Intel® NUC Compute Element
Carrier Board Design Overview

Revision Number 1.1
January 2020
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# Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
<th>Date</th>
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<tbody>
<tr>
<td>1.0</td>
<td>First Release</td>
<td>Dec 2019</td>
</tr>
<tr>
<td>1.1</td>
<td>Added sections on carrier board design and reference design package</td>
<td>Jan 2020</td>
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1 Introduction

There are hardware components and firmware components required to design a carrier board for the Intel® NUC Compute Element. This document is an overview of the design guides and supporting collateral available for designing an Intel® NUC Compute Element Carrier Board. This collateral will provide the needed information to allow for the design of a carrier board. Support will also be required from hardware and firmware suppliers.

For more information about the Intel® NUC Compute Element, visit the Intel® NUC Compute Element website.

2 Carrier Board Design

A carrier board is a board with a 300-pin connector for the NUC Compute Element that includes power, I/O ports, storage and other peripheral options to allow the NUC Compute Element to function.

There are options for obtaining a carrier board that can be used for your design.

- Use an off the shelf carrier board design from Intel that meets your requirements
  - Visit the NUC Compute Element website to see the products offered by Intel and other eco-system suppliers
- Use a third-party designer to design a carrier board that meets your requirements
  - Intel may be able to assist in finding an ODM
- Design your own carrier board that meets your requirements
  - Experience in schematic design and board layout design using components for computer systems will be necessary
  - Experience with embedded controllers and embedded controller firmware will be necessary
  - A design guide and a reference design are available
3 Embedded Controller

An Embedded Controller will be needed on the carrier board to support eSPI virtual wire signals (SLP_Sx, SUS_XXX), SMBus, interrupts, GPIO support, ACPI power management, battery management and other communications between the carrier board and the NUC Compute Element. Intel designed carrier board solutions are using the ITE IT5571 Embedded Controller. Refer to the design guide for details on the embedded controller and firmware. Firmware support using this controller is available from ITE. The ITE contact is Austin Chang.

Product Planning Manager for Desktop SIO product and IPC Marketing
9F, NO. 232-2, Baoqiao Rd., Xindian Dist, New Taipei City, 23145, Taiwan
Tel: 02-2912-6889 Ext: 6083
Email: austin.chang@ite.com.tw

4 NUC Compute Element Connector

A 300-pin connector has been developed for the interface between the NUC Compute Element and the carrier board. The details of this connector are covered in the design guide. The Lotes contact is Cathy Yang.

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Fax: 86-20-84682478
Mobile: 86-136-40250028 (Short Group Number:660028)
Email: cathy@lotes.com.cn

5 Reference Design Package

A reference design package is available to assist in designing a carrier board. This reference design is an example of a carrier board only solution for the Intel® NUC Compute Element. The package can be used as is for a carrier board design or as a starting point for a customized carrier board design. This reference design package includes the following:

- Schematics – Full board schematics in PDF format
- Board File – Full board layout in Allegro format
- 3D CAD File – Model in STEP format for the board
- BOM Files – Bill of Materials for the board
- Element Configuration Data (ECD) file – platform specific information
- Binary Modification Program (BMP) Utility – used to program EC firmware image
6 Collateral Lists

Table 1. Product Specifications

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Intel® NUC 8 Essential Compute Element CM8CCB4R and CM8PCB4R</td>
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<tr>
<td>Intel® NUC 8 Pro Compute Element CM8I3CB4N, CM8I5CB4N, CM8I7CB4N, CM8V5CB4N and CM8V7CB4N</td>
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<tr>
<td>Intel® NUC Pro Assembly Element CMA1BB</td>
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<td>Intel® NUC Pro Board Element CMB1BB, CMB1ABA and CMB1ABB</td>
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<tr>
<td>Intel® NUC Rugged Chassis Element CMCR1ABA and CMCR1ABB</td>
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The technical product specification documents in Table 1 are publicly available and can be located on the [Intel® NUC Compute Element Support website](https://support.intel.com).

Table 2. Design Collateral

<table>
<thead>
<tr>
<th>Title</th>
<th>Number</th>
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<tbody>
<tr>
<td>Intel® NUC Compute Element Carrier Board Design Guide</td>
<td>610837</td>
</tr>
<tr>
<td>Intel® NUC Compute Element Exterior Drawing</td>
<td>616816</td>
</tr>
<tr>
<td>Reference Design Package</td>
<td>616815</td>
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</tbody>
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The guides in Table 2 are Intel Confidential and can only be downloaded from [MyIntel](https://myintel.intel.com) under CNDA.

Table 3. Other Collateral

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<tr>
<td>Processor External Design Specification (EDS)</td>
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<tr>
<td>Platform Controller Hub External Design Specification</td>
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<tr>
<td>Platform Design Guide</td>
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<tr>
<td>Thermal and Mechanical Design Guide</td>
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</table>

The collateral in Table 3 can be useful as a reference when designing a carrier board solution. This collateral is processor specific. Determine the processor used on the Intel® NUC Compute Element to determine the collateral to reference. This collateral is Intel Confidential and can only be downloaded from [MyIntel](https://myintel.intel.com) under CNDA.