



**FCC Certification Test Report
for
Industrial Design & Mfg. LLC
R9N-SD401**

August 14, 2004

Prepared for:

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Prepared By:

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FCC Certification Test Program

FCC Certification Test Report for the Industrial Design & Mfg. LLC SD401 Stay Dri Repeater R9N-SD401

August 2, 2004

WLL JOB# 8211

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Abstract

This report has been prepared on behalf of Industrial Design & Mfg. LLC to support the attached Application for Equipment Authorization. The test report and application are submitted for a Intentional Radiator under Part 15.249 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for an Industrial Design & Mfg. LLC SD401 Stay Dri Repeater.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. 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 Industrial Design & Mfg. LLC SD401 Stay Dri Repeater complies with the limits for an Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

Table of Contents

Abstract.....	ii
1 Introduction.....	1
1.1 Compliance Statement	1
1.2 Test Scope.....	1
1.3 Contract Information.....	1
1.4 Test Dates	1
1.5 Test and Support Personnel	1
1.6 Abbreviations.....	2
2 Equipment Under Test.....	3
2.1 EUT Identification & Description	3
2.2 Test Configuration	4
2.3 Testing Algorithm.....	4
2.4 Test Location	4
2.5 Measurements	4
2.5.1 References.....	4
2.6 Measurement Uncertainty.....	5
3 Test Equipment.....	6
4 Test Results.....	7
4.1 Duty Cycle Correction	7
4.2 Occupied Bandwidth: (FCC Part §2.1049).....	12
4.3 Radiated Emissions: (FCC Part §2.1053)	16
4.3.1 Test Procedure	16
4.4 Conducted Emissions (AC Power Line).....	27

List of Tables

Table 1. Device Summary.....	4
Table 2: Test Equipment List.....	6
Table 3. Duty Cycle Data Sheet.....	12
Table 4. Occupied Bandwidth Results.....	16
Table 5. Radiated Emissions Limits	16
Table 6. Radiated Emissions Test Data, Receive Only Mode	18
Table 7. Fundamental Field Strength.....	20
Table 8. Radiated Emissions Data, Channel 0 Harmonics	20
Table 9. Radiated Emissions Data, Channel 4 Harmonics	23
Table 10. Radiated Emissions Data, Channel 8 Harmonics	25
Table 11: AC Power Line Conducted Emissions Test Data Sheet	27

List of Figures

Figure 1. Duty Cycle Plot – Worst Case 100ms and Pulse Train	8
Figure 2. Duty Cycle Plot – Pulse Width: Short Pulse	9
Figure 3. Duty Cycle Plot – Pulse Width: Medium Pulse	10
Figure 4. Duty Cycle Plot – Pulse Width: Long Pulse	11
Figure 5. Occupied Bandwidth	13
Figure 6. Occupied Bandwidth	14
Figure 7. Occupied Bandwidth	15

1 Introduction

1.1 Compliance Statement

The Industrial Design & Mfg. LLC SD401 Stay Dri Repeater complies with the limits for an Intentional Radiator device under Part 15.249 of the FCC Rules and Regulations.

This test report reflects the testing performed for the certification of the SD401. Separate testing was performed for the digital and receiver portion under the DoC process.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2001 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Industrial Design & Mfg. LLC 2655 Huntington Road Apple Grove, West Virginia 25502
Client Purchase Order:	127
WLL Quotation Number:	61657-A

1.4 Test Dates

Testing was performed from June 14 to June 16, 2004.

1.5 Test and Support Personnel

Washington Laboratories, LTD	Ken Gemmell
Client Representative	Chuck Tavares, Appalachian Electronics, Inc.

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
Amps	Amperes
b/s	bits per second
BW	Bandwidth
CE	Conducted Emission
cm	centimeter
CW	Continuous Wave
dB	decibel
dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga - prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
k	kilo - prefix for 10^3 multiplier
M	Mega - prefix for 10^6 multiplier
m	Meter
μ	micro - prefix for 10^{-6} multiplier
NB	Narrowband
LISN	Line Impedance Stabilization Network
RE	Radiated Emissions
RF	Radio Frequency
rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt

2 Equipment Under Test

2.1 EUT Identification & Description

This product is a system intended for use in nursing homes to provide a method to notify the staff that a patient has urinated in bed and consists of the three following components:

- Stay Dri Transmitter Model SD-201
- Stay Dri Receiver Model SD-301
- Stay Dri Repeater Model SD-401

The patient's bed will have a pad that measures approximately 3 by 3 feet containing two internal electrodes that connect to 4 snaps. These snaps provide both electrical connection and mounting for an attached Stay Dri Transmitter unit. When the pad becomes wet, the Stay Dri Transmitter detects this condition and transmits three short bursts of data via a 902 MHz radio link either directly to or via a Stay Dri Repeater to the Stay Dri Receiver. The Stay Dri Receiver passes data via an RS232 cable to a PC located at the nurse's station. This data identifies the Stay Dri Transmitters serial number so the patient's name and/or room number can be determined. Under normal conditions, i.e. no alarm, the Stay Dri Transmitter sends a message approximately every 3 minutes indicating that the bed is dry for the purpose of confirming system integrity.

Stay Dri Repeater Model SD-401

The Stay Dri Repeater is housed in a plastic case measuring approximately 1x4x5 inches with an antenna mounted on top using a proprietary SMB connector. The unit has two different antennas available, one that is perpendicular allowing for vertical polarization when the unit is setting flat on an object or mounted upside down to the ceiling and the other having a right angle connector allowing the antenna to be vertical when the unit is wall mounted. The Repeater contains a PIC16F870 micro-controller running at 3.6864 MHz, a Linx TXM-900-HP3-PPO transmitter module, a Linx RXM-900-HP3-PPO receiver module and is powered by a plug in (wall wart) non switching power module via a 6 ft. cable. The frequencies of both the transmitter and the receiver are programmed at the factory, same as the Stay Dri Transmitter mentioned earlier. Provisions have been made for a T-Pad attenuator between the transmitter and the antenna.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Industrial Design & Mfg. LLC
FCC ID Number	R9N-SD401
EUT Name:	Stay Dri Repeater
Model:	SD401
FCC Rule Parts:	§15.249
Frequency Range:	902 – 928MHz
Maximum Output Power:	N/A
Modulation:	FM and FSK
Occupied Bandwidth:	222.5 kHz
Keying:	Automatic
Type of Information:	Data
Number of Channels:	8
Power Output Level	Fixed
Antenna Type	External, proprietary connector
Interface Cables:	RS232 interface
Power Source & Voltage:	120VAC

2.2 Test Configuration

The SD401 was powered by an AC adaptor and configured with 1 or 2 antennas depending on the EUT's orientation.

2.3 Testing Algorithm

The SD401 was operated continuously both cohered and non-cohered.

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein 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.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (ANSI/TIA/EIA-603-93)

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ± 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.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2: Test Equipment List

Site 1 List:

Equipment	Identification	Calibration Due
Sunol JB1 Biconilog Antenna	A090501	10/21/04
ARA DRG118/A Microwave Horn Antenna	1236	4/17/05
Hewlett-Packard 8568B Spectrum Analyzer	2928A04750	7/01/05
Hewlett-Packard 85650A Quasi-Peak Adapter	3303A01786	7/08/04
Hewlett-Packard 85685A RF Preselector	3146A01296	7/06/05
Hewlett-Packard 8593A Spectrum Analyzer	3009A00739	6/25/04
Hewlett-Packard 8449B Microwave Preamp	3008A00385	9/29/05
Solar Electronics LISN 8012-50-R-24-BNC	8379493	9/30/04

4 Test Results

4.1 Duty Cycle Correction

Measurements may be adjusted where pulsed RF is utilized to find the average level associated with a quantity. This calculation is applied to limits for pulsed licensed and unlicensed devices.

On time = $N_1L_1 + N_2L_2 + \dots + N_{N-1}L_{N-1} + N_NL_N$, where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.

- For Licensed Transmitters basic formula can be stated as $20\log[\text{Duty Cycle}]$
- For Unlicensed Intentional Radiators under 47CFR Part 15, all duty cycle measurements compared to a 100 millisecond period
- i.e. duty cycle = on time/100 milliseconds or period, whichever is less
- Restating the basic formula:
 - o Duty cycle = $(N_1L_1 + N_2L_2 + \dots + N_{N-1}L_{N-1} + N_NL_N)/100$ or T, whichever is less

Where T is the period of the pulse train.

The following Figures show the plots of the modulated carrier. The spectrum analyzer was set to Zero Span and the video triggered to collect the pulse train of the modulation. Calculations of the duty cycle correction factor were obtained from time data provided by the plots.

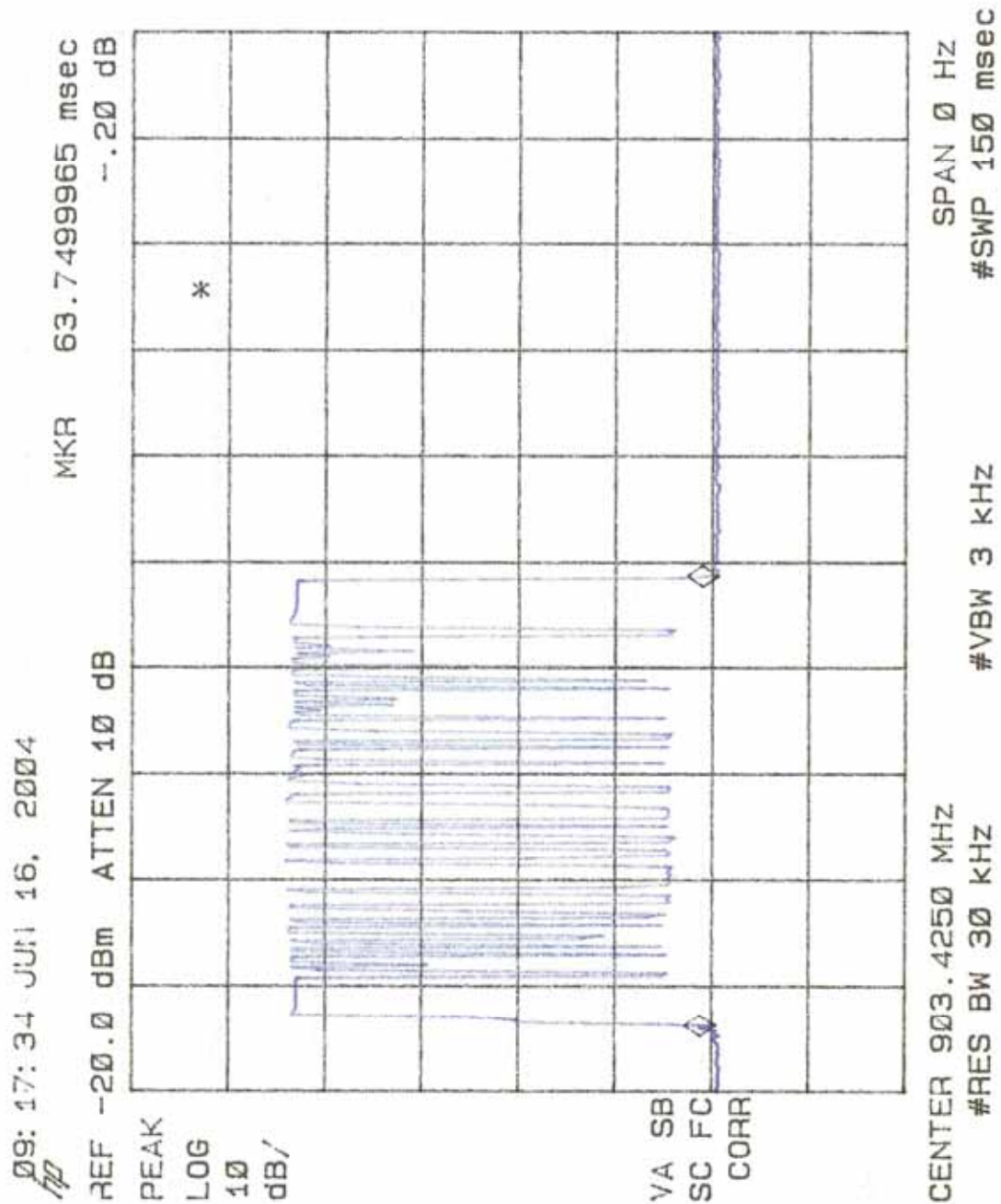


Figure 1. Duty Cycle Plot – Worst Case 100ms and Pulse Train

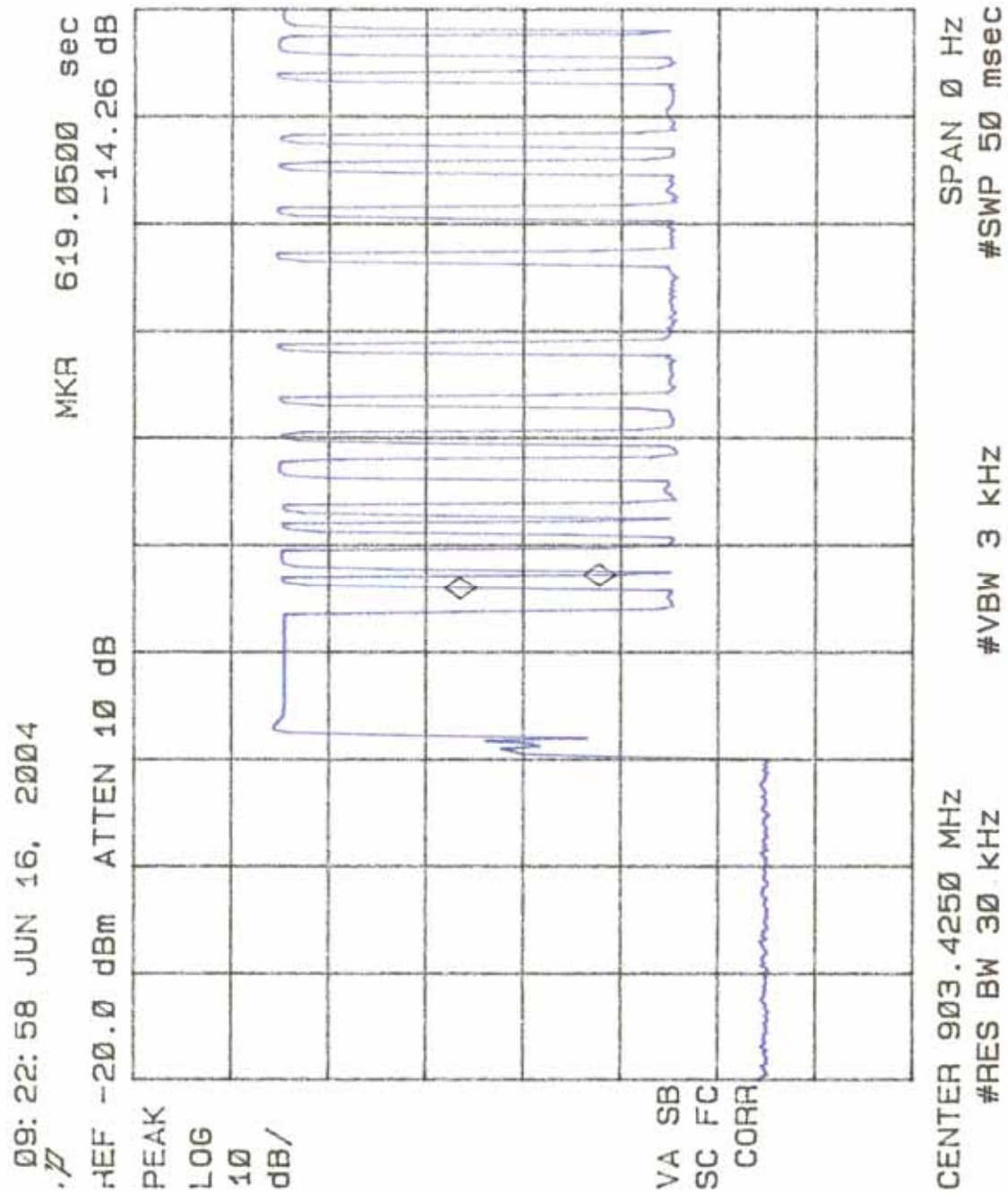


Figure 2. Duty Cycle Plot – Pulse Width: Short Pulse

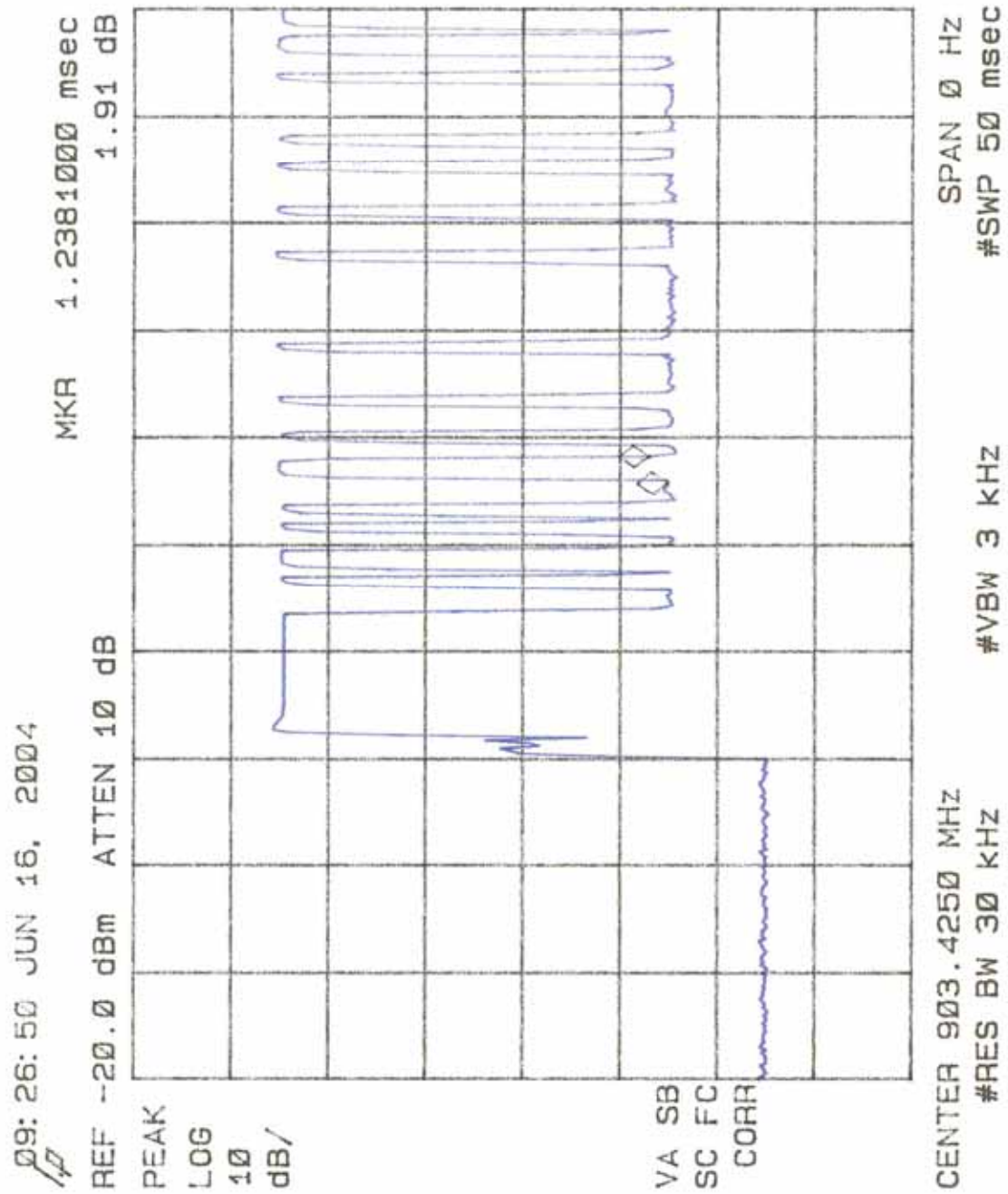


Figure 3. Duty Cycle Plot – Pulse Width: Medium Pulse

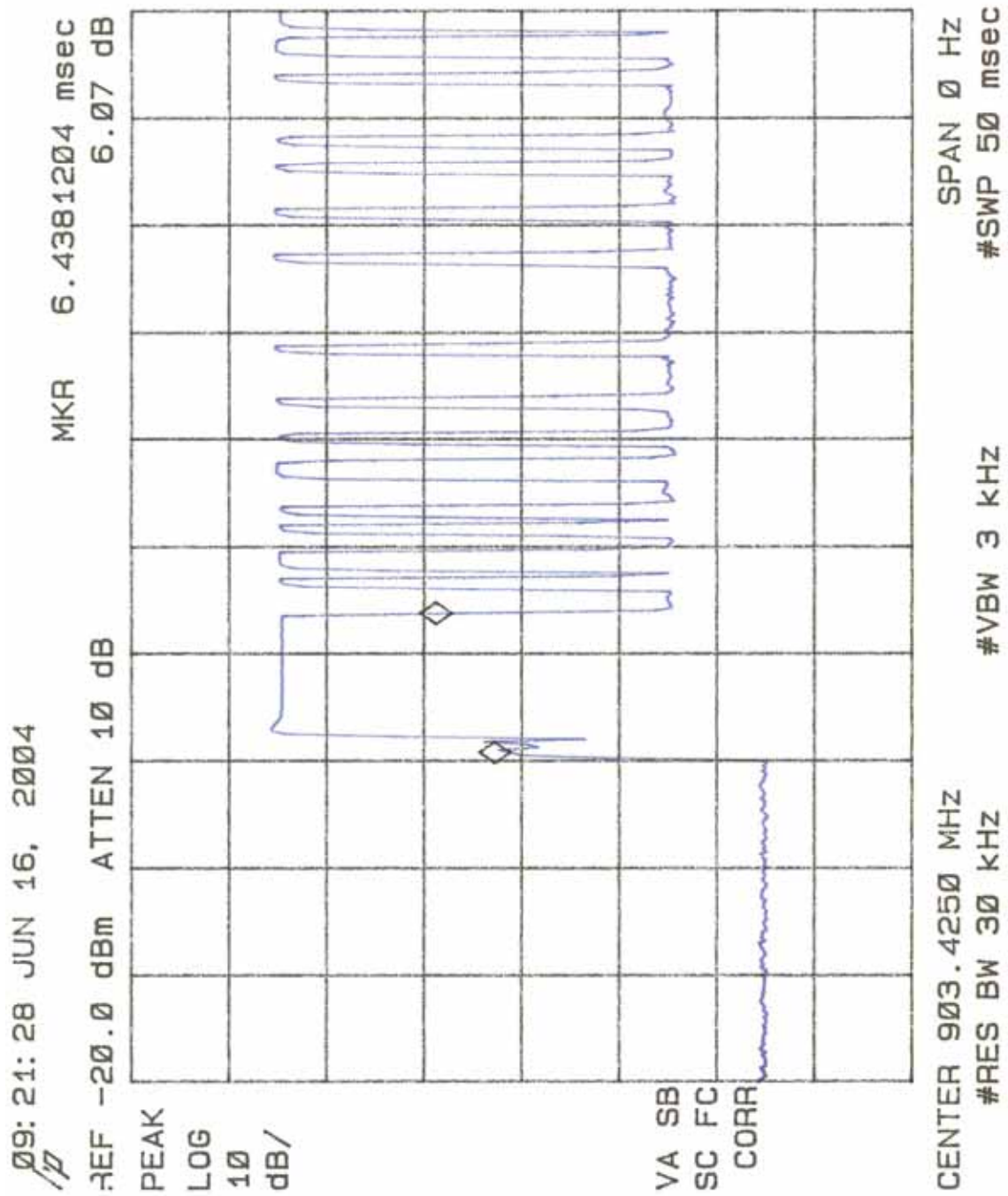


Figure 4. Duty Cycle Plot – Pulse Width: Long Pulse

From the data in Figure 1 through Figure 4, the following calculations are made.

Table 3. Duty Cycle Data Sheet

CLIENT:	IDM	DATE:	6/14/2004
TESTER:	Ken Gemmell	JOB #:	8211

EUT Information:

EUT:	Stay Dri Transceiver	S/N:	
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	Pulse 1	Pulse 2	Pulse 3	Pulse 4	Pulse 5	Pulse 6
Number	4	4	23	0	0	0
Pulse Width (microseconds)	2260	1420	600	0	0	0
Total Time in (microseconds)	9040	5680	13800	0	0	0
Total Time in (ms)	9.04	5.68	13.8	0	0	0

Total time for both types Pulses			28.52
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Worst Case Percent of 100 ms			28.52%
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Duty Cycle Correction Factor	-10.89701	dB
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4.2 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

At full modulation, the occupied bandwidth was measured as shown:

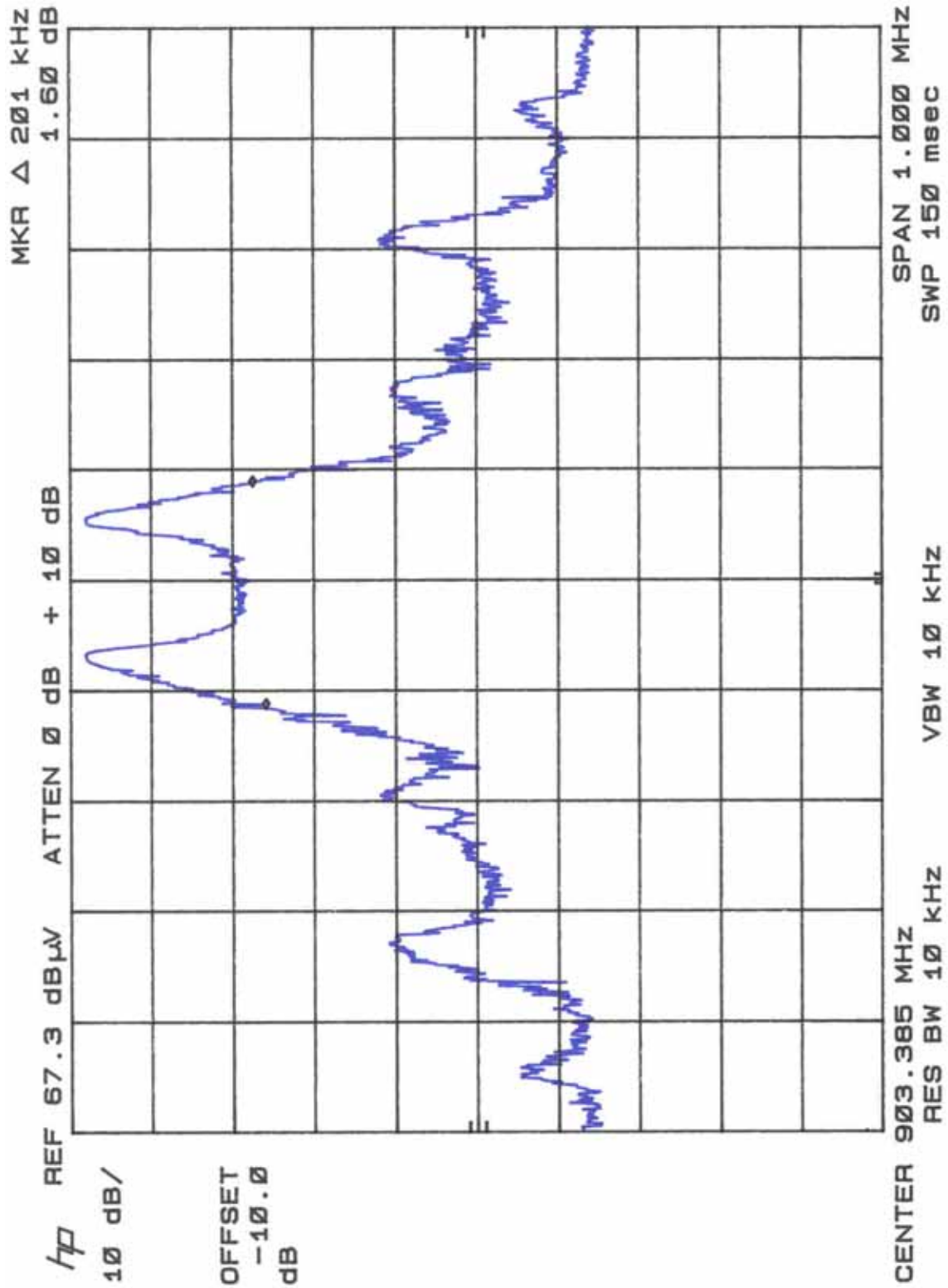


Figure 5. Occupied Bandwidth

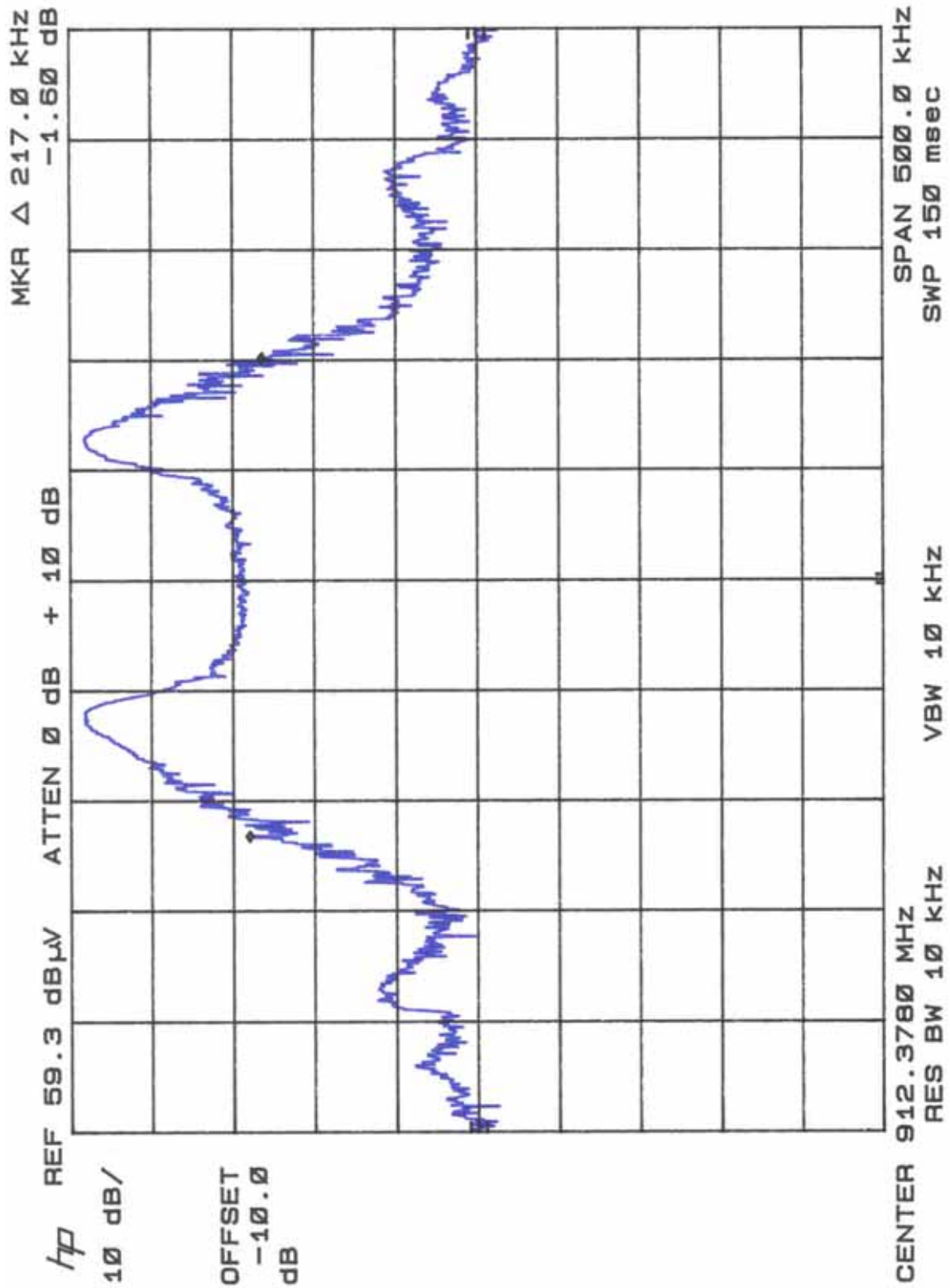


Figure 6. Occupied Bandwidth

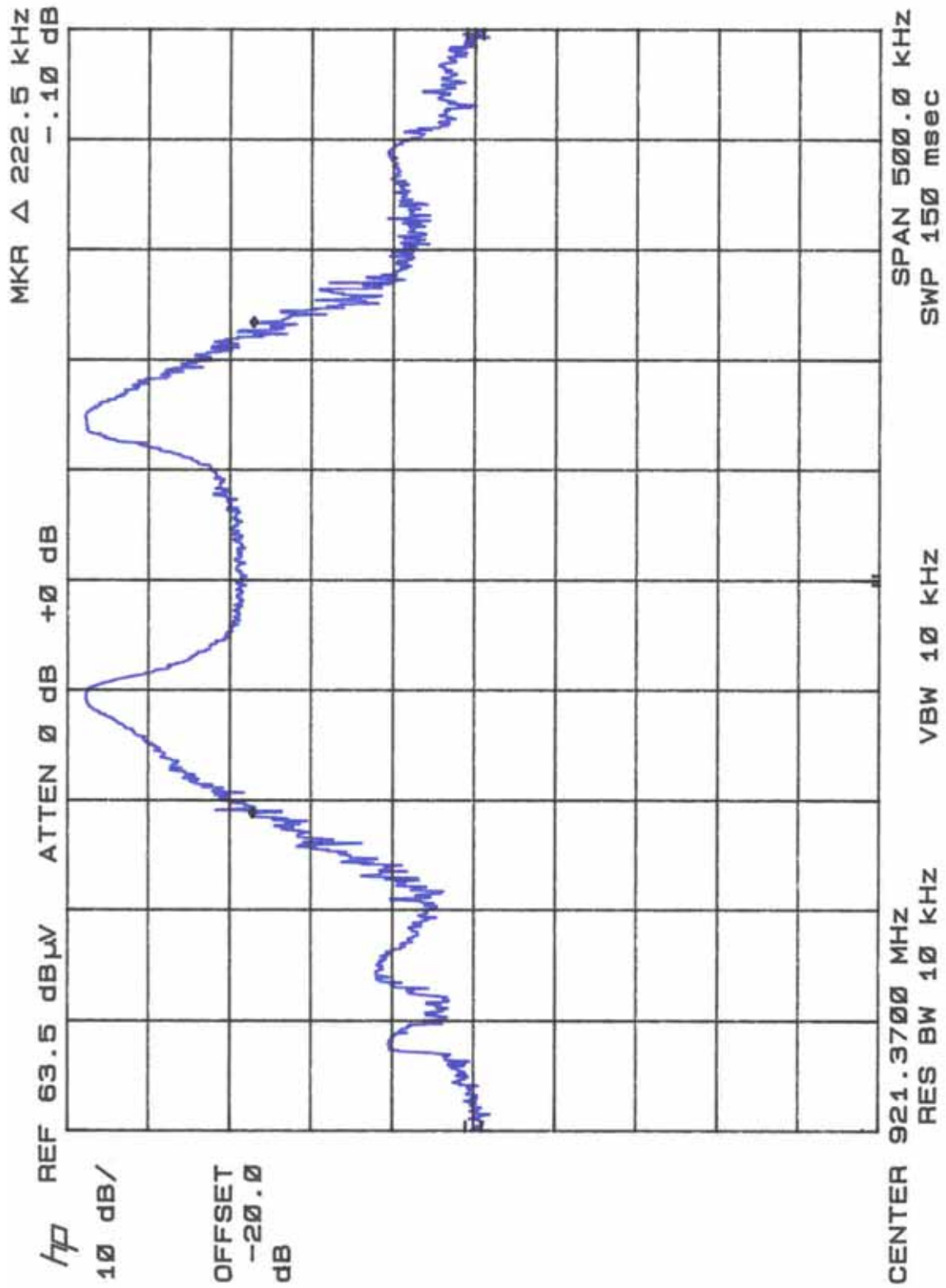


Figure 7. Occupied Bandwidth

Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4. Occupied Bandwidth Results

Frequency MHz	Bandwidth kHz
903	201
912.37	217
921.37	222.5

4.3 Radiated Emissions: (FCC Part §2.1053)

The EUT must comply with the radiated emission limits of 15.249(a). The limits are as shown in the following table.

Table 5. Radiated Emissions Limits

Fundamental Frequency	Field Strength of Fundamental (μV/m)	Field Strength of Harmonics (μV/m)
902 – 928 MHz	50,000	500
2400 – 2483.5 MHz	50,000	500
5725 – 5875 MHz	50,000	500
24.00 – 24.25 GHz	250,000	2500

4.3.1 Test Procedure

The EUT was placed on 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. Receiving 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 C63.4-2001. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	100kHz	>100kHz
>1000 MHz	1 MHz	1MHz (peak)

Emissions were measured to the 10th harmonic of the transmit frequency. Worst case emission levels are reported.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): V dBμV

Antenna Factor (Ant Corr): AFdB/m

Cable Loss Correction (Cable Corr): CCdB

Duty Cycle Correction (Average) DCCdB

Amplifier Gain: GdB

Electric Field (Corr Level): EdBμV/m = VdBμV + AFdB/m + CCdB +
DCCdB - GdB

Table 6. Radiated Emissions Test Data, Receive Only Mode

CLIENT:	IDM	DATE:	6/15/2004
TESTER:	Ken Gemmell	JOB #:	8211
<u>EUT Information:</u>		<u>Test Requirements:</u>	
EUT:	Stay - Dri Transceiver	TEST STANDARD:	FCC Part 15
CONFIGURATION:	RX Only	DISTANCE:	3m
CLOCKS:	4 MHz	CLASS:	B
<u>Test Equipment/Limit:</u>			
ANTENNA:	A_00382	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_3m	AMPLIFIER (dB)	None

Frequenc y (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margi n dB
42.56	V	135.0	1.0	8.1	11.9	1.1	0.0	21.1	11.4	100.0	-18.9
64.00	V	90.0	1.0	10.9	8.0	1.2	0.0	20.1	10.2	100.0	-19.9
113.50	V	45.0	1.0	4.8	13.4	1.5	0.0	19.7	9.7	150.0	-23.8
163.23	V	180.0	1.0	7.6	12.2	1.7	0.0	21.5	11.9	150.0	-22.0
228.76	V	270.0	1.0	4.9	11.2	2.1	0.0	18.1	8.1	200.0	-27.9
357.80	V	180.0	1.0	8.3	15.2	2.5	0.0	26.0	20.0	200.0	-20.0
868.70	V	135.0	1.0	10.9	22.4	3.7	0.0	37.0	71.0	200.0	-9.0
42.56	H	157.0	4.0	8.4	11.9	1.1	0.0	21.4	11.8	100.0	-18.6
64.00	H	90.0	4.0	8.6	8.0	1.2	0.0	17.8	7.8	100.0	-22.2
113.50	H	90.0	4.0	7.3	13.4	1.5	0.0	22.2	12.9	150.0	-21.3
163.23	H	180.0	4.0	5.9	12.2	1.7	0.0	19.8	9.8	150.0	-23.7
228.76	H	180.0	4.0	6.8	11.2	2.1	0.0	20.0	10.0	200.0	-26.0
357.80	H	180.0	3.0	6.5	15.2	2.5	0.0	24.2	16.2	200.0	-21.8
868.70	H	135.0	1.0	12.8	22.4	3.7	0.0	38.9	88.1	200.0	-7.1

Table 6. Radiated Emissions Test Data, Receive Only Mode, continued

Test Equipment/Limit:

ANTENNA: A_00004

LIMIT: LFCC_3m_Class_B

CABLE: CSITE1_HF

AMPLIFIER (dB) A_00312

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margi n dB
1000.00	H	180.0	1.0	43.0	24.6	2.2	34.4	35.4	59.1	500.0	-18.5
1203.36	H	180.0	1.0	37.4	25.5	2.3	34.3	30.9	35.1	500.0	-23.1
1737.24	H	180.0	1.0	45.0	27.3	2.4	34.1	40.6	107.3	500.0	-13.4
1000.00	V	180.0	1.0	38.8	24.6	2.2	34.4	31.2	36.2	500.0	-22.8
1203.36	V	180.0	1.0	38.4	25.5	2.3	34.3	31.9	39.2	500.0	-22.1
1737.24	V	180.0	1.0	48.7	27.3	2.4	34.1	44.3	164.3	500.0	-9.7

Table 7. Fundamental Field Strength

CLIENT: IDM
TESTER: Ken Gemmell

DATE: 6/14/2004
JOB #: 8211

EUT Information:

EUT: Transceiver
CONFIGURATION:

Test Requirements:

TEST STANDARD: FCC Part 15
DISTANCE: 3m
CLASS: B

Test Equipment/Limit:

ANTENNA: A_00382
CABLE: CSITE1_3m

LIMIT: LFCC_3m_Class_B
AMPLIFIER (dB) None

Freq.	Pol.	Azimuth	Ant. Height	SA Level (QP)	Ant. Corr.	Cable Corr.	Amp. Gain	Corr. Level	Corr. Level	Limit	Margin
(MHz)	H/V	Degree	(m)	dBμV	dB/m	dB	dB	dBμV/m	μV/m	μV/m	dB
Channel 0											
903.41	V	45.0	1.0	65.5	22.2	3.8	0.0	91.5	37520.2	50000	-2.5
903.41	H	90.0	1.0	54.3	22.2	3.8	0.0	80.3	10333.9	50000	-13.7
Channel 4											
912.32	V	0.0	1.0	65.2	22.4	3.9	0.0	91.5	37486.3	50000	-2.5
912.32	H	90.0	1.0	55.6	22.4	3.9	0.0	81.9	12412.9	50000	-12.1
Channel 8											
921.37	V	90.0	1.0	63.9	22.9	3.9	0.0	90.7	34105.7	50000	-3.3
921.37	H	90.0	1.0	53.3	22.9	3.9	0.0	80.1	10065.3	50000	-13.9

Table 8. Radiated Emissions Data, Channel 0 Harmonics

CLIENT: IDM
TESTER: Ken Gemmell

DATE: 6/14/2004
JOB #: 8211

EUT Information:

EUT: SD401
DISTANCE: 3m

Test Requirements:

TEST STANDARD: FCC Part 15
CLASS: B

Test Equipment/Limit:

ANTENNA: A_00004
CABLE: CSITE1_HF

LIMIT: LFCC_3m_Class_B
AMPLIFIER (dB) A_00312

Frequency	Polarity	Az	Ant. Hght	SA Level (QP)	Ant. Corr.	Cable Corr.	Duty Cycle Corr.	Amp Gain	Corr. Level	Corr. Level	Limit	Margin
(MHz)	H/V	Deg	(m)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(μV/m)	(μV/m)	dB
Channel 0 Flat on Table												

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
1806.82	V	90.0	1.0	50.7	27.5	2.4	-10.9	34.1	35.6	60.4	500.0	-18.4
2710.23	V	0.0	1.0	47.1	29.5	3.2	-10.9	34.4	34.5	52.9	500.0	-19.5
3613.64	V	45.0	1.0	45.7	30.7	3.7	-10.9	34.6	34.7	54.0	500.0	-19.3
4517.05	V	45.0	1.0	43.3	32.0	4.0	-10.9	34.5	33.8	49.2	500.0	-20.1
5420.46	V	0.0	1.0	30.4	33.5	4.2	0.0	34.5	33.6	48.0	500.0	-20.3 a
6323.87	V	0.0	1.0	29.9	35.3	4.6	0.0	34.6	35.2	57.6	500.0	-18.8 a
7227.28	V	0.0	1.0	32.2	37.1	5.0	0.0	34.8	39.5	93.9	500.0	-14.5 a
8130.69	V	0.0	1.0	32.9	37.4	5.3	0.0	34.3	41.2	114.9	500.0	-12.8 a
9034.10	V	0.0	1.0	32.5	38.0	5.5	0.0	33.0	43.0	141.6	500.0	-11.0 a
1806.82	H	90.0	1.0	45.9	27.5	2.4	-10.9	34.1	30.9	34.9	500.0	-23.1
2710.23	H	90.0	1.0	43.1	29.5	3.2	-10.9	34.4	30.4	33.2	500.0	-23.5
3613.64	H	45.0	1.0	41.8	30.7	3.7	-10.9	34.6	30.7	34.4	500.0	-23.3
4517.05	H	180.0	1.0	30.8	32.0	4.0	0.0	34.5	32.3	41.0	500.0	-21.7 a
5420.46	H	0.0	1.0	30.6	33.5	4.2	0.0	34.5	33.9	49.4	500.0	-20.1 a
6323.87	H	0.0	1.0	30.2	35.3	4.6	0.0	34.6	35.6	59.9	500.0	-18.4 a
7227.28	H	0.0	1.0	32.4	37.1	5.0	0.0	34.8	39.6	95.6	500.0	-14.4 a
8130.69	H	0.0	1.0	32.8	37.4	5.3	0.0	34.3	41.2	114.5	500.0	-12.8 a
9034.10	H	0.0	1.0	32.6	38.0	5.5	0.0	33.0	43.1	143.1	500.0	-10.9 a
Channel 0 Upright												
1806.82	V	90.0	1.0	49.5	27.5	2.4	-10.9	34.1	34.4	52.7	500.0	-19.5
2710.23	V	0.0	1.0	53.4	29.5	3.2	-10.9	34.4	40.8	109.3	500.0	-13.2
3613.64	V	45.0	1.0	46.1	30.7	3.7	-10.9	34.6	35.0	56.3	500.0	-19.0
4517.05	V	45.0	1.0	43.4	32.0	4.0	-10.9	34.5	34.0	49.9	500.0	-20.0
5420.46	V	0.0	1.0	30.4	33.5	4.2	0.0	34.5	33.7	48.2	500.0	-20.3 a
6323.87	V	0.0	1.0	30.1	35.3	4.6	0.0	34.6	35.5	59.4	500.0	-18.5 a
7227.28	V	0.0	1.0	32.0	37.1	5.0	0.0	34.8	39.3	91.9	500.0	-14.7 a
8130.69	V	0.0	1.0	32.7	37.4	5.3	0.0	34.3	41.0	112.1	500.0	-13.0 a
9034.10	V	0.0	1.0	32.4	38.0	5.5	0.0	33.0	43.0	140.8	500.0	-11.0 a
1806.82	H	90.0	1.0	48.5	27.5	2.4	-10.9	34.1	33.5	47.3	500.0	-20.5
2710.23	H	90.0	1.0	45.9	29.5	3.2	-10.9	34.4	33.3	46.1	500.0	-20.7
3613.64	H	45.0	1.0	47.5	30.7	3.7	-10.9	34.6	36.4	66.4	500.0	-17.5
4517.05	H	180.0	1.0	45.5	32.0	4.0	0.0	34.5	46.9	221.9	500.0	-7.1 a
5420.46	H	0.0	1.0	30.4	33.5	4.2	0.0	34.5	33.6	48.1	500.0	-20.3 a
6323.87	H	0.0	1.0	29.9	35.3	4.6	0.0	34.6	35.3	58.1	500.0	-18.7 a
7227.28	H	0.0	1.0	32.2	37.1	5.0	0.0	34.8	39.4	93.8	500.0	-14.5 a
8130.69	H	0.0	1.0	32.7	37.4	5.3	0.0	34.3	41.1	113.3	500.0	-12.9 a
9034.10	H	0.0	1.0	32.5	38.0	5.5	0.0	33.0	43.0	141.1	500.0	-11.0 a

a = average ambient reading

Table 9. Radiated Emissions Data, Channel 4 Harmonics

CLIENT:	IDM	DATE:	6/14/2004
TESTER:	Ken Gemmell	JOB #:	8211
<u>EUT Information:</u>		<u>Test Requirements:</u>	
EUT:	SD401	TEST STANDARD:	FCC Part 15
DISTANCE:	3m	CLASS:	B
<u>Test Equipment/Limit:</u>			
ANTENNA:	A_00004	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_HF	AMPLIFIER (dB)	A_00312

Frequency	Polarity	Az	Ant. Hght	SA Level (QP)	Ant. Corr.	Cable Corr.	Duty Cycle Corr.	Amp Gain	Corr. Level	Corr. Level	Limit	Margin
(MHz)	H/V	Deg	(m)	(dBµV)	(dB/m)	(dB)	(dB)	(dB)	(dBµV/m)	(µV/m)	(µV/m)	dB
Channel 4 Flat on Table												
1824.60	V	45.0	1.0	49.8	27.5	2.4	-10.9	34.1	34.8	54.9	500.0	-19.2
2736.90	V	0.0	1.0	45.7	29.5	3.2	-10.9	34.4	33.1	45.0	500.0	-20.9
3649.20	V	90.0	1.0	45.5	30.7	3.7	-10.9	34.6	34.4	52.8	500.0	-19.5
4561.50	V	135.0	1.0	42.9	32.1	4.0	-10.9	34.5	33.6	47.8	500.0	-20.4
5473.80	V	0.0	1.0	30.2	33.6	4.2	0.0	34.5	33.6	47.9	500.0	-20.4 a
6386.10	V	0.0	1.0	31.9	35.5	4.7	0.0	34.6	37.4	74.4	500.0	-16.5 a
7298.40	V	0.0	1.0	32.3	37.1	5.0	0.0	34.8	39.7	96.2	500.0	-14.3 a
8210.70	V	0.0	1.0	32.9	37.5	5.3	0.0	34.2	41.5	118.5	500.0	-12.5 a
9123.00	V	0.0	1.0	32.2	38.1	5.5	0.0	33.0	42.8	138.3	500.0	-11.2 a
1824.60	H	0.0	1.0	49.3	27.5	2.4	-10.9	34.1	34.3	51.9	500.0	-19.7
2736.90	H	45.0	1.0	44.8	29.5	3.2	-10.9	34.4	32.2	40.5	500.0	-21.8
3649.20	H	90.0	1.0	43.8	30.7	3.7	-10.9	34.6	32.8	43.8	500.0	-21.1
4561.50	H	180.0	1.0	30.5	32.1	4.0	0.0	34.5	32.1	40.1	500.0	-21.9 a
5473.80	H	0.0	1.0	30.4	33.6	4.2	0.0	34.5	33.8	48.8	500.0	-20.2 a
6386.10	H	0.0	1.0	30.2	35.5	4.7	0.0	34.6	35.7	61.1	500.0	-18.3 a
7298.40	H	0.0	1.0	32.2	37.1	5.0	0.0	34.8	39.5	94.7	500.0	-14.5 a
8210.70	H	0.0	1.0	32.9	37.5	5.3	0.0	34.2	41.4	117.8	500.0	-12.6 a
9123.00	H	0.0	1.0	32.2	38.1	5.5	0.0	33.0	42.9	139.0	500.0	-11.1 a
Channel 4 Upright												
1824.60	V	45.0	1.0	52.0	27.5	2.4	-10.9	34.1	37.0	70.5	500.0	-17.0
2736.90	V	0.0	1.0	53.1	29.5	3.2	-10.9	34.4	40.5	106.0	500.0	-13.5
3649.20	V	90.0	1.0	46.4	30.7	3.7	-10.9	34.6	35.4	58.8	500.0	-18.6
4561.50	V	135.0	1.0	43.0	32.1	4.0	-10.9	34.5	33.6	48.0	500.0	-20.3
5473.80	V	0.0	1.0	30.2	33.6	4.2	0.0	34.5	33.6	47.8	500.0	-20.4 a
6386.10	V	0.0	1.0	30.3	35.5	4.7	0.0	34.6	35.9	62.0	500.0	-18.1 a
7298.40	V	0.0	1.0	32.1	37.1	5.0	0.0	34.8	39.4	93.5	500.0	-14.6 a
8210.70	V	0.0	1.0	32.8	37.5	5.3	0.0	34.2	41.4	117.1	500.0	-12.6
9123.00	V	0.0	1.0	32.2	38.1	5.5	0.0	33.0	42.8	138.7	500.0	-11.1 a
1824.60	H	0.0	1.0	45.7	27.5	2.4	-10.9	34.1	30.7	34.2	500.0	-23.3
2736.90	H	45.0	1.0	48.3	29.5	3.2	-10.9	34.4	35.7	60.9	500.0	-18.3

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin dB
3649.20	H	90.0	1.0	45.6	30.7	3.7	-10.9	34.6	34.6	53.9	500.0	-19.4
4561.50	H	180.0	1.0	30.0	32.1	4.0	0.0	34.5	31.6	37.9	500.0	-22.4 a
5473.80	H	0.0	1.0	30.2	33.6	4.2	0.0	34.5	33.6	47.6	500.0	-20.4 a
6386.10	H	0.0	1.0	32.0	35.5	4.7	0.0	34.6	37.5	75.0	500.0	-16.5 a
7298.40	H	0.0	1.0	32.4	37.1	5.0	0.0	34.8	39.7	96.6	500.0	-14.3 a
8210.70	H	0.0	1.0	32.9	37.5	5.3	0.0	34.2	41.5	118.2	500.0	-12.5 a
9123.00	H	0.0	1.0	32.5	38.1	5.5	0.0	33.0	43.1	143.4	500.0	-10.8 a

a = average ambient reading

Table 10. Radiated Emissions Data, Channel 8 Harmonics

CLIENT:	IDM	DATE:	6/14/2004
TESTER:	Ken Gemmell	JOB #:	8211
<u>EUT Information:</u>		<u>Test Requirements:</u>	
EUT:	SD401	TEST STANDARD:	FCC Part 15
DISTANCE:	3m	CLASS:	B
<u>Test Equipment/Limit:</u>			
ANTENNA:	A_00004	LIMIT:	LFCC_3m_Class_B
CABLE:	CSITE1_HF	AMPLIFIER (dB)	A_00312

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin dB
Channel 8 Flat on Table												
1842.74	V	90.0	1.0	51.7	27.6	2.4	-10.9	34.0	36.8	69.4	500.0	-17.2
2764.11	V	180.0	1.0	47.9	29.6	3.2	-10.9	34.4	35.3	58.4	500.0	-18.7
3685.48	V	135.0	1.0	46.9	30.8	3.7	-10.9	34.6	35.9	62.5	500.0	-18.1
4606.85	V	180.0	1.0	43.1	32.2	4.0	-10.9	34.5	33.8	49.2	500.0	-20.1
5528.22	V	0.0	1.0	30.9	33.7	4.3	-10.9	34.4	23.5	14.9	500.0	-30.5 a
6449.59	V	0.0	1.0	32.2	35.6	4.7	-10.9	34.6	27.0	22.4	500.0	-27.0 a
7370.96	V	0.0	1.0	31.1	37.1	5.0	-10.9	34.8	27.6	24.1	500.0	-26.4 a
8292.33	V	0.0	1.0	34.5	37.5	5.3	-10.9	34.1	32.3	41.4	500.0	-21.6 a
9213.70	V	0.0	1.0	32.5	38.2	5.6	-10.9	33.0	32.4	41.5	500.0	-21.6 a
1833.74	H	180.0	1.0	50.4	27.6	2.4	-10.9	34.1	35.4	59.0	500.0	-18.6
2746.11	H	180.0	1.0	43.8	29.6	3.2	-10.9	34.4	31.2	36.2	500.0	-22.8
3658.48	H	90.0	1.0	43.6	30.8	3.7	-10.9	34.6	32.6	42.6	500.0	-21.4
4570.85	H	180.0	1.0	29.4	32.1	4.0	-10.9	34.5	20.1	10.1	500.0	-33.9 a
5483.22	H	0.0	1.0	29.6	33.6	4.2	-10.9	34.4	22.1	12.7	500.0	-31.9 a
6395.59	H	0.0	1.0	29.8	35.5	4.7	-10.9	34.6	24.4	16.6	500.0	-29.6 a
7307.96	H	0.0	1.0	33.4	37.1	5.0	-10.9	34.8	29.8	30.9	500.0	-24.2 a
8220.33	H	0.0	1.0	33.9	37.5	5.3	-10.9	34.2	31.6	38.1	500.0	-22.4 a
9132.70	H	0.0	1.0	32.7	38.1	5.5	-10.9	33.0	32.5	41.9	500.0	-21.5 a
Channel 8 Upright												
1842.74	V	90.0	1.0	51.0	27.6	2.4	-10.9	34.0	36.1	64.0	500.0	-17.9
2764.11	V	180.0	1.0	46.1	29.6	3.2	-10.9	34.4	33.5	47.5	500.0	-20.5
3685.48	V	135.0	1.0	45.3	30.8	3.7	-10.9	34.6	34.3	52.0	500.0	-19.7
4606.85	V	180.0	1.0	43.5	32.2	4.0	-10.9	34.5	34.2	51.5	500.0	-19.7
5528.22	V	0.0	1.0	30.2	33.7	4.3	0.0	34.4	33.7	48.2	500.0	-20.3 a
6449.59	V	0.0	1.0	32.3	35.6	4.7	0.0	34.6	38.0	79.4	500.0	-16.0 a
7370.96	V	0.0	1.0	32.4	37.1	5.0	0.0	34.8	39.8	97.9	500.0	-14.2 a
8292.33	V	0.0	1.0	33.0	37.5	5.3	0.0	34.1	41.7	122.0	500.0	-12.2 a
9213.70	V	0.0	1.0	32.4	38.2	5.6	0.0	33.0	43.1	143.7	500.0	-10.8 a
1833.74	H	180.0	1.0	48.5	27.6	2.4	-10.9	34.1	33.5	47.4	500.0	-20.5
2746.11	H	180.0	1.0	45.2	29.6	3.2	-10.9	34.4	32.6	42.5	500.0	-21.4

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin dB
3658.48	H	90.0	1.0	44.4	30.8	3.7	-10.9	34.6	33.4	46.7	500.0	-20.6
4570.85	H	180.0	1.0	30.7	32.1	4.0	0.0	34.5	32.2	40.9	500.0	-21.7 a
5483.22	H	0.0	1.0	30.4	33.6	4.2	0.0	34.4	33.8	48.8	500.0	-20.2 a
6395.59	H	0.0	1.0	30.2	35.5	4.7	0.0	34.6	35.7	60.9	500.0	-18.3 a
7307.96	H	0.0	1.0	32.3	37.1	5.0	0.0	34.8	39.6	95.4	500.0	-14.4 a
8220.33	H	0.0	1.0	32.9	37.5	5.3	0.0	34.2	41.5	118.9	500.0	-12.5 a
9132.70	H	0.0	1.0	32.3	38.1	5.5	0.0	33.0	42.9	140.3	500.0	-11.0 a

a = average ambient reading

4.4 Conducted Emissions (AC Power Line)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω /50 μ H Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

AC Power Line conducted emissions test data are included in Table 11.

Table 11: AC Power Line Conducted Emissions Test Data Sheet

CLIENT:	IDM	DATE:	6/15/2004
TESTER:	Ken Gemmell	TEST STANDARD:	FCC Part 15
MODEL:	Stay - Dri Transceiver	JOB #:	8211
CLASS:	FCC_B	TEST SITE:	CSITE1_CE
TEST VOLTAGE:	120 VAC		

LINE 1 - NEUTRAL

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.15	30.3	10.5	65.9	-25.1	30.3	10.5	55.9	-15.1
0.53	19.9	10.6	56.0	-25.5	19.9	10.6	46.0	-15.5
1.01	15.9	10.7	56.0	-29.4	15.9	10.7	46.0	-19.4
9.01	14.4	11.4	60.0	-34.2	14.4	11.4	50.0	-24.2
11.82	14.6	11.6	60.0	-33.8	14.6	11.6	50.0	-23.8
27.96	15.2	12.2	60.0	-32.6	15.2	12.2	50.0	-22.6

LINE 2 - PHASE

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.15	30.4	10.5	65.9	-25.0	30.4	10.5	55.9	-15.0
0.53	21.9	10.6	56.0	-23.5	21.9	10.6	46.0	-13.5
1.01	16.3	10.7	56.0	-29.0	16.3	10.7	46.0	-19.0
9.01	14.2	11.4	60.0	-34.4	14.2	11.4	50.0	-24.4
11.82	14.8	11.6	60.0	-33.6	14.8	11.6	50.0	-23.6
27.96	14.8	12.2	60.0	-33.0	14.8	12.2	50.0	-23.0

