

# Cinterion<sup>®</sup> Java Terminals

## Hardware Interface Overview

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## 0 Document History

New document: "Cinterion® Java Terminals Hardware Interface Overview" Version 01

| Chapter | What is new             |
|---------|-------------------------|
| ---     | Initial document setup. |

# 1 Introduction

This document<sup>1</sup> describes the hardware of the Cinterion® Java Terminals. The Java Terminals come in four variants depending on the included Cinterion® module and the available interfaces:

- **EHS5T** contains a Cinterion® EHS5-E module and implements a USB 2.0 interface with a USB-B connector as well as a 6-pole Western jack as plug-in power supply connector. Via a Weidmüller GPIO connectors it also implements a RS-485 interface including power supply and ignition line.
- **EHS6T-USB** contains a Cinterion® EHS6 module and implements a USB 2.0 interface with a USB-B connector and also a V.24 / V.28 RS-232 interface with a D-sub 9-pole female socket as well as a 6-pole Western jack as plug-in power supply connector.
- **EHS6T-LAN** contains a Cinterion® EHS6 module and implements an Ethernet interface with a RJ45 8-pin connector and also a V.24 / V.28 RS-232 interface with a D-sub 9-pole female socket as well as a 6-pole Western jack as plug-in power supply connector.
- **BGS5T** contains a Cinterion® BGS5 module and implements a USB 2.0 interface with a USB-B connector and also a V.24 / V.28 RS-232 interface with a D-sub 9-pole female socket as well as a 6-pole Western jack as plug-in power supply connector.

Wherever necessary and appropriate this document distinguishes between these four variants.

[Table 1](#) gives a short overview of the available interfaces for the different Java Terminals.

**Table 1:** Cinterion® Java Terminals overview

| Module/Interface                                            | EHS5T  | EHS6T-USB     | EHS6T-LAN     | BGS5T                 |
|-------------------------------------------------------------|--------|---------------|---------------|-----------------------|
| Cinterion® module                                           | EHS5-E | EHS6          | EHS6          | BGS5                  |
| RS-232 (Sub-D)                                              | -      | ✓             | ✓             | ✓                     |
| USB (USB-B)                                                 | ✓      | ✓             | -             | ✓                     |
| Weidmüller connector (GPIOs, SPI, I <sup>2</sup> C, RS-485) | ✓      | ✓ (no RS-485) | ✓ (no RS-485) | ✓ (no RS-485, no SPI) |
| Ethernet (RJ45)                                             | -      | -             | ✓             | -                     |
| Power supply (RJ11)                                         | ✓      | ✓             | ✓             | ✓                     |
| RF antenna                                                  | ✓      | ✓             | ✓             | ✓                     |

The scope of this document includes interface specifications, electrical issues and mechanical characteristics of Java Terminals. It specifies standards pertaining to wireless applications and outlines requirements that must be adhered to for successful product design. The Java Terminals are compact GSM/UMTS modems for the transfer of data in GSM/UMTS networks. Industrial standard interfaces and an integrated SIM card reader allow using the Java Terminals easily as GSM/GPRS/UMTS terminals.

1. The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Cinterion wireless product.

## 1.1 Related Documents

- [1] AT Command Set for your Java Terminal product
- [2] Release Notes for your Java Terminal product

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<http://m2m.gemalto.com>

## 1.2 Terms and Abbreviations

**Table 2:** Terms and abbreviations

| Abbreviation | Description                               |
|--------------|-------------------------------------------|
| ARP          | Antenna Reference Point                   |
| ATC          | AT Command                                |
| BTS          | Base Transceiver Station                  |
| CB           | Cell Broadcast                            |
| CODEC        | Coder-Decoder                             |
| DCE          | Data Circuit terminating Equipment        |
| DSR          | Data Set Ready                            |
| DTR          | Data Terminal Ready                       |
| EFR          | Enhanced Full Rate                        |
| EGSM         | Enhanced GSM                              |
| EMC          | Electromagnetic Compatibility             |
| ESD          | Electrostatic Discharge                   |
| ETS          | European Telecommunication Standard       |
| FDMA         | Frequency Division Multiple Access        |
| G.C.F.       | GSM Conformity Forum                      |
| GSM          | Global Standard for Mobile Communication  |
| HW           | Hardware                                  |
| IC           | Integrated Circuit                        |
| IF           | Intermediate Frequency                    |
| IMEI         | International Mobile Equipment Identifier |
| I/O          | Input/ Output                             |
| IGT          | Ignition                                  |
| ISO          | International Standards Organization      |
| ITU          | International Telecommunications Union    |
| kbps         | kbits per second                          |
| LVD          | Low voltage Directive                     |



## 1.2 Terms and Abbreviations

**Table 2:** Terms and abbreviations

| Abbreviation | Description                                     |
|--------------|-------------------------------------------------|
| Mbps         | Mbits per second                                |
| MMI          | Machine Machine Interface                       |
| MO           | Mobile Originated                               |
| MS           | Mobile Station                                  |
| MT           | Mobile Terminated                               |
| NC           | Not Connected                                   |
| NTC          | Negative Temperature Coefficient                |
| PA           | Power Amplifier                                 |
| PCB          | Printed Circuit Board                           |
| PCM          | Pulse Code Modulation                           |
| PCS          | Personal Communication System                   |
| PD           | Power Down                                      |
| PDU          | Protocol Data Unit                              |
| R&TTE        | Radio and Telecommunication Terminal Equipment  |
| RF           | Radio frequency                                 |
| RI           | Ring Indication                                 |
| RX           | Receive direction                               |
| SIM          | Subscriber Identification Module                |
| SMS          | Short Message Service                           |
| SW           | Software                                        |
| TDD          | Time Division Duplex                            |
| TDMA         | Time Division Multiple Access                   |
| TX           | Transmit direction                              |
| UART         | Universal Asynchronous Receiver and Transmitter |

## 1.3 Regulatory and Type Approval Information

### 1.3.1 Directives and Standards

Java Terminals have been designed to comply with the directives and standards listed below<sup>1</sup>.

**Table 3:** Directives

|                                            |                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 99/05/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 <b>CE XXXX</b> |
| 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)<br>    |
| 2002/96/EC                                 | Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE)                                                                                                                                                                                                   |
| 2003/108/EC                                | Directive of the European Parliament and of the Council of 8 December 2003 amending directive 2002/96/ec on waste electrical and electronic equipment (WEEE)                                                                                                                                                  |

**Table 4:** Standards of North American type approval

|                                                          |                                                                                                                                                          |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| CFR Title 47                                             | "Code of Federal Regulations, Part 15 B, Part 22 and Part 24 (Telecommunications, PCS)"; US Equipment Authorization FCC                                  |
| OET Bulletin 65<br>(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<br>Mobile Equipment Type Certification and IMEI control"<br>PCS Type Certification Review board (PTCRB) |
| RSS102 (Issue 4)<br>RSS132 (Issue 3)<br>RSS133 (Issue 6) | Canadian Standard                                                                                                                                        |
| IEEE Std. C95.1-1999                                     | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz                               |

**Table 5:** Standards of European type approval

|                        |                                                                                                                                                                                                                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3GPP TS 51.010-1       | "Digital cellular telecommunications system (Phase 2); Mobile Station (MS) conformance specification"                                                                                                                                                                                                                   |
| ETSI EN 301 511 V9.0.2 | Candidate Harmonized European Standard (Telecommunications series) 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) |
| GCF-CC V3.49           | Global Certification Forum - Certification Criteria                                                                                                                                                                                                                                                                     |

1. Standards of North American type approval do not apply to EHS5T, 3G/WCDMA related standards do not apply to BGS5T.

## 1.3 Regulatory and Type Approval Information

**Table 5:** Standards of European type approval

|                                                             |                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ETSI EN 301 489-1<br>V1.9.2                                 | Candidate Harmonized European Standard (Telecommunications series) 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<br>V1.3.1                                 | Candidate Harmonized European Standard (Telecommunications series) Electro Magnetic Compatibility and Radio spectrum Matters (ERM); Electro Magnetic 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<br>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<br>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<br>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                                                                 |
| EN 62311-2008                                               | Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)                                                                                                                                                                                                                                     |
| EN 60950-1 (2006)+<br>A11:2009+A1:2010+<br>AC:2011+A12:2011 | Safety of information technology equipment                                                                                                                                                                                                                                                                                                                               |

**Table 6:** Requirements of quality

|              |                       |
|--------------|-----------------------|
| IEC 60068    | Environmental testing |
| DIN EN 60529 | IP codes              |

## 1.3 Regulatory and Type Approval Information

**Table 7:** 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 | <p>"Marking for Control of Pollution Caused by Electronic Information Products" (2006-06).</p> <p>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 Hardware Interface Description.</p> <p>Please see <a href="#">Table 1.3.2</a> 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.</p> |

**Table 8:** Toxic or hazardous substances or elements with defined concentration limits

| 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               |
| <p>O:<br/>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。<br/>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.</p> <p>X:<br/>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。<br/>Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part <i>might exceed</i> the limit requirement in SJ/T11363-2006.</p> |                                |           |           |                 |               |                 |

### 1.3.2 Safety Precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any cellular terminal or mobile incorporating Java Terminals. Manufacturers of the cellular terminal are advised to convey the following safety information to users and operating personnel and incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Cinterion Wireless Modules GmbH assumes no liability for customer's failure to comply with these precautions.

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>When in hospitals or other health care facilities, observe the restrictions on the use of mobiles. Switch off the cellular terminal or mobile if to be instructed to do so by the guidelines posted in sensitive areas. Medical equipment may be sensitive to RF energy.</p> <p>The operation of cardiac pacemakers, other implanted medical equipment and hearing aids can be affected by interference from cellular terminals or mobiles placed close to the device. If in doubt about potential danger, contact the physician or the manufacturer of the device to verify that the equipment is properly shielded. Pacemaker patients are advised to keep their hand-held mobile away from the pacemaker, while it is on. This personal subgroup always should check the distance to the mobile.</p> |
|   | <p>Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it cannot be switched on inadvertently. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communications systems. Failure to observe these instructions may lead to the suspension or denial of cellular services to the offender, legal action, or both.</p> <p>Check the local and actual laws about these themes.</p>                                                                                                                                                                                                                                                                                                                                                  |
|  | <p>Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|  | <p>Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. Remember that interference can occur if it is used close to TV sets, radios, computers or inadequately shielded equipment. Follow any special regulations and always switch off the cellular terminal or mobile wherever forbidden, or when you suspect that it may cause interference or danger.</p>                                                                                                                                                                                                                                                                                                                                                                                                 |
|  | <p>Road safety comes first! Do not use a hand-held cellular terminal or mobile while driving a vehicle unless it is securely mounted in a holder for speakerphone operation. Before making a call with a hand-held terminal or mobile park the vehicle. Speakerphones must be installed by qualified personnel. Faulty installation or operation can constitute a safety hazard.</p> <p>Check the actual and local laws about these themes.</p>                                                                                                                                                                                                                                                                                                                                                            |

## 1.3 Regulatory and Type Approval Information

|                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>IMPORTANT!</b></p> <p>Cellular terminals or mobiles operate using radio signals and cellular networks. In that case connections cannot be guaranteed at all times under all conditions. Therefore, you should never rely solely upon any wireless device for essential communications, for example emergency calls.</p> <p>Remember, in order to make calls or receive calls the cellular terminal or mobile must be switched on in a service area with adequate cellular signal strength.</p> <p>Some networks do not allow for emergency calls if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may need to deactivate those features before you can make an emergency call.</p> <p>Some networks require a valid SIM card to be properly inserted in the cellular terminal or mobile.</p> |
|  | <p>If a power supply unit is used to supply the device it must meet the demands placed on SELV circuits in accordance with EN60950. The maximum permissible connection length between the device and the supply source should not exceed 3m.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|  | <p>According to the guidelines for human exposure to radio frequency energy, an antenna connected to the FME jack of the device should be placed at least 20cm away from human bodies.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



## 1.4 Product Label

The label fixed to the bottom of a Java Terminal comprises the following information.

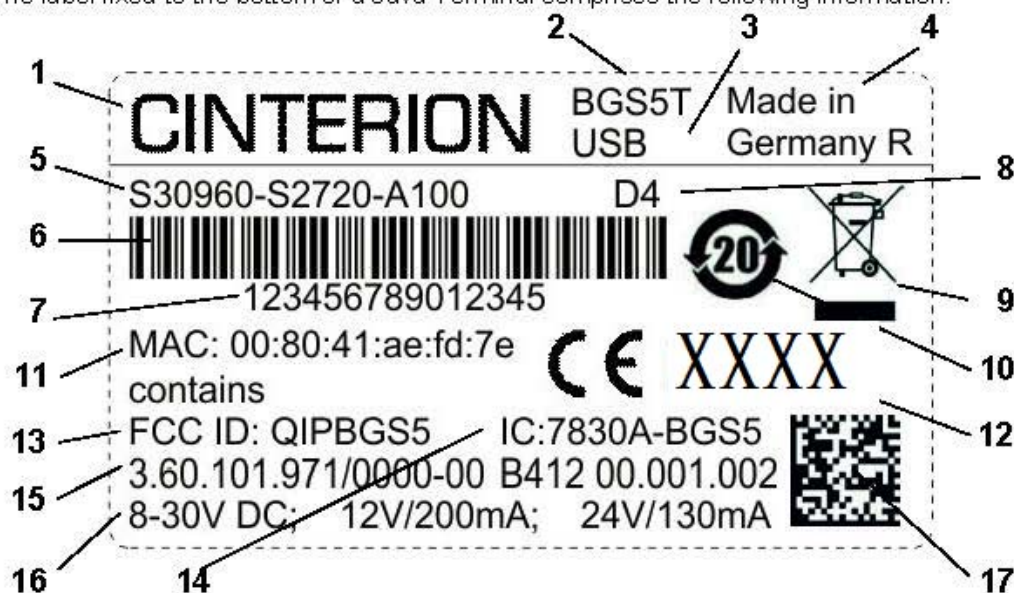


Figure 1: Sample Java Terminal label (BGS5T)

Table 9: Java Terminals label information

| No. | Information                                                                      |
|-----|----------------------------------------------------------------------------------|
| 1   | Cinterion logo                                                                   |
| 2   | Product name                                                                     |
| 3   | Product variant                                                                  |
| 4   | Marking "Made in Germany"                                                        |
| 5   | Product ordering number                                                          |
| 6   | Barcode (Code128)                                                                |
| 7   | Product IMEI                                                                     |
| 8   | Date code                                                                        |
| 9   | WEEE symbol (see Table 3)                                                        |
| 10  | Chinese RoHS symbol (see Table 7)                                                |
| 11  | „MAC" address                                                                    |
| 12  | CE logo with fixed number 0682 (may be replaced for samples with "Not for sale") |
| 13  | FCC ID                                                                           |
| 14  | IC ID                                                                            |
| 15  | Manufacturer code                                                                |
| 16  | Power supply unit ratings                                                        |
| 17  | Manufacturer code (2D)                                                           |

## 2 Product Concept

### 2.1 Key Features at a Glance

| Feature                                                                                    | Implementation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Incorporates Cinterion® Java module                                                        | The Java module handles all signal and data processing within the Java Terminals. Internal software runs the application interface and the complete GSM/GPRS protocol stack.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Frequency bands                                                                            | <p>EHS5T (with EHS5-E module):<br/> GSM/GPRS/EDGE: Dual band GSM 900/1800MHz<br/> UMTS/HSPA+: Dual band UMTS 900/2100MHz</p> <p>EHS6T-USB (with EHS6 module):<br/> GSM/GPRS/EDGE: Quad band 850/900/1800/1900MHz<br/> UMTS/HSPA+: Five band 800/850/900/1900/2100MHz</p> <p>EHS6T-LAN (with EHS6 module):<br/> GSM/GPRS/EDGE: Quad band 850/900/1800/1900MHz<br/> UMTS/HSPA+: Five band 800/850/900/1900/2100MHz</p> <p>BGS5T (with BGS5 module):<br/> Quad band GSM 850/900/1800/1900MHz</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GSM class                                                                                  | Small MS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Output power (according to Release 99, V5) depending on frequency band supported by module | <p>Class 4 (+33dBm <math>\pm</math>2dB) for EGSM850<br/> Class 4 (+33dBm <math>\pm</math>2dB) for EGSM900<br/> Class 1 (+30dBm <math>\pm</math>2dB) for GSM1800<br/> Class 1 (+30dBm <math>\pm</math>2dB) for GSM1900<br/> Class E2 (+27dBm <math>\pm</math> 3dB) for GSM 850 8-PSK<br/> Class E2 (+27dBm <math>\pm</math> 3dB) for GSM 900 8-PSK<br/> Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK<br/> Class E2 (+26dBm +3 /-4dB) for GSM 1900 8-PSK<br/> Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD Bdl<br/> Class 3 (+24dBm +1/-3dB) for UMTS 1900, WCDMA FDD BdlI<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</p> <p>The values stated above are maximum limits. According to Release 99, the maximum output power in a multislot configuration may be lower. The nominal reduction of maximum output power varies with the number of uplink timeslots used and amounts to 3.0dB for 2Tx.</p> |
| Power supply                                                                               | Single supply voltage 8V to 30V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Operating temperature (EHS5T, EHS6T-USB, BGS5T only)                                       | <p>Normal operation: -30°C to +85°C<br/> Extended operation: -40°C to -30°C and +85°C to +90°C</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Operating temperature (EHS6T-LAN only)                                                     | <p>Normal operation: TBD.<br/> Extended operation: TBD.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Physical                                                                                   | <p>Dimensions: 113.5mm x 75mm x 25.5mm<br/> (excluding antenna and serial interface connectors)<br/> Weight: 120g (approx.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| RoHS, WEEE                                                                                 | All hardware components are fully compliant with the EU RoHS and WEEE Directives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



## 2.1 Key Features at a Glance

| Feature                          | Implementation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HSPA features                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3GPP Release 6,7<br>(EHSxT only) | DL 7.2Mbps, UL 5.7Mbps<br>HSDPA Cat.8 / HSUPA Cat.6 data rates<br>Compressed mode (CM) supported according to 3GPP TS25.212                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UMTS features                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3GPP Release 4<br>(EHSxT only)   | PS data rate – 384 kbps DL / 384 kbps UL<br>CS data rate – 64 kbps DL / 64 kbps UL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| GSM / GPRS features              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Data transfer                    | GPRS: <ul style="list-style-type: none"> <li>• Multislot Class 12</li> <li>• Full PBCCH support</li> <li>• Mobile Station Class B</li> <li>• Coding Scheme 1 – 4</li> </ul> EGPRS (EHSxT only): <ul style="list-style-type: none"> <li>• Multislot Class 12</li> <li>• EDGE E2 power class for 8 PSK</li> <li>• Downlink coding schemes – CS 1-4, MCS 1-9</li> <li>• Uplink coding schemes – CS 1-4, MCS 1-9</li> <li>• SRB loopback and test mode B</li> <li>• 8-bit, 11-bit RACH</li> <li>• PBCCH support</li> <li>• 1 phase/2 phase access procedures</li> <li>• Link adaptation and IR</li> <li>• NACC, extended UL TBF</li> <li>• Mobile Station Class B</li> </ul> CSD: <ul style="list-style-type: none"> <li>• V.110, RLP, non-transparent</li> <li>• 2.4, 4.8, 9.6, 14.4kbps</li> <li>• USSD</li> </ul> |
| SMS                              | <ul style="list-style-type: none"> <li>• Point-to-point MT and MO</li> <li>• Cell broadcast</li> <li>• Text and PDU mode</li> <li>• </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Software                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| AT commands                      | Hayes 3GPP TS 27.007, TS 27.005, Gemalto M2M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Java™ Open Platform              | Java™ Open Platform with <ul style="list-style-type: none"> <li>• Java™ profile IMP-NG &amp; CLDC 1.1 HI</li> <li>• Secure data transmission via HTTPS/SSL</li> <li>• Multi-threading programming and multi-application execution</li> </ul> <p>Major benefits: seamless integration into Java applications, ease of programming, no need for application microcontroller, extremely cost-efficient hardware and software design – ideal platform for industrial GSM applications.</p> <p>The memory space available for Java programs is around 8 MB in the flash file system and around 6MB RAM. Application code and data share the space in the flash file system and in RAM.</p>                                                                                                                            |

## 2.1 Key Features at a Glance

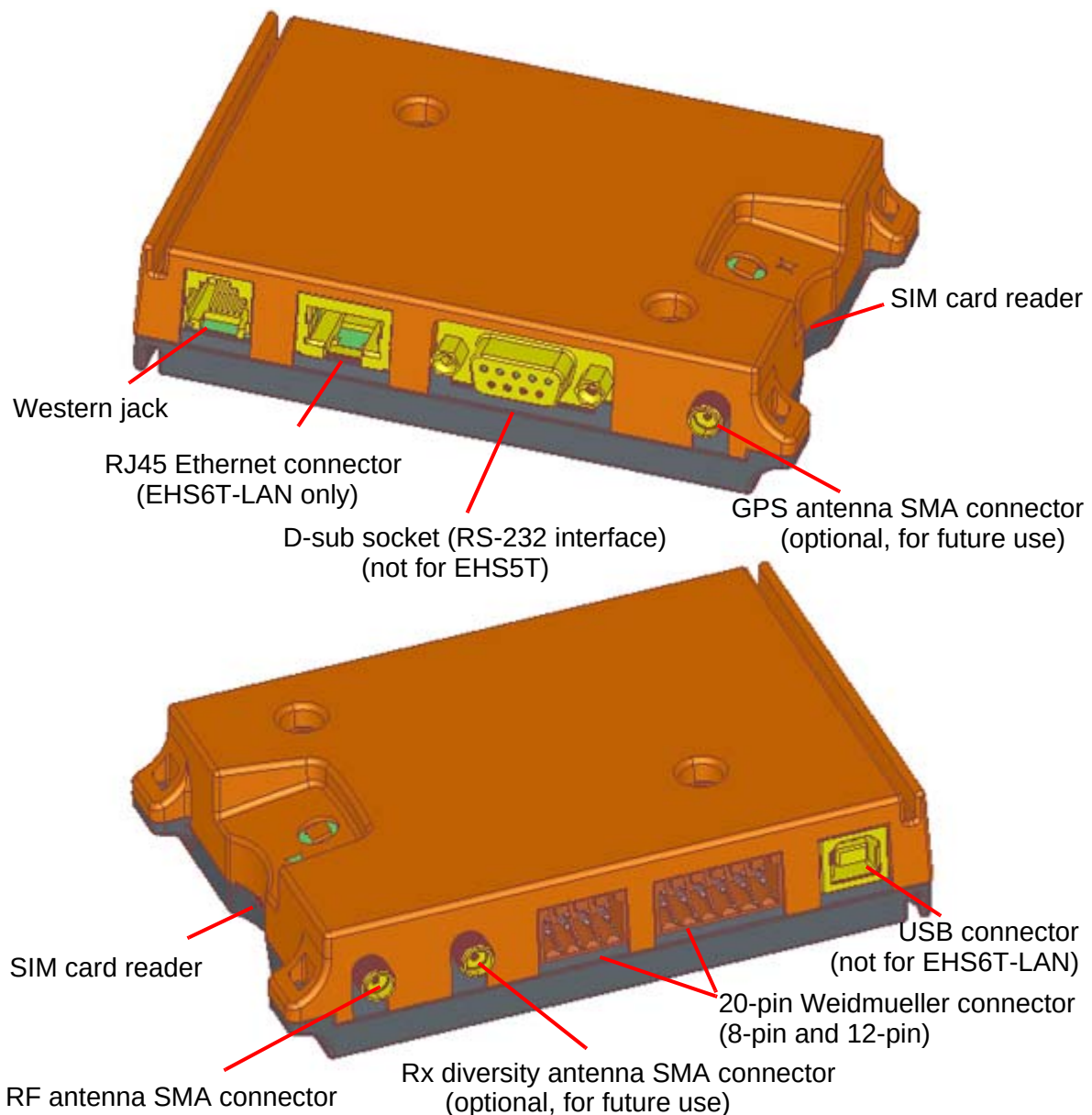
| Feature                 | Implementation                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SIM Application Toolkit | SAT Release 99                                                                                                                                                                                                                                                                                                                                  |
| TCP/IP stack            | Protocols: TCP server/client, UDP, HTTP, FTP, SMTP, POP3<br>Access by AT commands                                                                                                                                                                                                                                                               |
| Firmware update         | Upgradeable via serial or USB interface                                                                                                                                                                                                                                                                                                         |
| Interfaces              |                                                                                                                                                                                                                                                                                                                                                 |
| USB interfaces          | USB 2.0 Slave interface                                                                                                                                                                                                                                                                                                                         |
| RS232                   | RS-232 interface for AT commands and data: <ul style="list-style-type: none"> <li>• Supports RTS/CTS hardware handshake</li> <li>• Supports software XON/XOFF flow control</li> <li>• Multiplex ability according to GSM 07.10 Multiplexer protocol</li> <li>• Baud rates from 1200bps to 230400bps</li> <li>• Autobauding supported</li> </ul> |
| Weidmueller connector   | 20-pin (8-pin and 12-pin) header with GPIO interface, external power supply, ADC, SPI, I <sup>2</sup> C and RS-485 option                                                                                                                                                                                                                       |
| Ethernet                | TBD.                                                                                                                                                                                                                                                                                                                                            |
| Power connector         | 6-pole Western connector (female) for power supply, ignition, power down signal                                                                                                                                                                                                                                                                 |
| SIM card reader         | Supported SIM cards: 3V, 1.8V                                                                                                                                                                                                                                                                                                                   |
| Antenna                 | Antenna connected via female SMA connector                                                                                                                                                                                                                                                                                                      |
| Power on/off, Reset     |                                                                                                                                                                                                                                                                                                                                                 |
| Power on                | DTR line at RS-232 interface, IGT_IN line at power connector                                                                                                                                                                                                                                                                                    |
| Power off               | Normal switch-off by AT^SMSO or external On/Off push button<br>Automatic switch-off in case of critical temperature conditions                                                                                                                                                                                                                  |
| Reset                   | Orderly shutdown and reset by AT command<br>Emergency restart via RST_IN line at power connector                                                                                                                                                                                                                                                |
| Special features        |                                                                                                                                                                                                                                                                                                                                                 |
| Real time clock         | Timer functions via AT commands                                                                                                                                                                                                                                                                                                                 |
| Phonebook               | SIM card and terminal                                                                                                                                                                                                                                                                                                                           |

## 3 Interface Description

### 3.1 Overview

Java Terminals provide the following interfaces for power supply, antenna, SIM card and data transfer:

- 6-pin Western connector (female) for power supply, ignition, power down signal
- SMA antenna connectors (female) for RF antenna and future Rx diversity or GPS antennas
- SIM card reader
- 9-pin (female) D-sub connector (RS-232 interface)
- 4-pin (female) USB-B connector
- 12-pin and 8-pin Weidmueller GPIO connectors (including RS-485)
- 8-pin (female) RJ45 Ethernet connector



**Figure 2:** Java Terminals 3D view

## 3.2 Block Diagram

Figure 3 shows a block diagram of a sample configuration that incorporates a Java Terminal and typical accessories.

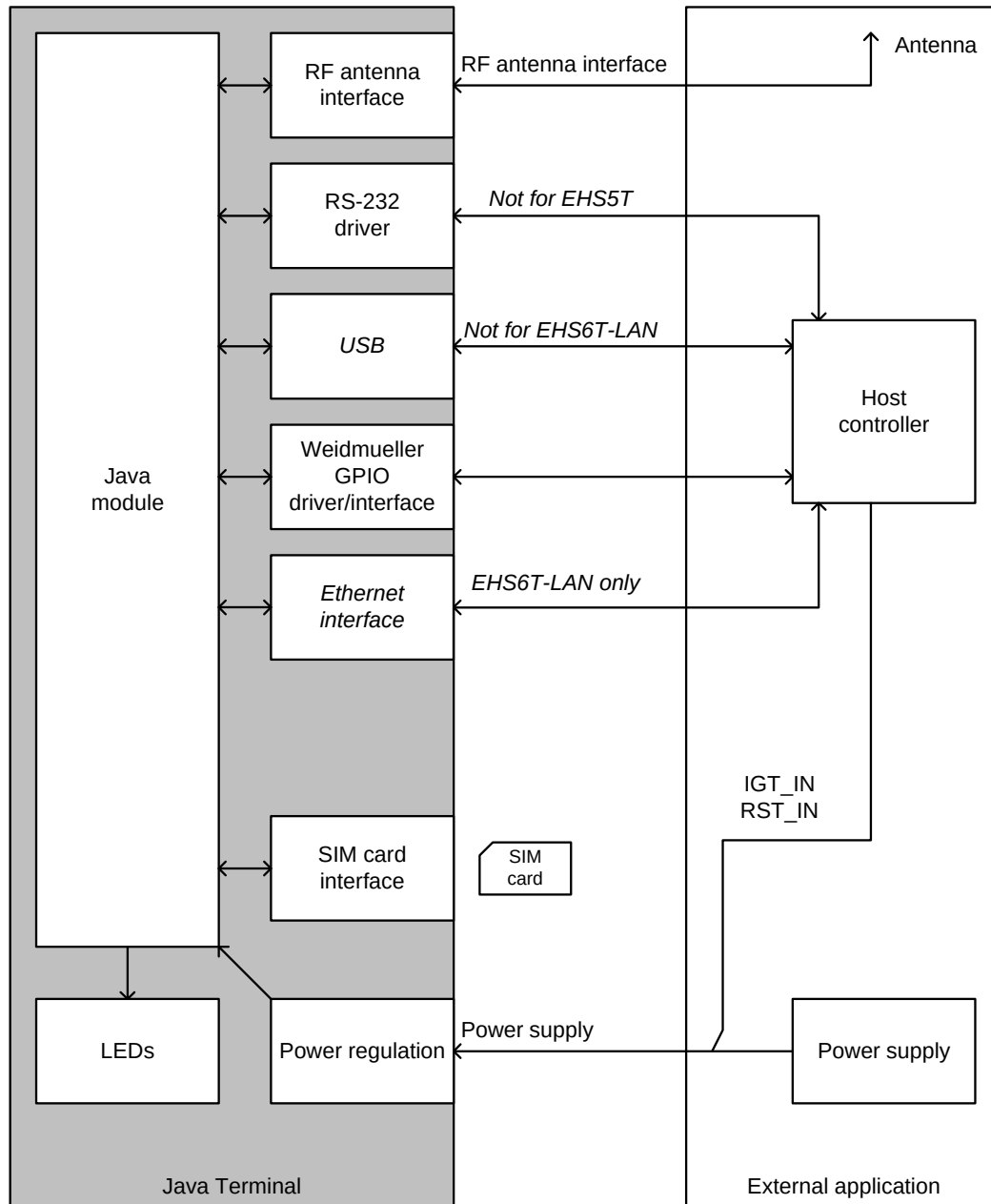


Figure 3: Block diagram

### 3.3 Operating Modes

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

**Table 10:** Overview of operating modes

|                  |                                                                                                                                               |                                                                                                                                                                                                                                    |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normal operation | GSM IDLE                                                                                                                                      | Software is active. Once registered to the GSM network paging with BTS is carried out. The Terminal is ready to send and receive.                                                                                                  |
|                  | GSM TALK<br>GSM DATA                                                                                                                          | Connection between two subscribers is in progress. Power consumption depends on network coverage individual settings, such as DTX off/on, FR/EFR/HR, hopping sequences, antenna.                                                   |
|                  | GPRS / UMTS / HSPA IDLE                                                                                                                       | Terminal is ready for GPRS data transfer, but no data is currently sent or received. Power consumption depends on network settings and GPRS configuration (e.g. multislot settings).                                               |
|                  | GPRS DATA                                                                                                                                     | GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates, GPRS configuration (e.g. used multislot settings) and reduction of maximum output power.   |
|                  | EGPRS DATA (EHSxT only)                                                                                                                       | EGPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates, EGPRS configuration (e.g. used multislot settings) and reduction of maximum output power. |
|                  | UMTS TALK<br>UMTS DATA (EHSxT only)                                                                                                           | UMTS data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.                                                                                                           |
|                  | HSPA DATA (EHSxT only)                                                                                                                        | HSPA data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.                                                                                                           |
| POWER DOWN       | Normal shutdown after sending the AT^SMSO command. The RTC works continuously, but the software is not active. Interfaces are not accessible. |                                                                                                                                                                                                                                    |

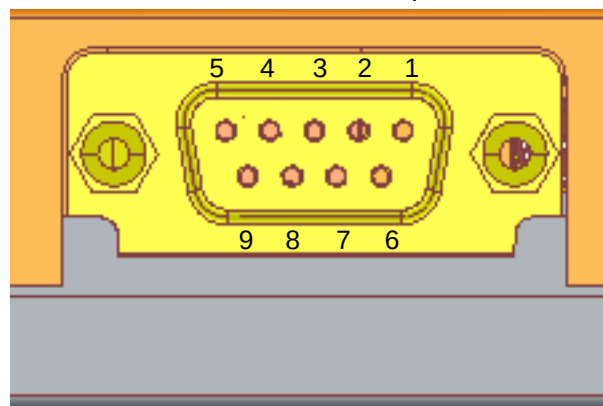
### 3.4 RS-232 Interface

The RS-232 interface is not available for EHS5T. The 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 bit rates from 1200bps to 921kbps. Autobauding supports bit rates from 1.2kbps to 230kbps.

For more information see also [Section 3.4.1](#).

#### 3.4.1 9-Pole D-sub Connector

Via RS-232 interface, the host controller controls the Java Terminals and transports data.



**Figure 4:** Pin assignment RS-232 (D-sub 9-pole female)

**Table 11:** 9-pole D-sub (female) RS-232

| Pin no. | Signal name | I/O | Function                                                                                                                         |
|---------|-------------|-----|----------------------------------------------------------------------------------------------------------------------------------|
| 1       | DCD         | O   | Data Carrier Detected                                                                                                            |
| 2       | RXD         | O   | Receive Data                                                                                                                     |
| 3       | TXD         | I   | Transmit Data                                                                                                                    |
| 4       | DTR         | I   | Data Terminal Ready<br>Attention: The ignition of Java Terminals is activated via a rising edge of high potential (+3 ... +15 V) |
| 5       | GND         | -   | Ground                                                                                                                           |
| 6       | DSR         | O   | Data Set Ready                                                                                                                   |
| 7       | RTS         | I   | Request To Send                                                                                                                  |
| 8       | CTS         | O   | Clear To Send                                                                                                                    |
| 9       | RING        | O   | Ring Indication                                                                                                                  |

Java Terminals are designed for use as a DCE. Based on the conventions for DCE-DTE connections it communicates with the customer application (DTE) using the following signals:

- Port TxD @ application sends data to TXD of the Java Terminals
- Port RxD @ application receives data from RXD of the Java Terminals

Hardware handshake using the RTS and CTS signals and XON/XOFF software flow control are supported.

## 3.5 USB Interface

In addition, the modem control signals DTR, DSR, DCD and RING are available. The modem control signal RING (Ring Indication) can be used to indicate, to the cellular device application, that a call or Unsolicited Result Code (URC) is received. There are different modes of operation, which can be set with AT commands.

**Note:** The DTR signal will only be polled once per second from the internal firmware of Java Terminals.

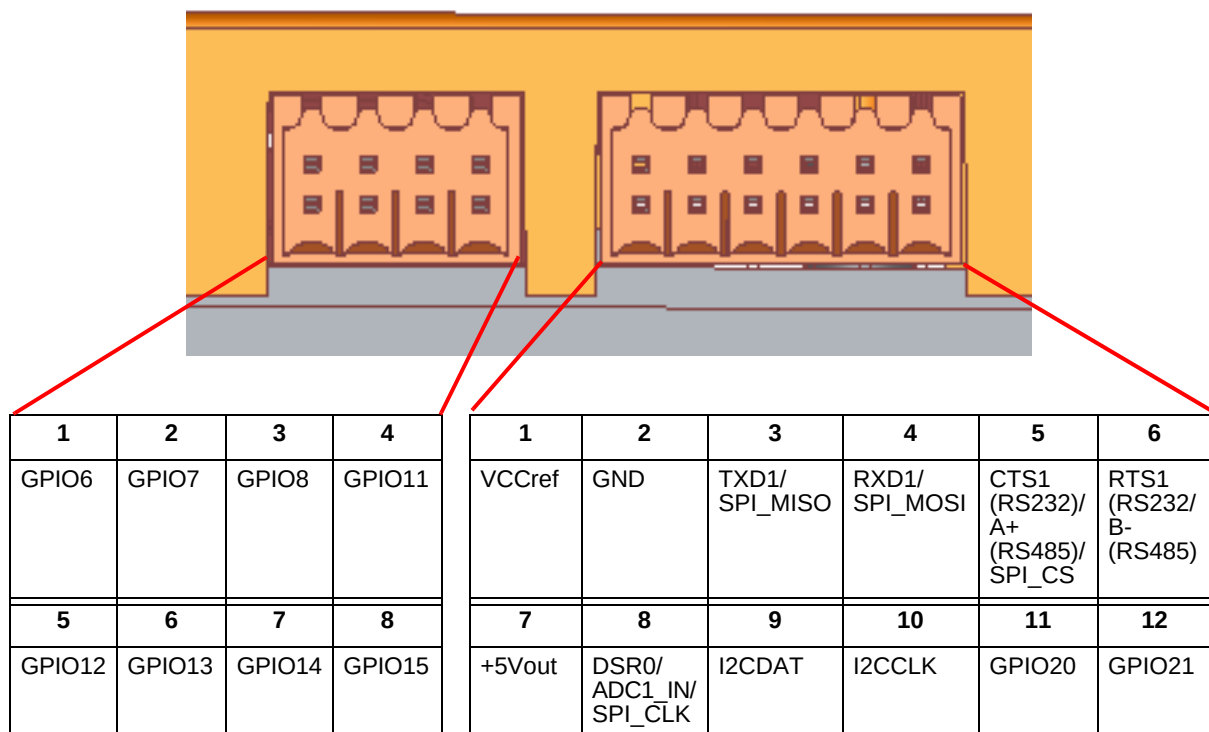
### 3.5 USB Interface

The USB interface is not available for EHS6T-LAN. The other Java Terminals support a USB 2.0 High Speed (480Mbit/s) device interface that is Full Speed (12Mbit/s) compliant.

The USB interface can be used as command and data interface and for downloading firmware. It is only available as a slave device and not able to act as a USB host.

### 3.6 Weidmueller GPIO Interface

The Weidmueller connectors provide access to various module signals including a number of configurable GPIOs.



**Figure 5:** Weidmueller connectors (8-pin and 12-pin)

## 3.6 Weidmueller GPIO Interface

The following [Table 12](#) shows the availability of the Weidmueller pins for various Java Terminal variants.

**Table 12:** Weidmueller pin availability

| PIN              | Signal                     | Comment                                                                                                    | EHS5T | EHS6T-USB | EHS6T-LAN | BGS5T            |
|------------------|----------------------------|------------------------------------------------------------------------------------------------------------|-------|-----------|-----------|------------------|
| 8-pin connector  |                            |                                                                                                            |       |           |           |                  |
| 1                | GPIO6                      | Configurable via AT command, also as PWM2 signal                                                           | ✓     | ✓         | ✓         | ✓                |
| 2                | GPIO7                      | Configurable via AT command, also as PWM1 signal                                                           | ✓     | ✓         | ✓         | ✓                |
| 3                | GPIO8                      | Configurable via AT command, also as COUNTER signal                                                        | ✓     | ✓         | ✓         | ✓                |
| 4                | GPIO11                     | Configurable via AT command                                                                                | -     | ✓         | ✓         | -                |
| 5                | GPIO12                     | Configurable via AT command                                                                                | -     | ✓         | ✓         | -                |
| 6                | GPIO13                     | Configurable via AT command                                                                                | -     | ✓         | ✓         | -                |
| 7                | GPIO14                     | Configurable via AT command                                                                                | -     | ✓         | ✓         | -                |
| 8                | GPIO15                     | Configurable via AT command                                                                                | -     | ✓         | ✓         | -                |
| 12-pin connector |                            |                                                                                                            |       |           |           |                  |
| 1                | VCCref                     | Input supply for level converter to specify external power level (e.g., connect +5Vout for 5V power level) | ✓     | ✓         | ✓         | ✓                |
| 2                | GND                        |                                                                                                            | ✓     | ✓         | ✓         | ✓                |
| 3                | TXD1                       | Configurable via AT command, also as SPI_MISO signal                                                       | ✓     | ✓         | ✓         | ✓<br>(no SPI)    |
| 4                | RXD1                       | Configurable via AT command, also as SPI_MOSI signal                                                       | ✓     | ✓         | ✓         | ✓<br>(no SPI)    |
| 5                | CTS1 or A+                 | Either CTS1 (for RS-232) or SPI_CS or A+ (for RS-485) depending on product variant                         | A+    | CTS1      | CTS1      | CTS1<br>(no SPI) |
| 6                | RTS1 or B-                 | Either RTS1 (for RS-232) or B- (for RS-485) depending on product variant                                   | B-    | RTS1      | RTS1      | RTS1             |
| 7                | +5Vout                     | External power supply up to 100mA, usable as VCCref input                                                  | ✓     | ✓         | ✓         | ✓                |
| 8                | DSR0 or ADC1_IN or SPI_CLK | Configurable via AT command                                                                                | ✓     | ✓         | ✓         | ✓<br>(no SPI)    |
| 9                | I2CDAT                     | I <sup>2</sup> C interface                                                                                 | ✓     | ✓         | ✓         | ✓                |
| 10               | I2CCLK                     | I <sup>2</sup> C interface                                                                                 | ✓     | ✓         | ✓         | ✓                |
| 11               | GPIO20                     | Configurable via AT command                                                                                | ✓     | ✓         | ✓         | ✓                |
| 12               | GPIO21                     | Configurable via AT command                                                                                | ✓     | ✓         | ✓         | ✓                |

Please refer to the respective “AT Command Set” for details on how to configure the GPIO pins.



### 3.7 Ethernet Interface

---

EHS5T's RS-485 interface is based on the TIA/EIA-485 standard defining electrical characteristics of drivers and receivers for use in balanced multidrop communication systems. RS-485 is used in a lot of different fieldbus systems like Profibus, Interbus, Modbus and P-net.

RS-485 uses a shielded twisted pair cable where the shield is used as ground return, and the inner pairs are used for balanced communication. The two conductors in each pair are called A and B. RS-485 is usually half-duplex.

Data transmission speed depends on the length of the RS-485 bus cable and may be up to 115kbps.

## **3.7 Ethernet Interface**

TBD.

### 3.8 Power Supply

The power supply of the Java Terminals has to be a single voltage source of  $V_{PLUS}=8V...30V$  capable of providing a peak current (pulsed 2x577ms at  $T=4.615ms$ ) of about TBD.A at 12V during an active transmission. The uplink burst causes strong ripple (drop) on the power lines. The drop voltage should not exceed 1V, but the absolute minimum voltage during drops must be  $>7.6V$ .

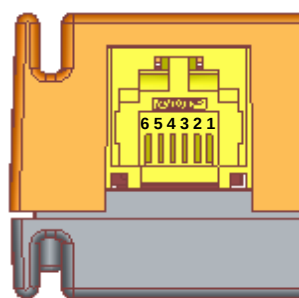
The Java Terminals are protected from supply voltage reversal. An external fast acting fuse  $\geq 0.4A$  with melting integral  $I^2t$  (0.15 ... 0.25) $A^2s$  is necessary to use the Java Terminals at a 12V or 24V unlimited power supply system.

The power supply must be compliant with the EN60950 guidelines. A switching regulator regulates the input voltage for the internal supply.

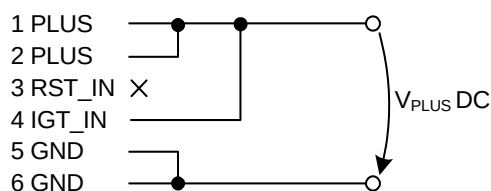
When power fails for  $>1ms$ , Java Terminals reset or switch off. When power fails for  $>15s$  the RTC will be reset.

**Table 13:** Female 6-pole Western plug for power supply, ignition, power down

| Pin | Signal name | Use                     | Parameters                                                                                                                                                        |
|-----|-------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | PLUS        | Power supply            | 8V – 30V DC, max. 33V for 1 min                                                                                                                                   |
| 2   | PLUS        | Power supply            | 8V – 30V DC, max. 33V for 1 min                                                                                                                                   |
| 3   | RST_IN      | Signal for module reset | $U_{IH} \geq 8V$ for $t > 10ms$ resets the terminal.<br>$U_{IL} < 2V$ and low level for normal operation.                                                         |
| 4   | IGT_IN      | Ignition                | $U_{IH} \geq 8V$<br>Ignition $\geq 8V$ for more than 200ms switches the Java Terminals on. Ignition is activated only by a rising edge. The rise time is $< 20ms$ |
| 5   | GND         | Ground                  | 0V                                                                                                                                                                |
| 6   | GND         | Ground                  | 0V                                                                                                                                                                |



Pin assignment and typical connection:



**Figure 6:** 6-pole Western jack for power supply, ignition, reset, typical connection

Mains adapter: If it fits into the design of your application we recommend the plug-in supply unit used with the type approved Gemalto M2M reference setup. Ordering information can be found in [Chapter 6](#). This 12V mains adapter comes with a 6-pole Western plug and provides an internal connection between IGT\_IN pin and PLUS pin for auto ignition (power up).

### 3.8.1 Turn Java Terminals on

Java Terminals are turned on by plugging an appropriate power supply unit between PLUS and GND of the 6-pole Western jack.

While the RST\_IN pin (pin 3) is not active (voltage <2V) you can start the Java Terminals by activating the RS-232 DTR line if in POWER DOWN mode.

The IGT\_IN signal (pin 4) may be used to switch on Java Terminals if in POWER DOWN mode.

After startup of the Java Terminals the RS-232 lines are in an undefined state for approx. 900ms. This may cause undefined characters to be transmitted over the RS-232 lines during this period.

### 3.8.2 Reset Java Terminals

An easy way to reset the Java Terminals is entering the command AT+CFUN=x,1. For details on AT+CFUN please see [\[1\]](#).

As an alternative, you can shut down the Java Terminals as described in [Section 3.8.3](#) and then restart it as described in [Section 3.8.1](#).

### 3.8.3 Turn Java Terminals off

Normal shutdown:

- To turn off the Java Terminals use the AT^SMSO command, rather than disconnecting the mains adapter.  
This procedure lets the Java Terminals log off from the network and allows the software to enter a secure state and save data before disconnecting the power supply. After AT^SMSO has been entered the Java Terminals returns the following result codes:

```
^SMSO: MS OFF
OK
^SHUTDOWN
```

The "^SHUTDOWN" result code indicates that the Java Terminals turns off in less than 1 second. After the shutdown procedure is complete the Java Terminals enters the POWER DOWN mode. The yellow LED stops flashing (see [Section 3.12](#) for a detailed LED description). The RTC is still fed from the voltage regulator in the power supply ASIC. Please note that if there is an auto ignition connection between PLUS and IGT\_IN the module will restart automatically after a normal shutdown.

### 3.8 Power Supply

---

Emergency restart:

- In the event of software hang-ups etc. the Java Terminals can be restarted by applying a voltage >8V to the RST\_IN pin (pin 3) for more than 10ms. The RST\_IN signal restarts the Java Terminals.

Caution: Use the RST\_IN pin only when, due to serious problems, the software is not responding for more than 5 seconds. Pulling the RST\_IN pin causes the loss of all information stored in the volatile memory since power is cut off immediately. Therefore, this procedure is intended only for use in case of emergency, e.g. if Java Terminals fails to shut down properly.

When the Java Terminals enter the Power Down mode, e.g., after you have issued the AT^SMSO command or activated the RST\_IN signal, all RS-232 interface lines are active for a period of 50ms to max. 3.5s. This may cause undefined characters to be transmitted on the RS-232 lines which can be ignored.

#### 3.8.4 Disconnecting power supply

Before disconnecting the power supply from the PLUS pin, make sure that the Java Terminals are in a safe condition. The best way is to wait 1s after the "^SHUTDOWN" result code has been indicated.

### 3.9 Automatic thermal shutdown

An on-board NTC measures the temperature of the built-in BGS2 module. If over- or undertemperature is detected on the module the Java Terminals automatically shut down to avoid thermal damage to the system. [Table 17](#) specifies the ambient temperature threshold for the Java Terminals.

The automatic shutdown procedure is equivalent to the power-down initiated with the AT^SMSO command, i.e. Java Terminals log off from the network and the software enters a secure state avoiding loss of data. In IDLE mode it takes typically one minute to deregister from the network and to switch off.

Alert messages transmitted before the Java Terminals switch off are implemented as Unsolicited Result codes (URCs). For details see the description of AT^SCTM command provided in [\[1\]](#).

Thermal shutdown will be deferred if a critical temperature limit is exceeded, while an emergency call or a call to a predefined phone number is in progress, or during a two minute guard period after power up. See [\[1\]](#) for details.

### 3.10 RTC

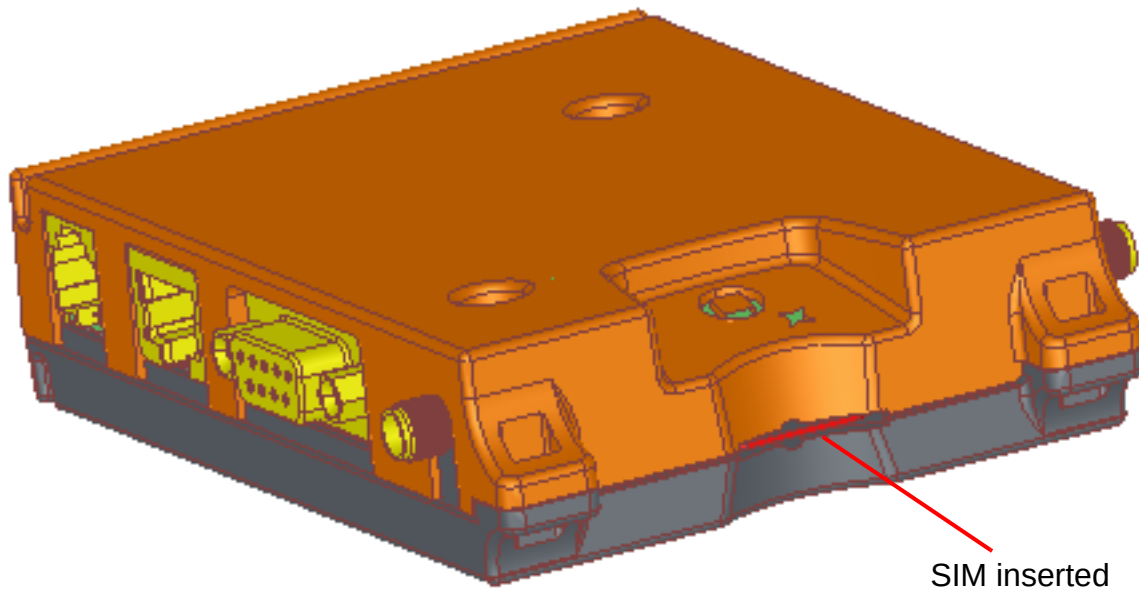
The internal Real Time Clock (RTC) of the Java Terminals retain the time and date and handle the alarm (reminder) function. The AT+CCLK command serves to set the time and date, and AT+CALA specifies a reminder message. See [\[1\]](#) for details.

A dedicated voltage regulator backs up the RTC even in POWER DOWN mode and enables Java Terminals to keep track of time and date.

However, please note that the Alarm mode described in [\[1\]](#), Section AT+CALA, is not intended for the Java Terminals. The AT+CALA command can only be used to set a reminder message, but not to configure the mobile to wake up from POWER DOWN mode into Alarm mode. Therefore, after setting a timer with AT+CALA be sure not to shut down the Java Terminals by AT^SMSO or RST\_IN signal.

### 3.11 SIM Interface

The SIM interface is intended for 1.8V and 3V SIM cards in accordance with GSM 11.12 Phase 2. The card holder is a five wire interface according to GSM 11.11. A sixth pin has been added to detect whether or not a SIM card is inserted.



**Figure 7:** SIM interface

The SIM - with the circuit side facing upwards - is inserted by gently pushing it into the SIM card holder until it snaps hold. It is now protected from accidental removal. The SIM can be removed from the card holder by using a flat object such as a screwdriver to carefully press the inserted SIM until it snaps out again.

All signals of the SIM interface are protected from electrostatic discharge with spark gaps to GND and clamp diodes to 1.8V resp. 2.9V and GND.

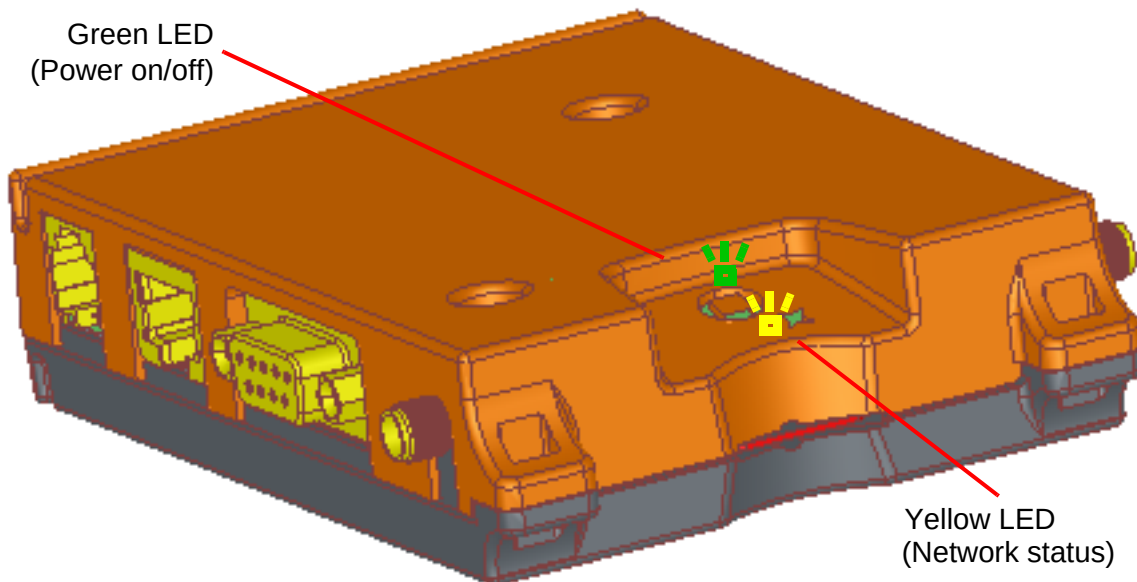
Removing and inserting the SIM card during operation requires the software to be reinitialized. Therefore, after reinserting the SIM card it is necessary to restart Java Terminals.

**Note:** No guarantee can be given, nor any liability accepted, if loss of data is encountered after removing the SIM card during operation. Also, no guarantee can be given for properly initializing any SIM card that the user inserts after having removed a SIM card during operation. In this case, the application must restart the Java Terminals.

### 3.12 Status LEDs

Java Terminals have two LEDs indicating its operating states through the semitransparent casing:

- A green LED indicates whether the Java Terminals are ready to operate.
- A yellow LED indicates the network registration state of the Java Terminals.

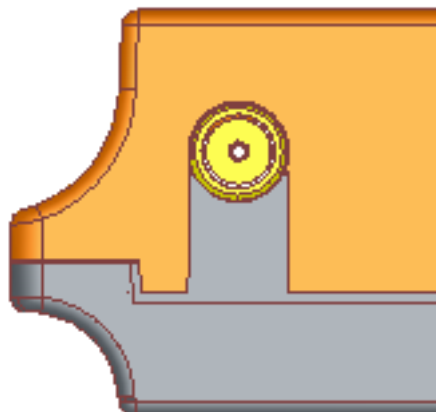


**Figure 8:** Status LED

The yellow LED is driven by a line of the integrated module that can be configured by using the AT^SLED command to either light permanently or to flash. For details on the AT command please refer to [\[1\]](#).

### 3.13 RF Antenna Interface

An external RF antenna is connected via the Java Terminals's female SMA connector that is also the antenna reference point (ARP).



**Figure 9:** Antenna connector

The system impedance is  $50\Omega$ . In any case, for good RF performance, the return loss of the customer application's antenna should be better than 10dB (VSWR < 2). Java Terminals withstand a total mismatch at this connector when transmitting with power control level for maximum RF power.

Inside the Java module an inductor to ground provides additional ESD protection to the antenna connector. To protect the inductor from damage no DC voltage must be applied to the antenna circuit.

For the application it is recommended to use an antenna with an SMA (male) connector:

Please note that the terminal should be installed and operated with a minimum distance of 20cm between the antenna connected to the terminal and any human bodies. Also, the transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The allowed maximum antenna gain (including cable loss) for stand-alone situation is given below in [Table 14](#).

**Table 14:** Allowed maximum antenna gain (including cable loss)

| Module             | 850MHz  | 900MHz  | 1800MHz  | 1900MHz | 2100MHz  |
|--------------------|---------|---------|----------|---------|----------|
| EHS6T-USB/EHS6-LAN | 3.42dBi | 4.18dBi | 9.64dBi  | 2.51dBi | 15.54dBi |
| BGS5T              | 2.15dBi | 2.15dBi | 2.15dBi  | 2.15dBi | na       |
| EHS5T              | na      | 6.10dBi | 12.30dBi | na      | 12.30dBi |

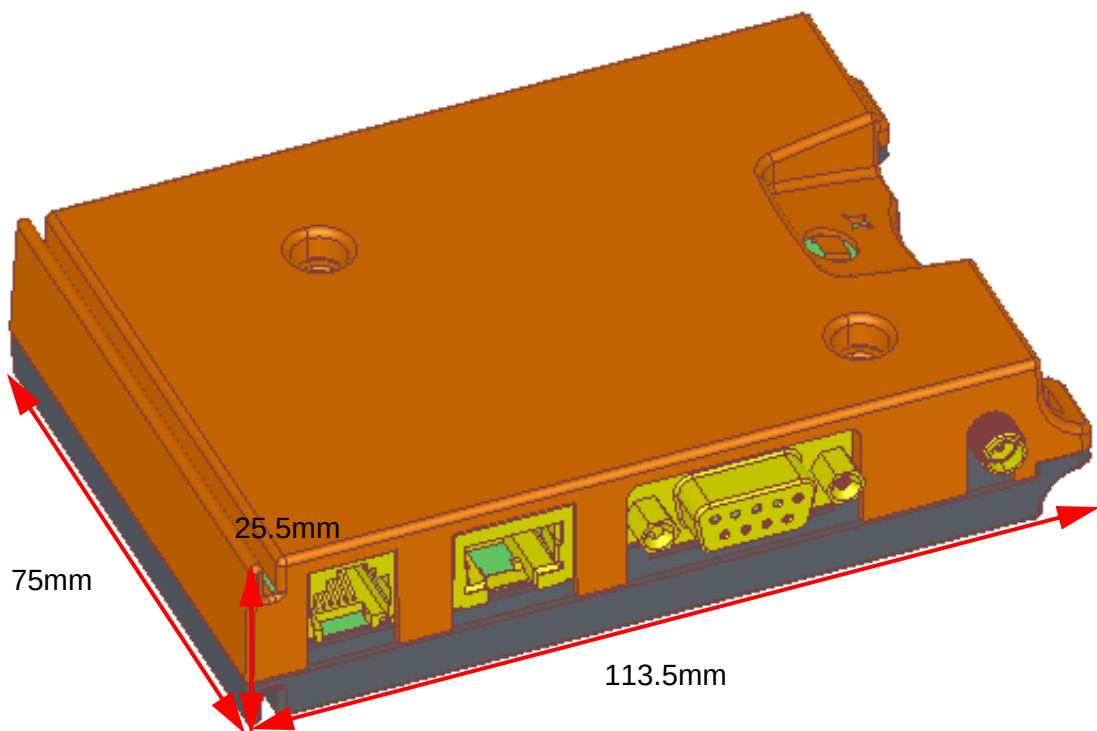


## 4 Mechanics, Mounting and Packaging

### 4.1 Mechanical Dimensions

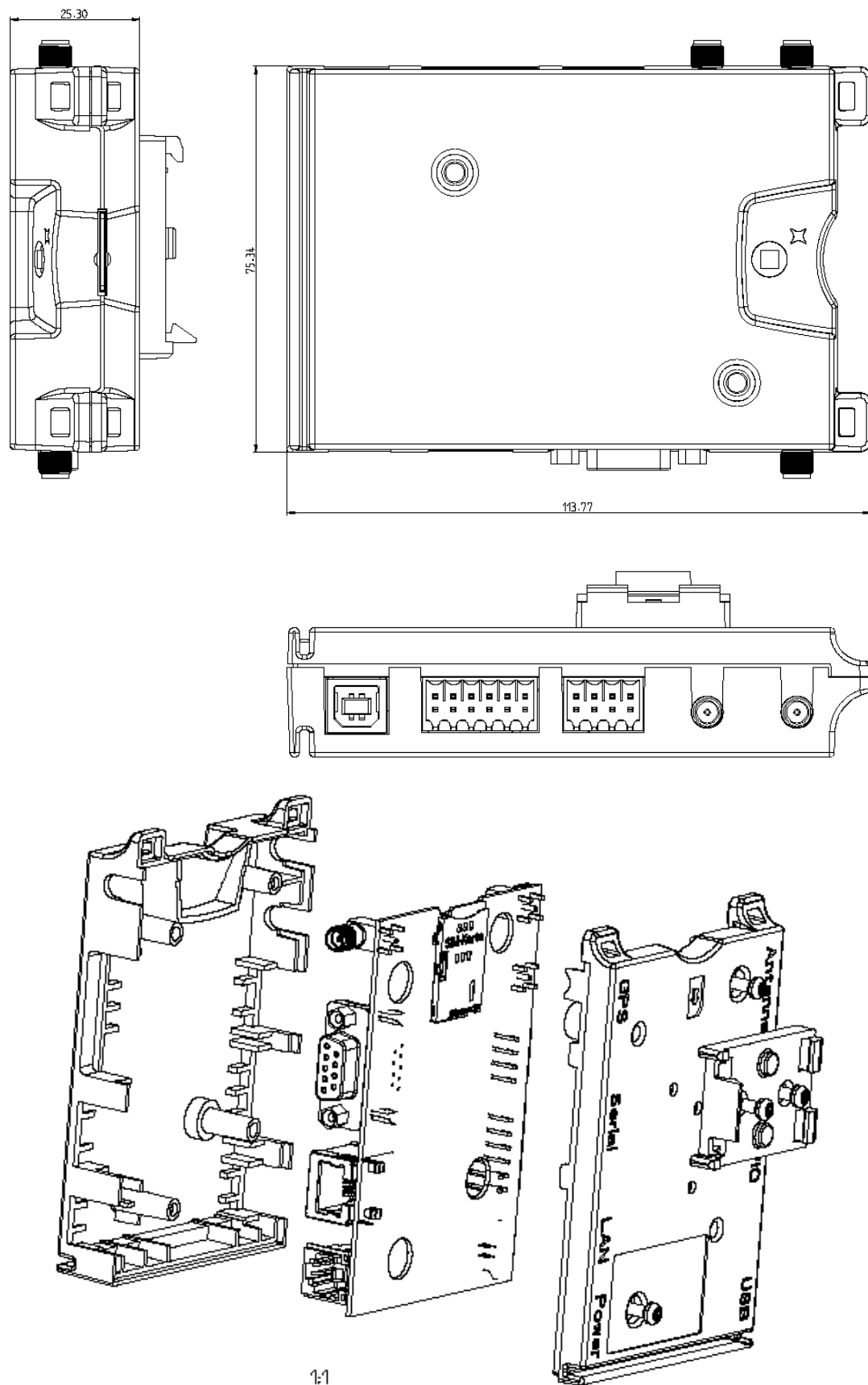
Figure 10 shows a 3D view of the Java Terminal and provides an overview of the mechanical dimensions of the board. For further details see Figure 11. To allow for an easier mechanical implementation into an external application a set of 3D STP data for the Java Terminals is attached to this PDF. Please open the [Attachments](#) navigation panel to view and save these files.

Length: 113.5mm (including fixtures for cable straps)  
Width: 75mm (excluding antenna and serial interface connectors)  
Height: 25.5mm  
  
Weight: 120g



**Figure 10:** Java Terminals 3D overview

## 4.1 Mechanical Dimensions

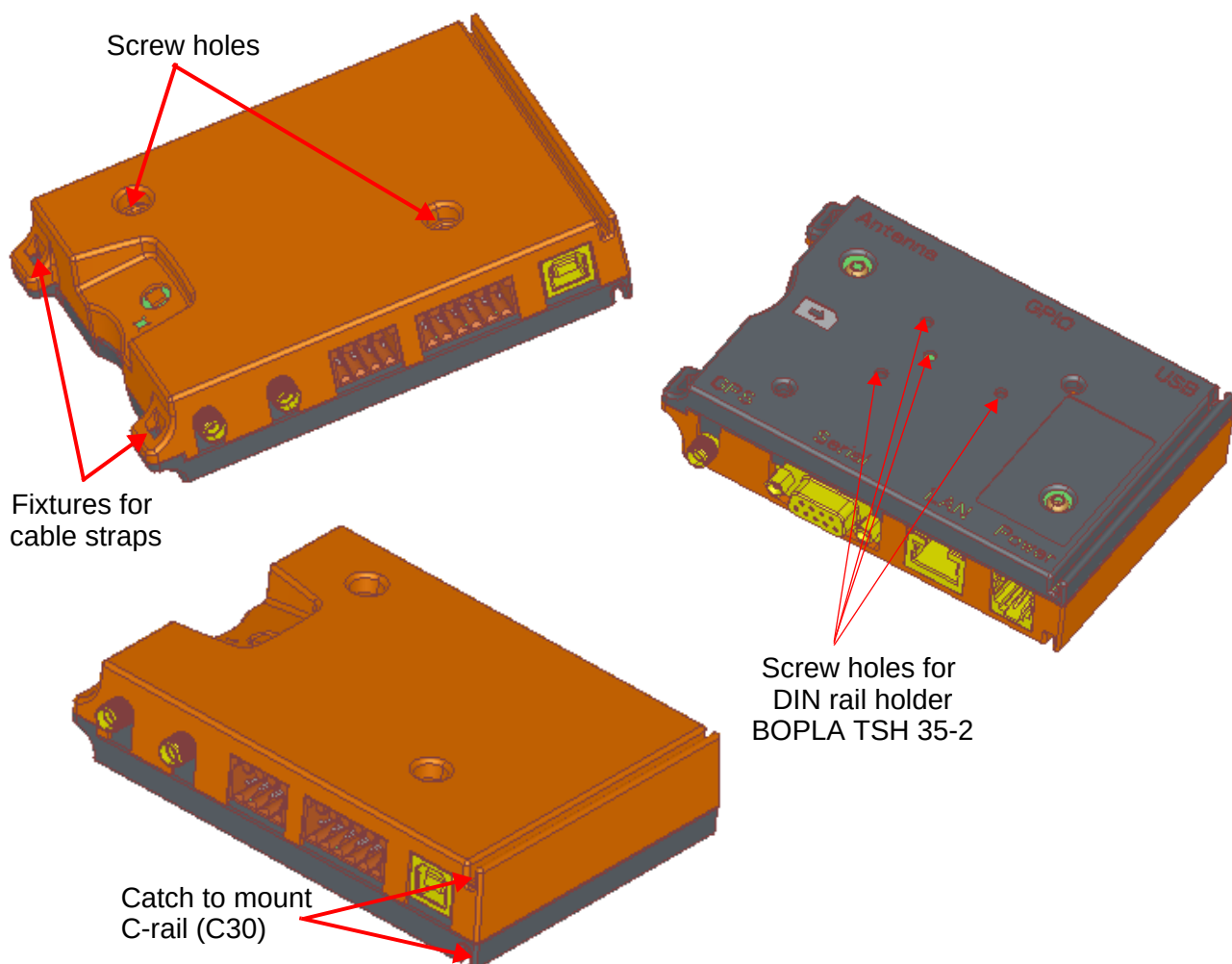
**Figure 11:** Java Terminals mechanical dimensions

## 4.2 Mounting the Java Terminals

There are a number of ways to mount the Java Terminals:

- Java Terminals can be attached to a rail installation or other surface using the two provided screw holes.
- Java Terminals can be fastened to a rack or holding using the two provided fixtures for cable straps.
- Java Terminals can be slid onto a specific DIN rail made according to DIN EN 60715 - C section, C30 format. A catch at the terminal's bottom side will have to be removed to slide multiple terminals onto a single rail.
- Using a BOPLA TSH 35-2 universal DIN rail holder the Java Terminals can be fitted onto another special type of DIN rail made according to DIN EN 60715 - Top hat section, 35mm (e.g., Wago 210-113 steel carrier rail).

The following figure shows the various possibilities provided to mount the Java Terminals.



**Figure 12:** Mounting the Java Terminals

The various ways to mount the Java Terminals may be combined where appropriate. It is for example possible to slide the terminal onto a DIN rail and in addition use cable straps to fasten it to a holding.

## **4.3 Packaging**

Java Terminals come in terminal boxes:

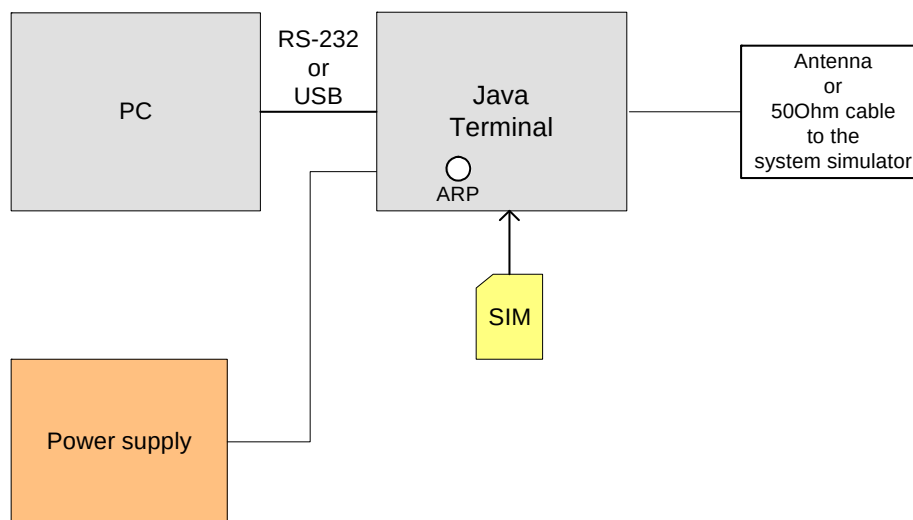
- Terminal box size: 191mm x 143mm x 44mm.

## 5 Full Type Approval

### 5.1 Gemalto M2M Reference Setup

The Gemalto M2M reference setup submitted to type approve Java Terminals consists of the following components:

- Java Terminals with approved Java module
- PC as MMI
- Power Supply



**Figure 13:** Reference equipment for approval

For ordering information please refer to [Chapter 6](#).

## 5.2 Restrictions

Later enhancements and modifications beyond the certified configuration require extra approvals. Each supplementary approval process includes submittal of the technical documentation as well as testing of the changes made.

- No further approvals are required for customer applications that comply with the approved Java Terminals configuration.
- Extra approval must be obtained for applications using other accessories than those included in the approved Java Terminals configuration (power supply, MMI implementation supported by AT commands).

## 5.3 CE Conformity

The Java Terminals meet the requirements of the EU directives listed below:

- R&TTE Directive 1999/5/EC

## 5.4 EMC

The Java Terminals comply with the equipment requirements specified in EN 301489-1, -7 and -24 are covered by the R&TTE Directive.

## 5.5 Compliance with FCC Rules and Regulations

As an integrated product, the Java Terminals EHS6T-USB, EHS6T-LAN and BGS5T are fully compliant with the grant of the FCC Equipment Authorization issued for the built-in Java module, and therefore, bears the label “Contains FCC ID QIPEHS6” or “Contains FCC ID QIPBGS5.”

The Equipment Authorization Certification for the Java modules is listed under the following identifiers:

*FCC Identifier: QIPEHS6 or QIPBGS5*

*Industry Canada Certification Number: 7830A-EHS6 or 7830A-BGS5*

*Granted to Gemalto M2M GmbH*

Radiofrequency radiation exposure Information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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

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

Changes or modifications made to this equipment not expressly approved by Cinterion may void the FCC authorization to operate this equipment.

This device contains UMTS, GSM and GPRS class functions in the 900, 1800 and 2100MHz bands that are not operational in U.S. Territories. This device is to be used only for mobile and fixed applications.

Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance: For more information on the RF antenna interface please refer to [Section 3.13](#) and [Section 4.6](#).

## 6 List of Parts and Accessories

**Table 15:** List of parts and accessories

| Description                                                                                                                                                    | Supplier                   | Ordering information                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Java Terminals                                                                                                                                                 | Gemalto M2M                | Ordering number<br>EHS5T: L30960-N2730-A100<br>EHS6T-USB: L30960-N2740-A100<br>EHS5T-LAN: L30960-N2750-A100<br>BGS5T: L30960-N2720-A100                                                                                                                                                                                                                                    |
| Power supply unit                                                                                                                                              | Gemalto M2M                | Terminal Power Supply<br>Ordering number: L36880-N8490-A12<br><br>UK adapter for Terminal Power Supply<br>Ordering number: L36880-N8490-A13<br><br>US adapter for Terminal Power Supply<br>Ordering number: L36880-N8490-A14<br><br>AU adapter for Terminal Power Supply<br>Ordering number: L36880-N8490-A15                                                              |
| DIN rail holder - BOPLA TSH 35-2<br>                                        | BOPLA                      | Ordering number: 20035000<br>BOPLA Gehäuse Systeme GmbH<br>Borsigstr. 17-25<br>D-32257 Bünde<br><br>Phone: +49 (0)5223 / 969 - 0<br>Fax: +49 (0)5223 / 969 - 100<br><br>Email: <a href="mailto:iinfo@bopla.de">iinfo@bopla.de</a><br>Web: <a href="http://www.bopla.de">http://www.bopla.de</a>                                                                            |
| Antenna - SMARTEQ-MiniMAG Dualband, 0dBd, 2.6m RG174, SMA (m)                                                                                                  | KÖBEL Mobile Communication | Ordering number: 1140.26 with crimped SMA connector<br>KÖBEL Mobile Communication<br>Sesamstrasse 12<br>D-24632 Lentföhrden                                                                                                                                                                                                                                                |
| RS-232 cable with 9-pin D-sub connector (male)                                                                                                                 | Tecline                    | Ordering number: 300574<br>Tecline GmbH<br>Behrener Straße 8<br>D-66117 Saarbrücken<br>Phone: +49-681-926-78-70<br>Fax: +49-681-926-78-555<br>Web: <a href="http://www.tecline-edv.de/">http://www.tecline-edv.de/</a>                                                                                                                                                     |
| 8-pin and 12-pin header connector (male) for Weidmueller GPIO interface<br> | Weidmueller                | Ordering number (12-pin): 1277510000<br>Ordering number (8-pin): 1277480000<br>Weidmüller Interface GmbH & Co. KG<br>Klingenbergstraße 16<br>D-32758 Detmold<br><br>Phone: +49 5231 14-0<br>Fax: +49 5231 14-2083<br><br>Email: <a href="mailto:iinfo@weidmueller.de">iinfo@weidmueller.de</a><br>Web: <a href="http://www.weidmueller.com">http://www.weidmueller.com</a> |



## About Gemalto

Gemalto (Euronext NL0000400653 GTO) is the world leader in digital security with 2011 annual revenues of €2 billion and more than 10,000 employees operating out of 74 offices and 14 Research & Development centers, located in 43 countries.

We are at the heart of the rapidly evolving digital society. Billions of people worldwide increasingly want the freedom to communicate, travel, shop, bank, entertain and work - anytime, everywhere - in ways that are enjoyable and safe. Gemalto delivers on their expanding needs for personal mobile services, payment security, authenticated cloud access, identity and privacy protection, eHealthcare and eGovernment efficiency, convenient ticketing and dependable machine-to-machine (M2M) applications.

Gemalto develops secure embedded software and secure products which we design and personalize. Our platforms and services manage these secure products, the confidential data they contain and the trusted end-user services they enable. Our innovations enable our clients to offer trusted and convenient digital services to billions of individuals.

Gemalto thrives with the growing number of people using its solutions to interact with the digital and wireless world.

### For more information please visit

[m2m.gemalto.com](http://m2m.gemalto.com), [www.facebook.com/gemalto](http://www.facebook.com/gemalto), or [Follow@gemaltom2m](https://twitter.com/gemaltom2m) on twitter.

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#### **Canada, Industry Canada (IC) Notices**

This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

#### **Canada, avis d'Industry Canada (IC)**

Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210.

Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

#### **Radio Frequency (RF) Exposure Information**

The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

#### **Informations concernant l'exposition aux fréquences radio (RF)**

La puissance de sortie émise par l'appareil de sans fil est inférieure à la limite d'exposition aux fréquences radio d'Industry Canada (IC). Utilisez l'appareil de sans fil de façon à minimiser les contacts humains lors du fonctionnement normal.

Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles (les antennes se situent à moins de 20 cm du corps d'une personne).

[www.gemalto.com/m2m](http://www.gemalto.com/m2m)

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