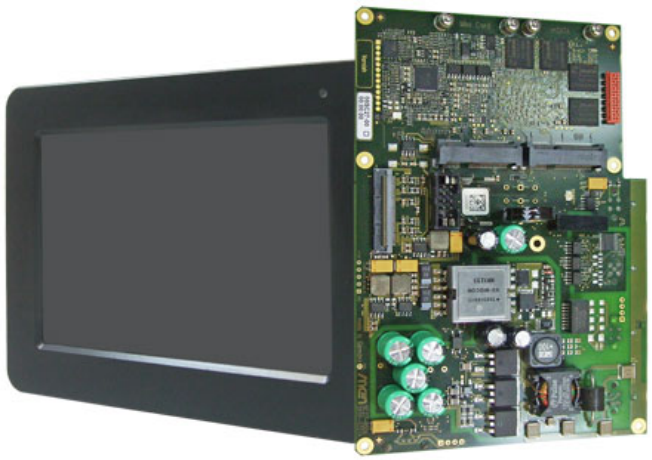
# SC27 – Intel® Atom™ SBC for Intelligent Displays

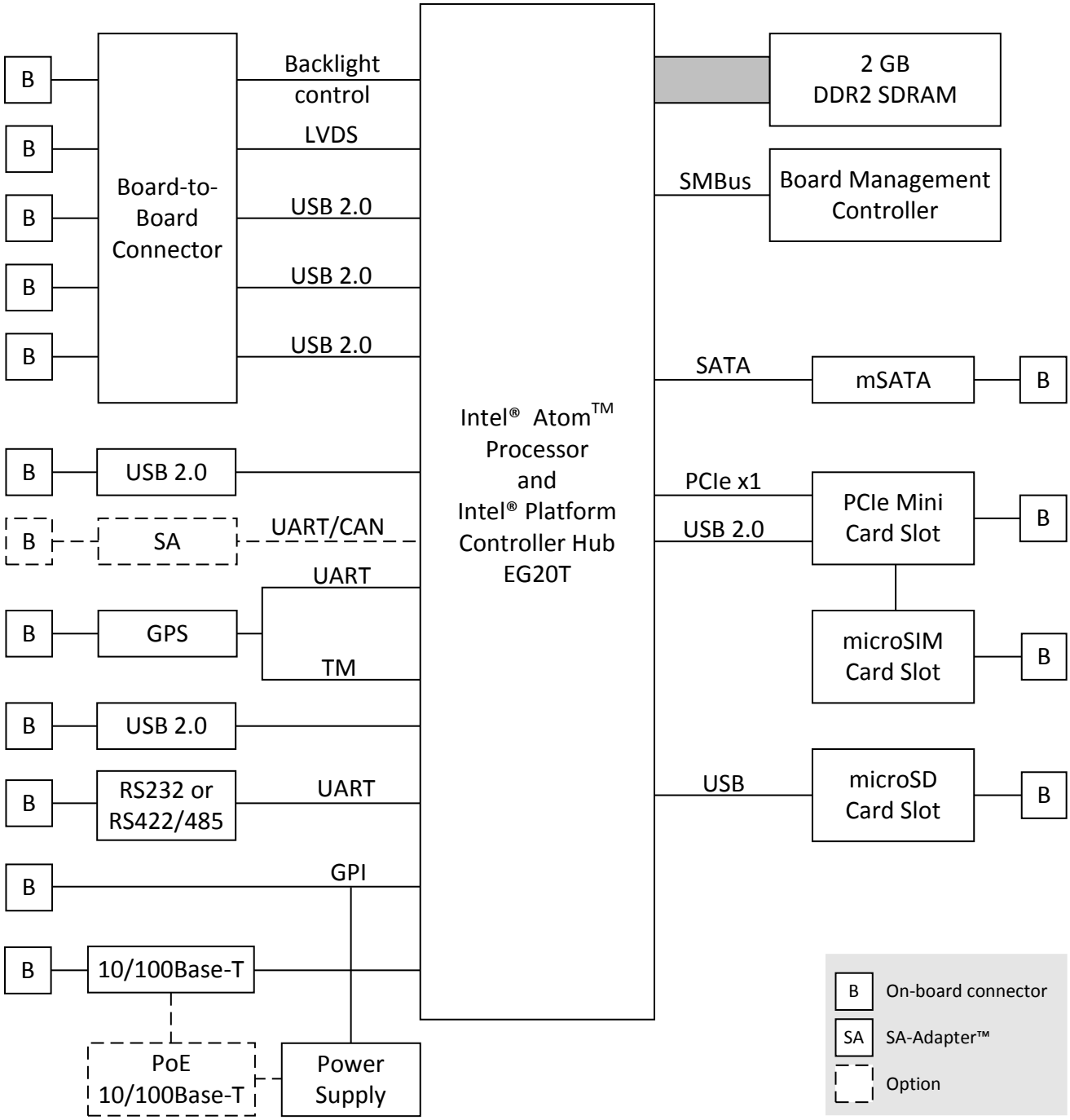
- **For LCD TFT panels from 7" to 15"**
- **LVDS up to 1280 x 768**
- **Intel® Atom™ E600 series, up to 1.6 GHz**
- **Up to 2 GB DDR2 SDRAM**
- **1 Fast Ethernet (PoE Class 0) on M12**
- **1 USB 2.0 (M12), 1 USB 2.0 (Type A)**
- **1 PCIe® Mini Card and 1 microSIM card slot**
- **1 GPS interface**
- **1 mSATA and 1 microSD™ slot**
- **24 VDC/36 VDC nom. (10 to 50.4 V) class S2**
- **-40 to +85°C operating temperature**
- **EN 50155 compliant (railways)**
- **Prepared for e1 certification (automotive)**



The SC27 is a rugged, fanless and maintenance-free single-board computer for rugged display computers, e.g., for in-seat infotainment purposes in trains, public buses or airplanes. Its small size makes it suitable for display devices with TFT LCD panels as small as 7".
The SC27 is controlled by an Intel® Atom™ E6xx processor running at 1.6 GHz and comes with 2 GB of DDR2 SDRAM and a MicroSD card slot. The standard interfaces comprise one Fast Ethernet (via M12 connector), two USB ports as well as a GPS and RS232 or RS422/485 interface. Further I/O can be added via SA-Adapters™. A temperature sensor is provided to monitor and control the display. The board's microSIM card slot and the microSD™ card slot can be made accessible on the display computer.

The SC27 is equipped with an internal 10 to 50.4 V (24 VDC nom. or 36 VDC nom.) wide-range power supply and able to operate in a -40 to +85°C environment with sufficient cooling. Optionally the SC27 can be supplied by a Power over Ethernet source with a power range of 37 to 57 V (48 VDC nom.). The SC27 provides EN 50155 conformity, which makes it ideal for any kind of railway application. All electronic components are soldered to withstand shock and vibration and are prepared for conformal coating.
Options include other types of the Intel® Atom™ E6xx series and a UART or CAN bus interface via an SA-Adapter™. A PCI Express® Mini Card slot (with a microSIM card slot) in combination with an external antenna can be used to incorporate wireless functions like Wi-Fi, WIMAX, GSM/GPRS, UMTS, HSDPA and LTE.

# Diagram


B
B
B
B
B
Board-to-Board Connector
Backlight control
LVDS
USB 2.0
USB 2.0
USB 2.0
B
USB 2.0
B
SA
UART/CAN
UART
B
GPS
TM
B
USB 2.0
B
RS232 or RS422/485
UART
B
GPI
B
10/100Base-T
PoE 10/100Base-T
Power Supply
Intel® Atom™ Processor and Intel® Platform Controller Hub EG20T
2 GB DDR2 SDRAM
SMBus
Board Management Controller
SATA
mSATA
B
PCIe x1
USB 2.0
PCIe Mini Card Slot
B
microSIM Card Slot
B
USB
microSD Card Slot
B
B On-board connector
SA SA-Adapter™
Option

# Technical Data

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|---|---|
| **CPU** | ■ Intel® Atom™ E680T<br>□ 1.6 GHz processor core frequency<br>■ Chipset<br>□ Intel® EG20T Platform Controller Hub (PCH) |
| **Memory** | ■ 2 GB DDR2 SDRAM system memory<br>□ Soldered<br>□ 800 MHz memory bus frequency<br>■ 16 Mbits boot Flash<br>■ mSATA disk slot<br>□ Connected via one SATA channel<br>□ SATA Revision 2.x support<br>□ Transfer rates up to 300 MB/s (3 Gbit/s)<br>■ One microSD™ card slot<br>□ Via USB |
| **Graphics** | ■ Integrated in Intel® Atom™ processor<br>■ One single-channel LVDS interface via board-to-board connector<br>□ For connection to a display adapter board<br>□ 80 MHz maximum pixel clock<br>□ Maximum resolution of up to 1280x768 @ 60 Hz |
| **PCI Express® Mini Card slot** | ■ PCI Express® and USB interface<br>■ microSIM card slot |
| **GPS Interface** | ■ 48-channel GPS (Global Positioning System) receiver based on SiRF® IV<br>■ GPS Band/Code: L1 frequency, C/A code, SPS<br>■ Integrated TCXO, RTC<br>■ Time mark signal is readable by application software<br>■ Accuracy (unaided):<br>□ Position: 2.5 m (CEP50)<br>□ Velocity: 0.01 m/s (50%)<br>□ Time: 1 µs (typ.)<br>■ Time To First Fix (TTFF):<br>□ Cold start: 35 s typ.<br>□ Warm start: 35 s typ.<br>□ Hot start: 1 s typ.<br>■ Sensitivity:<br>□ Acquisition (cold): -147 dBm<br>□ Re-Acquisition: -162 dBm<br>□ Tracking: -163 dBm<br>■ Protocol: NMEA 0183 (configurable to SiRF® binary OSP)<br>■ One U.FL antenna connector<br>□ For the use of an external active or passive antenna<br>□ Connected via UART<br>□ Data transfer rate configurable (default: 4800 baud 8N1) |

# Technical Data

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|---|---|
| **I/O** | ■ USB<br>□ One USB 2.0/1.1 port via Type A connector<br>□ One USB 2.0/1.1 port via M12 connector<br>□ OHCI (USB1.1) and EHCI (USB2.0) implementation<br>□ Data rates up to 12 Mbit/s (for USB1.1)<br>□ Data rates up to 480 Mbit/s (for USB2.0)<br>■ Ethernet<br>□ One 10/100Base-T Ethernet channel<br>□ Accessible via M12 connector<br>□ Power over Ethernet Class 0 optional<br>■ One RS232<br>□ Accessible via M12 connector<br>□ RS422/RS485 optionally available<br>■ One GPI line (General Purpose Input)<br>□ Accessible via M12 power input connector |
| **Intelligent Power Supply with Board Management Controller** | ■ Voltage supervision<br>■ Temperature supervision via sensor<br>■ Backlight control<br>□ 12 V backlight supply<br>□ Backlight enable, backlight dimming<br>■ Real-time clock with buffer functionality via supercapacitor<br>■ Watchdog<br>■ Accessible via SMBus |
| **Electrical Specifications** | ■ Supply voltage/power consumption:<br>□ +24 VDC/+36 VDC nom. (10..50.4 V), 10.8 W typ<br>□ +110 VDC nom. (66..154 V), 10.8 W typ (optional)<br>□ +48 VDC nom. (37..57 V), 10.8 W typ (optional power supply via Power over Ethernet)<br>□ EN 50155 power interruption class S2 |
| **Mechanical Specifications** | ■ Dimensions: 160 mm x 110 mm x 44 mm<br>■ Weight: 164 g |
| **Environmental Specifications** | ■ Temperature range (operation):<br>□ -40..+85°C (screened or with qualified components)<br>■ Temperature range (storage): -40..+85°C<br>■ Relative humidity (operation): max. 95% non-condensing<br>■ Relative humidity (storage): max. 95% non-condensing<br>■ Altitude: -300 m to +3000 m<br>■ Shock: 50 m/s², 30 ms (EN 61373)<br>■ Vibration (function): 1 m/s², 5 Hz - 150 Hz (EN 61373)<br>■ Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz (EN 61373)<br>■ Conformal coating on request |
| **MTBF** | ■ 500 000 h @ 40°C according to IEC/TR 62380 (RDF 2000) |
| **Safety** | ■ Flammability<br>□ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers |
| **EMC Conformity** | ■ EN 50121-3-2 (table 4, 5 and 6) / EN 55011 (radio disturbance)<br>■ EN 50121-3-2 (table 9) / EN 61000-4-2 (ESD)<br>■ EN 50121-3-2 (table 9) / EN 61000-4-3 (electromagnetic field immunity)<br>■ EN 50121-3-2 (table 8) / EN 61000-4-4 (burst)<br>■ EN 50155 / EN 61000-4-5 (surge)<br>■ EN 50121-3-2 (table 7) / EN 61000-4-6 (conducted disturbances)<br>■ Conducted Emission (Power Line): 2004/104/EC; 2005/83/EC; ISO7637-2<br>■ Prepared for certification according to e1 requirements of the German Federal Motor Transport Authority |
| **BIOS** | ■ InsydeH2O™ UEFI Framework |

# Technical Data

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| **Software Support** | ■ Windows®<br>■ Linux |

# Configuration & Options

### Standard Configurations

| Article No. | CPU | Memory | Graphics | I/O | Temperature |
|---|---|---|---|---|---|
| 08SC27-00 | E680T, 1.6 GHz | 2 GB RAM | 1 LVDS | 1 Fast Ethernet, 2 USB 2.0, 1 GPS, 1 RS232 | -40 to +85°C screened |

### Options

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|---|---|
| **CPU** | ■ Intel® Atom™ E620, 0.6 GHz, 320 MHz graphics frequency, 3.3 W<br>■ Intel® Atom™ E620T, 0.6 GHz, 320 MHz graphics frequency, 3.3 W<br>■ Intel® Atom™ E640, 1.0 GHz, 320 MHz graphics frequency, 3.6 W<br>■ Intel® Atom™ E640T, 1.0 GHz, 320 MHz graphics frequency, 3.6 W<br>■ Intel® Atom™ E660, 1.3 GHz, 400 MHz graphics frequency, 3.6 W<br>■ Intel® Atom™ E660T, 1.3 GHz, 400 MHz graphics frequency, 3.6 W<br>■ Intel® Atom™ E680, 1.6 GHz, 400 MHz graphics frequency, 4.5 W<br>■ Intel® Atom™ E680T, 1.6 GHz, 400 MHz graphics frequency, 4.5 W |
| **Memory** | ■ System RAM<br>□ 512 MB, 1 GB or 2 GB |
| **I/O** | ■ SA-Adapter™ slot<br>□ Supports one UART SA-Adapter™ (SA1, SA2, SA3 or SA22) or one CAN SA-Adapter™ (SA8) |
| **Power Supply** | ■ Power over Ethernet powered device instead of PSU<br>□ Class 0 |

**Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.**

# Ordering Information

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| **Standard SC27 Models** | **08SC27-00** | Display electronics SBC with Intel® Atom™ E680T, 1.6 GHz, 2GB RAM, 1 Fast Ethernet on M12, 1 USB 2.0 on M12, 1 USB 2.0 Type A, 1 PCIe® MiniCard socket, 1 micro SIM card socket, 1 GPS interface, 2 SA-Adapter™ slots, EN 50155 compliant PSU, -40..+85°C operation temperature via conduction cooling (screened), conformal coating |
| **Related Hardware** | **15PX01-00** | GLONASS & GPS PCI Express® MiniCard (full size), 3-axis Gyro sensor, -40..+85°C with qualified components |
| **Memory** | **0751-0046** | MicroSD card, 2 GB, -40..+85°C |
| | **0751-0051** | SSD mSATA, 8 GB, -40..+85°C |
| | **0751-0052** | MicroSD card, 4 GB, -40..+85°C |
| | **0754-0007** | SSD SATA 256 GB, 2.5" MLC, 0..+70°C |
| **SA-Adapters™** | **08SA01-00** | RS232, not optically isolated, 0..+60°C |
| | **08SA02-00** | RS422/485, half duplex, optically isolated, 0..+60°C |
| | **08SA02-01** | RS422/485, full duplex, optically isolated, 0..+60°C |
| | **08SA02-07** | RS422/485, full duplex, optically isolated, -40..+85°C screened |
| | **08SA02-09** | RS422/485, half duplex, optically isolated, -40..+85°C screened |
| | **08SA03-00** | 1 RS232, optically isolated, 0..+60°C |
| | **08SA03-01** | 1 RS232, optically isolated, -40..+85°C screened |
| | **08SA08-00** | CAN ISO high-speed, optically isolated, 0..+60°C |
| | **08SA08-01** | CAN ISO high-speed, optically isolated, -40..+85°C screened |
| | **08SA22-00** | IBIS master SA-Adapter™, -40..+85°C screened |
| | **08SA22-01** | IBIS slave SA-Adapter™, -40..+85°C screened |
| **Software: Linux** | This product is designed to work under Linux. See below for potentially available separate software packages from MEN. | |
| | **13MM02-03** | Linux Graphics Driver (Intel®) for MM2 and SC27 |
| | **13XM01-06** | MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller |
| **Software: Windows®** | This product is designed to work under Windows®. See below for potentially available separate software packages from MEN. | |
| | **13MM02-00** | Windows® Chipset Driver for MM2 and SC27 |
| | **13MM02-77** | Windows® Installset (MEN) for MM2 and SC27<br>(Includes all free drivers developed by MEN for the supported hardware.) |
| | **13SC27-00** | Windows® XP Graphics Driver (Intel®) for SC27 |

**For operating systems not mentioned here** contact MEN sales.

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|---|---|---|
| **Documentation** | Compare Chart Standard and Custom Panel PCs » Download | |
| | **20SC27-ER** | SC27 Errata |
| | **20SC27-00** | SC27 User Manual |
| | **21APPN016** | Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards |

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