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CERTIFICATION TEST REPORT
FCC, PART 2.1053
FCC, PART 22 SUBPART H
FCC, PART 24 SUBPART E

For The Personal Tracking Device
Model: AC2116

FCC ID: J9CINGEO2

PREPARED FOR:

Qualcomm
5775 Morehouse Dr
San Diego, CA 92121

Prepared on: July 25, 2008

Report Number: 2008 07111166 FCC
Project Number: 14926-1
NEx Number: 111166
Total Pages: 28

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	July 25, 2008	Prepared By: Alan Laudani
-	July 25, 2008	Initial Release: F. Fleury

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (2003) "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" and in accordance with the measurement methods of TIA-603-C (2004) Land Mobile FM or PM Communications Equipment Measurements and Performance Standards:

- The unit described in this report was received at Nemko USA, Inc.'s facilities on July 24, 2008.
- Testing was performed on the unit described in this report on July 24, 2008 to July 24, 2008
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), Industry Canada, NVLAP or any other government agency.

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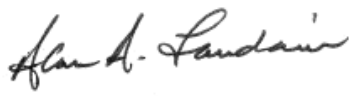
CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4–2003 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 15). The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample.

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.



Alan Laudani
EMC Engineer

1. ADMINISTRATIVE DATA AND TEST SUMMARY

1.1. Administrative Data

CLIENT:	Qualcomm 5775 Morehouse Dr San Diego, CA 92121
CONTACT: E-Mail:	Bob Scodellaro rscodell@qualcomm.com
DATE (S) OF TEST:	July 24, 2008 to July 24, 2008
EQUIPMENT UNDER TEST (EUT):	Personal Tracking Device
MODEL:	AC2116
SERIAL NUMBER:	0714CC2B
CONDITION UPON RECEIPT:	Suitable for Test
TEST SPECIFICATION:	FCC, PART 2.1053, FCC, PART 22 SUBPART H, FCC, PART 24 SUBPART E

1.2. Test Summary

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 test.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

Test Type	*In Accordance with Document*	*Frequency Range Investigated*	*EUT Complies*
Radiated Spurious Emissions	FCC, Part 22, Subpart H, Part 24, Subpart E	824 – 19990 MHz	PASS

The AC2116 complied with FCC Part 22 and Part 24; when tested in the system configuration defined herein.

Refer to the test results section for further details.

2. SYSTEM CONFIGURATION

2.1. Description and Method of Exercising the EUT

The AC2116 is a Personal Tracking Device. Its function is to transmit the location of the person wearing the device. The EUT was exercised on low, mid and high channels at rated power in each of the two operational bands while powered by the battery supported by the external charger. Emissions were continuous and modulated by a test program.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

2.2. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Personal Tracking Device	Qualcomm Model: AC2116 Serial #: 0714CC2B	22 awg 1.5m coaxial plug from Power Supply
Support – Switching Power Supply	SUNNY Model: SYS1196-0504-2-W2-QC SN: G0701405989	2 Prong Wall Wart

2.3. Device Interconnection and I/O Cables

Connection	I/O Cable
No I/O Connection	USB Cable for programming only

2.4. Design Modifications for Compliance

The following design modifications were made to the EUT during testing.

None. No design modifications were made to the EUT during testing.

2.5. Operational Description

2.5.1. Device Description

The inGeo1 AW device is a dedicated Human Tracking Terminal (HTT). It is a 50 gram, 40mm x 70 mm x 16mm sized device, targeted for toddlers, school age children, elderly and other users that need or desired to be tracked. The HTT is designed to be placed in a user's bag or attached to a belt or other article of clothing. While CDMA2000 1X compliant, the HTT design is optimized for minimal cost, minimal size, maximum battery life and superb position location performance. The device uses A-GPS to obtain position location and sends this information back to the network by SMS data packets. For the most active mode of operation, a position fix occurs about every 10 seconds followed by a 3 second SMS message. Other modes of simplified operation request position fixes less often. The hibernation mode extends the battery life beyond normal cellular phone standby time. Hibernation technology comprises of several innovative modes of battery saving. Smart mechanism selects the best fit mode based on future activities of the device. The inGeo1 AW device incorporates internal antennas for both WWAN and GPS.

The main on-board Qualcomm chipsets include:

- Baseband: MSM6125™
- RF: RFR6000™, RFT6100™
- Power Management: PM6650™

Key connectivity support includes:

- USB 2.0 high-speed
- DC power supply input

Qualcomm internal test software, QRCT, was used to set the inGeo1 AW device at the maximum output power setting for test purposes. QRCT simulates an equivalent waveform as compared to an actual signal, with the properly configured physical channels and is appropriate for radiated power and spur measurements. The measurement results shown in the later sections of the report correlate to the theoretically calculated power values under a reasonable measurement tolerance.

2.5.2. Technologies Supported

Table 2-1 describes the technologies and bands supported.

Table 2-1 Technology and Bands Supported

Mode	Band Name	Transmitter Range (MHz)	Receiver Range (MHz)	Duplex Separation (MHz)
CDMA2000	850 MHz - US Cellular	824-849	869-894	45
	1900 MHz - US PCS	1850-1910	1930-1990	80
GPS	GPS		1570-1590	N/A

2.5.3. Module/Host Electrical Interfaces

The inGeo1 AW device supports the following interfaces.

- **Primary Data Interfaces:**

  USB Interface: Supports USB 2.0 in all three modes (Low Speed, Full Speed, and High Speed).
  LED: Provide device ON/OFF indication, cellular coverage and battery status.

2.6. Technical Specifications of the EUT

Manufacturer:	Qualcomm
Operating Frequency:	824.7 MHz to 848.31 MHz 1851.25 MHz to 1908.75 MHz
Rated Power:	Part 22: 26.9 dBm Part 24: 26.4 dBm
Modulation:	CDMA
Antenna Connector:	None
Power Source:	AC Power as Battery Charger. Transmit while charging.

3. DESCRIPTION OF TEST SITE AND ENVIRONMENT

3.1. Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-2001 documents. The OATS normalized site attenuation characteristics are verified for compliance every year, and registered with the Federal Communications Commission under Registration Number 90579 and Industry Canada under 2040B-1 and 2040B-2.

3.2. Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	17 – 22 ºC
Humidity range	:	29 - 30%
Pressure range	:	87 - 105 kPa
Power supply range	:	120VAC 60Hz (±15%)

4. DESCRIPTION OF TESTING METHODS

4.1. Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document ANSI C63.4–2003, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003. These test methods and limits are specified in the Canadian Standards Association's (CSA) Standard C108.8-M1983 (1-1-94 version) and are "essentially equivalent" with FCC, Part 15 and CISPR 22 (EN55022) rules for unintentional radiators per EMCAB-3, Issue 3 (May 1998). No further testing is required for compliance to ICES-003.

4.2. Configuration and Methods of Measurements for Radiated Emissions

Section 8 of ANSI C63.4 determines the general configuration and procedures for measuring the radiated emissions of equipment under test. Initially, the primary emission frequencies are identified inside the test lab by positioning a broadband receive antenna one meter from the EUT to locate frequencies of significant radiation. Next, the EUT and associated system are placed on a turntable on a ten meter open area test site (registered with the FCC in accord with its Rules and ANSI C63.4) and the receive antenna is located at a distance of ten meters from the EUT.

The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. All significant radiated emissions are recorded when maximum radiation on each frequency is observed, in accordance with part 8 of ANSI C63.4–2003 and Section 15.33 of the FCC Rules. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived at by the following method:
Example: A=RR+CL+AF
A = Amplitude dBµV/m
RR = Receiver Reading dBµV
CL = cable loss dB
AF = antenna factor dB/m

Example Frequency = 110MHz
18.5 dBµV (spectrum analyzer reading)
+3.0 dB (cable loss @ frequency)
21.5 dBµV
+15.4 dB/m (antenna factor @ frequency)
36.9 dBµV/m Final adjusted value

The final adjusted value is then compared to the appropriate emission limit to determine compliance.

5. Test Results

5.1. Radiated Output Power

22.913 Effective radiated power limits.
(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. **The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts**

24.232 Power and antenna height limits.
(c) **Mobile/portable stations are limited to 2 watts EIRP peak power** and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Limits:

For 7 Watts :
10 x log(7Watts) +30 = 38.5 dBm

For 2 Watts :
10 x log(2Watts) +30 = 33.0 dBm

Corrected Reading = Maximum Reading + Antenna Factor + Cable Loss – Conversion Factor
Conversion Factor converts dBµV/m to dBm:
$V/m = 10^{((dB\mu V/m-120)/20)}$
P(Watts)= P_w = (V/m x distance)^2/5.5 EIRP; 7 replaces 5.5 for ERP
P(dBm) = 10 x Log(P_w)

Radiated Emissions Data

Job # : 14926-1 | Date : 07/24/08 | Page 1 of 1
NEX #: | Time : 0930am
Staff : AAL

Client Name : Qualcomm
EUT Name : Personal Tracking Device
EUT Model # : AC2116
EUT Serial # : 0714CC2B
EUT Config. : Transmit CDMA

EUT Voltage : 120
EUT Frequency : 60
Phase: 1
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 22 ERP
Loop Ant. #: NA
Bicon Ant.#: NA | Temp. (°C) : 20
Log Ant.#: 110 | Humidity (%) : 67
DRG Ant. # NA | Spec An.#: 835
Cable LF#: SOATS | Spec An. Display #: 835
Cable HF#: NA | QP #: NA
Preamp LF#: NA | PreSelect#: NA
Preamp HF# NA

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	3 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBm)	Spec. limit (dBm)	CR/SL Diff. (dB)	Pass Fail	Comment
824.70	98.0	97.2	P	-	1.0	98.0	26.9	38.5	-11.5	Pass	UPRIGHT
824.70	88.9	96.7	P	-	1.0	96.7	25.6	38.5	-12.8	Pass	LAYING DOWN
824.70	95.6	98.0	P	-	1.0	98.0	26.9	38.5	-11.5	Pass	SIDE
836.49	94.5	96.4	P	-	1.0	96.4	24.7	38.5	-13.7	Pass	UPRIGHT
836.49	91.3	98.1	P	-	1.0	98.1	26.4	38.5	-12.0	Pass	LAYING DOWN
836.49	95.1	97.3	P	-	1.0	97.3	25.6	38.5	-12.8	Pass	SIDE
848.31	97.8	98.3	P	-	1.0	98.3	26.8	38.5	-11.6	Pass	UPRIGHT
848.31	92.8	97.7	P	-	1.0	97.7	26.2	38.5	-12.2	Pass	LAYING DOWN
848.31	95.0	95.3	P	-	1.0	95.3	23.8	38.5	-14.6	Pass	SIDE

Radiated Emissions Data

Job # :	14926-1	Date :	07/24/08	Page	1 of 1
NEX #:	111166	Time :	0930am		
		Staff :	AAL		
Client Name :	Qualcomm			EUT Voltage :	120
EUT Name :	Personal Tracking Device			EUT Frequency :	60
EUT Model # :	AC2116			Phase:	1
EUT Serial # :	0714CC2B			NOATS	
EUT Config. :	Transmit CDMA			SOATS	X
				Distance < 1000 MHz:	3 m
Specification :	CFR47 Part 24		EIRP	Distance > 1000 MHz:	3 m
Loop Ant. #:	NA				
Bicon Ant.#:	NA	Temp. (°C) :	24		
Log Ant.#:	110	Humidity (%) :	47		
DRG Ant. #1	752	Spec An.#:	835		
DRG Ant. #	625				
Cable LF#:	SOATS	Spec An. Display #:	835		
Cable HF#:	40ft	QP #:	NA		
Preamp LF#:	NA	PreSelect#:	NA		
Preamp HF#1	317				
Preamp HF#2	919				

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBm)	Spec. limit (dBm)	CR/SL Diff. (dB)	Pass Fail	Comment
1851.25	91.2	84.3	P	-	1.0	91.2	26.4	33.0	-6.6	Pass	UPRIGHT
1851.25	89.4	89.9	P	-	1.0	89.9	25.0	33.0	-8.0	Pass	LAYING DOWN
1851.25	86.8	89.3	P	-	1.0	89.3	24.4	33.0	-8.6	Pass	SIDE
1880.00	91.1	83.6	P	-	1.0	91.1	26.3	33.0	-6.7	Pass	UPRIGHT
1880.00	82.9	84.1	P	-	1.0	84.1	19.3	33.0	-13.7	Pass	LAYING DOWN
1880.00	88.6	85.3	P	-	1.6	88.6	23.8	33.0	-9.2	Pass	SIDE
1908.75	90.7	82.1	P	-	1.0	90.7	26.0	33.0	-7.0	Pass	UPRIGHT
1908.75	83.5	84.5	P	-	1.0	84.5	19.8	33.0	-13.2	Pass	LAYING DOWN
1908.75	88.0	84.8	P	-	1.0	88.0	23.3	33.0	-9.7	Pass	SIDE

5.2. Results-- Substituted

Substitution Method For Radiated Emissions

Job # : 14926-1

Page 1 of 1

Client Name :	Qualcomm				
EUT Name :	Personal Tracking Device				
EUT Model # :	AC2116				
EUT Serial # :	0714CC2B				
EUT Config. :	Transmit				
Specification :	FCC Part 22 and 22			Reference :	
Log Ant.#:	110	Temp. (deg. C) :	24	Date :	7/24/2008
DRG Ant. # RX	752	Humidity (%) :	47	Time :	0:00
DRG Ant. # TX	529			Staff :	A. Laudani
Dipole Ant.#:	760				
Cable#: RX	40ft				
Cable#: TX	60ft	Phase:	NA		
Preamp#:	317	Location:	RN# 329550-01		
Spec An.#:	835	Distance:	3m		

target Frequency mHz	target level dBuV/m	dipole	cable loss dB	Signal Generator dBm	Total (ERP) dBm	Spec dBm	Margin dBm	Peak Bandwidth
824.70	98.0	0	2.4	28.40	26.00	38.5	-12.5	100 kHz
836.49	98.1	0	2.4	28.60	26.20	38.5	-12.3	100 kHz
848.31	98.3	0	2.5	29.10	26.60	38.5	-11.9	100 kHz

Target Frequency mHz	Target Level dBuV/m	Horn Gain dBi	Cable loss dB	Signal Generator dBm	Total (EIRP) dBm	Spec dBm	Margin dBm	Peak Bandwidth
1851.25	91.2	8.2	4.2	22.4	26.40	33	-6.6	1 MHz
1880.00	91.1	8.2	4.4	22.7	26.50	33	-6.5	1 MHz
1908.75	90.7	8.2	4.2	23.0	27.00	33	-6.0	1 MHz

5.3. Radiated Emissions –Transmit Mode

2.917 Emission limitations for cellular equipment.
(a) *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

24.238 Emission limitations for Broadband PCS equipment.
(a) *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

Additional Observations:

- P – (43+10log(P)) in dBW = -13 dBm
- The Spectrum was searched from 30MHz to the 10th Harmonic, 19100 MHz.
- The EUT Power Output was measured on three orthogonal axes, the highest
- Radiated Peak (RBW 1MHz/VBW 3MHz) and Average (RBW 1MHz/VBW 10Hz) measurements conducted above 1GHz.
- The device has an integral antenna with no conducted measurement capability.

Radiated Emissions Data

Job # : 14926-1 | Date : 07/24/08 | Page 1 of 1
NEX #: 111166 | Time : 0930am
Staff : AAL

Client Name : Qualcomm
EUT Name : Personal Tracking Device
EUT Model # : AC2116
EUT Serial # : 0714CC2B
EUT Config. : Transmit CDMA

EUT Voltage : 120
EUT Frequency : 60
Phase: 1
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 22
Loop Ant. #: NA
Bicon Ant.#: NA | Temp. (°C) : 20
Log Ant.#: 110 | Humidity (%) : 67
DRG Ant. # 752 | Spec An.#: 835
Cable LF#: SOATS | Spec An. Display #: 835
Cable HF#: 40ft | QP #: NA
Preamp LF#: NA | PreSelect#: NA
Preamp HF# 317

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBm)	Spec. limit (dBm)	CR/SL Diff. (dB)	Pass Fail	Comment
848.31											
1696.62	74.2	69.0	P	-	1.6	74.2	-27.1	-13.0	-14.1	Pass	
2544.93	66.2	70.2	P	-	1.0	70.2	-27.0	-13.0	-14.0	Pass	
3393.24	50.0	51.5	P	-	1.0	51.5	-45.5	-13.0	-32.5	Pass	
4241.55			P	-	1.0		-93.5	-13.0	-80.5	Pass	NF
5089.86			P	-	1.0		-90.8	-13.0	-77.8	Pass	NF
5938.17			P	-	1.0		-87.8	-13.0	-74.8	Pass	NF
6786.48			P	-	1.0		-85.8	-13.0	-72.8	Pass	NF
7634.79			P	-	1.0		-82.4	-13.0	-69.4	Pass	NF
8483.10			P	-	1.0		-80.7	-13.0	-67.7	Pass	NF
836.49											
1672.98	63.3	61.0	P	-	1.0	63.3	-39.0	-13.0	-26.0	Pass	
2509.47	64.8	60.5	P	-	1.0	64.8	-34.4	-13.0	-21.4	Pass	
3345.96			P	-	1.0		-97.0	-13.0	-84.0	Pass	NF
4182.45			P	-	1.0		-93.4	-13.0	-80.4	Pass	NF
5018.94			P	-	1.0		-90.8	-13.0	-77.8	Pass	NF
5855.43			P	-	1.0		-87.7	-13.0	-74.7	Pass	NF
6691.92			P	-	1.0		-85.9	-13.0	-72.9	Pass	NF
7528.41			P	-	1.0		-82.3	-13.0	-69.3	Pass	NF
8364.90			P	-	1.0		-80.9	-13.0	-67.9	Pass	NF
824.70											
1649.40	65.8	62.1	P	-	1.4	65.8	-37.5	-13.0	-24.5	Pass	
2474.10	58.9	59.6	P	-	1.0	59.6	-40.6	-13.0	-27.6	Pass	
3298.80			P	-	1.0		-97.1	-13.0	-84.1	Pass	NF
4123.50			P	-	1.0		-93.4	-13.0	-80.4	Pass	NF
4948.20			P	-	1.0		-91.5	-13.0	-78.5	Pass	NF
5772.90			P	-	1.0		-87.8	-13.0	-74.8	Pass	NF
6597.60			P	-	1.0		-86.0	-13.0	-73.0	Pass	NF
7422.30			P	-	1.0		-83.7	-13.0	-70.7	Pass	NF
8247.00			P	-	1.0		-80.8	-13.0	-67.8	Pass	NF

Radiated Emissions Data

Job # : 14926-1 | Date : 07/24/08 | Page 1 of 1
NEX #: 111166 | Time : 0930am
Staff : AAL

Client Name : Qualcomm
EUT Name : Personal Tracking Device
EUT Model # : AC2116
EUT Serial # : 0714CC2B
EUT Config. : Transmit CDMA

Specification : CFR47 Part 24
Loop Ant. #: NA
Bicon Ant.#: NA
Log Ant.#: 110
DRG Ant. #1 752
DRG Ant. # 625
Cable LF#: SOATS
Cable HF#: 40ft
Preamp LF#: NA
Preamp HF#1 317
Preamp HF#2 919

Temp. (°C) : 24
Humidity (%) : 47
Spec An.#: 835
Spec An. Display #: 835
QP #: NA
PreSelect#: NA

EUT Voltage : 120
EUT Frequency : 60
Phase: 1
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBm)	Spec. limit (dBm)	CR/SL Diff. (dB)	Pass Fail	Comment
1851.25											
3702.50	49.4	49.1	P	-	1.6	49.4	-41.4	-13.0	-28.4	Pass	
5553.75			P	-	1.0		-86.0	-13.0	-73.0	Pass	NF
7405.00			P	-	1.0		-81.6	-13.0	-68.6	Pass	NF
9256.25			P	-	1.0		-76.3	-13.0	-63.3	Pass	NF
11107.50			P	-	1.0		-72.7	-13.0	-59.7	Pass	NF
12958.75			P	-	1.0		-71.9	-13.0	-58.9	Pass	NF
14810.00			P	-	1.0		-61.5	-13.0	-48.5	Pass	NF
16661.25			P	-	1.0		-55.9	-13.0	-42.9	Pass	NF
18512.50			P	-	1.0		-37.7	-13.0	-24.7	Pass	NF
1880.00											
3760.00	48.3	49.1	P	-	1.0	49.1	-42.7	-13.0	-29.7	Pass	
5640.00			P	-	1.0		-85.8	-13.0	-72.8	Pass	NF
7520.00			P	-	1.0		-80.2	-13.0	-67.2	Pass	NF
9400.00			P	-	1.0		-76.8	-13.0	-63.8	Pass	NF
11280.00			P	-	1.0		-73.0	-13.0	-60.0	Pass	NF
13160.00			P	-	1.0		-69.9	-13.0	-56.9	Pass	NF
15040.00			P	-	1.0		-63.1	-13.0	-50.1	Pass	NF
16920.00			P	-	1.0		-56.1	-13.0	-43.1	Pass	NF
18800.00			P	-	1.0		-37.2	-13.0	-24.2	Pass	NF
1908.75											
3817.50	51.8	49.2	P	-	1.4	51.8	-41.1	-13.0	-28.1	Pass	
5726.25			P	-	1.0		-85.7	-13.0	-72.7	Pass	NF
7635.00			P	-	1.0		-80.3	-13.0	-67.3	Pass	NF
9543.75			P	-	1.0		-76.5	-13.0	-63.5	Pass	NF
11452.50			P	-	1.0		-73.0	-13.0	-60.0	Pass	NF
13361.25			P	-	1.0		-69.8	-13.0	-56.8	Pass	NF
15270.00			P	-	1.0		-62.6	-13.0	-49.6	Pass	NF
17178.75			P	-	1.0		-48.9	-13.0	-35.9	Pass	NF
19087.50			P	-	1.0		-34.1	-13.0	-21.1	Pass	NF

5.4. Results-- Substituted

Substitution Method For Radiated Emissions

Job # : 25-864-KYO — Test # : 3

Page 1 of 1

Client Name :	Qualcomm				
EUT Name :	Personal Tracking Device				
EUT Model # :	AC2116				
EUT Serial # :	0714CC				
EUT Config. :					
Specification :	FCC Part 22 and 22			Reference :	
Log Ant.#:	110	Temp. (deg. C) :	24	Date :	7/24/2008
DRG Ant. # RX	752	Humidity (%) :	47	Time :	0:00
DRG Ant. # TX	529			Staff :	A. Laudani
Dipole Ant.#:					
Cable#: RX	40ft				
Cable#: TX	60ft	Phase:	NA		RBW-1MHz, VBW-1MHz
Preamp#:	317	Location:	RN# 329550-01		
Spec An.#:	835	Distance:	3m		

Target Frequency mHz	Target Level dBuV/m	Horn Gain dBi	Cable loss dB	Signal Generator dBm	Total (EIRP) dBm	Spec dBm	Margin dBm	Peak Bandwidth
w/ preamp								
1696.62	74.2	7.9	3.8	-30.80	-26.70	-13	-13.7	1 MHz
2544.93	70.2	9.2	5.1	-31.50	-27.40	-13	-14.4	1 MHz

5.5. Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
110	Antenna, LPA	EMCO	3146	1217	10-Jan-08	10-Jan-09
317	Preamplifier	HP	8449A	2749A00167	31-Mar-08	31-Mar-09
529	Antenna, DRWG	EMCO	3115	2505	27-Aug-07	27-Aug-08
752	Antenna, DRWG	EMCO	3115	4943	27-Aug-07	27-Aug-08
760	Dipole Antenna	EMCO	3121C	1214	Verified 7/24/2008	
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	27-Jun-08	27-Jun-09
836	Signal Generator	Agilent	E8254A	US41140229	04-Dec-07	04-Dec-08

APPENDIX A
A. Radiated Emissions Measurement Uncertainties

1. Introduction

ISO/IEC 17025:2005 and ANSI/NCSL Z540.1-1994 (*R2002*) require that all measurements contained in a test report be "traceable". "Traceability" is defined in the *International Vocabulary of Basic and General Terms in Metrology* (ISO: 1993) as: "the property of the result of a measurement... whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, *all having stated uncertainties*".

The purposes of this Appendix are to "state the *Measurement Uncertainties*" of the conducted emissions and radiated emissions measurements contained in Section 5 of this Test Report, and to provide a practical explanation of the meaning of these measurement uncertainties.

2. Statement of the Worst-Case Measurement Uncertainties for the Conducted and Radiated Emissions Measurements Contained in This Test Report

Table 1: Worst-Case Expanded Uncertainty "U" of Measurement for a k=2 Coverage Factor

Radiated Emissions Measurement Detection Systems	Applicable Frequency Range	"U" for a k=2 Coverage Factor
Spectrum Analyzer with QPA & Preamplifier	30 MHz - 200 MHz	+3.9 dB, -4.0 dB
Spectrum Analyzer with QPA & Preamplifier	200 MHz-1000 MHz	+/- 3.5 dB
Spectrum Analyzer with Preamplifier	1 GHz - 18 GHz	+2.5 dB, -2.6 dB
Spectrum Analyzer with Preamplifier	18 GHz - 40 GHz	+/- 3.4 dB

NOTES:
1. Applies to 3 and 10 meter measurement distances
2. Applies to all valid combinations of Transducers (i.e. LISNs, Line Voltage Probes, and Antennas, as appropriate)
3. Excludes the Repeatability of the EUT

3. Practical Explanation of the Meaning of Radiated Emissions Measurement Uncertainties

In general, a "Statement of Measurement Uncertainty" means that with a certain (specified) confidence level, the "true" value of a measurand will be between a (stated) upper bound and a (stated) lower bound.

In the specific case of EMC Measurements in this test report, the measurement uncertainties of the conducted emissions measurements and the radiated emissions measurements have been calculated in accordance with the method detailed in the following documents:

- *ANSI Z540.2 (2002) Guide to the Expression of Uncertainty in Measurement*
- NIS 81:1994, *The Treatment of Uncertainty in EMC Measurements* (NAMAS, 1994)
- NIST Technical Note 1297(1994), *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results* (NIST, 1994)

The calculation method used in these documents requires that the stated uncertainty of the measurements be expressed as *an "expanded uncertainty", U, with a k=2 coverage factor*. The practical interpretation of this method of expressing measurement uncertainty is shown in the following example:

EXAMPLE: Assume that at 39.51 MHz, the (measured) radiated emissions level was equal to +26.5 dBuV/m, and that the +/- 2 standard deviations (i.e. 95% confidence level) measurement uncertainty was +/- 3.4 dB.

In the example above, the phrase "k = 2 Coverage Factor" simply means that the measurement uncertainty is stated to cover +/-2 standard deviations (i.e. a 95% confidence interval) about the measurand. The measurand is the radiated emissions measurement of +26.5 dBuV/m at 39.51 MHz, and the 95% bounds for the uncertainty are –3.4 dB to + 3.4 dB. One can thus be 95% confident that the "true" value of the radiated emissions measurement is between +23.1 dBuV/m and +29.9 dBuV/m. *In effect, this means that in the above example there is only a 2.5% chance that the "true" radiated emissions value exceeds +29.9 dBuV/m.*

APPENDIX B

B. Nemko USA, Inc. Test Equipment & Facilities Calibration Program

Nemko USA, Inc. operates a comprehensive Periodic Calibration Program in order to ensure the validity of all test data. Nemko USA's Periodic Calibration Program is fully compliant to the requirements of NVLAP Policy Guide PG-1-1988, ANSI/NCSL Z540.1-1994 (*R2002*), ISO 10012:2003, ISO/IEC 17025:2005, and ISO-9000: 2000. Nemko USA, Inc.'s calibrations program therefore meets or exceeds the US national commercial and military requirements [N.B. ANSI/NCSL Z540-1-1994 replaces MIL-STD-45662A].

Specifically, all of Nemko USA's *primary reference standard devices* (e.g. vector voltmeters, multimeters, attenuators and terminations, RF power meters and their detector heads, oscilloscope mainframes and plug-ins, spectrum analyzers, RF preselectors, quasi-peak adapters, interference analyzers, impulse generators, signal generators and pulse/function generators, field-strength meters and their detector heads, etc.) and certain *secondary standard devices* (e.g. RF Preamplifiers used in CISPR 11/22 and FCC Part 15/18 tests) are periodically recalibrated by:

- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratories by NIST; or,
- A Nemko USA-approved independent (third party) metrology laboratory that uses NIST-traceable standards and that is ISO Guide 25-accredited as a calibration laboratory by another accreditation body (such as A2LA) that is mutually recognized by NIST; or,
- A manufacturer of Measurement and Test Equipment (M&TE), if the manufacturer uses NIST-traceable standards and is ISO Guide 25-accredited as calibration laboratory either by NIST or by another accreditation body (such as A2LA) that is mutually recognized by NIST; or
- A manufacturer of M&TE (or by a Nemko USA-approved independent third party metrology laboratory) that is not ISO Guide 25-accredited. (In these cases, Nemko USA conducts an annual audit of the manufacturer or metrology laboratory for the purposes of proving traceabilty to NIST, ensuring that adequate and repeatable calibration procedures are being applied, and verifying conformity with the other requirements of ISO Guide 25).

In all cases, the entity performing the Calibration is required to furnish Nemko USA with a calibration test report and/or certificate of calibration, and a "calibration sticker" on each item of M&TE that is successfully calibrated.

Calibration intervals are normally one year, except when the manufacture advises a shorter interval or if US Government directives or client requirements demand a shorter interval. Items of instrumentation/related equipment which fail during routine use, or which suffer visible mechanical damage (during use or while in transit), are sidelined pending repair and recalibration. (Repairs are carried out either in-house [if minor] or by a Nemko USA-approved independent [third party] metrology laboratory, or by the manufacturer of the item of M&TE).

Each antenna used for CISPR 11 and CISPR 22 and FCC Part 15 and Part 18 radiated emissions testing (and for testing to the equivalent European Norms) is calibrated annually by either a NIST (or A2LA) ISO Standard 17025-Accredited third-party Antenna Calibration Laboratory or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory. The antenna calibrations are performed using the methods specified in Annex G.5 of CISPR 16-1(2003) or ANSI C63.5-2004, including the "Three-Antenna Method". Certain other kinds of antennas (e.g. magnetic-shielded loop antennas) are calibrated annually by either a NIST (or A2LA) ISO Standard 17025-accredited third-party antenna calibration laboratory, or by the antenna's OEM if the OEM is NIST or A2LA ISO Standard 17025-accredited as an antenna calibration laboratory using the procedures specified in the latest version of SAE ARP-958.

In accordance with FCC and other regulations, Nemko USA recalibrates its suite of antennas used for radiated emissions tests on an annual basis. These calibrations are performed as a precursor to the FCC-required annual revalidation of the Normalized Site Attenuation properties of Nemko USA's Open Area Test Site. Nemko USA, Inc. uses the procedures given in both Sub clause 16.6 and Annex G.2 of CISPR 16-1 (2003), and, ANSI C63.4-2003 when performing the normalized site attenuation measurements.

APPENDIX C
C. NVLAP Certification

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200116-0

Nemko USA, Inc. - San Diego EMC Division
San Diego, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2008-01-01 through 2008-12-31
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2006-09-13)

APPENDIX D
D. Nemko Authorization

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

EMC Laboratory: **Nemko USA, Inc.**
11696 Sorrento Valley Rd. Suite F
San Diego, CA 92121
USA

Scope of Authorization: **All standards for EMC and radio transmission that are listed on the accompanying page.**

Nemko has assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA -10. During the visit by the Nemko representative it was found that the Laboratory is capable of performing tests within the Scope of the Authorisation.

Accordingly, Nemko will normally accept test results from the laboratory on a partial or complete basis for certification of the products.

In order to maintain the Authorisation, the information given in the pertinent NLA-10 must be carefully followed. Nemko is to be promptly notified about any changes in the situation at the Laboratory, which may affect the basis for this Authorisation. The Authorisation may be withdrawn at any time if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through 31 December 2008.

Oslo, 01 January 2006

For Nemko AS:

TB Ketterling

TB Ketterling, Nemko Group EMC Coordination

NLA 3 ED2-2003

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

SCOPE OF AUTHORIZATION

BASIC TESTS AND ASSOCIATED STANDARDS

Capability to perform a basic test implies also that any product (family) standard calling up this basic test is also within the scope if mentioned below or not.

Disturbance emissions		
Electromagnetic radiation disturbance, 9 kHz to 30 MHz, re.: EN 55011 (CISPR 11), EN 60945 (IEC 60945)	***Electromagnetic radiation disturbance, 30 to 1000 MHz, re.:*** EN 55011 (CISPR 11), EN 55013 (CISPR 13), EN 55022 (CISPR 22), ANSI C63.4	***Electromagnetic radiation disturbance, above 1 GHz, re.:*** EN 55011 (CISPR 11), EN 55022 (CISPR 22)
Electromagnetic radiation disturbance, 9 kHz to 30 MHz, "Van Veen loop", re: EN 55015 (CISPR 15)	***Electromagnetic radiation disturbance, 50 Hz to 50 kHz, re:*** EN 55103-1	***Conducted common-mode disturbance power, 30-1000 MHz, re.:*** EN 55013 (CISPR 13) EN 55014-1 (CISPR 14-1)
Mains terminal disturbance voltage, re.: EN 55011 (CISPR 11), EN 55013 (CISPR 13), EN 55014-1 (CISPR 14-1), EN 55015 (CISPR 15), EN 55022 (CISPR 22), EN 60945 (IEC 60945), ANSI C63.4	***Conducted terminal disturbance, Hi-Z probe, re:*** EN 55011 (CISPR 11) EN 55014-1 (CISPR 14-1)	***Conducted discontinuous disturbance on power port, re.:*** EN 55014-1 (CISPR 14-1), section 4.2
Conducted common-mode disturbance at telecom/network ports, re.: EN 55022 (CISPR 22)	***Conducted antenna terminal disturbance, re:*** EN 55013 (CISPR 13)	***Luminaire insertion loss, re:*** EN 55015 (CISPR 15)
Mains inrush current, re: EN 55103-1	***Harmonic current emissions, re.:*** EN 61000-3-2 (IEC 61000-3-2)	***Voltage fluctuations and flicker in low-voltage supply systems, re.:*** EN 61000-3-3 (IEC 61000-3-3), EN 61000-3-11 (IEC 61000-3-11)
Immunity		
Electrostatic discharge immunity test, Re.: EN 61000-4-2 (IEC 61000-4-2)	***Radiated, radio-frequency, electromagnetic field immunity test, re.:*** EN 61000-4-3 (IEC 61000-4-3) ENV 50140:1993, ENV 50204:1995	***Power frequency magnetic field Immunity test, re.:*** EN 61000-4-8 (IEC 61000-4-8)
Radiated audio-frequency H-field, re: EN 55103-2	***Radiated E-field, 150 kHz to 150 MHz, re:*** EN 55020 (CISPR 20)	***Electrical fast transient/burst immunity test, re.:*** EN 61000-4-4 (IEC 61000-4-4)
Surge immunity test, re.: EN 61000-4-5 (IEC 61000-4-5) ENV 50142:1994	***Immunity to conducted disturbances, induced by radio-frequency fields, re.:*** EN 61000-4-6 (IEC 61000-4-6) ENV 50141:1993	***Immunity to voltage dips, short interruptions and voltage variation, re.:*** EN 61000-4-11 (IEC 61000-4-11)
Conducted antenna terminal, re: EN 55020 (CISPR 20)	***Conducted audio/video ports, re:*** EN 55020 (CISPR 20)	BLANK

Nemko

Nemko Laboratory Authorisation

Aut. No.: ELA 137- a

EMC Directive

PRODUCT-FAMILY STANDARDS

Unless specifically noted, only the sections of the standards below which are covered by the capability listing above are assumed covered by this authorisation. When the capability is expanded, more parts of the product standards will be covered.

Cable networks EN 50083-2 :2001 (doc=1.1.04) EN 50083-2:1995 + A1:1997 (docexp)	***UPS – Uninterruptible power supplies*** EN 50091-2:1995 (doc=exp)	***Alarm systems – immunity*** *EN 50130-4:1995 + A1:1998 (doc=exp)+A2:03*
Arc welding equipment *EN 50199:1995 (doc=exp)*	***ISM equipment, emission*** EN 55011:1998 + A1 :99 (doc=exp) + A2:2002 (doc=1.10.05) *CISPR 11:97 + A1 :1999 + A2 :2002*	***Broadcast receivers – emission*** EN 55013 :2001 (doc=1.9.04) + A1:2002 CISPR 13 :2001 (mod) +A1:2003 EN 55013:1990 + A12:1994 + A13:1996 + A14 :1999 (doc=exp) CISPR 13:1975 + A1:1983 mod.
Household appliances – emission EN 55014-1 :2000 (doc=1.8.03) + A1 :2001 (doc=1.10.04) + A2 :2002 (doc=1.10.05) CISPR 14-1 :2000 + A1 :2001 + A2 :2002	***Household appliances - immunity*** EN 55014-2:1997 (doc=exp) + A1:2001 (doc=1.12.04) CISPR 14-2:1997 + A1 :2001	***Electrical lighting – emission*** EN 55015 :2000 (doc=1.8.03) + A1 :2001 (doc=1.12.04) + A2 :2002 (doc=1.10.05) CISPR 15 :2000 + A1 :2000 + A2 :2002
Broadcast receives - immunity EN 55020:2002 (doc=1.4.05) CISPR 20:2002 A1:2002 to CISPR 20:2002 (not harm) EN 55020:1994 + A11:1996 + A12 :1999 + A13 :1999 + A14 :1999	***ITE - emission*** EN 55022:1998 + A1:2000 (doc=1.8.03) + A2:2003 CISPR 22:1997 + A1:2000 + A2:2002 EN 55022:1994 + A1:1995 + A2:1997 CISPR 22:1993 + A1:1995 + A2:1996	***ITE – immunity*** EN 55024:1998 (doc=exp) + A1 :2001 (doc=1.10.04) + A2 :2003 CISPR 24:1997 + A1 :2001 + A2 :2002
Professional AV – emission EN 55103-1:1996 (doc=exp)	***Professional AV - immunity*** EN 55103-2:1996 (doc=exp)	***Telecontrol equipment*** 60870-2-1:1996 (doc=exp) IEC 60870-2-1 :1995
Maritime navigation and radio EN 60945:2002 IEC 60945:2002 EN 60945:1997 IEC 60945:1996	***Harmonics*** EN 61000-3-2 :2000 +A2:2005 IEC 61000-3-2 :2000 (mod) + A1 :2001 +A2:2004	***Flicker*** EN 61000-3-3 :1995 (doc=exp) + A1 :2001 (doc=1.5.04) IEC 61000-3-3 :1994 + A1 :2001 EN 61000-3-11 :2000 (doc=1.11.03) IEC 61000-3-11 :2000
Generic immunity - light EN 61000-6-1:2001 (doc=1.7.04) IEC 61000-6-1:1997 (mod) EN 50082-1 :1997 (doc=exp)	***Generic immunity – Industrial*** EN 61000-6-2:2001 (doc=1.7.04) IEC 61000-6-2:1999 (mod)	*Generic emission – light* EN 61000-6-3 :2001 + A1:2004 IEC 61000-6-3 :1996 (mod) EN 50081-1:1992 (doc=exp)
Generic emission - industry EN 61000-6-4 :2001 (doc=1.7.04) IEC 61000-6-4:1997 (mod) *EN 50081-2:1993 (doc=exp)*	***PLC – Programmable Logic Controllers*** EN 61131-2 :2003 IEC 61131-2 :2003 *EN 61131-2 :1994 + A11 :1996 + A12 :2000 (doc=exp)* *IEC 61131-2 :1992*	***PS – Power supply*** *EN 61204-3:2000 (doc=1.11.03)* *IEC 61204-3:2000*
Laboratory equipment *EN 61326 :1997 + A1 :1998) + A2 :2001 +A3: 2003* *IEC 61326 :1997 + A1 1998 + A2 :2000*	***Electrical lighting – immunity*** *EN 61547 :1995 (doc=exp) + A1 :2000 (doc=1.11.03)* *IEC 61547 :1995 + A1 :2000*	***Power drives*** *EN 61800-3 :2004* *IEC 61800-3 :2004* *EN 61800-3 :1996 + A11 :2000 (doc=exp)* *IEC 61800-3 :1996*