**EMBEDDED SMARC 2.0**

**conga-SA5**

- Low power Intel® Atom™ E3900 Series, Celeron® and Pentium® N-Series processors
- High performance Intel® HD Graphics 500
- Industrial Temperature Range -40°C to 85°C
- Time Coordinated Computing
- Enhanced Security Execution

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**Form Factor**

| SMARC Specification 2.0 | 82x50 mm |
---|---|

**CPU**

<table>
<thead>
<tr>
<th>Processor</th>
<th>Frequency (Burst)</th>
<th>Clock</th>
<th>Core</th>
<th>L2 cache</th>
<th>TDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Atom® x7-E3950</td>
<td>2.00 GHz</td>
<td>1.6 GHz</td>
<td>Quad Core</td>
<td>2MB</td>
<td>12W</td>
</tr>
<tr>
<td>Intel® Atom® x5-E3940</td>
<td>1.80 GHz</td>
<td>1.6 GHz</td>
<td>Quad Core</td>
<td>2MB</td>
<td>9W</td>
</tr>
<tr>
<td>Intel® Atom® x5-E3930</td>
<td>1.80 GHz</td>
<td>1.3 GHz</td>
<td>Dual Core</td>
<td>2MB</td>
<td>6.5W</td>
</tr>
<tr>
<td>Intel® Pentium® N4200</td>
<td>2.50 GHz</td>
<td>1.1 GHz</td>
<td>Quad Core</td>
<td>2MB</td>
<td>6W</td>
</tr>
<tr>
<td>Intel® Celeron® N3350</td>
<td>2.40 GHz</td>
<td>1.1 GHz</td>
<td>Quad Core</td>
<td>2MB</td>
<td>6W</td>
</tr>
<tr>
<td>Intel® Celeron® J3455</td>
<td>2.30 GHz</td>
<td>1.5 GHz</td>
<td>Quad Core</td>
<td>2MB</td>
<td>10W</td>
</tr>
</tbody>
</table>

**DRAM**

- up to 8GB onboard LPDDR4 with 2400MT/s

**Ethernet**

- 2x Intel® I210 (Industrial) / I211 (Commercial) Gigabit Ethernet Controller with SDP support | 2x real-time trigger

**I/O Interfaces**

- 2x USB 3.0 | 4x USB 2.0 | 1x SATA3 | 1x SDIO | up to 4x PCIe Gen2 | 2x PCIe Bus | 2x SPI I 4x UART | optional onboard M.2 1216 WiFi/Bluetooth module

**Mass Storage**

- eMMC 5.0 onboard flash up to 128 GByte

**Sound**

- Intel® High Definition Audio | Integrated Audio DSP with Intel® Smart Sound Technology

**Graphics**

- Intel® HD Graphics 500 with support for 4k Ultra HD displays | DirectX 12 | OpenGL 4.4 | OpenCL 2.0 | OpenGL ES 3.0 | HDCP 1.4 (wired), HDCP 2.0 (wireless) | Video decode hardware acceleration including support for 4kp60 HEVC (H.265), H.264, MVC, VP8, VP9, VC-1, WMV9, JPEG/MJPEG | Video encode hardware acceleration including support for 4kp30 HEVC (H.265), H.264, MVC, VP8, JPEG/MJPEG.

**LVDS**

- Dual channel LVDS transmitter | support for flat panels with 2x24 bit data mapping up to a resolution of 1920x1200 @60Hz | shared with eDP or 2x MIPI-DSI x4 (option)

**DisplayPort / DDI**

- DisplayPort 1.2 up to 4096x2160p or DDI/TDMS up to 3840x2160p

**MIPI-CSI**

- 1x MIPI-CSI x4 and 1x MIPI-CSI x2

**congatec Board controller**

- Multistage watchdog | non-volatile user data storage | manufacturing and board information | board statistics | fast mode and multi-master I²C bus | power loss control

**Embedded BIOS Feature**

- AMI Aptio® UEFI firmware | 8 MByte serial SPI with congatec Embedded BIOS features OEM Logo | OEM CMOS Defaults | LCD Control | Display Auto Detection | Backlight Control | Flash Update

**Power Management**

- ACPI 5.0 compliant | Smart Battery Management

**Operating Systems**

- Microsoft® Windows 10 | Microsoft® Windows 10 IoT Enterprise | Microsoft® Windows IoT 10 Core | Linux | Yocto

**Power Consumption**

- Typ. application: 8-12W | see manual for full details

**Temperature Range**

- Commercial: Operating Temperature: 0 to +60°C | Storage Temperature: -20 to +85°C
- Industrial: Operating Temperature: -40 to +85°C | Storage Temperature: -40 to +85°C

**Humidity**

- Operating: 10 to 90% r. h. non cond.
- Storage: 5 to 95% r. h. non cond.

**Size**

- 82 x 50 mm (3.23” x 1.97”)
conga-SA5 | Block Diagram

Intel Atom E3900 Processor Series

LPDDR4 memory

eMMC

PCIe Gen2

USB 2.0

Onboard LPDDR4 memory

eMMC

PCIe Gen2

USB 2.0

WiFi/BT M.2 1216

Assembly Option

LPDDR4 2400MT/s

eDP0

dSi0

dSi1

PCIe Gen2

SATA 6Gb/s

Intel I210 / I211 GBE

Intel I210 / I211 GBE

Intel I210 / I211 GBE

PCIe Gen2

PCIe Gen2

USB 3.0

USB 3.0

USB 2.0

USB 2.0

MIPI-CSI

MIPI-CSI

SDIO

HDA

SSPI

UART

I2C

GPIO

SPI

ESPI

TPM 2.0

BDOS

congatec Board Controller

Multistage Watchdog

Board Information

HW Monitoring

Power Control / GPIO

SER1 / SER3 / I2C

Note: Assembly options on request only.
## SMARC 2.0 module conga

### Description

**conga-SA5/E3950-8G eMMC32**

<table>
<thead>
<tr>
<th>Article</th>
<th>PN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>conga-SA5/E3950-8G eMMC32</td>
<td>050000</td>
<td>SMARC 2.0 module with Intel® Atom™ x7-E3950 quad core processor with 16GHz core frequency up to 2.0GHz, 2MB L2 cache, 8GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/E3940-4G eMMC32</td>
<td>050001</td>
<td>SMARC 2.0 module with Intel® Atom™ x5-E3940 quad core processor with 16GHz core frequency up to 18GHz, 2MB L2 cache, 4GB 2133MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/E3930-2G eMMC16</td>
<td>050002</td>
<td>SMARC 2.0 module with Intel® Atom™ x5-E3930 dual core processor with 13GHz core frequency up to 18GHz, 2MB L2 cache, 2GB 2133MT/s LPDDR4 onboard memory and 16GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/E3930-2G eMMC16 1xGBe</td>
<td>050003</td>
<td>SMARC 2.0 module with Intel® Atom™ x5-E3930 dual core processor with 13GHz core frequency up to 18GHz, 2MB L2 cache, 2GB 2133MT/s LPDDR4 onboard memory and 16GB eMMC onboard flash. Only one GBE.</td>
</tr>
<tr>
<td>conga-SA5/i-E3950-4G eMMC32</td>
<td>050010</td>
<td>SMARC 2.0 module with Intel® Atom™ x7-E3950 quad core processor with 16GHz core frequency up to 2.0GHz, 2MB L2 cache, 4GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash. Industrial temperature range -40°C to 85°C.</td>
</tr>
<tr>
<td>conga-SA5/i-E3940-4G eMMC16</td>
<td>050011</td>
<td>SMARC 2.0 module with Intel® Atom™ x5-E3940 quad core processor with 16GHz core frequency up to 18GHz, 2MB L2 cache, 4GB 2133MT/s LPDDR4 onboard memory and 16GB eMMC onboard flash. Industrial temperature range -40°C to 85°C.</td>
</tr>
<tr>
<td>conga-SA5/i-E3930-2G eMMC16</td>
<td>050012</td>
<td>SMARC 2.0 module with Intel® Atom™ x5-E3930 dual core processor with 13GHz core frequency up to 18GHz, 2MB L2 cache, 2GB 2133MT/s LPDDR4 onboard memory and 16GB eMMC onboard flash. Industrial temperature range -40°C to 85°C.</td>
</tr>
<tr>
<td>conga-SA5/i-E3950-8G eMMC32</td>
<td>050013</td>
<td>SMARC 2.0 module with Intel® Atom™ x7-E3950 quad core processor with 16GHz core frequency up to 2.0GHz, 2MB L2 cache, 8GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash. Industrial temperature range -40°C to 85°C.</td>
</tr>
<tr>
<td>conga-SA5/N3350-4G eMMC32</td>
<td>050022</td>
<td>SMARC 2.0 module with Intel® Celeron® N3350 dual core processor with 1GHz core frequency up to 2.3GHz, 2MB L2 cache, 4GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/N4200-8G eMMC32</td>
<td>050023</td>
<td>SMARC 2.0 module with Intel® Pentium® N4200 quad core processor with 1.5GHz core frequency up to 2.50GHz, 2MB L2 cache, 8GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/J3455-4G eMMC16</td>
<td>050024</td>
<td>SMARC 2.0 module with Intel® Celeron® J3455 quad core processor with 1.5GHz core frequency up to 2.30GHz, 2MB L2 cache, 4GB 2400MT/s LPDDR4 onboard memory and 32GB eMMC onboard flash.</td>
</tr>
<tr>
<td>conga-SA5/E3950-8G eMMC32 SPKL-AC</td>
<td>050031</td>
<td>SMARC 2.0 module with Intel® Atom™ x7-E3950 quad core processor with 16GHz core frequency up to 2.0GHz, 2MB L2 cache, 8GB 2400MT/s LPDDR4 onboard memory, 32GB eMMC onboard flash and onboard Sparklan WNSQ-261AC(BT) Wifi/ BT module.</td>
</tr>
<tr>
<td>conga-SA5/i-CSP-B</td>
<td>050051</td>
<td>Passive cooling solution for SMARC 2.0 module conga-SA5 with lidded Intel Atom processor. All standoffs are with 2.7mm bore hole.</td>
</tr>
<tr>
<td>conga-SA5/i-HSP-B</td>
<td>050053</td>
<td>Standard heatspreader for SMARC 2.0 module conga-SA5 with lidded Intel Atom processor. All standoffs are with 2.7mm bore hole.</td>
</tr>
<tr>
<td>conga-SA5/CSP-B</td>
<td>050055</td>
<td>Passive cooling solution for SMARC 2.0 module conga-SA5 with open silicon Intel Pentium and Celeron processor. All standoffs are with 2.7mm bore hole.</td>
</tr>
<tr>
<td>conga-SA5/HSP-B</td>
<td>050057</td>
<td>Standard heatspreader for SMARC 2.0 module conga-SA5 with open silicon Intel Pentium and Celeron processor. All standoffs are with 2.7mm bore hole.</td>
</tr>
</tbody>
</table>

### Accessories

- **conga-SEVAL**: Evaluation Carrier Board for SMARC 2.0 modules.
- **conga-SMC/SMARC-x86**: 3.5" carrier board for congatec SMARC 2.0 modules based on x86 architecture.

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