EMC COMPLIANCE ENGINEERING AND TESTING

NVLAP Accredited

APPLICATION FOR FCC CERTIFICATION

UNLICENSED LOW POWER TRANSMITTER

Telean Technology LTD.
1603, 16/F., Fo Tan Industrial Centre, 26-28 Au Pui Wan St,
Fo Tan, Shatin, NT., Hong Kong
(852) 2693 2773

MODEL: FM-07-TX
FCC ID: MQ5FM-07-TX

October 2, 2000

This report concerns (check one):	**Original Grant:** X	**Class II Change:**
Equipment Type: **Transmitter**		

Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? **Yes:** **No**: X
If yes, defer until: _____
Date

Company name agrees to notify the Commission by: _____**(date) of the intended date of announcement of the product so that the grant can be issued on that date.**

REPORT PREPARED BY:

EMI Technician: Daniel W. Baltzell
Administrative Writer: Melissa Fleming

Rhein Tech Laboratories, Inc.

Document Number: 2000406

360 Herndon Parkway, Suite 1400
Herndon,VA 20170
703 689-0368 FAX 703 689-2056

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1.0 GENERAL INFORMATION

The following Application for FCC Certification of a Unlicensed Low Power Transmitter is prepared on behalf of Telean Technology, Ltd in accordance with Part 2, and Part 15, Subparts A and C of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the UAHTX-RF02-49 Transmitter, FCC ID: MQ5-FM-04-TX. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conform with the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instruments. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emission measurements were performed manually at Rhein Tech Laboratories, Inc. The radiated emission measurements required by the rules were performed on the 3/10 meter open field test ranges maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission.

Since the device is battery operated power line conducted measurements were not required. Conducted measurement with a connection to analyzer soldered to PCB at the antenna location for both the transmitter and receiver portions. The 9 kHz – 30 MHz receiver plot was taken at max hold and turned at the lowest frequency of 48 MHz and the highest frequency of 51 MHz, and no noticeable signals were seen.

1.1 RELATED SUBMITTAL(S)/GRANT(S)/DOC(S)

This is an original submission for Certification.

1.2 PRODUCT DESCRIPTION

Please see product description in appendix G

1.3 TEST SYSTEM DETAILS

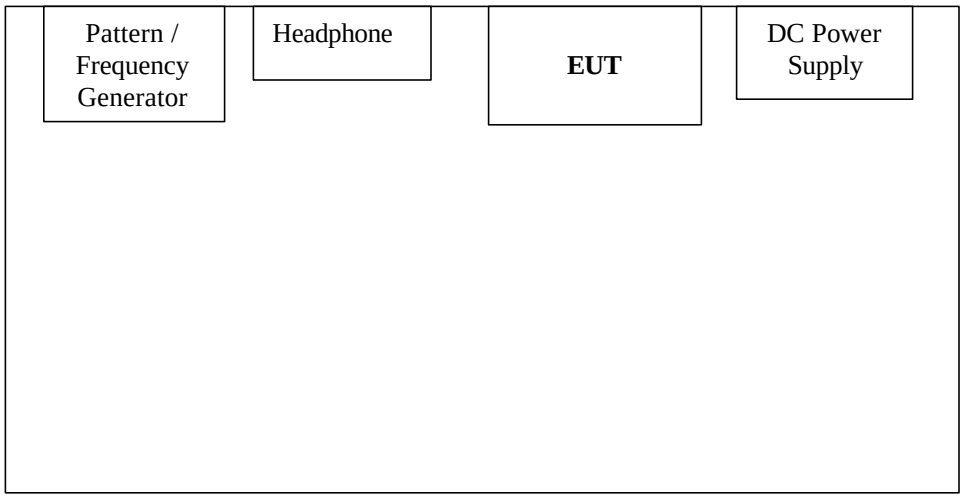
Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test.

TABLE 1: TEST SYSTEM DETAILS

External Components

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
POWER SUPPLY	HEWLETT PACKARD	6291	1928A05385	N/A	UNSHIELDED POWER	900773
PATTERN GENERATOR	PHILIPS	PM 5418 TDS	LO 604891	N/A	UNSHIELDED I/O UNSHIELDED POWER	900660
HEADPHONE (EUT)	**TELEAN TECHNOLOGY LTD**	**RF-830VX-RX 49MHZ**	**TTL-ESK09263-A**	**N/A**	**N/A**	**012552**
TRANSMITTER(EUT)	**TELEAN TECHNOLOGY LTD**	**FM-07-TX**	**TTL-ESK09263-B**		**UNSHIELDED I/O UNSHIELDED POWER**	**012551**

1.4 CONFIGURATION OF TESTED SYSTEM



1.5 TEST METHODOLOGY

Radiated testing was performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of one and three meters. The one meter test distance was used when there were strong ambient signals or extremely low spurious emissions that inhibited measuring at three meters per FCC 15.31 *f* (2). Section 3.1 contains other clocks and oscillators measured. FCC 15.227 average limit was used to determine the transmitter carrier amplitude. FCC 15.31 *f* (2) the square of an inverse linear distance extrapolation factor was used to extrapolate the new limit whenever an EUT to antenna distance other than the given FCC test distance for frequencies below 30 MHz per FCC 15.209 general radiation emission limit. Conducted emission testing was not performed on the host computer power line since the EUT does not have a power supply. The EUT's DC power is provided by an external 12V DC source.

1.6 TEST FACILITY

The open area test sites and conducted measurement facility used to collect the radiated data is located on the rear lot of Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400 in Herndon, Virginia. Our open area test sites 1 and 2 are approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

2.0 PRODUCT LABELING

See [roduct labeling in appendix H figure 1

3.0 SYSTEM TEST CONFIGURATION

3.1 JUSTIFICATION

The EUT is battery powered; conducted emissions measurement was not performed. The EUT was also tested in two orthogonal planes, namely vertical and horizontal. The following local oscillators, crystals and IF were investigated and measured:

1 Transmitter channel 1 = 48.9 $\pm$ 0.03 MHz,
2 Transmitter channel 2 = 49.4 $\pm$ 0.03 MHz,
3 Transmitter channel 3 = 49.9 $\pm$ 0.03 MHz,
4 Transmitter channel 1 crystal = 10.080 MHz,
5 Transmitter channel 2 crystal = 10.185 MHz,
6 Transmitter channel 3 crystal = 10.287 MHz,
7 Receiver Local Oscillator channel 1 = 38.2 MHz
8 Receiver Local Oscillator channel 2 = 38.7 MHz
9 Receiver Local Oscillator channel 3 = 39.2 MHz
10 Receiver IF Amplifier 10.7 MHz
11 Receiver channel 1 = 48.9 $\pm$ 0.5 MHz
12 Receiver channel 2 = 49.4 $\pm$ 0.5 MHz
13 Receiver channel 3 = 49.9 $\pm$ 0.5 MHz

3.2 EUT EXERCISE SOFTWARE

The EUT was powered with an external 12V power supply and a 1 kHz tone applied to the input.

The receiver was powered by 2AA cells (3V) and was tuned to the appropriate frequency.

3.3 OCCUPIED BANDWIDTH AND SPURIOUS NOISE

The EUT was set up as per section 1.4 and the transmitter carrier measured at each channel 1, 2, and 3 per ANSI 63.4 occupied bandwidth measurement. The resolution bandwidth was set at 10 KHz. The sweeptime was set so that the receiver filters were properly charged. Since the antenna is an integral antenna the a radiated measurement was used. See the occupied bandwidth plots, Figures 16-18.

3.4 CERTIFICATION STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature:  Date: November 7, 2000

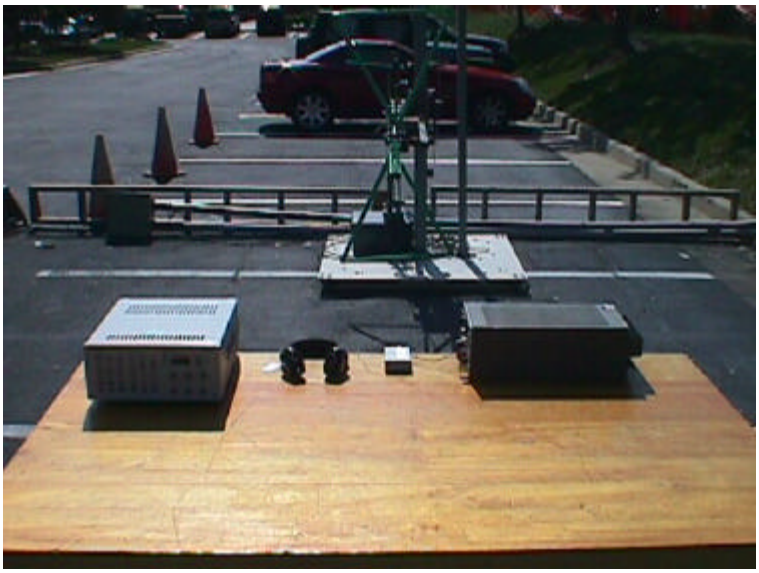
Typed/Printed Name: Desmond A. Fraser

Position: President
(NVLAP Signatory)

Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

4.0 MEASUREMENT PHOTOS



5.0 RADIATED EMISSION DATA

The following data lists the worst case emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph 6.1.

TABLE 2: RADIATED EMISSIONS TRANSMITTER:

CHANNEL 1

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.200	Qp	V	0	1.0	32.8	-10.6	22.2	40.0	-17.8
48.900	Qp	V	230	1.0	54.3	-21.2	33.1	40.0	-6.9
146.690	Qp	V	90	1.0	42.3	-10.6	31.7	43.5	-11.8
195.374	Qp	V	350	1.0	36.4	-11.4	25.0	43.5	-18.5
244.220	Qp	V	50	1.0	34.9	-8.6	26.3	46.0	-19.7
293.090	Qp	V	80	1.0	30.8	-6.7	24.1	46.0	-21.9
341.911	Qp	V	30	1.0	33.5	-4.9	28.6	46.0	-17.4
391.200	Qp	V	0	1.0	29.0	-3.0	26.0	46.0	-20.0
440.100	Qp	V	0	1.0	29.2	-1.4	27.8	46.0	-18.2
489.000	Qp	V	0	1.0	29.2	-0.2	29.0	46.0	-17.0

Channel 2

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.700	Qp	V	0	1.0	35.5	-11.1	24.4	40.0	-15.6
49.400	Qp	V	265	1.0	50.0	-21.4	28.6	40.0	-11.4
148.092	Qp	V	350	1.0	37.1	-10.7	26.4	43.5	-17.1
197.428	Qp	V	0	1.0	35.4	-11.3	24.1	43.5	-19.4
246.790	Qp	V	130	1.0	31.9	-8.4	23.5	46.0	-22.5
345.590	Qp	V	50	1.0	32.6	-4.5	28.1	46.0	-17.9
395.200	Qp	V	0	1.0	29.0	-2.8	26.2	46.0	-19.8
444.600	Qp	V	0	1.0	29.2	-1.3	27.9	46.0	-18.1
494.000	Qp	V	0	1.0	29.3	-0.1	29.2	46.0	-16.8

Channel 3

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV/m)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
39.200	Qp	V	350	1.0	34.3	-11.6	22.7	40.0	-17.3
49.850	Qp	V	270	1.0	54.0	-21.6	32.4	40.0	-7.6
149.561	Qp	V	0	1.0	35.2	-10.8	24.4	43.5	-19.1
198.490	Qp	V	350	1.0	40.6	-11.2	29.4	43.5	-14.1
199.423	Qp	V	0	1.0	34.6	-11.1	23.5	43.5	-20.0
199.994	Qp	V	350	1.0	38.3	-11.1	27.2	43.5	-16.3
249.296	Qp	V	70	1.0	34.4	-8.2	26.2	46.0	-19.8
299.165	Qp	V	70	1.0	30.5	-6.5	24.0	46.0	-22.0
349.009	Qp	V	50	1.0	32.5	-4.1	28.4	46.0	-17.6
399.200	Qp	V	0	1.0	29.1	-2.6	26.5	46.0	-19.5
449.100	Qp	V	0	1.0	29.2	-1.3	27.9	46.0	-18.1
499.000	Qp	V	0	1.0	29.4	-0.2	29.2	46.0	-16.8

See Appendix B for Radiated Test Methodology.

TEST PERSONNEL:

Signature:_____ Date: October 2, 2000

Typed/Printed Name: Daniel W. Baltzell

TABLE 3: RADIATED EMISSIONS RECEIVER:

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comments
38.200	Qp	V	120	1.0	34.7	-15.2	19.5	40.0	-20.5	Ch 1 LO
38.700	Qp	V	350	1.0	35.3	-15.7	19.6	40.0	-20.4	Ch 2 LO
39.200	Qp	V	120	1.0	33.5	-16.2	17.3	40.0	-22.7	Ch 3 LO
76.400	Noise Floor									
77.400	Noise Floor									
78.400	Noise Floor									

See Appendix B for Radiated Test Methodology.

TEST PERSONNEL:

Signature: _____ Date: October 2, 2000

Typed/Printed Name: Daniel W. Baltzell

5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)
FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

SCF(dB/m) = - PG(dB) + AF(dB/m) + CL(dB)

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

49.3 dBuV - 11.5 dB = 37.8 dBuV/m

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$