



FCC Certification Test Report
for
Ness Security Products Pty Ltd
02K-SMC315

February 28, 2003

Prepared for:

Ness Security Products Pty Ltd
4/167 Prospect Highway
Seven Hills, NSW 2147
Australia

Prepared By:

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FCC Certification Test Program

**FCC Certification Test Report
for the
Ness Security Products Pty Ltd
SMED315 SmartLink™ Medi-Call Dialer
02K-SMC315**

February 28, 2003

WLL JOB# 7260

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Abstract

This report has been prepared on behalf of Ness Security Products Pty Ltd to support the attached Application for Equipment Authorization. The test report and application are submitted for a Periodic Intentional Radiator under Part 15.231 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for a Ness Security Products Pty Ltd SMED315 SmartLink™ Medi-Call Dialer.

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 Ness Security Products Pty Ltd SMED315 SmartLink™ Medi-Call Dialer complies with the limits for a Periodic Intentional Radiator device under Part 15.231 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.....	3
2.3 Testing Algorithm.....	3
2.4 Test Location.....	3
2.5 Measurements.....	4
2.5.1 References.....	4
2.6 Measurement Uncertainty.....	4
3 Test Equipment.....	5
4 Test Results.....	6
4.1 Duty Cycle Correction.....	6
4.2 RF Power Output: (FCC Part §2.1046).....	9
4.3 Modulation Characteristics: (FCC Part §2.1047); Audio Frequency Response.....	9
4.4 Occupied Bandwidth: (FCC Part §2.1049).....	9
4.5 Radiated Spurious Emissions: (FCC Part §2.1053).....	11
4.5.1 Test Procedure	11
4.6 Conducted Emissions (AC Powerline).....	14
4.7 Frequency Stability: (FCC Part §2.1055).....	16

List of Tables

Table 1. Device Summary	3
Table 2: Test Equipment List	5
Table 3. Duty Cycle Correction.....	9
Table 4. Occupied Bandwidth Results	11
Table 5. Radiated Spurious Emissions Limits.....	11
Table 6: Radiated Emission Test Data.....	13
Table 7: AC Power Line Conducted Emissions Test Data Sheet	15

List of Figures

Figure 1. Duty Cycle Plots, Code Group	7
Figure 2. Duty Cycle Plot "Pulse Width"	8
Figure 3. Occupied Bandwidth.....	10

1 Introduction

1.1 Compliance Statement

The Ness Security Products Pty Ltd SMED315 SmartLink™ Medi-Call Dialer complies with the limits for a Periodic Intentional Radiator device under Part 15.231 of the FCC Rules and Regulations.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements 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.

1.3 Contract Information

Customer: Ness Security Products Pty Ltd
4/167 Prospect Highway
Seven Hills, NSW 2147
Australia

Purchase Order Number: 109915

Quotation Number: 60246-A

1.4 Test Dates

Testing was performed from September 18, 2002 to October 8, 2002.

1.5 Test and Support Personnel

Washington Laboratories, LTD

Ken Gemmell

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

The Ness Security Products Pty Ltd SMED315 SmartLink™ Medi-Call Dialer is the base unit portion of the Medi-Call emergency alert system. The Dialer is placed in-line between a standard telephone set and the wall jack. The Dialer can be configured to place automated emergency telephone calls when it receives a signal from the Radio Key Pendant (separate certification) or when activated from the front panel button.

The transmitter within the Dialer is used to verify the integrity of the receiver to assure that it is operating correctly should an emergency situation occur.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Ness Security Products Pty Ltd
FCC ID Number	02K-SMC315
EUT Name:	SmartLink™ Medi-Call Dialer
Model:	SMED315
FCC Rule Parts:	§15.231
Frequency Range:	315MHz
Maximum Output Power:	<1mW
Modulation:	Pulsed
Occupied Bandwidth:	120.4 kHz
Keying:	Automatic
Type of Information:	Control
Number of Channels:	1
Power Output Level	Fixed
Antenna Type	Integral
Frequency Tolerance:	N/A
Power Source & Voltage:	120Vac

2.2 Test Configuration

The SMED315 was configured with a telephone set and a power adapter.

2.3 Testing Algorithm

The SMED315 was configured to transmit continuously during the testing.

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

Manufacturer	Model/Type	Function	Identification	Cal. Due
HP	8568B	Spectrum Analyzer	2634A02888	7/03/03
HP	85650A	Quasi-Peak Adapter	3303A01786	7/05/03
Solar	8012-50-R-24BNC	LISN	8379493	6/20/03
ARA	LPB-2520	BiconiLog Antenna	1044	6/19/03
HP	85685A	RF Preselector	3221A01395	5/17/03
HP	8564E	Spectrum Analyzer	3643A00657	4/18/03
HP	8449B	RF Pre-Amplifier	3008A00385	9/26/03
ARA	DRG-118/A	Horn Antenna	1010	11/28/02

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:
 - 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.

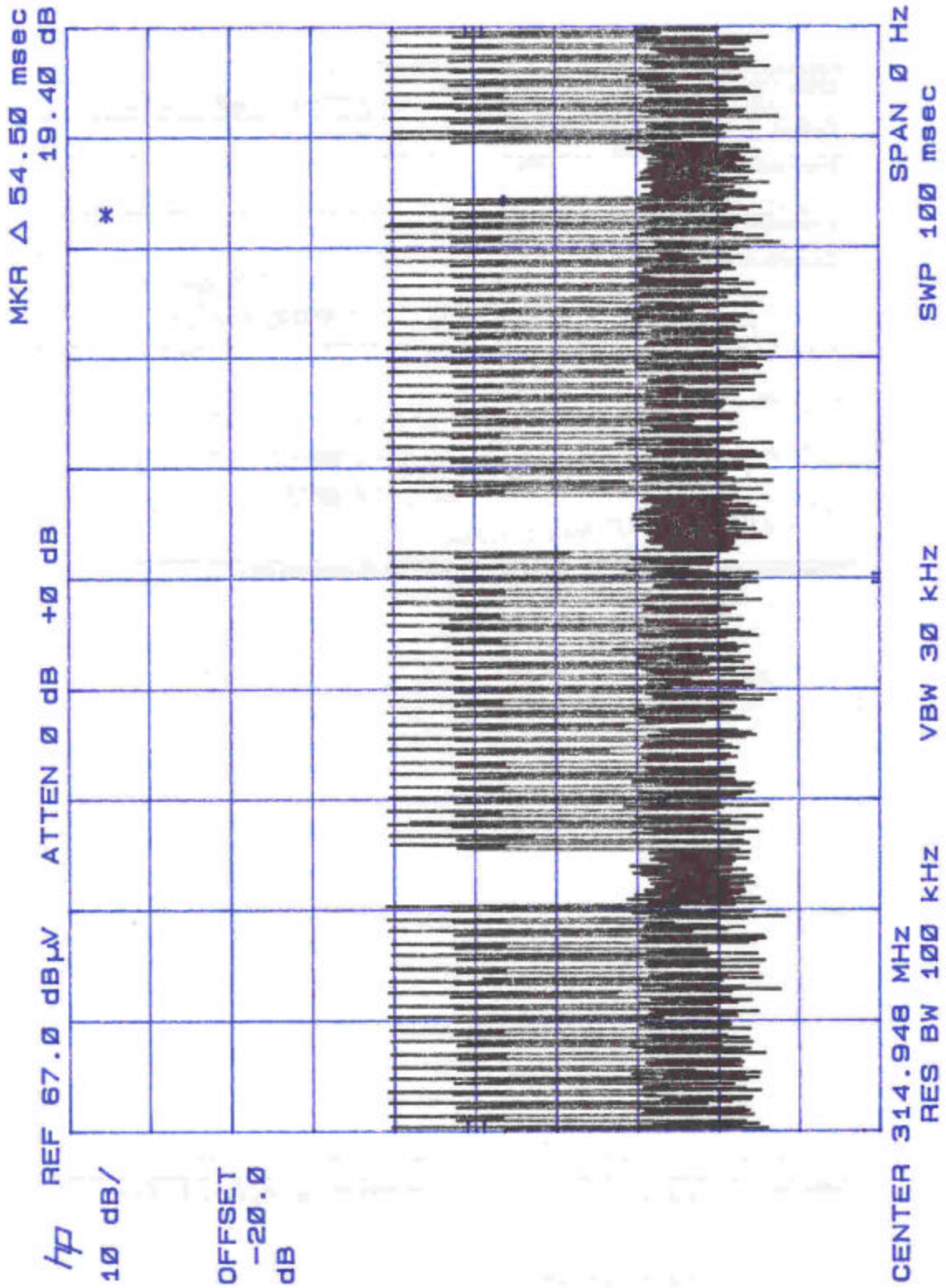


Figure 1. Duty Cycle Plots, Code Group

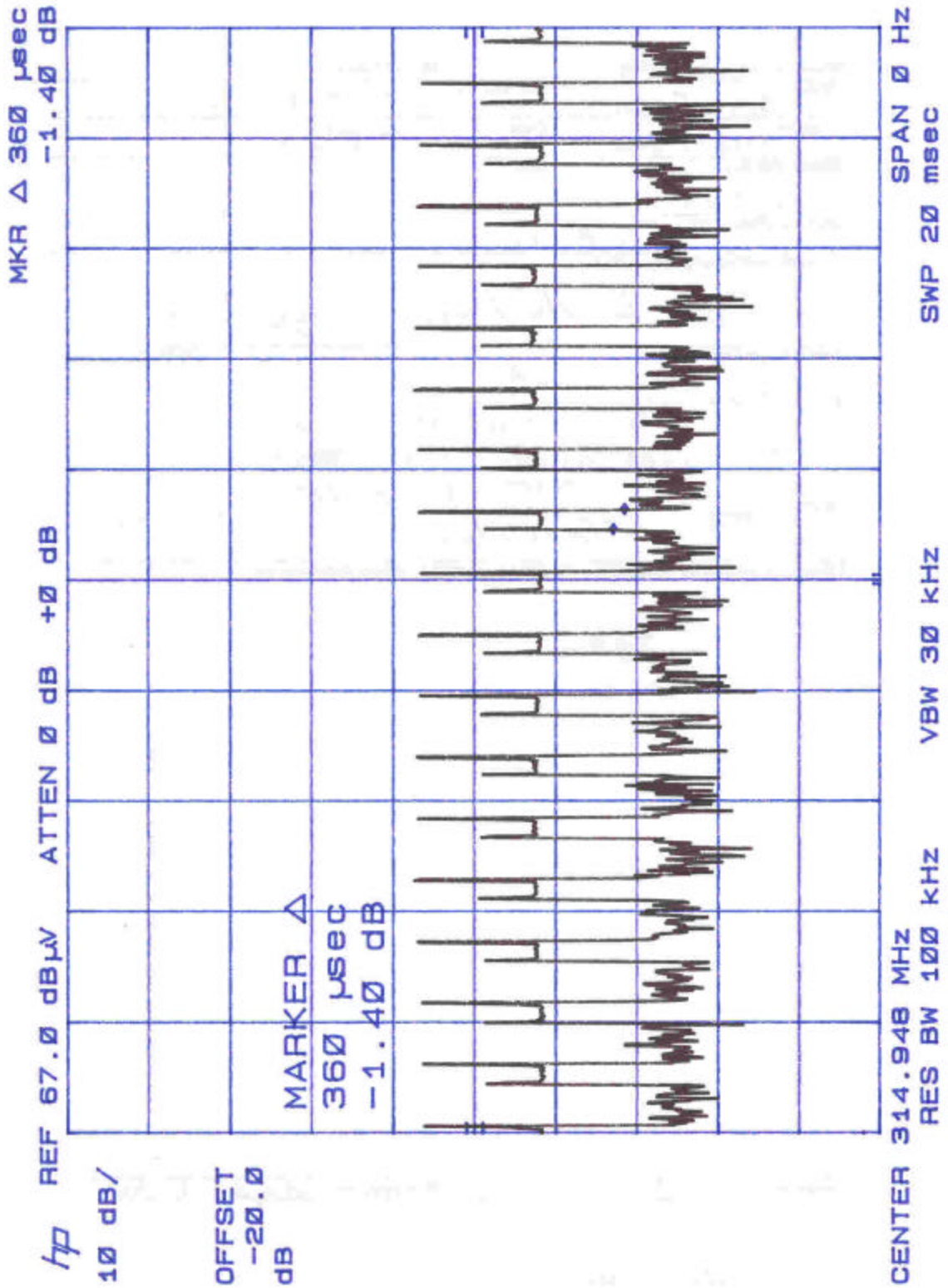


Figure 2. Duty Cycle Plot "Pulse Width"

From the data in Figure 1 and Figure 2, the following calculations are made.

Pulse width = $360\mu\text{s}$

Code group duration = 32ms

Pulse per code group = 25

On time per code group:

$(25 \times 360\mu\text{s}) = 9\text{ms}$

The data are summarized in the following table.

Table 3. Duty Cycle Correction

Measurement Time	Total ON Time	Duty Cycle (%)	Duty Cycle (dB)
32ms	9ms	28.13	11

4.2 RF Power Output: (FCC Part §2.1046)

N/A

4.3 Modulation Characteristics: (FCC Part §2.1047); Audio Frequency Response

N/A

4.4 Occupied Bandwidth: (FCC Part §2.1049)

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

FCC Part 15.231 states that the 20 dB bandwidth of the modulated carrier shall be as follows:

Frequency Range (MHz)	Occupied Bandwidth Limit
70-900 MHz	0.25%
> 900 MHz	0.5%

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

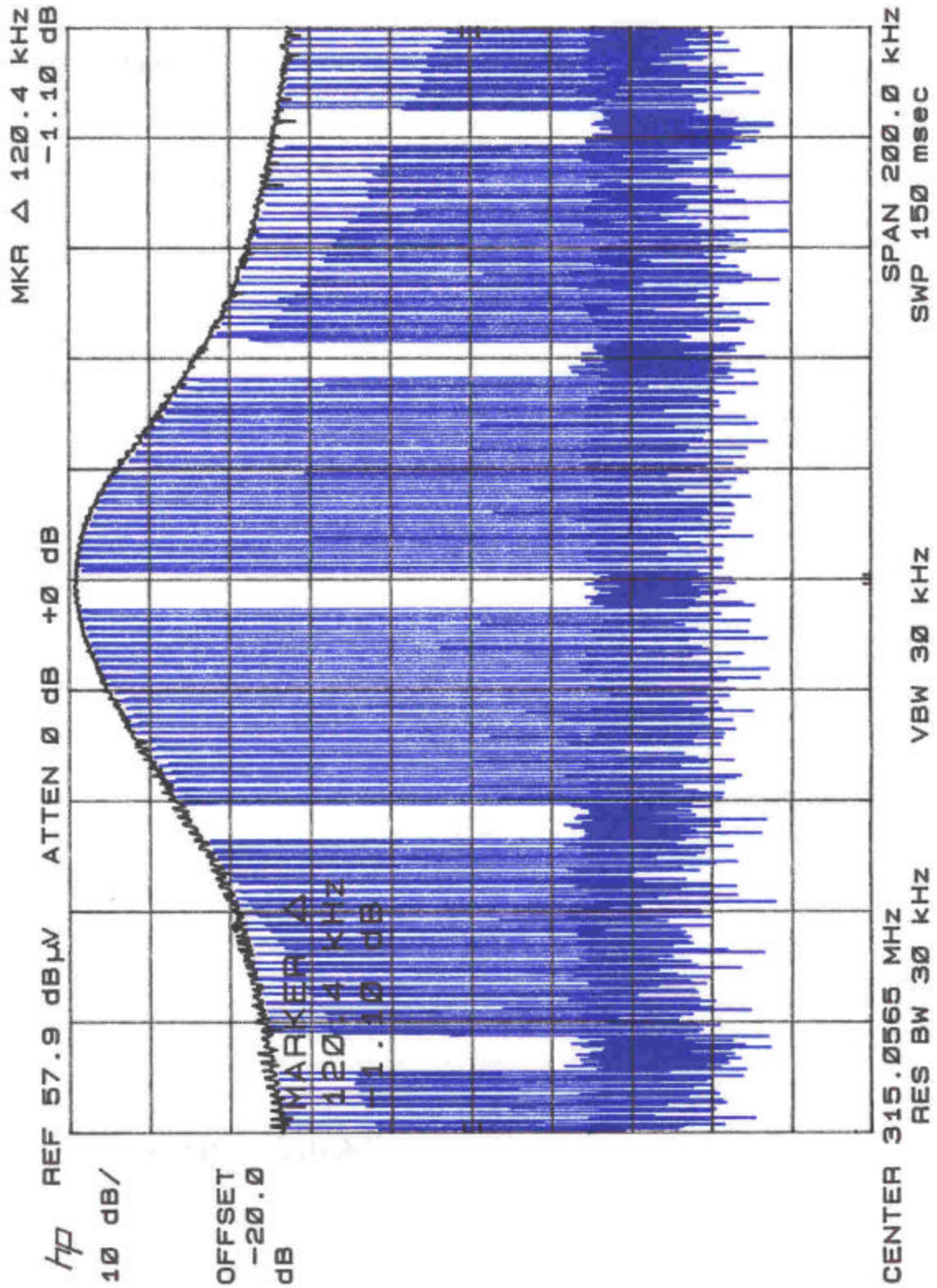


Figure 3. Occupied Bandwidth

Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4. Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
315 MHz	120.4 kHz	787.64 kHz	Pass

4.5 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with requirements for radiated spurious emissions. The limits are as shown in the following table.

Table 5. Radiated Spurious Emissions Limits

Frequency	Fundamental	Harmonic Level (-dBc or E-Field)
Fundamental	6040.4 uV/m	/
Harmonics		
Restricted bands		500 uV/m

4.5.1 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 C63.4-1992. 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	10Hz (avg), 1MHz (peak)

Emissions were measured to the 10th harmonic of the transmit frequency.

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 dB μ V
Antenna Factor (Ant Corr):	AFdB/m
Cable Loss Correction (Cable Corr):	CCdB
Duty Cycle Correction:	DCdB
Amplifier Gain:	GdB
Electric Field (Corr Level):	$EdB\mu V/m = VdB\mu V + AFdB/m + CCdB + DCdB - GdB$

Table 6: Radiated Emission Test Data

CLIENT: Ness Security Products DATE: 9/24/02
 TESTER: Ken Gemmell JOB #: 7258

EUT Information:

EUT: Dialer
 TEST STANDARD: FCC Part 15.231
 DISTANCE: 3m
 CLASS: B

Low Frequency Test Equipment/Limit:

ANTENNA: A_00007
 CABLE: CSITE2_3m
 LIMIT: LFCC_3m_Class_B
 TX Frequency 314.97

High Frequency Test Equipment/Limit:

ANTENNA: A_00004
 CABLE: CSITE2_HF

Peak Data - Harmonics

Freq.	Pol.	Azimuth	Ant. Hght	SA Level (Peak)	Ant. Corr.	Cable Corr.	Amp.	Duty Cycle	Corr. Level	Corr. Level	Limit	Margin
(MHz)	H/V	Degree	(m)	(dBuV)	(dB/m)	(dB)	(dB)	(dB)	(dBuV/m)	(uV/m)	(uV/m)	dB
314.97	V	315	1	57.3	14.6	3.9	0.0	-10.9	64.90	1757.9	6040.4	-10.7
629.94	V	270	1	16.5	18.9	5.9	0.0	-10.9	30.40	33.1	604.0	-25.2
944.91	V	0	1	5	22.9	7.8	0.0	-10.9	24.80	17.4	604.0	-30.8
1259.88	V	90	1	39.4	26.1	1.9	36.1	-10.9	20.36	10.4	604.0	-35.3
1574.85	V	90	1	40.3	27.5	2.6	35.8	-10.9	23.69	15.3	500.0	-30.3
1889.82	V	90	1	39.2	28.6	3.2	35.6	-10.9	24.55	16.9	604.0	-31.1
2204.79	V	90	1	41.3	29.3	3.3	35.5	-10.9	27.47	23.6	500.0	-26.5
2519.76	V	90	1	42.2	29.9	3	35.6	-10.9	28.60	26.9	604.0	-27.0
2834.73	V	90	1	40.5	30.4	2.8	35.7	-10.9	27.13	22.7	500.0	-26.8
3149.7	V	180	1	38.6	30.9	2.8	35.6	-10.9	25.75	19.4	604.0	-29.9
314.97	H	45	1	63.9	14.6	3.9	0.0	-10.9	71.50	3758.4	6040.4	-4.1
629.94	H	90	1.5	16.7	18.9	5.9	0.0	-10.9	30.60	33.9	604.0	-25.0
944.91	H	0	1.5	13.3	22.9	7.8	0.0	-10.9	33.10	45.2	604.0	-22.5
1259.88	H	90	1	40.1	26.1	1.9	36.1	-10.9	21.06	11.3	604.0	-34.6
1574.85	H	180	1	41.2	27.5	2.6	35.8	-10.9	24.59	17.0	500.0	-29.4
1889.82	H	90	1	39.2	28.6	3.2	35.6	-10.9	24.55	16.9	604.0	-31.1
2204.79	H	90	1	41.3	29.3	3.3	35.5	-10.9	27.47	23.6	500.0	-26.5
2519.76	H	180	1	41.4	29.9	3	35.6	-10.9	27.80	24.5	604.0	-27.8
2834.73	H	180	1	36.9	30.4	2.8	35.7	-10.9	23.53	15.0	500.0	-30.4
3149.7	H	180	1	37.6	30.9	2.8	35.6	-10.9	24.75	17.3	604.0	-30.9

4.6 Conducted Emissions (AC Powerline)

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 /50 mH 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 output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 450 kHz to 30 MHz was 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 7.

Note: The conducted emissions reported herein are done to the specifications that were in effect prior to September 9, 2002 as allowed by the transition provisions of 15.37.

Table 7: AC Power Line Conducted Emissions Test Data Sheet

CLIENT: Ness Security Products DATE: 10/8/2002
 TESTER: Ken Gemmell JOB #: 7260
 TEST STANDARD: FCC Part 15
 CLASS: FCC_B
 TEST VOLTAGE: 120 VAC

LINE 1 - NEUTRAL

Freq.	Voltage (QP)	Voltage	FCC Limit	Margin
MHz	dBuV	uV	uV	dB
1.00	21.5	11.9	250.0	-26.5
1.59	33.7	48.4	250.0	-14.3
6.66	22.4	13.2	250.0	-25.6
7.16	24.1	16.0	250.0	-23.9
22.85	20.6	10.7	250.0	-27.4
27.90	19.7	9.7	250.0	-28.3

LINE 2 - PHASE

Freq.	Voltage (QP)	Voltage	FCC Limit	Margin
MHz	dBuV	uV	uV	dB
1.00	21.2	11.5	250.0	-26.8
1.59	29.8	30.9	250.0	-18.2
6.66	24.3	16.4	250.0	-23.7
7.16	22.1	12.7	250.0	-25.9
22.85	19.7	9.7	250.0	-28.3
27.90	24.5	16.8	250.0	-23.5

4.7 Frequency Stability: (FCC Part §2.1055)

N/A