12th Gen Intel® Core™ Mobile Processor Reference Design based on Intel® Edge Scalable Design (Alder Island)

Product Brief

March 2025

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Revision History

Date	Revision	Description
March 2025	1.0	Initial release.

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1.0 Introduction

The Alder Island Reference Design is a platform developed by Intel, featuring the 12th Gen Intel® Core™ Mobile Processor, specifically tailored for network and edge applications.

Key features of the Alder Island Reference Design include:

- **3.5" SBC Form Factor**: The design is based on a 3.5-inch Single Board Computer (SBC) form factor, which is compact and suitable for various applications.
- **DDR5 SODIMM Dual Channel**: It supports DDR5 SODIMM memory in a dual-channel configuration, enhancing memory bandwidth and performance.
- **HDMI 2.1 LSPCON**: The design supports HDMI 2.1 with LSPCON (Level Shifter and Protocol Converter), Enabling high-resolution video output up to 8K.
- **Intel® Ethernet Controller I225 with TSN**: It includes the Intel® Ethernet Controller I225 with Time-Sensitive Networking (TSN) capabilities, which is beneficial for real-time data transmission in networked environments.
- **Supports HDMI Capture via MIPI CSI**: The design allows for HDMI capture through the MIPI CSI interface, which is useful for video processing and streaming applications.

Overall, the Alder Island Reference Design is a comprehensive solution for developers looking to create high-performance, energy-efficient devices for network and edge computing applications, leveraging the latest Intel technologies.

1.1 Terminology

Table 1. Terminology

Term	Description
HDMI	High-Definition Multimedia Interface
TSN	Time-Sensitive Networking
MIPI CSI	Mobile Industry Processor Interface Camera Serial Interface
LSPCON	Level Shifter and Protocol Converter
SIO	Super Input Output
eSPI	Enhanced Serial Peripheral Interface
DP	Display Port
eDP LVDS	Embedded Display Port with Low-Voltage Differential Signaling

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1.2   Reference Documents

Log in to the Resource and Documentation Center (rdc.intel.com) to search for and download the document numbers listed in the following table. Contact your Intel field representative for access.

Note: NDA Customers can access Alder Island Design Collaterals after obtaining a Design Licensing Agreement with Intel.

Table 2.   Alder Island Reference Documents

Document	Document No./Location
Alder Island Hardware Specifications	641806
Schematics PDF	638048
Schematic Cadence Format	638052
Schematic OrCAD Format	638053
Schematic Zuken Format	638054
Schematic Mentor Format	638055
Board Layout Files	638049
Bill of Materials (BOM)	638050
Tape Out Manufacturing Files	638051
Thermal Mechanical Design Guide (TMDG)	638057
User Guide	638056
Gold Deck	682318

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2.0   Alder Island Reference Design Specifications

Alder Island Reference Design, featuring the 12th Gen Intel® Core™ Mobile Processor, is tailored for network and edge applications, offering a compact 3.5" SBC form factor. The following section describes the high-level details and specifications of this cutting-edge platform.

Figure 1.   Alder Island Reference Design Landing Zone
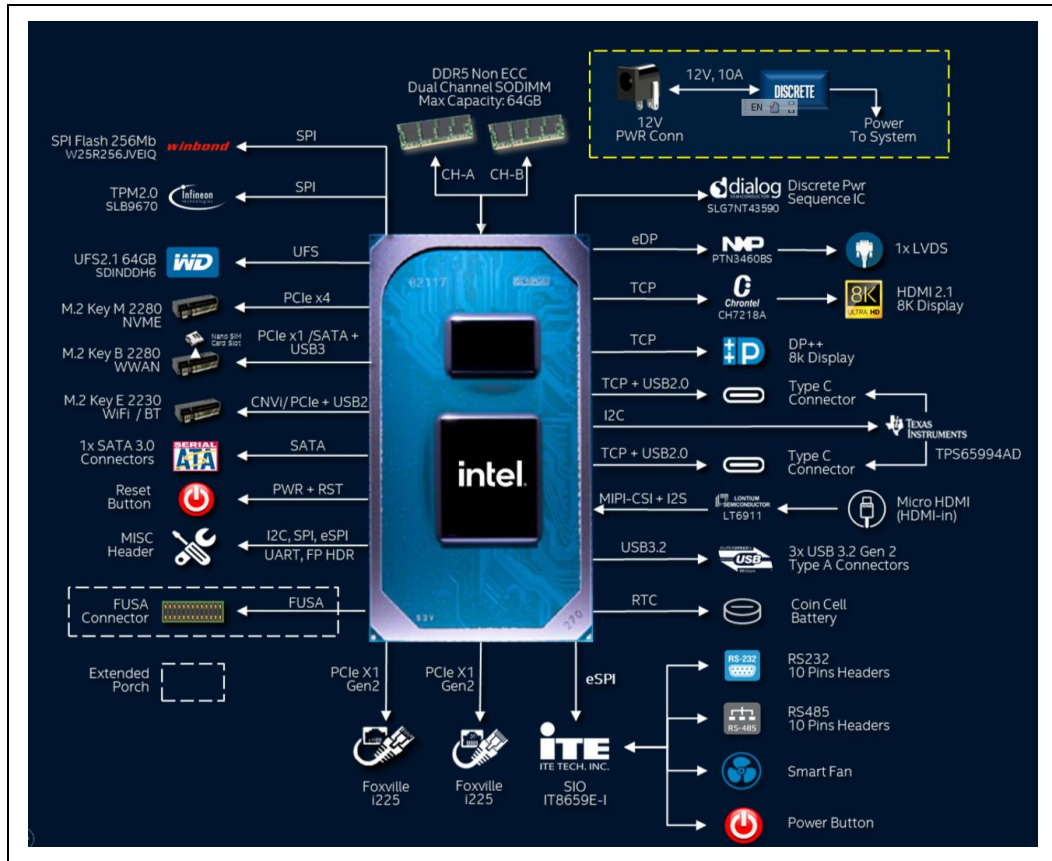
2.1   Alder Island Specification Overview Ingredients

Table 3.   Technical Specification Summary

Specification	Details
SoC	12th Gen Intel® Core™ Mobile Processor
Dimensions	3.5" SBC - 146mm x102mm
Layers	Type 3 PCB, 12 Layers
Memory	DDR5 SODIMM, 4800MT/s, Non-ECC, max 64GB
Display Out	Display Output (Maximum of 4 displays at one time)

	▪ 1x HDMI connector (HDMI2.1 – 8K) ▪ 2x Type-C Connector (DP1.4a) ▪ 1x Standard DP++ connector (DP1.4a) ▪ 1x LVDS Connector (eDP-LVDS)
Display In	1x micro-HDMI (LT6911 HDMI in – MIPI CSI)
Storage	1x M.2 Key B 2280 SSD [SATA] 1x M.2 Key M 2280 [PCIe x4 NVME] 1x SATA3.0 Connector with PWR headers 1x UFS2.1 64GB [SDINDDH6] 256MB SPI Chip [W25R256JWEIO]
USB	3x USB 3.2 Gen 2 Type-A Connector 2x USB 3.2 Gen 2 x1 Type-C Connector
Connectivity	2x Intel® Ethernet Controller I225 (2.5Gb) 'Foxville' 1x M.2 Key E 2230 for Wi-Fi/ Bluetooth® 1x M.2 Key B 2280 for WWAN (LTE/5G with 3052 KOZ) 1x Nano SIM Slot
Super IO	eSPI Super IO [IT8659E-I]
Expansion Slots	1x FUSA connector
Headers	eSPI HDR Front Panel HDR Fan Header UART HDR (SOC) RS232 HDR (SIO) RS485 HDR (SIO)
Security	TPM SLB9670VQ2.0
Power	12V, 10A Input Discrete Solution
Chassis	Open Chassis
Cooling	Active
Operating Temperature	Operating: 0 ~ 60 °C

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3.0   Call to Action

To obtain Alder Island design documents from Intel, an NDA (Non-Disclosure Agreement) and Design Licensing Agreement must be signed. This ensures compliance with legal and corporate policies while facilitating seamless collaboration between your company and Intel.

For our existing customers, please contact your Intel sales representative for more information about these agreements and how to proceed.

If you are new to Intel, please contact us at https://builders.intel.com/contact-us.

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