

# CQ40 Series Vehicle PC

## Product Overview

The CQ40 series is a compact, fanless in-vehicle PC with a range of processor options from Intel Celeron 2980U up to high performance Intel Core i7-4650U, with up to 8 GB RAM and dual internal SSDs with RAID support.

The CQ40 series accommodates a wide range of expansion options due to the presence of flexible I/O ports. These could take the form of 3 x RS-232 ports, or could allow simultaneous support of dual-channel CAN-bus and 1 x RS-232 - in addition to built-in GPS, Wi-Fi and 4G/LTE (with dual-SIM slots).

4-channel GPIO (2 in, 2 out) is a standard feature, along with a regulated 12V output for powering accessories. Other I/O ports include dual USB 3.0 (plus an additional USB 2.0 port), dual GbE LAN, 3 x audio ports and HDMI and DVI-I graphics supporting triple independent displays.

The fanless nature of the CQ40 series makes it suitable for extremely dusty environments, and the device's ruggedness is demonstrated by multiple MIL-STD-810F tests. The CQ40 series has been awarded E-mark certification, making it fully approved for in-vehicle use, and carries a 2-year warranty as standard.



Above: CQ40 series PC – rear view  
Below: CQ40 series PC – front view



## Product Highlights

- Intel Celeron 2980U, Intel Core i3-4010U or Intel Core i7-4650U processors
- Up to 8 GB DDR3 RAM
- Up to 2 SSDs supporting RAID
- HDMI & DVI-I video outputs supporting 3 independent displays
- Optional internal 4G, GPS (DR), WLAN, Bluetooth, CAN & video capture modules
- Dual SIM card slots for built-in cellular modem
- 2 x digital inputs and 2 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 + 1 x USB 2.0 port
- Up to 3 x RS-232 ports
- 2 x Gigabit Ethernet ports
- Auto on/off with vehicle ignition, configurable shut down delays via software, low battery detection
- 9-36V peak input voltage range
- Regulated 12V switched output for powering accessories (2A)
- E11 certified - fully approved for automotive use
- -40 to +70 degrees operating temperature range (at base specification with extended temperature RAM & SSD)
- MIL-STD-810F tests for shock & vibration
- 2-year RTB warranty (extendable to 3 or 5 years)
- Long-term availability

## Technical Specifications

<b>Processor</b>	<p>PC Model CQ41:</p> <ul style="list-style-type: none"> <li>• Intel Celeron 2980U</li> <li>• Dual core</li> <li>• 1.6 GHz</li> </ul> <p>PC Model CQ43:</p> <ul style="list-style-type: none"> <li>• Intel Core i3-4010U</li> <li>• Dual core</li> <li>• 1.7 GHz</li> <li>• Hyper-threading</li> </ul> <p>PC Model CQ47:</p> <ul style="list-style-type: none"> <li>• Intel Core i7-4650U</li> <li>• Dual core</li> <li>• 1.7 GHz (3.3 GHz with Intel Turbo boost)</li> <li>• Hyper-threading</li> </ul>
<b>RAM</b>	<p>Up to 8GB DDR3L 1600 MHz (4GB as standard)</p> <p>Optional extended temperature memory, allowing PC operating temperature of -40°C to +70°C.</p>
<b>SSD</b>	<p>Single or dual Solid State Drives (SSDs) with RAID support</p> <p>Standard Temperature SSDs:</p> <ul style="list-style-type: none"> <li>• 120, 256, 512 GB, 1 TB &amp; 2 TB capacities</li> <li>• 256 GB &amp; above models: ultra high performance &amp; excellent endurance</li> </ul> <p>Extended Temperature SSDs:</p> <ul style="list-style-type: none"> <li>• 32, 64, 128, 256, 512 GB &amp; 1 TB capacities</li> <li>• Industrial-grade memory</li> <li>• Allows full PC operating temperature range of -40 to +70 °C</li> </ul>
<b>LAN</b>	2 x Gigabit Ethernet ports
<b>Audio</b>	HD audio with line-out, line-in & mic-in external ports
<b>Graphics</b>	<p>Intel HD Graphics (HD Graphics 4400 for CQ43, HD Graphics 5000 for CQ47) with HDMI &amp; DVI-I outputs.</p> <p>DVI-I provides independent VGA and DVI-D outputs via optional adapter cable, resulting in triple independent display outputs (HDMI + DVI-D + VGA).</p>
<b>USB</b>	2 x USB 3.0 & 1 x USB 2.0 ports
<b>DIO Interface</b>	<p>2 x Digital Inputs (high =&gt; 3.3V, max input 32V)</p> <p>2 x Digital Outputs supporting relay switching (12V, 100 mA)</p> <p>Status of inputs/outputs is monitored/controlled via software</p>

### Serial

- Up to 3 x serial ports:
- COM 1 & COM 2 support RS-232/422/485
  - COM 3 supports RS-232 only

Note that the number of serial ports is reduced by one for each of the following features: GPS DR; each CAN channel; analogue video capture.

### Expansion

3 x Mini PCI Express slots

*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
- Reduces the number of serial ports by one
- Occupies 1 x Mini PCIe slot
- Model code: G7

*See below for 4G modules that include GPS*

### Cellular (3G / 4G)

Optional built-in 3G or 4G (with GPS) module:

- Dual externally accessible SIM card slots
- SIM switching is controlled during PC operation via software
- Occupies 1 x Mini PCIe slot
- SIM card provisioning available
- 3G / 4G specifications detailed below

### 3G Module Specifications

- Supports HSPA/UMTS/EDGE/GPRS/GSM network technologies (3.5G)
- Supports frequency bands 800-850/900/1900/2100 MHz
- Voice capable
- Maximum downlink: 14.4 Mbps (HSPA)
- Maximum uplink: 5.76 Mbps (HSPA)
- 2 x SMA connectors for 3G diversity antennas (available separately)

- GPS receiver supporting Standalone & Assisted GPS (GPS not enabled by default, disables 3G diversity when enabled, supports passive GPS antennas only (available separately))
- Model code: U01

#### 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)
- Model code: P21

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

- CAN 2.0B & 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 & header files for all common programming languages, plus documentation
- Numerous additional optional software and development tools available, including LabVIEW driver.
- Model code: P12 (1-channel), P13 (2-channel)

#### Optional 1-, 2- or 3-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 but only 3 channels usable due to space constraints)

CAN options occupy 1 x Mini PCIe slot, and each CAN channel reduces the number of serial ports by one.

#### Optional 8-channel video capture card:

#### Video Capture

- 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



- Reduces the number of serial ports by one
- 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
- Not available if a secondary SSD is specified
- Model code: P19

**Power Supply**

Internal intelligent automotive power supply:

- PC automatically turns on and off with vehicle ignition
- Input voltage: 9V to 36V
- High efficiency for extended battery life
- Protection against transients and load dumps
- Reverse polarity protection
- 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)
- 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
- Supports remote external power switch
- LED indicates PC power status
- 3-pin terminal block supplied for power input connector (screw lockable)
- 8-pin terminal block supplied for combined DIO, 12V output and

remote power switch 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**

Integrated mounting flanges

VESA or DIN rail mounting by special request.

**Vibration & Shock**

MIL-STD-810F (base spec, with SSD)

**Cooling**

Passive cooling (fanless)

**Dimensions**

Width: 182\* mm  
Length: 168 mm  
Height: 54 mm

\*The width figure does not include the mounting flanges at base (total length occupied by mounting flanges: 30 mm)

**Weight Environmental**

1.4 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.

**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 60 seconds: 9.23W

Whilst loading the Windows 10 operating system (from completion of POST to appearance of desktop):

- average over period: 10.70W
- peak observed: 20.59W

Whilst under stress-test conditions:

- average over test: 17.80W
- peak observed: 29.06W

The above figures were measured with a base-spec CQ43 PC (i.e. CQ40 series with Core i3 processor, 4 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** Q4 2020  
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**  
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 CQ40 series follow this format:

*CQ4*[CPU code]-[RAM code]-[Drive code]-  
[Optional model codes]

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

### CPU Code

- 1 (CQ41) = Intel Celeron 2980U 1.6 GHz
- 3 (CQ43) = Intel Core i3-4010U 1.7 GHz
- 7 (CQ47) = Intel Core i7-4650U 1.7 GHz (up to 3.3 GHz)

### 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).

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Above: CQ40 series PC – rear view