HE920 Family Product Description

80404ST10112A Rev.2 – 2013-05-06

Making machines talk.

APPLICABILITY TABLE

PRODUCT
HE920-EU
HE920-NA

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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Contents

1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Telit HE920 family, which is a rugged automotive grade family that supports GSM/GPRS/EDGE and UMTS/HSPA with data/voice capabilities and optional GPS/Glonass.

1.2. Audience

This document is intended for customers who are evaluating the HE920 family.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Document Organization

This document contains the following chapters (sample):

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "Overview" gives the information of product variants and the overview of the characteristics and features of the product.

"Chapter 3: "General Product Description" describes in details the characteristics of the product.

"Chapter 4: "Evaluation Kit" provides a brief description of the Telit Evaluation Kit (EVK2) as far as these modules are concerned.

"Chapter 5: "Software Features" provides an overview of the software features of the products.

"Chapter 6: "AT Commands" provides the information of compliant.

"Chapter 7: "Conformity Assessment" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 8: "Safety Recommendation" provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the HE920 family.

"Chapter 9: "List of Acronyms"

1.5. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.6. Related Documents

- HE920 family Hardware User Guide, 1vv0301014
- HE920 Software User guide, 1vv0301015
- HE920 AT command reference guide, 80404ST10113A
- xE920_Audio_Settings_Application_Note, 80404NT10095A
- HE920 Digital Voice Interface Application Note, TBD
- Telit EVK2 User Guide, 1vv0300704

2. Overview

The new HE920 product family introduces the new 3.5G Land Grid Array (LGA) module in the market incorporating a 2G/3G solution in a rugged automotive grade packaging.

The HE920 is a 3.5G wireless data module offering HSPA connectivity with download speeds up to 14.4 Mbps, upload speeds up to 5.76 Mbps and manufactured under ISO TS16949.

Designed for use in the most demanding of automotive applications, the HE920 also offers ruggedized LGA packaging with an increased robustness and cost reducing mating solution. Two HE920 regional versions, covering different series of HSPA bands, are available whether your market is Europe, North America, South America, Asia or Australia.

The HE920 is also fully backwards compatible to existing EDGE and GSM/GPRS networks through integrated quad-band radios.

Additional features such as, integrated TCP/IP and UDP stack, one DAC and a two ADC channels provide extended functionality, adding value to the end application without adding cost.

Moreover HE920 is also available with embedded GPS/GLONASS receiver and Antenna Diversity. The extensive interface set, which includes analog and digital audio, UARTs, USB, PCM and user definable GPIOs, provides ease of integration of peripherals and actuators. The HE920 is also compliant with eCall EU Directive.

The eCall project is sponsored by the European Commission and it's based on the EU directive E112. It is intended to adopt a blackbox device installed inside vehicles, wirelessly connected to Emergengy Centers. In case of an emergency such as an accident or by user intervention, the black box and its sensors will send information about the event to such centers, with the chance to establish a voice call for safety measures.

As a part of Telit's corporate policy of environmental protection, all Telit products comply with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2002/95/EG)

NOTE:

Some of the performances of the Telit modules depend on S/W version installed on the module itself. The Telit modules S/W group is continuously working in order to add new features and improve the overall performances. The Telit modules are easily upgraded by the developer using the Telit Flash Programmer.

NOTE:

In order to meet the competitive OEM and vertical market stringent requirements, Telit supports its customers with a dedicated Support Policy with:

- Telit Evaluation Kit EVK2 to help you to develop your application;
- A website with all updated information available;
- An high level specialist technical support to assist you in your development;

2.1. Product variants

All HE920 variants are quad-band GSM/GPRS/EDGE and tri-band HSPA. The series of HSPA band varies accordingly with the specific variant.

Two variants with different optional features and HSPA bands are available for each region:

HE920 Variants									
Variant name	Upload	Download	Frequencies	Features					
	HSUPA (Mbps)	HSDPA (Mbps)	UMTS|HSPA bands (MHz)	GSM|GPRS|EDGE Quad Band	Rx Diversity	Data	Voice	GNSS receiver	eCall
EMEA & APAC Market									
HE920-EU	5.76	14.4	850/900/2100	x	x	x	x	x	x
Americas & Australia Market									
HE920-NA	5.76	14.4	850/1700/1900	x	x	x	x	x	x

2.2. Target Market

The HE920 family is designed and developed for the usage in automotive applications and application foreseen to be used in harsh environments requiring assured extended operating temperature range and mechanical ruggedness.

2.3. Features

- GSM/GPRS protocol stack 3GPP Release 6 compliant
- HSPA 5.76/14.4 Mbps
- Dimensions 34 x 40 x 2.8mm

- Quad band GSM/GPRS/EDGE
- GPRS/EDGE Class 33
- Manufactured under TS16949
- Optional GPS/GLONASS receiver
- RX Diversity
- Control via AT commands according to 3GPP TS27.005, 27.007 and Telit customized AT commands
- Serial port multiplexer 3GPP TS27.010
- Power consumption (typical values)
  - Power off: 30 uA
  - idle (registered, power saving): <1.3 mA @ DRX=9 in GSM mode
  - idle (registered, power saving): <1.0 mA @ DRX=512F in WCDMA mode
- Output power
  - Class 4 (2W) @ 850 / 900 MHz, GSM/GPRS
  - Class 1 (1W) @ 1800 / 1900 MHz, GSM/GPRS
  - Class E2 (0.5W) @ 850/900 MHz, EDGE
  - Class E2 (0.4W) @ 1800/1900 MHz, EDGE
  - Class 3 (0.25W) @ 850/900/1700/1900/2100 MHz, WCDMA/HSPA
- Sensitivity:
  - - 108 dBm (typ.) @ 850 / 900 MHz (GSM)
  - - 108 dBm (typ.) @ 1800 / 1900 MHz (GSM)
  - - 109 dBm (typ.) @ 850/900/1700/1900/2100 MHz (WCDMA)

Interfaces

- 198-pad LGA interface
- 12 general I/O ports maximum including multi-functional I/Os
- Status LED output
- 2x Analog audio
- 1x Digital audio (PCM)
- 2 A/D converters
- 1 D/A converter (PWM output)
- UART.
- Reserved two wires CMOS UART for debugging
- USB 2.0 Hi-Speed, baud rate up to 480Mbps

- 1.8V/3V SIM interface

GPS Receiver (optional)

- gpsOne Gen8
- Sensitivity : -160 dBm
- Time To First Fix(Hot start) : 1sec
- Assisted-GNSS Support

Audio

- Telephony, emergency call
- HR, FR, EFR, AMR for GSM and AMR for WCDMA voice codec
- DTMF

SMS

- Point to point mobile originated and mobile terminated SMS
- SMS cell broadcast
- Text and PDU mode
- SMS over GPRS

Data transmission

- HSPA: D/L up to 14.4Mbps, U/L up to 5.76Mbps
- UMTS: D/L up to 384Kbps, U/L up to 384Kbps
- EDGE: D/L up to 236.8Kbps, U/L up to 236.8Kbps
- GPRS: D/L up to 85.6Kbps, U/L up to 85.6Kbps

GSM Supplementary Services

- Call forwarding
- Call barring
- Call waiting & call hold
- Advice of charge
- Calling line identification presentation [CLIP]
- Calling line identification restriction [CLIR]

- Unstructured supplementary services mobile originated data [USSD]
- Closed user group

Additional features

- Local security management
- Call control & status indication
- SIM phonebook
- Character management (IRA, UCS2)
- SIM related functions [FDN, ADN, PIN]
- Real Time Clock
- Automatic answer
- Alarm management
- Embedded TCP/IP stack, including TCP, IP, UDP, and FTP protocols
- eCall Compliant

2.4. Approvals

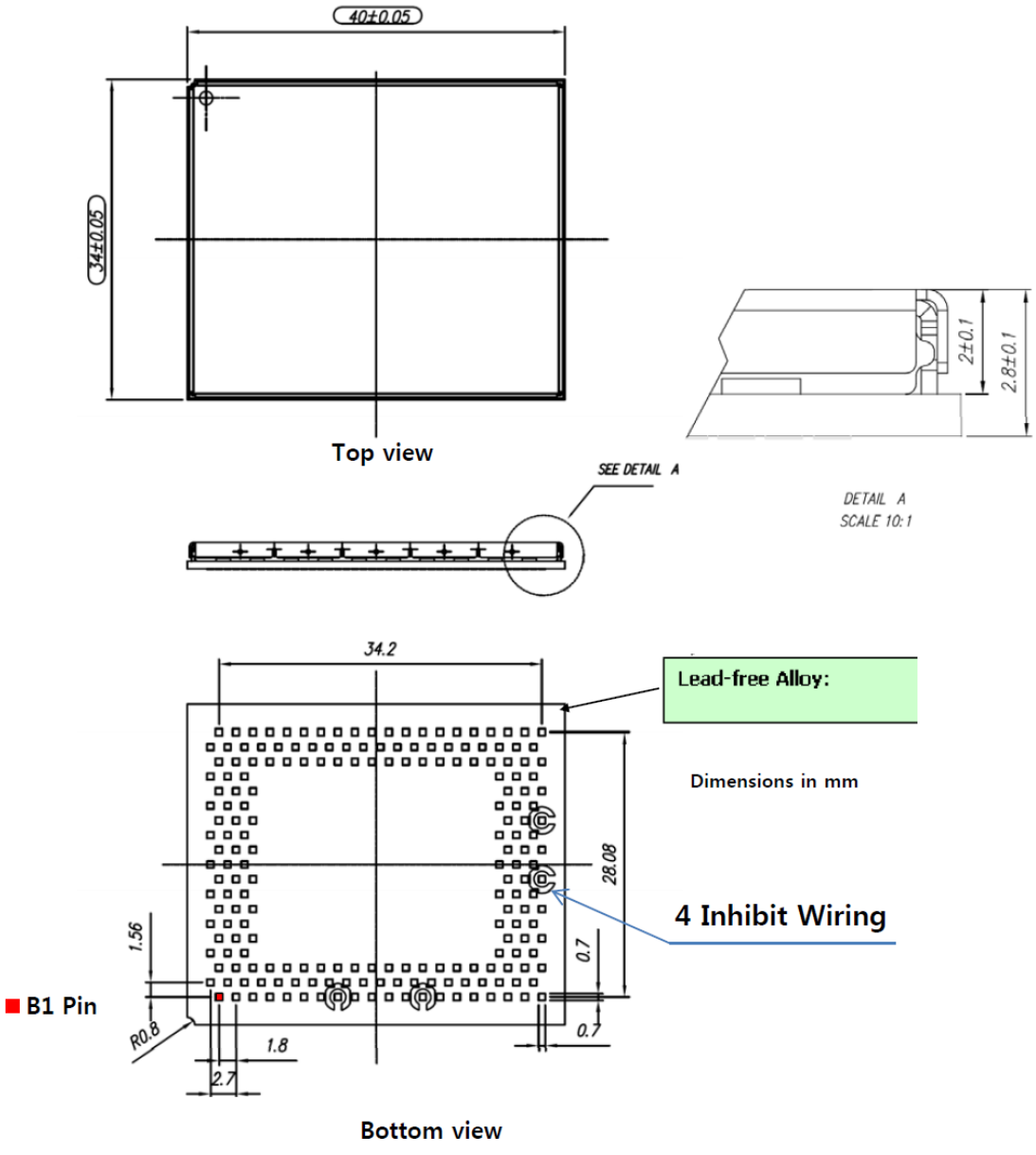
- Fully type approved confirming with R&TTE directive
- CE, GCF
- FCC, IC, PTCRB
- A-Tick
- RoHS (all versions)

3. General Product Description

3.1. Dimensions and 2D mechanical drawing

The overall dimensions of HE920 family are:

- Length: 34 mm
- Width: 40 mm
- Thickness: 2.8 mm



3.2. Weight

The module weight of HE920 family is less than 9 gram.

3.3. Environmental requirements

3.3.1. Temperature range

		Note
Operating Temperature Range	–20°C ~ +55°C	The module is fully functional(*) in all the temperature range, and it fully meets the ETSI specifications.
	–40°C ~ +85°C	The module is fully functional(*) in all the temperature range. Temperatures outside of the range –20°C ÷ +55°C might slightly deviate from ETSI specifications.
Storage and non-operating Temperature Range	–40°C ~ +90°C	

(*)Functional: the module is able to make and receive voice calls, data calls and SMS.

3.3.2. RoHS compliance

As a part of Telit corporate policy of environmental protection, the HE920 family complies with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU directive 2002/95/EG).

3.4. Operating Frequency

The operating frequencies in GSM850, EGSM900, DCS1800, PCS1900, WCDMA modes are confirm to the 3GPP and WCDMA specifications.

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
GSM850	824.2 ~ 848.8	869.2 ~ 893.8	128 ~ 251	45 MHz
EGSM900	890.0 ~ 914.8	935.0 ~ 959.8	0 ~ 124	45 MHz
	880.2 ~ 889.8	925.2 ~ 934.8	975 ~ 1023	45 MHz
DCS1800	1710.2 ~ 1784.8	1805.2 ~ 1879.8	512 ~ 885	95MHz
PCS1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8	512 ~ 810	80MHz
WCDMA850	826.4 ~ 846.6	871.4 ~ 891.6	Tx: 4132 ~ 4233 Rx: 4357 ~ 4458	45MHz
WCDMA900 (HE920-EU only)	882.4 ~ 912.6	927.4 ~ 957.6	Tx: 2712 ~ 2863 Rx: 2937 ~ 3088	45MHz
WCDMA (AWS) (HE920-NA only)	1712.4 ~ 1752.6	2112.4 ~ 2152.6	Tx: 9262 ~ 9538 Rx: 9662 ~ 9938	400MHz
WCDMA1900 (HE920-NA only)	1852.4 ~ 1907.6	1932.4 ~ 1987.6	Tx: 9262 ~ 9538 Rx: 9662 ~ 9938	80MHz
WCDMA2100 (HE920-EU only)	1922.4 ~ 1977.6	2112.4 ~ 2167.6	Tx: 9612 ~ 9888 Rx: 10562 ~ 10838	190MHz

3.5. Transmitter output power

The HE920 family transceiver output of GSM/GPRS mode in 850/900MHz bands are class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50ohm. In the 1800/1900MHz bands are class 1 in accordance with the specification which determines the nominal 1W peak RF power (+30dBm) on 50ohm.

The HE920 family transceiver output of EDGE mode in 850/900MHz bands are class E2 in accordance with the specifications which determine the nominal 0.5W peak RF power (+27dBm) on 50ohm. In the 1800/1900MHz bands are class E2 in accordance with the specification which determine the nominal 0.4W peak RF power (+26dBm) on 50ohm.

The HE920 family transceiver output of WCDMA mode in 850/900/AWS1700/1900/2100MHz bands is class 3 in accordance with the specifications which determine the nominal 0.25W peak RF power (+24dBm) on 50ohm.

3.6. Reference sensitivity

3.6.1. GSM/HSPA Sensitivity

The receiver sensitivity of HE920 family of GSM/GPRS/EDGE mode in 800/900MHz bands is better than -108 dBm (2.4% BER Class II – static channel) at normal operating condition.

The receiver sensitivity of HE920 family of GSM/GPRS/EDGE mode in 1800/1900MHz bands is better than -108 dBm (2.4% BER Class II – static channel) at normal operating condition.

The receiver sensitivity of HE920 family of WCDMA mode in 850/900/AWS1700/1900/2100MHz bands is better than -109 dBm (0.1% BER – static channel) at normal operating condition.

3.6.2. GPS Sensitivity

GPS sensitivity is -160 dBm .

3.7. Antenna(s)

3.7.1. Frequency band of GSM/WCDMA antenna

The antenna that the customer chooses should fulfill the following requirements:

Frequency range	Depending by frequency band(s) provided by the network operator, the customer shall use the most suitable antenna for that/those band(s)
Bandwidth	70MHz in GSM/WCDMA 850MHz band, 80MHz in GSM/WCDMA 900MHz band, 170MHz in DCS1800, 140MHz in GSM/WCDMA 1900MHz band, 250MHz in WCDMA 2100MHz band and 445MHz in WCDMA AWS band.

For further information, please refer to the HE920 family Hardware User Guide.

3.7.2. Frequency band of GPS antenna

The GPS antenna should be an active antenna which is fulfilled the following requirements.

Frequency range	GNSS(GPS L1 & GLONASS) : 1565 MHz ~ 1606 MHz GPS L1 : 1575.42MHz GLONASS : 1597.55 – 1605.89MHz
Bandwidth	GPS L1 : +/- 1.023MHz GLONASS : 8.34MHz

3.8. Supply voltage

The external power supply must be connected to VBATT signal and must fulfill the following requirements:

Nominal Supply Voltage	3.8V
Operating Voltage Range	3.4 ~ 4.2V

CAUTION:

The operating voltage should not be exceeded; Special care must be taken in order to fulfill min/max supply voltage requirement.

3.9. Power consumption

The current consumption of HE920 family is:

Power off current (Typical)	30 uA
Standby current at GSM Idle state	< 1.3 mA @DRX=9 (GNSS OFF)
Standby current at WCDMA Idle state	< 1.0 mA @ DRX=512F (GNSS OFF)

For further information, please refer to the HE920 family Hardware User Guide.

3.10. Logic level

Where not specifically stated, the most of interface circuits work at 1.8V CMOS logic levels. To get more detailed information about the logic level specifications used for HE920 family, please refer to the HE920 family Hardware User Guide.

3.11. Input and Outputs

3.11.1. General Purpose I/Os

12 pins of general purpose I/Os can be configured by AT command in three different ways as input, output and alternative function.

The GPIO listed below can be configured as an alternative function as well.

- TBD : Alarm output

3.11.2. Indication of Network Service Availability (STAT_LED)

The STAT_LED indicates the network service availability and call connection status. This function usually needs an external circuit for LED driving.

3.11.3. Power on monitor (PWR_MON) / Auxiliary power output for accessories (VAUX1)

The PWR_MON indicates the status of the module running properly.

A regulated 1.8 V, 100 mA (max) power output is provided for an external device.

3.11.4. Power on/off control (ON_OFF)

External power on/off control input. Refer to the HE920 family Hardware User Guide for more details of Power on timing.

3.12. SIM Reader

The HE920 family supports R5 and R99 3GPP TS 31.114 – USIM 1.8V and 3V ONLY with an external SIM socket. For 5V SIM operation, an external level translator needs to be added. Refer to the HE920 family Hardware User Guide.

3.13. Converters

The HE920 family has 1 DAC and 2 ADCs.

3.14. Audio Interface

The HE920-EU and HE920-NA family support for both analog and digital audio interfaces

- 2 differential analog audio for a headset
- PCM interface for digital audio interface

3.15. Serial ports

Two serial ports are available.

- Full RS232-C, with baud rate up to 4 Mbps (high-speed UART)
- Simplified serial port (RX/TX only) for debugging

3.16. USB port

The USB2.0 High speed supports data speed up to 480Mbps.

3.17. User Interface

The user interface is managed by AT commands according to ITU-T V.250, 3GPP 27.007 and 27.005 specifications. Please refer to the HE920 AT command User Guide for complete details.

3.18. Features

3.18.1. Speech Coding

The HE920-xxG and HE920-xxR family support the following voice codecs:

- Adaptive Multi Rate for WCDMA
- Half Rate, Full Rate, Enhanced Full Rate, Adaptive Multi Rate for GSM

3.18.2. SMS

The HE920 family supports the following SMS types:

- Mobile Terminated (MT) class 0 ~ 3 with signaling of new incoming SMS, SIM full, SMS read
- Mobile Originated class (MO) 0 ~ 3 with writing, saving in SIM and sending

3.18.3. Real Time Clock and Alarm

The HE920 family supports the Real Time Clock and Alarm functions through AT commands. An alarm output pin can be configured to indicate the alarm with a hardware line output.

Furthermore the output of the RTC power supply is provided to external so that a backup capacitor can be added to increase the RTC autonomy.

3.18.4. Data Transmission capabilities

The HE920 family supports:

- HSPA: D/L up to 14.4Mbps, U/L up to 5.76Mbps
- UMTS: D/L up to 384Kbps, U/L up to 384Kbps
- EDGE: D/L up to 236.8Kbps, U/L up to 236.8Kbps
- GPRS: D/L up to 85.6Kbps, U/L up to 85.6Kbps
- Asynchronous non transparent CSD up to 9.6kbps for GSM, 14.4kbps for WCDMA
- GPRS/EDGE Multi-slot Class 33, MS class B
- Coding scheme 1 to 4 (GPRS) & Modulation Coding scheme 1 to 9 (EDGE)

3.18.5. Local security management

The local security management can be done with the lock of Universal Subscriber Identity Module (USIM), and the security code will be requested at power-up.

3.18.6. Call control

The calling cost control function is supported.

3.18.7. Phonebook

This function allows storing the telephone numbers into SIM memory. The capability depends on the SIM version and its embedded memory.

3.18.8. Characters management

The HE920 family support the following character sets:

- IRA (International Reference Alphabet), in TEXT and PDU mode.
- UCS – 16-bits universal multiple-octet coded character set (ISO/IEC10646)

3.18.9. SIM related functions

Activation and deactivation of the numbers stored in phone book FDN (Fixed Dialing Numbers), ADN (Abbreviated Dialing Number) and PIN insertion are supported. Extension at the PIN2 for the PUK2 insertion capability for lock condition is supported too.

3.18.10. Call status indication

The call status indication is supported by AT commands.

3.18.11. Automatic answer

The automatic answering feature is supported. The user/application can specify the number of rings after which the module will make an answer automatically.

3.18.12. Supplementary services

The following supplementary services are supported for HE920-xxG and HE920-xxR family:

- Call Barring
- Call Forwarding
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Call Waiting, other party call Waiting Indication
- Call Hold, other party Hold/Retrieved Indication
- Closed User Group supplementary service (CUG)
- Advice of Charge
- Unstructured SS Mobile Originated (MO)

3.18.13. Acoustic signaling

The acoustic signaling of the HE920-xxG and HE920-xxR family on the selected acoustic device are the following:

- Call waiting tone
- Busy tone
- Congestion tone
- Alarm/warning tone

3.19. Mounting the modules on your board

The modules have been designed in order to be compliant with a standard lead-free SMT process. For detailed information about PCB pad design and conditions to use in SMT process, please refer to the respective Hardware User Guide.

3.20. Packing system

According to SMT process, for picking & placing movement requirements, HE920 family is packaged on trays. Each tray contains 20 pieces in size of 176 x 329.

The level of moisture sensibility of HE920 family is “3”, according with standard IPC/JEDEC J-STD-020, take care of all the relative requirements for using this kind of components. Special care for handling is highly required.

4. Evaluation Kit

In order to assist the customer in the development of the application, Telit offers the EVK2 Evaluation Kit that can be ordered separately. The EVK2 has a SIM card holder, the RS 232 serial port level translator, a direct UART connection, audio and antenna connector.

The EVK2 provides a fully functional solution for a complete data or phone application. The standard serial RS232 9 pin connector placed on the Evaluation Kit allows the connection of the EVK2 system with a PC or other DTE.

The development of the applications utilizing the Telit HE920 family must present a proper design of all the interfaces towards and from the module (e.g. power supply, audio paths, level translators), otherwise a decrease in the performances will be introduced or, in the worst case, a wrong design can even lead to an operating failure of the module.

In order to assist the hardware designer in his project phase, the EVK2 board presents a family of different solutions, which will cover the most common design requirements on the market, and which can be easily integrated in the OEM design as building blocks or can be taken as starting points to develop a specific one.

For a detailed description of the Telit Evaluation Kit, please refer to the documentation provided with the respective Hardware User Guide and EVK2 User Manual.

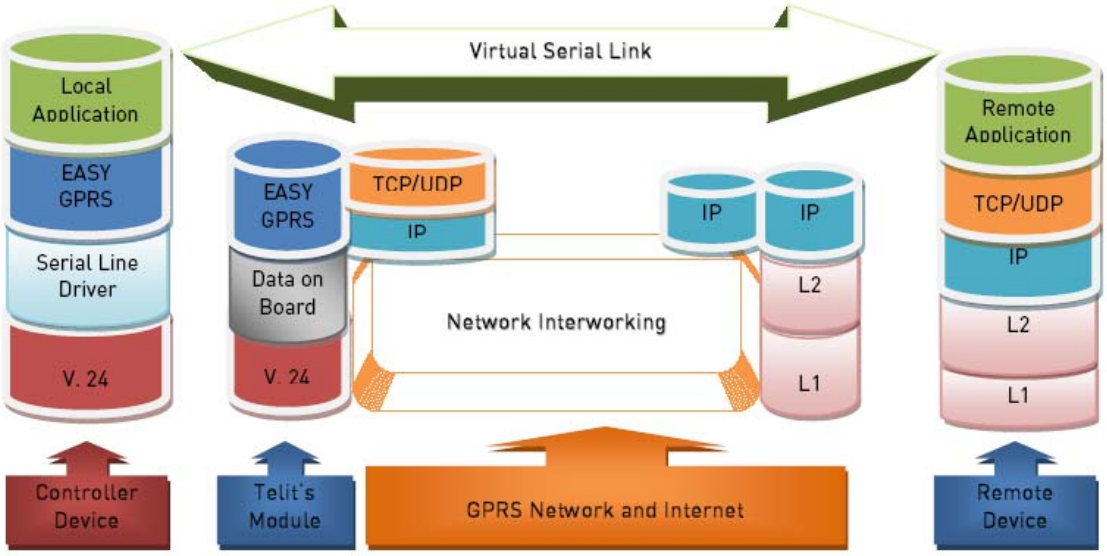
5. Software Features

5.1. Enhanced IP EASY Extension

5.1.1. Overview

The IP EASY feature allows the HE920 module user to contact a device in internet and establish with it a raw data flow over the WCDMA/EDGE/GPRS and Internet networks.

This feature can be seen as a way to obtain a "virtual" serial connection between the Application Software on the Internet machine involved and the controller of the Telit HE920 module, regardless of all the software stacks underlying.



This particular implementation allows to the devices interfacing to the Telit HE920 module the use of the WCDMA/EDGE/GPRS and Internet packet service without the need to have an internal TCP/IP stack since this function is embedded inside the module.

IP EASY overcomes some of the known limitations of the previous implementation and implements some new features such as:

- Keep the WCDMA/EDGE/GPRS context active even after the closing of a socket, allowing the application to keep the same IP address;
- Also Mobile terminated (incoming) connections can be made, now it is possible to receive incoming TCP connection requests;

- A new internal firewall has been implemented in order to guarantee a certain level of security on internet applications.

5.1.2. IP EASY definition

The IP EASY feature provides a way to replace the need of an Internet TCP/IP stack at the terminal equipment side. The steps that will be required to obtain a virtual serial connection (that is actually a socket) to the Internet peer are:

- configuring the WCDMA/EDGE/GPRS Access
- configuring the embedded TCP/IP stack behavior
- defining the Internet Peer to be contacted
- request the WCDMA/EDGE/GPRS and socket connections to be opened (host is connected)
- exchange raw data
- close the socket and WCDMA/EDGE/GPRS context

All these steps are achieved through AT commands.
As for common modem interface, two logical statuses are involved: command mode and data traffic mode.

- In Command Mode (CM), some AT commands are provided to configure the Data Module Internet stack and to start up the data traffic.
- In data traffic mode (Socket Mode, SKTM), the client can send/receive a raw data stream which will be encapsulated in the previously configured TCP / IP packets which will be sent to the other side of the network and vice versa. Control plane of ongoing socket connection is deployed internally to the module.

For more detailed information regarding the use of the IP EASY feature, please consult IP EASY User Guide and AT Commands Reference Guide.

6. AT Commands

The HE920 family can be driven via the serial and USB interface using the standard AT commands.

The modules are compliant with:

1. Hayes standard AT command set, in order to maintain the compatibility with existing S/W programs.
2. 3GPP TS 27.007 specific AT command and WCDMA/GPRS specific commands.
3. 3GPP TS 27.005 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)

Moreover, the modules support also Telit proprietary AT commands for special purposes.

For more information about the AT commands supported by the modules, please refer to the AT Commands Reference Guide.

7. Conformity assessment issues

7.1. 1999/5/EC Directive

The HE920-EU module has been assessed in order to satisfy the essential requirements of the R&TTE Directive 1999/05/EC (Radio Equipment & Telecommunications Terminal Equipments) to demonstrate the conformity against the harmonized standards with the final involvement of a Notified Body.

In order to satisfy the essential requirements of 1999/5/EC Directive, the HE920-EU is compliant with the following standards:

RF spectrum use (R&TTE art. 3.2)	EN 300 440-2 V1.4.1 EN 301 511 V9.0.2 EN 301 908-1 V5.2.1 EN 301 908-2 V5.2.1
EMC (R&TTE art. 3.1b)	EN 301 489-1 V1.9.2 EN 301 489-3 V1.4.1 EN 301 489-7 V1.3.1 EN 301 489-24 V1.5.1
Health & Safety (R&TTE art. 3.1a)	EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011+AC:2011

The conformity assessment procedure referred to in Article 10 and detailed in Annex IV of Directive 1999/5/EC has been followed with the involvement of the following Notified Body:

AT4 wireless, S.A.
Parque Tecnologico de Andalucía
C/ Severo Ochoa 2
29590 Campanillas – Málaga
SPAIN
Notified Body No: 1909

Thus, the following marking is included in the product:

CE 1909

The full declaration of conformity can be found on the following address:
http://www.telit.com

There is no restriction for the commercialization of the HE920-EU module in all the countries of the European Union.

Final product integrating this module must be assessed against essential requirements of the 1999/5/EC (R&TTE) Directive. It should be noted that assessment does not necessarily lead to testing. Telit Communications S.p.A. recommends carrying out the following assessments:

RF spectrum use (R&TTE art. 3.2)	It will depend on the antenna used on the final product.
EMC (R&TTE art. 3.1b)	Testing
Health & Safety (R&TTE art. 3.1a)	Testing

Alternately, assessment of the final product against EMC (Art. 3.1b) and Electrical safety (Art. 3.1a) essential requirements can be done against the essential requirements of the EMC and the LVD Directives:

- Low Voltage Directive 2006/95/EC and product safety
- Directive EMC 2004/108/EC for conformity for EMC

7.2. FCC/IC Regulatory notices

Modification statement

Telit 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.

Telit n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

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. This Class B digital apparatus complies with Canadian ICES-0003.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Wireless notice

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body. Antenna gain must be below:

Frequency band	HE920-NA
GSM850 /FDD V	2.0 dBi
PCS1900 /FDD II	2.0 dBi
FDD IV	2.0 dBi

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet appareil est conforme aux limites d'exposition aux rayonnements de la IC pour un environnement non contrôlé. L'antenne doit être installé de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps. Gain de l'antenne doit être ci-dessous:

Bande de fréquence	HE920-NA
GSM850 /FDD V	*2.0 dBi*
PCS1900 /FDD II	*2.0 dBi*
FDD IV	*2.0 dBi*

L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

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.

Information To Be Supplied to the End User by the OEM or Integrator notice

Modular information form OEM Information to Be Supplied to the End User by the OEM or Integrator
The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating an adapter in compliance with local regulations. Host system must be labeled with "Contains IC: 5131A-HE920NA " or "Contains FCCID:RI7HE920NA ", FCC ID/IC displayed on label.

8. Safety Recommendations

READ CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- Where there is risk of explosion such as gasoline stations, oil refineries, etc. It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.
The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the WCDMA/GSM network or external devices or having impact on the security. Should there be any doubt, please refer to the technical documentation and the regulations in force. Every module has to be equipped with a proper antenna with specific characteristics. The antenna has
to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case of this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information's are available on the European Community website:

http://ec.europa.eu/enterprise/sectors/rtte/documents/

The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://ec.europa.eu/enterprise/sectors/electrical/

9. List of acronyms

3GPP	3rd Generation Partnership Project
ADC	Analog to Digital Converter
ADN	Abbreviated Dialing Number
A-GPS	Assisted GPS
AMR	Adaptive Multi Rate
AT	Attention Commands
AWS	Advanced Wireless Services
BER	Bit Error Rate
BGA	Ball Grid Array
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CMOS	Complementary Metal-Oxide Semiconductor
CSD	Circuit Switched Data
DAC	Digital to Analog Converter
DARP	Downlink Advanced Receiver Performance
DTMF	Dual Tone Multi Frequency
FDN	Fixed Dialing Number
FTP	File Transfer Protocol
GLONASS (ГЛОНАСС)	ГЛОбальная НАвигационная Спутниковая Система; (**Glo**bal'naja **Na**vigacionnaja **S**putnikovaja **S**istema→ GLObal NAvigation Satellite System)
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile communication
GPRS	General Packet Radio Service
GPS	Global Positioning System
HSPA	High Speed Packet Access
HSUPA	High Speed Uplink Packet Access
H/W	Hardware

LED	Light Emitting Diode
MO	Mobile Originated
MT	Mobile Terminated
OEM	Other Equipment Manufacturer
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PDA	Personal Digital Assistant
PDU	Protocol Data Unit
PIN	Personal Identification Number
POS	Point Of Sales
PWM	Pulse Width Modulation
RF	Radio Frequency
RoHS	Restriction of Hazardous Substances
RTC	Real Time Clock
SAIC	Single Antenna Interface Cancellation
SIM	Subscriber Identity Module
SMD	Surface Mounted Device
SMS	Short Message Service
S/W	Software
TBD	To Be Determined
TCP/IP	Transmission Control Protocol/Internet Protocol
TTSC	Telit Technical Support Center
UART	Universal Asynchronous Receiver and Transmitter
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module
WCDMA	Wideband Code Division Multiple Access

10. Document History

Revision	Date	Changes
Preliminary 0	2012-06-11	First Preliminary issue
1	2012-12-27	Updated 2 Overview Updated 2.1 Product variants Updated 2.3 Features Updated 3.1 Dimensions and 2D mechanical drawing Updated 3.7.1 Frequency band of GSM/WCDMA antenna Updated 3.9 Power consumption Updated 3.11.1 General Purpose I/Os Updated 3.13 Converters Updated 3.18.4 Data Transmission capabilities
2	2013-05-06	Updated 1.6 Related Documents Updated 2.3 Features Updated 3.15 Serial Ports Updated 3.20 Packing system Updated 7 Conformity assessment issues