



## IN-VEHICLE COMPUTER

## ACO-6000-CML-1

In-Vehicle Computer with LGA 1200 for Intel 10th Gen CPU & W480E PCH, 2x LAN, 1x PCIe



## Features

- LGA 1200 socket for 10th Gen. Intel® CML S Processor (35W TDP)
- Intel® W480E chipset
- 2x DDR4 2666/2933MHz SODIMM. Max. up to 64GB
- Triple Independent Display: 2x DisplayPort, 1x DVI-I
- 2x Intel® GbE supporting Wake-on-LAN and PXE
- 2x Full-size Mini PCIe for communication or expansion modules, 2x SIM socket
- 3x 2.5" SATA HDD Bay (1x Internal) with RAID 0, 1, 5 support
- 1x M.2 (E Key, PCIe x1, USB 2.0, 2230)
- 8x RS-232/422/485 (6x internal), 6x USB 3.2 Gen 2, 3x USB 3.2 Gen 1 (1x internal)
- 8x DI + 8x DO with isolation
- 9 to 48 or 48 to 110VDC Wide Range Power Input Supporting AT/ATX Mode
- Wide Operating Temperature -25°C to 70°C (35W CPU)
- TPM 2.0 Supported
- Power ignition management

## Specifications

| System                                                                               |                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Processor                                                                            | Support 10th Gen Intel® CML S Processor (LGA 1200, 35W TDP)<br>- Intel® Xeon® W-1290TE, 10 Cores, 20MB Cache, up to 4.5 GHz<br>- Intel® Core™ i9-10900TE, 10 Cores, 20MB Cache, up to 4.5 GHz<br>- Intel® Core™ i7-10700TE, 8 Cores, 16MB cache, up to 4.4 GHz<br>- Intel® Core™ i5-10500TE, 6 Core, 12MB Cache, 3.7 GHz<br>- Intel® Core™ i3-10100TE, 4 Cores, 9MB Cache, up to 3.6 GHz |
| System Chipset                                                                       | Intel® W480E Chipset                                                                                                                                                                                                                                                                                                                                                                     |
| LAN Chipset                                                                          | GbE1: Intel I219 (Support Wake-on-LAN and PXE)<br>GbE2: Intel I210 (Support Wake-on-LAN and PXE)                                                                                                                                                                                                                                                                                         |
| Audio Codec                                                                          | Realtek ALC888S                                                                                                                                                                                                                                                                                                                                                                          |
| System Memory                                                                        | 2x 260-Pin DDR4 2666/2933MHz SODIMM.<br>Max. up to 64GB (ECC and Non-ECC)                                                                                                                                                                                                                                                                                                                |
| Graphics                                                                             | Intel® UHD Graphics 630                                                                                                                                                                                                                                                                                                                                                                  |
| BIOS                                                                                 | AMI 256Mbit SPI BIOS                                                                                                                                                                                                                                                                                                                                                                     |
| Watchdog                                                                             | Software Programmable Supports 1~255 sec. System Reset                                                                                                                                                                                                                                                                                                                                   |
| TPM                                                                                  | TPM 2.0                                                                                                                                                                                                                                                                                                                                                                                  |
| Display                                                                              |                                                                                                                                                                                                                                                                                                                                                                                          |
| Display Port                                                                         | 2x DisplayPort, support resolution 4096 x 2304, DP++                                                                                                                                                                                                                                                                                                                                     |
| DVI                                                                                  | 1x DVI-I, support resolution 1920 x 1200                                                                                                                                                                                                                                                                                                                                                 |
| Multiple Display                                                                     | Triple Display                                                                                                                                                                                                                                                                                                                                                                           |
| VGA                                                                                  | Yes (by optional split cable)                                                                                                                                                                                                                                                                                                                                                            |
| Storage                                                                              |                                                                                                                                                                                                                                                                                                                                                                                          |
| SIM Socket                                                                           | 2x External SIM socket (Mini PCIe attached)                                                                                                                                                                                                                                                                                                                                              |
| SSD/HDD                                                                              | 1x Internal 2.5" SATA HDD/SSD Bay (support H=9mm)<br>2x Removable 2.5" SATA HDD/SSD Bay (support H=7mm, Hot-swappable)<br>Support RAID 0, 1, 5                                                                                                                                                                                                                                           |
| Expansion                                                                            |                                                                                                                                                                                                                                                                                                                                                                                          |
| M.2                                                                                  | 1x M.2 (E Key, PCIe x1, USB 2.0, 2230)                                                                                                                                                                                                                                                                                                                                                   |
| Mini PCIe                                                                            | 2x Full-size Mini PCIe                                                                                                                                                                                                                                                                                                                                                                   |
| PCIe                                                                                 | 1x PCIe x16                                                                                                                                                                                                                                                                                                                                                                              |
| PCI                                                                                  | 1x PCI (Optional)                                                                                                                                                                                                                                                                                                                                                                        |
| Expansion Modules                                                                    |                                                                                                                                                                                                                                                                                                                                                                                          |
| Occupied One Universal I/O Slot:                                                     |                                                                                                                                                                                                                                                                                                                                                                                          |
| • 4-port GbE module with Intel® I350 Chipset, RJ-45 or M12 connector (PoE optional)  |                                                                                                                                                                                                                                                                                                                                                                                          |
| • 4-Port USB with Renesas uPD720201K8 host controller (share PCIe Gen2 x1 bandwidth) |                                                                                                                                                                                                                                                                                                                                                                                          |
| I/O                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                          |
| Audio                                                                                | 1x Mic-in, 1x Line-out                                                                                                                                                                                                                                                                                                                                                                   |
| CAN                                                                                  | 2x CAN 2.0 A/B 2-pin Internal header                                                                                                                                                                                                                                                                                                                                                     |
| COM                                                                                  | 2x RS-232/422/485 ; 6x RS-232/422/485 (internal)                                                                                                                                                                                                                                                                                                                                         |
| DIO                                                                                  | 8 in / 8 out (Isolated)                                                                                                                                                                                                                                                                                                                                                                  |
| LAN                                                                                  | 2x RJ45                                                                                                                                                                                                                                                                                                                                                                                  |
| Universal I/O Bracket                                                                | 2x Universal I/O Bracket (By mini PCIe interface)                                                                                                                                                                                                                                                                                                                                        |
| USB                                                                                  | 6x USB 3.2 Gen 2 (10 Gbps)<br>3x USB 3.2 Gen 1 (5 Gbps, 1x Internal)<br>2x USB 2.0 header (internal)                                                                                                                                                                                                                                                                                     |
| Others                                                                               | 5x WiFi Antenna Holes<br>1x Power Switch, 1x AT/ATX Switch, 1x Remote Power On/Off<br>1x PC/Car Mode Switch, 1x Delay Time Switch<br>1x Removable CMOS Battery<br>4x 4-Pin Power Connector, 1x 4-PIN FAN Connector                                                                                                                                                                       |
| Operating System                                                                     |                                                                                                                                                                                                                                                                                                                                                                                          |
| Windows                                                                              | Windows 10/11                                                                                                                                                                                                                                                                                                                                                                            |
| Linux                                                                                | Linux kernel                                                                                                                                                                                                                                                                                                                                                                             |

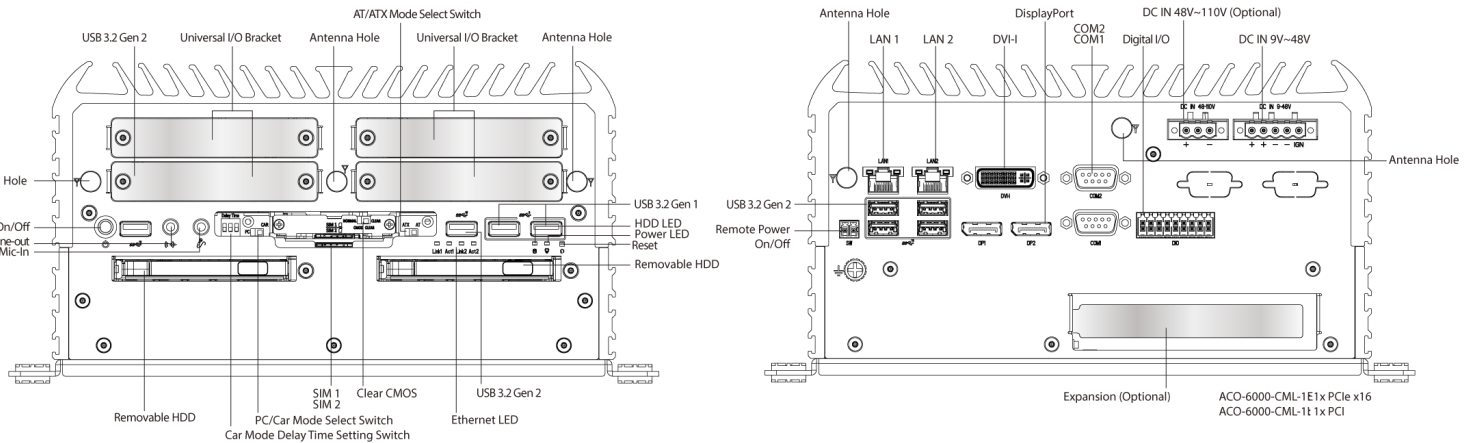
| Power                  |                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Power Adapter          | Optional AC/DC 24V/5A, 120W<br>Optional AC/DC 24V/9.2A, 220W<br>Optional AC/DC 24V/11.67A, 280W                                  |
| Power Mode             | AT, ATX                                                                                                                          |
| Power Ignition Sensing | Power Ignition Management                                                                                                        |
| Power Supply Voltage   | 9~48VDC<br>48~110VDC (Optional)                                                                                                  |
| Power Connector        | 5-pin Terminal Block (9~48VDC)<br>3-pin Terminal Block (48~110VDC, Optional)                                                     |
| Power Protection       | OVP (Over Voltage Protection);<br>OCP (Over Current Protection)<br>Reverse Protection                                            |
| Environment            |                                                                                                                                  |
| Operating Temperature  | -25°C to 70°C (35W CPU)                                                                                                          |
| Storage Temperature    | -30°C to 85°C                                                                                                                    |
| Relative Humidity      | 10% to 95% (non-condensing)                                                                                                      |
| Certification          | CE, FCC Class A,<br>E-Mark, EMC Conformity with EN50155 & EN50121-3-2                                                            |
| Vibration              | With SSD: 3 Grms, 5 - 500 Hz, 0.5 hr/axis<br>With HDD: 1 Grms, 5 - 500 Hz, 0.5 hr/axis                                           |
| Shock                  | With SSD: 20G, half sine, 11ms                                                                                                   |
| Physical               |                                                                                                                                  |
| Dimensions             | 240 (W) x 261 (D) x 127.3 (H) mm                                                                                                 |
| Weights                | ACO-6000-CML-1 : 6.9 kg<br>ACO-6000-CML-1-110V : 7.1 kg<br>ACO-6000-CML-1-16PM12 : 8.4 kg<br>ACO-6000-CML-1-16PM12-110V : 8.6 kg |
| Construction           | Extruded Aluminum with Heavy Duty Metal                                                                                          |
| Mounting Options       | Wall Mounting                                                                                                                    |

\* For 10th Gen Intel CPUs configured to run at 65W, operating temperatures will be limited to 70°C.

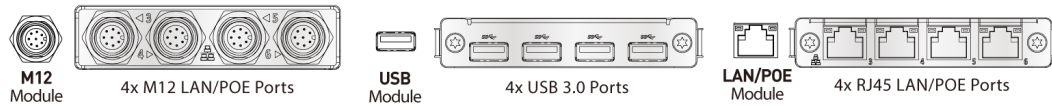
\*\* 65W CPUS may experience thermal throttling depending on extreme application workloads; this is also due to an increase in the physical CPU cores from the Intel silicon (up to 10 cores). Please note, this does not indicate system malfunction or problems in the fanless design. Please consult our embedded engineers for the best configuration to match your application requirements.

\*\*\* All specifications and photos are subject to change without notice.

## External I/O Mechanical Layout

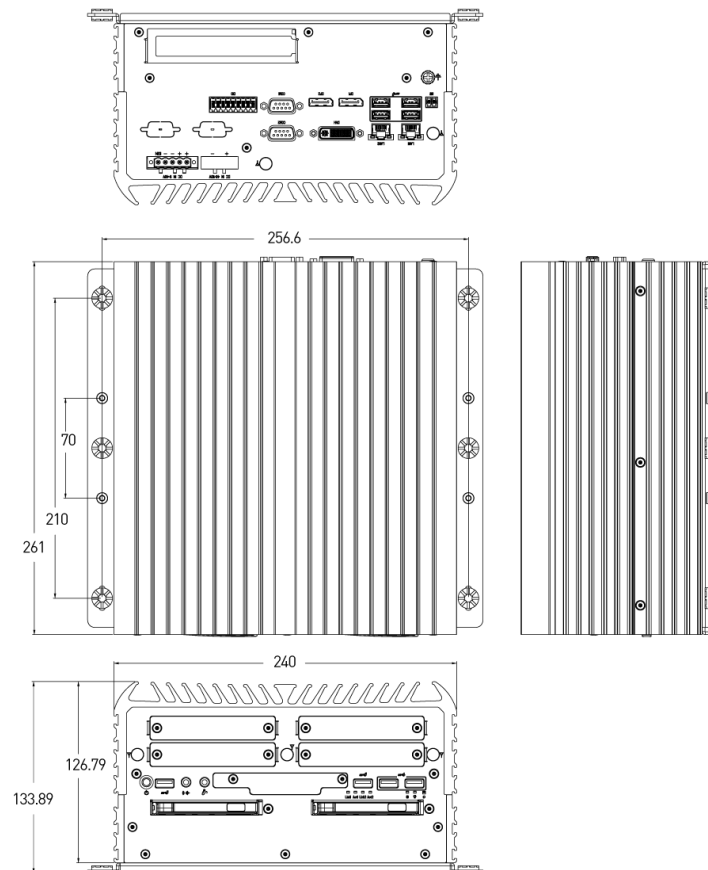


## Available Modules



## Dimension

Unit: mm



## Compliances and Standards

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vibration             | With SSD: 3 Grms, 5 - 500 Hz, 0.5 hr/axis<br>With HDD: 1 Grms, 5 - 500 Hz, 0.5 hr/axis<br>IEC60068-2-64:2008<br>Designed to comply with MIL-STD-810H Method 514.8 Procedure I                                                                                                                                                                                                                                                                                        |
| Shock                 | With SSD: 20G, half sine, 11ms<br>IEC60068-2-27:2008<br>Designed to comply with MIL-STD-810H Method 516.8 Procedure I                                                                                                                                                                                                                                                                                                                                                |
| Operating Temperature | -25°C to 70°C (35W CPU)<br>IEC60068-2-1:2007 (Cold test procedure)<br>IEC60068-2-2:2007 (Dry heat test procedure)<br>IEC60068-2-3:2007 (Damp heat, steady state, test procedure)<br>IEC60068-2-14:2009 (Wide temperature range thermal shock)                                                                                                                                                                                                                        |
| EMC                   | <ul style="list-style-type: none"> <li>• FCC Class A</li> <li>• CE</li> <li>• ICES-003</li> <li>• UKCA</li> <li>• Railway EMC Compliance</li> <li>- EN 50155: 2017</li> <li>- EN 50121-1: 2017</li> <li>- EN 50121-3-2: 2016</li> <li>• Industrial EMC Compliance</li> <li>- EN 61000-4-2: 2009</li> <li>- EN 61000-4-3: 2020</li> <li>- EN 61000-4-4: 2012</li> <li>- EN 61000-4-5: 2014 +A1: 2017</li> <li>- EN 61000-4-6: 2014</li> <li>- E-Mark (E13)</li> </ul> |
| Safety                | <ul style="list-style-type: none"> <li>• UL Safety: UL62368-1, 3rd Ed., (cULus)</li> <li>• Test procedure: CB Scheme</li> <li>• Standard: IEC 62368-1:2018</li> </ul>                                                                                                                                                                                                                                                                                                |

## Available Models

| Model No.              | Description                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------------------|
| ACO-6000-CML-1E        | In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN, 1x PCIe                  |
| ACO-6000-CML-1E-110V   | In-Vehicle Fanless Computer with LGA 1200 for Intel 10th Gen CPU and W480E PCH, 2x LAN, 1x PCIe, 48-110V         |
| ACO-6000-CML-1E-P      | In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, 1x PCIe, w/ Power Adapter          |
| ACO-6000-CML-1E-110V-P | In-Vehicle Computer With LGA 1200 For Intel 10th Gen CPU & W480E PCH, 2x LAN, 1x PCIe, 48-110V, w/ Power Adapter |

## Optional Accessories

| Model No.   | Description                                                             |
|-------------|-------------------------------------------------------------------------|
| 1-E09A22102 | Adapter AC/DC 24V 9.2A 220W with 3pin Terminal Block Plug 5.0mm Pitch   |
| 1-E09A22801 | Adapter AC/DC 24V/11.67A 280W with 3pin Terminal Block Plug 5.0mm Pitch |
| 1-TPCD00005 | Power Cord, 3-pin US Type, 180cm                                        |
| 1-TPCD00002 | Power Cord, European Type, 180cm                                        |
| 1-TPCD00001 | Power Cord, 3-pin UK Type, 180cm                                        |

## Packing List

1x ACO-6000-CML Series Embedded System  
1x Wall Mount Kit  
1x DVI to VGA Adapter

## US Exports And Tariff Codes

|           |              |
|-----------|--------------|
| ECCN      | 5A992.c      |
| HTS       | 8471.50.0150 |
| ScheduleB | 84.71        |

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