

**COMPLIANCE WORLDWIDE INC  
TEST REPORT 152-06**

**In Accordance with the Requirements of**

**Industry Canada RSS 210, Issue 6, Annex 1  
Federal Communications Commission CFR Title 47 Part 15.209, Subpart C**

issued to

**TYCO Software House  
70 Westview Street  
Lexington, MA 02421 USA  
(781) 768 0205**


for

**RM2L-PI26  
Proximity Card Reader with Keypad and LCD Display**

**FCC ID: SZC-PI26  
IC: 5690A-PI26**

on

**March 31, 2006**

  
\_\_\_\_\_  
Brian F. Breault

Reviewed by

  
\_\_\_\_\_  
Larry K. Stillings

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## 1. Test Description

### 1.1 Test Objective

To test the RM2L- PH to **FCC 15.209** and **RSS 210** requirements and detail the results in a test report.

### 1.2 E.U.T. Description

**General:** The RM2L- PH is an access control user interface that includes a keypad, LCD display and RF proximity card reader.

**Serial Number:** Pre-production unit

## 2. Test Results and Conclusions

### 2.1 Product Tested – Proximity Card Reader with keypad and LCD

### 2.2 Model Number - RM2L-PI26

### 2.3 Radiated Emissions Test Results

The test results conclude that the emissions radiated from this equipment are in compliance with the FCC 15.209 and RSS 210 Annex 1 Rules.

### 2.4 Conducted Emissions Test Results

The test results show that the emissions conducted through the power line from this equipment are in compliance with the FCC 15.209 and RSS 210 Annex 1 Rules.

### 2.5 Analysis and Conclusions

Based upon the radiated and conducted measurements we find that this equipment is within the limits of the FCC 15.209 and RSS 210 Annex 1 Rules. All results are based on a test of one sample, and represent other production units; only in as much as a sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

### 2.6 Notes (Special conditions unique to this test)

None

### 3. Test Equipment and Test Procedures

#### 3.1 Measurement Equipment

Device	Manufacturer	Model	Serial #	Cal. Due
EMI Receiver	Hewlett Packard	8546A	3650A00360	1/5/2007
Loop Antenna	EMCO	6502	2197	3/16/2008
Biconilog Antenna	Com-Power	AC220	25509	7/11/2006
LISN	EMCO	EM 3825/2	9109-1860	12/15/2006

All equipment used for testing has been calibrated according to the methods and procedures defined by the National Institute of Standards and Technology (NIST).

#### 3.2 Frequency Range to Be Scanned.

- A. Radiated emissions Test from 100 kHz to 30 MHz.
- B. Conducted emissions Test from 150 kHz to 30 MHz.

#### 3.3 Radiated Emissions Test Procedures.

The EUT, associated cables and peripheral devices are placed on an 80 cm high table. Any support equipment is configured remotely. The EUT is powered on and given a sufficient amount of time to achieve thermal stability. Any necessary operating or test software is installed. The EUT is first pre-scanned in a semi-anechoic chamber where it is rotated 360 degrees and examined in both horizontal and vertical antenna polarities. All emissions within the required frequency bands are identified and recorded. The EUT is then relocated to the open area test site. The required frequency bands are again investigated and all frequencies identified in the chamber are revisited. For each emission, the turntable is rotated 360 degrees to determine the position at which the emission maximizes. At the maximized turntable position, the antenna height is varied from 1 to 4 meters to determine the antenna position at which the maximum level occurs. In this manner, both vertical and horizontal antenna polarities are measured and recorded. When necessary, the EUT cables are repositioned to determine if they have an effect on the level of the emission.

#### 3.4 Conducted Emissions Test Procedure:

The power line of the EUT is connected to a Line Impedance Stabilization Network (LISN). Emissions conducted onto the power line by the EUT are measured in the frequency range from 150 kHz to 30 MHz. Both phase (L1) and neutral (L2) are investigated and the maximum readings are recorded.

All measurements are made according to the procedures defined in: "ANSI C63.4-2003 Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz, American National Standard for (ISBN 1-55937-215-5).

## 4. FCC 15.209 & IC RSS 210 Annex 1 TEST LIMITS

### 4.1 Class C Radiated Emissions Limits:

Frequency MHz	Distance meters	Limit dB $\mu$ V/m	Limit $\mu$ V/m
0.009 – 0.490	300	20 Log (2400/F)	2400/F (kHz) Avg
0.490 – 1.705	30	20 Log (24000/F)	24000/F (kHz)
1.705 - 30	30	29.5	30
30 – 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
960 and above	3	54.0	500

### 4.2. FCC Part 15 Conducted Emissions Limits (Quasi-Peak)

Frequency MHz	Quasi-Peak Limit dB $\mu$ V	Average Limit dB $\mu$ V
0.150 - 0.500	66 to 56	56 to 46
0.500 - 5.0	56	46
5.0 - 30.0	60	50

## 5. Test Facility Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023), and VCCI (member number 2147, registration numbers C-1987 and R-1856).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.

## 6. Product Identification

Product Tested: Proximity Card Reader with Keypad and LCD Display  
 Model Number: RM2L-PI26  
 Serial Number: Pre-production unit  
 Input power: Supplied by the Access Controller (C Cure apC/8X)  
 Application Software: C-Cure System Generator  
 C-Cure System Monitor  
 Additional Notes: A motorized unit with two cards attached was used to force the RM2L-PI26 to make continuous reads.

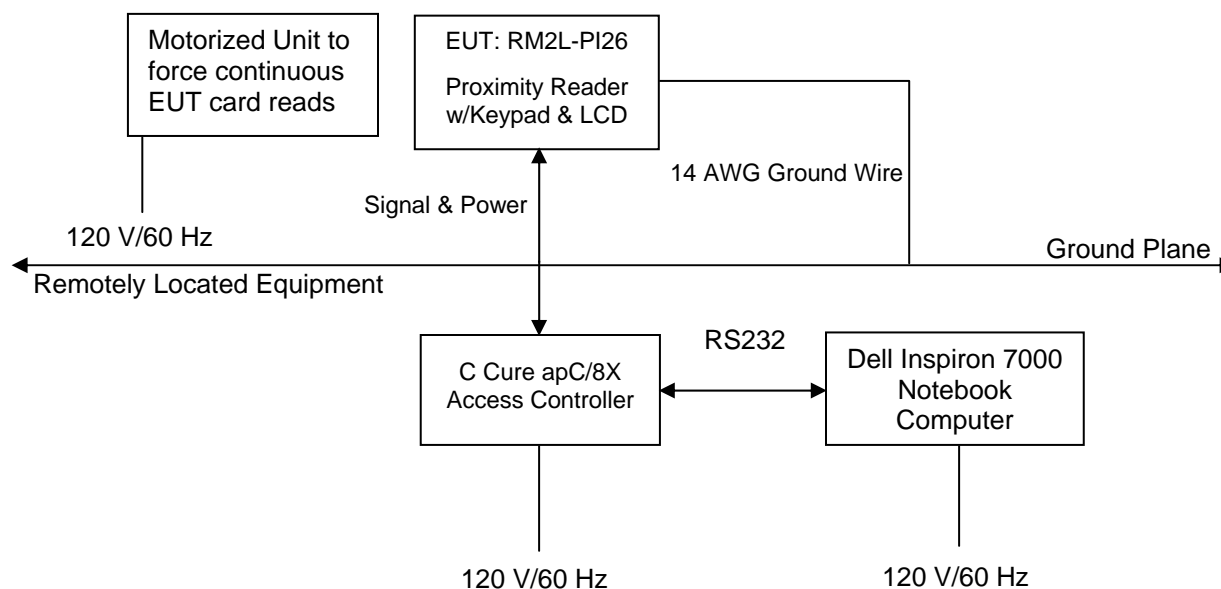
### Support Equipment:

Description	Manufacturer	Model	Serial No.
Access Controller	Tyco Software House	C Cure apC/8X	N/A
Notebook Computer	Dell	Inspiron 7000	N/A

### Cables:

Cable	From	To	Length	Shielded
14 AWG Ground Wire	EUT	Ground Plane	1 Meter	No
Signal and Power	EUT	C Cure apC/8X	5 Meters	Yes
RS232	C Cure apC/8X	Notebook Computer	1 Meter	Yes

### Block Diagram:



## 7. Test Measurements and Results

### 7.1 Radiated Emissions Test Results

Frequency Range: .009 - 1000 MHz.  
Measurement Distance: 1.0 Meter.  
Bandwidth: ANSI C63.4-2003.\* Requirement for Selected Range  
Detector Functions: Peak  
Video Filter: Auto for Selected Range  
Table Height: 0.8 meters  
Antenna Height Variation: 1 Meter.

#### 7.1.1 Worst Case Radiated Data and Transmitter Output Power

Freq. (MHz)	Azimuth (Degrees)	Antenna Height (Meters)	Polarity (H/V)	Distance (Meters)	Peak Amplitude (dBμV/m)	QP Amplitude (dBμV/m)	Limit (dBμV)	Margin (dB)
.12498 <sup>1</sup>	10	1.0	V	1	102.88	N/M	124.7 <sup>2</sup>	-21.9
.24968	10	1.0	V	1	60.16	N/M	118.7 <sup>2</sup>	-58.6
.37439	10	1.0	V	1	60.32	N/M	115.2 <sup>2</sup>	-54.9
.49924	10	1.0	V	1	52.64	N/M	92.7 <sup>2</sup>	-40.1
.62806	10	1.0	V	1	54.12	N/M	90.7 <sup>2</sup>	-36.6
.75135	10	1.0	V	1	56.76	N/M	89.2 <sup>2</sup>	-32.4
.87635	10	1.0	V	1	54.90	N/M	87.8 <sup>2</sup>	-32.9
1.00018	10	1.0	V	1	51.93	N/M	86.7 <sup>2</sup>	-34.8
1.11647	10	1.0	V	1	54.75	N/M	85.7 <sup>2</sup>	-40.0
1.24654	10	1.0	V	1	53.24	N/M	84.8 <sup>2</sup>	-31.5

<sup>1</sup>Fundamental Transmitter output.

<sup>2</sup>Limit is extrapolated at 40 dB per decade.

### 7.2 Conducted Emissions Test Results

Frequency Range: 150 kHz to 30.0 MHz.  
Bandwidth: 9 kHz per ANSI C63.4-2003.  
Detector Functions: Peak, Quasi-Peak, Average  
Table Height: 0.8 meters  
Video Bandwidth: 30 kHz.

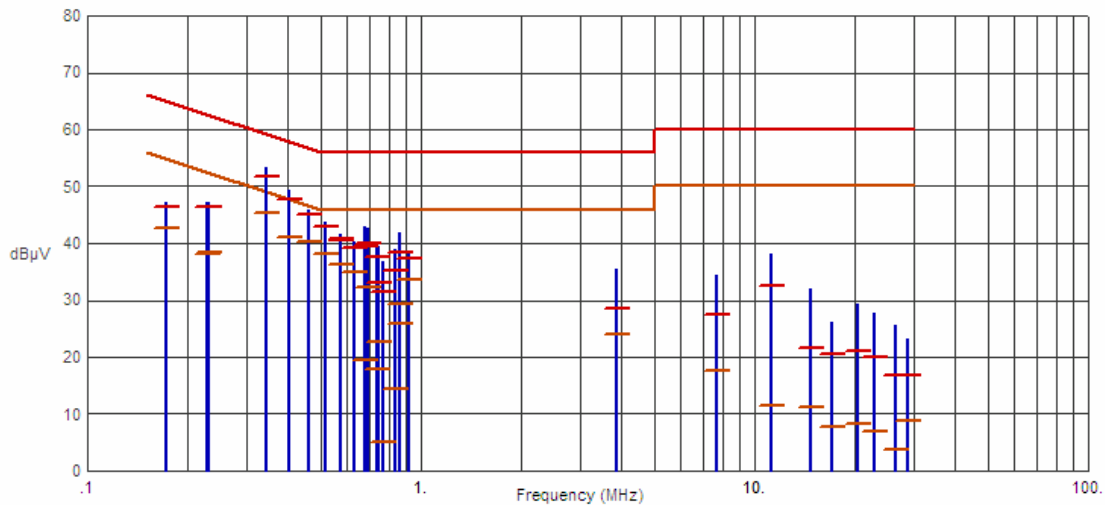
Phase and Neutral (L1 & L2) Measurements Taken.

Please see the following pages for conducted emissions test data.

### 7.2.1 120 Volts, 60 Hz Phase

Test No.: 152-06, 120 Volts, 60 Hz Phase

EN55022, Class B



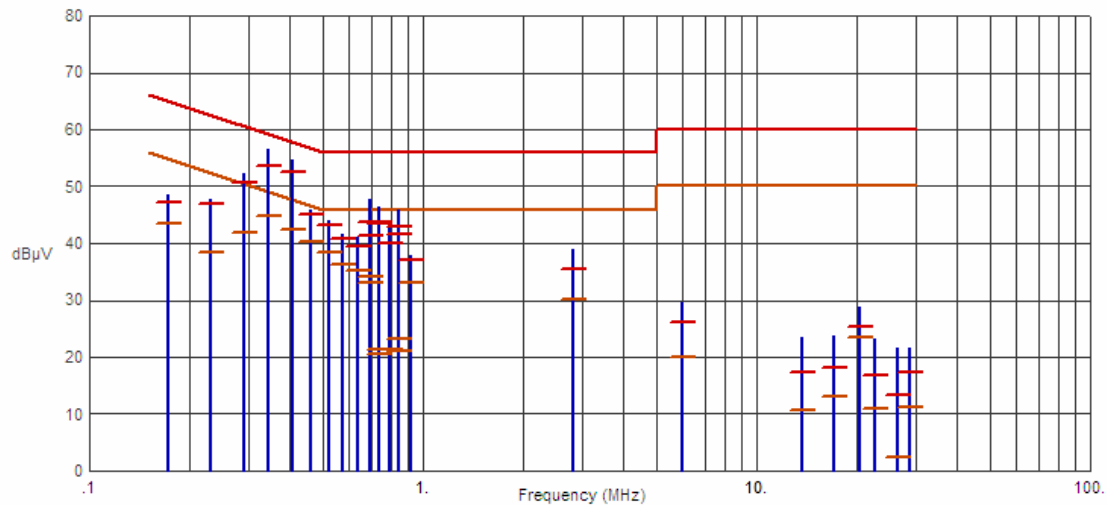
Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1722	47.25	46.53	64.85	-18.32	42.60	54.85	-12.25	
.2292	47.31	46.46	62.48	-16.02	38.26	52.48	-14.22	
.2302	47.24	46.50	62.44	-15.94	38.30	52.44	-14.14	
.3448	53.25	51.74	59.09	-7.35	45.35	49.09	-3.74	
.4028	49.37	47.71	57.80	-10.09	41.09	47.80	-6.71	
.4602	45.79	45.14	56.69	-11.55	40.18	46.69	-6.51	
.5184	43.78	42.95	56.00	-13.05	38.22	46.00	-7.78	
.5755	41.39	40.67	56.00	-15.33	36.24	46.00	-9.76	
.5760	41.57	40.59	56.00	-15.41	36.17	46.00	-9.83	
.6338	40.17	39.27	56.00	-16.73	34.90	46.00	-11.10	
.6787	42.90	39.49	56.00	-16.51	19.44	46.00	-26.56	
.6930	42.72	39.97	56.00	-16.03	32.30	46.00	-13.70	
.7353	40.18	37.70	56.00	-18.30	17.92	46.00	-28.08	
.7488	39.38	33.13	56.00	-22.87	22.74	46.00	-23.26	
.7714	36.92	31.59	56.00	-24.41	4.94	46.00	-41.06	
.8401	38.95	35.15	56.00	-20.85	14.39	46.00	-31.61	
.8610	41.27	38.30	56.00	-17.70	25.78	46.00	-20.22	
.8636	41.78	38.49	56.00	-17.51	29.25	46.00	-16.75	
.9228	38.39	37.46	56.00	-18.54	33.73	46.00	-12.27	
3.8661	35.36	28.50	56.00	-27.50	24.02	46.00	-21.98	
7.7348	34.43	27.49	60.00	-32.51	17.68	50.00	-32.32	
11.1867	38.14	32.46	60.00	-27.54	11.36	50.00	-38.64	
14.7079	32.12	21.66	60.00	-38.34	11.26	50.00	-38.74	
17.0528	26.24	20.54	60.00	-39.46	7.79	50.00	-42.21	
20.3820	29.32	21.07	60.00	-38.93	8.28	50.00	-41.72	
22.9491	27.69	19.93	60.00	-40.07	7.00	50.00	-43.00	
26.3896	25.47	16.83	60.00	-43.17	3.79	50.00	-46.21	
28.8426	23.32	16.86	60.00	-43.14	8.75	50.00	-41.25	



## 7.2.2 120 Volts, 60 Hz Neutral

Test No.: 152-06, 120 Volts, 60 Hz Neutral

EN55022, Class B



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1732	48.60	47.21	64.81	-17.60	43.34	54.81	-11.47	
.2311	47.79	46.95	62.41	-15.46	38.53	52.41	-13.88	
.2317	47.62	46.84	62.39	-15.55	38.41	52.39	-13.98	
.2898	52.27	50.74	60.53	-9.79	41.77	50.53	-8.76	
.3455	56.51	53.57	59.07	-5.50	44.82	49.07	-4.25	
.4057	54.55	52.46	57.74	-5.28	42.31	47.74	-5.43	
.4624	45.74	45.18	56.65	-11.47	40.16	46.65	-6.49	
.5199	44.01	43.15	56.00	-12.85	38.48	46.00	-7.52	
.5768	41.64	40.74	56.00	-15.26	36.31	46.00	-9.69	
.6344	41.13	39.43	56.00	-16.57	35.13	46.00	-10.87	
.6925	47.14	43.78	56.00	-12.22	34.16	46.00	-11.84	
.6945	47.70	41.34	56.00	-14.66	33.02	46.00	-12.98	
.7372	46.39	43.55	56.00	-12.45	20.50	46.00	-25.50	
.7373	46.39	43.78	56.00	-12.22	21.41	46.00	-24.59	
.7911	43.32	39.98	56.00	-16.02	21.24	46.00	-24.76	
.8433	45.64	41.71	56.00	-14.29	21.09	46.00	-24.91	
.8491	45.88	42.94	56.00	-13.06	23.17	46.00	-22.83	
.8498	45.84	42.89	56.00	-13.11	23.16	46.00	-22.84	
.9238	37.96	36.97	56.00	-19.03	33.01	46.00	-12.99	
.9244	37.92	37.07	56.00	-18.93	33.19	46.00	-12.81	
2.8310	38.85	35.37	56.00	-20.63	30.23	46.00	-15.77	
6.0005	29.57	26.14	60.00	-33.86	20.12	50.00	-29.88	
13.6973	23.54	17.45	60.00	-42.55	10.68	50.00	-39.32	
16.9956	23.62	18.26	60.00	-41.74	13.14	50.00	-36.86	
20.2765	28.84	25.25	60.00	-34.75	23.52	50.00	-26.48	
22.6613	23.28	16.74	60.00	-43.26	11.06	50.00	-38.94	
26.3377	21.60	13.44	60.00	-46.56	2.46	50.00	-47.54	
28.9128	21.57	17.40	60.00	-42.60	11.33	50.00	-38.67	

## 8. Photographs

### 8.1 Radiated Emissions Test Setup.





## 8.2 Conducted Emissions Test Setup.

