

# FCC PART 15 CLASS B

## EMI MEASUREMENT AND TEST REPORT

For

**Compass Systems, Inc.**

#1403 Ace Techno Tower 8, 219-17, Kuro-Dong, Kuro-Gu, Seoul, Korea

**FCC ID: TQ5SpeedPRO**

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| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report  | <b>Equipment Type:</b><br>Universal Programmer |
| <b>Test Engineer:</b> Jerry Wang <i>Jerry</i>  |  |
| <b>Report Number:</b> R0601061   |  |
| <b>Report Date:</b> 2006-01-26   |  |
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## GENERAL INFORMATION

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### Product Description for Equipment Under Test (EUT)

The *Compass Systems, Inc.* product, FCC ID: *TQ5SpeedPRO*, model number: *Speed PRO*, or the "EUT" as referred to this report, is a Universal Programmer, which measures approximately 230mmW x180mmL x 32mmH.

\* *The test data gathered are from production sample, serial number: SP\_E0033, provided by the manufacturer.*

### Objective

This Class B report is prepared on behalf of *Compass Systems, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with U.S.A. FCC Class B and Canada ICES-003 issue 4 limits for conducted and radiated margin requirements for Information Technology Equipment.

### 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 94085, USA with registration number: 90464.

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 have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations. 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 is attached hereinafter and can also be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

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### Justification

The EUT was tested in accordance with ANSI C63.4-2003.

### EUT Exercise Software

The EUT exercising software program was designed to exercise the various installed components in accordance with ANSI C63.4-2003.

### Special Accessories

The unit was tested with the normally supplied cabling and accessories provided by the supporting equipment and no special accessories were used.

### Schematics / Block Diagram

Exhibit D contains a copy of the EUT's schematics diagram as reference.

### Equipment Modifications

No modifications were made to the EUT.

### Local Support Equipment List and Details

| Manufacturer | Description | Model    | Serial Number | FCC ID |
|--------------|-------------|----------|---------------|--------|
| Compaq       | Notebook    | CAS-0389 | CS293823      | DOC    |

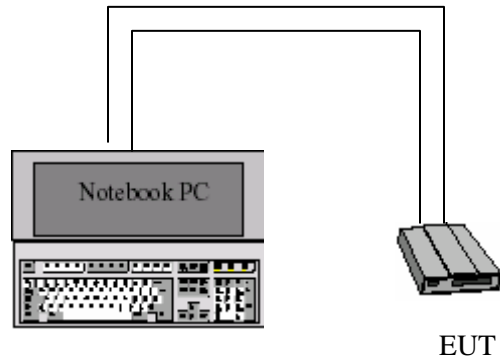
### Printed Circuit Boards in EUT

| Manufacturer/Description | Rev. | # of Layers | Crystals (MHz) |
|--------------------------|------|-------------|----------------|
| Compass System           | 1.1  | 4           | 24             |

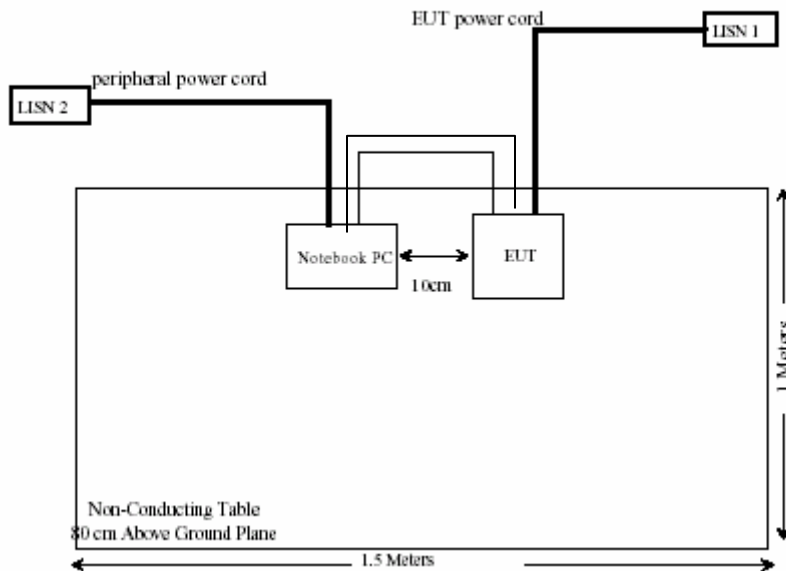
### Interface Ports and Cabling

| Cable Description     | Length (M) | From          | To       |
|-----------------------|------------|---------------|----------|
| USB Cable Line        | 1.5        | USB Port/EUT  | Notebook |
| Unshielded RJ45 Cable | 1.5        | RJ45 Port/EUT | Notebook |

### Configuration of Test System



### Test Setup Block Diagram



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**SUMMARY OF TEST REPORT**

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| RULE          | DESCRIPTION             | RESULTS     |
|---------------|-------------------------|-------------|
| 15.107        | Conducted Emissions     | Compliant   |
| 15.109        | Radiated Emissions      | Compliant * |
| 15.19         | Labelling Requirements  | Compliant   |
| 15.21, 15.105 | Information to the User | Compliant   |
| 15.27         | Special Accessories     | Compliant   |

\* Test data was within the measurement of uncertainty.

## §15.107 - CONDUCTED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is  $\pm 2.4$  dB.

### EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The adapter was connected to 120Vac/60Hz power source.

### Receiver Setup

The receiver was set to investigate the frequency from 150 kHz to 30MHz.

### Test Equipment List and Details

| Manufacturer    | Description                     | Model                    | Serial Number | Cal. Date  |
|-----------------|---------------------------------|--------------------------|---------------|------------|
| Rohde & Schwarz | Artificial-Mains Network        | ESH2-Z5                  | 871884/039    | 2005-8-15  |
| Fluke           | Calibrated Voltmeter            | 189                      | 18485-38      | 2004-7-18  |
| Rohde & Schwarz | Receiver, EMI Test              | ESCI<br>1166.5950K0<br>3 | 100044        | 2005-09-29 |
| Schaffner       | Network,<br>Coupling/Decoupling | CDN T200                 | 16891         | N/R        |
| Schaffner       | Network Coupling                | CDN-T400                 | 16913         | N/R        |

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



## Test Procedure

During the conducted emission test, the EUT was connected to the mains outlet of the LISN-1. Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are distinguished with an "Ave".

## Test Results Summary

According to the recorded data, the EUT complied with the FCC Conducted limits for a Class B device, with the worst margin reading of:

**-4.60 dB at 0.18 MHz on the Neutral conductor mode.**

## Conducted Emissions Test Data

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 17 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 1021mbar |

*\*Testing was performed by Jerry Wang on 2006-1-24.*

| Frequency<br>MHz | LINE CONDUCTED EMISSIONS |                         |                       | FCC15 CLASS B       |              |
|------------------|--------------------------|-------------------------|-----------------------|---------------------|--------------|
|                  | Amplitude<br>dB $\mu$ V  | Detector<br>Qp/Ave/Peak | Phase<br>Line/Neutral | Limit<br>dB $\mu$ V | Margin<br>dB |
| 0.18             | 49.9                     | Ave                     | Neutral               | 54.49               | -4.6         |
| 0.19             | 42.3                     | Ave                     | Neutral               | 54.26               | -12.0        |
| 0.18             | 42.4                     | Ave                     | Neutral               | 54.72               | -12.3        |
| 0.18             | 40.2                     | Ave                     | Line                  | 54.49               | -14.3        |
| 0.18             | 50.07                    | QP                      | Line                  | 64.49               | -14.4        |
| 0.18             | 50.13                    | QP                      | Neutral               | 64.49               | -14.4        |
| 0.19             | 44.96                    | QP                      | Neutral               | 64.26               | -19.3        |
| 0.18             | 43.50                    | QP                      | Line                  | 64.30               | -20.8        |
| 0.18             | 43.58                    | QP                      | Neutral               | 64.72               | -21.1        |
| 0.18             | 42.70                    | QP                      | Line                  | 64.67               | -22.0        |
| 0.18             | 29.8                     | Ave                     | Line                  | 54.67               | -24.9        |
| 0.18             | 27.5                     | Ave                     | Line                  | 54.30               | -26.8        |

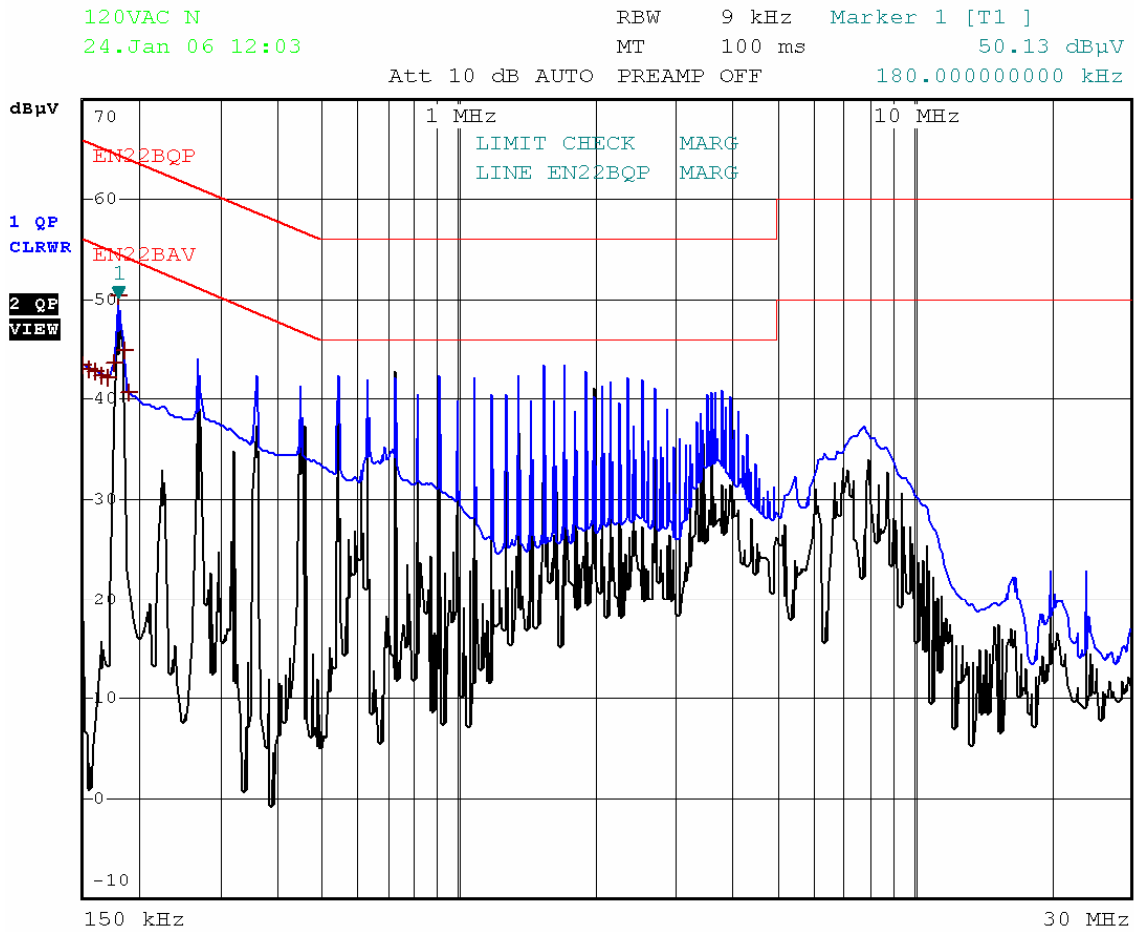
## Plots of Conducted Emission

The plots of conducted emission are presented hereinafter as reference.



CDMA UPLINK

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CDMA UPLINK

Date: 24.JAN.2006 12:03:19

## §15.109 - RADIATED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, 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 EMI Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is  $\pm 4.0$  dB.

### EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2003. The specification used was the FCC15B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The adapter was connected to 120Vac/60Hz power source.

### Receiver Setup

The system was tested to 1000 MHz.

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

| <i><u>Frequency Range</u></i> | <i><u>RBW</u></i> | <i><u>Video B/W</u></i> |
|-------------------------------|-------------------|-------------------------|
| Below 30MHz                   | 10kHz             | 10kHz                   |
| 30 – 1000MHz                  | 100kHz            | 100kHz                  |
| Above 1000MHz                 | 1MHz              | 1MHz                    |

## Test Equipment List and Details

| Manufacturer    | Description               | Model                | Serial Number | Cal Date   |
|-----------------|---------------------------|----------------------|---------------|------------|
| Sunol Sciences  | System Controller         | SC99V                | 122303-1      | N/R        |
| Agilent         | Amplifier, Pre            | 8447D                | 2944A10187    | 2005-8-20  |
| Rohde & Schwarz | Receiver, EMI Test        | ESCI<br>1166.5950K03 | 100044        | 2005-09-29 |
| EMCO            | Antenna, Log-<br>Periodic | 3146                 | 2101          | 2005-8-11  |
| EMCO            | Antenna, Biconical        | 3110B                | 9309-1165     | 2005-1-10  |

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

## Test Procedure

For the radiated emissions test, the EUT all support equipment were connected to the AC floor outlet. Maximizing procedure was performed on the six (6) highest emissions in the described configurations. 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 limits), and are distinguished with a "Qp" in the data table.

## 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 means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

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

## Summary of Test Results

According to the following table, the EUT complied with the FCC Class B standards and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, and had the worst margin of:

**-3.8\* dB (QP) at 912.00 MHz** in the **Horizontal** polarization, 30 to 1000 MHz  
 (\*Within the measurement uncertainty)

**Radiated Emissions Test Data, Measure at 10 Meter, and convert to 3 Meter****Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 14 °C    |
| Relative Humidity: | 37%      |
| ATM Pressure:      | 1020mbar |

*\*Testing was performed by Jerry Wang on 2006-1-21.*

| Frequency | Reading | Direction | Height | Polar | Antenna Loss | Cable loss | Amplifier | Distance Factor | Correction Factor | 15B   | 15B     |
|-----------|---------|-----------|--------|-------|--------------|------------|-----------|-----------------|-------------------|-------|---------|
| MHz       | dBuV/m  | Degree    | Meter  | H / V | dB           | dB         | dB        | dB              | dBuV/m            | Limit | Margin  |
| 240.00    | 47.1    | 300       | 3.0    | V10   | 11.5         | 1.14       | 27.5      | 10.0            | 42.2              | 46.0  | -3.8QP* |
| 48.00     | 43.1    | 30        | 1.2    | V10   | 10.6         | 0.55       | 28.6      | 10.0            | 35.7              | 40.0  | -4.4QP  |
| 336.00    | 43.1    | 200       | 3.0    | H10   | 14.2         | 1.33       | 27.5      | 10.0            | 41.1              | 46.0  | -4.9QP  |
| 912.00    | 33.4    | 120       | 1.2    | H10   | 22.4         | 2.48       | 27.3      | 10.0            | 41.0              | 46.0  | -5.0QP  |
| 240.00    | 45.5    | 200       | 1.2    | H10   | 11.5         | 1.14       | 27.5      | 10.0            | 40.6              | 46.0  | -5.4QP  |
| 528.00    | 38.7    | 270       | 3.0    | V10   | 18.0         | 1.65       | 28.5      | 10.0            | 39.9              | 46.0  | -6.2QP  |
| 48.00     | 40.6    | 0         | 1.2    | H10   | 10.6         | 0.55       | 28.6      | 10.0            | 33.2              | 40.0  | -6.9    |
| 266.66    | 42.3    | 180       | 3.0    | H10   | 13.0         | 1.15       | 27.4      | 10.0            | 39.1              | 46.0  | -7.0    |
| 595.00    | 36.2    | 200       | 3.0    | H10   | 19.4         | 1.87       | 28.6      | 10.0            | 38.9              | 46.0  | -7.1QP  |
| 333.33    | 40.7    | 300       | 3.0    | H10   | 14.2         | 1.33       | 27.5      | 10.0            | 38.7              | 46.0  | -7.3    |
| 912.00    | 30.8    | 270       | 2.5    | V10   | 22.4         | 2.48       | 27.3      | 10.0            | 38.4              | 46.0  | -7.6QP  |
| 263.67    | 42.3    | 180       | 1.2    | V10   | 12.3         | 1.19       | 27.4      | 10.0            | 38.4              | 46.0  | -7.6    |
| 624.00    | 35.8    | 180       | 1.2    | V10   | 19.0         | 1.90       | 28.4      | 10.0            | 38.3              | 46.0  | -7.7    |
| 288.00    | 40.9    | 270       | 3.0    | V10   | 13.6         | 1.21       | 27.4      | 10.0            | 38.3              | 46.0  | -7.7    |
| 595.00    | 35.4    | 180       | 1.2    | V10   | 19.4         | 1.87       | 28.6      | 10.0            | 38.1              | 46.0  | -7.9    |
| 288.00    | 40.6    | 200       | 3.0    | H10   | 13.6         | 1.21       | 27.4      | 10.0            | 38.0              | 46.0  | -8.0    |
| 144.00    | 39.2    | 30        | 1.2    | V10   | 13.3         | 0.88       | 28.1      | 10.0            | 35.3              | 43.5  | -8.2    |
| 333.33    | 39.8    | 300       | 1.2    | V10   | 14.2         | 1.33       | 27.5      | 10.0            | 37.8              | 46.0  | -8.2    |
| 624.00    | 35.8    | 300       | 3.0    | H10   | 19.0         | 1.30       | 28.4      | 10.0            | 37.7              | 46.0  | -8.3    |
| 336.00    | 38.9    | 200       | 3.0    | V10   | 14.2         | 1.33       | 27.5      | 10.0            | 36.9              | 46.0  | -9.1    |
| 432.00    | 36.2    | 180       | 1.2    | H10   | 16.5         | 1.30       | 28.2      | 10.0            | 35.8              | 46.0  | -10.2   |
| 432.00    | 35.9    | 120       | 3.0    | V10   | 16.5         | 1.52       | 28.2      | 10.0            | 35.7              | 46.0  | -10.3   |
| 144.00    | 36.8    | 180       | 3.0    | H10   | 13.3         | 0.88       | 28.1      | 10.0            | 32.9              | 43.5  | -10.6   |
| 528.00    | 33.2    | 300       | 1.2    | H10   | 18.0         | 1.65       | 28.5      | 10.0            | 34.4              | 46.0  | -11.7   |
| 192.00    | 36.2    | 180       | 3.0    | H10   | 11.5         | 1.00       | 27.7      | 10.0            | 31.0              | 43.5  | -12.5   |
| 192.00    | 34.7    | 300       | 3.0    | V10   | 11.5         | 1.00       | 27.7      | 10.0            | 29.5              | 43.5  | -14.0   |

*\*Within the measurement uncertainty*