

CQ50 Series Vehicle PC

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Product Overview

In-CarPC's CQ50 series of fanless in-vehicle PCs offer our highest level of performance in a compact fanless system so far, supporting 6th generation Intel Core i3/i5 and i7 processors with up to 32 GB RAM. The CQ50's compact chassis supports dual removable 2.5" drives with RAID, and the CQ50P series is our first PC to include Power over Ethernet (PoE), providing 4 PoE ports in total. Numerous built-in options are available, including up to two 4G/LTE modems, GPS, Wi-Fi and CAN-bus. The CQ50 can drive 3 displays independently via its DVI, DisplayPort and VGA video outputs.

The CQ50 series is split into the CQ50N (2 x LAN ports), CQ50L (4 x LAN ports, coming soon) and CQ50P (4 x PoE LAN ports). Other minor differences are detailed below under the "CQ50N / CQ50L / CQ50P Differences" section.

The fanless nature of the CQ50 series makes it suitable for extremely dusty environments, and the device's ruggedness is demonstrated by multiple MIL-STD-810G tests. The CQ50 series has been awarded E-mark certification making it fully approved for in-vehicle use, and carries a 2-year warranty as standard.

Product Highlights

- Processors from Intel Celeron 3955U 2.0 GHz to Intel Core i7-6600U 2.6/3.4 GHz
- Up to 32 GB DDR4 RAM
- Dual removable 2.5" SSDs (each up to 2 TB) with RAID support
- Internal (non-removable) mSATA SSD (CQ50P only)
- DVI-I, DisplayPort and optional VGA video outputs supporting triple independent displays
- Optional internal 4G, GPS (DR), WLAN, Bluetooth, CAN & video capture modules
- Supports dual internal cellular modems with external SIM slots (only one SIM external for CQ50P)
- 4 x digital inputs and 4 x digital outputs (supporting relay switching)
- Optional internal backup battery (UPS) providing approx. 10 minutes of operation with no external power
- 2 x USB 3.0 ports + 2 x USB 2.0 ports
- Up to 4 x RS-232 ports
- 4 x PoE Gigabit Ethernet ports for CQ50P (2 x non-PoE for CQ50N, 4 x non-PoE for CQ50L)
- Auto on/off with vehicle ignition, configurable shut down delays via software, low battery detection
- 9-36V peak input voltage range for CQ50N/CQ50P, 9-48V peak input voltage range for CQ50L
- Regulated 12V output for powering accessories (2A)
- 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



Above: CQ50P series PC – front view



Above: CQ50P series PC – rear



Above: CQ50N series PC – front view

Technical Specifications

Processor	<p>PC Model CQ51x:</p> <ul style="list-style-type: none"> Intel Celeron 3955U Dual core 2.0 GHz <p>PC Model CQ53x:</p> <ul style="list-style-type: none"> Intel Core i3-6100U Dual core 2.3 GHz Hyper-threading <p>PM Model CQ55x:</p> <ul style="list-style-type: none"> Intel Core i5-6300U Dual core 2.4 GHz Hyper threading <p>PC Model CQ57x:</p> <ul style="list-style-type: none"> Intel Core i7-6600U Dual core 2.6 GHz (3.4 GHz with Intel Turbo boost) Hyper-threading
RAM	<p>Up to 32GB DDR4 2133 MHz (8GB as standard)</p> <p>Optional extended temperature memory, allowing PC operating temperature of -40°C to +70°C.</p>
SSD (removable 2.5")	<p>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.</p> <p>Solid State Drive (SSD) - Standard Temperature:</p> <ul style="list-style-type: none"> 120, 240, 256, 512 GB, 1 & 2 TB capacities For 256 GB & above models: Ultra-high performance & excellent endurance <p>Solid State Drive (SSD) - Extended Temperature:</p> <ul style="list-style-type: none"> 64, 128, 256, 512 GB & 1 TB capacities Industrial-grade memory Allows PC operating temperature of -40 to +70°C
SSD (internal mSATA)	<p>CQ50P: 1 x mSATA slot supporting the following SSDs:</p> <ul style="list-style-type: none"> 120 GB, 240 GB and 480 GB capacities at Standard Temperature Extended Temperature mSATA SSDs available on request

LAN	<p>CQ50N: 2 x Gigabit Ethernet (RJ45)</p> <p>CQ50L: 4 x Gigabit Ethernet (RJ45)</p> <p>CQ50P: 4 x Gigabit Ethernet IEEE802.3AF PoE ports (M12 connectors, up to 15.4W per port). Optional 1m M12 Male to RJ45 Male cables, and RJ45 couplers, available.</p>
Audio	Realtek ALC662 HD audio with line-out and mic-in external audio ports
Graphics	<p>Intel HD Graphics 510 (for CQ51x) or HD Graphics 520 (for CQ53x/57x) supporting up to three independent displays with the following outputs:</p> <ul style="list-style-type: none"> DVI-I Single Link output (note that the pins normally used for Link 2 signals are non-standard, therefore Dual Link DVI cables should not be used). Can be converted to VGA or VGA+DVI-D via optional adapter cables. DisplayPort output (independent of DVI-I digital) Optional VGA output (shared with, and cannot be used at the same time as, DVI-I analogue), Model Code: V3
USB DIO Interface	<p>2 x USB 3.0 ports, 2 x USB 2.0 ports</p> <p>4 x Digital Inputs (high => 5V, max input 36V for CQ50N/P / 48V for CQ50L)</p> <p>4 x Digital Outputs, supporting relay switching (5V for CQ50N/P / 12V for CQ50L, both 100 mA)</p> <p>Status of inputs/outputs is monitored/controlled via software</p>
Serial	<p>Up to 4 x serial ports:</p> <p>CQ50N/CQ50L:</p> <ul style="list-style-type: none"> COM 1 - 2 (standard) support RS-232/422/485 COM 3 - 4 (optional) support RS-232 only <p>CQ50P:</p> <ul style="list-style-type: none"> COM 1 (standard) & COM 2 (optional) support RS-232/485 COM 3 - 4 (optional) support RS-232 only
TPM	<p>CQ50N: Not present</p> <p>CQ50L/CQ50P: Trusted Platform Module (TPM) version 2.0</p>
Expansion	<p>CQ50N:</p> <ul style="list-style-type: none"> 4 x Mini PCI Express slots <p>CQ50L:</p> <ul style="list-style-type: none"> 3 x Mini PCI Express slots 1 x M.2 slot <p>CQ50P:</p>

- 3 x Mini PCI Express slots (note that 2 of these slots do not support our full range of expansion cards)

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 single or dual built-in 4G (with GPS) module(s) with external SIM slot(s):

- CQ50N/CQ50L: 2 x externally accessible SIM card slots (1 per installed modem)
- CQ50P: 1 x externally accessible SIM card slot (2nd modem, if present, uses internal SIM)
- Occupies 1 or 2 x Mini PCIe slots
- 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)

WLAN & Bluetooth

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

- Model code: U06
- 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.

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

Video Capture

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 CQ50N/CQ50P, 9V to 48V for CQ50L
- 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

- Optional 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)
- Regulated 12V accessory output for powering peripherals (up to 2A)
- 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.
- 3-pin terminal block supplied for power input connector (screw lockable)
- Optional 6-pin break-out connector for 12V output (clip locking)
- 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: 250* mm
Depth: 150 mm
Height: 55* mm

*The above figures are without mounting flanges at base. With mounting flanges, width increases to 270 mm and height increases to 62 mm.

Weight Environmental

2.4 Kg (base specification)
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.

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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	<p>Whilst idling at the Windows 10 desktop:</p> <ul style="list-style-type: none"> • average over 30 seconds: 8.48W <p>Whilst loading the Windows 10 operating system (from completion of POST to appearance of desktop):</p> <ul style="list-style-type: none"> • average over period: 11.76W • peak observed: 25.81W <p>Whilst under stress-test conditions:</p> <ul style="list-style-type: none"> • average over test: 37.08W • peak observed: 47.02W <p>The above figures were measured with a base-spec CQ57N PC (i.e. CQ50N series with Core i7 processor, 4 GB RAM and 120 GB SSD).</p>
Recovery	<p>Optional Factory Recovery Solution for easy recovery to factory settings using F11 key at start-up:</p> <ul style="list-style-type: none"> • Preinstalled as standard if PC is ordered with OS license, optional otherwise
Warranty	<p>2 years RTB</p> <p>Extendable to 3 or 5 years if required.</p>
Estimated End of Life (EoL) Date	<p>~2030</p> <p>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.</p>
Certifications	<p>CE</p> <p>E11 ("E-mark" - fully approved for use in vehicles, including all optional configurations above. Approval number 10R-054687, certificate available upon request.)</p>
RoHS / WEEE	<p>RoHS Compliant</p> <p>In-CarPC is a registered member of a WEEE compliance scheme</p>

In-CarPC reserves the right to change product specifications at any time and without notice. E&OE.

Model Numbers

Model numbers for the CQ50 series follow this format:

*CQ5[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

- 1 (CQ51x) = Intel Celeron 3955U 2.0 GHz
- 3 (CQ53x) = Intel Core i3-6100U 2.3 GHz
- 5 (XQ55x) = Intel Core i5-6300U 2.4 GHz
- 7 (CQ57x) = Intel Core i7-6600U 2.6 GHz (up to 3.4 GHz)

Model Identifier

- N = CQ50N series (2 x non-PoE LAN)
- L = CQ50L series (4 x non-PoE LAN)
- P = CQ50P series (4 x PoE LAN)

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 *CQ57P-32-120SMN-U06* denotes the CQ50P series (i.e. with PoE), with an i7 processor, 32 GB RAM, 120 GB normal-temperature SSD and built-in 4G/GPS.

Summary of CQ50N / CQ50L / CQ50P Differences

The main differences between the CQ50N, CQ50L and the CQ50P are as follows:

Feature	CQ50N Series	CQ50L Series	CQ50P Series
Lan Ports & PoE	2 x GbE LAN ports with RJ45 connectors	4 x GbE LAN ports with RJ45 connectors	4 x PoE GbE LAN ports with M12 connectors (M12-to-RJ45 adapters available)
SIM Card Slots	2 x externally accessible SIM card slots (support for dual internal modems)	2 x externally accessible SIM card slots (support for dual internal modems)	1 x externally accessible SIM card slot. Dual modems can be accommodated but the 2nd SIM slot would be internal.
Expansion	4 x Mini PCIe slots	3 x Mini PCIe slots 1 x M.2	3 x Mini PCIe slots (2 of which do not support our full range of expansion cards)
TPM	No	Yes (Trusted Platform Module)	Yes (Trusted Platform Module)
mSATA	No, although CQ50N can optionally support SATA DOM module - please contact us for details	No, although CQ50L 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)

Right: CQ50P series PC – front view



Left: CQ50P series PC – rear view



Right: CQ50N series PC – front view



Left: CQ50N series PC – rear view

