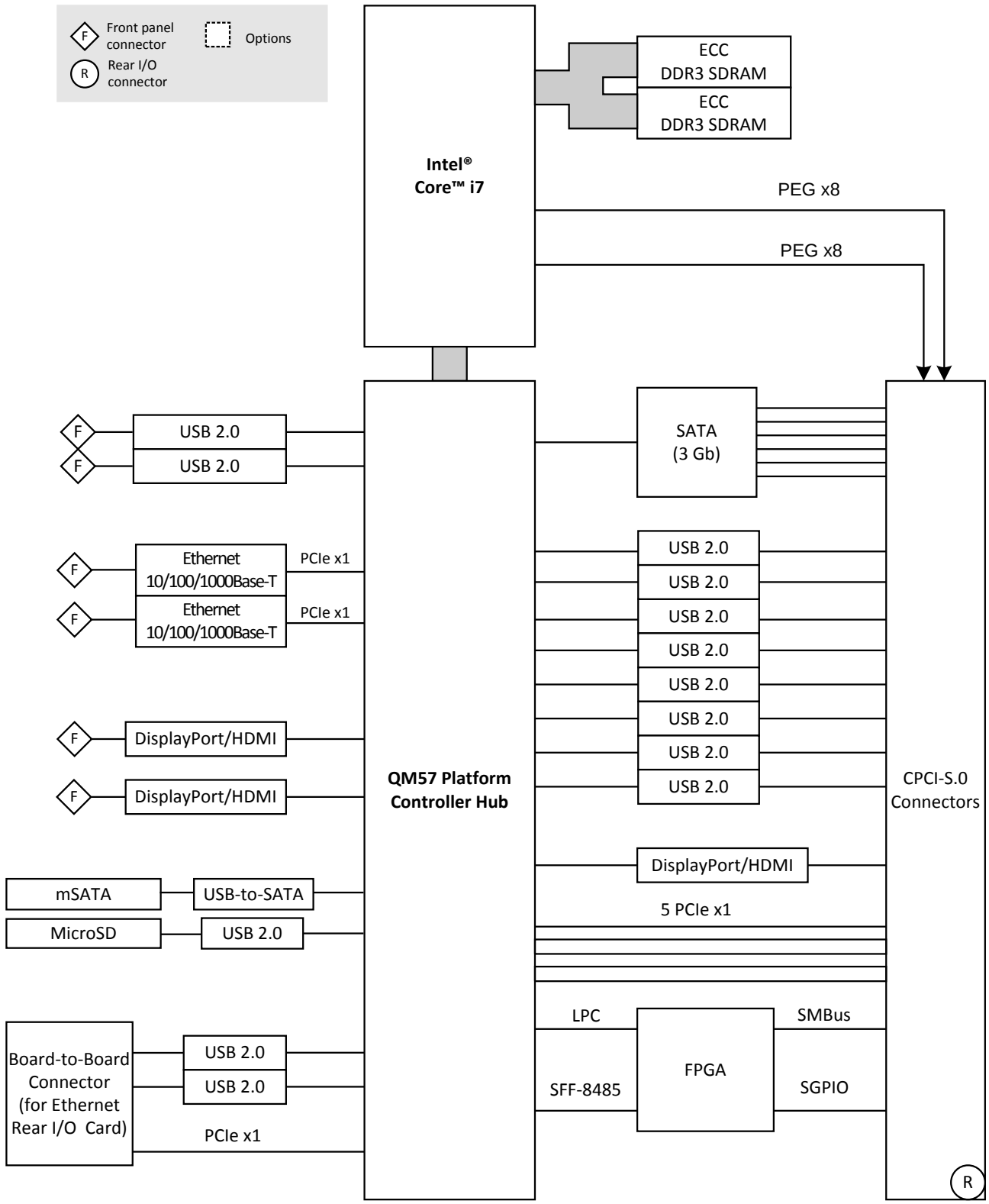
G20 – 3U CompactPCI® Serial Intel® Core™ i7 CPU Board

- **Intel® Core™ i7, 2.53 GHz**
- **Dual-core 64-bit processor**
- **PICMG CPCI-S.0 CompactPCI® Serial**
- **Up to 4 GB DDR3 DRAM soldered, ECC**
- **mSATA and microSD™ card slots**
- **Standard front I/O: 2 DisplayPorts, 2 Gb Ethernet, 2 USB**
- **Standard rear I/O: 7 PCIe®, 8 USB, 6 SATA, DisplayPort®/HDMI**
- **Rear I/O via mezzanine board: up to 8 Gigabit Ethernet**
- **Intel® Turbo Boost 2.53..3.2 GHz, Hyper-Threading, Active Management Technology**
- **Open CL 1.1 support**

The G20 is a versatile 4HP/3U single-board computer supporting a multitude of modern serial interfaces according to the CompactPCI® Serial standard. It is thus perfectly suited for data-intensive applications which require high computing-power. The CPU card is equipped with Intel®'s Core i7 processor running at up to 3.2 GHz maximum turbo frequency and offering multi-core architecture from Intel® with full 64-bit support. The G20 supports the Intel® Active Management technology which makes it possible to access the board via the network even when it is in soft-off or standby state.
The memory configuration of the G20 includes a state-of-the-art fast DDR3 DRAM which is soldered to the board to guarantee optimum shock and vibration resistance. An mSATA disk connected via a SATA channel and a microSD™ card device which is connected via a USB interface offer nearly unlimited space for user applications.
The board delivers an excellent graphics performance. Two DisplayPort® interfaces are accessible at the board front. Using an external adapter two HDMI or two DVI ports can also be realized. In addition the standard front I/O comprises two PCIe®-driven Gigabit Ethernet and two USB 2.0 ports.

Serial interfaces at the rear I/O connectors are 8 USB, 6 SATA interfaces, one DisplayPort® or HDMI (instead of one interface at the front panel), 5 PCI Express® x1 links, and two PEG x8 links. Up to eight Gigabit Ethernet interfaces can be realized using a rear I/O adapter board.
Thermal supervision of the processor and a watchdog for the operating system complete the functionality of the G20.
The G20 operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The InsydeH2O™ EFI BIOS was specially designed for embedded system applications.
The G20 is suited for a wide range of industrial applications, e.g. for monitoring, vision and control systems as well as test and measurement. Main target markets comprise industrial automation, multimedia, traffic and transportation, aerospace, shipbuilding, medical engineering and robotics.
The G20 comes with a tailored passive heat sink within 4 HP height. The robust design of the G20 makes the board especially suited for use in rugged environments with regard to shock and vibration according to applicable DIN, EN or IEC industry standards. The G20 is also ready for coating so that it can be used in humid and dusty environments and has a guaranteed minimum standard availability of 7 years.

Diagram


Front panel connector
Rear I/O connector
Options
Intel®
Core™ i7
ECC
DDR3 SDRAM
ECC
DDR3 SDRAM
PEG x8
PEG x8
QM57 Platform
Controller Hub
CPCI-S.0
Connectors
USB 2.0
USB 2.0
SATA
(3 Gb)
Ethernet
10/100/1000Base-T
PCIe x1
Ethernet
10/100/1000Base-T
PCIe x1
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
DisplayPort/HDMI
DisplayPort/HDMI
DisplayPort/HDMI
mSATA
USB-to-SATA
MicroSD
USB 2.0
5 PCIe x1
LPC
SMBus
FPGA
SFF-8485
SGPIO
Board-to-Board
Connector
(for Ethernet
Rear I/O Card)
USB 2.0
USB 2.0
PCIe x1
R

Technical Data

CPU	■ Intel® Core™ i7-610E □ 2.53 GHz processor core frequency □ 3.2 GHz maximum turbo frequency □ 1066 MHz system bus frequency ■ Chipset □ QM57 Platform Controller Hub (PCH)
Memory	■ 4 MB L3 cache integrated in i7 processor ■ Up to 4 GB SDRAM system memory □ Soldered □ DDR3 with ECC support □ Up to 1066 MHz memory bus frequency ■ 64 Mbits boot Flash ■ Serial EEPROM 2 KB for factory settings ■ mSATA disk slot □ Connected via one USB-to-SATA bridge ■ One microSD™ card slot □ Via USB
Mass Storage	■ Serial ATA (SATA) □ Six channels via rear I/O □ Transfer rates up to 3 Gbit/s □ RAID level 0/1/5/10 support □ Hot-plug together with G501
Graphics	■ Integrated in QM57 chipset □ 45nm, Hi-K process graphics □ 5.75th generation □ Maximum resolution: 2560x1600 (DisplayPort®), 1920x1200 (HDMI/DVI) ■ Two DisplayPort® connectors at front panel □ Optionally two DVI/HDMI ports via external adapter ■ One DisplayPort® at CPCI-S.0 rear connector (instead of one interface at the front) □ Optionally SDVO or DVI/HDMI port
I/O	■ USB □ Two USB 2.0 host ports via Series A connector at front panel □ Eight USB 2.0 host ports via CPCI-S.0 rear connector □ Two USB 2.0 host ports for connection of the rear I/O card □ EHCI implementation □ Data rates up to 480 Mbit/s ■ Ethernet □ Two 10/100/1000Base-T Ethernet channels at the front □ RJ45 connectors at front panel □ Ethernet controllers are connected by two x1 PCIe® links □ Two onboard LEDs to signal LAN link, activity status and connection speed ■ SGPIO lines □ Accessible via CPCI-S.0 rear connector
Front Connections	■ Two DisplayPort® ■ Two USB 2.0 (Series A) ■ Two Ethernet (RJ45)
Rear I/O	■ 6 SATA ■ 1 DisplayPort® ■ 8 USB ■ 5 PCI Express® x1 links ■ 2 PEG x8 links ■ SGPIO

Technical Data

PCI Express®	■ Two x8 PCI Express® graphics links via CPCI-S.0 rear connector ■ Five x1 PCIe® links via CPCI-S.0 rear connector ■ Two x1 PCIe® links to connect local 1000Base-T Ethernet controllers ■ One x1 PCIe® link via for connection of the rear I/O card ■ Data rate 250 MB/s (2.5 Gbit/s per lane)
Miscellaneous	■ Real-time clock with GoldCap backup, battery-buffered ■ Power supervision and watchdog ■ Temperature measurement ■ 2 board status LEDs ■ 2 user LEDs ■ Reset button
CompactPCI® Serial	■ Compliance with CompactPCI® Serial PICMG CPCI-S.0 Specification ■ System slot
Electrical Specifications	■ Supply voltage/power consumption: □ +12V (9..16V), 45W □ +5V (-5%/+5%) standby voltage optional
Mechanical Specifications	■ Dimensions: conforming to CompactPCI® Serial specification for 3U boards ■ Front panel: 4HP with ejector ■ Weight: □ 208 g (w/o heat sink) □ 398 g (with heat sink and mSATA adapter)
Environmental Specifications	■ Temperature range (operation): □ 0..+60°C □ Airflow: min. 1.5 m/s, typical power dissipation 29W, with Windows® XP operating system, 1 Gb Ethernet, without CPU clock reduction ■ Temperature range (storage): -40..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300 m to + 3,000 m ■ Shock: 50 m/s², 30 ms ■ Vibration (function): 1 m/s², 5 Hz - 150 Hz ■ Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz ■ Conformal coating on request
MTBF	■ 435,685h @ 40°C according to IEC/TR 62380 (RDF 2000)
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Conforming to EN 55022 (radio disturbance), IEC 61000-4-2 (ESD), IEC 61000-4-3 (electromagnetic field immunity), IEC 61000-4-4 (burst), IEC 61000-4-5 (surge) and IEC 61000-4-6 (conducted disturbances)
BIOS	■ InsydeH2O™ UEFI Framework
Intel® Active Management Technology	■ Out of Band (OOB) Access □ Power off Access □ Independent of OS status □ Power status control □ Keyboard-Video-Mouse (KVM) Viewer (VNC-compatible) □ IDE-Redirect □ Serial-over-LAN ■ Manageability Engine in Chipset ■ Network Filters in Chipset ■ Dedicated Flash Storage Area

Technical Data

Software Support	■ Windows® ■ Linux □ tested/verified with: Ubuntu 10.04 (kernel 2.6.32-21) 32-bit and 64-bit versions □ OpenSuse 11.3 32-bit and 64-bit versions □ Detailed matrix of supported interfaces under Ubuntu 10.04 and OpenSuse 11.3 ■ VxWorks® (on request) ■ QNX® (on request) ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	mSATA/microSD	Operating Temperature
02G020-02	i7-620UE	1.06 GHz	2 GB	0 MB	-40..+85°C screened
02G020-03	i7-610E	2.53 GHz	4 GB	0 MB	0..+60°C

Options

CPU	■ Intel® Core™ i7-610E, 2.53 GHz, 4 MB Cache, 35 W ■ Intel® Core™ i7-620LE, 2 GHz, 4 MB Cache, 25 W ■ Intel® Core™ i7-620UE, 1.06 GHz, 4 MB Cache, 18 W ■ Intel® Core™ i5-520E, 2.4 GHz, 3 MB Cache, 35 W, no AMT support ■ Intel® Core™ i3-330E, 2.13 GHz, 3 MB Cache, 35 W, no AMT support
Memory	■ System RAM □ 2 GB or 4 GB ■ mSATA disk □ 0 MB up to maximum available ■ microSD™ card □ 0 MB up to maximum available
I/O	■ Ethernet □ One Gigabit Ethernet on M12 connector instead of two interfaces on RJ45
Rear I/O	■ Ethernet □ Up to eight Gigabit Ethernet interfaces on the backplane using rear I/O card (e.g. GM1)
Operating Temperature	■ 0..+60°C ■ Depends on board configuration (CPU, mezzanines, hard disk...) ■ Minimum: -40°C (all processors)
Cooling Concept	■ Also available with conduction cooling in MEN CCA frame

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

Ordering Information

Standard G20 Models	**02G020-02**	Intel® Core™ i7-620UE, 1.06 GHz, 2 GB DDR3 DRAM with ECC, mSATA and uSD socket, -40..+85°C Tx screened (-40..+70°C, with up to +85°C for 10 minutes)
	02G020-03	Intel® Core™ i7-610E, 2.53 GHz, 4 GB DDR3 DRAM with ECC, mSATA and uSD socket, 0..+60°C
Related Hardware	Please note that the GM2 (08GM02-xx) is not supported by G20 boards (02G020-xx) with revisions lower than Rev. 01.01.00.	
	08AE63-00	DisplayPort® to LVDS converter, temperature sensor, ambient light, touch input, key control, input voltage 12V..24V, -40°..+85°C screened
	08GM01-00	CompactPCI® Serial 4x Gigabit Ethernet rear I/O mezzanine card, -40..+85°C screened
	08GM02-00	CompactPCI® Serial 8x Gigabit Ethernet rear I/O card, -40..+85°C screened
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
Systems & Card Cages	MEN delivers turn-key systems completely installed (hardware, operating system, accessories), wired and tested. Different rack sizes, power supplies and backplanes on request. For details please contact your local sales representative.	
	0701-0058	CompactPCI® Serial 19" 4U/84 HP rack-mount enclosure for 3U cards (vertical), 9-slot backplane, system slot left, full mesh, 460 W ATX PSU 90..264VAC, 1U fan tray with 2x 12 VDC fans, 0..+45°C
Miscellaneous Accessories	**05G000-00**	Front panel kit for use of 3U G2x family CPU cards with 6U 8HP front
	0780-0005	DisplayPort® to DVI-D adapter, 20 cm
	0780-0006	Active DisplayPort® (DP) to single link DVI-D adapter, 20cm, max. resolution 1920x1200, AMD / ATI Eyefinity technology
	08GM01-00	CompactPCI® Serial 4x Gigabit Ethernet rear I/O mezzanine card, -40..+85°C screened
Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN.	
	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
	13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W
	13Z001-90	Linux host driver (MEN) for 16Z001_SMB (I2C)

Ordering Information

Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.	
	10F014-78	Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1, BC50I, BC50M and BL50W
	10Y000-78	Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, F22P, G20, G22, XM1L, XM2, MM1, MM2, SC21, SC24, SC27, BC50M, BC50I, BL50W, BL50S, F206, F210, F215, F216, G215, P506, P507 and P511
	13G020-77	Windows® Installset (MEN) for G20 (Includes all free drivers developed by MEN for the supported hardware.)
	13T003-70	Windows® chipset driver (Intel®) for F14, F15, F17, F18, F18E, F19P, F21P, G20, XM2, D9, D6, D7, D601, A19 and A20
	13T010-70	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, SC24, BC50I, BC50M and BL50W
	13T020-70	Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, XM2, SC24, BC50I, BC50M and BL50W
	13T021-70	Windows® XP 32-bit graphics driver (Intel®) for G20
	13T022-70	Windows® 7/Vista 32-bit graphics driver (Intel®) for G20
	13T023-70	Windows® 7/Vista 64-bit graphics driver (Intel®) for G20
	13T027-70	Windows® Intel® Management Engine Driver (Intel®) for G20
Software: Firmware/BIOS	This product includes a specially adapted BIOS.	
	14G020-01	System BIOS for G20
Software: Miscellaneous	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under www.intel.com/cd/software/products/asmo-na/eng/index.htm. IA-32 Intel® Architecture Software Developer's Manuals are available under www.intel.com/products/processor/manuals/index.htm.	

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart 3U CompactPCI® Serial CPU and I/O cards » Download	
	20G020-ER	G20 Errata
	20G020-00	G20 User Manual
	21APPN014	Application Note: Switching on the AMT function
	21APPN015	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS
	21APPN016	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards

Contact Information

Germany

MEN Mikro Elektronik GmbH
Neuwieder Straße 3-7
90411 Nuremberg
Phone +49-911-99 33 5-0
Fax +49-911-99 33 5-901

info@men.de
www.men.de

France

MEN Mikro Elektronik SA
18, rue René Cassin
ZA de la Châtelaine
74240 Gaillard
Phone +33 (0) 450-955-312
Fax +33 (0) 450-955-211

info@men-france.fr
www.men-france.fr

USA

MEN Micro Inc.
860 Penllyn Blue Bell Pike
Blue Bell, PA 19422
Phone (215) 542-9575
Fax (215) 542-9577

sales@menmicro.com
www.menmicro.com