

EMC Test Report

Applicant : TeleDream Inc.
FCC Rule Part(s) : Part 15, Sub. Part B Class B
Equipment Class : Class B,
EUT Type : ADSL Modem
Model Name : DreamLink
Test Report No. : 2000-F15-006
Test Site : Estech Co., Ltd.
Dates of Tests : Nov. 8 - 15, 2000.

This device has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4(1992).

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualification of all persons taking them.

Estech certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).



Ilhwa Chung
President & Chief Engineer

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TeleDream Inc.

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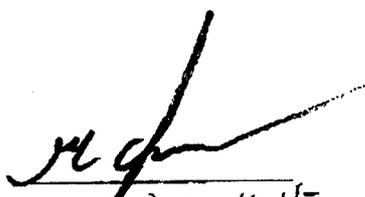
Nov 11. 2000

TIMCO ENGINEERING, Inc.
849 N.W. State Road 45
PO Box 370
Newberry, Florida 32669

To Whom It May Concern:

We, the undersigned, hereby authorize **ESTECH Co., Ltd.** to act on our behalf in all matters relation to applications for equipment authorizations, including the signing of all documents relating to these matters. Any and all acts carried out by **ESTECH Co., Ltd.** on our behalf shall have the same effect as acts of our own.

We also hereby certify that no party to this application is subject to a denial of benefits, including FCC benefit, pursuant to Section 5301 of the Anti-Drug Act of 1998, 21 U.S.C. 853(a).



2000.11.15

ESTECH Co., Ltd.

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MEASUREMENT REPORT

Scope - Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Company Name : **TeleDream Inc.**

Address : Shinhwa Bldg., 940-10 Daechi-Dong, Kangnam-Ku, Seoul 135-280, Korea
Tel. 822-554-4571, Fax. 822-554-4596

Attention : Mr. M.C.Chun

FCC Procedure	Class B Certification
EUT Type	ADSL Modem
Port/Connector(s)	Line
Crystal/Oscillator(s)	
Trade Name	TeleDream Inc.
Model Name	DreamLink
FCC Rule Part(s)	Part 15, Sub Part B Class
Date of Tests	Nov 8 - 15, 2000
Place of Tests	Estech Co., Ltd, Yaju, Kyunggi-Do, Korea
Test Report No.	2000-F15-006

INTRODUCTION

The measurement procedure described in FCC Part 15 and American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electric Equipment in the Range 9KHz to 40GHz(ANSI C 63.4-1992) were used in determine EME from **TeleDream Inc.. ADSL Modem.**

These measurement tests were conducted at Estech Co., Ltd facility in Yoju, Kyunggi-Do, Seoul, Korea. The site address is 58-1, Osan-Ri, Kanam-Myun, Yoju-Gun, Kyunggi-Do, Korea. The test site is one of the highest points in the Yoju-Gun area. The facility is 10 Km North-east of Radio Research laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the Radio Research laboratory.

PRODUCT INFORMATION

Equipment Description:

The Equipment Under Test (EUT) is ADSL Modem, Model DreamLink. This is equipped with a modular plug with a spiral cord and line cord. Insert the modular plug at the end of spiral cord into back of system, insert the modular plug at the end of the line cord to the wall socket.

EUT description detail

* Crystal/Oscillator(s) : 20.000MHz, 17.280MHz

* Main Chipset(s) :VC8410-PQC

* External Ports/Feature(s) : Phone, Line, LAN, Serial, Power

* Cable(s) :RJ11, RJ45.

*EMI suppression device(s) installed in production:

*EMI suppression device(s) added and/or modified during testing:
None

DESCRIPTION OF TESTS

Conducted Emissions

The line-conducted facility is located inside a 4 m x 6 m x 2.4(H) m shielded enclosure. It is manufactured by EM Engineering. The shielded effectiveness of the shield room is accordance with MIL-Std-285. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shielded room. Polarad, Model E2H2-Z5 and Schwarzback, Model NNLA8120 (10KHz-30MHz) 50 Ω /50 μ H Line-Impedance Stabilization Networks(LISN) are bonded to the shielded room. The EUT is powered from the Schwarzback LISN and support equipment powered from the Polarid LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter(100dB 14KHz-10GHz). The purpose of the filter is to attenuate ambient signal interface and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Polarad LISN. LISN schematic diagram is shown in Figure 1. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450KHz to 30MHz with 20msec sweep time The frequency producing the maximum level was re-examined using EMI/Field intensive meter and Quasi-peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switch power lines; varying the mode of operation or resolution, clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux. AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen the Appendix B. Each EME reported was calibrated using the HP8640B signal generator.

RADIATED EMISSION(Spurious)

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 200MHz using bi-conical antenna and 200 to 1000MHz using log-spiral antenna. Above 1GHz, bi-log antenna was used.

Final measurements were made outdoors at 3-meter and 10-meter test range using EMCO Dipole antennas. The test equipment was placed on a wooden and plastic bench situated on a 2.8 x 2.5 meters area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensive Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode and bandwidth of the receiver was set to 100KHZ or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment, and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 5 meter table . The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux. AC outlet, if applicable; and changing polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Appendix C. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 2 according to ANSI C63.4..

Radiated Emission (Antenna Conducted)

The antenna-power conducted measurement was performed with the EUT antenna terminals connected directly to a spectrum analyzer with a matching impedance termination. Power on the receive antenna terminals is ratio of V^2 / R , where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument. The power at the antenna terminal at any frequency from 30MHz to 1000MHz shall not exceed 2.0 nano-watts.

TEST DATA

Conducted Emission

Freq. (MHz)	Level (dBuV)	AFCL (dB)	POL (H/V)	Hight (m)	Azimuth (° angle)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.46829	41.11		N			48	41.11	6.89
0.53622	39.17		N			48	39.17	8.83
11.99366	40.18		H			48	40.18	7.82
13.40908	37.56		H			48	37.56	10.44
13.9541	38.68		N			48	38.68	9.32
26.18688	37.11		N			48	37.11	10.89

TEST DATA

Radiated Emission

Freq. (MHz)	Level (dBuV)	AFCL (dB)	POL (H/V)	Hight (m)	Azimuth (° angle)	Limit (dBuV)	Total (dBuV)	Margin (dB)
120.00	19.07	15.0	V	1.0	260	43.5	34.07	9.43
144.01	22.42	16.48	V	1.0	280	43.5	38.9	4.6
227.09	12.24	19.85	H	1.0	130	46.0	32.09	13.91
344.44	12.14	20.94	H	1.0	40	46.0	33.08	12.92
528.01	15.38	26.47	H	1.2	170	46.0	41.85	4.15
432.00	12.90	23.58	H	1.0	120	46.0	36.48	9.52

Table 2. Radiated Measurement at 3-meter

Note:

1. All modes of operating were investigated and the worst-case emission are reported.

TEST EQUIPMENT

Type	Model	Manufacturer	Cal. Due Date	S/N
Test Receiver	ESPC	Rohde&Schwarz	Aug 25, 1999	845296/021
Spectrum Analyzer	8568B	HP	April 7, 1999	2928A04802
Dipole Antenna	3121C	EMCO	August 6, 1999	9806-1383
Biconical Antenna	3109	EMCO	April 7, 1999	9701-3070
Biconi-log Antenna	3141	EMCO	April 29, 1999	9808-1113
Log-Periodic Antenna	3146	EMCO	April 7, 1999	9612-4727
Quasi-Peak Adaptor	HP85650A	HP	April 7, 1999	2811A0124
Digital Oscilloscope	TDS 350	Tektronic	April 14, 1999	B030850
LISN	ESH2-Z5	Polarad		872416/048
LISN	NNLA8120	Schwarzback		8120161
Loop	6052	EMCO		9607-3020
Turn Table	1060	EMCO		1060
Antenna Mast	1050	EMCO		1033
Plotter	7550	HP		2936a44001
Amplifier	8447F	HP		2944a03711
Antenna Master	2090	EMCO		9612-1202
Turn Table	1016	EMCO		1016
Signal Generator	8640B	HP		2421A25050

Appendix A - Sample Label

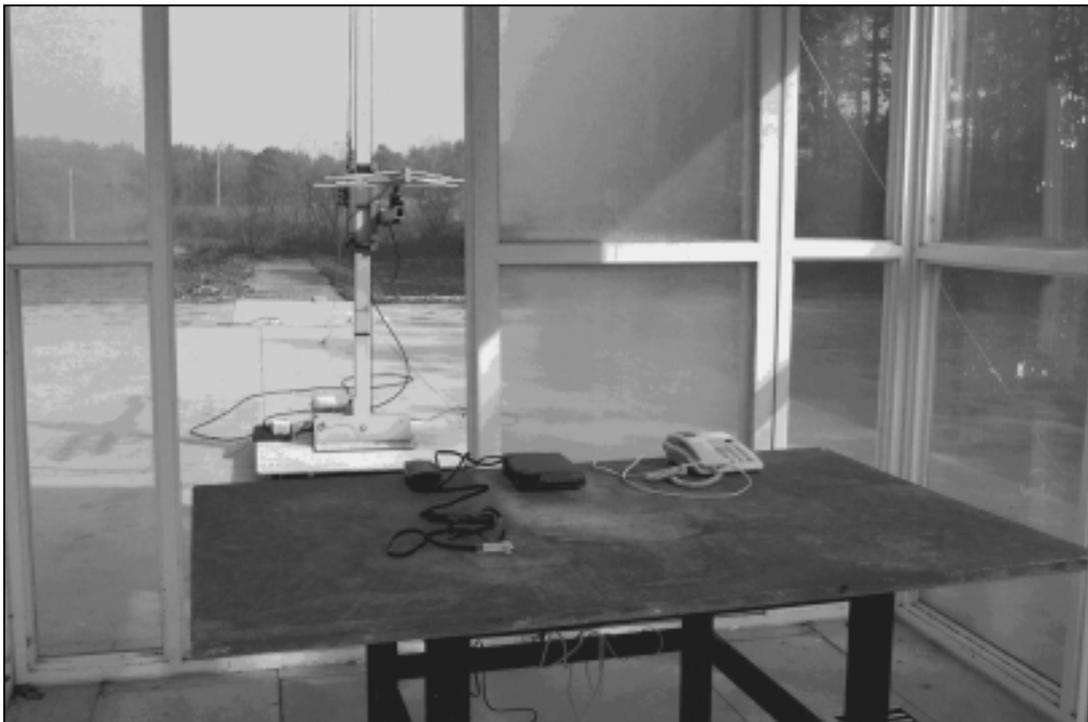
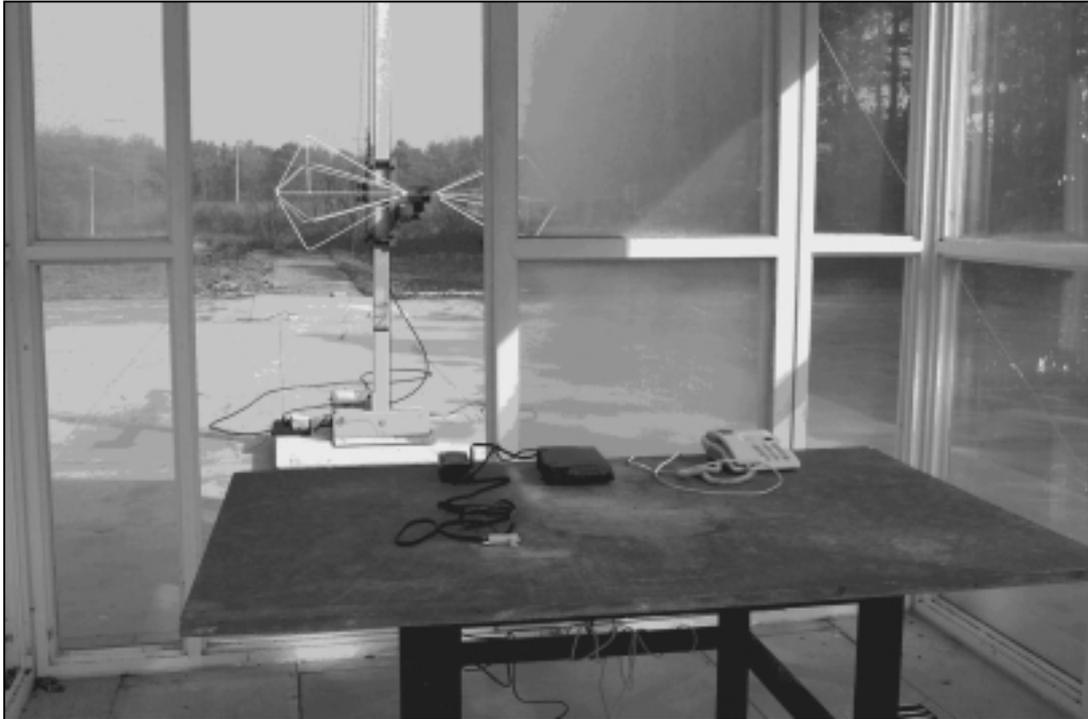
Labeling Requirements

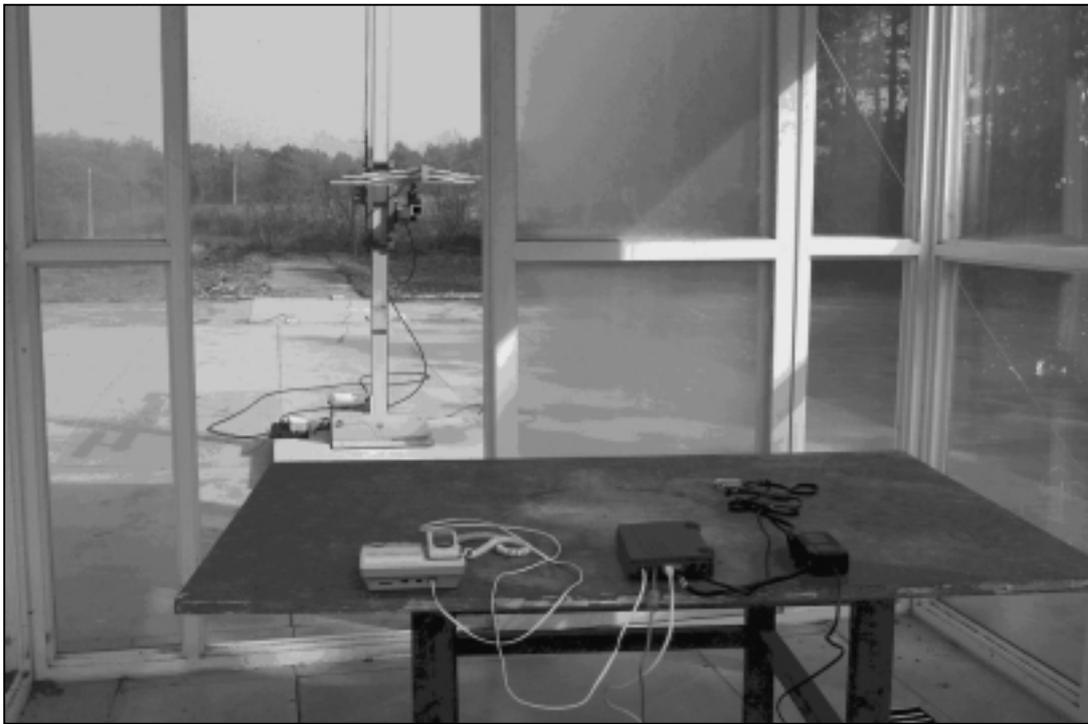
The label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time purchase.

1. Trade Name: TeleDream Inc.
2. Model No.: DreamLink
3. Manufacturer: TeleDream Inc.
4. FCC ID:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

Appendix B – Photographs







Appendix C - Block Diagram / Schematics

Appendix D - User's Manual