

MEASUREMENT/TECHNICAL REPORT
Chori America, Inc. Model Spot D Tek IV
FCC ID: K9R900041

APPLICATION FOR CERTIFICATION
RF Emission Measurements Performed For Determination of
Compliance with the US Code of Federal Regulations
Title 47, Chapter I, FCC Part 90.217
As Required for Certification for Intentional Radiators

Radiometrics Midwest Corporation Test Document RP-4082

Issue Date: 10/19/99

This report concerns: Original grant

Equipment type: UHF Transmitter

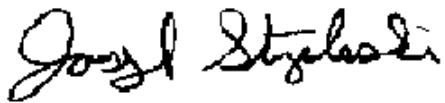
Tests Performed For

Chori America, Inc.
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Test Facility

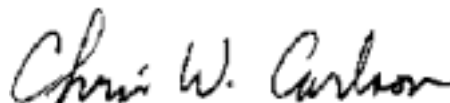
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1.0 General Information

Since the EUT is less than 120 mW it is required to meet the technical requirements of 90.217.

1.1 Product Description

The Model Spot-D-Tek IV (referred to as the EUT in this report) is a 100 mW UHF Transmitter. The EUT is manufactured by Chori America, Inc. The EUT is battery powered and operates at 464.500, 464.550, 469.500 and 469.550 MHz. The EUT is designed to operate with a 20 kHz channel bandwidth. . The emission designator is 20K0F2D.

The transmitter receives data from a sensor that acts a pipe locator and sends data to a remote monitor. The sensor receives a signal at 38 kHz. The remote monitor has an UHF receiver. The transmitter cannot send voice transmissions. The EUT will only be used for data transmission.

1.2 Related Submittals

The associated receiver is operated under FCC rules for unintentional radiators. It is subject to the FCC requirements pursuant to the Certification equipment authorization under Part 15 subpart B and is being currently submitted as FCC ID: K9R900042.

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system which have grants, are:

Model Number Serial Number	FCC ID	Manufacturer & Description	Cable Descriptions
M/N: Spot D Tek IV	K9R900041	Chori America, Inc. Location System	None; Battery Operated

1.4 Test Methodology

The test procedures used are in accordance with the FCC part 90 rules. The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

Since the EUT is battery powered, no AC conducted emissions were performed.

1.5 Test Facility

The test site used to collect the radiated data is located on 12 E Devonwood in Romeoville, Illinois. Details of the site characteristics are on file with the FCC. These sites have been fully described in a report and accepted by the FCC as (31040/SIT 1300F2).

2.0 Test Specification Requirements

The electromagnetic emissions from the EUT must comply with the following requirements.

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2.1 RF Power Output

The EUT shall not exceed the actual power necessary for satisfactory operation that is specified by the manufacturer to be 0.10 Watt or 100 milliwatts, with a tolerance of 20 Percent. In accordance with Paragraph 90.217, the maximum power output that will be authorized by the FCC for transmission is 120 milliwatts.

2.2 Occupied Bandwidth

For equipment designed to operate with a 20 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB from the unmodulated carrier. This is in accordance with 90.217 (a)

The occupied bandwidth of the emissions shall be measured at the RF output terminals of the transmitter. The frequency range of the measurement shall be 1 MHz to 5000 MHz.

3.0 Test Procedures

The test procedures used are in accordance with FCC Part 90 and Measurement Procedure MP-1. The specific procedures are described below.

3.1 RF Power Output

The EUT was positioned on a nonconductive test stand. Power was supplied through its DC supply. The transmitter was keyed with no modulation. The RF output of the transmitter was connected directly to the RF input of a Power Meter.

3.2 Occupied Bandwidth

The occupied of the RF output was also measured using the 8566A spectrum analyzer. The bandwidth was measured using the peak detector function and a narrow resolution bandwidth. The output of the transmitter was connected to the spectrum analyzer with a six-inch, low loss SMA cable.

The spectrum analyzer display was digitized and plotted. Several views of the output spectrum in the range from 1 MHz to 5000 MHz were plotted to show compliance with the requirements set forth for spurious emissions at the terminals, as well as compliance with the occupied bandwidth limitations of the fundamental transmission. The bandwidth of the spectrum analyzer was set as required by FCC part 90.210.

3.3 Frequency Stability

Frequency stability was also measured using the 8566A spectrum analyzer. For this measurement, the analyzer was used as a frequency counter. The frequency of the transmitter was measured with an antenna close to the EUT. The resolution bandwidth of the analyzer was reduced to 10 Hz in order to accurately read the fundamental frequency.

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The output frequency was measured while varying the input voltage to the EUT. Measurements were performed with the input voltage varied from the battery fully charged to the end point of battery operation.

The output frequency was also measured while varying the ambient temperature of the EUT. Measurements of the output frequency were performed with the ambient temperature varied over the range from -30 C to +50 C, at 10 degree increments. The EUT was placed in the temperature chamber during the test and the temperature was allowed to stabilize for 15 minutes at each temperature. The frequency was measured within 15 seconds of the initial keying of the transmitter at each temperature point.

4.0 System Test Configuration

4.1 Test System and Justification

Proper operation was determined prior to the onset of tests. This is only configuration that will be installed in a normal operation. Wiring was consistent with manufacturer's recommendations. The system was configured for testing in a typical fashion (as a customer would normally use it).

4.2 EUT Test Configuration

The EUT was tested as a stand-alone device. The EUT was operated at full rated output into its standard antenna transmitting the data from the pipe locator. The modulation was disabled only when determining the amplitude of the unmodulated carrier

4.3 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.4 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5.0 Occupied Bandwidth Results

The plots of the occupied bandwidth for the EUT are supplied on the following page two pages. For frequencies greater than 100 kHz from the fundamental, the results are listed in the table below

Transmit Freq. MHz	Unmodulated carrier Level dBuV	Spurious Frequency MHz	Spurious Level dBuV	Attenuation from carrier dB	90.217 Min. Attenuation dB
469.55	124.8	939.1	64.5	65.3	30
469.55	124.8	1408.7	76.8	48.0	30
469.55	124.8	2817.3	74.6	50.2	30
464.5	124.7	929.0	63.0	61.7	30
464.5	124.7	1393.5	74.8	49.9	30
464.5	124.7	2322.5	72.5	52.2	30

All other signals were at least 60 dB down from the fundamental amplitude.

Judgment: Passed Occupied Bandwidth by 18.0 dB

The radiated emissions were scanned from 30 to 4700 MHz. The highest emissions are listed above.

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Figure 5.1 Occupied Bandwidth Plot

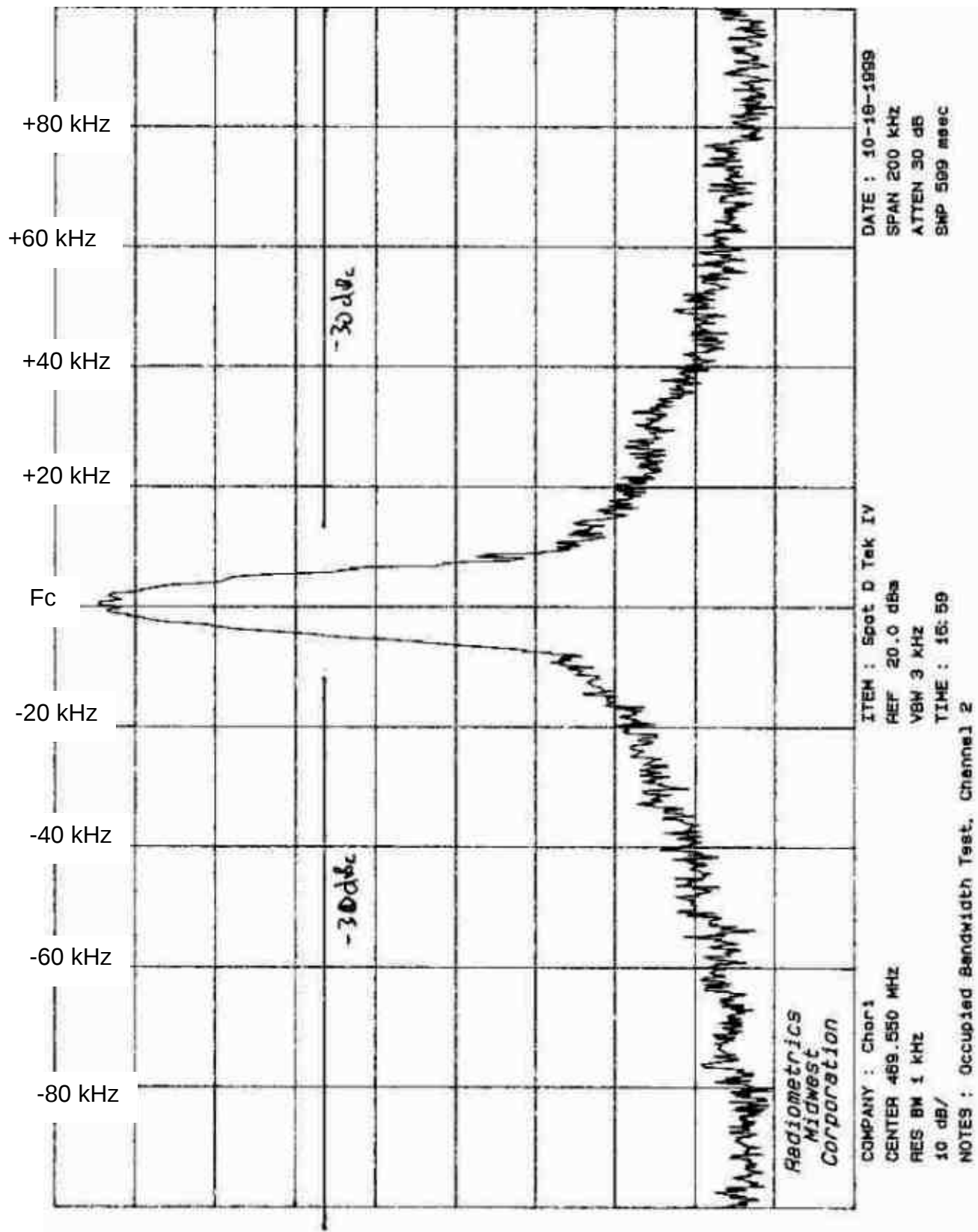
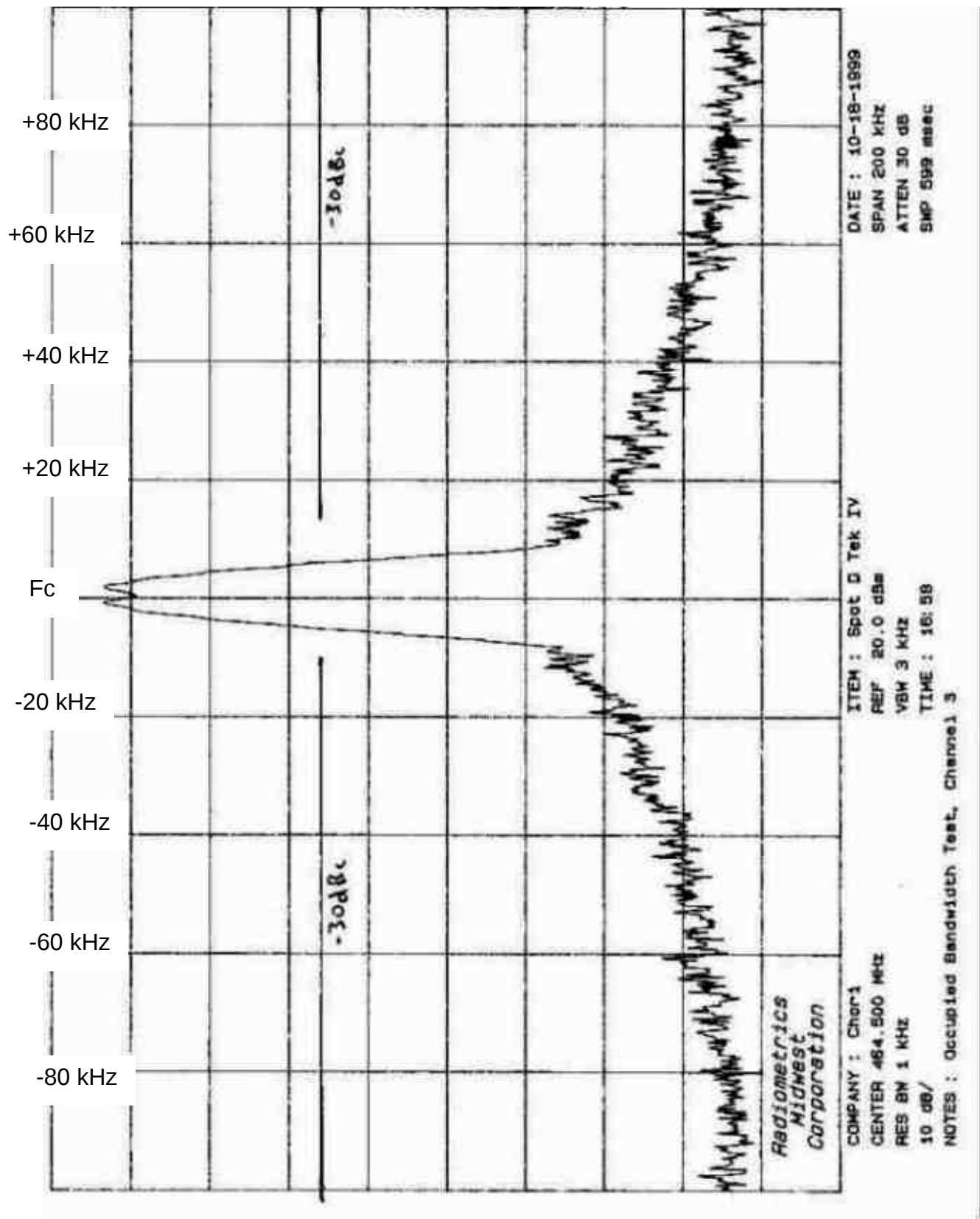


Figure 5.2 Occupied Bandwidth Plot



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6.0 RF Power Output Results

Test Description: RF Power Output; Paragraph 90.217

Received with power meter Signal Level dBm is 17.6

The rated power output is 100 mWatts

Note that 20.0 dB(m) = 100 mWatts

7.0 Frequency Stability Results

Test Description: Frequency Tolerance of Carrier Frequency Vs Temperature

Temperature Degrees C	Measured Frequency MHz	Frequency Deviation kHz
-30.0	464.5498	0.2
-20.0	464.5501	0.1
-10.0	464.5498	0.2
0.0	464.5495	0.5
10.0	464.5497	0.3
20.0	464.5499	0.1
30.0	464.5501	0.1
40.0	464.5504	0.4
50.0	464.5509	0.9

Test Description: Frequency Tolerance of Carrier Frequency Vs Input Voltage

Battery Input Voltage VDC	Measured Frequency MHz	Frequency Deviation kHz
10.00	464.5503	0.3
9.5	464.5503	0.3
9	464.5503	0.3
8.5	464.5503	0.3
7.5	464.5503	0.3
7.0	464.5503	0.3
6.5	464.5503	0.3
6.0	464.5492	0.8
5.5	464.5477	2.3

Note: The battery end point is 6.0 Volts.
Nominal Battery Voltage is 9.0 VDC

Test Result: The bandwidth required for frequency stability is 2.3 kHz

Test Personnel: Joseph Strzelecki
Senior EMC Engineer