Test Report

of an intentional radiator under Part 15 of the FCC rules prepared for:
Datamatic, Ltd.

Firefly Transmitter FCC ID: ODYD3000

DUT:	Water Meter Transmitter
Model:	D3000
Test Date:	17 – 19 January, 2005
Manufacturer:	Datamatic, Ltd. 3600 K Avenue Plano, Texas (972) 234-5000
Conducted by:	Control Design & Testing, Inc. 6010 Red Fox Drive Spotsylvania, VA 22553 (540) 582-2826
Facility	Carl T Jones Corporation 7901 Yarnwood Court Springfield, VA 22153 FCC Site #90490, IC Site #3101

CD&T FCC ID: ODYD3000

A. DEVICE UNDER TEST

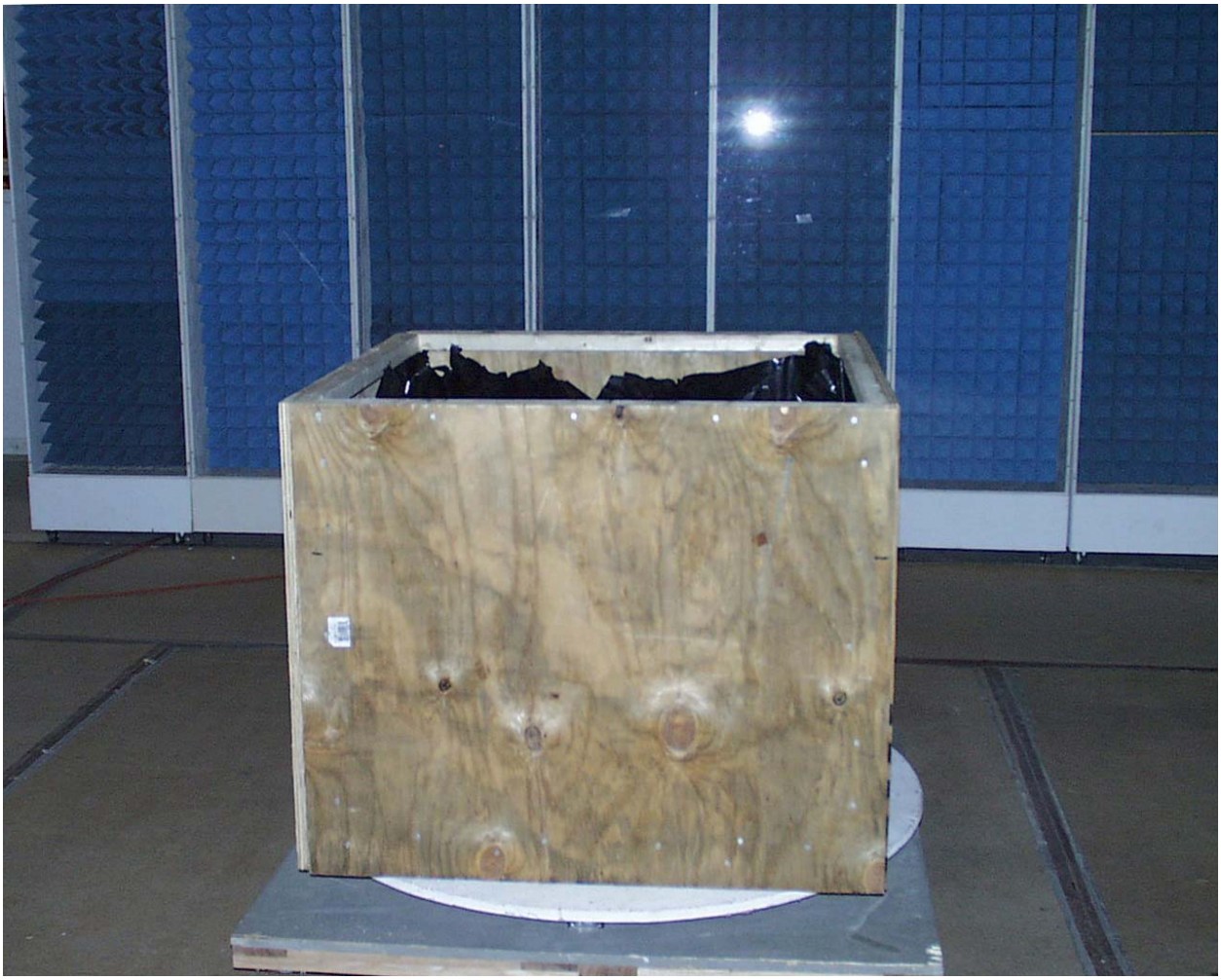
The product is a transmitter used for the wireless transmission of public utility water meter data. This device works in conjunction with a handheld receiver (ODYD740) that has been previously certified. This product is designed to operate under the provisions of Part 15.249 of the FCC rules.

The transmit frequency is 916.500 MHz., nominal. The modulation mode is on/off keyed using a proprietary NRZ pulse format. This device is installer programmed to transmit single data packets at intervals of from 1 second up to 18 hours. Power for the device is provided by an internal “D” size 3.6 volt lithium battery. The entire assembly is weather sealed by a custom molded silicone gasket compressed between the case body and the case lid.

The radio section consists of an RF Monolithics TX1000L transmitter module, a two element antenna matching network and helical wire antenna. The antenna is custom manufactured for the product and is soldered directly to the printed circuit board. There is no provision to connect an external antenna.

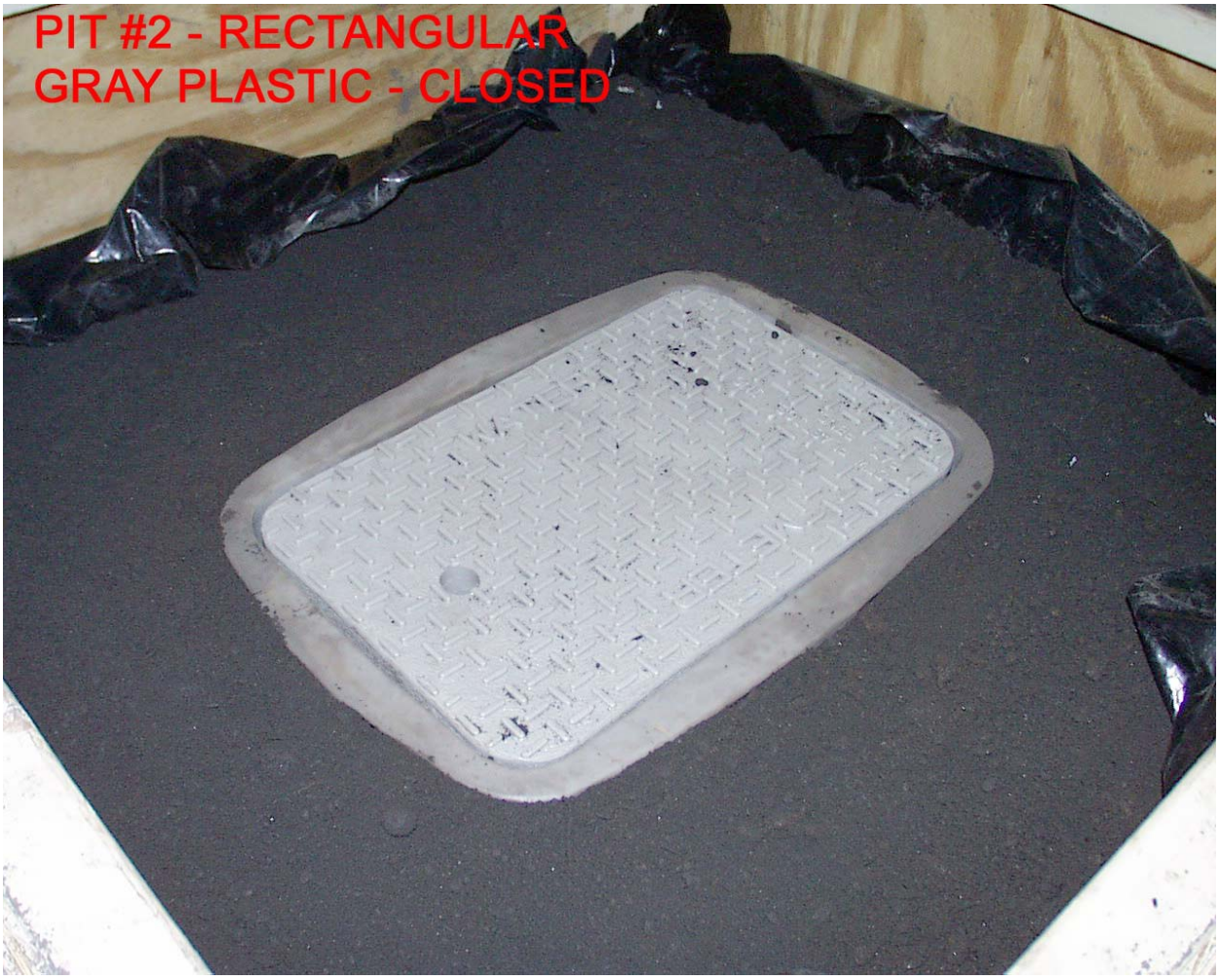
B. MEASUREMENT PROCEDURE: RADIATED EMISSIONS

Transmitter field strength measurements were made using a special earth filled box constructed of ¾ inch plywood, approximately 1 meter square by 0.9 meters high, designed to simulate a typical in ground installation. The soil in the box was filled to 0.8 meters above the OATS floor and leveled. A typical plastic water meter pit enclosure was positioned squarely in the center of the box with the top of the plastic enclosure level with the soil. The DUT was placed inside the plastic enclosure in secured by nylon straps to a ¾ inch plastic stake. The box fixture is shown in the photograph below.



Prior to taking final measurements, emission levels at the fundamental frequency were investigated using three different plastic pit enclosures each mounted in the box. They were of different sizes and shapes and from different manufacturers. For each check the DUT was tried in different mounting positions within the pit enclosures to determine the worst case (least attenuation) placement. The worst case position in all the enclosures was with the DUT near pit center and as close to the top of the pit as possible without interfering with the closure of the pit lid. All the pits produced similar attenuations; within about 3.5 dB of each other. However, the gray rectangular enclosure (Pit #2) exhibited the least attenuation and so it was used for the final testing.

The setup with the gray enclosure is shown in the photos below. Setup photographs for Pits #1 and #3 will be show in the setup exhibits that accompany the application.


PIT #2 - RECTANGULAR
GRAY PLASTIC - CLOSED


PIT # 2 - RECTANGULAR
GRAY PLASTIC - OPEN - FRONT

The box fixture was placed on a rotating turntable, centered at 3 meters distant from the measurement antennas. Testing was then carried out in normal OATS fashion according to the procedures set forth in ANSI C63.4 (1992). Testing was conducted with a fresh battery and monitored periodically to insure that the battery voltage (under load) was maintained at 95% of nominal or greater.

The field strength measurements were taken using an HP8596E spectrum analyzer, an EMCO 3121C dipole set, an EMCO 3115 double ridge guide horn and an Avantek UJ210 preamp. The device was scanned from 30 MHz. to 10 GHz. and all emissions were noted. In this case, the only emissions detected were those harmonically related to the fundamental transmit frequency.

There is a 4 MHz clock crystal associated with the micro-controller and the 8th harmonic (32 MHz) could be seen with a preamp in the screen room but was not detectable on the OATS setup.

At each detected emission frequency, the DUT was measured by rotating the turntable and adjusting the antenna height over a range of 1 to 4 meters to obtain the maximum output level. This procedure was performed with both horizontal and vertical antenna polarizations. The peak reading for each frequency was recorded in the fourth column in Table 1 below.

Measurements taken for weak emissions were performed by reducing the distance from the measurement antenna to 1 meter and factoring –9.54dB into the calculation. This method was used for the 6th and 7th harmonics.

To facilitate radiated emissions testing, the sample was specially programmed to transmit a constant stream of typical data packets. The occupied bandwidth (Plot 1) was also captured from this mode.

Table 1

Final radiated emissions data in gray plastic pit enclosure

CLIENT: DATAMATIC, LTD FCC ID: ODYD3000

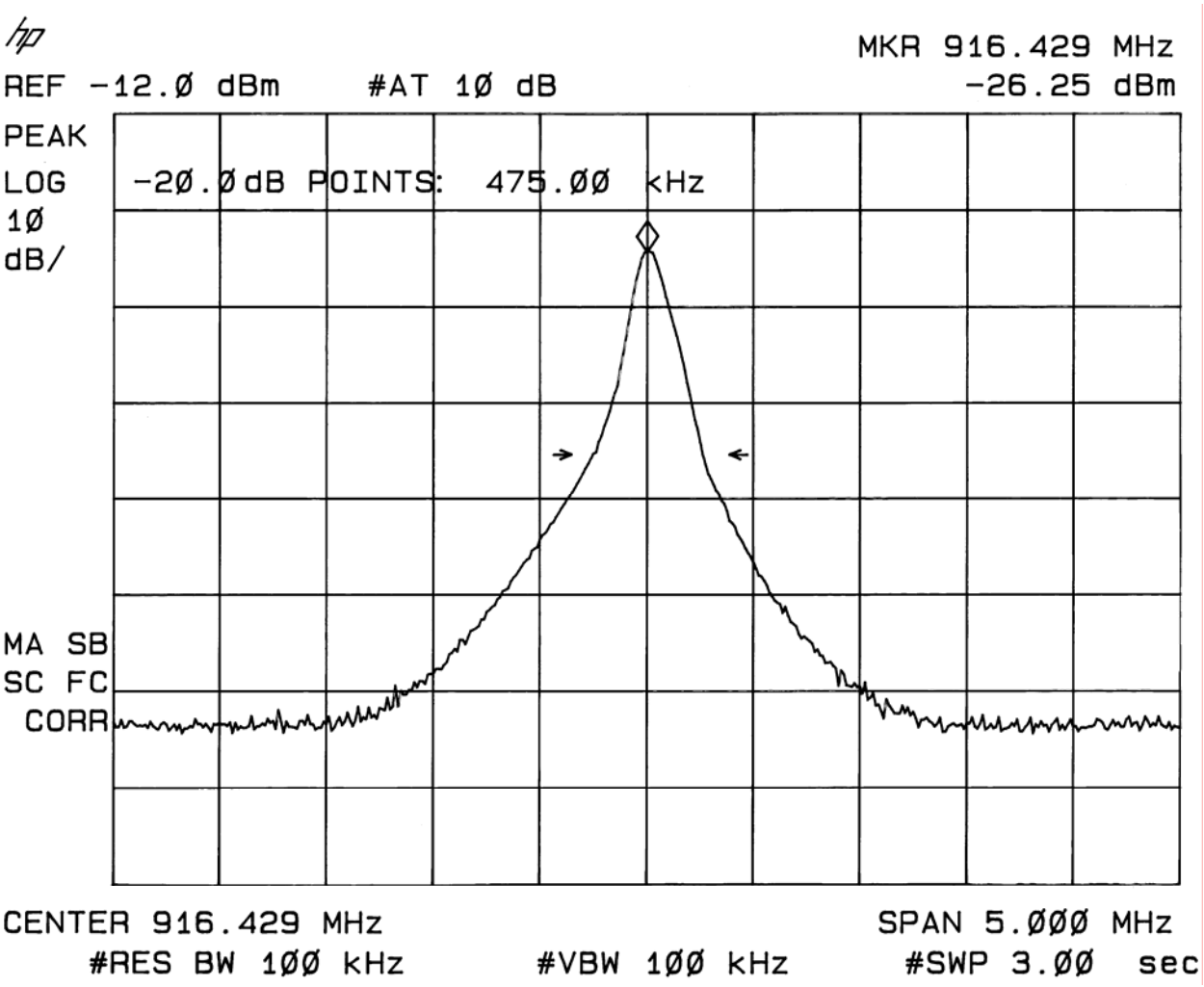
ANTENNA: DIPOLES/DRG HORN EUT: METER DATA TRANSMITTER

PART 15.249 TEST DATE: 17/18-Jan-05

Frequency In MHz.	Ant. Polar. H/V	Ant. Factor dB	Peak reading dBm	Duty Cycle -dB	Peak Power uV/m@3m	Corrected Power uV/m@3m	FCC Limit uV/m@3m
916.429	V	30.5	-44.03		47152 *		50000
1832.858	V	30.2	-90.71		211		500
2749.287	V	33.4	-94.22		204		500
3665.716	H	35.7	-96.85		196		500
4582.145	H	36.6	-99.40		162		500
5498.574	V	38.6	-109.29		65		500
6415.003	H	39.1	-112.07		50		500

* quasi-peak

Plot 1


MKR 916.429 MHz
REF -12.Ø dBm
#AT 1Ø dB
-26.25 dBm
PEAK
LOG
1Ø
dB/
-2Ø.Ø dB POINTS: 475.ØØ kHz
MA SB
SC FC
CORR
CENTER 916.429 MHz
SPAN 5.ØØØ MHz
#RES BW 1ØØ kHz
#VBW 1ØØ kHz
#SWP 3.ØØ sec