

FCC PART 15 Subpart C
EMI MEASUREMENT AND TEST REPORT
For
Million Industrial Ltd.

9/FL., FLAT A, RODEO CENTRE, 73-79 LARCH STREET, TAI KOK TSUI, KOWLOON, HONG KONG

FCC ID: MQDMILWT-359

January 12, 2004

This Report Concerns: ☒ Original Report	Equipment Type: Walkie- Talkie
Test Engineer: Jandy Su	
Report No.: RSZ04010202	
Test Date: January 6,2003	
Reviewed By: Ling Zhang	
Prepared By: Bay Area Compliance Lab Corp. Suite C, 41-D Electronics Science & Technology Building, No. 2070 Shennanzhong Rd ShenZhen, Guandong 518031, P.R. China Tel: (755) 83296449 Fax: (755) 83273756	

Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

1 - GENERAL INFORMATION.....	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
1.2 OBJECTIVE	3
1.3 RELATED SUBMITTAL(S)/GRANT(S)	3
1.4 TEST METHODOLOGY	3
1.5 TEST FACILITY	3
1.6 TEST EQUIPMENT LIST	4
1.7 EXTERNAL I/O CABLING	4
2 - SYSTEM TEST CONFIGURATION.....	5
2.1 DESCRIPTION OF TEST CONFIGURATION	5
2.2 CONFIGURATION OF TEST SYSTEM.....	5
2.3 TEST CONFIGURATION PHOTOS.....	5
2.4 EQUIPMENT MODIFICATIONS	6
3 - SUMMARY OF TEST RESULTS.....	7
4 – ANTENNA REQUIREMENT	8
5 - CONDUCTED EMISSIONS TEST DATA.....	9
6 - RADIATED EMISSION DATA	10
6.1 MEASUREMENT UNCERTAINTY	10
6.2 EUT SETUP.....	10
6.3 SPECTRUM ANALYZER SETUP	10
6.4 TEST PROCEDURE	10
6.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	11
6.6 SUMMARY OF TEST RESULTS	11
6.7 RADIATED EMISSIONS TEST RESULT DATA	11
6.8 TEST RESULT: PASS	11
7 – BAND EDGES TESTING.....	12
7.1 SPECTRUM ANALYZER SETUP	12
7.2 TEST DATA	12
7.3 TEST RESULT	12

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Million Industrial Ltd.*'s product, model name: *WT-359*, Serial number: 040105 or the "EUT" as referred to in this report is a Walkie- Talkie. The EUT is a Transmitter, which measures approximately 7.4cmL x 6.7cmW x 10.9cmH.

The EUT power: DC 6V battery.

** The test data was good for test sample Serial: 040105 only. It may have deviation for other product samples.*

1.2 Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2001.

The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by FCC Title 47, Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.235.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2001, 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. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated electromagnetic disturbance and disturbance voltage measurement data is located in the No. 3 building JingHua Courtyard, Shennanzhong Rd ShenZhen, Guandong 518031, P.R. C, and 230 Commercial Street, Sunnyvale, CA 94085 USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4 - 2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22:1997 and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R/S	Spectrum Analyzer	FSEM	849720/019	08/05/2003	1 year
HP	Amplifier	8447D	2944A0979 5	08/05/2003	1 year
ETS	Log Periodic Antenna	3146	9603-4421	09/05/2003	1 year
ETS	Biconical Antenna	3110B	3360	08/05/2003	1 year
Solar Electronics	LISN	TYPE 8012-50-R-24-BNC	21162	09/05/2003	1 year
Solar Electronics	LISN	TYPE 8012-50-R-25-BNC	21163	10/05/2003	1 year
COM Power	LISN	LI-200	12208	10/30/2003	1 year
COM Power	LISN	LI-200	12005	10/30/2003	1 year
HP	Spectrum Analyzer	8568B	2517A0161 0	10/30/2003	1 year
HP	Spectrum Analyzer Display Unit	8568B	2517A1003 9	10/30/2003	1 year
HP	Quasi-Peak Adapter	8565A	3107A0157 2	10/30/2003	1 year
FCC	Absorbing Clamp	F-201-23mm	90	10/30/2003	1 year
FLUKE	True RMS Multimeter	187	78540402	03/24/2003	1 year

***Statement of Traceability: Bay Area Compliance Laboratory Corp.** Certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY.

1.7 External I/O Cabling

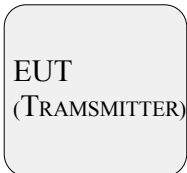
Cable Description	Length (M)	From/Port	To	Core
Shielded Detachable Earphone Cable	0.5	EUT	Headphone	No

2 - SYSTEM TEST CONFIGURATION

2.1 Description of Test Configuration

The EUT was lie, stand, and side for testing.

2.2 Configuration of Test System



2.3 Test Configuration Photos

lie configuration



Stand Configuration



Side Configuration



2.4 Equipment Modifications

The EUT tested was not modified by BACL.

3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna requirement	Pass
§ 15.205	Restricted bands of operation	Pass
§ 15.207	Conduct requirement	Pass
§ 15.209	Radiated requirement	Pass
§ 15.235	Radiated requirement	Pass

4 – ANTENNA REQUIREMENT

The antenna of the EUT is permanent attached, fullfilled requirement of section 15.203.

Test result: pass

5 - CONDUCTED EMISSIONS TEST DATA

The EUT unit is battery powered so AC conducted emissions testing are not applicable.

6 - RADIATED EMISSION DATA

6.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

6.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 2001. The specification used was the FCC 15 Subpart C limits for transmitter.

The test configures were lie, stand, and side. Stand is the worst configure, and the worst configure test data was included in the test report.

The EUT was placed center of the test table.

6.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the system was investigated from 30 MHz to 1000 MHz.

The spectrum analyzer was set with the following configurations during the radiated emission test:

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Sweep Speed	Auto
IF Bandwidth	100 KHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	100 KHz

6.4 Test Procedure

For the radiated emissions test, since the EUT does not have AC power source, there was no connection to AC outlets.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "Qp" in the data table.

6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for applicable limits. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Applicable Limit}$$

6.6 Summary of Test Results

According to the data in section 5.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, 15.209 and 15.235(a) after tested to 10th harmonics as required by FCC and had the worst margin of:

-8.0 dB μ V at 99.7 MHz in the **Horizontal** polarization, 30 to 1000 MHz, 3Meters.

6.7 Radiated Emissions Test Result Data

Date of Test	:	January 6,2003	Temperature	:	25°C
EUT	:	Walkie- Talkie	Humidity	:	70%
M/N	:	WT-359	Operating Mode	:	Transmitting
S/N	:	040105	Test Engineer:	:	Jandy Su

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Frequency MHz	Ampl. dB μ V/m	Direction Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	Mode
99.7	45.67	180	1.2	h	10.4	0.9	25	32.0	40	-8.0	Peak
99.7	44.83	180	1.2	v	10.4	0.9	25	31.1	40	-8.9	Peak
199.53	43.11	60	1.2	h	14.4	1.2	25	33.7	43.5	-9.8	Peak
149.62	41.14	45	1	h	13.4	0.8	25	30.3	43.5	-13.2	Peak
149.58	41.29	45	1	v	13.4	0.8	26	29.5	43.5	-14.0	Peak
199.35	39.66	180	1.2	v	14.4	1.2	27	28.3	43.5	-15.2	Peak
249.34	38.2	45	1	h	11.3	0.9	25	25.4	46	-20.6	Peak
249.26	40.42	270	1	v	11.3	0.9	28	24.6	46	-21.4	Peak
49.86	62.53	180	1.2	v	11.3	0.4	25	49.2	80	-30.8	Fund(AV)
49.86	61.7	45	1	h	11.3	0.4	25	48.4	80	-31.6	Fund(AV)
49.86	63.80	180	1.2	v	11.3	0.4	25	50.47	100	-49.53	Fund(Peak)
49.86	62.1	45	1	h	11.3	0.4	25	48.8	100	-51.2	Fund(Peak)

6.8 Test Result: Pass

7 – BAND EDGES TESTING

Requirements: The field strength of any emissions appearing between the band edges and up to 10KHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in §15.209.

7.1 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the band edges testing:

Start Frequency 49.80 MHz
Stop Frequency 49.92 MHz
Sweep Speed 300 ms
Video Bandwidth 10 KHz
Resolution Bandwidth..... 10 KHz

7.2 Test Data

According to the data, the EUT complied with the FCC Title 47, Part 15, Subpart C, section , 15.235(b)

Date of Test	:	January 6,2003	Temperature	:	25°C
EUT	:	Walkie- Talkie	Humidity	:	70%
M/N	:	WT-359	Operating Mode	:	Transmitting
S/N	:	040105	Test Engineer:		Jandy Su

Frequency	Emission Attenuation Level	Limit
MHz	dBμV	dBμV
49.81	49.40	26
49.91	49.97	26

7.3 Test Result

PASS

