

**Nemko Test Report:** 138966-23TRFWL

**Applicant:** DAP Technologies  
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**Apparatus:** Encompass 1d Handheld Reader

**FCC ID:** T5M5000B7

**In Accordance With:** FCC Part 22 Subpart H  
Cellular Radiotelephone Service and  
FCC Part 24 Personal Communications Services  
Subpart E Broadband PCS –  
Fundamental and spurious emissions

**Authorized By:** Andrey Adelberg, Senior Wireless/EMC Specialist

**Date:** December 16, 2009

**Total Number of Pages:** 16

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## Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Parts 22 and 24. Conducted measurements were performed in accordance with ANSI TIA-603-B-2002. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

<b>Apparatus Assessed:</b>	Encompass 1d Handheld Reader
<b>Specification:</b>	FCC Part 22 Subpart H FCC Part 24 Subpart E Fundamental and spurious emissions
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None
<b>Report Release History:</b>	Original Release
<b>Test Location:</b>	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
<b>Registration Number:</b>	176392 (3 m Semi-Anechoic Chamber)
<b>Tests Performed By:</b>	Kevin Ma, EMC/Wireless Specialist
<b>Test Dates:</b>	December 2009

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 2 : Equipment Under Test

### 2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	Handheld reader CE 5000B with RFID
Brand Name:	DAP
Model Number:	5000B7
FCC ID:	T5M5000B7
Date of Receipt:	November 25, 2009

### 2.2 Accessories

No accessories were used during this assessment.

### 2.3 EUT Description

The EUT is a handheld reader with internal RFID and GPRS connectivity. The RFID End Cap Reader was equipped with 2D imager.

## 2.4 Technical Specifications of the EUT

<b>Operating Band:</b>	824–849 MHz (Part 22) 1850–1910 MHz (Part 24)
<b>Operating Frequencies:</b>	824.2–848.8 MHz 1850.2–1909.8 MHz
<b>Modulation:</b>	GMSK, 8-PSK
<b>Antenna Data:</b>	Flexible mylar antenna 2.0 dBi max.
<b>Power Supply Requirements:</b>	120 VAC, 60 Hz / 7.4 VDC (Battery powered)

## 2.5 EUT Setup diagram



## 2.6 Operation of the EUT during testing

The EUT was operated using test software that would cause the EUT to transmit continuously.

## 2.7 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

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## **Section 3 : Test Conditions**

### **3.1 Specifications**

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures  
FCC Part 22 Subpart H Cellular Radiotelephone Service  
FCC Part 24 Subpart E, Broadband PCS

### **3.2 Deviations From Laboratory Test Procedures**

No deviations were made from laboratory test procedures.

### **3.3 Test Environment**

All tests were performed under the following environmental conditions:

Temperature range	:	15–30 °C
Humidity range	:	20–75 %
Pressure range	:	86–106 kPa
Power supply range	:	±5 % of rated voltages

### **3.4 Measurement Uncertainty**

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

### 3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	May 06/09	May 06/10
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 16/08	Dec. 16/09
Bilog	Sunol	JB3	FA002108	Jan. 27/09	Jan. 27/10
Horn Antenna #2	EMCO	3115	FA000825	Jan. 21/09	Jan. 21/10
1 – 18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 7/09	Oct 7/10
Spectrum Analyzer	Rohde & Schwarz	FSU46	FA001877	Sep 29/09	Sep 29/10
Horn 18 – 26.5 GHz	Electro-Metrics	SH-50/60-1	FA000479	COU	COU
18.0 – 26.0 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU	COU
Highpass Filter	Trilithic Inc.	6HC1000/10000	FA002232	COU	COU
Highpass Filter	Trilithic Inc.	6HC3000/18000	FA002231	COU	COU
Notch Filter	Microwave Circuits	2400-2483MHz	FA001940	COU	COU
Notch Filter	Microwave Circuits	902-928MHz	FA002096	COU	COU

COU – Calibrate on Use

NCR – No Calibration Required

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## Section 4 : Results Summary

This section contains the following:

FCC Part 22 Subpart H : Test Results

FCC Part 24 Subpart E : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

### 4.1 FCC Part 22 Subpart H : Test Results

Clause	Test Method	Test Description	Required	Result
22.913(a)	2.1046	Effective Radiated Power Limits	Y	PASS
22.917(a)	2.1053	Field strength of spurious radiation	Y	PASS

### 4.2 FCC Part 24 Subpart E : Test Results

Clause	Test Method	Test Description	Required	Result
24.232(c)	2.1046	EIRP Limits	Y	PASS
24.238(a)	2.1053	Field strength of spurious radiation	Y	PASS

Note: Only partial tests were performed based on the original modular approval certification. The EUT has a custom antenna path and layout therefore fundamental and spurious emissions tests were performed.



## Appendix A : Test Results

### Clause 22.913(a) Effective Radiated Power Limits

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**Test Results:** Pass

### Additional Observations:

The EUT was modified to perform the conducted measurements.

Fresh batteries were used throughout all tests.

The test was performed using a spectrum analyzer with peak detector set to 300 kHz/1 MHz RBW/VBW.

Only the worst case is presented in the report.

### GMSK modulation:

Channel	Frequency MHz	Output power dBm	Antenna gain dBd	ERP dBm	Limit dBm	Margin dB
128	824.2	30.48	-0.15	30.33	38.45	8.12
190	836.6	30.57	-0.15	30.42	38.45	8.03
251	848.8	30.63	-0.15	30.48	38.45	7.97

### 8-PSK modulation:

Channel	Frequency MHz	Output power dBm	Antenna gain dBd	ERP dBm	Limit dBm	Margin dB
128	824.2	26.46	-0.15	26.31	38.45	12.14
190	836.6	26.24	-0.15	26.09	38.45	12.36
251	848.8	26.45	-0.15	26.30	38.45	12.15

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**Clause 22.917(a) Field Strength of spurious radiation**

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

**Test Results:** Pass

**Additional Observations:**

The spectrum was searched from 30 MHz to 10<sup>th</sup> harmonic of the highest fundamental frequency.

The EUT was tested radiated at the distance of 3 m.

The test was performed using a spectrum analyzer with peak detector set to 1 MHz/3 MHz RBW/VBW.

The EUT was scanned in 3 orthogonal positions.

Fresh batteries were used throughout all tests.

Only the worst case is presented in the report.

**GMSK modulation:**

Channel	Frequency (MHz)	Pol.	RCVD (dB $\mu$ V)	ERP dBm	Limit dBm	Margin dB
128	1648.2679	H	48.94	-21.40	-13.00	8.40
	1648.3160	V	44.21	-26.16	-13.00	13.16
	2472.4278	H	47.81	-19.55	-13.00	6.55
	2472.5000	V	45.59	-19.68	-13.00	6.68
190	1677.1682	H	50.61	-19.45	-13.00	6.45
	1677.2403	V	47.35	-22.66	-13.00	9.66
	2515.5157	H	47.55	-19.80	-13.00	6.80
	2515.3474	V	44.43	-20.62	-13.00	7.62
251	1697.5323	H	51.25	-18.61	-13.00	5.61
	1697.6044	V	48.00	-21.75	-13.00	8.75
	2545.5911	H	45.10	-21.84	-13.00	8.84
	2545.7676	V	43.15	-21.86	-13.00	8.86

**8-PSK modulation:**

Channel	Frequency (MHz)	Pol.	RCVD (dB $\mu$ V)	ERP dBm	Limit dBm	Margin dB
128	1648.4442	H	40.46	-29.88	-13.00	16.88
	1648.7086	V	35.91	-34.46	-13.00	21.46
	2472.6682	H	40.57	-26.79	-13.00	13.79
	2472.6442	V	39.93	-25.34	-13.00	12.34
190	1677.0641	H	45.50	-24.56	-13.00	11.56
	1677.0721	V	37.56	-32.45	-13.00	19.45
	2515.8762	H	43.05	-24.10	-13.00	11.10
	2516.0605	V	40.02	-25.03	-13.00	12.03
251	1697.7086	H	42.10	-27.76	-13.00	14.76
	1697.2599	V	41.78	-27.97	-13.00	14.97
	2546.3653	H	42.72	-24.22	-13.00	11.22
	2546.3605	V	42.10	-22.91	-13.00	9.91

There were no additional emissions or change in existing emissions when the GPRS was operated simultaneously with the RFID.

### Clause 24.232(c) Effective Isotropic Radiated Power Limits

Mobile/portable stations are limited to 2 W EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

**Test Results:** Pass

#### Additional Observations:

The EUT was modified to perform the conducted measurements.

Fresh batteries were used throughout all tests.

The test was performed using a spectrum analyzer with peak detector set to 300 kHz/1 MHz RBW/VBW.

Only the worst case is presented in the report.

#### GMSK modulation:

Channel	Frequency MHz	Output power dBm	Antenna gain dBd	EIRP dBm	Limit dBm	Margin dB
512	1850.2	27.06	2.0	29.06	33.00	3.94
661	1980.0	27.25	2.0	29.25	33.00	3.75
810	1909.8	27.51	2.0	29.51	33.00	3.49

#### 8-PSK modulation:

Channel	Frequency MHz	Output power dBm	Antenna gain dBd	EIRP dBm	Limit dBm	Margin dB
512	1850.2	24.93	2.0	26.93	33.00	6.07
661	1980.0	25.37	2.0	27.37	33.00	5.63
810	1909.8	25.63	2.0	27.63	33.00	5.37

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**Clause 24.238(a) Field Strength of spurious radiation**

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

**Test Results:** Pass

**Additional Observations:**

The spectrum was searched from 30 MHz to 10<sup>th</sup> harmonic of the highest fundamental frequency.

The EUT was tested radiated at the distance of 3 m.

The test was performed using a spectrum analyzer with peak detector set to 1 MHz/3 MHz RBW/VBW.

The EUT was scanned in 3 orthogonal positions.

Fresh batteries were used throughout all tests.

Only the worst case is presented in the report.

**GMSK modulation:**

Channel	Frequency (MHz)	Pol.	RCVD (dB $\mu$ V)	ERP dBm	Limit dBm	Margin dB
512	3699.8546	H	12.33	-49.69	-13.00	36.69
	3759.6532	V	13.80	-47.37	-13.00	34.37
661	3760.4682	H	13.21	-48.42	-13.00	35.42
	3777.2403	V	15.23	-45.95	-13.00	32.95
810	3819.6314	H	14.59	-46.90	-13.00	33.90
	3819.3910	V	19.42	-41.79	-13.00	28.79

**8-PSK modulation:**

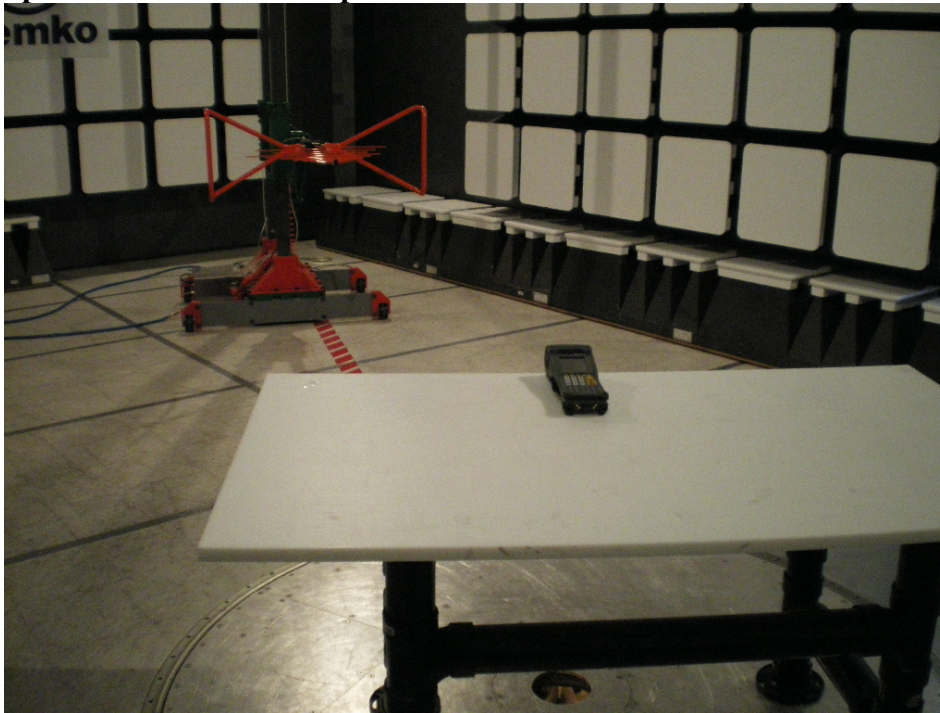
No emissions were detected within 20 dB below the emission limit.

There were no additional emissions or change in existing emissions when the GPRS was operated simultaneously with the RFID.

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## Appendix B : Setup Photographs

### Spurious Emissions Setup:



## Appendix C : Block Diagram of Test Setups

### Radiated Emissions above 30 MHz Test Site

