Radio Frequency Exposure Evaluation Report

for

Manufacturer: Verizon Telematics Inc.
Model number: AT-250

Product Description: GPS Navigation Device with 3G and Bluetooth

FCC ID: ZOQAT-250
IC Certification Number: 9734A-AT-250

Applied Rules and Standards

CFR Part Part 1 (1.1307 &1.1310), Part 2 (2.1091),
FCC OET Bulletin 65 (1997-01) Supplement C (2001-01),
FCC KDB 447498 D01 General 24 RF Exposure Guidance v05r01

Industry Canada RSS-102, Issue 4 of March 2010

Report number: EMC_VERIT-001-13001_AT_250_MPE

DATE: 2014-03-18

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

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Department:	Compliance
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Acting Test Lab Manager	Franz Engert

1.2 Identification of the Client / Manufacturer

Applicant's Name:	Verizon Telematics Inc.
Street Address:	2002 Summit Blvd., Suite 1800
City/Zip Code	Atlanta, GA 30319
Country	USA
Contact Person:	Bryant Elliott
Phone No.	+1 404 573 5800
e-mail:	bryant.elliott@verizon.com

2 Equipment under Assessment

Marketing Name:	**in-Drive Communicator AT-250**
Model Number:	**AT-250**
FCC ID:	**ZOQAT-250**
IC Certification Number:	**9734A-AT-250**
Product Description:	**GPS Navigation Device with 3G and Bluetooth**
Transmitter information:	1. Sierra Wireless SL8080; FCC ID: N7NSL8080; IC ID: 2417C-SL8080 • 850/900/1800/1900MHz GSM/GPRS/EDGE; GPRS multislot class 10; EDGE multislot class 12 • 850/900/1900/2100 MHz WCDMA; 2. Bluetooth EDR radio, 2mW/3dBm; 3. GPS 1575.42 MHz;
Antenna info (antenna as presented for testing with the development board):	cellular: internal; -1.6 dBi at 850MHz; +1 dBi at 1900MHz; BT: ceramic chip; 0.4dBi peak gain;
Co-located Transmitters/ Antennas?	■ Yes (Bluetooth and Cellular) ☐ No
Device Category:	■ Fixed Installation ☐ Mobile ☐ Portable ☐ mixed Mobile and Portable
Exposure Category:	☐ Occupational/ Controlled ■ General Population/ Uncontrolled
Rated Operating Voltage Range:	+6 to +24Vdc
Rated Operating Temperature Range:	–40°C ~ +85°C
Test Sample Status:	Prototype

3 Assessment

This RF Exposure evaluation report provides information about compliance of the below identified device with the RF Exposure limits for mobile or fixed devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 under given conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated, respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications.

Company	Description	Model #
Verizon Telematics, Inc.	**GPS Navigation Device with 3G and Bluetooth**	**AT-250**

Report reviewed by:

Date	Section	Name	Signature
2014-03-18	Compliance	Josie Sabado (Test Lab Manager)	Signing on behalf of Franz Engert (Compliance Manager)

Responsible for the Report:

Date	Section	Name	Signature
2014-03-18	Compliance	Kenneth Reyes (EMC Engineer)	Kenneth Reyes Digitally signed by Kenneth Reyes DN: cn=Kenneth Reyes, c=US, o=CETECOM, ou=Compliance, email=kenneth.reyes@cetecom.com Reason: I have reviewed this and it is ready to go. Date: 2014.03.20 15:10:18 -07'00'

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Maximum Permissible Exposure (MPE) Limits acc. to FCC 1.1310(e) / RSS-102, cl. 4.2:

Frequency Range (MHz)	Power density (mW/cm^2)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30 (IC:6)
1500 – 100.000 (IC:1500 – 150000)	1.0	30 (IC:6)

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

Operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (IC: 2.5W / 34.0dBm EIRP);
Operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (IC: 5.0W / 37.0dBm EIRP);

4.3 EMC Output Power Limits (ERP/EIRP) acc. to FCC part 22/24/27 / IC RSS-132, RSS-133, RSS-139 (to be additionally taken into account for maximum antenna gain considerations)

part 22: 7W ERP / 38.5dBm (IC: 11.5W / 40.6dBm EIRP)
part 24: 2W EIRP / 33.0dBm
part 27: 1W EIRP / 30.0dBm

Per KDB 447498 D01 FCC allows calculative estimation of RF exposure for mobile applications when routine environmental evaluation categorical exclusion applies and also for fixed applications.
When categorical exclusion can not be claimed for mobile applications MPE measurement is required for TCB approval.

RSS-102 of Industry Canada does generally not require RF exposure evaluation for fixed or mobile applications which stay below the given exclusion limits.

4.4 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of it's radiating structures from the body of persons according to it's use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm^2 or W/m^2)
P = power input to the antenna (mW or W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

The following calculations are – for the portion of the cellular transmitter - based on the specified maximum conducted average output power of the cellular module incorporated in the EUT and thus – considering the specified peak antenna gain of the integral antennae - resulting in the theoretical worst case maximum average ERP/EIRP, because all measured conducted average values are lower.

5.1 Routine Environmental Evaluation Applicability

Based on the theoretical maximum average ERP/EIRP, see above.
Pmax is the target conducted output power plus the upper tolerance as specified for the integrated cellular module. For the Bluetooth transmitter the maximum conducted output power value is taken from the relevant FCC grant;
Only the known worst cases with highest resulting average EIRP are listed per band.

Transmission Mode	**Pmax**	**Peak Gain**	**Duty Cycle**	**EIRP, source based time averaged ($EIRP_{max}$)**	**Total EIRP simultaneous transmissions intra-band (worst cases only)**	**FCC & IC Limit for** Routine Environmental Evaluation Applicability, EIRP	**Excluded?**
	dBm	dBi	%	dBm	dBm	dBm	
GPRS 850 1TS	33+2	-1.6	12.5	24.4	n.a.	33.9	yes
GPRS 850 2TS	**33+2**	**-1.6**	**25**	**27.4**	**n.a.**	**33.9**	**yes**
WCDMA Bd V	24+1	-1.6	100	23.4	n.a.	33.9	yes
GPRS 1900 1TS	30+2	+1.0	12.5	24.0	n.a.	36.9	yes
GPRS 1900 2TS	**30+2**	**+1.0**	**25**	**27.0**	**n.a.**	**36.9**	**yes**
WCDMA Bd II	24+1	+1.0	100	26.0	n.a.	36.9	yes
Bluetooth 2.4 GHz	3.0	0.04	100	3.04	n.a.	36.9	yes

Result: The transmitters in the equipment are categorically excluded from Routine Environmental Evaluation. There are no intra-band co-transmissions possible in the device.

5.2 Compliance with MPE (Power Density) limits

Limits:
Smax @ 824MHz = 0.55mW/cm^2 (824MHz is worst case as lowest operating frequency in the cellular band);
Smax @ 1900MHz and @ 2400MHz = 1.0mW/cm^2;

The highest source base time averaged EIRPmax per band calculated with the rated peak antenna gain values are taken from the table in section 5.1 above;
The highest power density is resulting from the formula: $S = EIRPmax / 4*\pi*r^2$;
The power density is calculated for the minimum distance r = 20cm;

Highest source base time averaged EIRP with GPRS 850 MHz, 2TS: 27.4dBm;
Resulting maximum power density at 850MHz: **S(850MHz) = 0.11mW/cm^2**

Highest source base time averaged EIRP with GPRS 1900 MHz, 2TS: 27dBm;
Resulting maximum power density at 1900MHz: **S(1900MHz) = 0.11mW/cm^2**

Result: The equipment fulfills the MPE limits for the minimum distance between the antenna and the human body of 20cm.

5.3 Simultaneous Transmission MPE Test Exclusion (per KDB 447498 D01)

Possible simultaneous transmissions: Cellular Radio and Bluetooth.
Consideration of simultanous transmission with the Bluetooth radio is obsolete due to the low power of only 2mW.

Result: The equipment is excluded from simultaneous transmission MPE test.

6 Revision History

Date	Change Description	Revision
2014-03-18	n.a.	initial