

Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1
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TEST REPORT			
REPORT DATE:	April 28, 1998		REPORT NO: 98120D
CONTENTS:	See Table of Contents		
SUBMITTOR:	TELIAN CORPORATION 4th. Fl., Daekwang Plaza B/D, 302-2 Haan-Dong Kwang Myung-Si, Kyung Gi-Do, Korea		
SUBJECT:	Model No: 2-9930A FCC ID: NPQ2-9930A		
TEST SPECIFICATION	FCC CFR 47 15.233 AND 2.989 Sections: 15.35, 15.107, 15.109, 15.207 and 15.209 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	March 24, 1998	DATE TESTED:	March 26 & April 27, 1998
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS	The following alterations required for compliance with referenced specification: Base Unit: A 0.01 μ F capacitor was added between IC 7 Pin 10 and Ground		
Tested by:	Original signed by: Jim Sims <i>Hiran De Silva</i> Hiran De Silva	Approved and Certified by:	<i>Robert G. Marshall</i> Robert G. Marshall, P. Eng.
Reviewed by:	<i>Ed. Chang</i> Edward Chang	Date:	<i>Am 29/98</i>
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Authorized by:
Professional Engineer
Ontario



Engineering &
Administrative



Testing For FCC
Submissions/Verifications

Industry Canada
Industrie Canada
Approved Test Facility



TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Telian Corporation
4th. Fl., Daekwang Plaza B/D, 302-2 Haan-Dong
Kwang Myung-Si,
Kyung Gi-Do, Korea

FCC Identifier

NPQ2-9930A

Manufacturer

Cal-Comp Electronics (Thailand) Co. Ltd.
60 Moo 8, Sethakij Road,
Klong Maduea, Kratoom Bean
Samuthsakorn, Thailand

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EXHIBIT A

(FCC Ref. 2.1033(b)(3))

"Installation and Operating Instructions
Furnished to the User"

EXHIBIT D

(FCC Ref. 2.1033(b)(6))

"Report of Measurements"

EXHIBIT D(1)

DEVICE MEASURED

(FCC Ref. 2.1033(b)(6))

APPLICANT:

Telian Corporation
4th. Fl., Daekwang Plaza B/D, 302-2 Haan-Dong
Kwang Myung-Si,
Kyung Gi-Do, Korea

MANUFACTURER:

Cal-Comp Electronics (Thailand) Co. Ltd.
60 Moo 8, Sethakij Road,
Klong Maduea, Kratoom Bean
Samuthsakorn, Thailand

FCC IDENTIFIER:

NPQ2-9930A

TRADE NAME:

Telian

MODEL NUMBER:

2-9930A

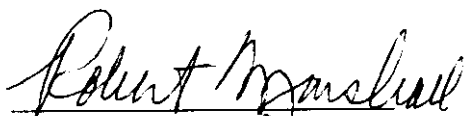
SERIAL NO.:

N/M

Marstech Limited
11 Kelfield Street
Etobicoke, Ontario
M9W 5A1 CANADA

TECHNICIANS:

Jim Sims - Com-Serve Corp.
Hiran De Silva - Marstech Limited


Robert G. Marshall, P. Eng.

Date: Apr 29/98

EXHIBIT D(2)

TEST FACILITY AND INSTRUMENT LIST

FACILITIES

Radiated ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

Conducted 2.5m Anechoic Chamber

EQUIPMENT

Anritsu 2601 A spectrum analyzer.
Hewlett-Packard RF generator # 8640 B with an 002 doubler
Hewlett-Packard 8449B Preamp. (30 dB) .. 1.0 MHz to 26.5 Ghz
A.H. Systems biconical antenna; 20 MHz to 330 MHz
A.H. Systems log periodic antenna; 300 MHz to 1.8 GHz
A.H. Systems log periodic antenna; 1.0 GHz to 12.4 GHz
Eaton dipole antennas; T1, T2, T3 25 MHz to 1.0 GHz
Roberts dipole antennas; T1, T2, T3 & T4 25 MHz to 1.0 GHz
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz
Notch Filter; Model FIL01605001 30 dB at 920 MHz
M/A-COM High Frequency Cable Assembly; No. 2026-0600

NOTE:

The Anritsu 2601 A spectrum analyzer, is calibrated annually, and that calibration is directly traceable to the National Research Council of Canada (NRC). This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three meter test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road
Columbia, MD 21046
Telephone: 301-725-1585 (ext-218)
Facsimile: 301-344-2050

September 23, 1997

IN REPLY REFER TO
31040/SIT
1300F2

Electrohome Electronics Ltd
809 Wellington Street, North
Kitchener, Ontario N2G 4J6, Canada

Attention: Garry Gallagher

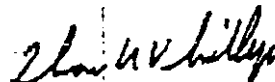
Re: Measurement facility located at Roseville
(3 meter site)

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for certification or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips
Electronics Engineer
Customer Service Branch

FCC ID: NPQ2-9930A
EXHIBIT D(2)-2
Marstech Report No. 98120D

EXHIBIT D(2)

SPECTRUM ANALYZER -

ANRITSU MS2601A S/N MT64544 - NEXT
CALIBRATION APRIL 1998

SUMMARY OF RESULTS

COMPLIANCE (yes) (no)

FIELD STRENGTH OF THE CARRIER FREQUENCIES

Handset, Low Channel: (X) ()
Handset, High Channel: (X) ()

Base Station, Low Channel: (X) ()
Base Station, High Channel: (X) ()

SPURIOUS RADIATED EMISSIONS (15.109)

Handset: (X) ()

Base Station: (X) ()

SPURIOUS RADIATED EMISSIONS (15.209)

Handset, Low Channel: (X) ()
Handset, High Channel: (X) ()

Base Station, Low Channel: (X) ()
Base Station, High Channel: (X) ()

LINE CONDUCTED SPURIOUS EMISSIONS

Base Station: Telephone mode: (X) ()

EQUIPMENT REQUIREMENTS AND IDENTIFICATION

a) Manufacturers or applicants name: (x) ()
b) FCC ID: (x) ()
c) Serial number: (N/M) ()
d) Antenna: (x) ()
e) Operator controls: (x) ()
f) Security Coding (x) ()
g) Equipment/Packaging Marking (x) ()

CARRIER FREQUENCY FIELD STRENGTH

RESULTS

Handset:

Low Channel: Maximum field strength of 14,081 $\mu\text{V}/\text{M}$; at 926.225 MHz.

High Channel: Maximum field strength of 16,763 $\mu\text{V}/\text{M}$; at 927.575 MHz.

Note: The remote headset was attached to the handset during carrier level tests.

Base Station:

Low Channel: Maximum field strength of 12,096 $\mu\text{V}/\text{M}$; at 902.225 MHz.

High Channel: Maximum field strength of 11,880 $\mu\text{V}/\text{M}$; at 903.625 MHz.

Note: All other channels were checked for carrier frequency field strength levels.

TEST CONDITIONS

Equipment Positioning:

Handset: vertical or upright

Base Station: standing on its back with the antenna extended in the vertical plane

Antenna Polarization:

Handset: vertical

Base Station: horizontal

Antenna Type: T.4; tuned half wave dipole

Measurement Bandwidth: 100 KHz

Supply Voltages:

Handset: 3.6 VDC from an internal battery.

Base Station: 120 VAC/60 Hz to 09 VDC (adapter)

METHODS OF MEASUREMENT

The cordless phone components were placed in turn on a one metre high, non-metallic turntable and set at maximum output level. Measurements were made in a minimum of 3 positions for the handset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer and a substitution signal from an RF generator. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

SPURIOUS RADIATED EMISSIONS

RESULTS

The maximum field strength of any harmonic or spurious emission with respect to the applicable limit, while transmitting or receiving was:

Handset: **Maximum field strength of: NONE FOUND below 1000 MHz**
 Maximum field strength of: NONE FOUND over 1000 MHz

Base Station: **Maximum field strength of 57.0 μ V/M at 100-155 MHz**
 Maximum field strength of: NONE FOUND over 1000 MHz

Note: *The remote headset was attached to the handset during spurious emission tests.*

TEST CONDITIONS

Equipment Positioning:

Handset: standing vertically and laying on its side
Base Station: standing on its back with the antenna extended in the vertical plane.

Antenna Polarization:

Handset: vertical and horizontal
Base Station: vertical and horizontal
Base Station, Receive: vertical

Measurement Bandwidth: 100/120 KHz & 1.0 MHz (IF)

Supply Voltages:

Handset: 3.6 VDC from an internal battery.
Base Station: 120 VAC/60 Hz to 09 VDC (adapter)

METHODS OF MEASUREMENT

The cordless phone components were placed in turn on a one metre high, non-metallic turntable. Measurements were made in a minimum of 3 positions for the handset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer and a substitution signal from an RF generator. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

RADIATED EMISSION RESULTS

BW: 100/120 KHz and 1.0 MHz

Span: 5 to 50 MHz

HANDSET

TEST # MODE	FREQ.MHZ BAND	LEVEL μ V	ANT. TYPE (PZ)	ANT. FACT.	F.S. μ V/M	LIMIT μ V/M	DIFF. TO LIMIT; dB
CARRIER	926.225	315.00	RT.4 V	44.7	14080.5	50,000	-11.01
CARRIER	927.575	375.00	RT.4 V	44.7	16762.5	50,000	-9.49

BASE STATION

TEST # MODE	FREQ.MHZ BAND	LEVEL μ V	ANT. TYPE (PZ)	ANT. FACT.	F.S. μ V/M	LIMIT μ V/M	DIFF. TO LIMIT; dB
CARRIER	902.225	280.00	RT.4 H	43.2	12096.0	50,000	-12.33
CARRIER	903.625	275.00	RT.4 H	43.2	11880.0	50,000	-12.48
01 RX	100-155	08.5	B/C V	6.7	57.0	150	-8.41

POWER LINE CONDUCTED EMISSIONS

RESULTS

The largest RF voltages on the AC power lines, over the frequency range of 450 KHz to 30 MHz, was **45.03 μ V (33.07 dB μ V) at 14.22 MHz** from the base station while transmitting and/or receiving. (A side of the line in the telephone mode) Refer to the attached results.

TEST CONDITIONS

<u>Measurement Bandwidth:</u>	9 KHz Q.P. (IF)
<u>AC Test Voltage:</u>	120 VAC (filtered and stabilized)
<u>Mode of Operation:</u>	Telephone

METHODS OF MEASUREMENT

The base station portion of the cordless phone was placed on a wooden table directly above a 50 ohm line impedance stabilization network.(LISN) If adjustable, the whip antenna was fully extended vertically and the AC power attachment cord went directly down to the LISN. The LISN is grounded directly to the floor of the test facility. Excess AC cord was coiled in a figure eight pattern before connecting directly to the 50 micro-henry LISN.

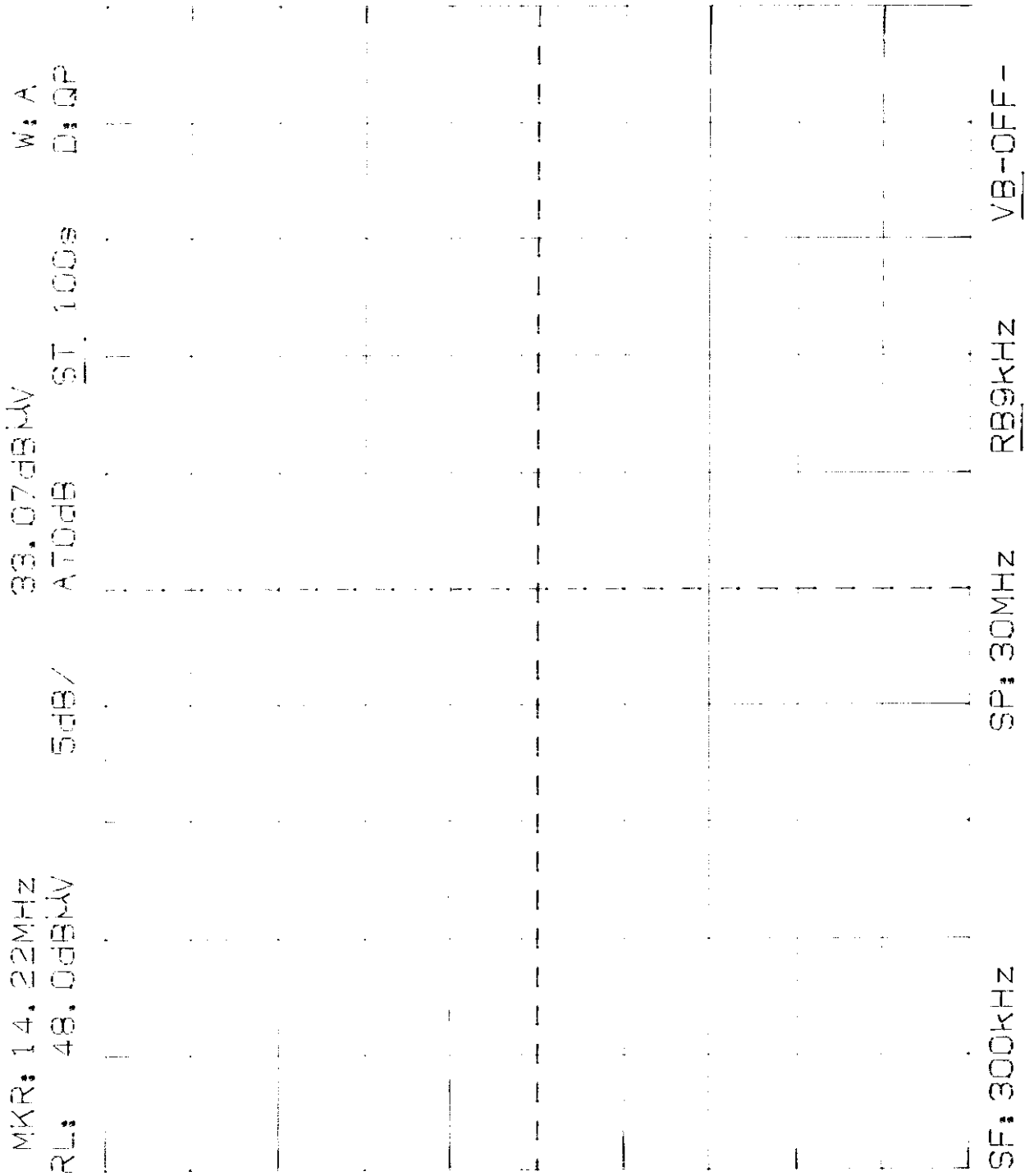
The base station was connected to a simulated 9,000 foot phone line and 48 VDC was applied. The 9,000 foot phone line network was grounded to the nearest AC outlet with a test lead.

A length of low loss RF foam cable was used to couple the RF voltages from the LISN to the spectrum analyzer. The base station transmitter was keyed on by the handset transmitting nearby. All of the RF voltages were recorded and are attached.

The base station was tested in all modes of operation which were applicable to the specific equipment under test. This included operating modes such as "calling/paging", quiescent or receive mode and standard telephone/transmit operation while switching the transmit channels.

If the cordless phone contained an intercom mode of operation, then this test was repeated in that mode. The attached results represent the **worst case results** in each test condition and frequency band.

POWER LINE CONDUCTED EMISSIONS
 MODEL 2-9930A
 SIDE: A - ON HOOK



POWER LINE CONDUCTED EMISSIONS

MODEL 2-9930A

SIDE: B - ON HOOK

