

F5321 and H5321 User Guide

USER GUIDE



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Abstract

This document describes the Ericsson Mobile Broadband Modules F5321 and H5321 from a user perspective. End-user value, functionality, features and basic building blocks are described.

This user guide for F5321 and H5321 gives the reader a deeper technical understanding of the features, applications and configuration of F5321 and H5321. 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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Contents

| | | |
|----------|--|-----------|
| 1 | Product Overview | 5 |
| 1.1 | Product Features | 5 |
| 2 | Communication | 7 |
| 2.1 | Network Technologies | 7 |
| 2.1.1 | 3G | 7 |
| 2.1.2 | 2G | 8 |
| 2.2 | Core features | 8 |
| 2.2.1 | Browsing and Internet access | 8 |
| 2.2.2 | SMS | 8 |
| 2.2.3 | GPS | 9 |
| 3 | Hardware Overview | 10 |
| 3.1 | General | 10 |
| 3.2 | Dimensions | 10 |
| 3.3 | Functional Block Diagram | 12 |
| 4 | Operational and Regulatory information | 13 |
| 4.1 | Operational Information | 13 |
| 4.1.1 | Wireless Interoperability | 13 |
| 4.1.2 | Safety | 13 |
| 4.1.3 | Recommendations | 14 |
| 4.1.4 | Children | 14 |
| 4.1.5 | Disposal of old electrical & electronic equipment | 15 |
| 4.1.6 | Emergency calls | 15 |
| 4.2 | Regulatory Information | 15 |
| 4.2.1 | United States, FCC Notices | 15 |
| 4.2.2 | European Union, EU Declaration of Conformity | 17 |
| 4.3 | Conformity Assessment of Telecommunication Equipment regulation in Thailand | 18 |
| 4.4 | Related Information | 19 |
| 5 | Terminology and Abbreviations | 20 |

1 Product Overview

F5321 is a PCI Express Full-Mini Card Mobile Broadband Module and H5321 is a PCI Express Half-Mini Card Mobile Broadband Module (see photo below) for UMTS and GSM. They enable host device users to have flexible and high speed mobile access to the Internet or corporate network, including “always online” capability. They 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

F5321 and H5321 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, F5321 and H5321 can operate globally. They automatically choose between UMTS band I, II, V/VI, or VIII. They 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 F5321 and H5321 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.

F5321 and H5321 have wide host device compatibility. They are designed to use the integrated antennas in host devices. F5321 and H5321 support the Microsoft Windows XP, Vista, Windows 7, 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

The F5321 and H5321 Mobile Broadband Modules keep end users up to date by providing them the best available mobile service wherever they are.

F5321 and H5321 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 F5321 and H5321. F5321 and H5321 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, F5321 and H5321 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 F5321 and H5321 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.

F5321 and H5321 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.

F5321 and H5321 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

F5321 and H5321 provide a standard Internet connection. It is possible to use the Internet or intranet with a generic browser.

2.2.2 SMS

F5321 and H5321 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 F5321 and H5321 modules can be used together with all major positioning applications to, for example, show locations on maps, trace routes, give information on how to get to a destination, etc. The product may have GPS function.

F5321 and H5321 have a built-in standalone GPS receiver with good sensitivity performance. For increased performance, F5321 and H5321 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.

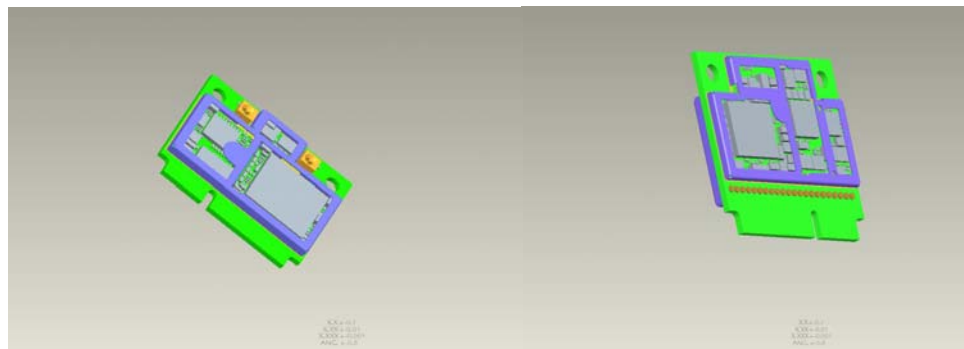
3 Hardware Overview

3.1 General

F5321 is a full-size and H5321 a half-size mini card, built according to the PCI express mini card specifications, see chapter 4.4. F5321 and H5321 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 Mini 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 and secondary sides of the half-size module are depicted.

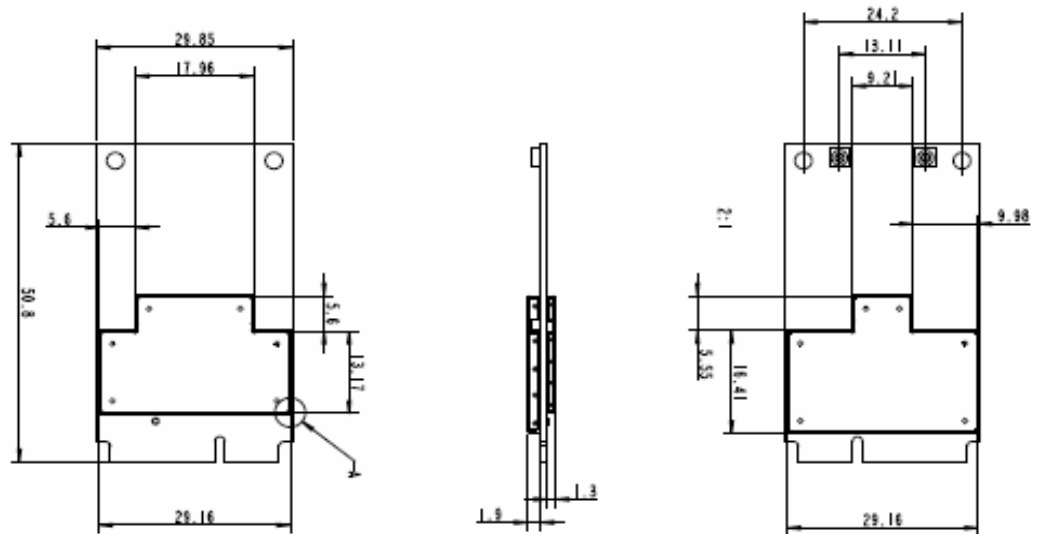


All components except the two antenna connectors are covered by EMC shields. All power and communication is routed through the edge connector of the card. The fastening holes in the upper corners are connected to ground.

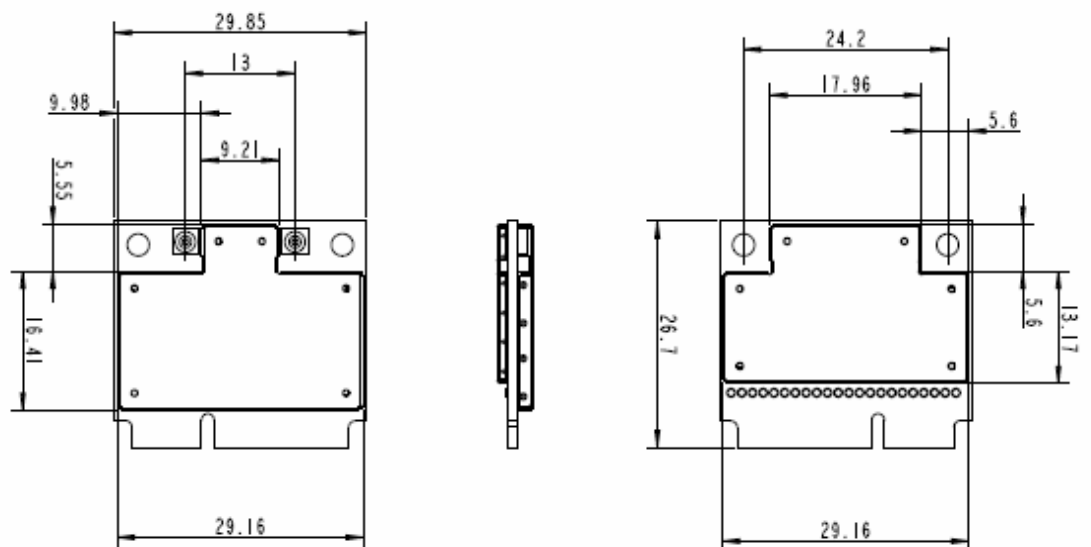
3.2 Dimensions

The dimensions of the cards are given in the figure below. The figure shows top and bottom views of the cards with all measurements in millimeters. The full-size mini card is designed to fit into a full-size Mini card slot and the half-size into a half-size Mini card slot. Note that the figures are given without tolerance values; see the PCI Express Mini Card Electro Mechanical specification for more details.

F5321:



H5321:



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

The RF connectors are of type U.FL. The Main connector is used for UMTS/GSM transmission and reception. The AUX connector is used for UMTS receiver diversity and GPS.

3.3 Functional Block Diagram

The diagram illustrates the Salmon system architecture. It begins with a **System interface** block on the left, which connects to a large **Baseband** block. Inside the Baseband, there is an **Analog baseband** section (dashed box) and a **Digital baseband** section (dashed box). The Analog baseband is connected to **USB** and **RTC**. The Digital baseband is connected to **SYSCLK2** and **MCLK0**. The Baseband block is labeled **Salmon** at the bottom. Below the Baseband block is a **32.768kHz** crystal. The Baseband block connects to three RF blocks: **WCDMA Transceiver**, **GSM Transceiver**, and **GPS RF**. The WCDMA Transceiver is connected to **WCDMA RF**, which is connected to **GSM RF**, which is connected to **GPS RF**. The WCDMA Transceiver is also connected to a **26MHz** crystal. The GPS RF is connected to a **16.368MHz** crystal. The RF blocks connect to a **Frontend & Antenna interfaces** block on the right, which is connected to two antenna symbols.

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

Changes or modifications made to this equipment not expressly approved by Ericsson AB may void the FCC/IC authorization to operate this equipment.

Radiation Exposure Statement

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 your body except and must not be collocated with other transmitters except otherwise authorised.

This device has been evaluated for and shown compliant with the FCC RF exposure limits under portable exposure conditions (antennas are within 20 cm of a person's body) when installed in certain specific OEM configurations. This device has also been evaluated and shown compliant with the FCC RF Exposure limits under mobile exposure conditions (antennas are greater than 20cm from a person's body).

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.

Interference statement

This device complies with Part 15 of FCC Rules and RSS-Gen of IC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of this device.

Class B digital 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 F5321 module, this label should contain the following information:

Contains transmitter module FCC ID: VV7-MBMF5321; IC: 287AG-MBMF5321

For H5321 module, this label should contain the following information:

Contains transmitter module FCC ID: VV7-MBMH5321; IC: 287AG-MBMH5321

4.2.2

European Union, EU Declaration of Conformity

European Union, R&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 tyypinen 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. |

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| 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-Direttiva 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

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|------|---|
| Thai | “เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามมาตรฐานทางเทคนิค เลขที่ ...” “เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กทช.” |
|------|---|

4.4 Related Information

| Web Site | Information |
|---|---|
| http://www.ericsson.com/mobilebroadbandmodules | Product information and information about mobile network infrastructure |
| http://www.gsmworld.com/ | General information on GSM, GPRS and EDGE |
| http://www.ums-forum.org | General information on UMTS |
| http://www.pcisig.com/home | The PCI Express Mini Card Standard |
| http://mbm.sourceforge.net | Linux Support for MBM Modules |

5 Terminology and Abbreviations

| | |
|-----------------------|--|
| 2G | Generic term for the second generation of cellular networks, when digital technology was used. GSM is a 2G network. |
| 3G | Generic term for the third generation of cellular networks such as UMTS. |
| APN | Access Point Name. Used in GPRS to define services to which the terminal can connect, for example, Internet, MyCompany. |
| bps | Bits per second – rate of data flow. |
| DLL | Dynamic-link library, a shared library. |
| E-GPRS | Enhanced GPRS. A GPRS network enhanced with EDGE technology to provide greater speed and capacity. |
| EDGE | Enhanced Data Rates for Global Evolution. Technology which improves the throughput of a GPRS network by a factor of 3. |
| GPRS | General Packet Radio Services. |
| GPS | Global Positioning System. |
| GSM | 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. |
| HSPA | High Speed Packet Access, term for HSDPA and HSUPA. |
| HSPA Evolution | 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). |
| HSDPA | High Speed Downlink Packet Access. |
| HSUPA | High Speed Uplink Packet Access. |
| ISP | Internet Service Provider. |
| kbps | Kilobit per second – rate of data flow. |

| | |
|-------------------------|--|
| Mbps | Megabit per second – rate of data flow. |
| PC | Personal Computer. |
| Service Provider | A company that provides services and subscriptions to mobile services (phones, mobile broadband, etc.). |
| SIM card | 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. |
| SMS | 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. |
| UICC | UMTS Integrated Circuit Card. |
| UMTS | Universal Mobile Telecommunications System. 3G network technology using WCDMA methods. |
| WCDMA | 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. |