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# ASSESSMENT REPORT

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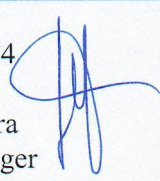
**Report No.:**  
**28842IDT.002**

**REPORT ON:** RF EXPOSURE ASSESSMENT OF THE F3507g ERICSSON MOBILE BROADBAND MODULE INSTALLED IN THE DELL ADAMO 13 LAPTOP COMPUTER

<b>Product</b>	: Ericsson Mobile Broadband Module
<b>Trade Mark</b>	: Ericsson
<b>Model</b>	: F3507g
<b>FCC ID:</b>	: VV7-MBMF3507G-D
<b>Manufacturer</b>	: Ericsson AB
<b>Requested by</b>	: Ericsson AB
<b>Host Platform</b>	: DELL ADAMO 13
<b>Other Identification</b>	: Regulatory Model: P01S
<b>Standard(s)</b>	: OET Bulletin 65 Edition 97-01 August 1997 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 1999/519/EC Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003 ARPANSA RPS No. 3 Vodafone requirements [1999/519/EC]

This test report includes 2 annexes and therefore, the total number of pages is 25.

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Date: 2008-11-24	Issued by:  Date: 2008-11-24 Nadia Martínez Worldwide Compliance Engineer	Approved by:  Date: 2008-11-24 Juan Carlos Mora Technical Manager Laboratories Division
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## 1. COMPETENCE AND GUARANTEES

AT4 wireless is a testing laboratory competent to carry out the evaluation described in this report.

AT4 wireless guarantees the reliability of the data presented in this report, which is based on the information available at AT4 wireless at the time of performance of the evaluation.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under review and the results of such evaluation

## 2. GENERAL CONDITIONS

1. This report refers only to the item that has undergone the evaluation as described in Annex A of this report according to the information provided by the applicant.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

## 3. CHARACTERISTICS OF THE EVALUATION

### 3.1. SERVICES REQUESTED

RF exposure assessment of the F3507g Ericsson Mobile Broadband Module installed in the DELL ADAMO 13 laptop computer according to:

Requirements	Frequency bands
<p>OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields</p> <p>FCC 47 CFR § 1.1307 - Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.</p> <p>FCC 47 CFR § 1.1310 - Radiofrequency radiation exposure limits.</p>	<p>GSM 850, FDD V, PCS 1900, FDD II</p>
<p>1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)</p>	<p>E-GSM 900, DCS 1800, FDD I</p>

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Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003 ARPANSA RPS No. 3 – Maximum Exposure Levels to Radiofrequency Fields (3 kHz to 300 GHz)	FDD V, E-GSM 900, DCS 1800, FDD I
Vodafone requirements [1999/519/EC]	GSM 850, FDD V, E-GSM 900, DCS 1800, PCS 1900, FDD II, FDD I

### 3.2. REQUIREMENTS AND METHOD

The evaluation has been carried out according to the following documents and standards:

Requirements	Frequency bands
OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields FCC 47 CFR § 1.1307 - Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared. FCC 47 CFR § 1.1310 - Radiofrequency radiation exposure limits.	GSM 850, FDD V, PCS 1900, FDD II
1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)	E-GSM 900, DCS 1800, FDD I
Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003 ARPANSA RPS No. 3 – Maximum Exposure Levels to Radiofrequency Fields (3 kHz to 300 GHz)	FDD V, E-GSM 900, DCS 1800, FDD I
Vodafone requirements [1999/519/EC]	GSM 850, FDD V, E-GSM 900, DCS 1800, PCS 1900, FDD II, FDD I

## 4. IDENTIFICATION DATA SUPPLIED BY THE APPLICANT

Identification data included in this section has been supplied by the client.

### 4.1. APPLICANT

**Name / Company:** Ericsson AB

**V.A.T. Registration number:** 556056-625801

**Address:** Lindholmspiren 11, SE-417 56 Goteborg

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**Country:** Sweden

**Telephone:** +46 31 747 0000

**Fax:** +46 31 747 6033

#### 4.2. REPRESENTATIVE

**Name:** Pelle Hellberg

**Address:** Lindholmospiren 11, SE-417 56 Goteborg

**Country:** Sweden

**Telephone:** +46 31 747 0000

**Fax:** +46 31 747 6033

#### 4.3. IDENTIFICATION OF ITEM/ITEMS EVALUATED

**Product:** Ericsson Mobile Broadband Module

**Trade mark:** Ericsson

**Model:** F3507g

**FCC ID:** VV7-MBMF3507G-D

**Manufacturer:** Ericsson AB

**Country of manufacture:** China

**Host platform:** DELL ADAMO 13

**Description:** 850/900/1800/1900/2100 MHz GSM/GPRS Class10/EDGE/HSDPA/HSUPA/WCDMA Release 6 Module installed in a DELL ADAMO 13 Laptop.

### 5. EVALUATION RESULTS

Abbreviations used in the VERDICT column of the following tables are:

- C** Compliant with requirements
- NC** Not Compliant with requirements
- NA** Not Applicable
- NE** Not Evaluated

#### 5.1. RESULTS FOR ITEM EVALUATED TRANSMITTING ALONE

DOCUMENT/STANDARD	VERDICT			
	NA	C	NC	NE
OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields		C		
FCC 47 CFR § 1.1307 - Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.				
FCC 47 CFR § 1.1310 - Radiofrequency radiation exposure limits.				
1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)		C		

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Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003 ARPANSA RPS No. 3 – Maximum Exposure Levels to Radiofrequency Fields (3 kHz to 300 GHz)	C
Vodafone requirements [1999/519/EC]	C

## 5.2. RESULTS FOR ITEM EVALUATED TRANSMITTING SIMULTANEOUSLY WITH OTHER CO-LOCATED TRANSMITTERS

DOCUMENT/STANDARD	VERDICT			
	NA	C	NC	NE
OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields FCC 47 CFR § 1.1307 - Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared. FCC 47 CFR § 1.1310 - Radiofrequency radiation exposure limits.		C		
1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)		C		
Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003 ARPANSA RPS No. 3 – Maximum Exposure Levels to Radiofrequency Fields (3 kHz to 300 GHz)		C		
Vodafone requirements [1999/519/EC]		C		

## 6. REMARKS AND COMMENTS

GSM and GPRS modes have been evaluated together because both modes share the same power class and modulation scheme in the uplink.

WCDMA and HSDPA modes have been evaluated together because HSDPA is an improved mode of operation only for Downlink (equipment reception), but using the normal WCDMA mode for the Uplink (equipment transmission).

## 7. SUMMARY

Considering the results of the performed analysis and evaluation, stated in annexes A and B, the item under evaluation is **IN COMPLIANCE** with the specifications listed in section 3.1 “SERVICES REQUESTED”.

NOTE: The results presented in this report apply only to the particular item under evaluation established in section “4.3. IDENTIFICATION OF ITEM/ITEMS EVALUATED” of this document, as presented for evaluation by the applicant.

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## ANNEX A

### HOST PLATFORM ANALYSIS

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## A.1. INTRODUCTION

DELL ADAMO 13 is a widescreen laptop computer which can be fitted with the following transmitters:

### MAIN/PRIMARY TRANSMITTER:

#### WWAN transmitter:

Type of equipment : Ericsson Mobile Broadband Module  
Trade mark : Ericsson  
Model : F3507g  
FCC ID : VV7-MBMF3507G-D

### ADDITIONAL/SECONDARY TRANSMITTERS:

#### Bluetooth transmitter:

Type of equipment : Bluetooth 2.0 + EDR  
Trade mark : Dell  
Model : Wireless 370  
FCC ID : QDS-BRCM1034

#### WLAN transmitters:

Type of equipment : 802.11abgn WLAN transmitter  
Trade mark : Intel  
Model : WiFi Link 5300  
FCC ID : E2K533ANH

Type of equipment : 802.11abgn WLAN transmitter  
Trade mark : Intel  
Model : WiFi Link 5100  
FCC ID : E2K512ANHMW

**NOTE:** - Only one of the listed above WLAN transmitters can be installed in the DELL ADAMO 13 laptop computer at one time.

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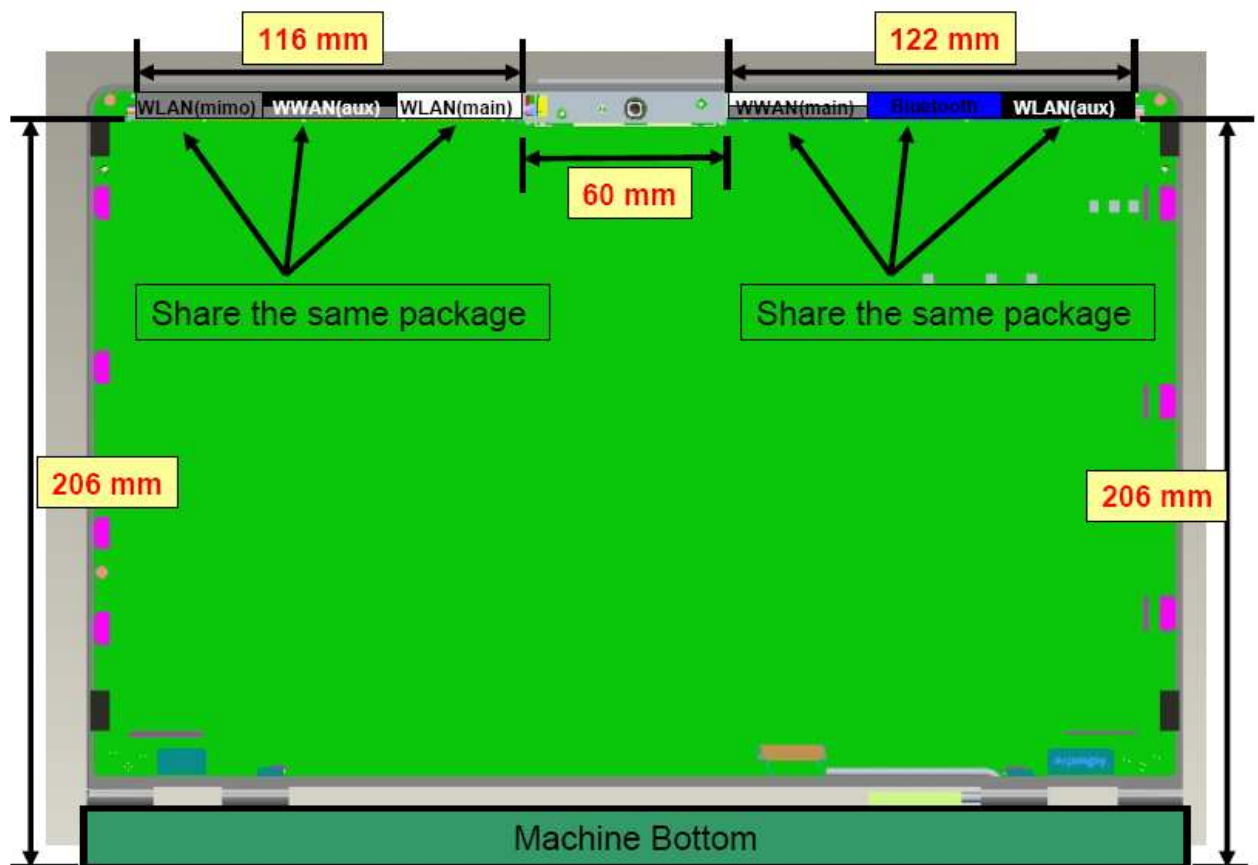


## A.2. ANTENNAS INFORMATION

### Antennas locations and distances – Option 1:

Antenna	Antenna location	Maximum antenna gain (dBi)	Antenna to user distance (mm)	Antenna to WWAN Tx antenna distance (mm)
WWAN MAIN	Top right corner of the display	0,93	206	-
WLAN MAIN	Top left corner of the display	3	206	< 200
WLAN AUX	Top right corner of the display	3	206	< 200
WLAN MIMO	Top left corner of the display	3	206	< 200
Bluetooth	Top right corner of the display	3	206	< 200

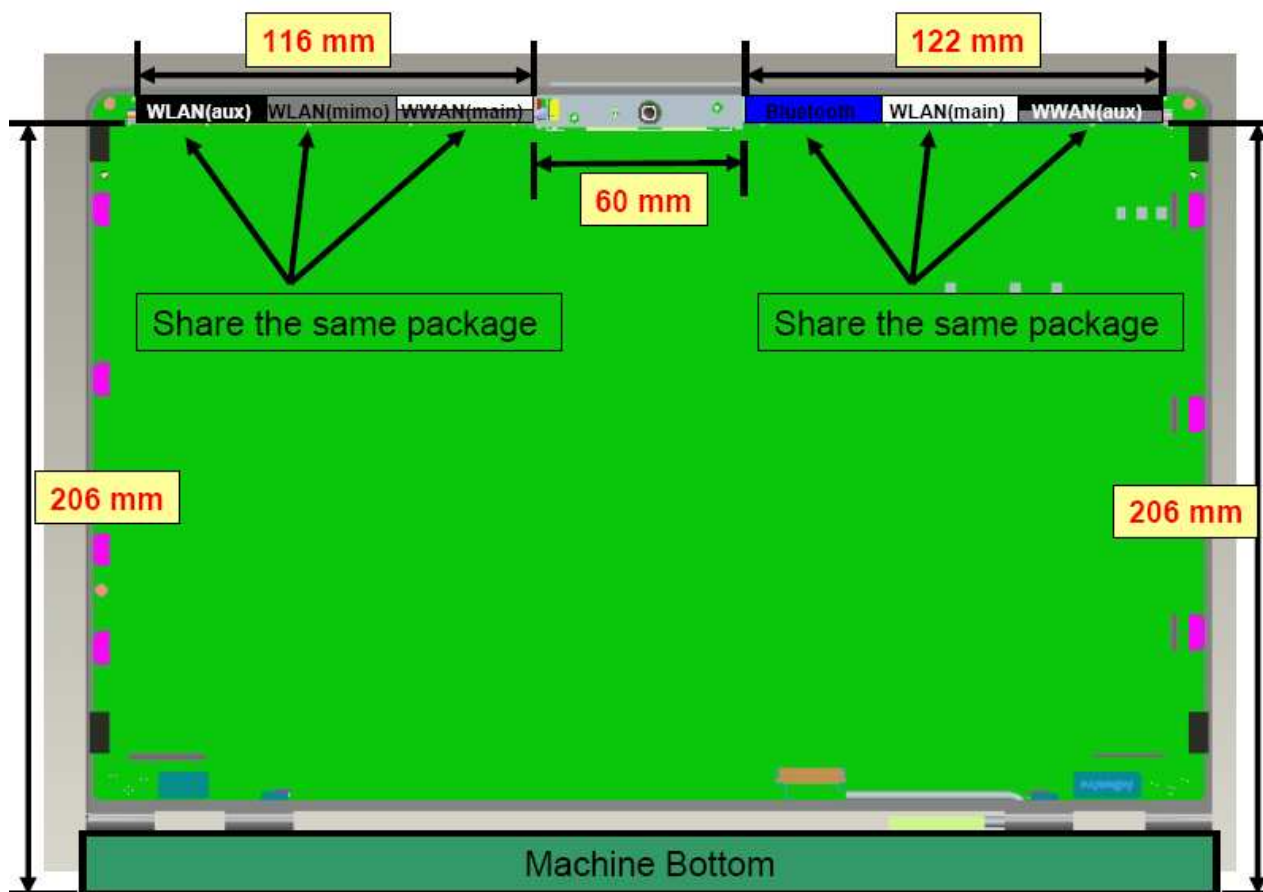
### Diagram of the WWAN, WLAN and Bluetooth transmitters' antennas locations – Option 1:



**Antennas locations and distances – Option 2:**

Antenna	Antenna location	Maximum antenna gain (dBi)	Antenna to user distance (mm)	Antenna to WWAN Tx antenna distance (mm)
WWAN MAIN	Top left corner of the display	0,93	206	-
WLAN MAIN	Top right corner of the display	3	206	< 200
WLAN AUX	Top left corner of the display	3	206	< 200
WLAN MIMO	Top left corner of the display	3	206	< 200
Bluetooth	Top right corner of the display	3	206	< 200

**Diagram of the WWAN, WLAN and Bluetooth transmitters' antennas locations – Option 2:**



## CONCLUSIONS:

- WLAN transmitter is in co-location condition in relation to the WWAN transmitter, Ericsson F3507g, (WWAN antenna to WLAN antennas distance < 20 cm). WLAN contribution has to be considered when evaluating the exposure to electromagnetic fields due to the F3507g Ericsson Mobile Broadband Module installed in the DELL ADAMO 13 laptop computer.
- Bluetooth transmitter is in co-location condition in relation to the WWAN transmitter, Ericsson F3507g, (WWAN antenna to Bluetooth antenna distance < 20 cm). Bluetooth contribution has to be considered when evaluating the exposure to electromagnetic fields due to the F3507g Ericsson Mobile Broadband Module installed in the DELL ADAMO 13 laptop computer.
- WWAN transmitter, Ericsson F3507g, WLAN transmitters and Bluetooth transmitters are in mobile exposure conditions (antenna to user distance > 20 cm).

## A.3. TRANSMITTERS SPECIFICATIONS

### MAIN/PRIMARY TRANSMITTER:

#### WWAN transmitter:

Type of equipment : Ericsson Mobile Broadband Module  
 Trade mark : Ericsson  
 Model : F3507g  
 FCC ID : VV7-MBMF3507G-D  
 Output power : See table

Frequency Band	Mode	Frequency range (MHz)	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty Cycle	Equivalent conducted output power (mW)	Maximum antenna gain (dBi)	Maximum antenna gain (numerical)	EIRP (mW)
GSM 850	GSM/GPRS	824,2 - 848,8	33,00	1995,26	25%	498,82	0,93	1,24	617,93
	EDGE	824,2 - 848,8	31,00	1258,93	25%	314,73	0,93	1,24	389,89
FDD V	WCDMA/HSDPA	826,4 - 846,6	23,62	230,14	100%	230,14	0,93	1,24	285,10
	HSUPA	826,4 - 846,6	23,08	203,24	100%	203,24	0,93	1,24	251,77
E-GSM 900	GSM/GPRS	880,2 - 914,8	33,99	2506,11	25%	626,53	0,93	1,24	776,14
	EDGE	880,2 - 914,8	27,00	501,19	25%	125,30	0,93	1,24	155,22
DCS 1800	GSM/GPRS	1710,2 - 1784,8	32,54	1794,73	25%	448,68	0,93	1,24	555,83
	EDGE	1710,2 - 1784,8	26,10	407,38	25%	101,85	0,93	1,24	126,17
PCS 1900	GSM/GPRS	1850,2 - 1909,8	29,30	851,14	25%	212,78	0,93	1,24	263,60
	EDGE	1850,2 - 1909,8	28,70	741,31	25%	185,33	0,93	1,24	229,58
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	23,00	199,53	100%	199,53	0,93	1,24	247,17
	HSUPA	1852,4 - 1907,6	22,80	190,55	100%	190,55	0,93	1,24	236,05
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	22,40	173,78	100%	173,78	0,93	1,24	215,28
	HSUPA	1922,4 - 1977,6	22,10	162,18	100%	162,18	0,93	1,24	200,91

### ADDITIONAL/SECONDARY TRANSMITTERS:

#### Bluetooth transmitters:

Type of equipment : Bluetooth 2.0 + EDR  
 Trade mark : Dell  
 Model : Wireless 370  
 FCC ID : QDS-BRCM1034  
 Output power : See table

Model name	FCC ID	Frequency range (MHz)	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty Cycle	Equivalent conducted output power (mW)	Maximum antenna gain (dBi)	Maximum antenna gain (numerical)	EIRP (mW)
Dell Wireless 370	QDS-BRCM1034	2400-2483,5	4,31	2,70	100%	2,70	3,00	2,00	5,39

**WLAN transmitters:**

Type of equipment : 802.11abgn WLAN transmitter  
 Trade mark : Intel  
 Model : WiFi Link 5300  
 FCC ID : E2K533ANH  
 Output power : See table

Model name	FCC ID	Frequency range (MHz)	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty Cycle	Equivalent conducted output power (mW)	Maximum antenna gain (dBi)	Maximum antenna gain (numerical)	EIRP (mW)
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	26,41	438,00	100%	438,00	3,00	2,00	873,92
		5150,0 - 5350,0	16,53	45,00	100%	45,00	3,00	2,00	89,79
		5470,0 - 5725,0	16,53	45,00	100%	45,00	3,00	2,00	89,79
		5725,0-5850,0	26,44	441,00	100%	441,00	3,00	2,00	879,91

Type of equipment : 802.11abgn WLAN transmitter  
 Trade mark : Intel  
 Model : WiFi Link 5100  
 FCC ID : E2K512ANHMW  
 Output power : See table

Model name	FCC ID	Frequency range (MHz)	Maximum conducted output power (dBm)	Maximum conducted output power (mW)	Duty Cycle	Equivalent conducted output power (mW)	Maximum antenna gain (dBi)	Maximum antenna gain (numerical)	EIRP (mW)
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	18,57	72,00	100%	72,00	3,00	2,00	143,66
		5150,0 - 5350,0	16,53	45,00	100%	45,00	3,00	2,00	89,79
		5470,0 - 5725,0	18,51	71,00	100%	71,00	3,00	2,00	141,66
		5725,0 - 5850,0	17,92	62,00	100%	62,00	3,00	2,00	123,71

## ANNEX B

### RF EXPOSURE ASSESSMENT

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## B.1. MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMITS

### B.1.1. FCC LIMITS

#### Normative documents:

- OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
- FCC 47 CFR § 1.1307 - Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.
- FCC 47 CFR § 1.1310 - Radiofrequency radiation exposure limits.1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

#### Reference levels:

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density ( $\frac{W}{m^2}$ )	Averaging time (minutes)
300 – 1500	$\frac{f(MHz)}{1500}$	30
1500 – 100.000	1.0	30

#### MPE limits:

- Main/Primary transmitter (F3507g Ericsson Mobile Broadband Module):

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit ( $S_{eq}$ ) ( $\frac{mW}{cm^2}$ )
GSM 850	GSM/GPRS	824,2 - 848,8	824,20	0,5495
	EDGE	824,2 - 848,8	824,20	0,5495
FDD V	WCDMA/HSDPA	826,4 - 846,6	826,40	0,5509
	HSUPA	826,4 - 846,6	826,40	0,5509
PCS 1900	GSM/GPRS	1850,2 - 1909,8	1850,20	1,0000
	EDGE	1850,2 - 1909,8	1850,20	1,0000
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	1852,40	1,0000
	HSUPA	1852,4 - 1907,6	1852,40	1,0000

- Additional/Secondary transmitters: All the transmission frequencies for WLAN and Bluetooth modules are above 1.5 GHz, so that the MPE limit is 1 mW/cm<sup>2</sup>.

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## B.1.2. EUROPEAN UNION MPE LIMITS

### Normative document:

- 1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

### Reference levels:

The table below is excerpted from Table 2 of 1999/519/EC, titled “Reference levels for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz, unperturbed rms values)”:

Frequency range	E-field strength ( $\frac{V}{m}$ )	H-field strength ( $\frac{A}{m}$ )	B-field ( $\mu T$ )	Equivalent plane wave power density $S_{eq}$ ( $\frac{W}{m^2}$ )
400 - 2000 MHz	$1,375 \cdot f(MHz)^{1/2}$	$0,0037 \cdot f(MHz)^{1/2}$	$0,0046 \cdot f(MHz)^{1/2}$	$\frac{f(MHz)}{200}$
2 - 300 GHz	61	0,16	0,2	10

### MPE limits:

- Main/Primary transmitter (F3507g Ericsson Mobile Broadband Module):

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit ( $S_{eq}$ ) ( $\frac{mW}{cm^2}$ )
E-GSM 900	GSM/GPRS	880,2 - 914,8	880,20	0,4401
	EDGE	880,2 - 914,8	880,20	0,4401
DCS 1800	GSM/GPRS	1710,2 - 1784,8	1710,20	0,8551
	EDGE	1710,2 - 1784,8	1710,20	0,8551
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	1922,40	0,9612
	HSUPA	1922,4 - 1977,6	1922,40	0,9612

- Additional/Secondary transmitters: All the transmission frequencies for WLAN and Bluetooth modules are above 2 GHz, so that the MPE limit is  $1 \text{ mW/cm}^2$ .

## B.1.3. AUSTRALIA MPE LIMITS

### Normative documents:

- Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard 2003
- ARPANSA RPS No. 3 – Maximum Exposure Levels to Radiofrequency Fields (3 kHz to 300 GHz)

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### Reference levels:

The table below is excerpted from Table 7 of ARPANSA RPS No. 3, titled “Reference levels for time averaged exposure to RMS electric and magnetic fields (unperturbed rms values)”:

Exposure category	Frequency range	E-field strength	H-field strength	Equivalent plane wave power density	Equivalent plane wave power density $S_{eq}$
		$\frac{V}{m}$ rms)	$\frac{A}{m}$ rms)	$S_{eq}$ $(\frac{W}{m^2})$	$S_{eq}$ $(\frac{mW}{cm^2})$
General public	400 MHz - 2 GHz	$1,37 \cdot f(MHz)^{1/2}$	$0,00364 \cdot f(MHz)^{1/2}$	$\frac{f(MHz)}{200}$	$\frac{f(MHz)}{2000}$
General public	2 - 300 GHz	61	0,16	10	1

### MPE limits:

- Main/Primary transmitter (F3507g Ericsson Mobile Broadband Module):

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit ( $S_{eq}$ ) $(\frac{mW}{cm^2})$
FDD V	WCDMA/HSDPA	826,4 - 846,6	826,40	0,4132
	HSUPA	826,4 - 846,6	826,40	0,4132
E-GSM 900	GSM/GPRS	880,2 - 914,8	880,20	0,4401
	EDGE	880,2 - 914,8	880,20	0,4401
DCS 1800	GSM/GPRS	1710,2 - 1784,8	1710,20	0,8551
	EDGE	1710,2 - 1784,8	1710,20	0,8551
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	1922,40	0,9612
	HSUPA	1922,4 - 1977,6	1922,40	0,9612

- Additional/Secondary transmitters: All the transmission frequencies for WLAN and Bluetooth modules are above 2 GHz, so that the MPE limit is  $1 \text{ mW/cm}^2$ .

### B.1.4. VODAFONE MPE LIMITS

#### Normative document:

- 1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

### Reference levels:

The table below is excerpted from Table 2 of 1999/519/EC, titled “Reference levels for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz, unperturbed rms values)”:

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Exposure category	Frequency range	E-field strength ( $\frac{V}{m}$ rms)	H-field strength ( $\frac{A}{m}$ rms)	Equivalent plane wave power density $S_{eq}$ ( $\frac{W}{m^2}$ )	Equivalent plane wave power density $S_{eq}$ ( $\frac{mW}{cm^2}$ )
General public	400 MHz - 2 GHz	$1,37 \cdot f(MHz)^{1/2}$	$0,00364 \cdot f(MHz)^{1/2}$	$\frac{f(MHz)}{200}$	$\frac{f(MHz)}{2000}$
General public	2 - 300 GHz	61	0,16	10	1

#### MPE limits:

- Main/Primary transmitter (F3507g Ericsson Mobile Broadband Module):

Frequency Band	Mode	Frequency Range (MHz)	Reference frequency (MHz)	MPE limit ( $S_{Lim}$ ) ( $\frac{mW}{cm^2}$ )
GSM 850	GSM/GPRS	824,2 - 848,8	824,20	0,4121
	EDGE	824,2 - 848,8	824,20	0,4121
FDD V	WCDMA/HSDPA	826,4 - 846,6	826,40	0,4132
	HSUPA	826,4 - 846,6	826,40	0,4132
E-GSM 900	GSM/GPRS	880,2 - 914,8	880,20	0,4401
	EDGE	880,2 - 914,8	880,20	0,4401
DCS 1800	GSM/GPRS	1710,2 - 1784,8	1710,20	0,8551
	EDGE	1710,2 - 1784,8	1710,20	0,8551
PCS 1900	GSM/GPRS	1850,2 - 1909,8	1850,20	0,9251
	EDGE	1850,2 - 1909,8	1850,20	0,9251
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	1852,40	0,9262
	HSUPA	1852,4 - 1907,6	1852,40	0,9262
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	1922,40	0,9612
	HSUPA	1922,4 - 1977,6	1922,40	0,9612

- Additional/Secondary transmitters: All the transmission frequencies for WLAN and Bluetooth modules are above 2 GHz, so that the MPE limit is 1 mW/cm<sup>2</sup>.

## B.2. RF EXPOSURE ASSESSMENT – INDIVIDUAL TRANSMITTERS

### B.2.1. INTRODUCTION

Calculations to predict power density levels in the far-field of the antenna are made by use of the following equation:

$$S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW)

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 (appropriate units, e.g., cm)

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## B.2.2. RF EXPOSURE ASSESSMENT FOR F3507g ERICSSON MOBILE BROADBAND MODULE INSTALLED IN DELL ADAMO 13 LAPTOP COMPUTER

### FCC REQUIREMENTS

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density ( $S_{eq}$ ) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ $\left(\frac{mW}{cm^2}\right)$	MPE limit ( $S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$	COMPLIANCE ( $S_{eq} < S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$
GSM 850	GSM/GPRS	824,2 - 848,8	617,93	20,60	0,1159	0,5495	COMPLIANT
	EDGE	824,2 - 848,8	389,89	20,60	0,0731	0,5495	COMPLIANT
FDD V	WCDMA/HSDPA	826,4 - 846,6	285,10	20,60	0,0535	0,5509	COMPLIANT
	HSUPA	826,4 - 846,6	251,77	20,60	0,0472	0,5509	COMPLIANT
PCS 1900	GSM/GPRS	1850,2 - 1909,8	263,60	20,60	0,0494	1,0000	COMPLIANT
	EDGE	1850,2 - 1909,8	229,58	20,60	0,0431	1,0000	COMPLIANT
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	247,17	20,60	0,0464	1,0000	COMPLIANT
	HSUPA	1852,4 - 1907,6	236,05	20,60	0,0443	1,0000	COMPLIANT

### EUROPEAN UNION REQUIREMENTS

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density ( $S_{eq}$ ) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ $\left(\frac{mW}{cm^2}\right)$	MPE limit ( $S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$	COMPLIANCE ( $S_{eq} < S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$
E-GSM 900	GSM/GPRS	880,2 - 914,8	776,14	20,60	0,1455	0,4401	COMPLIANT
	EDGE	880,2 - 914,8	155,22	20,60	0,0291	0,4401	COMPLIANT
DCS 1800	GSM/GPRS	1710,2 - 1784,8	555,83	20,60	0,1042	0,8551	COMPLIANT
	EDGE	1710,2 - 1784,8	126,17	20,60	0,0237	0,8551	COMPLIANT
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	215,28	20,60	0,0404	0,9612	COMPLIANT
	HSUPA	1922,4 - 1977,6	200,91	20,60	0,0377	0,9612	COMPLIANT

### AUSTRALIA REQUIREMENTS

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density ( $S_{eq}$ ) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ $\left(\frac{mW}{cm^2}\right)$	MPE limit ( $S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$	COMPLIANCE ( $S_{eq} < S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$
FDD V	WCDMA/HSDPA	826,4 - 846,6	285,10	20,60	0,0535	0,4132	COMPLIANT
	HSUPA	826,4 - 846,6	251,77	20,60	0,0472	0,4132	COMPLIANT
E-GSM 900	GSM/GPRS	880,2 - 914,8	776,14	20,60	0,1455	0,4401	COMPLIANT
	EDGE	880,2 - 914,8	155,22	20,60	0,0291	0,4401	COMPLIANT
DCS 1800	GSM/GPRS	1710,2 - 1784,8	555,83	20,60	0,1042	0,8551	COMPLIANT
	EDGE	1710,2 - 1784,8	126,17	20,60	0,0237	0,8551	COMPLIANT
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	215,28	20,60	0,0404	0,9612	COMPLIANT
	HSUPA	1922,4 - 1977,6	200,91	20,60	0,0377	0,9612	COMPLIANT

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## VODAFONE REQUIREMENTS

Frequency Band	Mode	Frequency Range (MHz)	EIRP (mW)	Evaluation distance (R) (cm)	Power Density ( $S_{eq}$ ) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ $\left(\frac{mW}{cm^2}\right)$	MPE limit ( $S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$	COMPLIANCE ( $S_{eq} < S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$
GSM 850	GSM/GPRS	824,2 - 848,8	617,93	20,60	0,1159	0,4121	COMPLIANT
	EDGE	824,2 - 848,8	389,89	20,60	0,0731	0,4121	COMPLIANT
FDD V	WCDMA/HSDPA	826,4 - 846,6	285,10	20,60	0,0535	0,4132	COMPLIANT
	HSUPA	826,4 - 846,6	251,77	20,60	0,0472	0,4132	COMPLIANT
E-GSM 900	GSM/GPRS	880,2 - 914,8	776,14	20,60	0,1455	0,4401	COMPLIANT
	EDGE	880,2 - 914,8	155,22	20,60	0,0291	0,4401	COMPLIANT
DCS 1800	GSM/GPRS	1710,2 - 1784,8	555,83	20,60	0,1042	0,8551	COMPLIANT
	EDGE	1710,2 - 1784,8	126,17	20,60	0,0237	0,8551	COMPLIANT
PCS 1900	GSM/GPRS	1850,2 - 1909,8	263,60	20,60	0,0494	0,9251	COMPLIANT
	EDGE	1850,2 - 1909,8	229,58	20,60	0,0431	0,9251	COMPLIANT
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	247,17	20,60	0,0464	0,9262	COMPLIANT
	HSUPA	1852,4 - 1907,6	236,05	20,60	0,0443	0,9262	COMPLIANT
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	215,28	20,60	0,0404	0,9612	COMPLIANT
	HSUPA	1922,4 - 1977,6	200,91	20,60	0,0377	0,9612	COMPLIANT

### B.2.3. RF EXPOSURE ASSESSMENT FOR SECONDARY TRANSMITTERS INSTALLED IN DELL ADAMO 13 LAPTOP COMPUTER

Model name	FCC ID	Frequency range (MHz)	EIRP (mW)	Evaluation distance (cm)	Power Density ( $S_{eq}$ ) $S = \frac{P \cdot G}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$ $\left(\frac{mW}{cm^2}\right)$	MPE limit ( $S_{Lim}$ ) $\left(\frac{mW}{cm^2}\right)$	COMPLIANCE ( $S_{eq} < S_{Lim}$ )
Dell Wireless 370	QDS-BRCM1034	2400-2483,5	5,39	20,60	0,0010	1,0000	COMPLIANT
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	873,92	20,60	0,1639	1,0000	COMPLIANT
		5150,0 - 5350,0	89,79	20,60	0,0168	1,0000	COMPLIANT
		5470,0 - 5725,0	89,79	20,60	0,0168	1,0000	COMPLIANT
		5725,0-5850,0	879,91	20,60	0,1650	1,0000	COMPLIANT
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	143,66	20,60	0,0269	1,0000	COMPLIANT
		5150,0 - 5350,0	89,79	20,60	0,0168	1,0000	COMPLIANT
		5470,0 - 5725,0	141,66	20,60	0,0266	1,0000	COMPLIANT
		5725,0 - 5850,0	123,71	20,60	0,0232	1,0000	COMPLIANT

### B.3. RF EXPOSURE ASSESSMENT – CO-LOCATION CONSIDERATIONS

#### B.3.1. INTRODUCTION

In situations where simultaneous exposure to fields of different equipment and frequencies occurs, the possibility that these exposures will be additive in their effects must be considered. Calculations based on this additivity are performed by the sum of relative exposure for each equipment according to the following compliance criteria:

$$\sum_1^N \frac{S_{eqn}}{S_{Limn}} = \frac{S_{eq1}}{S_{Lim1}} + \frac{S_{eq2}}{S_{Lim2}} + \dots + \frac{S_{eqN}}{S_{LimN}} \leq 1$$

where:

$S_{eq}$  is the power density of the electromagnetic field caused, at a given distance (evaluation distance), by a specific equipment transmitting at a defined frequency.

$S_{Lim}$  is the MPE limit for the evaluated transmission frequency.

#### B.3.2. FCC REQUIREMENTS

##### RELATIVE EXPOSURE FOR F3507g ERICSSON BROADBAND MODULE

Frequency Band	Mode	Frequency Range (MHz)	$S_{eq}$	$S_{Lim}$	$\frac{S_{eq}}{S_{Lim}}$
GSM 850	GSM/GPRS	824,2 - 848,8	0,1159	0,5495	<b>0,2109</b>
	EDGE	824,2 - 848,8	0,0731	0,5495	0,1331
FDD V	WCDMA/HSDPA	826,4 - 846,6	0,0535	0,5509	0,0970
	HSUPA	826,4 - 846,6	0,0472	0,5509	0,0857
PCS 1900	GSM/GPRS	1850,2 - 1909,8	0,0494	1,0000	0,0494
	EDGE	1850,2 - 1909,8	0,0431	1,0000	0,0431
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	0,0464	1,0000	0,0464
	HSUPA	1852,4 - 1907,6	0,0443	1,0000	0,0443

##### RELATIVE EXPOSURE FOR SECONDARY TRANSMITTERS

Model name	FCC ID	Frequency range (MHz)	$S_{eq}$	$S_{Lim}$	$\frac{S_{eq}}{S_{Lim}}$
Dell Wireless 370	QDS-BRCM1034	2400 - 2483,5	0,0010	1,0000	<b>0,0010</b>
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	0,1639	1,0000	0,1639
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0168	1,0000	0,0168
		5725,0-5850,0	0,1650	1,0000	<b>0,1650</b>
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	0,0269	1,0000	<b>0,0269</b>
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0266	1,0000	0,0266
		5725,0 - 5850,0	0,0232	1,0000	0,0232

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### SIMULTANEOUS EXPOSURE

Equipment		Maximum $\frac{S_{eq}}{S_{Lim}}$	Maximum	COMPLIANCE
			$\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}}$	$\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}} < 1$
Primary transmitter	Ericsson F3507g	0,2109	0,4038	<b>COMPLIANT</b>
Secondary transmitter (Bluetooth)	Dell Wireless 370	0,0010		
Secondary transmitter (WLAN)	Intel WiFi Link 5300	0,1650		
Secondary transmitter (WLAN)	Intel WiFi Link 5100	0,0269		

### B.3.3. EUROPEAN UNION REQUIREMENTS

#### RELATIVE EXPOSURE FOR F3507g ERICSSON BROADBAND MODULE

Frequency Band	Mode	Frequency Range (MHz)	$S_{eq}$	$S_{Lim}$	$\frac{S_{eq}}{S_{Lim}}$
E-GSM 900	GSM/GPRS	880,2 - 914,8	0,1455	0,4401	<b>0,3307</b>
	EDGE	880,2 - 914,8	0,0291	0,4401	0,0661
DCS 1800	GSM/GPRS	1710,2 - 1784,8	0,1042	0,8551	0,1219
	EDGE	1710,2 - 1784,8	0,0237	0,8551	0,0277
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	0,0404	0,9612	0,0420
	HSUPA	1922,4 - 1977,6	0,0377	0,9612	0,0392

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**RELATIVE EXPOSURE FOR SECONDARY TRANSMITTERS**

Model name	FCC ID	Frequency range (MHz)	S <sub>eq</sub>	S <sub>Lim</sub>	$\frac{S_{eq}}{S_{Lim}}$
Dell Wireless 370	QDS-BRCM1034	2400 - 2483,5	0,0010	1,0000	<b>0,0010</b>
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	0,1639	1,0000	0,1639
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0168	1,0000	0,0168
		5725,0-5850,0	0,1650	1,0000	<b>0,1650</b>
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	0,0269	1,0000	<b>0,0269</b>
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0266	1,0000	0,0266
		5725,0 - 5850,0	0,0232	1,0000	0,0232

**SIMULTANEOUS EXPOSURE**

Equipment		Maximum $\frac{S_{eq}}{S_{Lim}}$	Maximum $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}}$	COMPLIANCE $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}} < 1$
Primary transmitter	Ericsson F3507g	0,4135	0,5237	<b>COMPLIANT</b>
Secondary transmitter (Bluetooth)	Dell Wireless 370	0,0010		
Secondary transmitter (WLAN)	Intel WiFi Link 5300	0,1650		
Secondary transmitter (WLAN)	Intel WiFi Link 5100	0,0269		

### B.3.4. AUSTRALIA REQUIREMENTS

#### RELATIVE EXPOSURE FOR F350g ERICSSON BROADBAND MODULE

Manufacturer	Model name	Frequency range (MHz)	S <sub>eq</sub>	S <sub>Lim</sub>	$\frac{S_{eq}}{S_{Lim}}$
FDD V	WCDMA/HSDPA	826,4 - 846,6	0,0535	0,4132	0,1294
	HSUPA	826,4 - 846,6	0,0472	0,4132	0,1143
E-GSM 900	GSM/GPRS	880,2 - 914,8	0,1455	0,4401	<b>0,3307</b>
	EDGE	880,2 - 914,8	0,0291	0,4401	0,0661
DCS 1800	GSM/GPRS	1710,2 - 1784,8	0,1042	0,8551	0,1219
	EDGE	1710,2 - 1784,8	0,0237	0,8551	0,0277
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	0,0404	0,9612	0,0420
	HSUPA	1922,4 - 1977,6	0,0377	0,9612	0,0392

#### RELATIVE EXPOSURE FOR SECONDARY TRANSMITTERS

Model name	FCC ID	Frequency range (MHz)	S <sub>eq</sub>	S <sub>Lim</sub>	$\frac{S_{eq}}{S_{Lim}}$
Dell Wireless 370	QDS-BRCM1034	2400 - 2483,5	0,0010	1,0000	<b>0,0010</b>
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	0,1639	1,0000	0,1639
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0168	1,0000	0,0168
		5725,0-5850,0	0,1650	1,0000	<b>0,1650</b>
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	0,0269	1,0000	<b>0,0269</b>
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0266	1,0000	0,0266
		5725,0 - 5850,0	0,0232	1,0000	0,0232

### SIMULTANEOUS EXPOSURE

Equipment		Maximum $\frac{S_{eq}}{S_{Lim}}$	Maximum $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}}$	COMPLIANCE $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}} < 1$
Primary transmitter	Ericsson F3507g	0,3307	0,5237	<b>COMPLIANT</b>
Secondary transmitter (Bluetooth)	Dell Wireless 370	0,0010		
Secondary transmitter (WLAN)	Intel WiFi Link 5300	0,1650		
Secondary transmitter (WLAN)	Intel WiFi Link 5100	0,0269		

### B.3.5. VODAFONE REQUIREMENTS

#### RELATIVE EXPOSURE FOR F3507g ERICSSON BROADBAND MODULE

Manufacturer	Model name	Frequency range (MHz)	$S_{eq}$	$S_{Lim}$	$\frac{S_{eq}}{S_{Lim}}$
GSM 850	GSM/GPRS	824,2 - 848,8	0,1159	0,4121	0,2812
	EDGE	824,2 - 848,8	0,0731	0,4121	0,1774
FDD V	WCDMA/HSDPA	826,4 - 846,6	0,0535	0,4132	0,1294
	HSUPA	826,4 - 846,6	0,0472	0,4132	0,1143
E-GSM 900	GSM/GPRS	880,2 - 914,8	0,1455	0,4401	<b>0,3307</b>
	EDGE	880,2 - 914,8	0,0291	0,4401	0,0661
DCS 1800	GSM/GPRS	1710,2 - 1784,8	0,1042	0,8551	0,1219
	EDGE	1710,2 - 1784,8	0,0237	0,8551	0,0277
PCS 1900	GSM/GPRS	1850,2 - 1909,8	0,0494	0,9251	0,0534
	EDGE	1850,2 - 1909,8	0,0431	0,9251	0,0465
FDD II	WCDMA/HSDPA	1852,4 - 1907,6	0,0464	0,9262	0,0500
	HSUPA	1852,4 - 1907,6	0,0443	0,9262	0,0478
FDD I	WCDMA/HSDPA	1922,4 - 1977,6	0,0404	0,9612	0,0420
	HSUPA	1922,4 - 1977,6	0,0377	0,9612	0,0392

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### RELATIVE EXPOSURE FOR SECONDARY TRANSMITTERS

Model name	FCC ID	Frequency range (MHz)	$S_{eq}$	$S_{Lim}$	$\frac{S_{eq}}{S_{Lim}}$
Dell Wireless 370	QDS-BRCM1034	2400 - 2483,5	0,0010	1,0000	<b>0,0010</b>
Intel WiFi Link 5300	E2K533ANH	2400,0 - 2483,5	0,1639	1,0000	0,1639
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0168	1,0000	0,0168
		5725,0-5850,0	0,1650	1,0000	<b>0,1650</b>
Intel WiFi Link 5100	E2K512ANHMW	2400,0 - 2483,5	0,0269	1,0000	<b>0,0269</b>
		5150,0 - 5350,0	0,0168	1,0000	0,0168
		5470,0 - 5725,0	0,0266	1,0000	0,0266
		5725,0 - 5850,0	0,0232	1,0000	0,0232

### SIMULTANEOUS EXPOSURE

Equipment		$\frac{S_{eq}}{S_{Lim}}$	Maximum $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}}$	COMPLIANCE $\frac{S_{Pri}}{S_{Lim\_Pri}} + \frac{S_{Sec\_WLAN}}{S_{Lim\_Sec\_WLAN}} + \frac{S_{Sec\_BT}}{S_{Lim\_Sec\_BT}} + < 1$
Primary transmitter	Ericsson F3507g	0,3307	0,5237	<b>COMPLIANT</b>
Secondary transmitter (Bluetooth)	Dell Wireless 370	0,0010		
Secondary transmitter (WLAN)	Intel WiFi Link 5300	0,1650		
Secondary transmitter (WLAN)	Intel WiFi Link 5100	0,0269		