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Vehicle Computer Systems

CQ70 Series Vehicle PC

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Product Overview

Being slightly bigger than our previous flagship series (CQ60G), the new king - the CQ70G series - delivers an even greater amount of processing horse-power. With its powerful 6-core Intel Core i7-8700T CPU and full-sized NVidia GTX1060 GPU, this platform can handle the most demanding of workloads in an impressively discrete form factor (<6.6 litres).

As with all our PCs, numerous built-in options are available, including GPS, Wi-Fi, video capture and CAN-bus. The fanless nature of the CQ70 series makes it suitable for extremely dusty environments, and the device's ruggedness is demonstrated by multiple MIL-STD-810G tests. The CQ70 series is E-mark certified making it fully approved for in-vehicle use. A 2-year warranty is standard, extendable to 3 or 5 years.

Product Highlights

- Intel Core i7-8700T processor (6-core, 12 threads, up to 2.4 GHz, PassMark score >12648)
- NVIDIA GeForce GTX 1060 Ti GPU supporting 1280 CUDA cores
- Up to 32 GB DDR4 RAM
- Dual removable 2.5" SSDs (each up to 2 TB) with RAID support
- Internal (non-removable) mSATA SSD
- 4 x independent HDMI and 3 x independent DisplayPort outputs
- Optional internal 4G, GPS (DR), WLAN, Bluetooth, CAN & video capture modules
- Supports up to 2 internal cellular (4G / LTE) modems (1 x supports dual external SIM)
- Optional 8 x digital inputs and 4 x digital outputs (supporting relay switching)
- 4 x USB 3.0 ports
- Up to 3 x RS-232 ports
- Up to 10 x GbE LAN ports– with optional Power over Ethernet (PoE) on 8 ports
- Auto on/off with vehicle ignition, configurable shut down delays via software, low battery detection
- 9-48V peak input voltage range
- E11 certified (all configurations) - fully approved for automotive use
- -40°C to +60°C operating temperature range (at base specification with extended temperature RAM & SSD)
- MIL-STD-810G tests for shock & vibration
- 2-year RTB warranty (extendable to 3 or 5 years)
- Long-term availability

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Technical Specifications

Processor	PC Model CQ77G: • Intel Core i7-8700T • 2.4 GHz • 6 Cores • 12 Threads (Hyper-threading)
RAM	Up to 32GB DDR4 2133 MHz (8GB as standard) Optional extended temperature memory, allowing PC operating temperature of -40°C to +70°C.
SSD (removable 2.5")	Dual removable SSD slots, each supporting any of the following drives. Drives need to have caddy head attached (2 caddy heads supplied as standard). RAID (0/1) support for 2-drive configurations. Solid State Drive (SSD) - Standard Temperature: • 120, 240, 256, 512 GB, 1 & 2 TB capacities • For 256 GB & above models: Ultra-high performance & excellent endurance Solid State Drive (SSD) - Extended Temperature: • 64, 128, 256, 512 GB & 1 TB capacities • Industrial-grade memory • Allows PC operating temperature of -40 to +70°C
SSD (internal mSATA)	1 x mSATA slot supporting the following SSDs: • 120 GB, 240 GB and 480 GB capacities at Standard Temperature • Extended Temperature mSATA SSDs available on request
LAN	10 x Gigabit Ethernet Ports • Optional PoE on 8 ports, max 100W across all ports
Audio	Realtek HD audio with line-out, line-in and mic-in external audio ports.
Graphics	Intel HD Graphics 630 • 3 x independent DisplayPort outputs NVIDIA GeForce GTX 1060 GPU • 4 x independent HDMI outputs • 1280 CUDA cores • OpenGL 4.5, OpenCL 1.2 • DirectX 12 support
USB	4 x USB 3.0 ports
DIO Interface	8 x Digital Inputs (high => 5V, max input 48V) 4 x Digital Outputs, supporting relay switching (5V, 100 mA) Status of inputs/outputs is monitored/controlled via software
Serial	Up to 3 x serial ports (2 as standard), supporting RS-232/422/485
TPM	Trusted Platform Module (TPM) version 2.0
Expansion	• 3 x Mini PCI Express slots • 1 x M.2 slot (2230/3030, A-E Key) *See below for available expansion card options*
GPS (DR)	Optional built-in GPS module: • Ublox6 chipset • 1 x SMA connector for GPS antenna (supports active & passive antennas, available separately) • Occupies 1 x Mini PCIe slot • Model code: G5 Optional built-in GPS DR (Dead Reckoning) module: • As above, but with internal gyroscope and external inputs for speed pulse & forward/reverse signal lines • Occupies 1 x Mini PCIe slot • Model code: G7 *See below for 4G modules that include GPS*
Cellular (3G / 4G)	Optional up to 2 built-in 4G (with GPS) module(s): • 2 x externally accessible SIM card slots (supporting single-modem/dual-SIM for modem #1) • Each modem occupies 1 x Mini PCIe slot • SIM card provisioning available • 4G specifications detailed below **4G (with GPS) Module Specifications** • Supports LTE/HSPA+/UMTS/EDGE/GPRS/GSM network technologies (4G with fall back to 3G) • Supports frequency bands 800/900/1800/2100/2600 MHz (4G) and 850/900/1900/2100 MHz (3G) • Maximum downlink: 100 Mbps (21.1 Mbps when falling back to HSPA+) • Maximum uplink: 50 Mbps (5.76 Mbps when falling back to HSPA+)

- GPS & GLONASS receiver supporting Standalone & Assisted Modes
- 2 x SMA connectors for 3G/4G diversity/MIMO antennas (available separately)
- 1 x SMA connector for active or passive GPS antenna (available separately)
- Model code: U06

WLAN & Bluetooth

Optional built-in WLAN (Wi-Fi) & Bluetooth module:

- 802.11 a/b/g/n/ac
- 2.4 & 5 GHz operation
- Up to 867 Mbps (WLAN)
- Bluetooth v4.0
- 2 x SMA connectors for concurrent WLAN diversity & Bluetooth antennas (available separately)
- Occupies 1 x Mini PCIe slot
- Model code: W10

Extended temperature modules available on request

CAN-bus

Optional 2-channel CAN interface (Standard):

- CAN 2.0B & 2.0A compliant
- USB signalling
- Complies with EN61000-4-5 2.5 kV surge protection, IEC 60950-1:2005 +A1:2009 + A2:2013 2.5 kV HiPot protection, EN61000-4-2 (ESD) Air-15kV, Contact-8kV
- Supports 50, 125, 250, 500 & 1000 kbit/s baud rates
- Supports Linux SocketCAN
- API supplied
- Optional CAN bus termination (disabled by default, please specify at order time)
- Allows PC operating temperature range of -40°C to +70°C
- Model code: P21

Optional 1- or 2-channel CAN interface (Advanced):

- CAN 2.0B & CAN 2.0A compliant
- PCI Express signalling
- 300V galvanic isolation between CAN-bus and PC
- Supports baud rates from 5 kbit/s to 1 Mbit/s
- CAN monitoring software supplied
- API supplied comprising DLL, examples and header files for all common programming languages, plus documentation
- Numerous additional optional software and development tools available, including LabVIEW driver
- Allows PC operating temperature range of -40°C to +70°C
- Model code: P12 (1-channel), P13 (2-channel)

Optional 1-, 2- or 4-channel CAN FD interface (Advanced):

- CAN FD, 2.0B & 2.0A compliant
- Supports ISO and non-ISO CAN FD standards (switchable)
- PCI Express signalling
- 300V galvanic isolation between CAN-bus and PC
- Supports baud rates from 25 kbit/s to 12 Mbit/s (CAN FD)
- Supports baud rates from 25 kbit/s to 1 Mbit/s (CAN)
- CAN monitoring software supplied
- API supplied comprising DLL, examples and header files for all common programming languages, plus documentation
- Numerous additional optional software and development tools available, including LabVIEW driver
- Allows PC operating temperature range of -40°C to +70°C
- Model code: P25 (1-channel), P26 (2-channel), P27 (4-channel)

CAN options occupy 1 x Mini PCIe slot and may reduce the number of available serial ports.

Video Capture

Optional 8-channel video capture card:

- 8-channel video (4-channel video + 4-channel audio available on request)
- H.264/MPEG4 software compression
- 240/200 fps (NTSC/PAL) at up to D1 resolution shared across all channels
- SDK available
- Occupies 1 x Mini PCIe slot
- Model code: N7

Power Supply

Internal intelligent automotive power supply:

- PC automatically turns on and off with vehicle ignition
- Input voltage: 9V to 48V
- High efficiency for extended battery life
- Protection against transients and load dumps
- Automatic shutdown with low battery (only for 12V vehicles, or for 24V vehicles using voltage dropper)
- Ignition status detectable via software
- Command Line Interface (CLI) tool provided to allow programmatic detection of ignition status, UPS status and other parameters (CLI tool runs on Windows OS only)
- Configurable shut-down delay. The time between the ignition being

	turned off and the PC powering down can be changed via software. • Hard Power Off. In the event of a software crash during shut down the power will be cut to prevent draining of the vehicle battery. • OS loading guard timer. If the ignition is turned off having only just been turned on, a delay will be applied before issuing the shut down command, in order to allow the PC to fully boot before attempting to shut down • External power switch on front of PC. • LED indicates PC power status. • 5-pin terminal block supplied for power/ignition input connector (screw lockable) • Modified PSU firmware can be loaded for customers with special requirements - please contact us for more information.
Watchdog	• Optional watchdog timer generates automatic system reset in the event of a software crash
Operating System	Microsoft Windows 10 Pro 64-bit Other operating systems, including Windows Embedded options, are available upon request.
Mounting	Removable mounting flanges supplied
Vibration & Shock	MIL-STD-810G (base spec, with SSD)
Cooling	Passive cooling (fanless)
Dimensions	• Width: 290 mm • Depth: 250 mm • Height: 90 mm These measurements include the non-removable mounting brackets
Weight	4.8 Kg (base specification)
Environmental	Operating Temperature: -40°C to +70°C Storage Temperature: -40°C to +80°C The above temperature ranges are at base specification and with extended temperature RAM & SSD. Using standard RAM results in an operating temperature range of 0°C to +70°C. Using a standard SSD results in an operating temperature range of 0°C to +55°C. Some optional features also restrict the unit's operating temperature range - for the operating temperature range of a specific configuration please contact us.

	In common with all passively cooled (fanless) computers, the PC should be installed in a location that allows cooling air to flow freely over the chassis fins.
Power Consumption	Whilst idling at the Windows 10 desktop: • average over 30 seconds: 19.44W Whilst loading the Windows 10 operating system (from completion of POST to appearance of desktop): • average over period: 24.48W • peak observed: 56.40W Whilst under stress-test conditions (no CUDA workload): • average over test: 43.68W • peak observed: 70.56W Whilst under stress-test conditions (with CUDA workload on NVIDIA GPU): • average over test: 65.04W • peak observed: 95.88W The above figures were measured with a base-spec CQ77G PC (i.e. CQ70G series with Core i7 processor, 8 GB RAM and 120 GB SSD).
Recovery	Optional Factory Recovery Solution for easy recovery to factory settings using F11 key at start-up: Preinstalled as standard if PC is ordered with OS license, optional otherwise
Warranty	2 years RTB • Extendable to 3 or 5 years if required.
Estimated End of Life (EoL) Date	Q3 2021 (due to NVIDIA GPU) This is the earliest date at which we expect to stop producing new units of this PC model. However, the warranty for each PC will remain in place regardless of whether the EoL date has passed, and will continue for the duration of the original warranty period.
Certifications	CE E11 ("E-mark" - fully approved for use in vehicles, including all optional configurations above. Approval number 10R-054687, certificate available upon request.)
RoHS / WEEE	RoHS Compliant In-CarPC is a registered member of a WEEE compliance scheme

Model Numbers

Model numbers for the CQ70 series follow this format:

CQ7[CPU code][Model identifier]-[RAM code]-[Drive code]-[Optional model codes]

Commonly ordered values for each section of the model number are as follows:

CPU Code

- 7 (CQ77…) = Intel Core i7-8700T 2.4GHz

Model Identifier

- G (e.g. CQ77G...) = Model with NVIDIA (and Intel) graphics

RAM Code

Amount of RAM in GB

Drive Code

Value in GB of drive capacity with the following suffixes:

- SMN = MLC-type SSD (normal temperature range)
- SME = MLC-type SSD (extended temperature range)
- E = solid state hybrid drive (SSHD)
- No suffix = mechanical hard drive

Optional Model Codes

See Specifications section above for model codes. Where multiple optional codes are present, they are simply listed one after the other without any spacing (e.g. "U06W10" in this section indicates the presence of both 4G (with GPS) and Wi-Fi/Bluetooth modules).

Example

Model code **CQ77G-32-120SMN-U06** denotes the CQ70G series with an i7 processor, 32 GB RAM, 120 GB normal-temperature SSD and built-in 4G/GPS.

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