CPPS - Gate40 Sensor

Merging the Industrial and IT worlds
General Description

The **new era in Industry** demands interconnecting heterogeneous systems, high computational capacity and flexible interfaces with the "physical" world.

**CPPS - Gate40 Sensor** is a powerful **Smart Gateway** that faces **Cyber-Physical Production System** requirements. It merges high computational capability, flexible and high availability industrial and IT networking, physical processing sensing and database management.

**CPPS - Gate40 Sensor** simplifies the implementation of advanced data acquisition and industrial networking infrastructures focused on **Big Data** analytics, **M2M** solutions and applications for **remote monitoring and automation**.

**CPPS - Gate40 Sensor** consists of a modular embedded hardware and software system, designed to offer easy access to a huge variety of field devices through a wide range of industrial interfaces. It is powered by SMARTZynq module and by high-availability and synchronization IPs from **SoCe**. This technology is **field proven and present in more than 15 countries worldwide**.

**CPPS - Gate40 Sensor** integrates different technologies and protocols to offer a Smart gateway solution which allows users to achieve **accelerated business development** into the **IoT** environment, merging the plant with the IT world.

Hardware Key Features

The "heart" of the **CPPS - Gate40 Sensor** is a Xilinx Zynq device. This is the last generation of programmable System-on-Chip platforms. It embeds in the same device a double-core ARM-9 processor and a high-end FPGA section.

**Communication interfaces:**
- 4 SFP cages for 10/100/1000Base-Tx Ethernet copper or 1000Base-X fiber. These interfaces are driven by the FPGA section of the Zynq device providing low-latency switching capabilities. All switching implementations include an internal port that provides access to the network to the internal ARM9 multiprocessor.
- 1 10/100/1000Base-Tx Ethernet copper port directly attached to the internal ARM9 multiprocessor.
- 1 serial RS232 port.
- 1 half and full duplex RS485 port with Serial Modbus and Profibus support.

**Memory features:**
- 8 Gb DDR3: Fast DDR memory to store operating systems, software applications, protocols stacks or large buffers.
- 256 Mb Quad SPI Flash: Memory for firmware and bitstream storage.
- µSD connector: High density and low cost large storage for complex operating systems, permanent data storage and quick upgrade.
- EEPROM with unique MAC integrated: Ready to use unique MAC in each module to reduce the time-to-market of the customer product.
Networking Key Features

**SoCe** IP cores provide on the FPGA section of the internal SoC chip **flexible and powerful networking capabilities** for both the Industrial and the IT Section. Tri-speed Legacy Ethernet ports can be combined with **high availability** “Plug&Work” Ethernet ports based on HSR and PRP **zero-delay recovery time redundancy** protocols. Among other switching configurations, it is worth to mention:

- 4x Legacy Ethernet ports.
- 2x HSR/PRP ports and 1 Legacy Ethernet port.
- 4x HSR/PRP ports.
- 2x HSR/PRP or Legacy ports and 2x Real Time Profinet ports.
- 2x HSR/PRP or Legacy ports and 2x Ethernet IP/DLR ports.

IEEE 1588 **SoCe** technology for **sub-microsecond synchronization** integrated on **CPPS - Gate40 Sensor** offers an “out-of-the-box” for IEEE 1588 implementations. The device can work as Master of the network, Slave and Boundary Clock. Furthermore, all **SoCe** switching implementations include Transparent-Clock functionality ensuring high precision synchronization in different and complex implementations.

Cyber-security Key Features

- **Zynq-7000 Secure Boot**, which provides private key cryptography (AES/HMAC) and public key cryptography (RSA) allowing sensitive software to be encrypted and authenticated in a chain of trust.
- **IEEE 802.1X protocol**, which provides an authentication mechanism to the devices wishing to attach to the network.
- **MACsec standard**, which defines a security infrastructure to provide data confidentiality, data integrity and data origin authentication.

Applications and Services

- **Soft PLC**
- **Modbus Server/Client management**
- **HMI integration**
- **Synchronization:** IEEE 1588v2 Master/Slave/Boundary Clock, SNTP to synchronize system clock in Internet
- **Database management:** CouchDB, SQL, Cassandra, JSON, etc.
- **Sensor RAW data preprocessing by hardware and software**
- **OPC UA support**
- **Fiware**
- **Event and Log**
- **Environmental Monitoring**
- **Multiprotocol stack:** Siemens S7, Profinet, Profibus, etc.
- **Maintenance:** Configuration backup and restore
- **Management:** SNMP/Web/Telnet/CLI, SSL/SSH for secure management
Specifications

<table>
<thead>
<tr>
<th>Network interfaces characteristics</th>
<th>Supported standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 SFP cages for 10/100/1000Base-Tx Ethernet copper or 1000Base-X fiber with LED indicators</td>
<td>IEC 62439-3 Clause 4 PRP &quot;Parallel Redundancy Protocol&quot;</td>
</tr>
<tr>
<td>1 10/100/1000Base-Tx Ethernet copper port with LED indicators</td>
<td>IEC 62439-3 Clause 5 HSR &quot;High-availability Seamless Redundancy&quot;</td>
</tr>
<tr>
<td>1 serial RS232 port</td>
<td>IEEE 1588v2 PTP &quot;Precision Time Protocol&quot; Default, Power Profile and IEC 61850-9-3</td>
</tr>
<tr>
<td>1 half and full duplex RS485 port with Serial Modbus and Profibus support</td>
<td>IEEE 802.3 for 10Base-T</td>
</tr>
<tr>
<td>1 USB Female B type connector</td>
<td>IEEE 802.3u for 100Base-TX</td>
</tr>
</tbody>
</table>

| Digital inputs: Up to 3, 0-24 V | IEEE 802.1Q for VLAN Tagging |
| Analog input: 0/4-20mA | IEEE 802.1D for STP (Spanning Tree Protocol) |
| Potential-free relay output 250 V AC max | IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol) |
| Temperature sensor interfaces: 1 three-wire RTD (PT100) and 1 thermocouple Type K | IEEE 802.1Q for VLAN based Ethernet Priorities |
| Integrated electronic piezoelectric (IEPE) accelerometer input | IEEE 802.1p for Class of Service (CoS) |
| Power Supply | IEEE 802.1X access control for port based and MAC based authentication, MAC-Port binding and authentication for login security |
| supports input voltage range from 6V DC to 30V DC | IEEE 802.1ab for Link Layer Discovery Protocol (LLDP) |

| Physical characteristics |  |
| Dimensions: 174 mm x 125 mm x 62 mm | Profinet IEC 61158/IEC 61784 |
| Material: aluminium case with a tough plastic frame and interchangeable rubber brackets | Profibus IEC 61158/EN 50170 |
| Mounting: DIN rail wall mounting | SNMP RFC 1157/RFC 3410 |

| Working temperature | SNTP RFC 4330 |
| -40 °C to +85 °C |  |

Ordering information and contact

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