CQ60 Series Vehicle PC

Product Overview

The CQ60 series fanless PC is our most powerful fanless PC to date. Compared to our existing fanless PCs, the CQ60's slightly larger form factor, and therefore greater heat dissipation capability, enables support for significantly more powerful Intel processors, as well as an optional NVIDIA GeForce GTX 1050 Ti GPU.

The CQ60 series is split into the CQ60N (standard graphics, coming soon) and the CQ60G (NVIDIA graphics). Both models feature powerful 6th generation Intel Core i7-6700TE quad core processors with support for up to 32 GB RAM, dual 2.5" removable SSD/HDD slots and up to 8 PoE GbE LAN ports.

Above: CQ60N series PC – front view

The CQ60N features a unique expansion slot which can be used to add a range of functionality to the PC, including 4 x GbE LAN ports (giving 8 x GbE LAN ports in total) or a module supporting 3 x internal LTE modems (giving 5 x LTE modems in total - all with easily accessible SIM card slots).

Meanwhile the CQ60G features a built-in NVIDIA GeForce GTX 1050 Ti GPU which supports 768 CUDA cores, making the CQ60G perfect for applications involving demanding parallel processing such as autonomous vehicles. The combination of both NVIDIA and Intel graphics chipsets means that the CQ60G supports 7 independent HDMI outputs - perfect for digital signage applications involving large numbers of displays.

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 CQ60 series makes it suitable for extremely dusty environments, and the device's ruggedness is demonstrated by multiple MIL-STD-810G tests. The CQ60 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 i7-6700TE processor (quad-core, 8 threads, up to 3.4 GHz, PassMark score >9000)
- NVIDIA GeForce GTX 1050 Ti GPU supporting 768 CUDA cores (CQ60G only)
- Up to 32 GB DDR4 RAM
- Dual removable 2.5" SSDs (each up to 2 TB) with RAID support
- Internal (non-removable) mSATA SSD (CQ60G only)
- 7 x independent HDMI outputs for CQ60G (2 x DisplayPort & 1 x VGA for CQ60N)
- Optional internal 4G, GPS (DR), WLAN, Bluetooth, CAN & video capture modules
- CQ60N supports up to 5 internal cellular (4G / LTE) modems, all with easily accessible SIM card slots (CQ60G supports 2 modems)
- Optional 8 x digital inputs and 4 x digital outputs (supporting relay switching)
- Optional internal backup battery (UPS) providing approx. 10 min operation with no external power
- 4 x USB 3.0 ports
- Up to 4 x RS-232 ports
- Up to 8 x GbE LAN ports for CQ60N (6 for CQ60G) – with optional Power over Ethernet (PoE) on all 8 ports (4 for CQ60G)
- Auto on/off with vehicle ignition, configurable shut down delays via software, low battery detection
- 9-36V peak input voltage range (9-48V for CQ60G)
- E11 certified (all configurations) - fully approved for automotive use
- -40°C to +70°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

Technical Specifications

Processor	PC Model CQ67N/G: • Intel Core i7-6700TE • Quad core • 2.4 GHz (3.4 GHz with Intel Turbo boost) • Hyper-threading PC Model CQ61N/G*: • Intel Pentium G4400TE • Dual core • 2.4 GHz PC Model CQ63N/G*: • Intel Core i3-6100TE • Dual core • 2.7 GHz • Hyper-threading *Intel Pentium and Core i3 processors by special request only
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 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)	CQ60G: 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	CQ60N: Up to 8 x Gigabit Ethernet Ports (4 as standard), all of which can optionally support PoE (IEEE802.3AF, subject to up to 100W across all ports).

	CQ60G: 6 x Gigabit Ethernet ports, 4 of which can optionally support PoE (IEEE802.3AF, subject to up to 60W across all 4 ports).
Audio	Realtek ALC662 HD audio with line-out, line-in and mic-in external audio ports.
Graphics	CQ60N: Intel HD Graphics 530 supporting up to 3 independent displays with 2 x DisplayPort and 1 x VGA outputs. CQ60G: NVIDIA GeForce GTX 1050 Ti GPU & Intel HD Graphics 530 with 7 x independent HDMI outputs (4 from NVIDIA GPU, 3 from Intel CPU). NVIDIA GPU features 768 CUDA cores.
USB	4 x USB 3.0 ports
DIO Interface	8 x Digital Inputs (high => 5V, max input 36V for CQ60N / 48V for CQ60G) 4 x Digital Outputs, supporting relay switching (5V, 100 mA) Status of inputs/outputs is monitored/controlled via software
Serial	Up to 4 x serial ports (2 as standard), supporting RS-232/422/485
TPM	Trusted Platform Module (TPM) version 2.0
Expansion	CQ60N: • 4 x Mini PCI Express slots • Proprietary expansion slot providing 3 x additional Mini PCI Express slots or 4 x GbE LAN ports CQ60G: • 3 x Mini PCI Express slots • 1 x M.2 slot *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*

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Cellular (3G / 4G)	Optional up to 5 (CQ60N) or 2 (CQ60G) built-in 4G (with GPS) module(s) with external SIM slot(s):

- CQ60N: 2 x externally accessible SIM card slots (supporting either single-modem/dual-SIM or dual-modem) plus optional 3 x additional SIM card slots (one per modem, easily accessible via thumbscrews)
- CQ60G: 2 x externally accessible SIM card slots (supporting either single-modem/dual-SIM or dual-modem)
- 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 3.5G)
- 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

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
UPS / Backup Battery	Optional internal backup battery (UPS):
	- Provides operating power for up to approx. 10 minutes with no external power - Controlled shutdown if external power is not restored - Unless specified at order time PC initiates shut down procedure immediately upon power loss - Model code: P19
Power Supply	Internal intelligent automotive power supply:
	- PC automatically turns on and off with vehicle ignition - Input voltage: 9V to 36V for CQ60N, 9V to 48V for CQ60G - 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. - CQ60N: 4-pin terminal block supplied for power input plus 2-pin terminal block for ignition input - CQ60G: 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	CQ60N: - Width: 240* mm - Depth: 226 mm - Height: 79* mm CQ60G: - Width: 260* mm - Depth: 226 mm - Height: 89* mm *The above figures are without mounting flanges at base. With mounting flanges, width at base increases by 29 mm and height increases by 6 mm.
Weight	CQ60N: 3.9 Kg (base specification) CQ60G: 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	CQ60N: TBC
	CQ60G:
	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 CQ67G PC (i.e. CQ60G 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	CQ60N: Approx. 2030
	CQ60G: Q3 2020 (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 CQ60 series follow this format:

CQ6[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 (CQ67…) = Intel Core i7-6700TE 2.4 GHz (up to 3.4 GHz)

Model Identifier

- N (e.g. CQ67N...) = Model with Intel graphics
- G (e.g. CQ67G...) = 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)
- No suffix = mechanical hard drive
- E = solid state hybrid drive (SSHD)

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 **CQ67G-32-120SMN-U06** denotes the CQ60G series (i.e. with NVIDIA graphics), with an i7 processor, 32 GB RAM, 120 GB normal-temperature SSD and built-in 4G/GPS.

Summary of CQ60N / CQ60G Differences

The main differences between the CQ60N and the CQ60G are as follows:

	CQ60N Series	CQ60G Series
Graphics	Intel HD Graphics 530 with 2 x DisplayPort and 1 x VGA outputs (3 independent displays)	NVIDIA GeForce GTX 1050 Ti & Intel HD Graphics 530, with 7 x HDMI outputs (7 independent displays). NVIDIA GPU supports 768 CUDA cores.
Lan Ports & PoE	4 x GbE LAN ports as standard (8 optional), all of which can optionally support PoE.	6 x GbE LAN ports, 4 of which can optionally support PoE.
Expansion	4 x Mini PCIe slots (7 optional)	3 x Mini PCIe slots & 1 x M.2 slot
Cellular Modems (4G / LTE)	Up to 5 internal LTE modems, all with easily accessible SIM card slots	Up to 2 internal LTE modems, both with externally accessible SIM card slots
mSATA	No, although CQ60N can optionally support SATA DOM module - please contact us for details	Yes (allows internal fixed SSD in addition to 2 x removable 2.5" drive slots)
Dimensions	240 x 226 x 79 mm	260 x 226 x 89 mm

Right: CQ60N series PC (rear view) with optional 8 x GbE LAN

Left: CQ60N series PC (front view)

Right: CQ60G series PC (front view)

Left: CQ60G series PC (rear view)