FCC PART 15.225
EMI MEASUREMENT AND TEST REPORT

For

Uniform Industrial Corp.

47709 Fremont Blvd. Fremont, CA 94539

FCC ID: TFJUIC802RFMG-001

This Report Concerns:	**Equipment Type:**
☒ Original Report	Card Reader

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Uniform Industrial Corp.* product, FCC ID: *TFJUIC802RFMG-001* or the "EUT" as referred to in this report is a Card Reader. The EUT measures approximately 16.5cm (L) x 10cm (W) x 3cm (H).

** The test data gathered is from production samples, serial number: 3, provided by the manufacturer.*

Objective

This Type approval report is prepared on behalf of *Uniform Industrial Corp.* in accordance with Part 2, Subpart J, and Part 15 Subpart C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules, Part 15, sec 15.35, sec 15.203, sec 15.205, sec 15.207, sec 15.209 and sec 15.225.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, 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 test methods and procedures set forth in ANSI C63.4-2003.

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, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components.

Special Accessories

As shown in the following test setup block diagram, all interface cables used for compliance testing are un-shielded.

Schematics and Block Diagram

Please refer to Appendix D.

Equipment Modifications

No modifications were made to the EUT

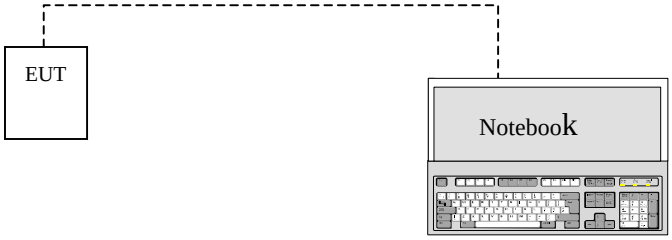
Remote Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Notebook	PP05L	CN-0G5152-48643-48F-0708

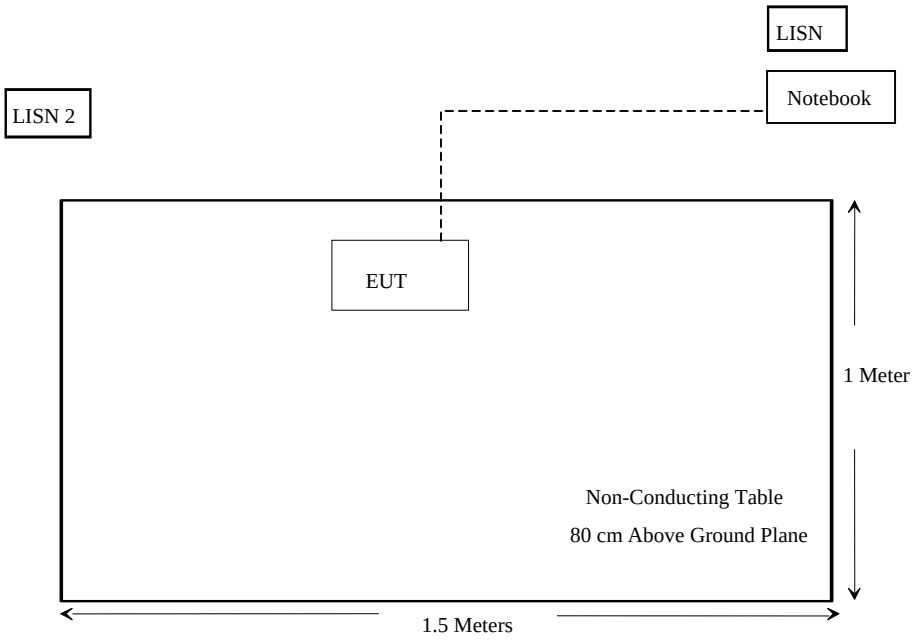
Interface Ports and Cabling

Cable Description	Length (M)	Port/From	To
RJ45 Cable	30	Dell Notebook	EUT

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.35 § 15.205 § 15.209 § 15.225	Radiated Emission	Compliant*
§ 15.207	Conducted Emission	N/A
§15.225(e)	Frequency Stability	Compliant

* Within the Measurement of Uncertainty

§ 15.35, § 15.205, § 15.209, § 15.225 - RADIATED EMISSION TEST

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.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of test table and bundle when necessary.

The EUT was placed on the center of the back edge on the test table.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, the EUT was tested to 1 GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Amplifier, Pre	8447D	2944A10187	2004-08-25
ETS	Antenna, Loop, H-Field, Passive	6512	34167	2005-05-09
Sunol Sciences	Antenna	JB1	A013105-3	2005-02-11
Sunol Sciences	System Controller	SC99V	122303-1	N/R
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2004-09-29

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dB of specification limitation), and are distinguished with a "**QP**" in the data table.

The EUT was operating at normal to represent worst case during final qualification test. Therefore, this configuration was used for final test data recorded in the following table of this report.

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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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 means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Limit

Summary of Test Results

According to the data in the following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.225. The EUT measured –2.59 dB within the measurement uncertainty of ±4.0 dB, and had the worst margin reading of:

-2.59 dB (QP) at **325.46 MHz** in the **Horizontal** polarization

Environmental Conditions

Temperature:	23°C
Relative Humidity:	44%
ATM Pressure:	1021 mbar

** Testing was performed by Jerry Wang on 2005-06-28.*

Radiated Emissions Test Result Data @ 3M

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR				FCC 15.209	
Freq	Reading	Angle	Height	Polar	Antenna	Cable	Amp.	Correction Factor	Limit	Margin
MHz	dBμV	Degree	Meter	H/ V	dB	dB	dB	dBμV/m	dBμV/m	dB
325.46	53.0	200	1.2	H	14.1	3.8	27.5	43.41	46	-2.59 QP
339.02	51.2	200	1.2	V	14.2	3.9	27.5	41.78	46	-4.22
555.99	46.0	100	1.2	H	19.1	5.1	28.5	41.70	46	-4.3
325.46	51.3	200	1.2	V	14.1	3.8	27.5	41.67	46	-4.33 QP
189.86	52.5	200	1.2	V	11.5	2.8	27.8	39.0	43.5	-4.5
122.04	50.8	200	1.2	V	14.0	2.4	28.2	39.0	43.5	-4.5
555.99	45.3	180	1.5	H	19.1	5.1	28.5	41.0	46	-5.0 QP
528.87	46.4	200	1.2	H	18.0	5.0	28.5	40.9	46	-5.1
339.03	50.3	180	1.2	H	14.2	3.9	27.5	40.9	46	-5.1
366.14	49.5	200	1.5	V	14.8	4.1	27.8	40.6	46	-5.4
352.58	49.5	300	1.2	V	14.5	4.2	27.7	40.5	46	-5.5
528.88	45.8	200	1.2	H	18.0	5.0	28.5	40.3	46	-5.7
528.86	44.7	45	1.2	V	18.0	5.0	28.5	39.2	46	-6.8
556.00	43.2	30	1.2	V	19.1	5.1	28.5	38.9	46	-7.1
176.28	49.8	180	1.2	V	11.8	2.7	27.9	36.4	43.5	-7.1
135.57	48.2	200	1.2	V	13.8	2.4	28.1	36.3	43.5	-7.2
298.33	48.6	270	1.2	H	13.5	3.7	27.4	38.4	46	-7.6
135.60	47.6	200	1.5	H	13.8	2.4	28.1	35.7	43.5	-7.8
379.70	46.3	200	1.2	V	15.5	4.1	27.9	38.0	46	-8.0
54.24	50.4	180	1.2	V	8.3	1.6	28.5	31.8	40	-8.2
54.23	49.8	180	1.5	H	8.3	1.6	28.5	31.2	40	-8.8
311.90	46.2	180	1.2	V	13.8	3.8	27.5	36.3	46	-9.7
257.65	47.8	200	1.2	V	11.9	3.4	27.4	35.7	46	-10.3
311.89	45.3	300	1.2	H	13.8	3.8	27.5	35.4	46	-10.6
352.57	44.4	200	1.2	H	14.5	4.2	27.7	35.4	46	-10.6
230.53	48.5	200	1.5	H	11.0	3.3	27.6	35.2	46	-10.8
827.18	34.4	200	1.5	H	21.9	6.5	27.7	35.1	46	-10.9
406.84	43.2	30	1.2	V	15.4	4.6	28.1	35.1	46	-10.9
216.96	48.7	180	1.2	V	10.6	3.1	27.6	34.8	46	-11.2
48.00	45.2	200	1.2	V	10.6	1.5	28.6	28.7	40	-11.3
244.09	47.4	180	1.2	H	11.5	3.3	27.5	34.7	46	-11.3
244.08	46.8	180	1.2	V	11.5	3.3	27.5	34.1	46	-11.9
705.15	36.7	20	1.2	V	19.6	6.0	28.3	34.0	46	-12.0
48.00	44.3	180	1.5	H	10.6	1.5	28.6	27.8	40	-12.2
393.26	42.3	45	1.2	V	15.2	4.3	28.1	33.7	46	-12.3
240.00	46.3	180	1.2	H	11.5	3.3	27.5	33.6	46	-12.4
176.30	44.2	200	1.5	H	11.8	2.7	27.9	30.8	43.5	-12.7
149.17	43.6	180	1.2	H	12.7	2.5	28.0	30.8	43.5	-12.7
257.65	45.3	200	1.5	H	11.9	3.4	27.4	33.2	46	-12.8

Radiated Emissions Test Result Data @ 3M (Cont.)

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR				FCC 15.209	
Freq	Reading	Angle	Height	Polar	Antenna	Cable	Amp.	Correction Factor	Limit	Margin
MHz	dBμV	Degree	Meter	H/ V	dB	dB	dB	dBμV/m	dBμV/m	dB
240.00	45.8	200	1.2	V	11.5	3.3	27.5	33.1	46	-12.9
515.32	36.4	180	1.2	H	18.1	5.0	28.5	31.0	46	-15.0
216.98	43.2	180	1.5	H	10.6	3.1	27.6	29.3	46	-16.7
13.76	40.3	200	1.5	H	15.8	0.3	27.3	29.1	60.5	-31.4
13.75	39.7	180	1.2	V	15.8	0.3	27.3	28.5	60.5	-32.0
13.57	39.6	180	1.5	H	15.8	0.3	27.3	28.4	70.5	-42.1
13.57	38.4	200	1.2	V	15.8	0.3	27.3	27.2	70.5	-43.3
13.56	68.4	30	1.5	V	15.8	0.3	27.3	57.2	104	-46.8 Fund
13.56	66.8	0	1.2	H	15.8	0.3	27.3	55.6	104	-48.4 Fund

§ 15.207 – CONDUCTED EMISSIONS TEST

No testing due to the battery operation.

§ 15.203 – ANTENNA REQUIEMENT

Standard Applicable

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction

This device has an integral antenna; it is a permanently attached antenna.

§ 15.225(e) - FREQUENCY STABILITY MEASUREMENT

Standard Applicable

According to FCC §15.225(e), the frequency tolerance of the carrier signal shall be maintained within ± 0.01% of the operating frequency over a temperature variation of –20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency stability versus environmental temperature

The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

Frequency Stability versus Input Voltage

At room temperature (25±5°C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial No.	Calibration Date
Tenny	Oven, Temperature	Versa Tenna	12.222-193	2005-06-24
Metric	AC Power Source	1001A	N/A	N/A

*** Statement of Traceability: BACL Corp**. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1021 mbar

Testing was performed by Jerry Wang on 2005-06-28.

Test Results

Reference Frequency: 13.5600 MHz			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (MHz)	PPM Error
50	3	13.5603	22.1
40	3	13.5607	51.6
30	3	13.5607	51.6
20	3	13.5604	29.4
10	3	13.5608	58.9
0	3	13.5605	36.8
-10	3	13.5607	51.6
-20	3	13.5606	42.2

Frequency Stability Versus Input Voltage

Reference Frequency: 13.5600 MHz						
Power Supplied (VDC)	Frequency Measure with Time Elapsed					
	2 Minutes		5 Minutes		10 Minutes	
	MHz	PPM	MHz	PPM	MHz	PPM
3	13.5604	29.4	13.5604	29.5	13.5605	36.8
2.7	13.5605	36.8	13.5606	42.2	13.5606	42.2

Conclusion: The EUT complied with the applicable Frequency Stability Limits (100PPM).