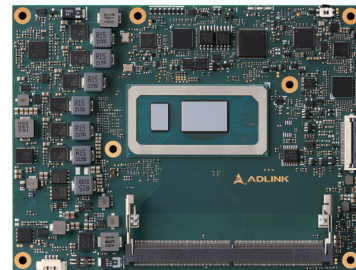


# Express-ADP

COM Express COM.0 R3.1 Type 6 Module  
 based on Intel® Alder Lake-P platform



## Features

- Performance hybrid architecture (P-core, E-core)
- Up to 14 cores, 20 threads at 15W/28W/45W TDP
- Up to 64GB DDR5 SO-DIMM at max. 4800MT/s, non-ECC
- AI inference (AVX-512 VNNI, Iris Xe GPU 96EUs)
- 4 displays via DDI/LVDS (opt. eDP, VGA) and USB4/Thunderbolt 4 (TBC)
- 1 PCIe x8 Gen4, 2 PCIe x4 Gen4, 2.5GbE (TSN opt.)

## Specifications

| Core System | SoC              | 12th Gen Intel® Core™ processors (formerly Alder Lake-P)                                                                                                                                                                                                                                                                                                          |               |       |                  |                |
|-------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------|------------------|----------------|
|             |                  | Processor                                                                                                                                                                                                                                                                                                                                                         | Cores/Threads | Cache | TDP              | Graphics       |
|             |                  | i7-12800HE                                                                                                                                                                                                                                                                                                                                                        | 6P+8E/20T     | 24MB  | 45W(35W cTDP)    | Iris Xe, 96EUs |
|             |                  | i5-12600HE                                                                                                                                                                                                                                                                                                                                                        | 4P+8E/16T     | 18MB  | 45W(35W cTDP)    | Iris Xe 80EUs  |
|             |                  | i3-12300HE                                                                                                                                                                                                                                                                                                                                                        | 4P+4E/12T     | 12MB  | 45W(35W cTDP)    | UHD 48EUs      |
|             |                  | i7-1270PE                                                                                                                                                                                                                                                                                                                                                         | 4P+8E/16T     | 18MB  | 28W(20/35W cTDP) | Iris Xe, 96EUs |
|             |                  | i5-1250PE                                                                                                                                                                                                                                                                                                                                                         | 4P+8E/16T     | 12MB  | 28W(20/35W cTDP) | Iris Xe 80EUs  |
|             |                  | i3-1220PE                                                                                                                                                                                                                                                                                                                                                         | 4P+4E/12T     | 12MB  | 28W(20/35W cTDP) | UHD 48EUs      |
|             |                  | i7-1265UE                                                                                                                                                                                                                                                                                                                                                         | 2P+8E/12T     | 12MB  | 15W(12/28W cTDP) | Iris Xe, 96EUs |
|             |                  | i5-1245UE                                                                                                                                                                                                                                                                                                                                                         | 2P+8E/12T     | 12MB  | 15W(12/28W cTDP) | Iris Xe 80EUs  |
|             |                  | i3-1215UE                                                                                                                                                                                                                                                                                                                                                         | 2P+4E/8T      | 10MB  | 15W(12/28W cTDP) | UHD 64EUs      |
|             |                  | Celeron 7305E                                                                                                                                                                                                                                                                                                                                                     | 1P+4E/5T      | 8MB   | 15W(12/28W cTDP) | UHD 48EUs      |
|             |                  | Note: 28/15W SKUs are supported by project basis only. Please consult your ADLINK representative.                                                                                                                                                                                                                                                                 |               |       |                  |                |
|             |                  | Supports: Intel® VT (including VT-x, VT-d, VT-x with Extended Page Tables), Intel® HT Technology, Intel® SSE4.2, Intel® 64 Architecture, Intel® Turbo Boost Technology 2.0, Intel® AVX512-VNNI, Intel® TXT, Execute Disable Bit, Intel® Data Protection Technology with Intel® Secure Key, Intel® AES-NI                                                          |               |       |                  |                |
|             |                  | Note: Availability of features may vary between processor SKUs.                                                                                                                                                                                                                                                                                                   |               |       |                  |                |
|             | Memory           | Up to 64GB (2x 32GB) DDR5 non-ECC SO-DIMM memory, max. 4800MT/s<br>2 memory channels with 1DPC design                                                                                                                                                                                                                                                             |               |       |                  |                |
|             | Embedded BIOS    | AMI UEFI with CMOS backup in 32 SPI BIOS (dual BIOS opt.)                                                                                                                                                                                                                                                                                                         |               |       |                  |                |
|             | Cache            | See above                                                                                                                                                                                                                                                                                                                                                         |               |       |                  |                |
|             | Expansion Busses | PCIe x8 Gen4, lanes 16-23, available for 45W(35W cTDP SKUs)<br>PCIe x4 Gen4, lanes 24-27<br>PCIe x4 Gen4, lanes 28-31<br>8 PCIe x1 Gen3: Lanes 0/1/2/3 (configurable to x1, x2, x4) and 4 PCIe x1 Gen3: Lanes 4/5/6/7 (via PCIe switch) (depopulate PCIe switch by project basis)<br>LPC bus (via ESPI-to-LPC bridge IC), SMBus (system), I2C (user), GP_SPI(TBC) |               |       |                  |                |

Note: "Build option" indicates an alternative BOM configuration to support additional or alternative functions that are not available on the standard product. Be aware that these "build option" part numbers will need to be newly created and this will result in production lead times.

## Specifications

|                       |                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | SEMA Board Controller                                                                                     | Supports: Voltage/current monitoring, power sequence debug support, AT/ATX mode control, logistics and forensic information, genral purpose I <sup>2</sup> C, UART, GPIO, watchdog timer, fan control                                                                                                                                                                                                   |
|                       | Debug Headers                                                                                             | 30-pin multipurpose flat cable connector for use with DB30-x86 debug module providing BIOS POST code LED, SEMA Board Controller access, SPI BIOS flashing, power testpoints, debug LEDs                                                                                                                                                                                                                 |
| Video                 | GPU Feature Support                                                                                       | Intel® Iris Xe or UHD Graphics Core Architecture, max. 96EUs, supporting 4 concurrent display combinations of DisplayPort/HDMI/LVDS/eDP/VGA and Display alternative mode through USB4/Thunderbolt4 outputs 1x 8K30 or 4x 4K60<br>Hardware video encode/decode, up to 8K60 HEVC<br>DirectX 12, OpenGL 4.6, Vulkan 1.2, Mesa 3D support<br>OneVPL<br>HDCP 2.3<br>Graphics Hardware Virtualization (SRIOV) |
|                       | Digital Display Interface                                                                                 | DDI 1/2/3 supporting DP 1.4a, HDMI 2.1, DVI                                                                                                                                                                                                                                                                                                                                                             |
|                       | VGA                                                                                                       | Supported by build option via DP-to-VGA IC (in place of DDI 3), max. resolution 1920x1200@60Hz                                                                                                                                                                                                                                                                                                          |
|                       | LVDS                                                                                                      | Single/dual channel 18/24-bit LVDS from eDP-to-LVDS IC, max. resolution 1920x1200@60Hz in dual mode                                                                                                                                                                                                                                                                                                     |
|                       | eDP                                                                                                       | Build option in place of LVDS, 4 lanes, eDP 1.4b                                                                                                                                                                                                                                                                                                                                                        |
|                       | USB4                                                                                                      | Max. 2x USB4 in place of DDI 1/2, supports DP 1.4a by DP alternative mode, Thunderbolt 4 capable (TBC)<br>Requires BIOS code modification by project basis, re-timer with PD on carrier                                                                                                                                                                                                                 |
| Audio                 | Chipset                                                                                                   | Integrated on SoC                                                                                                                                                                                                                                                                                                                                                                                       |
|                       | Codec                                                                                                     | On carrier Express-BASE6 (ALC886 standard support)                                                                                                                                                                                                                                                                                                                                                      |
| Ethernet              | Intel® MAC/PHY                                                                                            | Intel® Ethernet Connection I225 series (I225-IT supports TSN by build option)                                                                                                                                                                                                                                                                                                                           |
|                       | Interface                                                                                                 | 2.5GbE and 1000/100/10 Mbit/s Ethernet connection<br>GbE0_SDP if TSN support enabled (TBC)                                                                                                                                                                                                                                                                                                              |
| Multi I/O and Storage | USB                                                                                                       | 4x USB 3.2/2.0/1.1 (USB 0-3), 4x USB 2.0/1.1 (USB 4-7)<br>2x SATA 6Gb/s (SATA 0-1)<br>Max. two USB4 (in place of DDI 1/2) by project basis, Thunderbolt 4 capable (TBC)                                                                                                                                                                                                                                 |
|                       | On-board Storage                                                                                          | NVMe SSD in place of PCIe lanes 28-31 (build option, project basis)                                                                                                                                                                                                                                                                                                                                     |
|                       | Serial                                                                                                    | 2x UART ports with console redirection                                                                                                                                                                                                                                                                                                                                                                  |
|                       | GPIO                                                                                                      | 8x GPIO (GPI with interrupt)                                                                                                                                                                                                                                                                                                                                                                            |
| Super I/O             | Supported on carrier if needed (standard support W83627DHG-P, other Super I/O supported by project basis) |                                                                                                                                                                                                                                                                                                                                                                                                         |
| TPM                   | Chipset                                                                                                   | Infineon                                                                                                                                                                                                                                                                                                                                                                                                |
|                       | Type                                                                                                      | TPM 2.0 (SPI based)                                                                                                                                                                                                                                                                                                                                                                                     |
| Power                 | Standard Input                                                                                            | ATX: 12V±5% / 5Vsb ±5%; or AT: 12V±5%                                                                                                                                                                                                                                                                                                                                                                   |
|                       | Wide Input                                                                                                | ATX: 8.5-20V / 5Vsb ±5%; or AT: 8.5-20V                                                                                                                                                                                                                                                                                                                                                                 |
|                       | Management                                                                                                | ACPI 5.0 compliant, Smart Battery support (TBC)                                                                                                                                                                                                                                                                                                                                                         |
|                       | Power States                                                                                              | C1-C6, S0, S1, S3, S4, S5, S5 ECO mode (Wake on USB S3/S4, WOL S3/S4/S5) (TBC)                                                                                                                                                                                                                                                                                                                          |
|                       | ECO Mode                                                                                                  | Supports deep S5 mode for power saving                                                                                                                                                                                                                                                                                                                                                                  |

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## Specifications

|                              |                       |                                                                                                                                            |
|------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanical and Environmental | Form Factor           | PICMG COM.0: Rev 3.1 Type 6                                                                                                                |
|                              | Dimension             | Basic size: 125 mm x 95 mm                                                                                                                 |
|                              | Operating Temperature | Standard: 0°C to 60°C (storage: -20°C to 80°C)<br>Extreme Rugged: -40°C to 85°C (storage: -40°C to 85°C, TBC, build option, selected SKUs) |
|                              | Humidity              | 5-90% RH operating, non-condensing<br>5-95% RH storage (and operating with conformal coating)                                              |
|                              | Shock and Vibration   | IEC 60068-2-64 and IEC-60068-2-27<br>MIL-STD-202F, Method 213B, Table 213-I, Condition A and Method 214A, Table 214-I, Condition D (TBC)   |
|                              | HALT                  | Thermal Stress, Vibration Stress, Thermal Shock and Combined Test                                                                          |
| Operating Systems            | Standard Support      | Windows 10 IOT Enterprise LTSC, Ubuntu 64-bit, Yocto project-based Linux 64-bit (TBC), VxWorks (TBC)                                       |

## Ordering Information

### Starter Kit

COM Express Type 6 Starter Kit Plus Starter kit for COM Express Type 6

### Module

|                        |                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------|
| Express-ADP-i7-12800HE | Basic size COM Express Type 6 module based on Intel Alder Lake-P i7-12800HE 3.5GHz/14C 45W   |
| Express-ADP-i5-12600HE | Basic size COM Express Type 6 module based on Intel Alder Lake-P i5-12600HE 3.3GHz/12C 45W   |
| Express-ADP-i3-12300HE | Basic size COM Express Type 6 module based on Intel Alder Lake-P i3-12300HE 3.3GHz/8C 45W    |
| Express-ADP-i7-1270PE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i7-1270PE 3.3GHz/12C 28W    |
| Express-ADP-i5-1250PE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i5-1250PE 3.2GHz/12C 28W    |
| Express-ADP-i3-1220PE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i3-1220PE 3.1GHz/8C 28W     |
| Express-ADP-i7-1265UE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i7-1265UE 3.5GHz/10C 15W    |
| Express-ADP-i5-1245UE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i5-1245UE 3.3GHz/10C 15W    |
| Express-ADP-i3-1215UE  | Basic size COM Express Type 6 module based on Intel Alder Lake-P i3-1215UE 3.3GHz/6C 15W     |
| Express-ADP-7305E      | Basic size COM Express Type 6 module based on Intel Alder Lake-P Celeron 7305E 1.0GHz/5C 15W |

## Accessories

### Heat Spreaders

|            |                                                                           |
|------------|---------------------------------------------------------------------------|
| HTS-ADP-B  | Heatspreader for Express-ADP with threaded standoffs for bottom mounting  |
| HTS-ADP-BT | Heatspreader for Express-ADP with through-hole standoffs for top mounting |

### Passive Heatsinks

|             |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| THS-ADP-BL  | Low-profile Heatsink for Express-ADP with threaded standoffs for bottom mounting  |
| THS-ADP-BTL | Low-profile Heatsink for Express-ADP with through-hole standoffs for top mounting |
| THSH-ADP-BL | High-profile Heatsink for Express-ADP with threaded standoffs for bottom mounting |

### Active Heatsinks

|             |                                                                                            |
|-------------|--------------------------------------------------------------------------------------------|
| THSF-ADP-BL | High-profile Heatsink with Fan for Express-ADP with threaded standoffs for bottom mounting |
|-------------|--------------------------------------------------------------------------------------------|

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