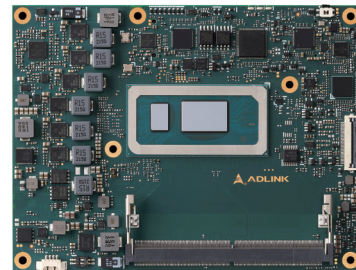


# Express-ADP

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

Preliminary



## 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.)
- Extreme Rugged operating temperature (optional, selected SKUs)

## Specifications

Core System	SoC	12th Gen Intel® Core™ processors (formerly Alder Lake-P)																				
		<table border="1"> <thead> <tr> <th>Processor</th> <th>Cores/Threads</th> <th>Cache</th> <th>TDP</th> <th>Graphics</th> </tr> </thead> <tbody> <tr> <td>Core™ i7-12800HE</td> <td>6P+8E/20T</td> <td>24MB</td> <td>45W(35W cTDP)</td> <td>Iris Xe GPU</td> </tr> <tr> <td>Core™ i5-12600HE</td> <td>4P+8E/16T</td> <td>18MB</td> <td>45W(35W cTDP)</td> <td>Iris Xe GPU</td> </tr> <tr> <td>Core™ i3-12300HE</td> <td>4P+4E/12T</td> <td>12MB</td> <td>45W(35W cTDP)</td> <td>UHD GPU</td> </tr> </tbody> </table>	Processor	Cores/Threads	Cache	TDP	Graphics	Core™ i7-12800HE	6P+8E/20T	24MB	45W(35W cTDP)	Iris Xe GPU	Core™ i5-12600HE	4P+8E/16T	18MB	45W(35W cTDP)	Iris Xe GPU	Core™ i3-12300HE	4P+4E/12T	12MB	45W(35W cTDP)	UHD GPU
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		Note: Some processor 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 2 memory channels with 1DPC design																				
	Embedded BIOS	AMI UEFI with CMOS backup in 32 SPI BIOS (dual BIOS opt.)																				
	Cache	Core™ i7-12800HE : 24MB Core™ i5-12600HE / Core™ i7-1270PE : 18MB Core™ i3-12300HE / Core™ i5-1250PE / Core™ i3-1220PE / Core™ i7-1265UE / Core™ i5-1245UE : 12MB Core™ i5-1245UE : 10MB Celeron 7305E : 8MB																				
	Expansion Busses	PCIe x8 Gen4, lanes 16-23, available for 45W(35W cTDP SKUs) PCIe x4 Gen4, lanes 24-27 PCIe x4 Gen4, lanes 28-31 8 PCIe x1 Gen3: Lanes 0/1/2/3 (configurable to x1, x2, x4) and 4 PCIe x1 Gen3: Lanes 4/5/6/7 LPC bus (via ESPI-to-LPC bridge IC), SMBus (system), I2C (user), GP_SPI(TBC)																				

## 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 Hardware video encode/decode, up to 8K60 HEVC DirectX 12, OpenGL 4.6, Vulkan 1.2, Mesa 3D support OneVPL HDCP 2.3 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) 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 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) 2x SATA 6Gb/s (SATA 0-1) 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

## 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) 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 5-95% RH storage (and operating with conformal coating)
	Shock and Vibration	IEC 60068-2-64 and IEC-60068-2-27 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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## Block diagram

