               | 46.3               | -20.0 | 2.2   | 28.5    | 26.6    | 500.0 | -25.5  |
| 9384.00   | V        | 0.00    | 1.0               | 46.67              | -20.0 | 2.7   | 29.4    | 29.3    | 500.0 | -24.6  |

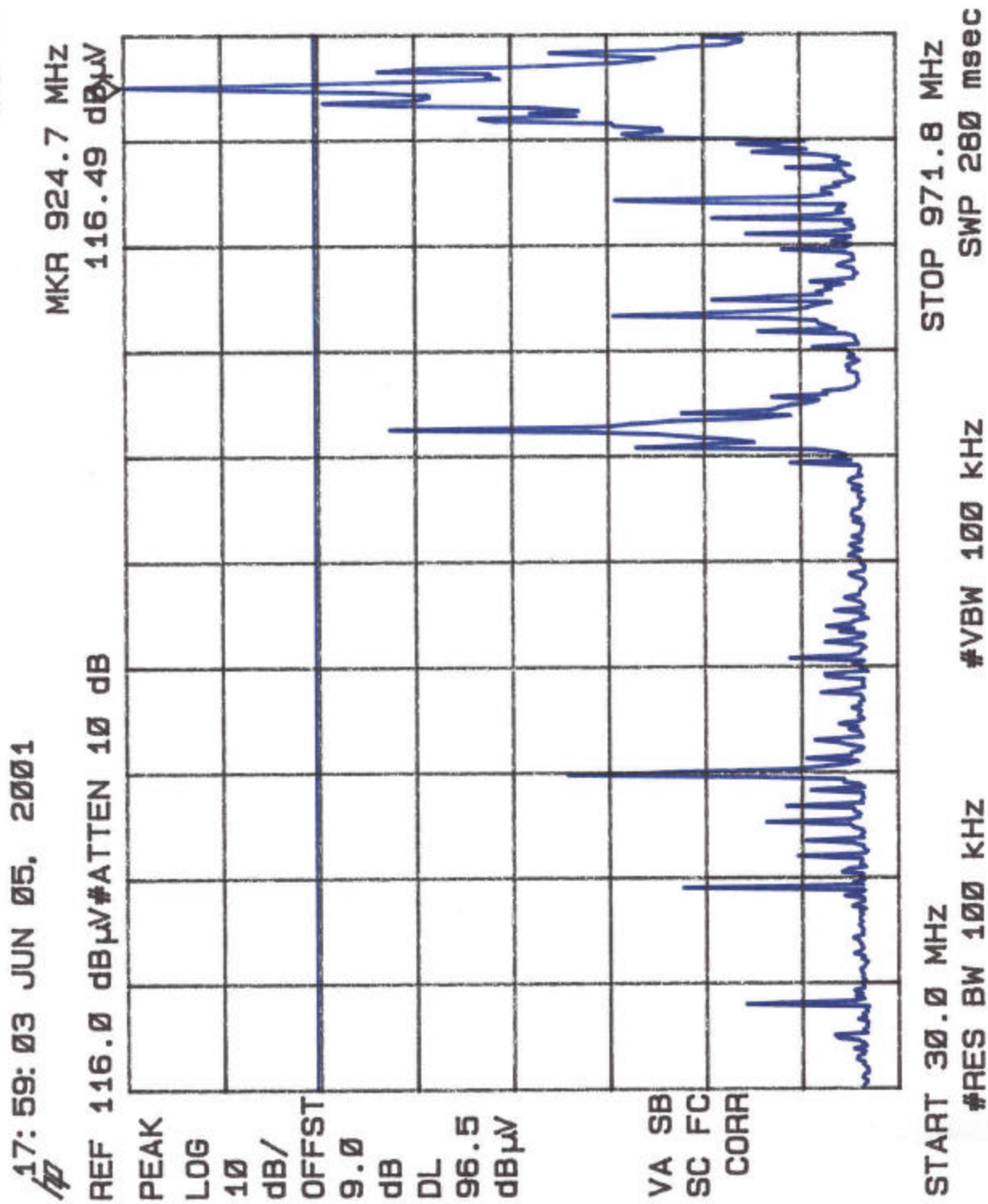
| Frequency | Polarity | Azimuth | Antenna<br>Height | SA Level<br>(PEAK) | Afd   | AFc   | E-Field | E-Field | Limit | Margin |
|-----------|----------|---------|-------------------|--------------------|-------|-------|---------|---------|-------|--------|
| MHz       | H/V      | Degree  | m                 | dBuV               | dB    | dB/m  | dBuV/m  | uV/m    | uV/m  | dB     |
| 1216.80   | H        | 315.00  | 1.0               | 56.20              | -20.0 | -10.9 | 25.3    | 18.4    | 500.0 | -28.7  |
| 1231.44   | H        | 315.00  | 1.0               | 72.70              | -20.0 | -10.8 | 41.9    | 124.3   | 500.0 | -12.1  |
| 1539.30   | H        | 315.00  | 1.0               | 64.00              | -20.0 | -8.7  | 35.3    | 58.4    | 500.0 | -18.7  |
| 2770.83   | H        | 315.00  | 1.0               | 63.50              | -20.0 | -4.8  | 38.7    | 86.0    | 500.0 | -15.3  |
| 3694.44   | H        | 270.00  | 1.0               | 63.00              | -20.0 | -3.6  | 39.4    | 93.1    | 500.0 | -14.6  |
| 4603.62   | H        | 338.00  | 1.0               | 54.80              | -20.0 | -2.7  | 32.1    | 40.2    | 500.0 | -21.9  |
| 4618.05   | H        | 180.00  | 1.0               | 53.00              | -20.0 | -2.7  | 30.3    | 32.7    | 500.0 | -23.7  |
| 4926.80   | H        | 0.00    | 1.0               | 48.50              | -20.0 | -2.4  | 26.1    | 20.1    | 500.0 | -27.9  |
| 5541.36   | H        | 180.00  | 1.0               | 50.00              | -20.0 | -1.9  | 28.1    | 25.3    | 500.0 | -25.9  |
| 7388.64   | H        | 180.00  | 1.0               | 56.7               | -20.0 | 2.2   | 38.9    | 88.1    | 500.0 | -15.1  |
| 8312.22   | H        | 0.00    | 1.0               | 46.0               | -20.0 | 2.2   | 28.2    | 25.7    | 500.0 | -25.8  |
| 9384.00   | H        | 0.00    | 1.0               | 47.00              | -20.0 | 2.7   | 29.7    | 30.5    | 500.0 | -24.3  |

### **3.4 RF Antenna Conducted Spurious Emissions Testing**

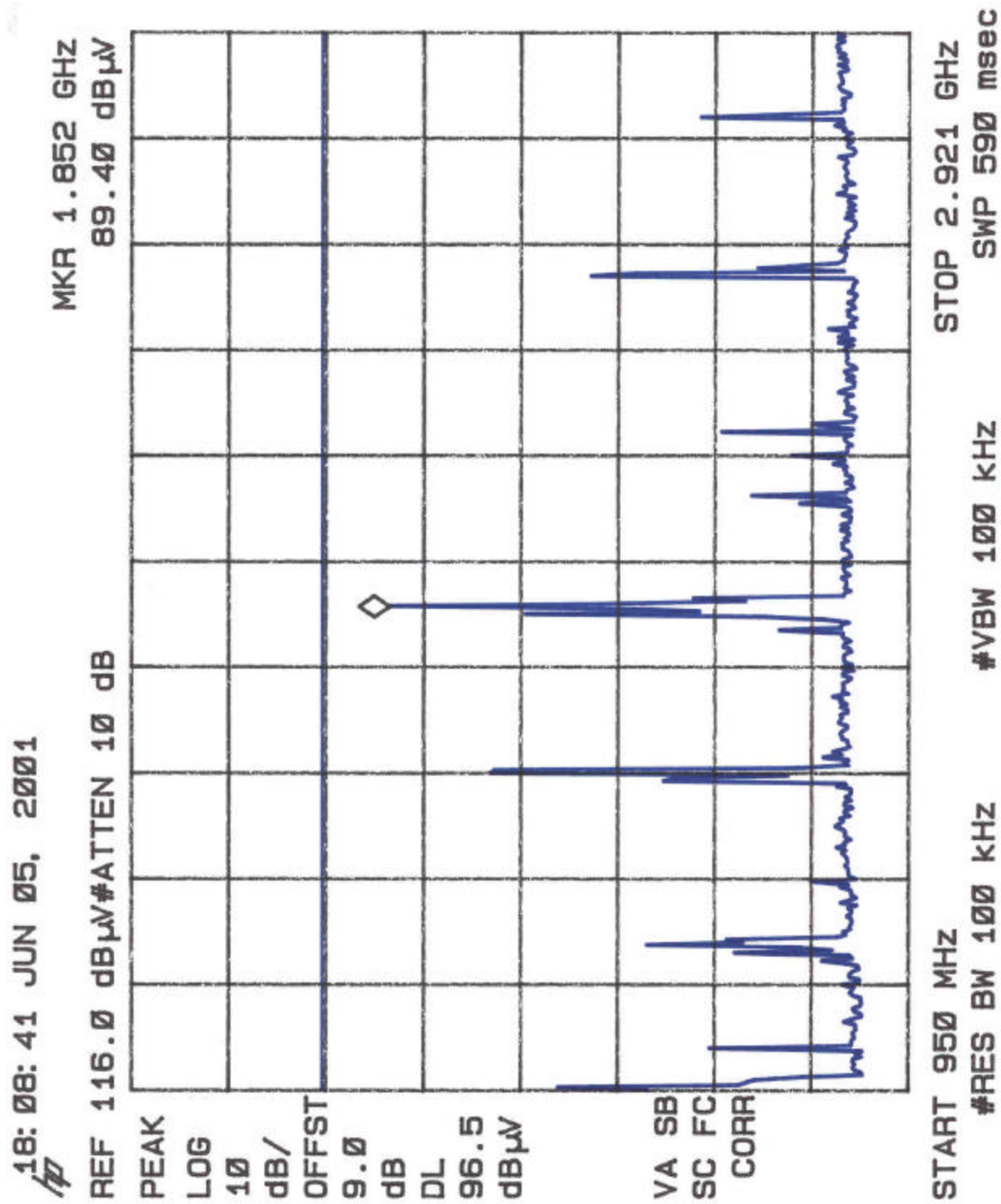
The EUT antenna was replaced with a short piece of microwave "hard line" coaxial cable and the cable was connected directly into the spectrum analyzer input. The analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 100 kHz. The emissions were scanned up to the tenth harmonic of the carrier. At each frequency, an external attenuator or filter was used to confirm that the transmitter input was not overloading the spectrum analyzer input.

Data are included in the following spectrum analyzer plots. All spurious emissions were verified to be 20dB down from the carrier power up to the tenth harmonic.

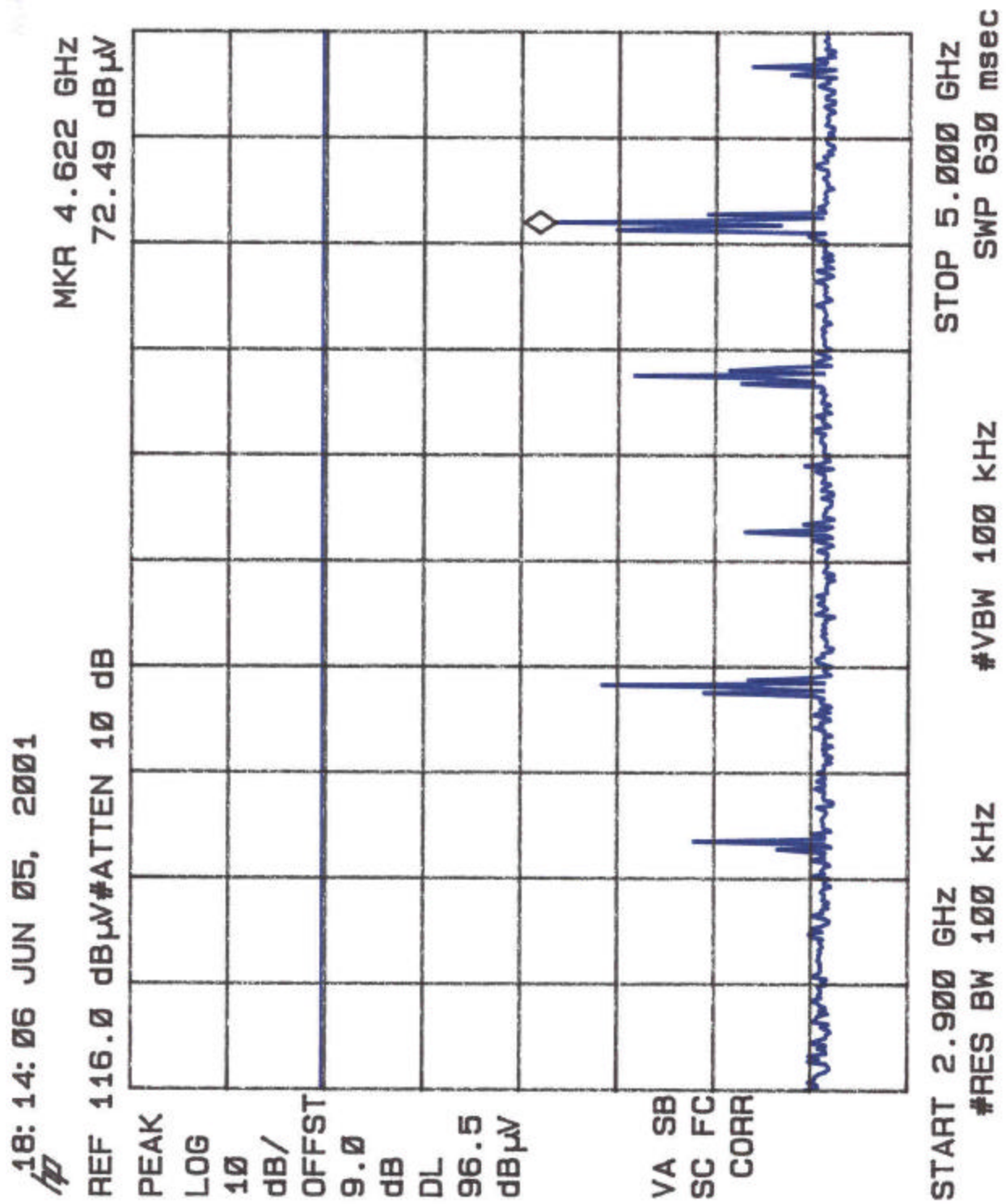
Plot #1: Conducted Spurious Emissions at Antenna Terminal  
20dBc



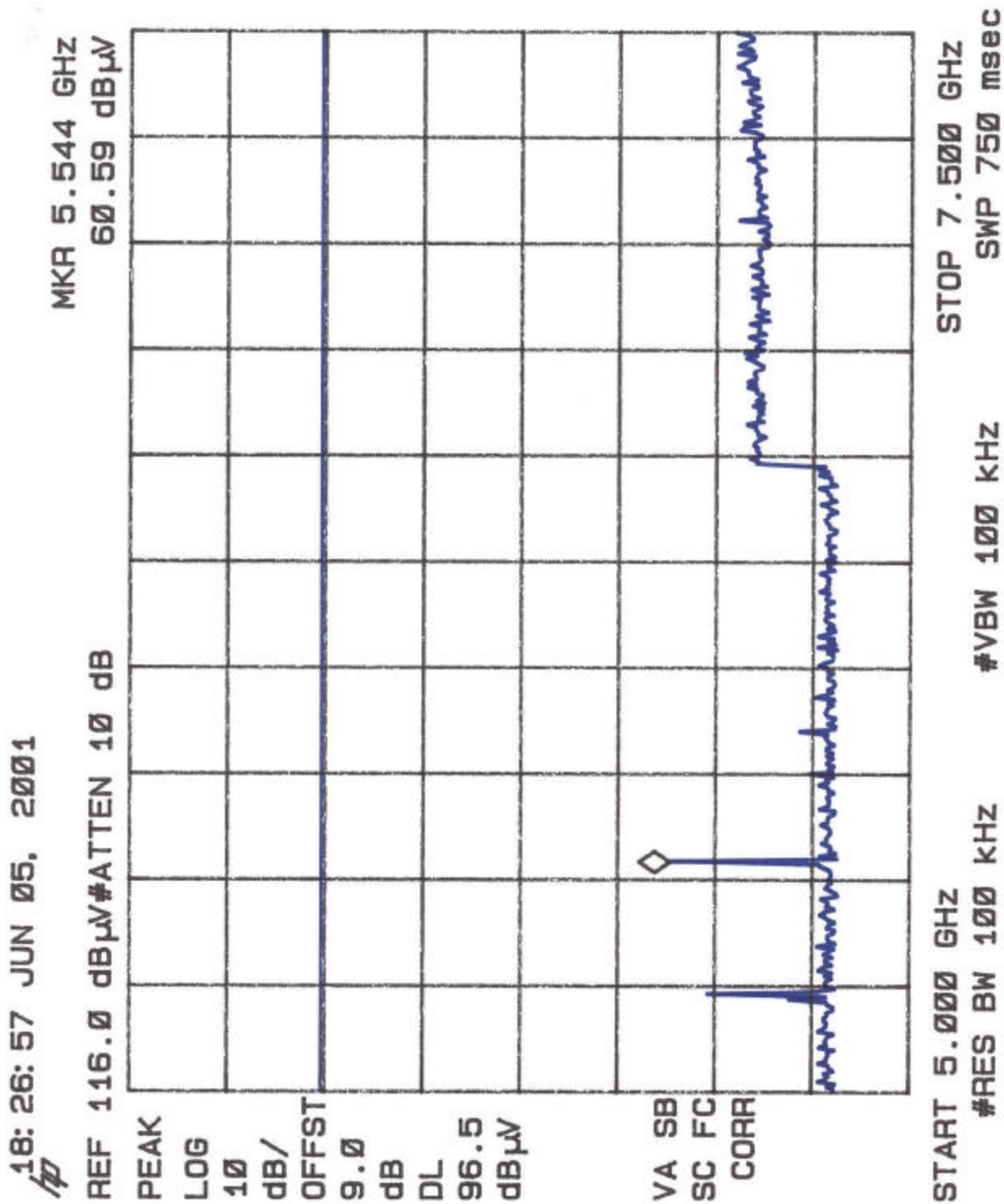
Plot #2: Conducted Spurious Emissions at Antenna Terminal  
20dBc



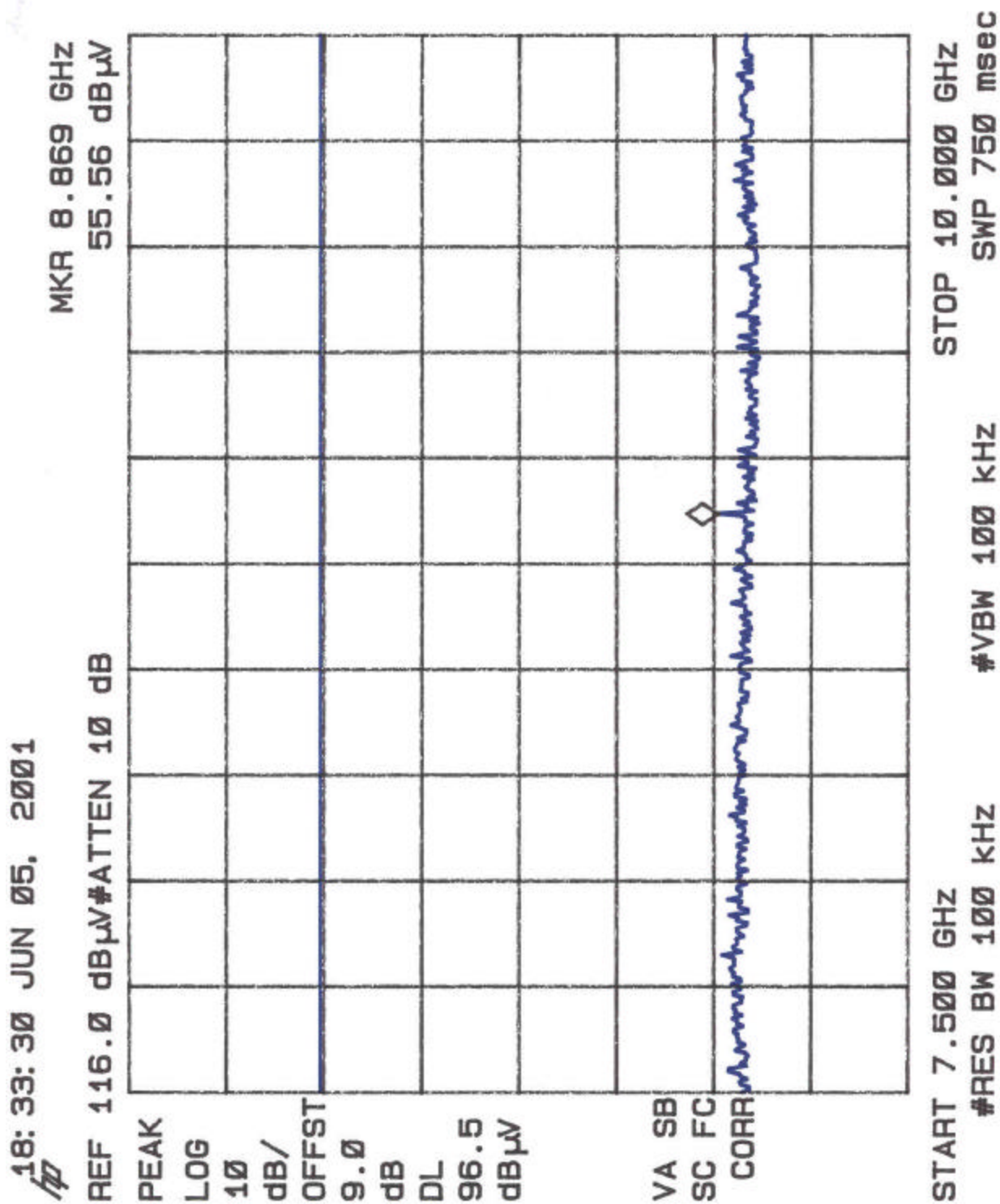
Plot #3: Conducted Spurious Emissions at Antenna Terminal  
20dBc



Plot #4: Conducted Spurious Emissions at Antenna Terminal  
20dBc



Plot #5: Conducted Spurious Emissions at Antenna Terminal  
20dBc



## **Table 2: System Under Test**

FCC ID: C2DLWSN-30-DX

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EUT: IntelliSense (C & K Systems, Inc.) SN931 Outdoor Spread Spectrum Transmitter;  
FCC ID: C2DLWSN-30-DX

## **Table 3: Measurement Equipment Used**

The following equipment is used to perform measurements:

Hewlett-Packard Spectrum Analyzer: HP 8568B

Hewlett-Packard Quasi-Peak Adapter: HP 85650A

Hewlett-Packard Preselector: HP 85685A

Hewlett-Packard Spectrum Analyzer: HP 8564E

Hewlett-Packard Pre-Amplifier: HP 8449A

Antenna Research Associates, Inc. Biconical Log Periodic Antenna: LPB-2520A (Site 2)

Antenna Research Associates, Inc. Horn Antenna: DRG-118/A

Solar 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network: 8012-50-R-24-BNC

Solar 50  $\Omega$ /50  $\mu$ H Line Impedance Stabilization Network: 8028-50-TS-24-BNC

AH Systems, Inc. Portable Antenna Mast: AMS-4 (Site 2)

AH Systems, Inc. Motorized Turntable (Site 2)

RG-214 semi-rigid coaxial cable

RG-223 double-shielded coaxial cable

## Appendix A

### Statement of Measurement Uncertainty

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is  $\pm 2.3$  dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty =  $0.5 (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$  dB