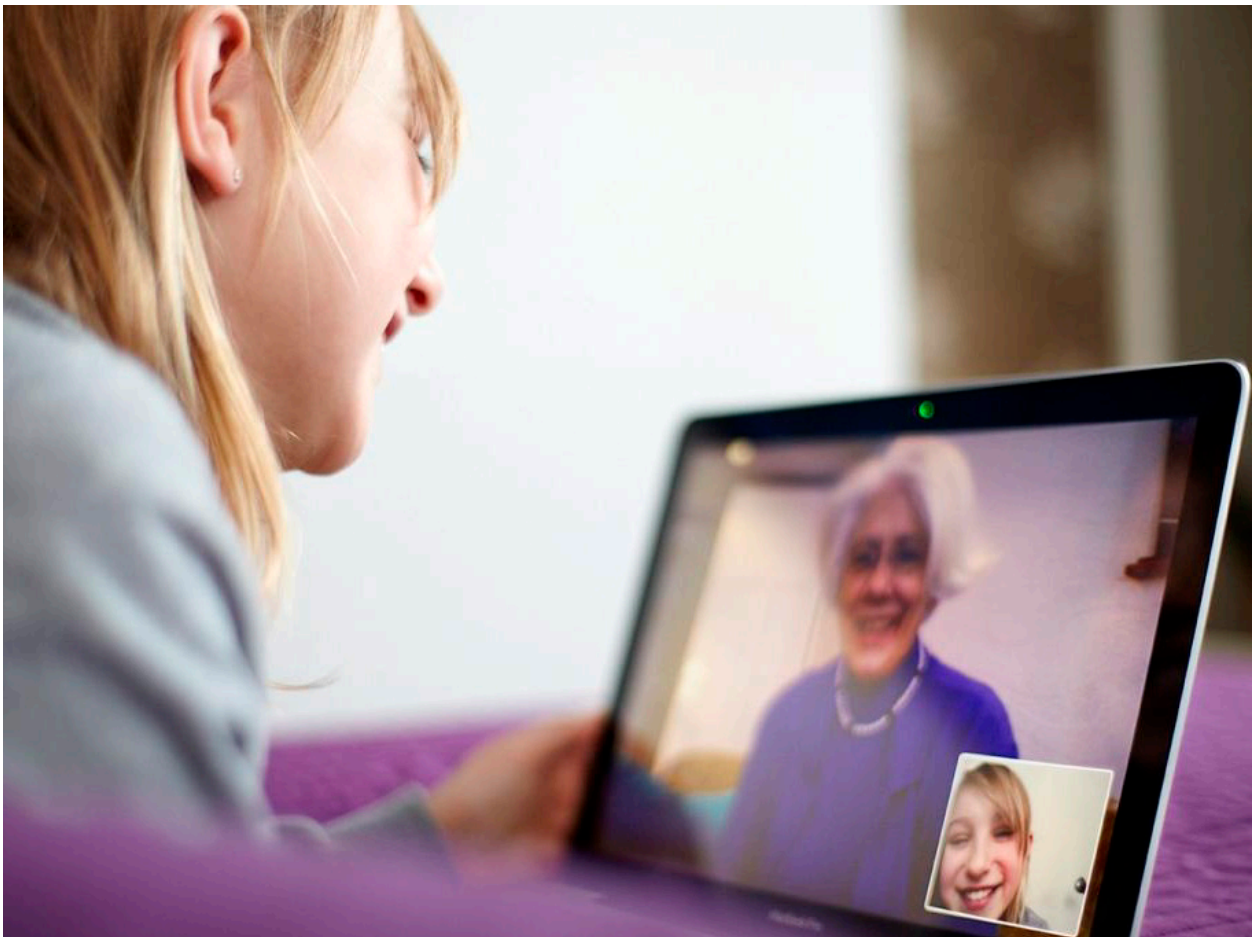


# N5321 User Guide

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## USER GUIDE





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## Abstract

This document describes the Ericsson Mobile Broadband Modules N5321 from a user perspective. End-user value, functionality, features and basic building blocks are described.

This user guide for N5321 gives the reader a deeper technical understanding of the features, applications and configuration of N5321. A simplified technical explanation of GSM/GPRS/EDGE and UMTS/HSPA/HSPA Evolution data services is also included in this document.

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# 1 Product Overview

N5321 is a PCI Express M.2 WWAN Card (see photo below) for UMTS and GSM. N5321 modules enable host device users to have flexible and high speed mobile access to the Internet or corporate network, including “always online” capability. N5321 modules support data services through HSPA Evolution, UMTS, EDGE, GPRS, and Data message service. The module has a GPS receiver which is working with most common positioning applications. Updated versions of the PC application software, drivers and module firmware can be installed by the end user.



## 1.1 Product Features

N5321 modules are flexible and automatically choose the best data service available in a particular location, whether it is HSPA Evolution, UMTS, EDGE or GPRS. This is particularly useful for users roaming on several different networks.

As a quad-band device, N5321 can operate globally. N5321 automatically choose between UMTS band I, II, V/VI, or VIII. N5321 modules are also quad-band GSM devices, and can operate on GSM systems all over the world. Therefore, users can use wireless communication from their host devices on all five continents, in over 205 countries.



With the N5321 Mobile Broadband Module installed in a host device, it is always available for data transfer. Connection settings are automatically configured based on the SIM card. The user simply clicks the “Connect” button to make an Internet connection. Parameter settings suitable for many networks are included and can be configured if needed to facilitate manual configuration where required. A status screen and an icon in the notification area enable users to check status information such as signal strength, to perform common functions and to access help.

N5321 modules have wide host device compatibility. N5321 modules are designed to use the integrated antennas in host devices. N5321 support the Microsoft Windows XP, Vista, Windows 7, Windows 8, Linux, and Android operating systems. Since the modules are designed for host devices, they are better integrated and provide a superior end-user experience compared to generically produced USB dongles that need to work across multiple computing platforms.

The built-in GPS receiver provides positioning data compatible with most commonly used positioning applications, to show the position on maps, trace the route, or provide driving directions. There are product variations, where the GPS is omitted.



## 2 Communication

N5321 Mobile Broadband Modules keep end users up to date by providing them the best available mobile service wherever they are.

N5321 modules are dual mode devices, able to connect via UMTS/HSPA and GSM/GPRS/EDGE. The user will remain connected without having to think about what system is being used – the handover between two systems and network technologies is automatically managed by N5321. N5321 come in hardware versions supporting both quad-band UMTS (Band I, II, V/VI and VIII) and quad-band GSM/GPRS/EDGE (850/900/1800/1900 MHz).

### 2.1 Network Technologies

#### 2.1.1 3G

3G (third-generation) services combine high-speed radio access with IP-based (Internet Protocol) services. This not only means fast mobile connection to the Internet, but also a totally new way to communicate, access information, conduct business, learn and be entertained.

Compared to 2G mobile networks, 3G significantly boosts network capacity, a much needed feature in densely populated areas. This means that operators are able to support more users and offer them more sophisticated services.

##### 2.1.1.1 HSPA Evolution

HSPA (High Speed Packet Access) Evolution enables downlink speeds up to 21 Mbps (HSDPA cat 14) and uplink speeds up to 5.76 Mbps (HSUPA cat 6). Higher order modulation results in higher possible speeds in the network.

##### 2.1.1.2 HSPA

HSPA is available in all developed 3G markets. With the HSDPA solution, N5321 modules are capable of downlink speeds of up to 14.4 Mbps and uplink speeds of up to 5.76 Mbps. This, together with its antenna diversity technology, gives N5321 a fast and reliable connection.

##### 2.1.1.3 WCDMA

The initial implementation of 3G networks enables Internet or corporate network access at bidirectional data rates of up to 384 kbps.



## **2.1.2 2G**

GSM/GPRS coverage is available in almost all populated areas of the world and provides a secure fall back so that network connection is maintained.

### **2.1.2.1 GPRS**

GPRS is an enhancement to GSM networks and provides packet data transmission. The connection setup is fast and, once connected, applications may send and receive data whenever required.

N5321 modules are using GPRS with Multislot class 10, which enables communication speed up to 100/60 kbps (DL/UL).

### **2.1.2.2 EDGE**

EDGE (Enhanced Data rates for Global Evolution) is an integral part of the GSM family of open mobile standards. EDGE improves GPRS by increasing data throughput by a factor of three. GPRS networks enhanced with EDGE are often referred to as E-GPRS (Enhanced GPRS) networks.

N5321 modules are using E-GPRS with Multislot class 10, which enables communication speeds up to 296/177.6 kbps (DL/UL).

## **2.2 Core features**

### **2.2.1 Browsing and Internet access**

N5321 provide a standard Internet connection. It is possible to use the Internet or intranet with a generic browser.

### **2.2.2 SMS**

N5321 can send and receive text messages. Facilities such as copy and paste make it fast and easy to send information via text messages from a computer. The standard maximum length of a text message is 160 characters, (dependent on character coding), but since concatenation is supported, messages longer than 160 characters can be sent and received.





### 2.2.3

#### GPS

The Global Positioning System (GPS) gives the positioning information around the globe and can be used together with the most commonly used positioning applications. The positioning data from the N5321 modules can be used together with all major positioning applications too, for example, show locations on maps, trace routes, give information on how to get to a destination, etc. The product may have GPS function.

N5321 have a built-in standalone GPS receiver with good sensitivity performance. For increased performance, N5321 support both network and Internet assisted GPS, which helps the GPS receiver increase its sensitivity and perform a faster Time To First Fix (TTFF). There are product variations, where the GPS is omitted.



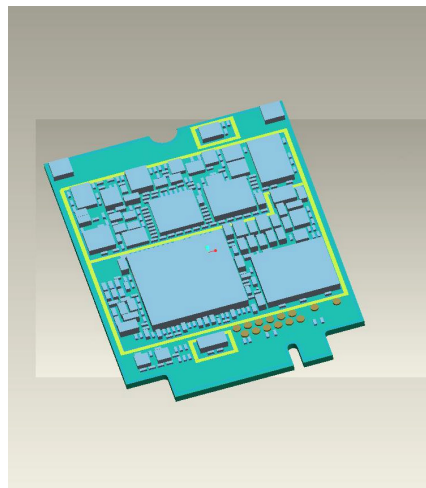
## 3 Hardware Overview

### 3.1 General

N5321 is a PCI Express M.2 WWAN card of type 3042-S3-B, built according to the PCI express M.2 Electromechanical specification, see chapter 4.4. N5321 modules are integrated solutions using the host device's antenna system and UICC reader. It is designed as an add-in option for integrators of host devices and comprises the following component parts:

- HSPA wireless network adapter with GPS, which is the wireless enabler and GPS circuitry integrated onto the M.2 Card PCB together with its mechanical RF shielding.
- RF connectors, which provide physical connectivity to the antennas integrated into the host device's mechanical housing.
- System connector, which provides the data, control, power, status and UICC interface between the host computer and the wireless network adapter.

Below, the primary side of the M.2 WWAN module is depicted.



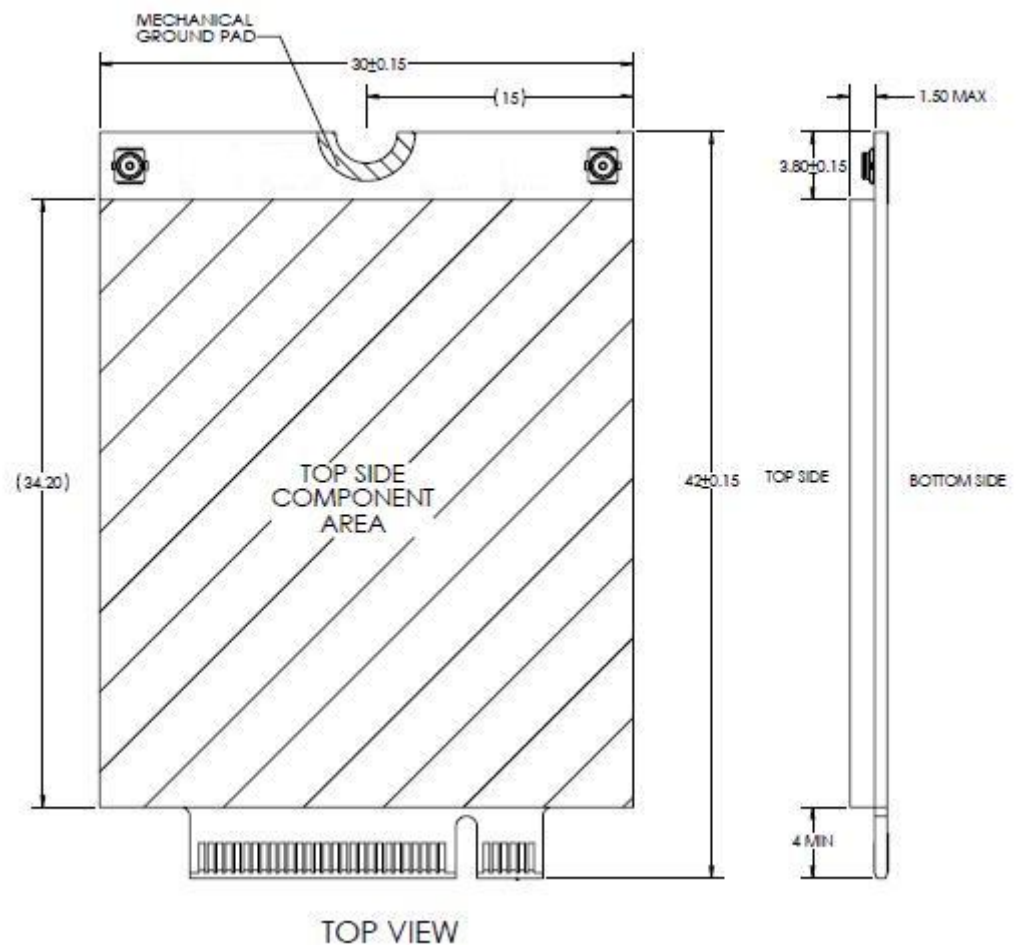
All major components are covered by EMC shields. All power and communication is routed through the edge connector of the card. The fastening hole in the upper corner is connected to ground.



## 3.2 Dimensions

The dimensions of the card are given in the figure below. The figure shows top and side views of the card with all measurements in millimeters. The M.2 WWAN card is of type 3042-S3-B and is designed to fit into a Socket 2 card slot. Note that the figures are given without tolerance values; see the PCI Express M.2 Electro Mechanical specification for more details.

N5321:



There are three connectors located on N5321 card: two RF connectors located in the top corners and one system connector located on the lower edge.

The RF connectors are generic 2x2mm receptacles as specified in PCI Express M.2 Electromechanical specification. The Main connector is used for UMTS/GSM transmission and reception. The AUX connector is used for UMTS receiver diversity and GPS.

The System connector is a straight single 67-pin connector. The connector is specified in the PCI Express M.2 Electromechanical specification.



## 4 Operational and Regulatory information

Please read this information before using your Wireless Mobile Broadband Module.

### 4.1 Operational Information

#### 4.1.1 Wireless Interoperability

The Wireless Mobile Broadband Module is designed to be interoperable with the specific wireless service providers and their roaming partners.

#### 4.1.2 Safety

The Mobile Broadband Module, like other radio devices, emits radio frequency electromagnetic energy. The Mobile Broadband Module operates within the guidelines found in radio frequency safety and recommendations. These standards and recommendations reflect the consensus of the scientific community and result from deliberations of panels and committees of scientists who continually review and interpret the extensive research literature. In some situations or environments, the use of the Mobile Broadband Module may be restricted by the proprietor of the building or responsible representatives of the applicable organization.

Examples of such situations include the following:

- Using the Mobile Broadband equipment on board airplanes, or
- Using the Mobile Broadband equipment in any other environment where the risk of interference with other devices or services is perceived or identified as being harmful.

If you are uncertain of the policy that applies to the use of wireless devices in a specific organization or environment (an airport, for example), you are encouraged to ask for authorization to use the Mobile Broadband device before you turn it on.

**WARNING: Explosive Device Proximity Warning** – Do not operate a portable transmitter (such as a wireless network device) near unshielded blasting caps or in an explosive environment unless the device has been modified to be qualified for such use.

**CAUTION: Use on Aircraft** – Regulations of the FCC and FAA prohibit airborne operation of radio-frequency wireless devices because their signals could interfere with critical aircraft instruments.



### 4.1.3 Recommendations

- Always treat your product with care and keep it in a clean and dust-free place.
- Do not expose your product to liquid, moisture or humidity.
- Do not expose your product to extreme high or low temperatures.
- Do not expose your product to open flames or lit tobacco products.
- Do not drop, throw or try to bend your product.
- Do not paint your product.
- Do not use your product near medical equipment without requesting permission from your treating physician or authorized medical staff.
- Do not use your product when in or around aircraft or in areas displaying a “turn off two-way radio” sign.
- Do not use your product in an area where a potentially explosive atmosphere exists.
- Do not place your product or install wireless equipment in the area above your car’s airbag.
- Do not attempt to disassemble your product. Only authorized personnel should perform service.

### 4.1.4 Children

Do not allow children to play with your Mobile Broadband Module. They could hurt themselves or others, or could accidentally damage the Mobile Broadband Module. Your Mobile Broadband Module may contain small parts that could be detached and create a choking hazard.

### 4.1.5 Disposal of old electrical & electronic equipment

All electrical and electronic equipment included should not be treated as household waste. It should instead be left at the appropriate collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, your household waste disposal service or the store where you purchased your Mobile Broadband Module.



### 4.1.6 Emergency calls

This Mobile Broadband Modules do not support voice calls or voice services, nor emergency calls and should not be relied upon for essential communications.

## 4.2 Regulatory Information

The Mobile Broadband Module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. The device manufacturer is not responsible for any radio or television interference caused by unauthorized modification of the devices included with the Mobile Broadband, or the substitution or attachment of connecting cables and equipment other than that specified by the device manufacturer. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. The device manufacturer and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

### 4.2.1 United States, FCC Notices Modification statement

Ericsson AB has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

#### Interference statement

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

#### Radiation ExposureStatement

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65 and RSS-102 of the IC radio frequency (RF) Exposure rules. Nevertheless, the Wireless Mobile Broadband Module should be used in such a manner that the potential for human contact during normal operation is minimized. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and any person and must not be collocated with other transmitters except otherwise authorised.



Antenna gain must not be higher than the values shown here:

Frequency band	Antenna gain
GSM 850/FDD V	6,18 dBi
PCS 1900/FDD II	4,14 dBi

This device has been evaluated and shown compliant with the FCC/IC RF exposure limits under mobile exposure conditions (antennas are greater than 20CM from any person). This device can be evaluated and show compliance with the FCC/IC RF exposure limits under portable exposure conditions (antennas are within 20 cm distance of a person's body) when installed in certain specific OEM configurations.

Details of the authorized configurations can be found at <http://www.fcc.gov/oet/ea/fccid/> by entering the FCC ID number on the device.

#### **FCC Class B digital device notice**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### **Labelling Requirements for the Host device**

The certification label of a module shall be clearly visible at all times when installed in a host device; otherwise the host device must be labelled to display a label referring to the enclosed module.

For N5321 module, this label should contain the following information:

**Contains transmitter module FCC ID: VV7-MBMN5321; IC: 287AG-MBMN5321**



## 4.2.2

## European Union, EU Declaration of Conformity

## European Union, R&amp;TTE Compliance Statement

Bulgarian	С настоящето Ericsson AB декларира, че Mobile Broadband Module отговаря на съществените изисквания и другите приложими изисквания на Директива 1999/5/EC.
Czech	Ericsson AB tímto prohlašuje, že tento Mobile Broadband Module je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
Danish	Undertegnede Ericsson AB erklærer herved, at følgende udstyr Mobile Broadband Module overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Dutch	Hierbij verklaart Ericsson AB dat het toestel Mobile Broadband Module in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
English	Hereby, Ericsson AB, declares that this Mobile Broadband Module is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Estonian	Käesolevaga kinnitab Ericsson AB seadme Mobile Broadband Module vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
German	Hiermit erklärt Ericsson AB, dass sich das Gerät Mobile Broadband Module in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
Greek	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Ericsson AB ΔΗΛΩΝΕΙ ΟΤΙ Mobile Broadband Module ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Hungarian	Alulírott, Ericsson AB nyilatkozom, hogy a Mobile Broadband Module megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.
Finnish	Ericsson AB vakuuttaa täten että Mobile Broadband Module tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
French	Par la présente Ericsson AB déclare que l'appareil Mobile Broadband Module est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Icelandic	Hér með lýsir Ericsson AB yfir því að Mobile Broadband Module er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC
Italian	Con la presente Ericsson AB dichiara che questo Mobile Broadband Module è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latvian	Ar šo Ericsson AB deklarē, ka Mobile Broadband Module atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.





Lithuanian	Šiuo Ericsson AB deklaruoja, kad šis Mobile Broadband Module atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Maltese	Hawnhekk, Ericsson AB, jiddikjara li dan Mobile Broadband Module jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Norwegian	Ericsson AB erklærer herved at utstyret Mobile Broadband Module er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.
Polish	Niniejszym Ericsson AB oświadcza, że Mobile Broadband Module jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC
Portuguese	Ericsson AB declara que este Mobile Broadband Module está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Slovak	Ericsson AB týmto vyhlasuje, že Mobile Broadband Module spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Slovenian	Ericsson AB izjavlja, da je ta Mobile Broadband Module v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Spanish	Por medio de la presente Ericsson AB declara que el Mobile Broadband Module cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Swedish	Härmed intygar Ericsson AB att denna Mobile Broadband Module står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

### 4.3 Conformity Assessment of Telecommunication Equipment regulation in Thailand

Thai	“เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามมาตรฐานทางเทคนิค เลขที่ ...” “เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กทช.”
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## 4.4 Module Supplier

Name:	Ericsson AB Product Area Mobile Broadband Modules
Address:	Torshamnsgatan 48 164 40 Kista Sweden
Telephone number:	+46 (0)8 719 00 00
E-mail address:	ericsson.mobilebroadband.modules@ericsson.com

## 4.5 Related Information

Web Site	Information
<a href="http://www.ericsson.com/yourbusiness/telecom_operators/mobile-broadband">http://www.ericsson.com/yourbusiness/telecom_operators/mobile-broadband</a>	Product information and information about mobile network infrastructure
<a href="http://www.gsmworld.com/">http://www.gsmworld.com/</a>	General information on GSM, GPRS and EDGE
<a href="http://www.umts-forum.org">http://www.umts-forum.org</a>	General information on UMTS
<a href="http://www.pcisig.com/home">http://www.pcisig.com/home</a>	The PCI Express Mini Card Standard
<a href="http://mbm.sourceforge.net">http://mbm.sourceforge.net</a>	Linux Support for MBM Modules



## 5 Terminology and Abbreviations

<b>2G</b>	Generic term for the second generation of cellular networks, when digital technology was used. GSM is a 2G network.
<b>3G</b>	Generic term for the third generation of cellular networks such as UMTS.
<b>APN</b>	Access Point Name. Used in GPRS to define services to which the terminal can connect, for example, Internet, MyCompany.
<b>bps</b>	Bits per second – rate of data flow.
<b>DLL</b>	Dynamic-link library, a shared library.
<b>E-GPRS</b>	Enhanced GPRS. A GPRS network enhanced with EDGE technology to provide greater speed and capacity.
<b>EDGE</b>	Enhanced Data Rates for Global Evolution. Technology which improves the throughput of a GPRS network by a factor of 3.
<b>GPRS</b>	General Packet Radio Services.
<b>GPS</b>	Global Positioning System.
<b>GSM</b>	Global System for Mobile Communications. GSM is the world's most widely-used digital mobile phone system. At the end of Jan 2004 there were over one billion GSM subscribers across more than 205 countries.
<b>HSPA</b>	High Speed Packet Access, term for HSDPA and HSUPA.
<b>HSPA Evolution</b>	High Speed Packet Access Evolution with DL speeds up to 21 Mbps (HSDPA cat 14) and UL speeds up to 5.76 Mbps (HSUPA cat 6).
<b>HSDPA</b>	High Speed Downlink Packet Access.
<b>HSUPA</b>	High Speed Uplink Packet Access.
<b>ISP</b>	Internet Service Provider.
<b>kbps</b>	Kilobit per second – rate of data flow.



<b>Mbps</b>	Megabit per second – rate of data flow.
<b>M.2</b>	PCI Express add-in card/module specification, formerly called NGFF (Next Generation Form Factor)
<b>PC</b>	Personal Computer.
<b>Service Provider</b>	A company that provides services and subscriptions to mobile services (phones, mobile broadband, etc.).
<b>SIM card</b>	Subscriber Identity Module card – a card that must be inserted in any GSM-based mobile terminal. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized, but both types have the same functions.
<b>SMS</b>	Short Message Service. Allows messages of up to 160 characters to be sent and received via the network operator's message center to a mobile phone.
<b>UICC</b>	UMTS Integrated Circuit Card.
<b>UMTS</b>	Universal Mobile Telecommunications System. 3G network technology using WCDMA methods.
<b>WCDMA</b>	Wideband Code Division Multiple Access. A modulation technique using a wide bandwidth (5MHz in the case of UMTS). All terminals transmit in the entire bandwidth and the signals from each are differentiated via the use of unique codes assigned to each transmission.