FORTEC
ELEKTRONIK AG

# Manual

# MTX-HSPA-PH8-P+G

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# MTX-HSPA-PH8-P+G

## *User Manual*

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## Important information

This technical description contains important information for the start up and use of the MTX-HSPA-PH8-P+G Modem.

Read it carefully before you start working with the MTX-HSPA-PH8-P+G Modem.

The warranty will be void should damage occur due to non-compliance with these instructions for use.

We cannot accept any responsibility for consequential loss.

## Service and Support

To contact customer support please use the contact details below:

Matrix Electrónica
Alejandro Sánchez, 109
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Information about the MTX-HSPA-PH8-P+G product and its accessories is available on the following web site:

www.mtxm2m.com

Or contact your local distributor / sales agent.

## Revision information

| Revision | Date | Author | Changes |
|---|---|---|---|
| 1.3 | 2014/01 | JS | First preliminary release |
| 2.0 | 2014/11 | AEM/TP | New document format<br>General and language revision |

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# 1. Introduction

## 1.1 Description

When your application needs to receive data up to 3.6 Mbps download or transmit up to 386Kbps, the MTX-HSPA-PH8-P+G modem is the solution based on HSDPA technology.

The HSPA (High Speed Downlink Packet Access) is a transmission standard based on the UMTS network which allows a download speed of up to 3.6 Mbit/s. The technology therefore enables services like broadband internet, e-mail access, high-speed download of large data files and streaming of videos or music.

The MTX-HSPA-PH8-P+G is a complete modem that encapsulates everything you need in one compact plug-and-play unit. The integration is almost not needed because it has its own SIM card reader and a USB port plus an RS232 port which minimize the need for further hardware components.

The MTX-HSPA-PH8-P+G is controlled via AT commands and standard interfaces such as Serial RS232 and USB 2.0 full speed and RIL/NDIS driver.

When the UMTS-HSDPA network operation is not present, the MTX-HSPA-PH8-P+G can operate in EDGE class 12 max. 236.8 kpbs (DL), max. 118 kbps (UL) or in GPRS class 12: max. 85.6 kbps (DL), max. 42.8 kbps (UL)

The MTX-HSPA-PH8-P+G can also work in simple CSD data transmission (GSM data rate 14.4 kpbs, V.110, UMTS data rate 57.6 kpbs V.120) as well Short Messaging (SMS) and FAX specifications. It also has an analog interface and is capable of making voice communication calls.

As a plus feature the MTX-HSPA-PH8-P+G adds a GPS receiver and NMEA protocol in the third multiplex channel (MUX GSM 07.10 protocol is needed).

The MTX-HSPA-PH8-P+G is manufactured with SMD Technologies following the ISO 9001 & IS0 14001 Quality certifications and it is RoHs / WEEE compliant.

A full list of antennas, cables, supplies and accessories are available.

The MTX-HSPA-PH8-P+G modem is powered by an internal SIEMENS Wireless Module PH8

## 1.2 Ordering information

**199801098**: MTX-HSPA-PH8+G
Five-Band GSM 800/850/**AWS1700**/1900/2100MHz
1xRS232, USB, receiver

**199801308**: MTX-HSPA-PH8-P+G
Five-Band GSM 800/850/**900**/1900/2100MHz
1xRS232, USB, GPS receiver

## 1.3 Highlights

**Interfaces**

- GSM FME M antenna connector
- SMA F antenna connector for GPS or other RF options (*)
- USB 2.0 High Speed port up to 480Mbps
- SIM card interface 1.8V and 3V
- DB9 female connector: complete 8-wire RS232 modem interface (*)
- Operating status LEDs
- Plug-in power supply (RJ12 connector)

**General features**

- MTX-HSPA-PH8+G bands
  - UMTS/HSPA+: Five-Band 800/850/AWS1700/1900/2100MHz
  - GSM/GPRS/EDGE: Quad band 850/900/1800/1900MHz
- MTX-HSPA-PH8-P+G bands
  - UMTS/HSPA+: Five-Band 800/850/900/1900/2100MHz
  - GSM/GPRS/EDGE: Quad band 850/900/1800/1900MHz
- EDGE multi-slot class 12
- UMTS/HSPA+ 3GPP Release 6, 7, GSM/GPRS/EDGE 3GPP release 99
- Control via AT commands (Hayes, TS 27.007, TS 27.005)
- TCP/IP stack access via AT commands
- Internet services: TCP, UDP, HTTP, FTP, SMTP, POP3
- Supply voltage range
  - Maximum: 6.5 to 40VDC
  - Recommended: 7 to 35VDC
- Temperature range
  - Operating: -20ºC to +85ºC
- Dimensions, excluding connectors: 78.1 x 66.8 x 37.2mm
- Weight: < 190 g
- IP30 enclosure
- Powered by Cinterion PHS8 module

**Specifications**

- HSDPA Cat.10 /HSUPA Cat. 6 data rates
  - DL speed: max 14.4Mbps
  - UL speed: max 5.76Mbps
- EDGE
  - EDGE class 12
  - DL speed: max 237kbps
  - UL speed: max 237kbps
- GPRS
  - GPRS class 12

  - DL speed: max 85.6kbps
  - UL speed: max 85.6kbps
  - Mobile station class B
  - Full PBCCH support
  - Coding schemes CS 1-4
- CSD data transmission
  - GSM data rate 14.4kbps V.110
- SMS
  - Point-to-point MO and MT
  - SMS cell broadcast
  - Text and PDU mode
- Voice
  - AMR, EFR, FR, HR codecs
  - DTMF supported
  - CEPT/ANSI supervisory tones supported
  - Handset, Headset, Hands-free modes
  - TTY supported

**GPS features**

- E911 A-GPS functionality via Control Plane
- Standalone GPS, SUPL prepared
- GPS dedicated AT command
- Protocol: NMEA-0183 V2.3
- GPS active antenna supply: 3.3V
- Tracking sensitivity: better than -158dBm
- No GPS blanking

**Drivers**

- NDIS, USB, MUX driver for Microsoft® Windows XP™, Vista™, Windows 7™
- RIL, NDIS, USB, MUX driver for Microsoft® Windows Embedded Handheld™ >= 6.x
- USB, MUX driver for Microsoft® Windows Embedded Compact™ >= 5.x
- RIL driver for devices based on Android OS
- USB serial/CDC-ACM driver for Linux

**Special features**

- USB interfaces support multiple composite modes and a Linux -/Mac- compliant mode
- Firmware update via USB/RS232
- Multiplexer according 3GPP TS 27.010
- Customer IMEI/Netlock as an option
- Integrated FOTA, configurable and royalty free

## 1.4 Product label

The label fixed to the bottom of a MTX Modem comprises the following information:

| No. | Information |
|---|---|
| 1 | MTX M2M logo |
| 2 | Product name (model) |
| 3 | Product ordering number |
| 4 | Hardware and Firmware Revisions |
| 5 | FCC ID |
| 6 | Year/Week of fabrication |
| 7 | Barcode (Code 128) (IMEI) |
| 8 | Product IMEI |
| 9 | RoHS symbol |
| 10 | Pb-Free symbol |
| 11 | WEEE symbol |
| 12 | CE logo |
| 13 | PTCRB Certification logo |

## 1.5 Main features and services

The MTX-HSPA-PH8-P+G modem performs a set of telecom services (TS) according to GSM standard phase 2+, ETSI and ITU-T. The services and functions of the MTX-HSPA-PH8-P+G are implemented by issuing customized applications embedded on the device, by AT commands issued internally or over the USB, RS232 or RS485 interface.

### 1.5.1 Key features at a glance

The MTX-HSPA-PH8-P+G is a UMTS/HSPA and also GSM/GPRS/EDGE band mobile station with the characteristics shown in the table below.

| Feature | Implementation |
|---|---|
| **General** | |
| Frequency bands | UMTS/HSPA+:<br>• PH8: Five band, 800/850/AWS1700/1900/2100MHz<br>• PH8-P: Five band, 800/850/900/1900/2100MHz<br>GSM/GPRS/EDGE: Quad band, 850/900/1800/1900MHz |
| GSM class | Small MS |
| Output power | Class 4 (+33dBm ±2dB) for EGSM850<br>Class 4 (+33dBm ±2dB) for EGSM900<br>Class 1 (+30dBm ±2dB) for GSM1800<br>Class 1 (+30dBm ±2dB) for GSM1900<br>Class E2 (+27dBm ± 3dB) for GSM 850 8-PSK<br>Class E2 (+27dBm ± 3dB) for GSM 900 8-PSK<br>Class E2 (+27dBm +3dB/-4dB) for GSM 1800 8-PSK<br>Class E2 (+27dBm +3/-4dB) for GSM 1900 8-PSK<br>Class E2 (+26dBm +3/-4dB) for GSM 1800 8-PSK<br>Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD BdI<br>Class 3 (+24dBm +1/-3dB) for UMTS 1900, WCDMA FDD BdII<br>Class 3 (+24dBm +1/-3dB) for UMTS 900, WCDMA FDD BdVIII<br>Class 3 (+24dBm +1/-3dB) for UMTS 850, WCDMA FDD BdV<br>Class 3 (+24dBm +1/-3dB) for UMTS 800, WCDMA FDD BdVI |
| Power supply | Single supply voltage<br>Maximum: 6.5 to 40V (without damaging the device)*<br>Recommended: 7 to 35V<br>**(Device operation from 6.5 to 7V is not guaranteed over the whole temperature range / Supplies from 35 to 40V may damage the device during an extended use)*|
| Physical | Dimensions: 78,1 x 66,8 x 37,2 mm Weight: approx. 190g |
| RoHS | All hardware components are fully compliant with the EU RoHS Directive |
| **HSPA features** | |
| 3GPP Release 6,7 | DL 14.4Mbps, UL 5.7Mbps<br>UE CAT. 1-12 supported<br>Compressed mode (CM) supported according to 3GPP TS25.212 |
| **UMTS features** | |
| 3GPP Release 8 | PS data rate – 384 kbps DL / 384 kbps UL<br>CS data rate – 64kbps DL / 64 kbps UL |

| GSM / GPRS / EGPRS features | |
|---|---|
| Data transfer | GPRS<br>• Multislot Class 12<br>• Full PBCCH support<br>• Mobile Station Class B<br>• Coding Scheme 1 – 4<br>EGPRS<br>• Multislot Class 12<br>• EDGE E2 power class for 8 PSK<br>• Downlink coding schemes – CS 1-4, MCS 1-9<br>• Uplink coding schemes – CS 1-4, MCS 1-9<br>• SRB loopback and test mode B<br>• 8-bit, 11-bit RACH<br>• PBCCH support<br>• 1 phase/2 phase access procedures<br>• Link adaptation and IR<br>• NACC, extended UL TBF<br>• Mobile Station Class B<br>CSD<br>• V.110, RLP, non-transparent<br>• 14.4kbps<br>• USSD |
| SMS | Point-to-point MT and MO<br>Cell broadcast<br>Text and PDU mode |
| **Software** | |
| AT commands | Hayes, 3GPP TS 27.007, 27.005, Gemalto M2M<br>AT commands for RIL compatibility |
| Audio | Audio speech codecs<br>GSM: AMR, EFR, FR, HR<br>3GPP: AMR<br>Speakerphone operation, echo cancellation, noise suppression, 9 ringing tones, TTY support |
| SIM Application Toolkit | SAT Release 99 |
| Firmware update | Generic update from host application over RS232 or USB. |
| **Interfaces (depending on models)** | |
| USB | Supports a USB 2.0 High Speed (480Mbit/s) device interface, Full Speed (12Mbit/s) compliant |
| RS232 (8-wire) | Adjustable baud rates: 1200bps to 921600bps<br>Autobauding: 1200 to 230400bps<br>Supports RTS/CTS hardware flow control<br>Multiplex ability according to GSM 07.10 Multiplexer Protocol |
| Status | Bi-color LED to indicate network connectivity status. |
| UICC interface | Supported chip cards: UICC/SIM/USIM 3V, 1.8V |
| Antenna | 50 Ohms. GSM/UMTS main antenna |
| Audio | 1 analog microphone balanced input<br>1 analog speaker balanced output |

| **Power on/off, Reset** | |
|---|---|
| Power on/off | Automatic switch-on at power supply<br>Switch off by AT command<br>Switch off by hardware signal TURN_OFF<br>Automatic switch-off in case of critical temperature or voltage conditions |
| Software Reset | Orderly shutdown and reset by AT command |
| Hardware Reset | Emergency reset by hardware signal TURN_OFF |
| **Special features** | |
| Antenna | SAIC (Single Antenna Interference Cancellation) / DARP (Downlink Advanced Receiver Performance)<br>Rx Diversity (receiver type 3i – 64-QAM) / MIMO |
| **GNSS features** | |
| Protocol | NMEA |
| Modes | Standalone GNSS<br>Assisted GNSS<br>• Control plane – E911<br>• User plane – gpsOneXTRA |
| General | Power saving modes<br>Power supply for active GNSS antenna supported |

### 1.5.2 Operating modes

The table below briefly summarizes the various operating modes referred to in the following chapters.

| Limits | Function | |
|---|---|---|
| Normal operation | GSM / GPRS / UMTS / HSPA SLEEP | Power saving automatically activated when no calls are in progress, the USB connection is suspended by the host or not present, and there is no active communication via ASC0 |
| | GSM / GPRS / UMTS / HSPA IDLE | Power saving is disabled if a USB connection is not suspended, but no call is in progress. |
| | GSM TALK / GSM DATA | Connection between two subscribers is in progress. Power consumption depends on the GSM network coverage and several connection settings (e.g. DTX off/on, FR/EFR/HR, hopping sequences and antenna connection). The following applies when power is to be measured in TALK_GSM mode: DTX off, FR and no frequency hopping. |
| | GPRS DATA | GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates and GPRS configuration (e.g. used multislot settings). |
| | EGPRS DATA | EGPRS data transfer in progress. Power consumption depends on network<br>settings (e.g. power control level), uplink / downlink data rates and EGPRS configuration (e.g. used multislot settings). |
| | UMTS TALK / UMTS DATA | UMTS data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate. |
| | HSPA DATA | HSPA data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate. |
| Airplane mode | Airplane mode shuts down the radio part of the modem, causes the modem to log off from the GSM/GPRS network, and disables all AT commands whose execution requires a radio connection. Airplane mode can be controlled by AT commands. | |

### 1.5.3 Power Consumption

It is recommended to use 12V/1.5A power supply.

| | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| IIN[1] | OFF State supply current | POWER DOWN | | | 7 | | mA |
| | Average GSM / GPRS supply current (GNSS off) | IDLE[2] (USB disconnected, UART active) @ DRX=2 | | | 13 | | mA |
| | | IDLE[2] (USB active) @ DRX=2 | | | 21 | | mA |
| | | Voice Call GSM850/900; PCL=5 | | | 87 | 109[3] | mA |
| | | GPRS Data transfer GSM850/900; PCL=5; 1Tx/4Rx | ROPR=8 (max. reduction) | | 87 | | mA |
| | | | ROPR=4 (no reduction) | | 87 | | mA |
| | | GPRS Data transfer GSM850/900; PCL=5; 2Tx/3Rx | ROPR=8 (max. reduction) | | 111 | | mA |
| | | | ROPR=4 (no reduction) | | 150 | | mA |
| | | GPRS Data transfer GSM850/900; PCL=5; 4Tx/1Rx | ROPR=8 (max. reduction) | | 144 | | mA |
| | | | ROPR=4 (no reduction) | | 245 | 271[3] | mA |
| | Average GSM / GPRS supply current (GNSS off) | EDGE Data transfer GSM850/900; PCL=5; 1Tx/4Rx | ROPR=8 (max. reduction) | | 56 | | mA |
| | | | ROPR=4 (no reduction) | | 56 | | mA |
| | | EDGE Data transfer GSM850/900; PCL=5; 2Tx/3Rx | ROPR=8 (max. reduction) | | 71 | | mA |
| | | | ROPR=4 (no reduction) | | 83 | | mA |
| | | EDGE Data transfer GSM850/900; PCL=5; 4Tx/1Rx | ROPR=8 (max. reduction) | | 109 | | mA |
| | | | ROPR=4 (no reduction) | | 142 | | mA |
| | | Voice Call GSM1800/1900; PCL=0 | | | 62 | 76[3] | mA |
| | | GPRS Data transfer GSM1800/1900; PCL=0; 1Tx/4Rx | ROPR=8 (max. reduction) | | 62 | | mA |
| | | | ROPR=4 (no reduction) | | 62 | | mA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | GPRS Data transfer GSM1800/1900; PCL=0; 2Tx/3Rx | ROPR=8 (max. reduction) | | 75 | | mA |
| | | | ROPR=4 (no reduction) | | 94 | | mA |
| | | GPRS Data transfer GSM1800/1900; PCL=0; 4Tx/1Rx | ROPR=8 (max. reduction) | | 97 | | mA |
| | | | ROPR=4 (no reduction) | | 153 | 181[3] | mA |
| | | EDGE Data transfer GSM1800/1900; PCL=0; 1Tx/4Rx | ROPR=8 (max. reduction) | | 49 | | mA |
| | | | ROPR=4 (no reduction) | | 49 | | mA |
| | | EDGE Data transfer GSM1800/1900; PCL=0; 2Tx/3Rx | ROPR=8 (max. reduction) | | 62 | | mA |
| | | | ROPR=4 (no reduction) | | 73 | | mA |
| | | EDGE Data transfer GSM1800/1900; PCL=0; 4Tx/1Rx | ROPR=8 (max. reduction) | | 87 | | mA |
| | | | ROPR=4 (no reduction) | | 112 | | mA |
| | Peak current during GSM transmit burst | VOICE Call GSM850/900; PCL=5 | | | 0,54 | 0,75[3] | A |
| | | VOICE Call GSM1800/1900; PCL=0 | | | 0,30 | 0,51[3] | A |
| | Average GSM / GNSS supply current (GNSS on) | GSM active (UART/USB active); @DRX=2 & GNSS NMEA output off | | | 15 | | mA |
| | | GSM active (UART/USB active); @DRX=2 & GNSS NMEA output on[4] | | | 23 | | mA |
| | Average WCDMA supply current (GNSS off) | IDLE2 (USB disconnected, UART active) @ DRX=6 | | | 9 | | mA |
| | | IDLE2 (USB active) @ DRX=6 | | | 16 | | mA |
| | | Voice Call Band I; 24dBm | | | 159 | | mA |
| | | Voice Call Band II; 24dBm | | | 177 | 214[3] | mA |
| | | Voice Call Band IV; 24dBm[5] | | | 178 | | mA |
| | | Voice Call Band V/VI; 24dBm | | | 164 | | mA |
| | | Voice Call Band VIII; 24dBm[6] | | | 178 | 197[3] | mA |
| | | UMTS Data transfer Band I @+24dBm | | | 152 | | mA |
| | | UMTS Data transfer Band II @+24dBm | | | 174 | | mA |
| | | UMTS Data transfer Band IV @+24dBm[5] | | | 177 | | mA |
| | | UMTS Data transfer Band V/VI @+24dBm | | | 160 | | mA |
| | | UMTS Data transfer Band VIII @+24dBm[6] | | | 171 | | mA |
| | | HSPA Data transfer Band I @+24dBm | | | 164 | | mA |
| | | HSPA Data transfer Band II @+24dBm | | | 181 | 222[3] | mA |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | HSPA Data transfer Band IV @+24dBm[5] | | 188 | | mA |
| | | HSPA Data transfer Band V/VI @+24dBm | | 167 | | mA |
| | | HSPA Data transfer Band VIII @+24dBm[6] | | 177 | 205[3] | mA |
| | Average WCDMA/ GNSS supply current (GNSS on) | WCDMA active (UART / USB active); @DRX=6 & GNSS NMEA output off | | 15 | | mA |
| | | WCDMA active (UART / USB active); @DRX=6 & GNSS NMEA output on[4] | | 23 | | mA |

1. With an impedance of $Z_{LOAD}$=50Ohm at the antenna port.
2. Measurements start 6 minutes after switching ON the modules
   Average times: transfer modes – 1.5 minutes
   Communication tester settings: no neighbor cells, no cell reselection etc., RMC (reference measurement channel)
3. At total mismatch
4. One fix per second
5. AWS UMTS/HSPA+ band IV supported by MTX-HSPA-PH8+G only
6. 900MHz UMTS/HSPA+ band VII supported by MTX-HSPA-PH8-P+G only

### 1.5.4 RF antenna interface description

The table below briefly summarizes the RF Antenna interface GSM/UMTS

| Parameter | | Conditions | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|---|
| UMTS/HSPA connectivity | | Band I, II, IV, V, VI, VIII | | | | |
| Receiver Input Sensitivity @ ARP | | UMTS 800/850 Band VI/V | -104.7/-106.7 | -110 | | dBm |
| | | UMTS 900 Band VIII | -103.7 | -110 | | dBm |
| | | MTS AWS Band IV | -106.7 | -110 | | dBm |
| | | UMTS 1900 Band II | -104.7 | -109 | | dBm |
| | | UMTS 2100 Band I | -106.7 | -110 | | dBm |
| RF Power @ ARP with 50Ohm Load | | UMTS 800/850 Band VI/V | 21 | 24 | 25 | dBm |
| | | UMTS 900 Band VIII | 21 | 24 | 25 | dBm |
| | | UMTS 1800 Band III | 21 | 24 | 25 | dBm |
| | | UMTS 2100 Band I | 21 | 24 | 25 | dBm |
| Tx noise @ ARP with max. RF power for UMTS:<br>Band 1 channel 9777<br>Band 2 channel 9477 | | GNSS band | | -170 | | dBm/Hz |
| GPRS coding schemes | | Class 12, CS1 to CS4 | | | | |
| EGPRS | | Class 12, MCS1 to MCS9 | | | | |
| GSM Class | | Small MS | | | | |
| Static Receiver Input Sensitivity @ ARP | | GSM 850 / E-GSM 900 | -102 | -109 | | dBm |
| | | GSM 1800 / GSM 1900 | -102 | -108 | | dBm |
| RF Power @ ARP with 50Ohm Load | GSM | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| RF Power @ ARP with 50Ohm Load, (ROPR = 4, i.e. no reduction) | GPRS, 1 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 1 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 2 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 2 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 3 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 3 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 4 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| RF Power @ ARP with 50Ohm Load, (ROPR = 5) | GPRS, 1 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 1 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 2 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 2 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 3 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 3 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 4 TX | GSM 850 / E-GSM 900 | | 31 | | dBm |
| | | GSM 1800 / GSM 1900 | | 28 | | dBm |
| | EDGE, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| RF Power @ ARP with 50Ohm Load, (ROPR = 6) | GPRS, 1 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 1 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 2 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 2 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 3 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 3 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 4 TX | GSM 850 / E-GSM 900 | | 29 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | EDGE, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| RF Power @ ARP with 50Ohm Load, (ROPR = 7) | GPRS, 1 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 1 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 2 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 2 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 3 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 3 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 24 | | dBm |
| | EDGE, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 24 | | dBm |

| | | | | | | |
|---|---|---|---|---|---|---|
| RF Power @ ARP with 50Ohm Load, (ROPR = 8, i.e. maximum reduction) | GPRS, 1 TX | GSM 850 / E-GSM 900 | | 33 | | dBm |
| | | GSM 1800 / GSM 1900 | | 30 | | dBm |
| | EDGE, 1 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 26 | | dBm |
| | GPRS, 2 TX | GSM 850 / E-GSM 900 | | 30 | | dBm |
| | | GSM 1800 / GSM 1900 | | 27 | | dBm |
| | EDGE, 2 TX | GSM 850 / E-GSM 900 | | 24 | | dBm |
| | | GSM 1800 / GSM 1900 | | 23 | | dBm |
| | GPRS, 3 TX | GSM 850 / E-GSM 900 | | 28.2 | | dBm |
| | | GSM 1800 / GSM 1900 | | 25.2 | | dBm |
| | EDGE, 3 TX | GSM 850 / E-GSM 900 | | 22.2 | | dBm |
| | | GSM 1800 / GSM 1900 | | 21.2 | | dBm |
| | GPRS, 4 TX | GSM 850 / E-GSM 900 | | 27 | | dBm |
| | | GSM 1800 / GSM 1900 | | 24 | | dBm |
| | EDGE, 4 TX | GSM 850 / E-GSM 900 | | 21 | | dBm |
| | | GSM 1800 / GSM 1900 | | 20 | | dBm |

### 1.5.5 SIM Card

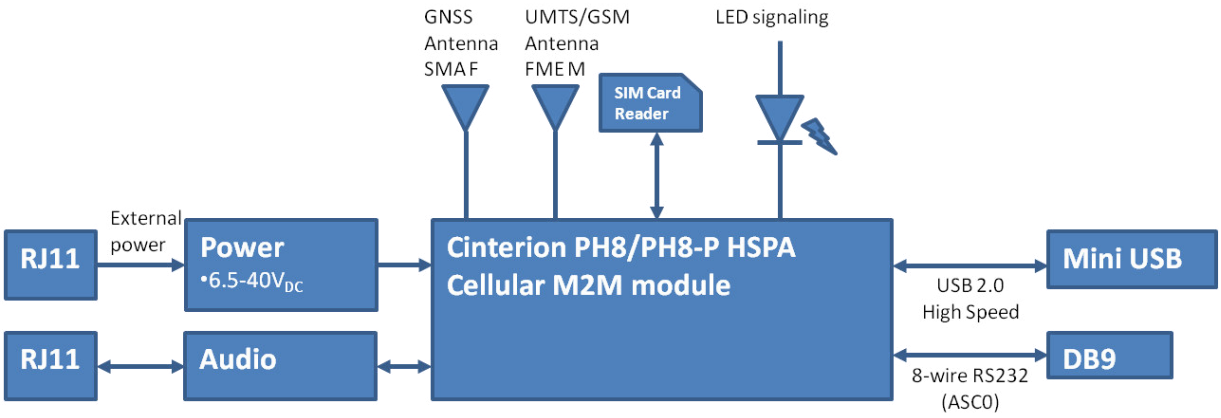
The MTX-HSPA-PH8-P+G supports an external SIM card through the integrated SIM holder. Both 3V and 1.8V SIM technology is supported. Older 5V SIM technology is not supported.

## 1.6 Precautions

MTX-HSPA-PH8-P+G as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in Technical Data

## 1.7 Block diagram

The base MTX-HSPA-PH8-P+G modem's block diagram is shown in the following figure:




## 1.8 Hardware revisions

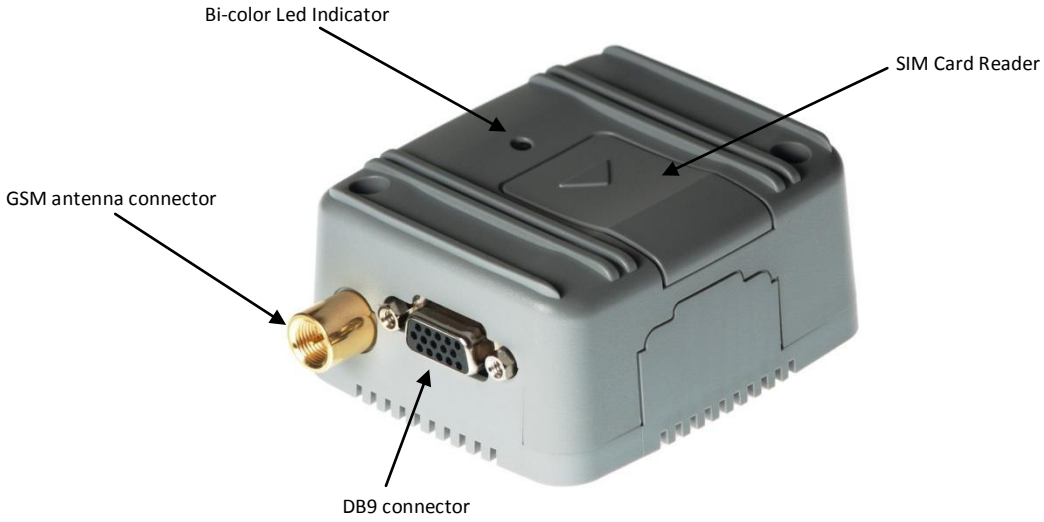
Base MTX-HSPA-PH8-P+G and MTX-HSPA-PH8-P+G models

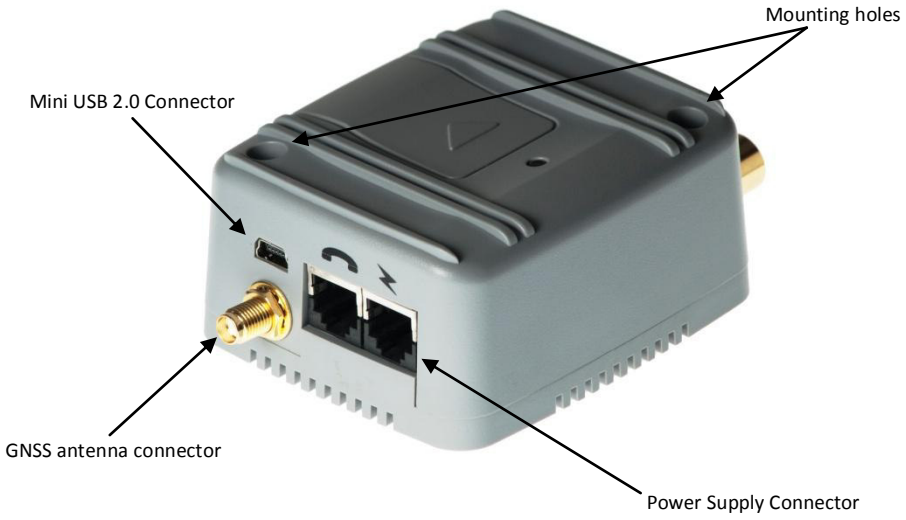
| Hardware Revision | Starting production date | Changes |
|---|---|---|
| 2.03 | 01/2014 | Initial version |

# 2. Mechanical description

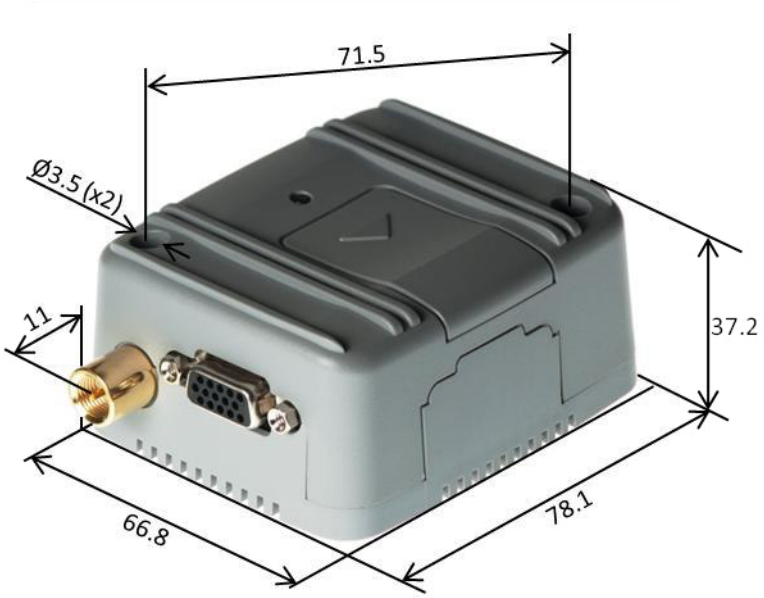
## 2.1 Overview

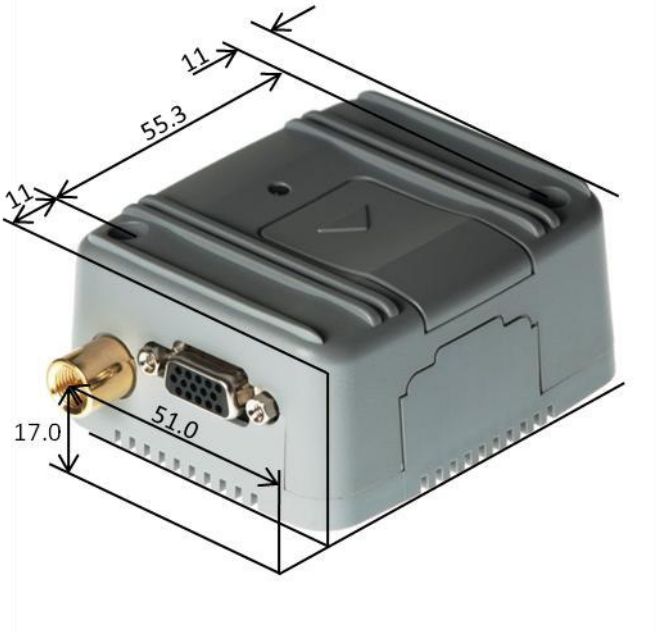
The pictures below show the mechanical design of the modem along with the positions of the different connectors and mounting holes. The modem case is made of durable PC/ABS plastic.



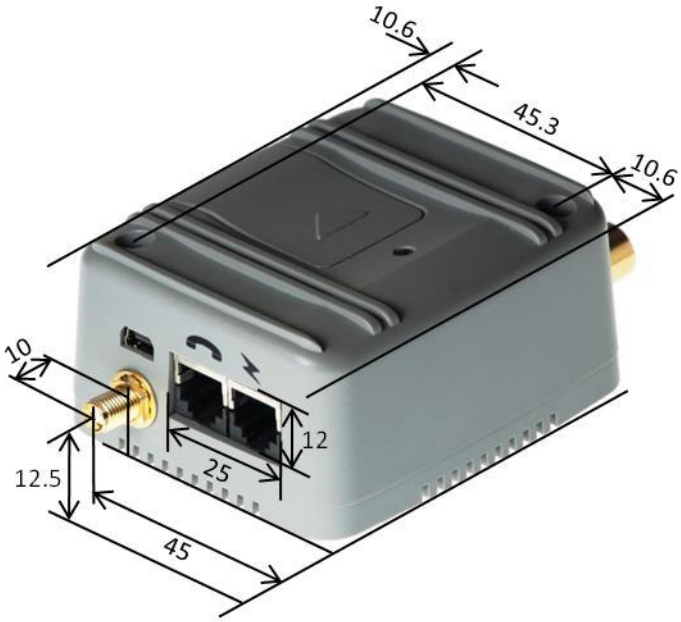



## 2.2 Dimensions




All dimensions are in millimeters



All dimensions are in millimeters

# 3. Electrical and environmental characteristics

## 3.1 Electrical specifications

### 3.1.1 Power supply

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Max.** | **Unit** |
| VIN | Supply voltage | | 0 | 45 | V |

| CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| VIN | Supply voltage | Maximum | 6.5 | | 40 | V |
| | | Recommended | 7 | | 35 | V |
| IIN | Supply current | | - | * | - | A |
| η | Efficiency | VIN=12V, IIN=2A, 25ºC | | 80 | | % |
| $f_O$ | Switching Frequency | | 127 | 150 | 173 | kHz |

* See section 1.6.3

### 3.1.2 RS232 interface

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Max.** | **Unit** |
| $V_I$ | Input voltage range | Drivers | -0.3 | 6 | V |
| | | Receivers | -25 | 25 | V |
| $V_O$ | Output voltage range | Drivers | -13.2 | 13.2 | V |
| | | Receivers | -0.3 | 5 | V |
| | Electrostatic discharge | Human body model | | 2 | kV |

| CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| $V_{OH}$ | Driver high-level output voltage | $R_L$=3kΩ to GND | 5 | 5.4 | | V |
| $V_{OL}$ | Driver low-level output voltage | $R_L$=3kΩ to GND | -5 | -5.4 | | V |
| $r_o$ | Driver output resistance | VIN = 0V | 300 | 10M | | Ω |
| $V_{IT+}$ | Receiver positive-going input threshold voltage | | | 1.5 | 2.4 | V |
| $V_{IT-}$ | Receiver negative-going input threshold voltage | | 0.6 | 1.2 | | V |
| $V_{hys}$ | Receiver input hysteresis ($V_{IT+}$ - $V_{IT-}$) | | | 0.3 | | V |
| $r_i$ | Receiver input resistance | Input voltage ±3 to ±25V | 3 | 5 | 7 | kΩ |

### 3.1.3 Audio interface

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Max.** | **Unit** |
| $V_I$ | Input voltage | | -0.3 | 3.5 | V |

| CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Output** | | | | | | |
| $V_{OD}$ | Audio output differential voltage | Audio mode 5, Outstep 4, no load, minimum differential load 7.5Ω | | 4.2 | 6 | Vpp |
| $R_o$ | Differential output load resistance | | 7.5 | 8 | | kΩ |
| $G_E$ | Absolute output gain error | outBbcGain=2 | -0.1 | | 0.1 | dB |
| N | Idle output channel noise | outBbcGain=2 | | -83 | -75 | dBm |
| SNR | Output Signal to Noise and Distortion | outBbcGain=2 | 47 | | | dB |
| | Output Frequency response | 0-100Hz | | | -34 | dB |
| | | 200Hz | | -1.1 | | dB |
| | | 300-3350Hz | -0.2 | | 0.1 | dB |
| | | 3400Hz | | -0.7 | | dB |
| | | 4000Hz | | -39 | | dB |
| | | ≥4400Hz | | | -75 | dB |
| **Input** | | | | | | |
| $V_{ID}$ | Full scale input voltage | Audio mode 5 | | 1.6 | | Vpp |
| | Input amplifier gain in 6dB steps | | 0 | | 42 | dB |
| N | Idle input channel noise | | | -82 | -76 | dBm |
| SNR | Input Signal to Noise and Distortion | | | 70 | 77 | dB |
| | Input Frequency response | 0-100Hz | | | -34 | dB |
| | | 200Hz | | -1.1 | | dB |
| | | 300-3350Hz | -0.2 | | 0.1 | dB |
| | | 3400Hz | | -0.7 | | dB |
| | | 4000Hz | | -39 | | dB |
| | | ≥4400Hz | | | -75 | dB |

## 3.2 Operating temperatures

Please note that the modem's lifetime, i.e., the MTTF (mean time to failure) may be reduced if operated outside the extended temperature range.

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Normal operation | -30 | +25 | +85 | °C |
| Extended operation[1] | -40 | | +90 | °C |
| Automatic shutdown[2] | <-40 | | >+90 | °C |

1. Extended operation allows normal mode speech calls or data transmissions for a limited time until the automatic thermal shutdown mode takes effect. Within the extended temperature range (outside the operating temperature range) the specified electrical characteristics may be increased or decreased.
2. Due to uncertainty in temperature measurement, a tolerance of ±3ºC on the stated shutdown thresholds may occur.

Note that within the specified operating temperature ranges the modem temperature may vary to a great extent depending on the operating mode, used frequency band, radio output power and current supply voltage.

## 3.3 Storage conditions

The conditions stated below are only valid for modems in their original packed state in weather protected, non-temperature-controlled storage locations. Normal storage time under these conditions is a maximum of 12 months. The modems will be delivered in a packaging that meets the requirements according "IPD/JEDEC J-STD-033B.1" for Low Temperature Carriers.

| Type | Condition | Unit | Reference |
|---|---|---|---|
| Air temperature: Low<br>High | -30<br>+75 | ºC | ETS 300 019-2-1: T1.2, IEC 60068-2-1 Ab<br>ETS 300 019-2-1: T1.2, IEC 60068-2-2 Db |
| Relative humidity: Low<br>High<br>Condensation | 10<br>90 at 30ºC<br>90-100 at 30ºC | % | ---<br>ETS 300 019-2-1: T1.2, IEC 60068-2-56 Cb<br>ETS 300 019-2-1: T1.2, IEC 60068-2-30 Db |
| Air pressure: Low<br>High | 70<br>106 | kPa | IEC TR 60271-3-1:1K4<br>IEC TR 60271-3-1:1K4 |
| Movement of surrounding air | 1.0 | m/s | IEC TR 60271-3-1:1K4 |
| Water: rain, dripping, icing and frosting | Not allowed | - | - |
| Radiation: Solar<br>Heat | 1120<br>600 | W/m2 | ETS 300 019-2-1: T1.2, IEC 60068-2-2Bb<br>ETS 300 019-2-1: T1.2, IEC 60068-2-2Bb |
| Chemically active substances | Not recommended | | IEC TR 60271-3-1:1C1L |
| Mechanically active substances | Not recommended | | IEC TR 60271-3-1:1S1 |
| Sinusoidal vibration:<br>Displacement<br>Acceleration<br>Frequency range | <br>1.5<br>5<br>2-9  9-200 | <br>mm<br>m/s2<br>Hz | IEC TR 60271-3-1:1M2 |
| Shocks:<br>Shock spectrum<br>Duration<br>Acceleration | <br>semi-sinusoidal<br>1<br>50 | <br><br>ms<br>m/s2 | IEC 60068-2-27 Ea |

# 4. Interface description

All electrical connections to the modem are protected in compliance with the standard air and contact Electrostatic Discharge (ESD).

The modem family uses the following industry standard connectors:

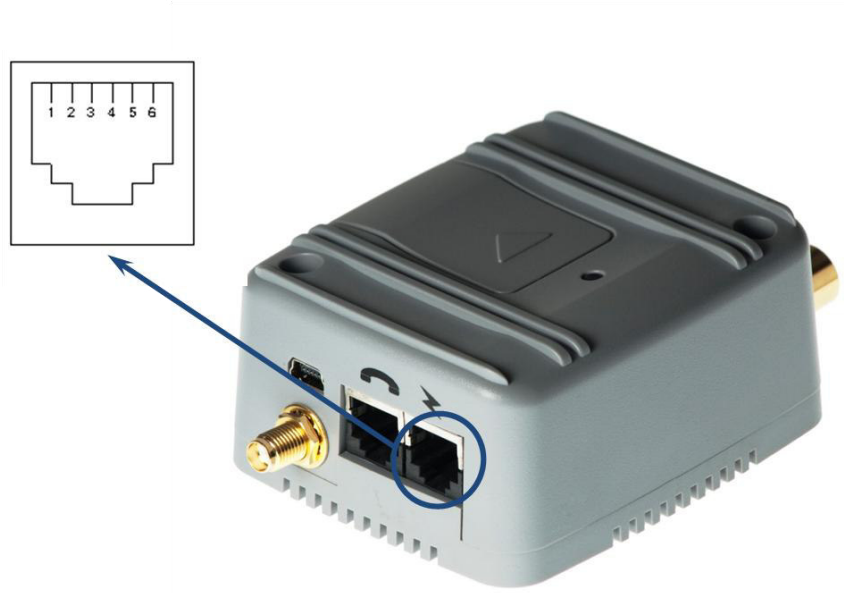
- USB mini connector
- DB9 female (main RS232 port)
- RJ11 6-way (power supply connector)
- RJ11 6-way (audio handset connector)
- SIM card reader
- FME male coaxial jack (GSM antenna connector)
- SMA female coaxial jack (GPS antenna connector)

## 4.1 Power supply connector

An RJ11 6-way connector, as shown and described below, serves as a means of supplying and controlling DC power to the modem.

The power supply voltage (VCC) required by the modem is in the range of 6.5 to 40VDC. We recommend a 12V DC power supply. The power supply has to be a single voltage source capable of providing a current peak during an active transmission. The uplink burst causes strong ripples (drop) on the power lines.

By default, the MTX-HSPA-PH8-P+G will automatically switch on when power supply is applied at PIN 1 and PIN 6.




| Pin | Signal | Direction | Limits | Description |
|---|---|---|---|---|
| 1 | VIN | Input | 6.5-40VDC | Positive power input |
| 2 | Not connected | | | Reserved for future uses |
| 3 | TURN_OFF | Input | Vmax: VIN | Active high control line used to switch off or reset the modem<br>VIH>5V, VIL<2V<br>Power off: t >10ms |
| 4 | Not connected | | | Reserved for future uses |
| 5 | Not connected | | | Reserved for future uses |
| 6 | GND | Input | | Negative power (ground) |

## 4.2 Mini USB connector

The MTX-HSPA-PH8-P+G supports a USB 2.0 High Speed (480Mbit/s) device interface. The USB interface is primarily intended for use as a command and data interface and for downloading firmware. The USB I/O pins are capable of driving the signal at a minimum of 3.0V. They are 5V I/O compliant.

The USB port has different functions depending on whether Java is running or not. With Java, the lines may be used for debugging purposes. If Java is not used, the USB interface is available as a command and data interface and for downloading firmware.

To properly connect the module's USB interface to the host, a USB 2.0 compatible connector is required. Furthermore, the USB modem driver which is delivered with MTX-HSPA-PH8-P+G must be installed as described below.

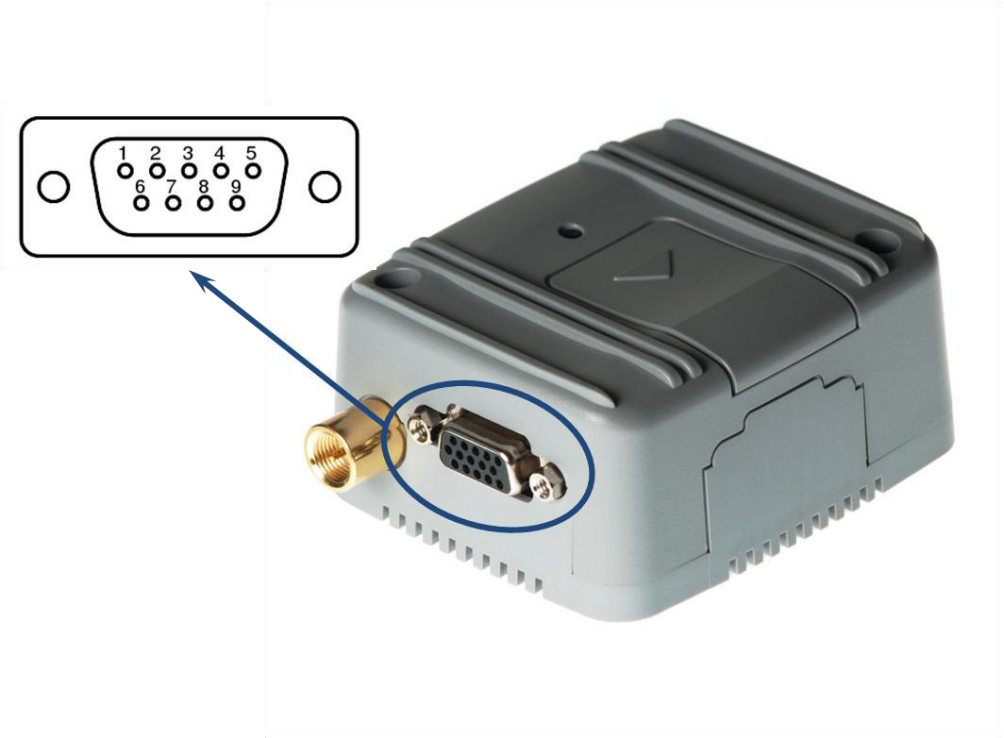
The USB host is responsible for supplying power across the VUSB_IN line to the module's USB interface. This is because MTX-HSPA-PH8-P+G is designed as a self powered device compliant with the *"Universal Serial Bus Specification Revision 2.0".*

The MTX-HSPA-PH8-P+G cannot be powered by a USB port. If you need this feature, contact gsmsupport@matrix.es. Only modems that have a mounted internal Li-Po battery (-BAT) can operate with USB power voltage.

There are drivers available for Windows and Linux environment applications. Visit the MTX-HSPA-PH8-P+G web page at www.mtxm2m.com

## 4.3 DB9 connector: RS232 port

The modem supports a standard RS232 8-wire serial interface (EIA/TIA 574) via its 9 pin Sub-D connector, shown below. It is connected to the modem's ASC0 main port using a level shifter converter.




The MTX-HSPA-PH8-P+G modem is designed to be used as a DCE (data circuit-terminating equipment). Based on the conventions for DCE-DTE connections, it communicates with the customer application (DTE- data terminating equipment) using the following signals:

- Port TxD @ application sends data to TXD of MTX-HSPA-PH8-P+G Modem
- Port RxD @ application receives data from RXD of MTX-HSPA-PH8-P+G Modem

The RS-232 interface is implemented as a serial asynchronous transmitter and receiver conforming to ITU-T V.24 Interchange Circuits DCE. It is configured for 8 data bits, no parity and 1 stop bit and can be operated at fixed bit rates from 1200bps to 921600bps.

Autobauding supports bit rates from 1200bps to 230400bps. Autobauding is not compatible with multiplex mode. Hardware handshake using the /RTS and /CTS signals and XON/XOFF software flow control are supported.

In addition, the modem control signals DTR, DSR, DCD and RING are available. The MODEM control RING signal (Ring Indication) can be used to indicate, to the cellular device application, that an incoming call or Unsolicited Result Code (URC) is received. It can also be used to send pulses to the host application; for example, to wake the application up from the power saving mode.

The DB9 connector pinout is shown in the table below:

| Pin | Signal | Direction | Description |
|---|---|---|---|
| 1 | DCD | Output | Data carrier detected |
| 2 | RD 0 | Output | Received data |
| 3 | TD 0 | Input | Transmitted data |
| 4 | DTR | Input | Data terminal ready |
| 5 | GND | - | Ground connection |
| 6 | DSR | Output | Data set ready |
| 7 | RTS | Input | Request to send |
| 8 | CTS | Output | Clear to send |
| 9 | RI | Output | Ring indicator |

Features

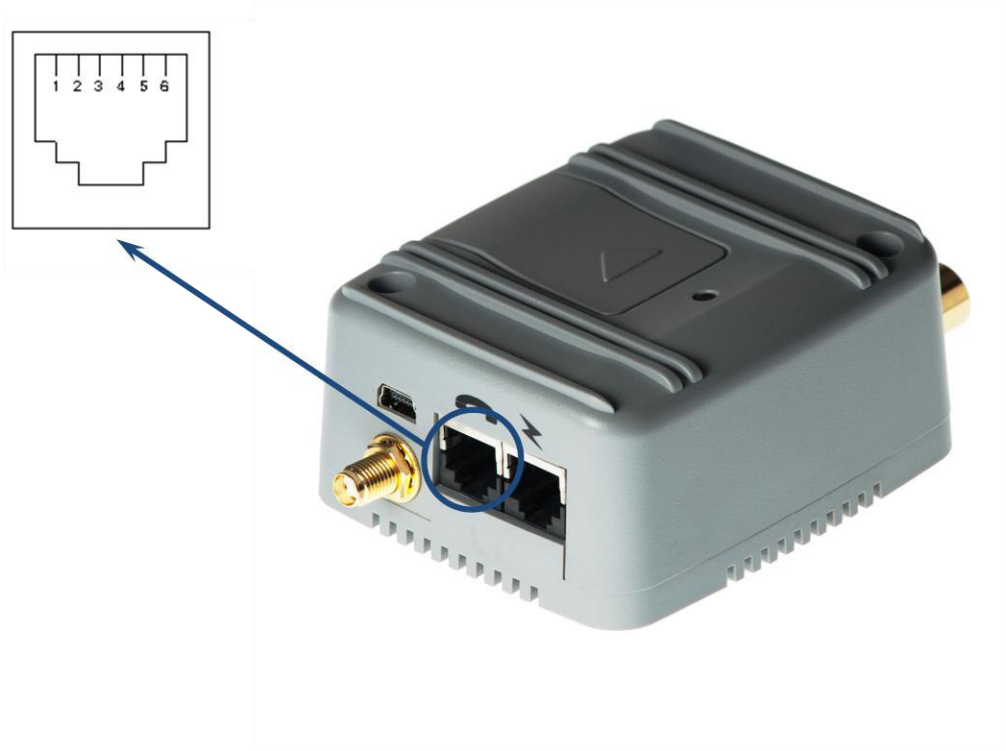
- Includes the data lines TXD0 and RXD0, the status lines RTS0 and CTS0 and also the modem control lines DTR0, DSR0, DCD0 and RING0.
- ASC0 is primarily designed for controlling voice calls, transferring CSD, fax and GPRS data and for controlling the GSM engine with AT commands.
- Full Multiplex capability allows the interface to be partitioned into three virtual channels, but with CSD and fax services only available on the first logical channel. Please note that when the ASC0 interface runs in Multiplex mode, ASC1 cannot be used.
- The DTR0 signal will only be polled once per second from the internal firmware of MTX-HSPA-PH8-P+G.
- The RING0 signal serves to indicate incoming calls and other types of URCs (Unsolicited Result Code). It can also be used to send pulses to the host application; for example, to wake the application up from the power saving mode. To configure the RING0 line, use the following AT Command: AT^SCFG.
- The default configuration is 8 data bits, no parity and 1 stop bit. The setting can be changed using the AT command AT+ICF and, if required, AT^STPB.
- ASC0 can be operated at fixed bit rates from 1200bps to 921600bps.
- **The default serial speed for MTX-HSPA-PH8-P+G is 115200bps.**

## 4.4 Audio connector

A 6-way 4-pole RJ connector, as shown below, allows a telephone handset to be plugged into the modem, giving access to the microphone and earpiece signals. The connector may also be used to drive other analog audio sub-systems or devices.

The audio interface provides one analog input for a microphone and one analog output for an earpiece.

- The microphone input and the earpiece output are balanced
- For electret microphones a supply source is implemented
- The MTX-HSPA-PH8-P+G is pre-configured to work with a range of handsets, the audio interface is flexible and its performance can be configured, using AT commands, to match a particular handset or audio subsystem
- Earpiece outputs are short-circuit protected




| Pin | Signal | Direction | Description |
|---|---|---|---|
| 1 | Not connected | | |
| 2 | MICN | Input | Microphone negative input |
| 3 | EPN | Output | Earpiece negative output |
| 4 | EPP | Output | Earpiece positive output |
| 5 | MICP | Input | Microphone positive input |
| 6 | Not connected | | |

To suit the different types of accessories, the audio interfaces can be configured for different audio modes via the AT^SNFS command. The electrical characteristics of the voiceband part vary with the audio mode. For example, sending and receiving amplification, sidetone paths, noise suppression etc. depend on the selected mode and can be altered with AT commands (except for mode 1).

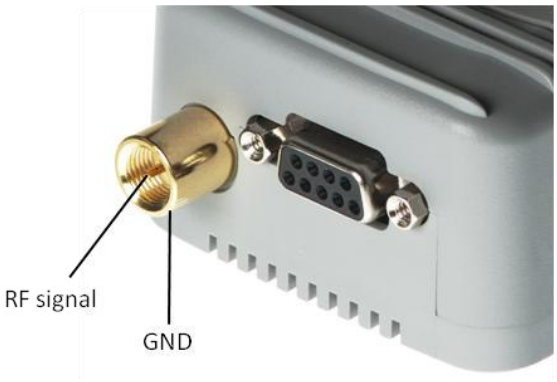
Both analog audio interfaces can be used to connect headsets with microphones or speakerphones. Headsets can be operated in audio mode 3 and speakerphones in audio mode 2. Audio mode 5 can be used for direct access to the speech coder without signal pre- or post-processing.

When shipped from the factory, all audio parameters of MTX-HSPA-PH8-P+G are set to interface 1 and audio mode 1. This is the default configuration optimized for the Votronic HH-SI-30.3/V1.1/0 handset and used for type approving the MTX Modems' reference configuration. Audio mode 1 has fixed parameters which cannot be modified. To adjust the settings of the Votronic handset simply change to another audio mode.

| **Audio mode no. AT^SNFS=** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|
| Name | Default Handset | Router | User Handset | Headset | Speaker phone | Transparent |
| Purpose | DSB with Votronic handset | Analog phone interface | | Mono Headset | Handheld speakerphone | Direct access to speech coder |
| TX-Filters | Adjusted | Flat | Adjusted | Flat | Flat | Flat |
| RX-Filters | Adjusted to fit artificial ear type 3.2 low leakage | Flat | Adjusted to fit artificial ear type 3.2 low leakage | 800Hz HP | 800Hz HP | Flat |
| Default SNFI Parameters<br><micAmp1><br><micAmp2><br><micTxVol> | 0 (0dB)<br>63 (+35.25dB)<br>16384 (0dB) | 0 (0dB)<br>18 (+1.5dB)<br>16384 (0dB) | 0 (0dB)<br>63 (+35.25dB)<br>16384 (0dB) | 1 (+20dB)<br>37 (+15.75dB)<br>16384 (0dB) | 1 (+20dB)<br>48 (+24dB)<br>16384 (0dB) | 0 (0dB)<br>21 (+3.75dB)<br>16384 (0dB) |
| Default SNFO Parameters<br><cdcRxGain><br><rxVol><br><stGain> | 61 (+4dB)<br>33 (0dB)<br>5514<br>(-21.5dB) | 50 (-7dB)<br>33 (0dB)<br>0 (Mute) | 61 (+4dB)<br>33 (0dB)<br>5514<br>(-21.5dB) | 49 (-8dB)<br>33 (0dB)<br>12288<br>(-15dB) | 61 (+4dB)<br>33 (0dB)<br>0 (Mute) | 58 (+1dB)<br>33 (0dB)<br>0 (Mute) |
| Echo canceller Behaviour optimized for | ON<br>low echo | ON<br>low echo | ON<br>low echo | ON<br>moderate echo | ON<br>high echo | OFF |
| Residual echo suppression with comfort noise generator | ON | ON | ON | ON | ON | OFF |
| Noise Reduction (Tx) | OFF | OFF | -12dB | -12dB | -12dB | OFF |
| MIC input signal for 0dBm0, f = 1024 Hz | 15mV | 650mV | 15mV | 12mV | 5mV | 420mV |
| EP output signal in mV rms.<br>@ 0dBm0,<br>1024 Hz, no load (default gain) /<br>@ 3.14 dBm0 | 465mV<br>2.1Vpp | 512mV<br>2.1Vpp | 465mV<br>2.1Vpp | 370mV<br>1.6Vpp | 1485mV<br>5.7Vpp | 1290mV<br>5.5Vpp |
| Sidetone gain at default settings | 20.8dB | -∞ dB | 20.8dB | 17.0dB | -∞ dB | -∞ dB |

## 4.5 GSM/GPRS/UMTS antenna connector

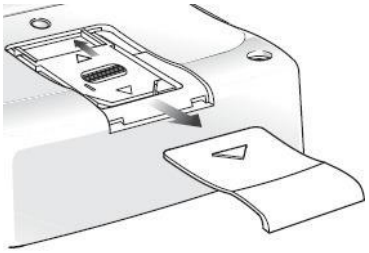
The antenna connector allows radio frequency (RF) transmission signals between the modem and an external customer-supplied antenna. The modem is fitted with a 50Ω, FME male coaxial jack.

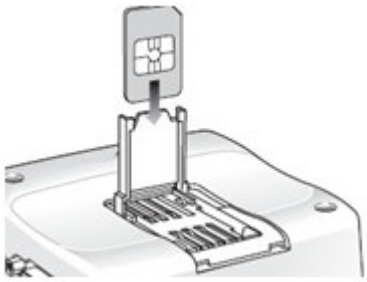



The external antenna must be matched properly to achieve the best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression.

## 4.6 SIM card reader

The MTX-HSPA-PH8-P+G modem is fitted with a SIM card reader designed for 1.8V and 3V SIM cards. It is the flip-up type which is lockable in the horizontal position and is accessed through a removable panel as shown below.





The card holder is a five wire interface according to GSM 11.11. It has a SIM card detector switch to detect whether or not the SIM card drawer is inserted.

Removing and inserting the SIM card during operation requires the software to be reinitialized. Therefore, after reinserting the SIM card it is necessary to restart the MTX-HSPA-PH8-P+G modem.

The full operation of the MTX-HSPA-PH8-P+G relies on a SIM card being inserted. Some MTX-HSPA-PH8-P+G functionality may be lost if you try to operate the control modem without a SIM card.

## 4.7 GPS

The MTX-HSPA-PH8-P+G integrates a GNSS receiver that offers the full performance of GPS/GLONASS technology. The GNSS receiver is able to continuously track all GPS/GLONASS satellites in view, thus providing accurate satellite position data.

The integrated GNSS receiver supports the NMEA protocol via USB or RS232 interfaces. NMEA is a combined electrical and data specification for communication between various (marine) electronic devices including GNSS receivers. It has been defined and controlled by the US-based National Marine Electronics Association. For more information on the NMEA Standard please refer to http://www.nmea.org.

Depending on the receiver's knowledge of the last position, current time and ephemeris data, the receiver's startup time (i.e., TTFF = Time-To-First-Fix) may vary: if the receiver has no knowledge of its last position or time, a startup takes considerably longer than if the receiver has still knowledge of its last position, time and almanac or still has access to valid ephemeris data and the precise time. For more information see Section 6.9.

By default, the GNSS receiver is switched off. It has to be switched on and configured using AT commands. For more information on how to control the GNSS interface via the AT command AT^SGPSC see the AT Command Set manual.

### 4.7.1 GPS antenna connector

The antenna connector allows for the transmission of radio frequency (RF) signals between the modem and an external customer-supplied antenna. The modem is fitted with a 50Ω, SMA F coaxial jack.

It is possible to connect active or passive GPS antennas. In either case they must have 50 Ohm impedance.

## 4.8 Firmware updates

It is possible and sometimes necessary to update the MTX-HSPA-PH8-P+G firmware.
Updates must be carried out by an approved technician.
Please contact gsmsupport@matrix.es for details regarding Service/Programming.

# 5. Operation

## 5.1 Switching on the modem. New *"Automatic restart after shutdown"* feature

There is no special way to turn the modem on: just apply power to the VIN terminal via a power connector (see Section 4.1). The modem will be fully operational after 4 to 9 seconds. Logging onto a network may take longer than this and is out of the modem's control.

The *Automatic Restart after Shutdown* feature is enabled as part of the default factory settings. This means that if/when the modem has to be switched off, due to a critical power supply, the modem will restart itself within a few seconds. This feature allows an application to be switched on all the time and also allows it to restart itself.

The *Automatic Restart after Shutdown* feature cannot be disabled.

## 5.2 Switching off the modem

There are several ways to switch off (power down) the modem:

- Using the TURN_OFF pin (see section 4.1 to see the modems that use it). Continuously pressing the TURN_OFF pin (for at least 1 second) causes the modem to enter power down mode. Its use is not recommended except in an emergency. A delay of up to 10 seconds is experienced until the modem logs out of the network. The RTC stays active.

- AT^SMSO command: this allows the modem to log out of from the network and allows the software to enter into a secure state and save data before disconnecting the power supply. A delay of up to 10 seconds is experienced until the modem logs out of the network. The RTC stays active.

## 5.3 Status LEDs

The MTX-HSPA-PH8-P+G modem family has a bicolor status LED (green and red).

The green color LED is handled automatically by the modem and indicates its different operating modes, as shown in table below. The LED mode configuration is set by the AT^SLED command.

| Modem status | <mode>=1 | <mode>=2 <flash>=default | <mode>=2 <flash>=user defined |
|---|---|---|---|
| • GSM CS data call in progress or established<br>• GSM voice call in progress or established<br>• UMTS voice call in progress or established<br>• UMTS CS data call in progress | Permanently ON | 10ms ON<br>990ms OFF | <flash> ms ON<br>990 ms OFF |
| • GSM PS data transfer<br>• UMTS data transfer | Permanently ON | 10ms ON<br>1990ms OFF | <flash> ms ON<br>1990 ms OFF |
| • ME registered to a network. No call, no data transfer | Permanently ON | 10ms ON<br>1990ms OFF | <flash> ms ON<br>3990 ms OFF |
| • Limited Network Service (e.g. no SIM, no PIN or during network search) | 500ms ON<br>500ms OFF | 10ms ON<br>990ms OFF | <flash> ms ON<br>990 ms OFF |

The red color LED is connected to the GPIO5 in the MTX-HSPA-PH8-P+G. This allows the user to define the functionality of this LED by issuing AT commands.

# 6. AT command interpreter

After a successful installation of the PHS8-P driver package, the physical USB interface of the modem is represented in the operating system by two virtual interfaces, each assigned to a virtual COM port of its own:

- **Modem interface:**

This interface is referred to as "Modem" if queried using the AT^SQPORT command. In the quick reference tables it is named USB0-MDM.

The Modem interface is intended particularly for data transmission (UMTS or GPRS).

All URCs are normally issued on the Application interface. URCs related to data calls (RING, NO CARRIER) as well as the "^SYSSTART" URC are issued on the Modem interface.

- **Application interface:**

This interface is referred to as "Application" if queried using the AT^SQPORT command. In the quick reference tables it is named USB0-APP.

The Application interface is designed especially for controlling the MTX-HSPA-PH8-P+G, i.e. for entering AT commands, receiving URCs, or sending and receiving short messages. It cannot be used as a data interface for UMTS, or GPRS.

Please note that URCs are normally indicated only on this interface, no matter whether the Modem interface or the Application interface was used to send the AT commands to activate their presentation. This URC management scheme is the default configuration recommended for a typical MTX-HSPA-PH8-P+G application.

Bear in mind that the Modem interface and the Application interface are handled by the same AT command interpreter.

As a result, AT commands entered on both interfaces are not executed in parallel but sequentially, one after the other. So, an AT command issued on one interface will be buffered on this interface to be executed after the other interface has completed processing earlier AT commands.

When a data connection is established over the Modem interface, the Application interface can be used simultaneously for any control functions. This eliminates the need for the user to enter AT commands, such as +++ and ATO, as well as switching back and forth between command and online mode when working on one interface only.

See the MTX-HSPA-PH8-P+G Quick Start guide for a complete step by step installation process.

# 7. Safety and product care

**Please read the information in this section and the information in "Installation of the Modem", before starting your integration work!**

## 7.1 Safety instructions

**PLEASE READ THESE SAFETY INSTRUCTIONS AND KEEP A COPY OF THEM**

- Always ensure that use of the modem is permitted. The modem may present a hazard if used in proximity to personal electronic medical devices. As a rule, the modem must not be used in hospitals, airports or planes.

- Never use the modem at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.

- Operating the modem close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.

- This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body. In applications where this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.

- You are responsible for observing your country's safety standards, and where applicable, the relevant wiring rules.

## 7.2 General precautions

The MTX-HSPA-PH8-P+G Modem as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in "Technical Data".

- Avoid exposing the modem to lighted cigarettes, naked flames or to extreme hot or cold temperatures.

- Never try to dismantle the modem yourself. There are no components inside the modem that can be serviced by the user. If you attempt to dismantle the modem, you may invalidate the warranty.

- The MTX-HSPA-PH8-P+G Modem must not be installed nor located in areas where the surface temperature of the plastic case could exceed 85°C.

- In order to provide strain relief and to avoid transmitting excessive vibration to the modem during installation, all cables connected to the MTX-HSPA-PH8-P+G Modem must be secured or clamped immediately adjacent to the modem's connectors.

- To protect the power supply cables, and in order to comply with fire safety requirements, when the unit is powered from a battery or a high current supply, a fast 1.25A fuse should be connected in line with the positive supply.

- Any incompatible components or products must not be connected to the MTX-HSPA-PH8-P+G modem.

***Note!*** MTX-HSPA-PH8-P+G distributors and sales offices may refuse warranty claims where evidence of product misuse is found.

## 7.3 SIM card precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder.

***Caution!*** Do not touch these connectors! If you do, you may release an electrical discharge that could damage the modem or the SIM card.

- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

## 7.4 Antenna precautions

If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one modem to a single antenna. The modem can be damaged by radio frequency energy from the transmitter of another modem.

- Like any mobile station, the antenna of the modem emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signal cable.

- The modem and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware: ground potentials are not always what they appear to be.

## 7.5 Radio Frequency (RF) exposure and SAR

Your wireless modem device is a low-power radio transmitter and receiver (transceiver). When it is turned on, it emits low levels of radio frequency energy (also known as radio waves or radio frequency fields).

Governments around the world have adopted comprehensive international safety guidelines, developed by scientific organizations such as ICNIRP (International Commission on Non-Ionizing Radiation Protection) and IEEE (The Institute of Electrical and Electronics Engineers Inc.), through periodic and thorough evaluation of scientific studies. These guidelines establish permitted levels of radio wave exposure for the general population. The levels include a safety margin designed to assure the safety of all persons, regardless of age and health, and to account for any variations in measurements.

Specific Absorption Rate (SAR) is the unit of measurement for the amount of radio frequency energy absorbed by the body when using a transceiver. The SAR value is determined at the highest certified power level in laboratory conditions, but the actual SAR level of the transceiver while operating can be well below this value. This is because the transceiver is designed to use the minimum power required to reach the network.

The MTX-HSPA-PH8-P+G wireless modem device has been approved for applications where the antenna is located more than 20cm from the body. In all other configurations **the user** is responsible for meeting the local SAR regulations.

Users of the MTX-HSPA-PH8-P+G wireless modem device are responsible for ensuring that they meet the SAR regulatory requirements of the countries in which they intend to operate the device and that their documentation contains the relevant SAR declaration, certification information and user guidance as appropriate.

## 7.6 Personal medical devices

Wireless modem devices may affect the operation of cardiac pacemakers, hearing aids and certain other implanted equipment. If a minimum distance of 15 cm (6 inches) is maintained between the MTX-HSPA-PH8-P+G modem radiating antenna and a pacemaker, the risk of interference is limited. If the user's application is likely to be situated in the vicinity of personnel, a suitable warning should be contained in the equipment manual to this effect.

# 8. Modem installation

This chapter gives you advice and helpful hints on how to integrate the MTX-HSPA-PH8-P+G Modem into your application from a hardware perspective.

## 8.1 Where to install the modem

There are several conditions which need to be taken into consideration when designing your application as they might affect the modem and its function. They are:

### 8.1.1 Environmental conditions

The modem must be installed so that the environmental conditions stated in the Technical Data chapter such as temperature, humidity and vibration are satisfied.
Additionally, the electrical specifications in the Technical Data section must not be exceeded.

### 8.1.2 Signal strength

The modem has to be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the modem is to a radio base station. You must ensure that where you intend to use the modem is within the network coverage area. Degradation in signal strength can be the result of disturbance from another source; for example, an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in section 9.3.5.

When an application is completed, you can verify the signal strength by issuing the AT command AT+CSQ.

***Tip!*** Before installing the modem, use an ordinary mobile telephone to check a possible location for it. In determining the location for the modem and antenna, you should consider signal strength as well as cable length.

### 8.1.3 Connections of components to MTX-HSPA-PH8-P+G Modem

The user is responsible for the final integrated system. If not correctly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the modem or equipment.

### 8.1.4 Network and subscription

Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.

- If you intend to use SMS in the application, ensure this is included in your (voice) subscription.
- Consider the choice of supplementary services

## 8.2 How to install the modem

### 8.2.1 Power supply

Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current.
When the unit is powered from a battery or a high current supply, connect a fast 1.25A fuse in line with the positive supply. This protects the power cabling and modem.

### 8.2.2 Securing the modem

Before securing the modem take into account the amount of additional space required for the mating connectors and cables that will be used in the application.

- Where access is restricted, it may be easier to connect all the cables to the modem prior to securing it in the application.
- Securely attach the MTX-HSPA-PH8-P+G Modem modem to the host application using two 3mm diameter pan-head screws

## 8.3 Antenna

### 8.3.1 General

The antenna is the component in your system that maintains the radio link between the network and the modem. Since the antenna transmits and receives electromagnetic energy, its efficient function will depend on:

- The type of antenna (for example, circular or directional);
- The placement of the antenna;
- Communication disturbances in the vicinity in which the antenna operates.

In the sections below, issues concerning antenna type, antenna placement, antenna cable, and possible communication disturbances are addressed. In any event, you should contact your local antenna manufacturer for additional information concerning antenna type, cables, connectors, antenna placement, and the surrounding area.

You should also determine whether the antenna needs to be grounded or not. Your local antenna manufacturer might be able to design a special antenna suitable for your application.

### 8.3.2 Antenna type

Make sure that you choose the right type of antenna for the modem. Consider the following requirements:

- The antenna must be designed for one of the frequency bands in use; please ask your network provider for more information:
  - UMTS 800/850/900/1900/2100 MHz
  - GSM 850/900/1800/1900 MHz
- The impedance of the antenna and antenna cable must be 50Ω;
- The antenna output-power handling must be a minimum of 2W

### 8.3.3 Antenna placement

The antenna should be placed away from electronic devices and other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If the signal strength is weak, it is useful to face a directional antenna towards the closest radio base station. This can increase the strength of the signal received by the modem. The modem's peak output power can reach 2W.

RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential /commercial areas and the light industry can withstand a minimum of 3V/m.

### 8.3.4 The antenna cable

Use 50Ω impedance low-loss cable and high-quality 50Ω impedance connectors (frequency range up to 3GHz) to avoid RF losses. Ensure that the antenna cable is as short as possible. The Voltage Standing-Wave Ratio (VSWR) may depend on the effectiveness of the antenna, cable and connectors. In addition, if you use an adaptor between the antenna cable and the antenna connector, it is crucial that the antenna cable is a high-quality, low-loss cable. Minimize the use of extension cables, connectors and adapters. Each additional cable, connector or adapter causes a loss of signal power.

### 8.3.5 Possible communications disturbances

Possible communication disturbances include the following:

- **Noise** can be caused by electronic devices and radio transmitters.
- **Path-loss** occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.
- **Shadowing** is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- **Multi-path fading** is a sudden decrease or increase in the signal strength. This is the result of interference which is caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.
- **Hand-over** occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, disruption.

# 9. Conformity assessment

MATRIX ELECTRONICA S.L.U.
C/ Alejandro Sanchez 109
28019 Madrid
Spain

## 9.1 Standards of European Type Approval

We declare under our sole responsibility that the products MTX-HSPA-PH8-P+G Modem 0 containing Cellular Engine Cinterion engine PH8 (Type S30960-N1055-A200), to which this declaration relates, are labeled with the CE conformity mark.

DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.

DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

ETSI EN 301 511 V9.0.2: Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC) (GSM 13.11 version 7.0.1 Release 1998).

ETSI EN 301 489-1 V1.9.2: Electro Magnetic Compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common Technical Requirements

ETSI EN 301 489-7 V1.3.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS).

ETSI EN 301 489-24 V1.5.1: Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment.

ETSI EN 301 908-01 V5.2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements of article 3.2 of the R&TTE Directive.

ETSI EN 301 908-02 V5.2.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive

IEC/EN 60950-1:2005 / EN 60950-1:2006+A11:2009: Health and Safety

The technical documentation relevant to the above equipment will be held at
MATRIX ELECTRONICA S.L.U.
Alejandro Sanchez 109
28019 Madrid
Spain

Madrid, 20/05/2013.
Mr. J. Vicente
Managing Board

## 9.2 FCC Compliant

MTX-HSPA-PH8-P+G and any variants contain FCC ID: QIPPH8. The FCC Equipment Authorization Certification for the PH8 Module is listed under the FCC identifier QIPPH8
Industry Canada Certification Number: 7830A-PH8 granted to Gemalto M2M GmbH.

The Cinterion reference application of the PH8 Module registered under the above identifier is certified to be in accordance with the following Rules and Regulations of the Federal Communications Commission (FCC). Power listed is ERP for Part 22 and EIRP for Part 24. It is compliant with FCC regulations.

### 9.2.1 SAR information

Cinterion Wireless Modules models: PH8 is marketed without a defined antenna.

The Maximum Antenna Gain when using indoor antennas depends on the distance from the antenna to any nearby persons when in normal operation. It should not exceed the values shown on the table below.

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

The maximum measured power output in the 850 MHz band is 1866.38 mW (32.71 dBm, see 7layers test report MDE_Siem_0714_FCCb).
The maximum permissible exposure is defined as 47 CFR 1.1310 with 0.55773 mW/cm².
The maximum measured power output in the 1900 MHz band is 974.99 mW (29.89 dBm, see 7layers test report MDE_Siem_0714_FCCc).
The maximum permissible exposure is defined as 47 CFR 1.1310 with 1 mW/cm².

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

$S = P*G/4\pi R^2$
$S = 0.55773$ mW/cm² or 1 mW/cm²
P = 1866.38 mW or 974.99 mW
R = 20 cm or 100cm
$\pi = 3.1416$
G(dBi)=10*log10(G)

Solving for G; the maximum antenna gain is

| Band | Distance | Maximum Gain in dBi |
|---|---|---|
| 850MHz | 20cm | 1.7669 |
| 850MHz | 50cm | 9.7257 |
| 1900MHz | 20cm | 7.1227 |
| 1900MHz | 50cm | 15.0815 |

# 10. Declaración de conformidad (Spanish)

MATRIX ELECTRONICA S.L.U.
C/ Alejandro Sanchez 109
28019 Madrid
Spain

## 10.1 Estándares de homologación europea

Declaramos bajo nuestra responsabilidad que los productos MTX-HSPA-PH8-P+G que contienen un modulo celular Cinterion PH8 (Tipo S30960-N1055-A200), al cual se refiere esta declaración, están etiquetados con el marcado CE de conformidad.

DIRECTIVA 2004/108/EC DEL PARLAMENTO EUROPE Y DEL CONSEJO del 15 de Diciembre de 2004 sobre la aproximación de las leyes de los Estados Miembros correspondientes a la compatibilidad electromagnética y que deroga la Directiva 89/336/EEC.

DIRECTIVA 2006/95/EC DEL PARLAMENTO EUROPE Y DEL CONSEJO del 12 de Diciembre de 2006 sobre la armonización de las leyes de los estados miembros relacionadas con los equipos eléctricos diseñados para su uso bajo ciertos límites de voltaje.

ETSI EN 301 511 V9.0.2: Sistema Global de Comunicaciones Móviles (GSM); estándar unificado para estaciones móviles en las bandas GSM 900 y DCS 1800, que cubren los requisitos esenciales del artículos 3.2 de la directiva R&TTE (1999/5/EC) (GSM 13.11 versión 7.0.1 Release 1998).

ETSI EN 301 489-1 V1.9.2: Cuestiones sobre Compatibilidad Electromagnética y espectro Radioeléctricos (ERM); estándar de compatibilidad electromagnética (EMC) para equipos y sistema de radio; Parte 1: Requisitos Técnicos Comunes

ETSI EN 301 489-7 V1.3.1: Cuestiones sobre Compatibilidad Electromagnética y espectro Radioeléctricos (ERM); estándar de compatibilidad electromagnética (EMC) para equipos y sistema de radio; Parte 7: Condiciones específicas para equipos de radio móviles y portátiles y equipos auxiliares de sistemas de radiocomunicaciones móviles digitales (GSM y DCS).

ETSI EN 301 489-24 V1.5.1: Cuestiones sobre Compatibilidad Electromagnética y espectro Radioeléctricos (ERM); estándar de compatibilidad electromagnética (EMC) para equipos y sistema de radio; Parte 24: Condiciones específicas para IMT-2000 CDMA Direct Spread (UTRA) para radios móviles y portátiles (UE) y equipamiento auxiliar.

ETSI EN 301 908-01 V5.2.1: Cuestiones sobre Compatibilidad Electromagnética y espectro Radioeléctricos (ERM); estaciones base (BS) y equipamiento de usuario (UE) para redes celulares IMT-2000 de tercera generación; Parte 1: Normativa europea armonizada para IMT-2000, introducción y requisitos comunes del artículo 3.2 de la directiva R&TTE.

ETSI EN 301 908-02 V5.2.1: Cuestiones sobre Compatibilidad Electromagnética y espectro Radioeléctricos (ERM); estaciones base (BS) y equipamiento de usuario (UE) para redes celulares IMT-2000 de tercera generación; Parte 2: Normativa europea armonizada para IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) que cubre los requisitos esenciales del artículo 3.2 de la directiva R&TTE

IEC/EN 60950-1:2005 / EN 60950-1:2006+A11:2009: Salud y Seguridad

La documentación técnica referente al equipo anterior está disponible en:
MATRIX ELECTRONICA S.L.U.
Alejandro Sanchez 109
28019 Madrid
España

Madrid, 20/05/2013.
Sr. J. Vicente
Managing Board

## 10.2 Conformidad FCC

MTX-HSPA-PH8-P+G y todas sus variantes contienen el FCC ID: QIPPH8. El Certificado de Autorización de Equipo de la FCC para el módulo EHS6 está listado con el identificador FCC QIPPH8 Número de Certificación de Industria en Canadá: 7830A-PH8 asignado a Gemalto M2M GmbH.

El formulario de referencia del módulo PH8 registrado bajo el anterior identificador está conforme con las siguientes Reglas y Regulaciones de la Comisión Federal de Comunicaciones (FCC). La potencia listada como ERP para la parte 22 y como EIRP para la parte 24 cumple con las regulaciones de la FCC.

### 10.2.1 Tasa de absorción específica (SAR)

El modulo Cinterion PH8 es comercializado sin una antena definida. La ganancia máxima de antena usando antenas de interior depende de la distancia de esta a las personas cercanas y en condiciones normales no debe sobrepasar los límites mostrados en la tabla siguiente.

La máxima potencia de salida medida en la banda de 850MHz es 1866.38 mW (32.71 dBm, ver el reporte de test de 7layers MDE_Siem_0714_FCCb).
La máxima exposición permisible se define en 47 CFR 1.1310 con un valor de 0.55773 mW/cm².
La máxima potencia de salida medida en la banda de 1900 MHz es 974.99 mW (29.89 dBm, ver el reporte de test de 7layers MDE_Siem_0714_FCCc).
La máxima exposición permisible se define en 47 CFR 1.1310 con un valor de 1 mW/cm².

De acuerdo al límite en 47 CFR 1.1310, obtenemos el valor de la máxima ganancia de antena como sigue:

$S = P*G/4\pi R^2$
$S = 0.55773\ mW/cm^2$ o $1\ mW/cm^2$
P = 1866.38 mW o 974.99 mW
R = 20 cm o 100cm
$\pi = 3.1416$
G(dBi)=10*log10(G)

Despejando G; la máxima ganancia de antena es:

| Banda | Distancia | Ganancia Máxima en dBi |
|---|---|---|
| 850MHz | 20cm | 1.7669 |
| 850MHz | 50cm | 9.7257 |
| 1900MHz | 20cm | 7.1227 |
| 1900MHz | 50cm | 15.0815 |

# 11. Regulatory and type approval information

## 11.1 Directives and standards

The MTX-HSPA-PH8-P+G modem has been designed to comply with the directives and standards listed below.

It is the responsibility of the application manufacturer to ensure compliance of the final product with all provisions of the applicable directives and standards, as well as with the technical specifications provided in this document.

| Directives | |
|---|---|
| 1999/05/EC | Directive of the European Parliament and of the council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (in short referred to as R&TTE Directive 1999/5/EC).<br>The product is labeled with the CE conformity mark |
| 2002/95/EC (RoHS 1)<br>2011/65/EC (RoHS 2) | Directive of the European Parliament and of the Council of 27 January 2003 (and revised on 8 June 2011) on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) |

| Standards of North American type approval | |
|---|---|
| CFR Title 47 | Code of Federal Regulations, Part 22 and Part 24 (Telecommunications, PCS); US Equipment Authorization FCC |
| OET Bulletin 65 (Edition 97-01) | Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields |
| UL 60 950-1 | Product Safety Certification (Safety requirements) |
| NAPRD.03 V5.15 | Overview of PCS Type certification review board Mobile Equipment Type Certification and IMEI control<br>PCS Type Certification Review board (PTCRB) |
| RSS132, RSS133, RSS139 | Canadian Standard |

| Standards of European type approval | |
|---|---|
| 3GPP TS 51.010-1 | Digital cellular telecommunications system (Release 7); Mobile Station (MS) conformance specification; |
| ETSI EN 301 511 V9.0.2 | Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC) |
| GCF-CC V3.49 | Global Certification Forum - Certification Criteria |
| ETSI EN 301 489-01 V1.8.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common Technical Requirements |
| ETSI EN 301 489-03 V1.4.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions of Short-Range Devices (SRD) operating on frequencies between 9kHz and 40GHz |
| ETSI EN 301 489-07 V1.3.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS) |
| ETSI EN 301 489-24 V1.4.1 | Electromagnetic Compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment |

| | |
|---|---|
| EN 301 908-01 V3.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements of article 3.2 of the R&TTE Directive |
| EN 301 908-02 V3.2.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third Generation cellular networks; Part 2: Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive |
| EN 300 440-02 V1.3.1 | Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive |
| EN 62311:2008 | Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz) |
| IEC/EN 60950-1:2006 | Safety of information technology equipment |

| **Requirements of quality** | |
|---|---|
| IEC 60068 | Environmental testing |
| DIN EN 60529 | IP codes |

| **Standards of the Ministry of Information Industry of the People's Republic of China** | |
|---|---|
| SJ/T 11363-2006 | "Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products" (2006-06). |
| SJ/T 11364-2006 | "Marking for Control of Pollution Caused by Electronic Information Products" (2006-06).<br><br>According to the "Chinese Administration on the Control of Pollution caused by Electronic Information Products" (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Gemalto M2M Hardware Interface Description.<br><br>Please see next table for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006. |

| 部件名称<br>Name of the part | 有毒有害物质或元素 Hazardous substances | | | | | |
|---|---|---|---|---|---|---|
| | 铅<br>(Pb) | 汞<br>(Hg) | 镉<br>(Cd) | 六价铬<br>(Cr(VI)) | 多溴联苯<br>(PBB) | 多溴二苯醚<br>(PBDE) |
| 金属部件<br>(Metal Parts) | O | O | O | O | O | O |
| 电路模块<br>(Circuit Modules) | X | O | O | O | O | O |
| 电缆及电缆组件<br>(Cables and Cable Assemblies) | O | O | O | O | O | O |
| 塑料和聚合物部件<br>(Plastic and Polymeric parts) | O | O | O | O | O | O |

O:
表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。
Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X:
表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。
Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part *might exceed* the limit requirement in SJ/T11363-2006.

## 11.2 SAR requirements specific to portable mobiles

Mobile phones, PDAs or other portable transmitters and receivers incorporating a GSM module must be in accordance with the guidelines for human exposure to radio frequency energy. This requires the Specific Absorption Rate (SAR) of portable EHS6 based applications to be evaluated and approved for compliance with national and/or international regulations.

Since the SAR value varies significantly with the individual product design, manufacturers are advised to submit their product for approval if designed for portable use. For European markets the relevant directives are mentioned below. It is the responsibility of the manufacturer of the final product to verify whether or not further standards, recommendations or directives are in force outside these areas.

*Products intended for sale in US markets*

EN 59005/ANSI C95.1: Considerations for evaluation of human exposure to Electromagnetic Fields (EMFs) from Mobile Telecommunication Equipment (MTE) in the frequency range 30MHz – 6GHz

*Products intended for sale in European markets*

EN 50360: Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz - 3GHz)

Please note that SAR requirements are specific only for portable devices and not for mobile devices as defined below:

- Portable device:
  A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the user´s body.
- Mobile device:
  A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the user's body or that of nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and cannot be easily moved to another location.

## 11.3 SELV requirements

The power supply connected to the MTX-HSPA-PH8-P+G modem shall be in compliance with the SELV requirements defined in EN 60950-1.

## 12. RoHS Statement

The MTX-HSPA-PH8-P+G modem is compliant with the 2002/95/EC Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

## 13. Disposal of old electrical & electronic equipment

This symbol, applied on our products and/or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable 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 to the environment and human health, which could otherwise be caused by inappropriate disposal 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, household waste disposal service or the retail store where you purchased this product.

# 14. Abbreviations

| Abbreviation | Description |
|---|---|
| ADC | Analog-to-digital converter |
| AGC | Automatic Gain Control |
| ANSI | American National Standards Institute |
| ARFCN | Absolute Radio Frequency Channel Number |
| ARP | Antenna Reference Point |
| ASC0/ASC1 | Asynchronous Controller. Abbreviations used for first and second serial interface of EHS6 |
| B | Thermistor Constant |
| BER | Bit Error Rate |
| BTS | Base Transceiver Station |
| CB or CBM | Cell Broadcast Message |
| CE | Conformité Européene (European Conformity) |
| CHAP | Challenge Handshake Authentication Protocol |
| CPU | Central Processing Unit |
| CS | Coding Scheme |
| CSD | Circuit Switched Data |
| CTS | Clear to Send |
| DAC | Digital-to-Analog Converter |
| DAI | Digital Audio Interface |
| dBm0 | Digital level, 3.14dBm0 corresponds to full scale, see ITU G.711, A-law |
| DCE | Data Communication Equipment (typically modems, e.g. Gemalto M2M module) |
| DCS 1800 | Digital Cellular System, also referred to as PCN |
| DL | Download |
| dnu | Do not use |
| DRX | Discontinuous Reception |
| DSB | Development Support Box |
| DSP | Digital Signal Processor |
| DSR | Data Set Ready |
| DTE | Data Terminal Equipment (typically a computer, terminal, printer or, for example, a GSM application) |
| DTR | Data Terminal Ready |
| DTX | Discontinuous Transmission |
| EDGE | Enhanced Data rates for GSM Evolution |
| EFR | Enhanced Full Rate |
| EGSM | Enhanced GSM |
| EIRP | Equivalent Isotropic Radiated Power |
| EMC | Electromagnetic Compatibility |
| ERP | Effective Radiated Power |
| ESD | Electrostatic Discharge |
| ETS | European Telecommunication Standard |
| ETSI | European Telecommunications Standards Institute |
| FCC | Federal Communications Commission (U.S.) |
| FDD | Frequency Division Duplex |
| FDMA | Frequency Division Multiple Access |

| | |
|---|---|
| FR | Full Rate |
| GMSK | Gaussian Minimum Shift Keying |
| GPIO | General Purpose Input/Output |
| GPRS | General Packet Radio Service |
| GSM | Global Standard for Mobile Communications |
| HiZ | High Impedance |
| HR | Half Rate |
| HSDPA | High Speed Downlink Packet Access |
| I/O | Input/Output |
| IC | Integrated Circuit |
| IMEI | International Mobile Equipment Identity |
| ISO | International Standards Organization |
| ITU | International Telecommunications Union |
| kbps | kbits per second |
| LED | Light Emitting Diode |
| Li-Ion/Li+ | Lithium-Ion |
| Li battery | Rechargeable Lithium Ion or Lithium Polymer battery |
| LPM | Link Power Management |
| MBB | Moisture barrier bag |
| Mbps | Mbits per second |
| MCS | Modulation and Coding Scheme |
| MMI | Man Machine Interface |
| MO | Mobile Originated |
| MS | Mobile Station (GSM module), also referred to as TE |
| MSISDN | Mobile Station International ISDN number |
| MSL | Moisture Sensitivity Level |
| MT | Mobile Terminated |
| nc | Not connected |
| NTC | Negative Temperature Coefficient |
| OEM | Original Equipment Manufacturer |
| PA | Power Amplifier |
| PAP | Password Authentication Protocol |
| PBCCH | Packet Switched Broadcast Control Channel |
| PCB | Printed Circuit Board |
| PCL | Power Control Level |
| PCM | Pulse Code Modulation |
| PCN | Personal Communications Network, also referred to as DCS 1800 |
| PCS | Personal Communication System, also referred to as GSM 1900 |
| PD | Pull Down resistor (appr. 100k) |
| PDU | Protocol Data Unit |
| PLL | Phase Locked Loop |
| PPP | Point-to-point protocol |
| PS | Packet Switched |
| PSK | Phase Shift Keying |
| PSU | Power Supply Unit |

| | |
|---|---|
| PU | Pull Up resistor (appr. 100k) |
| PWM | Pulse Width Modulation |
| QAM | Quadrature Amplitude Modulation |
| R&TTE | Radio and Telecommunication Terminal Equipment |
| RAM | Random Access Memory |
| RF | Radio Frequency |
| RLS | Radio Link Stability |
| RMS | Root Mean Square (value) |
| RoHS | Restriction of the use of certain hazardous substances in electrical and electronic equipment. |
| ROM | Read-only Memory |
| RTC | Real Time Clock |
| RTS | Request to Send |
| Rx | Receive Direction |
| SAR | Specific Absorption Rate |
| SAW | Surface Acoustic Wave |
| SELV | Safety Extra Low Voltage |
| SIM | Subscriber Identification Module |
| SMD | Surface Mount Device |
| SMS | Short Message Service |
| SMT | Surface Mount Technology |
| SPI | Serial Peripheral Interface |
| SRAM | Static Random Access Memory |
| SRB | Signalling Radio Bearer |
| TA | Terminal adapter (e.g. GSM module) |
| TDMA | Time Division Multiple Access |
| TE | Terminal Equipment, also referred to as DTE |
| TLS | Transport Layer Security |
| TPC | Transmit Power Control |
| TS | Technical Specification |
| Tx | Transmit Direction |
| UART | Universal asynchronous receiver-transmitter |
| UICC | USIM Integrated Circuit Card |
| UL | Upload |
| UMTS | Universal Mobile Telecommunications System |
| URC | Unsolicited Result Code |
| USB | Universal Serial Bus |
| USIM | UMTS Subscriber Identification Module |
| USSD | Unstructured Supplementary Service Data |
| VSWR | Voltage Standing Wave Ratio |
| WCDMA | Wideband Code Division Multiple Access |

# 15. AT command summary

The AT standard is a line-oriented command language. AT is an abbreviation of ATtention and it is always used to send a command line from the terminal equipment (TE) to the terminal adaptor (TA). The command line consists of a string of alphanumeric characters. It is sent to the MTX-HSPA-PH8-P+G to instruct it to perform the commands specified by the characters.

The AT commands listed below are supported from within the MTX-HSPA-PH8-P+G. The AT Command Set manual can be downloaded from the MTX-HSPA-PH8-P+G web page at www.mtxm2m.com.

| AT Command | Description |
|---|---|
| +++ | Escape from Data Mode to AT Command Mode |
| A/ | Repeat Previous Command Line |
| AT&C | Set Data Carrier Detect (DCD) line mode |
| AT&D | Set Data Terminal Ready (DTR) line mode |
| AT&F | Reset AT Command Settings to Factory Default Values |
| AT&S | Set Data Set Ready (DSR) line mode |
| AT&V | Display current Configuration |
| AT&W | Store AT Command Settings to User Defined Profile |
| AT+CACM | Accumulated call meter (ACM) reset or query |
| AT+CAMM | Accumulated call meter maximum (ACMmax) set or query |
| AT+CAOC | Advice of Charge Information |
| AT+CBST | Select Bearer Service Type |
| AT+CCFC | Call forwarding number and conditions control |
| AT+CCLK | Real Time Clock |
| AT+CCUG | Closed User Group |
| AT+CCWA | Call Waiting |
| AT+CEER | Extended Error Report |
| AT+CFUN | PH8-P Functionality Level |
| AT+CGACT | PDP Context Activate or Deactivate |
| AT+CGATT | PS Attach or Detach |
| AT+CGCMOD | PDP Context Modify |
| AT+CGDATA | Enter Data State |
| AT+CGDCONT | Define PDP Context |
| AT+CGEQMIN | 3G Quality of Service Profile (Minimum acceptable) |
| AT+CGEQREQ | 3G Quality of Service Profile (Requested) |
| AT+CGMI | Request manufacturer identification |
| AT+CGMM | Request model identification |
| AT+CGMR | Request revision identification of software status |
| AT+CGPADDR | Show PDP Address |
| AT+CGQMIN | Quality of Service Profile (Minimum acceptable) |
| AT+CGQREQ | Quality of Service Profile (Requested) |
| AT+CGREG | Packet Domain Network Registration Status |
| AT+CGSMS | Select Service for MO Short Messages |
| AT+CGSN | Request International Mobile Equipment Identity (IMEI) |

| | |
|---|---|
| AT+CHLD | Call Hold and Multiparty |
| AT+CHUP | Hang up call |
| AT+CIMI | Request International Mobile Subscriber Identity (IMSI) |
| AT+CLCC | List of current calls |
| AT+CLCK | Facility Lock |
| AT+CLIP | Calling Line Identification Presentation |
| AT+CLIR | Calling Line Identification Restriction |
| AT+CMEE | Error Message Format |
| AT+CMGC | Send an SMS command |
| AT+CMGD | Delete short message |
| AT+CMGF | Select SMS message format |
| AT+CMGL | List SMS messages from preferred store |
| AT+CMGR | Read SMS messages |
| AT+CMGS | Send Short Message |
| AT+CMGW | Write Short Messages to Memory |
| AT+CMMS | More Messages to Send |
| AT+CMSS | Send short messages from storage |
| AT+CMUT | Mute control |
| AT+CMUX | Multiplex mode |
| AT+CNMA | New Message Acknowledgement to UE/TE |
| AT+CNMI | SMS Event Reporting Configuration |
| AT+CNUM | Read own numbers |
| AT+COLP | Connected Line Identification Presentation |
| AT+COPN | Read operator names |
| AT+COPS | Operator Selection |
| AT+CPAS | Activity Status |
| AT+CPBF | Find phonebook entries |
| AT+CPBR | Read from phonebook |
| AT+CPBS | Select phonebook memory storage |
| AT+CPBW | Write into phonebook |
| AT+CPIN | PIN Authentication |
| AT+CPLS | Selection of preferred Operator list |
| AT+CPMS | Preferred SMS message storage |
| AT+CPOL | Preferred Operator List |
| AT+CPUC | Price per unit and currency table |
| AT+CPWD | Change Password |
| AT+CR | Service reporting control |
| AT+CRC | Set Cellular Result Codes for incoming call indication |
| AT+CREG | Network Registration Status |
| AT+CRLP | Configure RLP Parameters for Outgoing Non-Transparent Data Calls |
| AT+CRSM | Restricted USIM Access |
| AT+CSCA | SMS Service Center Address |
| AT+CSCB | Select Cell Broadcast Message Indication |
| AT+CSCS | Character Set |
| AT+CSDH | Show SMS text mode parameters |
| AT+CSIM | Generic USIM Access |

| | |
|---|---|
| AT+CSMP | Set SMS Text Mode Parameters |
| AT+CSMS | Select Message Service |
| AT+CSQ | Signal quality |
| AT+CSSN | Supplementary service notifications |
| AT+CSTA | Select type of address |
| AT+CUSD | Unstructured Supplementary Service Data |
| AT+ES | Synchronous Data Mode Configuration |
| AT+ESA | Synchronous Access Mode Configuration |
| AT+GCAP | Capabilities List |
| AT+GMI | Request manufacturer identification |
| AT+GMM | Request model identification |
| AT+GMR | Request revision identification of software status |
| AT+GSN | Request International Mobile Equipment Identity (IMEI) |
| AT+IPR | Bit Rate |
| AT+VTS | DTMF and tone generation |
| AT+WS46 | Select wireless network |
| AT\Q | Flow Control |
| AT^SAD | Antenna Configuration |
| AT^SAIC | Audio Interface Configuration |
| AT^SBNW | Binary Write |
| AT^SBV | Battery/Supply Voltage |
| AT^SCFG | Extended Configuration Settings |
| AT^SCID | USIM Identification Number |
| AT^SCKS | Query USIM and Chip Card Holder Status |
| AT^SCML | List Concatenated Short Messages from preferred store |
| AT^SCMR | Read Concatenated Short Messages |
| AT^SCMS | Send Concatenated Short Messages |
| AT^SCMW | Write Concatenated Short Messages to Memory |
| AT^SCSL | Customer SIM Lock |
| AT^SCTM | Critical Operating Temperature Monitoring |
| AT^SDPORT | Configure Interface Allocation |
| AT^SFDL | Enter Firmware Download Mode |
| AT^SGAUTH | Set Type of Authentication for PDP-IP Connections |
| AT^SGCONF | Configuration of GPRS related Parameters |
| AT^SGPSC | GPS Configuration |
| AT^SGPSS | GPS Switch |
| AT^SHUP | Hang up call(s) indicating a specific 3GPP TS 24.008 release cause |
| AT^SICS | Internet Connection Settings |
| AT^SIND | Extended Indicator Control |
| AT^SISC | Internet Service Close |
| AT^SISE | Internet Service Error Report |
| AT^SISO | Internet Service Open |
| AT^SISR | Internet Service Read Data |
| AT^SISS | Internet Service Setup Profile |
| AT^SIST | Transparent Access Mode |
| AT^SISW | Internet Service Write Data |

| | |
|---|---|
| AT^SISX | Internet Service Execution |
| AT^SLCC | Extended list of current calls |
| AT^SLED | LED Feature |
| AT^SMGL | List Short Messages from preferred store without setting status to REC READ |
| AT^SMONI | Monitor the serving cell |
| AT^SMONP | Monitor neighbour cells |
| AT^SMSO | Switch Off PH8-P |
| AT^SNFI | Set microphone path parameters |
| AT^SNFO | Set audio output parameter (loudspeaker path) |
| AT^SNFS | Select audio hardware set |
| AT^SNFTTY | Signal TTY/CTM audio mode capability |
| AT^SOPS | Extended Operator Selection |
| AT^SPIC | Display PIN Counter |
| AT^SQPORT | Query Port Type |
| AT^SRTC | Ringtone configuration |
| AT^SSET | USIM Data Ready Indication |
| AT^SSTA | Remote-SAT Interface Activation |
| AT^SSTGI | SAT Get Information |
| AT^SSTGI | SAT Get Information - Refresh (1) |
| AT^SSTGI | SAT Get Information - Set Up Event List (5) |
| AT^SSTGI | SAT Get Information - Set Up Call (16) |
| AT^SSTGI | SAT Get Information - Send SS (17) |
| AT^SSTGI | SAT Get Information - Send USSD (18) |
| AT^SSTGI | SAT Get Information - Send Short Message (19) |
| AT^SSTGI | SAT Get Information - Send DTMF (20) |
| AT^SSTGI | SAT Get Information - Launch Browser (21) |
| AT^SSTGI | SAT Get Information - Play Tone (32) |
| AT^SSTGI | SAT Get Information - Display Text (33) |
| AT^SSTGI | SAT Get Information - Get Inkey (34) |
| AT^SSTGI | SAT Get Information - Get Input (35) |
| AT^SSTGI | SAT Get Information - Select Item (36) |
| AT^SSTGI | SAT Get Information - Set up Menu (37) |
| AT^SSTGI | SAT Get Information - Set up Idle Mode Text (40) |
| AT^SSTGI | SAT Get Information - Language Notification (53) |
| AT^SSTR | SAT Response |
| AT^SSTR | SAT Response - Refresh (1) |
| AT^SSTR | SAT Response - Set Up Event List (5) |
| AT^SSTR | SAT Response - Set Up Call (16) |
| AT^SSTR | SAT Response - Send SS (17) |
| AT^SSTR | SAT Response - Send USSD (18) |
| AT^SSTR | SAT Response - Send Short Message (19) |
| AT^SSTR | SAT Response - Send DTMF (20) |
| AT^SSTR | SAT Response - Launch Browser (21) |
| AT^SSTR | SAT Response - Play Tone (32) |
| AT^SSTR | SAT Response - Display Text (33) |
| AT^SSTR | SAT Response - Get Inkey (34) |

| | |
|---|---|
| AT^SSTR | SAT Response - Get Input (35) |
| AT^SSTR | SAT Response - Select Item (36) |
| AT^SSTR | SAT Response - Setup Menu (37) |
| AT^SSTR | SAT Response - Set Up Idle Mode Text (40) |
| AT^SSTR | SAT Response - Language Notification (53) |
| AT^SSTR | SAT Event - Menu Selection (211) |
| AT^SSTR | SAT Event - User Activity (232) |
| AT^SSTR | SAT Event - Idle Screen Available (233) |
| AT^SSTR | SAT Event - Language Selection (235) |
| AT^SSTR | SAT Event - Browser Termination (236) |
| AT^SSTR | SAT Event - Terminate Command (254) |
| ATA | Connect to Incoming Call |
| ATD | Mobile originated call to specified number |
| ATD*99# | Request Packet Domain service |
| ATD><index> | Mobile originated call from active memory using index number |
| ATD><mem><index> | Mobile originated call using specific memory and index number |
| ATD><str> | Mobile originated call from memory using corresponding string |
| ATE | AT Command Echo |
| ATH | Disconnect existing data connection |
| ATI | Display product identification information |
| ATL | Set monitor speaker loudness |
| ATM | Set monitor speaker mode |
| ATO | Switch from command mode to data mode |
| ATP | Select pulse dialing |
| ATQ | Result Code Presentation Mode |
| ATS0 | Automatic Answer |
| ATS10 | Set disconnect delay after indicating the absence of data carrier |
| ATS3 | Command Line Termination |
| ATS4 | Response Formatting |
| ATS5 | Command Line Editing |
| ATS6 | Set pause before blind dialing |
| ATS7 | Set number of seconds to wait for connection completion |
| ATS8 | Comma Dial Pause Time |
| ATT | Select tone dialing |
| ATV | Result code format mode |
| ATX | CONNECT Result Code Format |
| ATZ | Restore AT Command Settings from User Defined Profile |

# 16. Accessories

The MTX-HSPA-PH8-P+G has a wide range of available accessories, including:

- Power supplies
- All type of antennas (indoor, outdoor, high gain, etc…)
- Cables and DIN adapters

The MTX-HSPA-PH8-P+G is shipped without any accessories.

Please visit the following web sites to see the full range of accessories:

- www.mtxm2m.com

# 17. Sales contact

www.mtxm2m.com

| Matrix Madrid | Matrix Barcelona | Matrix Bilbao | Matrix Valencia |
|---|---|---|---|
| Matrix Electrónica S.L.<br><br>C/ Alejandro Sánchez, 109<br>28019 Madrid (SPAIN)<br><br>Phone 1: 902 19 81 46<br>Phone 2: +34915602737<br>Fax 1: 902 99 54 14<br>Fax 2: +34915652865 | Matrix Electrónica S.L.<br><br>Ctra. Rubí a Sabadell Km 13<br>Nave 109, Oficinas 6-9<br>08191 Rubí, Barcelona<br>(SPAIN)<br><br>Phone 1: 902 19 81 46<br>Fax 1: 902 99 54 14 | Matrix Electrónica S.L.<br><br>Pol. Aliendalde, 11<br>Oficina 2G<br>48200 - Durango, Vizcaya<br>(SPAIN)<br><br>Phone 1: 902 19 81 46<br>Fax 1: 902 99 54 14 | Matrix Electrónica S.L.<br><br>Valencia (SPAIN)<br><br>Phone 1: 902 19 81 46<br>Fax 1: 902 99 54 14 |
| **Matrix Sevilla** | **Matrix Lisboa** | **Matrix Santiago de Chile** | |
| Matrix Electrónica S.L.<br><br>Sevilla (SPAIN)<br><br>Phone: 902 19 81 46<br>Fax: 902 99 54 14<br><br>Phone 1: 902 19 81 46<br>Fax 1: 902 99 54 14 | LusoMatrix Lda.<br><br>Av. Coronel Eduardo<br>Galhardo, 7 1ºC<br>1170-105 - Lisboa<br>(PORTUGAL)<br><br>Phone 1: +351218162625<br>Fax 1: +351218149482 | Matrix Electrónica S.L.<br><br>Calle Badajoz, 100<br>Oficina 1305<br>Santiago de Chile (CHILE)<br><br>Phone 1: +56(9)53369943<br>Phone 2: +56(9)74822647 | |

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