EUROFINS PRODUCT SERVICE GMBH

ACCREDITED
TESTING CERT# 1983.01

RF-EXPOSURE ASSESSMENT

FCC 47 CFR 2.1091
IC RSS-102

Telematics Unit

AT-100

FCC ID: ZOQAT-100
IC: 9734A-AT100

REPORT NUMBER: G0M-1105-1155-C-2

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1 General Information

1.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

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Operator:

Date	Eurofins-Lab.	Name	Signature
29.08.2011		C. Weber	C. Weber

Technical responsibility for area of testing:

Date	Eurofins	Name	Signature
29.08.2011		J. Zimmermann	J. Z

1.2 Testing laboratory

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Storkower Strasse 38c
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Germany
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DAKKS ACCREDITED TESTING LABORATORY
DAKKS-REGISTRATION NUMBER: D-PL-12092-01-01

RECOGNIZED NOTIFIED BODY EMC
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

RECOGNIZED NOTIFIED BODY R&TTE
REGISTRATION NUMBER: BNetzA-bS-02/51-53

FCC FILED TEST LABORATORY
REG.-NO. 96970

A2LA ACCREDITED TESTING LABORATORY
CERTIFICATE NO. 1983.01

BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

INDUSTRY CANADA FILED TEST LABORATORY
REG. NO. IC 3470

Test location, where different:

Name	: ./.
Street	: ./.
Town	: ./.
Country	: ./.
Telephone	: ./.
Fax	: ./.

1.3 Details of approval holder

Name	: Hughes Telematics, Inc.
Street	: 2002 Summit Blvd, Suite 1800
Town	: GA 30319 Atlanta, Georgia
Country	: USA
Telephone	: +1 404 573 5848
Fax	: +1 404 285 0648
Contact	: Mr. Bryant Elliott
Telephone	: +1 404 573 5848

Manufacturer:
(if applicable)

Name	: Hughes Telematics, Inc.
Street	: 2002 Summit Blvd, Suite 1800
Town	: GA 30319 Atlanta, Georgia
Country	: USA

1.4 Application details

Date of receipt of application	: 14.06.2011
Date of receipt of test item	: 14.06.2011
Date of assessment	: 29.08.2011

1.5 Acronyms and abbreviations

EUT	:	Equipment under Test
TX	:	Transmission
RX	:	Reception
RBW	:	Measurement Resolution Bandwidth
Pol	:	Measurement Polarization
N/A	:	Not applicable

1.6 Reference standards

Technical standards : **FCC 47 CFR 1.1310**
FCC 47 CFR 2.1091
FCC 47 CFR 2.1093

OET Bulletin 65 : ” ***Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Elec tromagnetic Fields*****” 1997**

RSS-102 Issue 4 : “*Radio Frequency (RF) Exposure Com pliance of Radiocommunication Apparatus (All Frequency Bands)*”, 2010

Safety Code 6: “*Limits of Human Exposure to Radiofre quency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz*”, 2009

IEEE C95.3 : “*IEEE Recommended Practice for Measure ments and Computations of Radio Frequency Electro magnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz*”, 2002

Health Canada : “*Technical Guide for Interpretation and Compliance Assessment of Health Canada’s Radiofre quency Exposure Guidelines*”, 2009

1.7 Test item

Description of test item	:	Telematics Unit
Type identification	:	AT-100
Serial Number	:	Unspecified
Hardware version	:	Rev. A
Software version	:	2.0.0
Radiation sources included	:	GSM850 / GSM1900 / Bluetooth
Equipment type	:	End product
Exposure Category	:	Uncontrolled / General public
Device type	:	Mobile

1.8 Referenced documents

FCC/IC Bluetooth test report:		G0M-1105-1155-P-15 Eurofins Product Service GmbH
FCC/IC GSM test report	:	G0M-1105-1155-P-2224 Eurofins Product Service GmbH

1.9 Additional information

None

2 Exposure Assessment

2.1 Device Types

Fixed

A fixed device is defined as a device physically secured at one fixed location and cannot be easily relocated.

Mobile

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. (47 CFR 2.1091)

Portable

A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. (47 CFR 2.1093)

2.2 Exposure Categories

Occupational / Controlled Exposure

In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.

General Public / Uncontrolled Exposure

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

2.3 MPE Limits

IC Limits for maximum permissible exposure (MPE)				
Frequency range [MHz]	**Electric field strength [V/m]**	**Magnetic field strength [A/m]**	**Power density [W/m^2]**	**Averaging time [min]**
Limits for Occupational / Controlled Exposure				
0.003 – 1.0	600	4.9		6
1 – 10	600/f	4.9/f		6
10 – 30	60	4.9/f		6
30 – 300	60	0.163	10.0*	6
300 – 1500	$3.54 \cdot f^{0.5}$	$0.0094 \cdot f^{0.5}$	f/30	6
1500 – 15000	137	0.364	50	6
15000 – 150000	137	0.364	50	$616000/f^{0.5}$
150000 – 300000	$0.354 \cdot f^{0.5}$	$9.4 \cdot 10^{-4} \cdot f^{0.5}$	$3.33 \cdot 10^{-4} \cdot f$	$616000/f^{0.5}$
Limits for General Population / Uncontrolled Exposure				
0.003 – 1.0	280	2.19		6
1 – 10	280/f	2.19/f		6
10 – 30	28	2.19/f		6
30 – 300	28	0.073	2.0*	6
300 – 1500	$1.585 \cdot f^{0.5}$	$0.0042 \cdot f^{0.5}$	f/150	6
1500 – 15000	61.4	0.163	10	6
15000 – 150000	61.4	0.163	10	$616000/f^{0.5}$
150000 – 300000	$0.158 \cdot f^{0.5}$	$4.21 \cdot 10^{-4} \cdot f^{0.5}$	$6.67 \cdot 10^{-5} \cdot f$	$616000/f^{0.5}$

* = Power density is applicable at frequencies greater than 100MHz
f in MHz

FCC Limits for maximum permissible exposure (MPE)				
Frequency range [MHz]	**Electric field strength [V/m]**	**Magnetic field strength [A/m]**	**Power density [mW/cm^2]**	**Averaging time [min]**
Limits for Occupational / Controlled Exposure				
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1842/f	4.89/f	(900/f^2)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500			f/300	6
1500 – 100000			5.0	6
Limits for General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	(100)*	30
1.34 – 30	842/f	2.19/f	(180/f^2)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500			f/1500	30
1500 – 100000			1.0	30

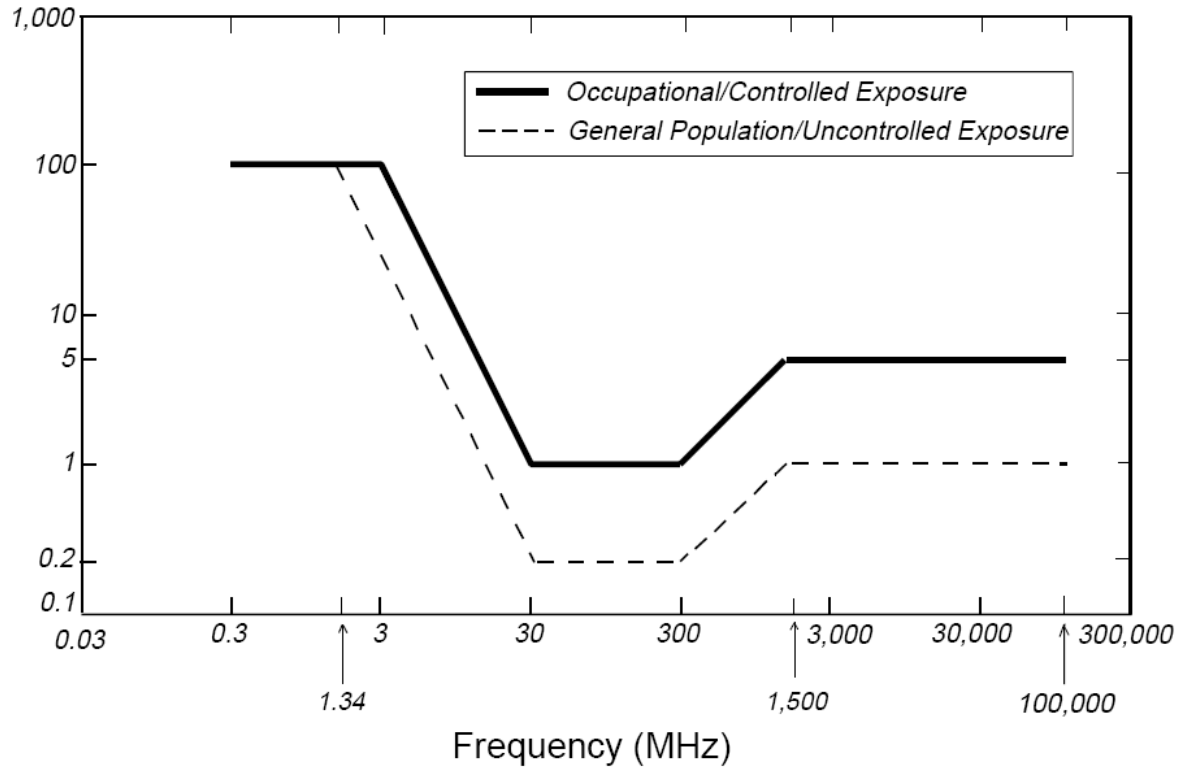
* = Plane-wave equivalent power density
f in MHz
47 CFR 1.1310

Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can execise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Figure 1. *FCC Limits for Maximum Permissible Exposure (MPE)*

Plane-wave Equivalent Power Density



2.4 Transmission modes

GSM850	
TX frequency range	824 - 849MHz
Channels	128 – 251
Transmission modes	Voice, GPRS, EGPRS
Modulation	GMSK, 8-PSK
Multislot class	10
Maximum timeslots used	2 of 8
Maximum radiated power	29.54dBm
Antenna type	Integrated
Antenna diameter	5cm

GSM1900	
TX frequency range	1850 - 1900MHz
Channels	512 – 810
Transmission modes	Voice, GPRS, EGPRS
Modulation	GMSK, 8-PSK
Multislot class	10
Maximum timeslots used	2 of 8
Maximum radiated power	29.35dBm
Antenna type	Integrated
Antenna diameter	5cm

Bluetooth	
TX frequency range	2400 -2483.5MHz
Channels	0 – 78 (hopping channels)
Transmission modes	BR, EDR
Modulation	GFSK, 8-PSK
Maximum duty cycle	47%
Maximum radiated power	2.51dBm
Antenna type	Integrated
Antenna diameter	1cm

2.5 Exposure assessment

GSM850		
Transmission mode		
Exposure Category	General Public	
TX frequency range [MHz]	824-849MHz	
Assessment frequency	848.80MHz	
Duty cycle	25.0%	
Conducted power	29.34dBm	
Radiated power	29.54dBm	
Antenna gain	0.20dBi	
Antenna diameter	5.00cm	
Far-field distance		
Wavelength	0.353m	35.34cm
Antenna far-field distance	0.014m	1.41cm
Power Evaluation		
Conducted power	859.01mW	29.34dBm
Antenna gain	1.05	0.20dBi
Calculated radiated power	899.50mW	29.54dBm
Measured radiated power	899.50mW	29.54dBm
Source averaged power		
Duty cycle	25.0%	
Duty cycle correction	0.25	-6.02dB
Maximum radiated power	899.50mW	29.54dBm
Averaged radiated power	224.87mW	23.52dBm
Power density		
Compliance power density limit	0.566mW/cm²	5.66W/m²
Power density @ far-field distance	8.942mW/cm²	89.417W/m²
Power density @ 20cm	0.045mW/cm²	0.447W/m²
Distance for compliance power density	0.056m	5.62cm
Verdict	**The power density of the EUT at 20cm is below the FCC/IC MPE limit**	

GSM1900		
Transmission mode		
Exposure Category	General Public	
TX frequency range [MHz]	1850-1910MHz	
Assessment frequency	1909.80MHz	
Duty cycle	25.0%	
Conducted power	27.85dBm	
Radiated power	29.35dBm	
Antenna gain	1.50dBi	
Antenna diameter	5.00cm	
Far-field distance		
Wavelength	0.157m	15.71cm
Antenna far-field distance	0.032m	3.18cm
Power Evaluation		
Conducted power	609.54mW	27.85dBm
Antenna gain	1.41	1.50dBi
Calculated radiated power	860.99mW	29.35dBm
Measured radiated power	860.99mW	29.35dBm
Source averaged power		
Duty cycle	25.0%	
Duty cycle correction	0.25	-6.02dB
Maximum radiated power	860.99mW	29.35dBm
Averaged radiated power	215.25mW	23.33dBm
Power density		
Compliance power density limit	1.000mW/cm²	10.00W/m²
Power density @ far-field distance	1.691mW/cm²	16.907W/m²
Power density @ 20cm	0.043mW/cm²	0.428W/m²
Distance for compliance power density	0.041m	4.14cm
Verdict	**The power density of the EUT at 20cm is below the FCC/IC MPE limit**	

Bluetooth		
Transmission mode		
Exposure Category	General Public	
TX frequency range [MHz]	2400-2483.5MHz	
Assessment frequency	2480.00MHz	
Duty cycle	47.0%	
Conducted power	2.60dBm	
Radiated power	4.60dBm	
Antenna gain	2.00dBi	
Antenna diameter	1.00cm	
Far-field distance		
Wavelength	0.121m	12.10cm
Antenna far-field distance	0.002m	0.17cm
Power Evaluation		
Conducted power	1.82mW	2.60dBm
Antenna gain	1.58	2.00dBi
Calculated radiated power	2.88mW	4.60dBm
Measured radiated power	2.88mW	4.60dBm
Source averaged power		
Duty cycle	47.0%	
Duty cycle correction	0.47	-3.28dB
Maximum radiated power	2.88mW	4.60dBm
Averaged radiated power	1.36mW	1.32dBm
Power density		
Compliance power density limit	1.000mW/cm²	10.00W/m²
Power density @ far-field distance	3.946mW/cm²	39.461W/m²
Power density @ 20cm	0.000mW/cm²	0.003W/m²
Distance for compliance power density	0.003m	0.33cm
Verdict	**The power density of the EUT at 20cm is below the FCC/IC MPE limit**	