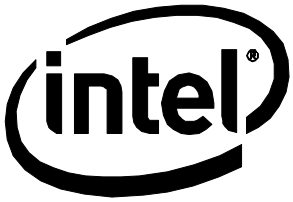


Embedded Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset

Development Kit User's Manual

February 2012
Order Number: 326544

Revision History

Revision	Revision History	Date
001	First release of the Intel® Atom™ D2700 Processor with NM10 Express Chipset Development Kit User's Manual	January 2012
002	Updated link in Section 7	February 2012

This product specification applies to only the standard Intel® Embedded Board D2700 with BIOS identifier CCCDT10N.86A.

Component Information

The Intel® Atom™ Processor D2700 and NM10 Express Chipset used on the Intel® Embedded Board D2700 include the following component stepping, identifiable by associated S-Spec numbers:

Device	Stepping	S-Spec Number
D2700	B2	SR0D9
NM10	B0	SLGXX

Ordering Information

The name of this Development Kit is the ***Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset Development Kit***. This document is the user guide for this Kit.

For ordering purposes, the part number of the Kit is ***EMBCDTNMCCDVK***, and the kit's product code is ***MM# 920352.***

The product brief and other collaterals for the platform based on the Intel® Atom™ Processor D2700 and NM10 Express Chipset can be downloaded at:
http://www.intel.com/p/en_US/embedded/hwsw/hardware/atom-n2000-d2000/hardware

This kit comprises a chassis, peripherals, cables, and an Intel® mini-ITX sized Embedded Board D2700 which includes the two Intel devices which comprise the platform - the Intel® Atom™ processor D2700 and Intel® NM10 Express chipset. In addition, this kit also includes an SSD (Solid State Disk) for the Operating System Image, and a USB Stick for additional components, and tools.

Preface

This User's Manual specifies the typical hardware set-up procedures, features, and use of the evaluation board and other components included in the Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset Development Kit. The Intel® Embedded Board D2700 is mounted inside the Development Kit and functions as the mainboard for the entire mini-ITX chassis.

Intended Audience

This manual is written for OEMs, system evaluators, and embedded system developers. The manual is intended to provide detailed, technical information about the development kit and its components. It is specifically *not* intended for general audiences and assumes basic familiarity with the fundamental concepts involved with installing and configuring hardware for a personal computer system.

What This Document Contains

Chapter	Description
1	Development kit contents
2	Evaluation board hardware and contents
3	A map of the resources of the Intel Embedded Board
4	The features supported by the BIOS
5	A description of the BIOS error messages, beep codes, and POST codes
6	Assembling/Disassembling the development kit
7	Operating System references
8	Battery disposal information

Typographical Conventions

This section contains information about the conventions used in this specification. Not all of these symbols and abbreviations appear in all specifications of this type.

Notes, Cautions, and Warnings

NOTE

Notes call attention to important information.

CAUTION

Cautions are included to help you avoid damaging hardware or losing data.

Other Common Notations

#	Used after a signal name to identify an active-low signal (such as USBP0#)
GB	Gigabyte (1,073,741,824 bytes)
GB/s	Gigabytes per second
Gb/s	Gigabits per second
KB	Kilobyte (1024 bytes)
Kb	Kilobit (1024 bits)
kb/s	1000 bits per second
MB	Megabyte (1,048,576 bytes)
MB/s	Megabytes per second
Mb	Megabit (1,048,576 bits)
Mb/s	Megabits per second
TDP	Thermal Design Power
xxh	An address or data value ending with a lowercase h indicates a hexadecimal value.
x.x V	Volts. Voltages are DC unless otherwise specified.
*	This symbol is used to indicate third-party brands and names that are the property of their respective owners.

Contents

Figures

Tables

1 Development Kit Contents

1.1 Included Hardware and Documentation

- Each development kit ships as a complete system in a mini-ITX chassis (Size: 192x210x62mm)

- Intel® Embedded Board D2700 with Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset installed in chassis

- 2 GB DDR3 1066 MT/s non-ECC memory SO-DIMM
- SSD (Solid State Disk), with a Yocto Project* based Linux Operating System pre-installed, with power and SATA extension cable
- Power supply-60W Desktop type AC/DC switching mode power supply

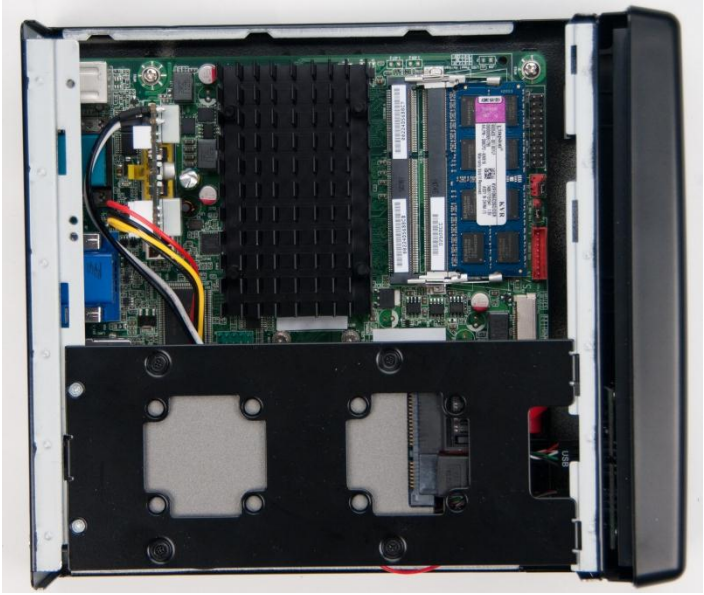
- picoPSU-120, 120W output, 12V input DC-DC power supply adapter

- USB Stick with documentation and software

1.2 Development Kit Images

1.2.1 Front

1.2.2 Inside



1.2.3 Back

2 Intel® Embedded Board D2700 Overview

2.1 Overview

2.1.1 Feature Summary

Table 1 summarizes the features of Intel® Embedded Board D2700.

Table 1. Feature Summary

Form Factor of D2700 Embedded Board	Mini-ITX (6.7 inches by 6.7 inches [170 millimeters by 170 millimeters]) compatible with microATX
Processor	Passively-cooled, soldered-down Dual-Core Intel® Atom™ processor D2700 with integrated graphics and integrated memory controller
Memory	• Two 204-pin DDR3 SDRAM Small Outline Dual Inline Memory Module (SO-DIMM) sockets • Support for DDR3 1066 MHz, DDR3 1333 MHz, and DDR3 1600 MHz SO-DIMMs Note: DDR3 1333 MHz and DDR3 1600 MHz memory will run at 1066 MHz • Support for up to 4 GB of system memory on a single SO-DIMM (or two 2 GB SO-DIMMs)
Chipset	Intel® NM10 Express Chipset
Audio	Multi-streaming 5.1 (6-channel) audio subsystem support based on the Realtek* ALC662 high definition audio codec
Graphics	Onboard Intel® graphics subsystem with support for: • Analog displays (VGA) • Digital displays (DVI-I) • Flat Panel displays (LVDS interface)
Legacy I/O Control	Winbond* W83627DHG-P based Legacy I/O controller for hardware management, serial, parallel, and PS/2* ports
Peripheral Interfaces	• Seven USB 2.0 ports: — Four back panel ports — Two ports are implemented with a dual port internal header for front panel cabling — One port is implemented with an internal header (brown-colored) that supports an Intel® Z-U130 USB Solid-State Drive or compatible device • Two Serial ATA (SATA) 3.0 Gb/s connectors (supporting IDE and AHCI mode) • One parallel port header • Two serial port connectors on the back panel • Two serial port headers • One PS/2-style keyboard port • One PS/2-style mouse port
LAN Support	Two Intel® 82574L Gigabit (10/100/1000 Mb/s) Ethernet LAN Controllers including two RJ45 back panel connectors for dual LAN subsystems.

Table 1. Feature Summary (continued)

BIOS	• Intel® BIOS resident in the Serial Peripheral Interface (SPI) Flash device • Support for Advanced Configuration and Power Interface (ACPI), Plug and Play, and System Management BIOS (SMBIOS)
Instantly Available PC Technology	• Suspend to RAM support • Wake on PCI, PCI Express*, PS/2, serial, front panel, USB ports, and LAN
Expansion Capabilities	• One Conventional PCI bus connector (with riser card support for up to two PCI cards) • One PCI Express Full-/Half-Mini Card slot
Hardware Monitor Subsystem	• Hardware monitoring through the Winbond I/O controller • Voltage sense to detect out of range power supply voltages • Thermal sense to detect out of range thermal values • One fan header • One fan sense input used to monitor fan activity • Fan speed control

2.1.2 Board Layout

Figure 1 shows the location of the major components.

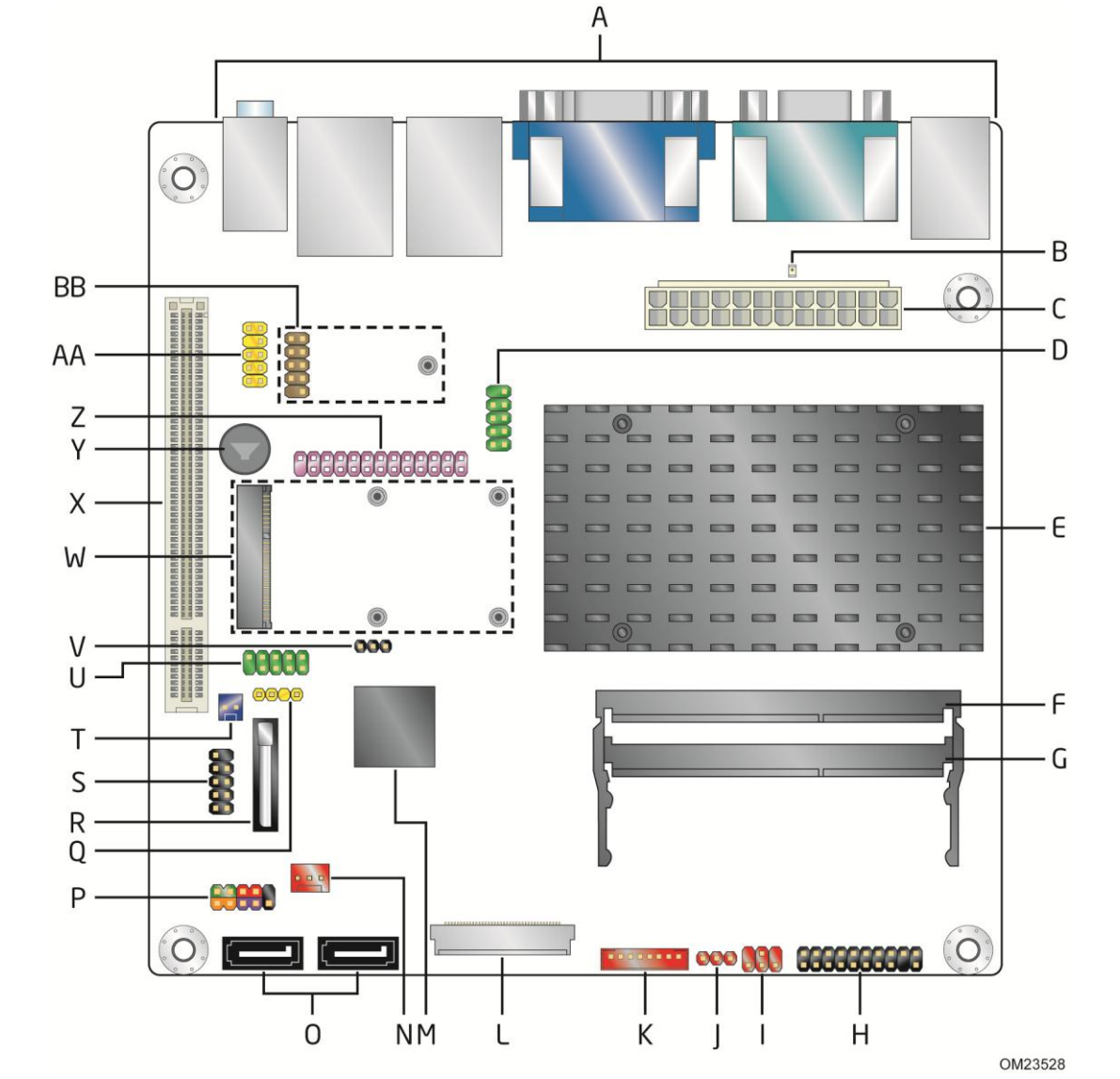


Figure 1. Major Board Components (Top)

Table 2 lists the components identified in Figure 1.

Table 2. Board Components Shown in Figure 1

Item/callout from Figure 1	Description
A	Back panel connectors
B	Standby power LED
C	Processor core power connector (2 x 12)
D	Serial port header
E	Intel Atom processor
F	SO-DIMM channel A DIMM 0 socket
G	SO-DIMM channel A DIMM 1 socket (Populate DIMM 1 when using a single SO-DIMM)
H	Trusted Platform Module (TPM) header
I	Backlight inverter voltage selection jumper
J	Flat panel voltage selection jumper
K	FPD brightness connector
L	LVDS data connector
M	Intel NM10 Express Chipset
N	System fan header
O	SATA connectors
P	Front panel header
Q	S/PDIF header
R	Battery
S	Front panel USB 2.0 header
T	Front Panel Wireless Activity LED header
U	Serial port header
V	BIOS setup configuration jumper block
W	PCI Express Full-/Half-Mini Card slot
X	Conventional PCI bus add-in card connector
Y	Piezoelectric speaker
Z	Parallel port header
AA	Front panel audio header
BB	Front panel USB header with Intel Z-U130 USB Solid-State Drive or compatible device support (brown-colored)

2.1.3 Block Diagram

Figure 2 is a block diagram of the major functional areas of the Intel® Embedded Board D2700.

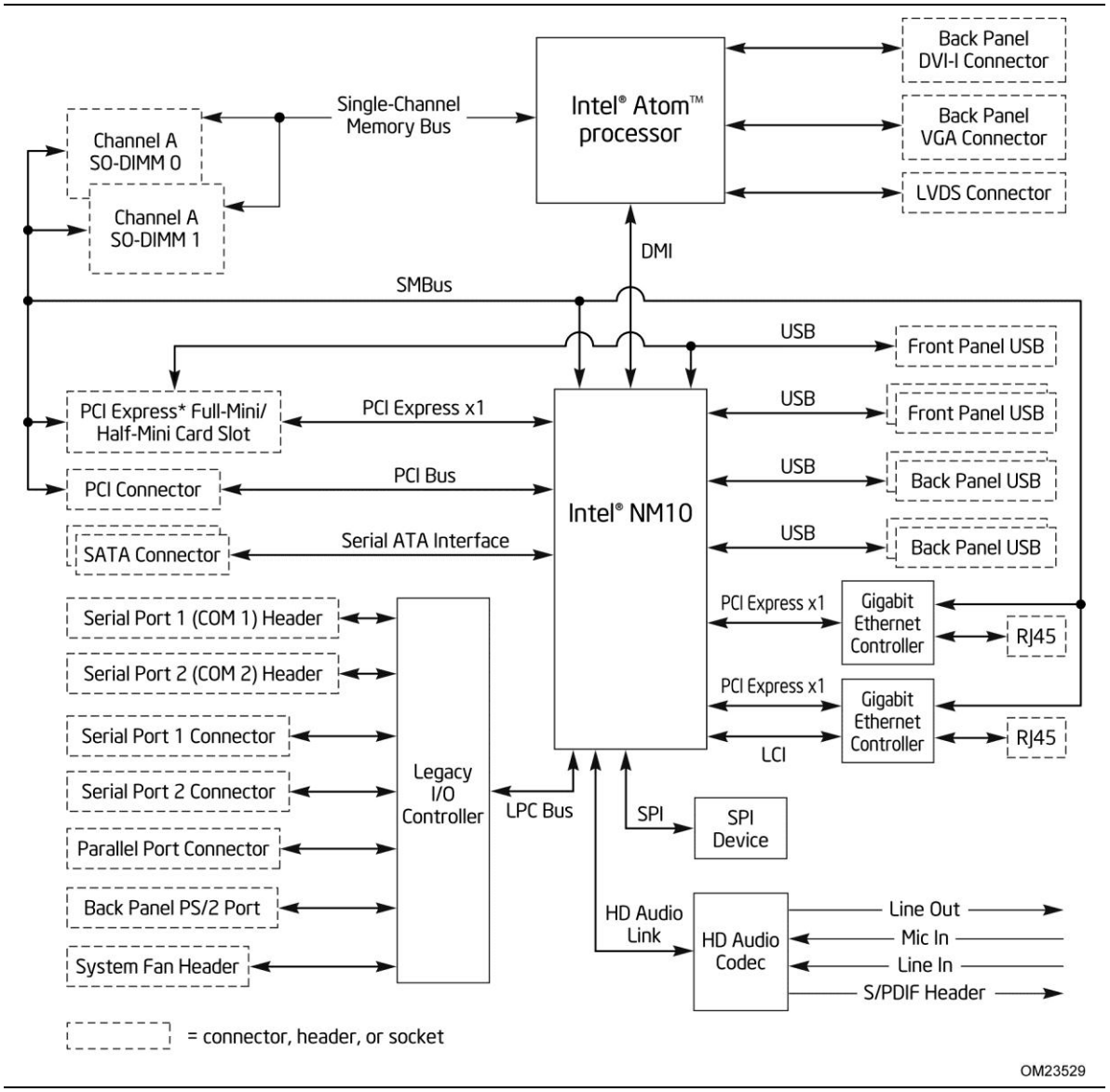


Figure 2. Block Diagram of Development Kit

2.2 Online Support

For information about…	Visit this web site:
Intel® Atom™ Processor D2700 and NM10 Express Chipset Platform Overview	http://www.intel.com/p/en_US/embedded/hwsw/hardware/atom-n2000-d2000/overview
Chipset information	http://www.intel.com/products/desktop/chipsets/index.htm (Search for NM10 Express Chipset)
BIOS and driver updates	http://downloadcenter.intel.com
Tested memory	http://www.intel.com/support/motherboards/desktop/sb/CS-025414.htm
Solid State Drives (SSD)	http://ark.intel.com/ (Click on SOLID STATE DRIVES link on the right)
Integration information	http://www.intel.com/support/go/buildit
Roadmap information, tools, software, technical documents	Intel Embedded Design Center: http://www.intel.com/p/en_US/embedded/hwsw/hardware/atom-n2000-d2000/hardware

2.3 Supported Operating Systems

The following independent operating systems are supported for this platform:

Operating System - Driver Support
Microsoft Windows* 7 - Intel provides drivers
Microsoft Windows* Embedded Standard 7- Intel provides drivers
Microsoft Windows* XP - Intel provides drivers
Microsoft Windows* Embedded CE 7 - Intel provides drivers
MeeGo* 1.2 - Intel provides drivers
Yocto Project* - Intel provides drivers
Wind River* VxWorks* – Wind River provides drivers

Intel strives to provide customers with a complete development environment supporting customer applications and operating systems. Any software provided in development kits is subject to change without notice.

For the latest information on operating system and BIOS support refer to the Intel Embedded Design Center: http://www.intel.com/p/en_US/embedded/hwsw/hardware/atom-n2000-d2000/software

2.4 BIOS vendors

The BIOS vendors are:

BIOS vendors
American Megatrends*
Insyde Software*
Phoenix Technologies
Byosoft*

2.5 Processor

The board has a passively-cooled, soldered-down Dual-Core Intel® Atom™ processor D2700 with integrated graphics and integrated memory controller.

NOTE

The board is designed to be passively cooled in a properly ventilated chassis. Chassis venting locations are recommended above the processor area for maximum heat dissipation effectiveness.

For information about	Refer to
Power supply connectors	Section 3.2.2.3

2.5.1 Intel® Embedded Board D2700 Graphics Subsystem

2.5.1.1 Intel® Graphics Media Accelerator 3600 Graphics Controller (Intel® GMA)

The Intel® Atom™ Processor D2700 contains an integrated graphics core, the Intel® GMA 3600 graphics controller, which features the following functionalities:

- High quality texture engine
  - DirectX* 9.0c and OpenGL* 3.0 compliant
  - Hardware Pixel Shader 4.1
  - Vertex Shader Model 4.1
- 640 MHz graphics core frequency
- 200 MHz render clock frequency
- Seven display planes, Display Plane A, B, Display Sprite C (can be connected to either pipe), Display OV (can be connected to either pipe), Cursor A, Cursor B, and VGA
- Two display pipes, Pipe A and B support the dual independent displays
- Max Pixel Clock: SC LVDS: 112 MHz, 18bpp and 24bpp; DDI: 2x 4, 1.62GHz, 2.7GHz; VGA: up to 350MHz
- Display Ports: DVI-I, LVDS (single channel), VGA (CRT/DAC)
- Embedded panel: LVDS
- External panel: DVI-I (HDMI w/adapter), LVDS, VGA (CRT/DAC)
- Supports HDCP 1.3 & PAVP1.1c for Bluray playback (HDCP is needed for High Definition playback)
  - PAVP: Collection of HW-based security mechanisms designed to provide a secure path for content from a media player application to the graphics hardware
  - HDCP: Specification developed by Intel Corporation to protect digital entertainment content across the DVI interface
  - Subsequently ported to HDMI and Display Port
- Supports HDMI 1.3a through SW lip-sync
- Supports DX*9
- Supports NV12 data format
- 3x3 Panel Fitter shared by two pipes
- Supports Intel® HD Audio Codec
- Supports Intel® Display Power Saving Technology (Intel® DPST) 4.0
- No Frame Buffer Compensation (FBC)
- No TVOut

Table 3 summarizes the resolution support of the graphics interfaces.

Table 3. Summary of the Resolution of the Graphics interfaces

Interface	Max Resolution	Remark
LVDS (Single Ch)	1440 x 900	60 Hz; 18 & 24 bpps
VGA (CRT/DAC)	1920 x 1200	60 Hz at 355 MHz Max
DVI/HDMI	1920 x 1200	60 Hz; up to 165MHz

2.5.1.2 Video

The Intel® Atom™ Processor D2700 supports the following video output functionalities over its display interfaces:

- The Intel® Atom™ Processor D2000 series supports full MPEG2 (VLD/ iDCT/MC), WMV, Fast video Composing, HW decode/ acceleration for MPEG4 Part 10 (AVC/H.264) & VC-1; 720p60, 1080i60, 1080p@24 up to 20 Mps
- MPEG4 part2 does not utilize Next Generation Intel® Atom™ Processor based Platform H/W
- No hardware assist for Flash Decode from Adobe 11.0 and onwards
- D2700 processor supports Blu-Ray* 2.0 playback (Windows* only) - 1 x HD and 1 x SD streaming
- Video image Enhancement: Hue, Saturation, Brightness, Contrast (HSBC) adjust, Bob De-Interlacing

2.6 System Memory

The board has two 204-pin DDR3 SO-DIMM sockets and supports the following memory features:

- DDR3 SDRAM SO-DIMMs with gold-plated contacts
- Unbuffered, non-ECC, Raw Card B (1Rx8) and Raw Card-F (2Rx8) SO-DIMMs only
- 4 GB maximum total system memory
- Minimum total system memory: 256 MB
- Non-ECC DIMMs
- Serial Presence Detect
- DDR3 800 MHz and DDR3 1066 MHz SO-DIMMs (Higher speed SO-DIMMs supported at 1066 MHz if supported by the memory module.)
- When only using one SO-DIMM, DIMM 1 must be used

NOTE

Due to passively-cooled thermal constraints, system memory must have an operating temperature rating of 85 °C.

The board is designed to be passively cooled in a properly ventilated chassis. Chassis venting locations are recommended above the system memory area for maximum heat dissipation effectiveness.

NOTE

To be fully compliant with all applicable DDR3 SDRAM memory specifications, the board should be populated with SO-DIMMs that support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read the SPD data and program the chipset to accurately configure memory settings for optimum performance. If non-SPD memory is installed, the BIOS will attempt to correctly configure the memory settings, but performance and reliability may be impacted or the SO-DIMMs may not function under the determined frequency.

Table 4 lists the supported SO-DIMM configurations.

Table 4. Supported Memory Configurations[1]

Raw Card Version	SO-DIMM Capacity	DRAM Device Technology	DRAM Organization	# of DRAM Devices
B	1 GB	1 Gb	128 M x 8	8
	2 GB	2 Gb	256 M x 8	8
F	2 GB	1 Gb	128 M x 8	16
	4 GB[2]	2 Gb	256 M x 8	16

Notes:
1. System memory configurations are based on availability and are subject to change.
2. Support for one 4 GB SO-DIMM installed in slot 1. Slot 0 must be left empty.

Figure 3 illustrates the memory channel and SO-DIMM configuration.

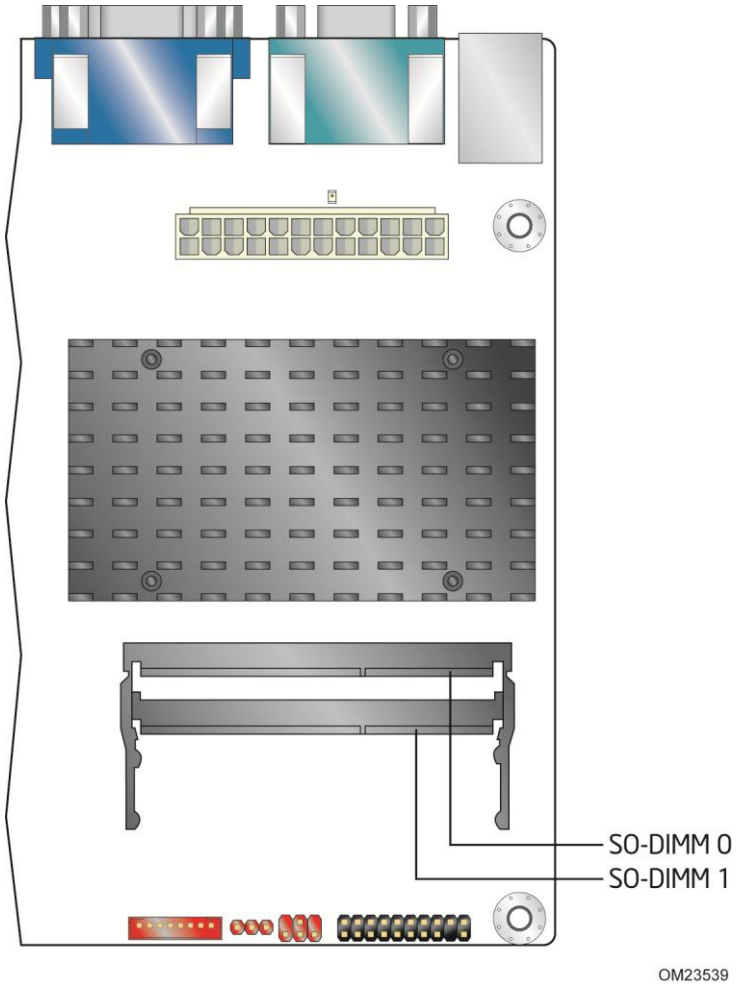


Figure 3. Memory Channel and SO-DIMM Configuration

2.7 Intel® NM10 Express Chipset

The Intel® NM10 Express Chipset with Direct Media Interface (DMI) interconnect provides interfaces to the processor and the USB, SATA, LPC, LAN, PCI, and PCI Express interfaces. The Intel® NM10 Express Chipset is a centralized controller for the board's I/O paths.

NOTE

The board is designed to be passively cooled in a properly ventilated chassis. Chassis venting locations are recommended above the processor heatsink area for maximum heat dissipation effectiveness.

For information about	Refer to
Intel® NM10 Express chipset	http://www.intel.com/products/desktop/chipsets/index.htm In *Find Content* field, enter "NM10"
Resources used by the chipset	Section 2.1.3

2.7.1 Video Memory Allocation

Video memory is allocated from the total available system memory for the efficient balancing of 2-D/3-D graphics performance and overall system performance.

Dynamic allocation of system memory to video memory is as follows:

- 256 MB total RAM results in 32 MB video RAM
- 512 MB total RAM results in 64 MB video RAM
- 1 GB total RAM results in 128 MB video RAM
- 2 GB total RAM results in 224 MB video RAM

2.7.2 Analog Display (VGA)

The VGA port supports analog displays. The maximum supported resolution is 1920 x 1200 (WUXGA) at a 60 Hz refresh rate. The VGA port is enabled for POST whenever a monitor is attached.

2.7.3 Digital Visual Interface (DVI-I)

The DVI-I port supports both digital and analog DVI displays. The maximum supported resolution is 1920 x 1200 (WUXGA). The DVI port is compliant with the DVI 1.0 specification. DVI analog output can also be converted to VGA using a DVI-VGA converter.

2.7.4 Flat Panel Interface (LVDS)

The flat panel interface (LVDS) supports the following:

- Panel support up to 1440 x 900

- 25 MHz to 112 MHz single–channel; @18 or 24 bpp
  - TFT panel type
- Panel fitting, panning, and center mode
- CPIS 1.5 compliant
- Spread spectrum clocking
- Panel power sequencing
- Integrated PWM interface for LCD backlight inverter control
- Flat panel brightness control via front panel button input as well as Windows* 7 "Screen brightness" adjustment slider

NOTE

Support for flat panel display configuration complies with the following:

1. *Internal flat panel display settings are not exposed through Intel® Integrator Toolkit or Intel® Integrator Assistant GUIs.*
2. *Internal flat panel display settings will not be overwritten by loading BIOS setup defaults.*
3. *Internal flat panel display settings will be preserved across BIOS updates.*

2.7.5 Configuration Modes

For monitors attached to the VGA port, video modes supported by this board are based on the Extended Display Identification Data (EDID) protocol.

Video mode configuration for LVDS displays is supported as follows:

- Automatic panel identification via Extended Display Identification Data (EDID) for panels with onboard EDID support
- Panel selection from common predefined panel types (without onboard EDID)
- Custom EDID payload installation for ultimate parameter flexibility, allowing custom definition of EDID data on panels without onboard EDID

In addition, BIOS setup provides the following configuration parameters for internal flat panel displays:

- Screen Brightness: allows the end user to set the screen brightness for the display effective through the Power-On Self Test stage (such as while showing the splash screen image and BIOS setup). Windows 7 ignores this setting in favor of the native "screen brightness" control provided by the operating system.
- Brightness Steps: allows the system integrator to configure the brightness steps for the operating system's "screen brightness" control (such as the "Screen brightness" adjustment slider under the Windows 7 "Power Options" control panel).
- Flat Panel Configuration Changes Lock: allows the system integrator to "lock" critical settings of the LVDS configuration to avoid end users potentially rendering the display unusable.
- Color Depth: allows the system integrator to select whether the panel is 24 bpp or 18 bpp.
- Inverter Frequency and Polarity: allows the system integrator to set the operating frequency and polarity of the panel inverter board.

- Maximum and Minimum Inverter Current Limit (%): allows the system integrator to set maximum PWM%, as appropriate, according to the power requirements of the internal flat panel display and the selected inverter board.
- Panel Power Sequencing: allows the system integrator to adjust panel sequencing parameters, if necessary.

NOTE

Support for flat panel display configuration complies with the following:

1. *Internal flat panel display settings are not exposed through Intel® Integrator Toolkit or Intel® Integrator Assistant GUIs.*
2. *Internal flat panel display settings will not be overwritten by loading BIOS setup defaults.*
3. *Internal flat panel display settings will be preserved across BIOS updates.*

2.7.6 USB

The board provides up to seven USB 2.0 ports, supports UHCI and EHCI, and uses UHCI- and EHCI-compatible drivers:

- Four back panel ports
- Two ports are implemented with a dual port internal header for front panel cabling
- One port is implemented with an internal header (brown-colored) that supports an Intel® Z-U130 USB Solid-State Drive or compatible device

NOTE

Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device is attached to the cable. Use shielded cable that meets the requirements for full-speed devices.

For information about	Refer to
The location of the USB connectors on the back panel	Figure 9
The location of the front panel USB headers	Figure 11

2.7.7 SATA Support

The board provides two SATA interface connectors that support one device per connector.

The board's SATA controller offers independent SATA ports with a theoretical maximum transfer rate of 3.0 Gb/s on each port. One device can be installed on each port for a maximum of two SATA devices. A point-to-point interface is used for host to device connections, unlike PATA which supports a master/slave configuration and two devices on each channel.

For compatibility, the underlying SATA functionality is transparent to the operating system. The SATA controller supports IDE and AHCI configuration and can operate in both legacy and native modes. In legacy mode, standard ATA I/O and IRQ resources are assigned (IRQ 14 and 15). In native mode, standard Conventional PCI bus

resource steering is used. Native mode is the preferred mode for configurations using the Windows Vista* operating system.

For information about	Refer to
Obtaining AHCI driver	Section 2.2
The location of the SATA connectors	Figure 11

2.8 Real-Time Clock Subsystem

A coin-cell battery (CR2032) powers the real-time clock and CMOS memory. When the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the standby current from the power supply extends the life of the battery. The clock is accurate to ± 13 minutes/year at 25 ºC with 3.3 VSB applied.

NOTE

If the battery and AC power fail, custom defaults, if previously saved, will be loaded into CMOS RAM at power-on.

When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one. Figure 1 shows the location of the battery.

2.9 Legacy I/O Controller

The Legacy I/O Controller provides the following features:

- Two serial port headers
- Two serial port connectors on the back panel
- One parallel port header with Enhanced Parallel Port (EPP) support
- Serial IRQ interface compatible with serialized IRQ support for Conventional PCI bus systems
- PS/2-style keyboard and mouse ports
- Intelligent power management, including a programmable wake-up event interface
- Conventional PCI bus power management support

The BIOS Setup program provides configuration options for the Legacy I/O controller.

For information about	Refer to
The location of the headers	Figure 11
The serial port headers signal mapping	Table 13

2.9.1 Serial Ports

The four serial ports (two back panel connectors and two internal headers) support data transfers at speeds up to 115.2 kb/s with BIOS support.

For information about	Refer to
The location of the serial port connectors	Figure 9

2.9.2 Parallel Port

Use the BIOS Setup program to set the parallel port mode for the 25-pin D-Sub parallel port header.

For information about	Refer to
The location of the parallel port connector	Figure 9

2.9.3 Keyboard and Mouse Interfaces

PS/2 keyboard and mouse connectors are located on the back panel.

NOTE

The keyboard is supported in the top PS/2 connector and the mouse is supported in the bottom PS/2 connector. Power to the computer should be turned off before a keyboard or mouse is connected or disconnected.

For information about	Refer to
The location of the keyboard and mouse connectors	Figure 9

2.10 LAN Subsystem

The LAN subsystem consists of the following:

- Intel® NM10 Express Chipset
- Two Intel® 82574L Gigabit Ethernet Controllers (10/100/1000 Mb/s)
- RJ-45 LAN connector with integrated status LEDs

Additional features of the LAN subsystem include:

- CSMA/CD protocol engine
- LAN connect interface that supports the Ethernet controller
- Conventional PCI bus power management
  - Supports ACPI technology
  - Supports LAN wake capabilities

2.10.1 Intel® 82574L Gigabit Ethernet Controllers

The Intel® 82574L Gigabit Ethernet Controllers support the following features:

- PCI Express link
- 10/100/1000 IEEE 802.3 compliant
- Compliant to IEEE 802.3x flow control support
- 802.1p and 802.1q
- TCP, IP, and UDP checksum offload (for IPv4 and IPv6)
- Transmit TCP segmentation
- Full device driver compatibility
- PCI Express power management support

2.10.2 LAN Subsystem Software and Drivers

LAN software and drivers are available from Intel's web site.

For information about	Refer to
Obtaining LAN software and drivers	http://downloadcenter.intel.com

2.10.3 RJ-45 LAN Connector with Integrated LEDs

Two LEDs are built into the RJ-45 LAN connectors (shown in Figure 4).

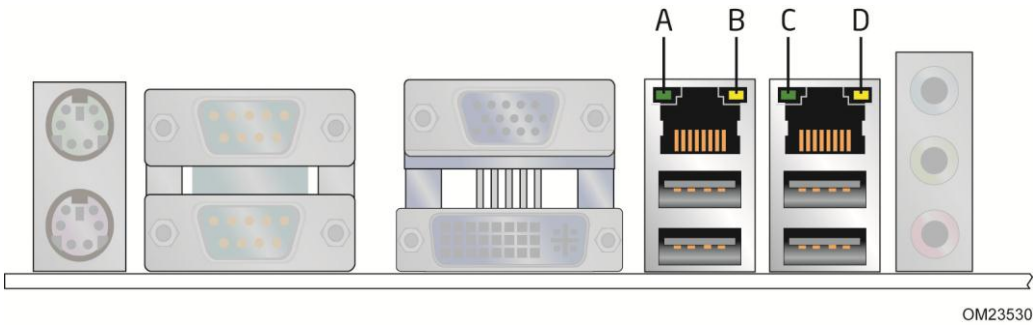


Figure 4. LAN Connector LED Locations

Table 5 describes the LED states when the board is powered up and the Ethernet LAN subsystem is operating.

Table 5. LAN Connector LED States

LED	LED Color	LED State	Condition
Link/Activity (A, C)	Green	Off	LAN link is not established.
		On	LAN link is established.
		Blinking	LAN activity is occurring.
Link Speed (B, D)	Green/Yellow	Off	10 Mb/s data rate is selected or negotiated.
		Green	100 Mb/s data rate is selected or negotiated.
		Yellow	1000 Mb/s data rate is selected or negotiated.

2.11 Audio Subsystem

The board supports the Intel® High Definition Audio (Intel® HD Audio) subsystem. The audio subsystem consists of the following:

- Intel® NM10 Express Chipset
- Realtek* ALC662 audio codec

The audio subsystem has the following features:

- Advanced jack sense for the back panel audio jacks that enables the audio codec to recognize the device that is connected to an audio port. The back panel audio jacks are capable of re-tasking according to the user's definition, or can be automatically switched depending on the recognized device type.
- Front panel Intel® HD Audio and AC '97 audio support.
- 3-port analog audio out stack.
- Windows Vista Basic certification.
- A signal-to-noise (S/N) ratio of 95 dB.

Table 6 lists the supported functions of the front panel and back panel audio jacks.

Table 6. Audio Jack Support

Audio Jack	Micro-phone	Headphones	Line Out (Front Spks)	Line In (Stereo 2)	Mic-In
Front panel – Green		Default			
Front panel – Pink	Default				
Back panel – Blue				Default	
Back panel – Green		(ctrl panel)	Default		
Back panel – Pink					Default

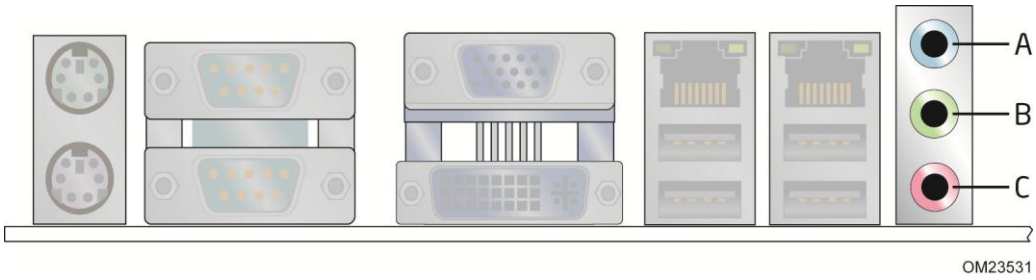
2.11.1 Audio Subsystem Software

Audio software and drivers are available from Intel's web site.

For information about	Refer to
Obtaining audio software and drivers	Section 2.2

2.11.2 Audio Connectors and Headers

The board contains audio connectors and headers on both the back panel and the component side of the board. The component-side audio headers include front panel audio (a 2 x 5-pin header that provides mic in and line out signals for front panel audio connectors).



Item	Description
A	Line in
B	Line out
C	Mic in

Figure 5. Back Panel Audio Connectors

NOTE

The back panel audio line out connector is designed to power headphones or amplified speakers only. Poor audio quality occurs if passive (non-amplified) speakers are connected to this output.

For information about	Refer to
The locations of the front panel audio header and S/PDIF audio header	Figure 11
The signal names of the front panel audio header and S/PDIF header	Section 3.2.2.1
The back panel audio connectors	Figure 5

2.12 Hardware Management Subsystem

The hardware management features enable the board to be compatible with the Wired for Management (WfM) specification. The board has several hardware management features, including the following:

- Thermal monitoring
- Voltage monitoring

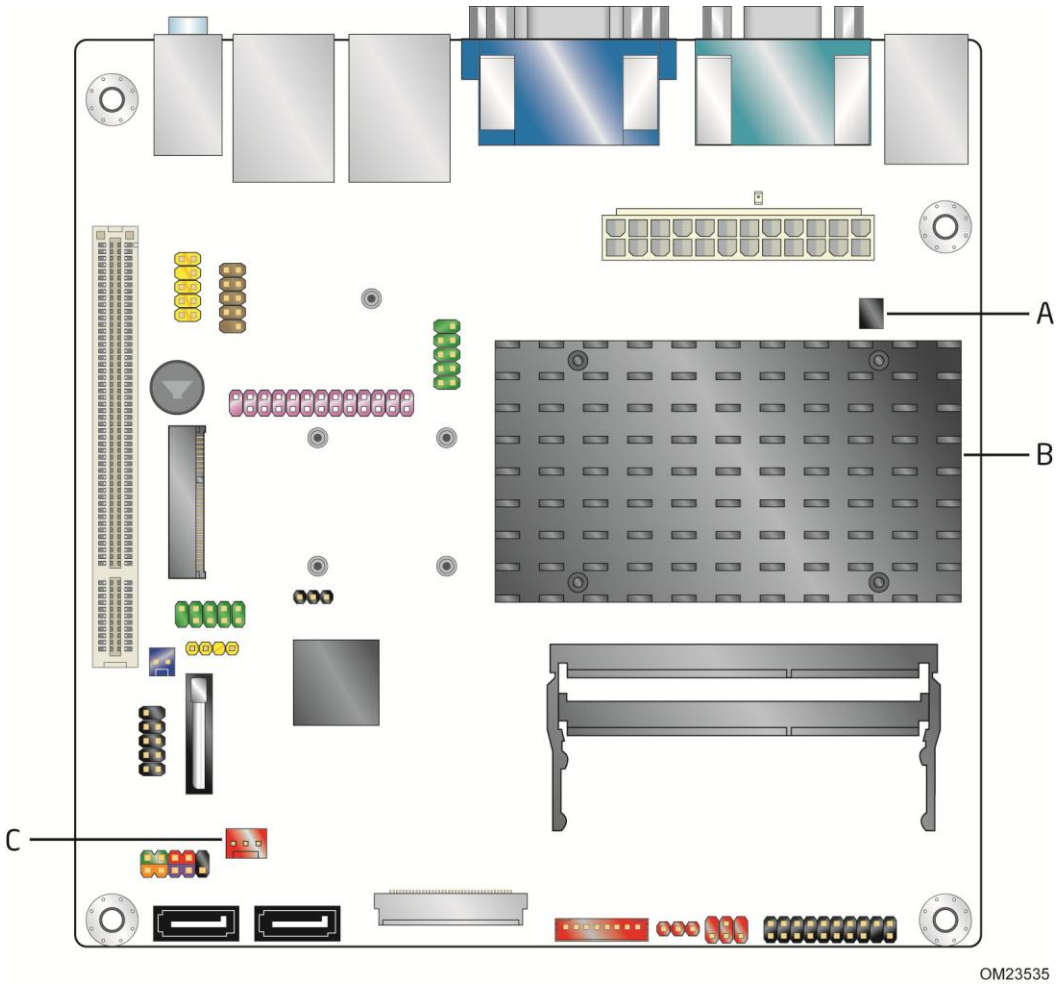
2.12.1 Hardware Monitoring

The hardware monitoring and fan control subsystem is based on the Winbond W83627DHG-P device, which supports the following:

- System ambient temperature monitoring
- System fan speed monitoring
- Power monitoring of +12 V, +5 V, +5 Vstdby, +3.3 V, and +VCCP
- SMBus interface

2.12.2 Thermal Monitoring

Figure 6 shows the locations of the thermal sensors and fan header.



Item	Description
A	Remote thermal sensor
B	DTS, located on the processor die
C	System fan header

Figure 6. Thermal Sensors and Fan Header

2.13 Power Management

Power management is implemented at several levels, including:

- Software support through Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  - Power connector
  - Fan header
  - LAN wake capabilities
  - Instantly Available PC technology
  - Wake from USB
  - Wake from PS/2 devices
  - Wake from serial port
  - Power Management Event signal (PME#) wake-up support
  - WAKE# signal wake-up support

2.13.1 ACPI

ACPI gives the operating system direct control over the power management and Plug and Play functions of a computer. The use of ACPI with the board requires an operating system that provides full ACPI support. ACPI features include:

- Plug and Play (including bus and device enumeration)
- Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video displays, and hard disk drives
- Methods for achieving less than 15-watt system operation in the power-on/standby sleeping state
- A Soft-off feature that enables the operating system to power-off the computer
- Support for multiple wake-up events (see Table 9)
- Support for a front panel power and sleep mode switch

Table 7 lists the system states based on how long the power switch is pressed, depending on how ACPI is configured with an ACPI-aware operating system.

Table 7. Effects of Pressing the Power Switch

If the system is in this state…	…and the power switch is pressed for	…the system enters this state
Off (ACPI G2/G5 – Soft off)	Less than four seconds	Power-on (ACPI G0 – working state)
On (ACPI G0 – working state)	Less than four seconds	Power-off (ACPI G2/G5 – Soft off)
On (ACPI G0 – working state)	More than four seconds	Fail safe power-off (ACPI G2/G5 – Soft off)
Sleep (ACPI G1 – sleeping state)	Less than four seconds	Wake-up (ACPI G0 – working state)
Sleep (ACPI G1 – sleeping state)	More than four seconds	Power-off (ACPI G2/G5 – Soft off)

2.13.1.1 System States and Power States

Under ACPI, the operating system directs all system and device power state transitions. The operating system puts devices in and out of low-power states based on user preferences and knowledge of how devices are being used by applications. Devices that are not being used can be turned off. The operating system uses information from applications and user settings to put the system as a whole into a low-power state.

Table 8 lists the power states supported by the board along with the associated system power targets. Refer to the ACPI specification for a complete description of the various system and power states.

Table 8. Power States and Targeted System Power

Global States	Sleeping States	Processor States	Device States	Targeted System Power (Note 1)
G0 – working state	S0 – working	C0 – working	D0 – working state.	Full power > 30 W
G1 – sleeping state	S3 – Suspend to RAM. Context saved to RAM.	No power	D3 – no power except for wake-up logic.	Power < 5 W (Note 2)
G1 – sleeping state	S4 – Suspend to disk. Context saved to disk.	No power	D3 – no power except for wake-up logic.	Power < 5 W (Note 2)
G2/S5	S5 – Soft off. Context not saved. Cold boot is required.	No power	D3 – no power except for wake-up logic.	Power < 5 W (Note 2)
G3 – mechanical off. AC power is disconnected from the computer.	No power to the system.	No power	D3 – no power for wake-up logic, except when provided by battery or external source.	No power to the system. Service can be performed safely.

Notes:

1. Total system power is dependent on the system configuration, including add-in boards and peripherals powered by the system's power supply.
2. Dependent on the standby power consumption of wake-up devices used in the system.

2.13.1.2 Wake-up Devices and Events

Table 9 lists the devices or specific events that can wake the computer from specific states.

Table 9. Wake-up Devices and Events

Devices/events that wake up the system…	…from this sleep state
Power switch	S3, S4, S5 (Note 1)
RTC alarm	S3, S4, S5 (Note 1)
LAN	S3, S4, S5 (Note 1)
USB	S3 (Note 2)
WAKE#	S3, S4, S5 (Note 1)
PME# signal	S3, S4, S5 (Note 1)
Serial port	S3
PS/2 devices	S3, S4, S5 (Notes 1 and 3)

Notes:

1. S4 implies operating system support only.
2. USB ports must be turned off during S4/S5 states.
3. PS/2 wake from S5 should have a selection in the BIOS to enable wake from a combination key (Alt + Print Screen) or the keyboard power button.

NOTE

The use of these wake-up events from an ACPI state requires an operating system that provides full ACPI support. In addition, software, drivers, and peripherals must fully support ACPI wake events.

2.13.2 Hardware Support

The board provides several power management hardware features, including:

- Power connector
- Fan header
- LAN wake capabilities
- Instantly Available PC technology
- Wake from USB
- Wake from PS/2 devices
- Power Management Event signal (PME#) wake-up support
- WAKE# signal wake-up support
- +5V Standby Power Indicator LED

LAN wake capabilities and Instantly Available PC technology require power from the +5 V standby line.

NOTE

The use of Wake from USB technologies from an ACPI state requires an operating system that provides full ACPI support.

2.13.2.1 Fan Header

The function/operation of the fan header is as follows:

- The fan is on when the board is in the S0 state.
- The fan is off when the board is off or in the S3, S4, or S5 state.
- The system fan header supports closed-loop fan control that can adjust the fan speed and is wired to a fan tachometer input.
- The fan header supports +12 V, 3-wire fans at 1 A maximum.

For information about	Refer to
The locations of the fan header and thermal sensors	Figure 6
The signal names of the system fan header	Table 18

2.13.2.2 LAN Wake Capabilities

LAN wake capabilities enable remote wake-up of the computer through a network. The LAN subsystem network adapter monitors network traffic at the Media Independent Interface. The board supports LAN wake capabilities with ACPI in the following ways:

- By Ping
- By Magic Packet

Upon detecting the configured wake packet type, the LAN subsystem asserts a wake-up signal that powers up the computer.

2.13.2.3 Instantly Available PC Technology

Instantly Available PC technology enables the board to enter the ACPI S3 (Suspend-to-RAM) sleep-state. While in the S3 sleep-state, the computer will appear to be off (the hard drive(s) and fan will power off, the front panel LED will blink). When signaled by a wake-up device or event, the system quickly returns to its last known state. Table 9 lists the devices and events that can wake the computer from the S3 state.

The board supports the *PCI Bus Power Management Interface Specification*. Add-in boards that also support this specification can participate in power management and can be used to wake the computer.

2.13.2.4 Wake from USB

USB bus activity wakes the computer from an ACPI S3 state.

NOTE

Wake from USB requires the use of a USB peripheral that supports Wake from USB and support in the operating system.

2.13.2.5 PME# Signal Wake-up Support

When the PME# signal on the PCI bus is asserted, the computer wakes from an ACPI S3, S4, or S5 state (with Wake on PME enabled in the BIOS).

2.13.2.6 Wake from PS/2 Devices

PS/2 keyboard activity wakes the computer from an ACPI S3, S4, or S5 state. However, when the computer is in an ACPI S4 or S5 state, the only PS/2 activity that will wake the computer is the Alt + Print Screen or the Power Key available only on some keyboards.

2.13.2.7 WAKE# Signal Wake-up Support

When the WAKE# signal on the PCI Express bus is asserted, the computer wakes from an ACPI S3, S4, or S5 state.

2.13.2.8 Wake from Serial Port

Serial port activity wakes the computer from an ACPI S3 state.

2.13.2.9 +5 V Standby Power Indicator LED

The +5 V standby power indicator LED shows that power is still present even when the computer appears to be off. Figure 7 shows the location of the standby power indicator LED.

CAUTION

If AC power has been switched off and the standby power indicator is still lit, disconnect the power cord before installing or removing any devices connected to the board. Failure to do so could damage the board and any attached devices.

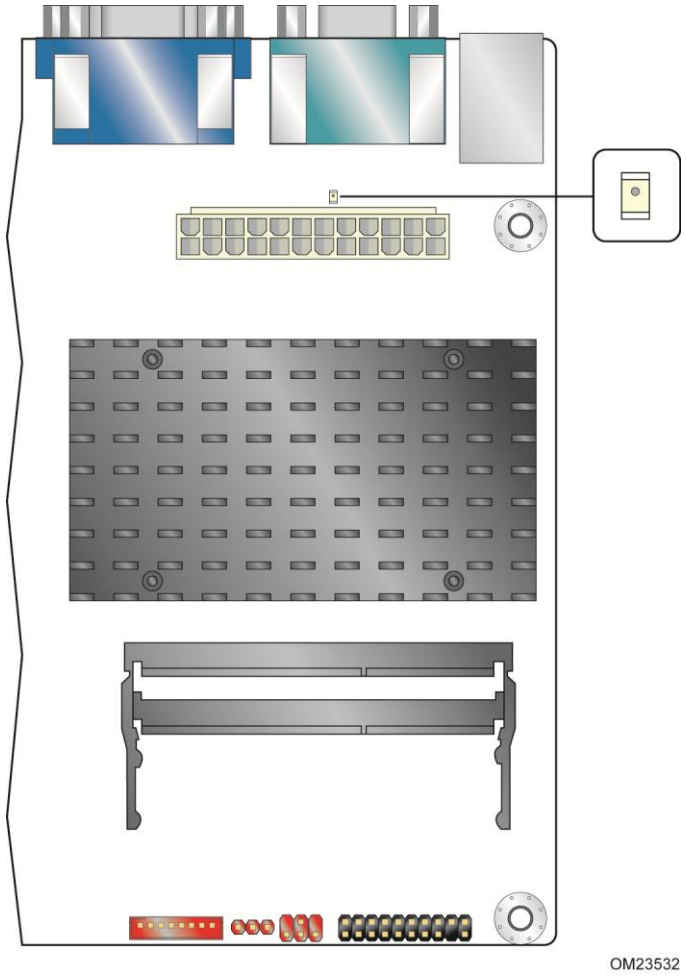


Figure 7. Location of the Standby Power Indicator LED

2.14 Debug Interfaces

The following debug support is provided on the Intel® Embedded Board D2700:

- XDP (Extended Debug Port) connector supporting 3.3V JTAG is provided at location J22 (on the reverse side of the board) for processor run control debug support.
- Two back panel serial ports and additional onboard headers provide UART connectivity (see Section 3.2)

3 Technical Reference

3.1 Memory Map

3.1.1 Addressable Memory

The board utilizes 4 GB of addressable system memory. Typically the address space that is allocated for Conventional PCI bus add-in cards, PCI Express configuration space, BIOS (SPI Flash), and chipset overhead resides above the top of DRAM (total system memory). On a system that has 4 GB of system memory installed, it is not possible to use all of the installed memory due to system address space being allocated for other system critical functions. These functions include the following:

- BIOS/ SPI Flash (2 MB)
- Local APIC (19 MB)
- Direct Media Interface (40 MB)
- Internal graphics address registers
- Memory-mapped I/O that is dynamically allocated for Conventional PCI add-in cards

The amount of installed memory that can be used will vary based on add-in cards and BIOS settings. Figure 8 shows a schematic of the system memory map. All installed system memory can be used when there is no overlap of system addresses.

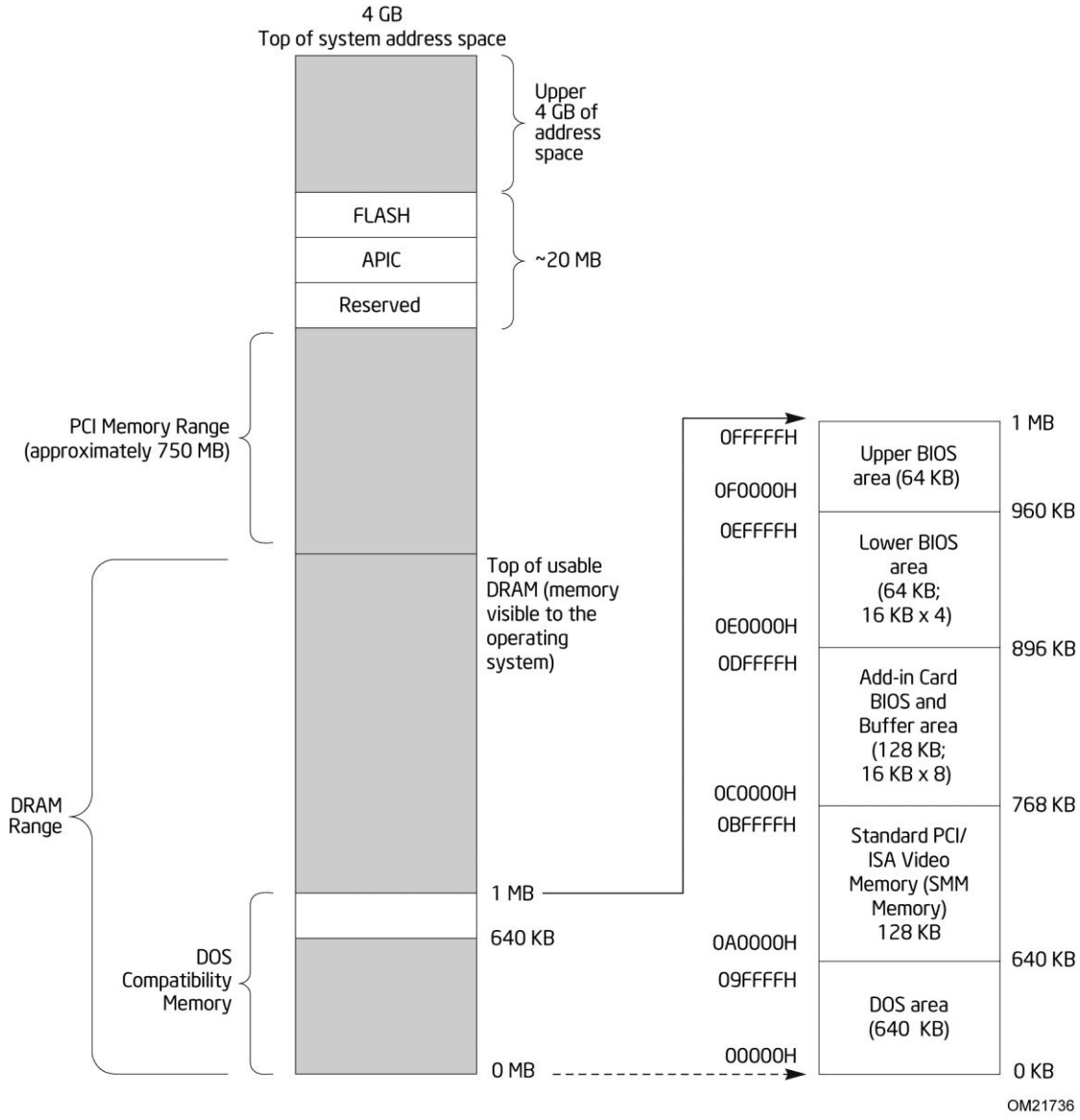


Figure 8. Detailed System Memory Address Map

Table 10 lists the system memory map.

Table 10. System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 4194304 K	100000 - FFFFFFFF	4095 MB	Extended memory
960 K - 1024 K	F0000 - FFFFF	64 KB	Runtime BIOS
896 K - 960 K	E0000 - EFFFF	64 KB	Reserved
800 K - 896 K	C8000 - DFFFF	96 KB	Potential available high DOS memory (open to the PCI bus). Dependent on video adapter used.
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

3.2 Connectors and Headers

CAUTION

Only the following connectors/headers have overcurrent protection: Back panel and front panel USB, VGA, serial, and PS/2.

The other internal connectors/headers are not overcurrent protected and should connect only to devices inside the computer's chassis, such as fans and internal peripherals. Do not use these connectors/headers to power devices external to the computer's chassis. A fault in the load presented by the external devices could cause damage to the computer, the power cable, and the external devices themselves.

NOTE

Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device is attached to the cable. Use shielded cable that meets the requirements for full-speed devices.

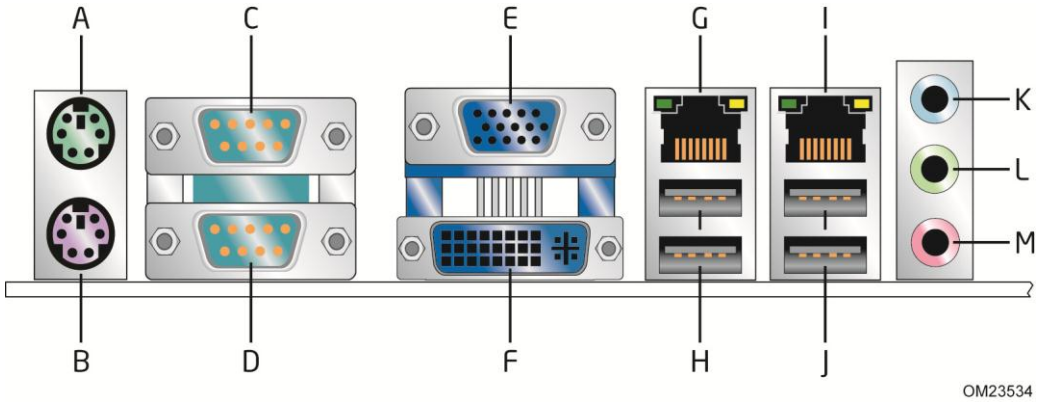
This section describes the board's connectors and headers. The connectors and headers can be divided into these groups:

- Back panel I/O connectors (see page 47)
- Component-side connectors and headers (see page 49)

3.2.1 Back Panel

3.2.1.1 Back Panel Connectors

Figure 9 shows the location of the back panel connectors.



Item	Description
A	PS/2 mouse port
B	PS/2 keyboard port
C	Serial port connector
D	Serial port connector
E	VGA connector
F	DVI-I connector
G	LAN port
H	USB 2.0 ports
I	LAN port
J	USB 2.0 ports
K	Line in
L	Line out
M	Mic in

Figure 9. Back Panel Connectors

NOTE

The back panel audio line out connector is designed to power headphones or amplified speakers only. Poor audio quality occurs if passive (non-amplified) speakers are connected to this output.

3.2.1.2 I/O Shield

The I/O shield provided with the board allows access to all back panel connectors and is compatible with standard mini-ITX and microATX chassis. As an added benefit for system configurations with wireless PCI Express Mini Card solutions, the I/O shield also provides pre-cut holes for user installation of up to three external wireless antenna. Figure 10 shows an I/O shield reference diagram. Dimensions are listed in inches [millimeters].

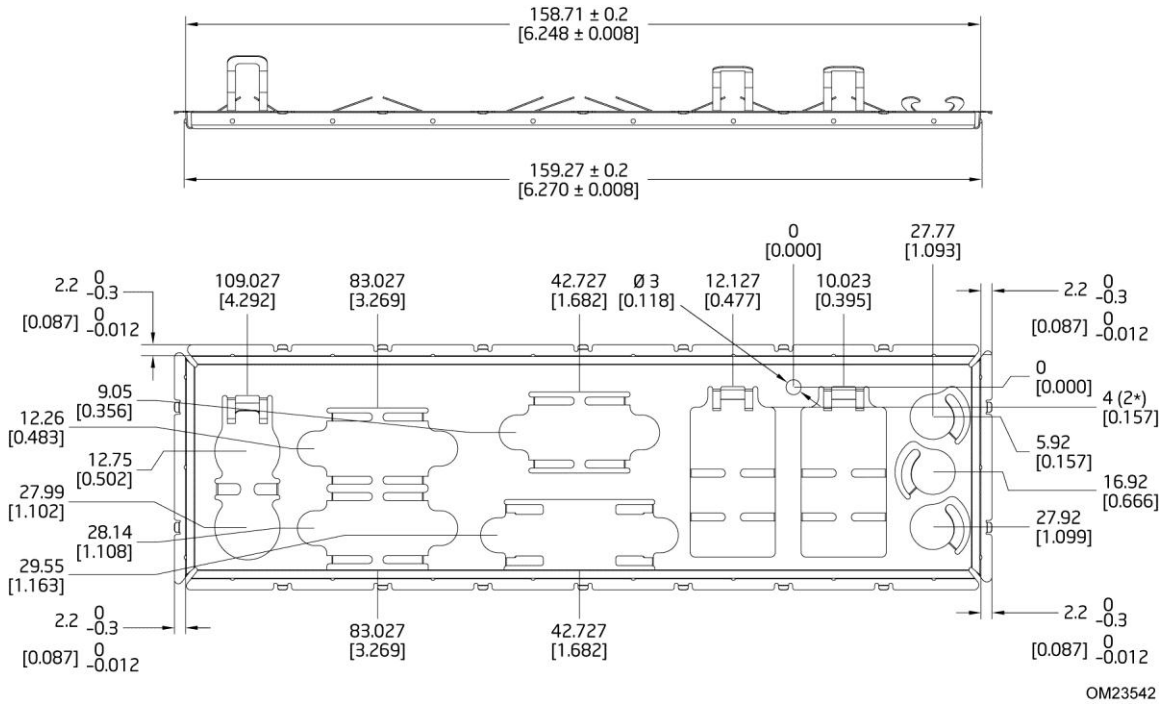


Figure 10. I/O Shield Reference Diagram

3.2.2 Component-side Connectors and Headers

Figure 11 shows the locations of the component-side connectors and headers.

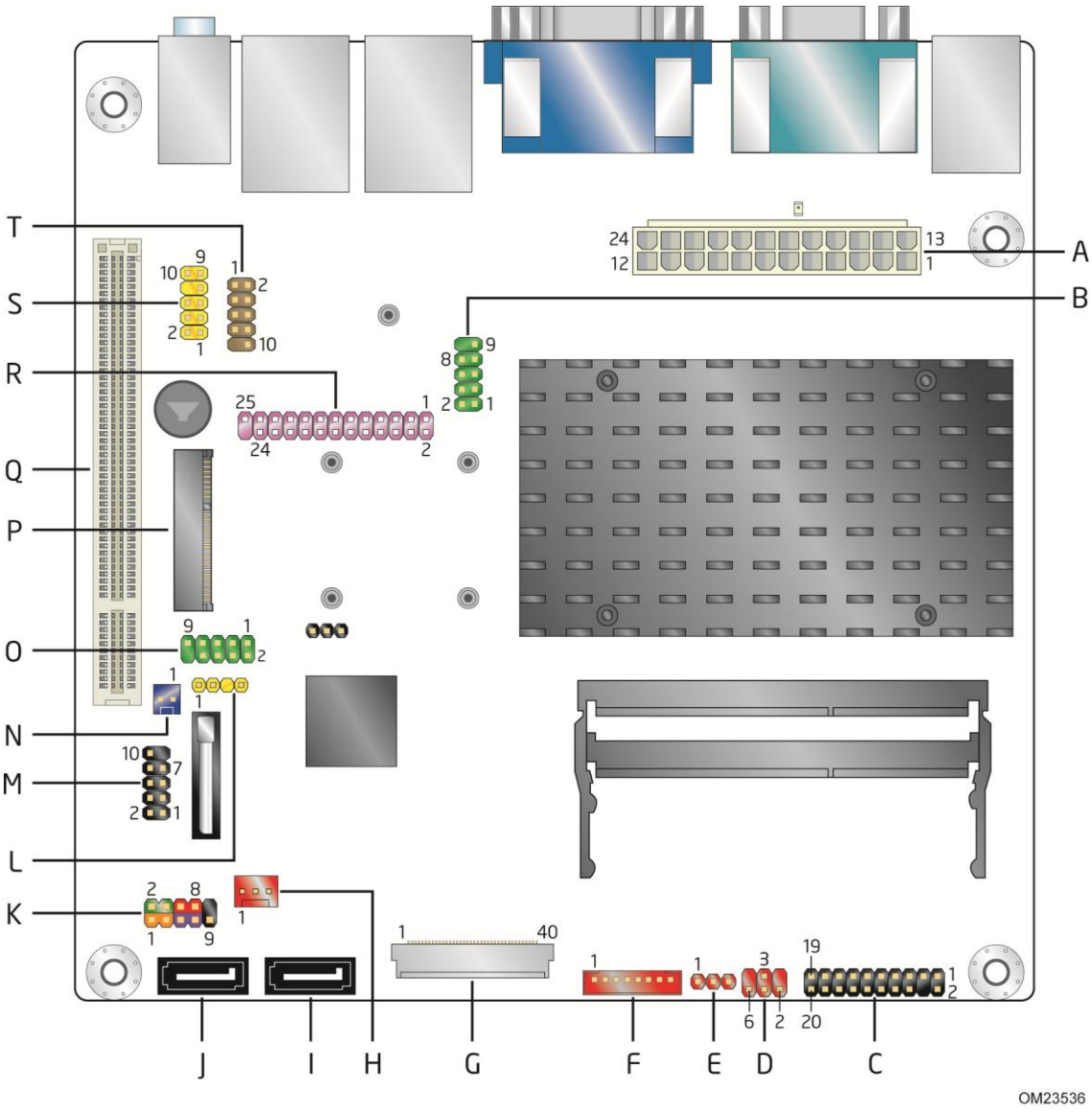


Figure 11. Component-side Connectors and Headers

Table 11 lists the component-side connectors and headers identified in Figure 11.

Table 11. Component-side Connectors and Headers Shown in Figure 11

Item/callout from Figure 11	Description
A	Processor core power connector (2 x 12)
B	Serial port header
C	TPM header
D	Backlight inverter voltage selection jumper
E	Flat panel voltage selection jumper
F	FPD brightness connector
G	LVDS data connector
H	System fan header
I	SATA connector
J	SATA connector
K	Front panel header
L	S/PDIF header
M	Front panel USB 2.0 header
N	Front Panel Wireless Activity LED header
O	Serial port header
P	PCI Express Full-/Half-Mini Card slot
Q	Conventional PCI bus add-in card connector
R	Parallel port header
S	Front panel audio header
T	Front panel USB header with Intel® Z-U130 USB Solid-State Drive or compatible device support (brown-colored)

3.2.2.1 Signal Tables for the Connectors and Headers

Table 12. TPM Header

Pin	Signal Name	Pin	Signal Name
1	CK_33M_TPM_DIP	2	Ground
3	LFRAME#	4	Key (no pin)
5	PLTRST#	6	No connection
7	LAD3	8	LAD2
9	+3.3 V	10	LAD1
11	LAD0	12	Ground
13	No connection	14	No connection
15	+3.3 VSB	16	TPM_SERRQ
17	Ground	18	TPM_CLKRUN#
19	LPCPD#	20	No connection

Table 13. Serial Port Headers

Pin	Signal Name	Pin	Signal Name
1	DCD (Data Carrier Detect)	2	RXD# (Receive Data)
3	TXD# (Transmit Data)	4	DTR (Data Terminal Ready)
5	Ground	6	DSR (Data Set Ready)
7	RTS (Request To Send)	8	CTS (Clear To Send)
9	RI (Ring Indicator)	10	Key (no pin)

Table 14. LVDS Data Connector

Pin	Signal Name	Pin	Signal Name
1	EVEN_Lane3_P	21	N/C
2	EVEN_Lane3_N	22	EDID_3.3V
3	EVEN_Lane2_P	23	LCD_GND
4	EVEN_Lane2_N	24	LCD_GND
5	EVEN_Lane1_P	25	LCD_GND
6	EVEN_Lane1_N	26	EVEN_CLK_P
7	EVEN_Lane0_P	27	EVEN_CLK_N
8	EVEN_Lane0_N	28	BKLT_GND
9	ODD_Lane3_P	29	BKLT_GND
10	ODD_Lane3_N	30	BKLT_GND
11	ODD_Lane2_P	31	EDID_CLK
12	ODD_Lane2_N	32	BKLT_ENABLE
13	ODD_Lane1_P	33	BKLT_PWM_DIM
14	ODD_Lane1_N	34	ODD_CLK_P
15	ODD_Lane0_P	35	ODD_CLK_N
16	ODD_Lane0_N	36	BKLT_PWR (5V/12V/19V)
17	EDID_GND	37	BKLT_PWR (5V/12V/19V)
18	LCD_VCC (3.3V/5V/12V)	38	BKLT_PWR (5V/12V/19V)
19	LCD_VCC (3.3V/5V/12V)	39	N/C
20	LCD_VCC (3.3V/5V/12V)	40	EDID_DATA

Table 15. Backlight Inverter Voltage Selection Jumper

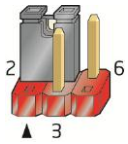
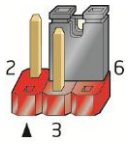
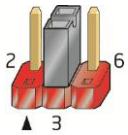
Voltage	Jumper Setting		Configuration
3.3 V	2 and 4		Jumper position for 3.3 V (default)
5 V	6 and 4		Jumper position for 5 V
12 V	3 and 4		Jumper position for 12 V

Table 16. FPD Brightness Connector

Pin	Signal Name	Description
1	BKLT_EN	Backlight enable
2	BKLT_PWM	Backlight control
3	BKLT_PWR (5 V/12 V)	Backlight inverter power
4	BKLT_PWR (5 V/12 V)	Backlight inverter power
5	BKLT_GND/Brightness_GND	Ground (shared)
6	BKLT_GND/Brightness_GND	Ground (shared)
7	Brightness_Up	Panel brightness increase
8	Brightness_Down	Panel brightness decrease

Table 17. Flat Panel Voltage Selection Jumper

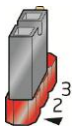
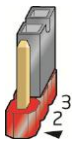
Voltage	Jumper Setting		Configuration
5 V	1 and 2		Jumper position for 5 V (default)
12 V	3 and 2		Jumper position for 12 V

Table 18. System Fan Header

Pin	Signal Name
1	Ground
2	+12 V (PWM controlled pulses)
3	Tach

Table 19. SATA Connectors

Pin	Signal Name
1	Ground
2	TXP
3	TXN
4	Ground
5	RXN
6	RXP
7	Ground

Table 20. Front Panel Wireless Activity LED Header

Pin	Signal Name
1	Ground
2	MINICARD_WLAN#

Table 21. Front Panel Audio Header for Intel® HD Audio

Pin	Signal Name	Pin	Signal Name
1	[Port 1] Left channel	2	Ground
3	[Port 1] Right channel	4	PRESENCE# (Dongle present)
5	[Port 2] Right channel	6	[Port 1] SENSE_RETURN
7	SENSE_SEND (Jack detection)	8	Key (no pin)
9	[Port 2] Left channel	10	[Port 2] SENSE_RETURN

Table 22. Front Panel Audio Header for AC '97 Audio

Pin	Signal Name	Pin	Signal Name
1	MIC	2	AUD_GND
3	MIC_BIAS	4	AUD_GND
5	FP_OUT_R	6	FP_RETURN_R
7	AUD_5V	8	KEY (no pin)
9	FP_OUT_L	10	FP_RETURN_L

Table 23. Front Panel USB 2.0 Headers

Pin	Signal Name	Pin	Signal Name
1	+5 VDC	2	+5 VDC
3	D-	4	D-
5	D+	6	D+
7	Ground	8	Ground
9	KEY (no pin)	10	No Connect

Table 24. Front Panel USB Header with Intel® Z-U130 USB Solid-State Drive or Compatible Device Support

Pin	Signal Name	Pin	Signal Name
1	+5 VDC	2	NC
3	D-	4	NC
5	D+	6	NC
7	Ground	8	NC
9	KEY (no pin)	10	LED#

Table 25. Internal S/PDIF Header

Pin	Signal Name	Description
1	GND	Ground
2	SPDIF_OUT	S/PDIF signal from the codec
3	Key (no pin)	Key (no pin)
4	+5V_DC	5 V power (for optical/TOSLINK module)

Table 26. Parallel Port Header

Pin	Standard Signal Name	ECP Signal Name	EPP Signal Name
1	STROBE#	STROBE#	WRITE#
2	AUTOFD#	AUTOFD#, HOSACK	DATASTB#
3	PD0	PD0	PD0
4	FAULT#	FAULT#, PERIPHREQST#	FAULT#
5	PD1	PD1	PD1
6	INT#	INT#, REVERSERQST#	RESET#
7	PD2	PD2	PD2
8	SLCTIN#	SLCTIN#	ADDRSTB#
9	PD3	PD3	PD3
10	GROUND	GROUND	GROUND
11	PD4	PD4	PD4
12	GROUND	GROUND	GROUND
13	PD5	PD5	PD5
14	GROUND	GROUND	GROUND
15	PD6	PD6	PD6
16	GROUND	GROUND	GROUND
17	PD7	PD7	PD7
18	GROUND	GROUND	GROUND
19	ACK#	ACK#	INTR
20	GROUND	GROUND	GROUND
21	BUSY	BUSY#, PERIPHACK	WAIT#
22	GROUND	GROUND	GROUND
23	PERROR	PE, ACKREVERSE#	PE
24	GROUND	GROUND	GROUND
25	SELECT	SELECT	SELECT
26	KEY (no pin)	KEY (no pin)	KEY (no pin)

3.2.2.2 Add-in Card Connectors

The board has the following add-in card connectors:

- PCI Express Full-/Half-Mini Card slot
- Conventional PCI bus connector (with riser card support for up to two PCI cards)

Note the following considerations for the Conventional PCI bus connector:

- The Conventional PCI bus connector is bus master capable.
- SMBus signals are routed to the Conventional PCI bus connector. This enables Conventional PCI bus add-in boards with SMBus support to access sensor data on the board. The specific SMBus signals are as follows:
  - The SMBus clock line is connected to pin A40.
  - The SMBus data line is connected to pin A41.

The Conventional PCI bus connector also supports single-slot and dual-slot riser cards for use of up to two bus master PCI expansion cards. In order to support two PCI bus master expansion cards, the riser card must support the following PCI signal routing:

- Pin A11: additional 33 MHz PCI clock
- Pin B10: additional PCI Request signal (i.e., PREQ#2)
- Pin B14: additional PCI Grant signal (i.e., GNT#2)

NOTE

BIOS IRQ programming for the second PCI slot on PCI riser card:

- *ID_SEL: AD20 (Device 4)*
- *Second PCI slot INT Mapping:*
  - *INT A# (A6) → INT D# of mother board PCI slot.*
  - *INT B# (B7) → INT A# of mother board PCI slot.*
  - *INT C# (A7) → INT B# of mother board PCI slot.*
  - *INT D# (B8) → INT C# of mother board PCI slot.*

NOTE

The Conventional PCI slot on this board does not support the PCI PHOLD[1] function. Due to this limitation (errata), certain PCI cards may experience performance or detection issues when DMA transfer is used as part of the PCI card operation.

[1] *PHOLD is the signal required to hold the bus during DMA transfers.*

3.2.2.3 Power Supply Connector

The board has a 2 x 12 power connector (see Table 27). This board requires a TFX12V or SFX12V power supply.

Table 27. Power Connector

Pin	Signal Name	Pin	Signal Name
1	+3.3 V	13	+3.3 V
2	+3.3 V	14	-12 V
3	Ground	15	Ground
4	+5 V	16	PS-ON# (power supply remote on/off)
5	Ground	17	Ground
6	+5 V	18	Ground
7	Ground	19	Ground
8	PWRGD (Power Good)	20	No connect
9	+5 V (Standby)	21	+5 V
10	+12 V	22	+5 V
11	+12 V	23	+5 V
12	No connect	24	Ground

3.2.2.4 Front Panel Header

This section describes the functions of the front panel header. Table 28 lists the signal names of the front panel header. Figure 12 is a connection diagram for the front panel header.

Table 28. Front Panel Header

Pin	Signal	In/ Out	Description	Pin	Signal	In/ Out	Description
Hard Drive Activity LED				**Power LED**			
1	HD_PWR	Out	Hard disk LED pull-up to +5 V	2	HDR_BLNK_GRN	Out	Front panel green LED
3	HDA#	Out	Hard disk active LED	4	HDR_BLNK_YEL	Out	Front panel yellow LED
Reset Switch				**On/Off Switch**			
5	Ground		Ground	6	FPBUT_IN	In	Power switch
7	FP_RESET#	In	Reset switch	8	Ground		Ground
Power				**Not Connected**			
9	+5 V		Power	10	N/C		Not connected

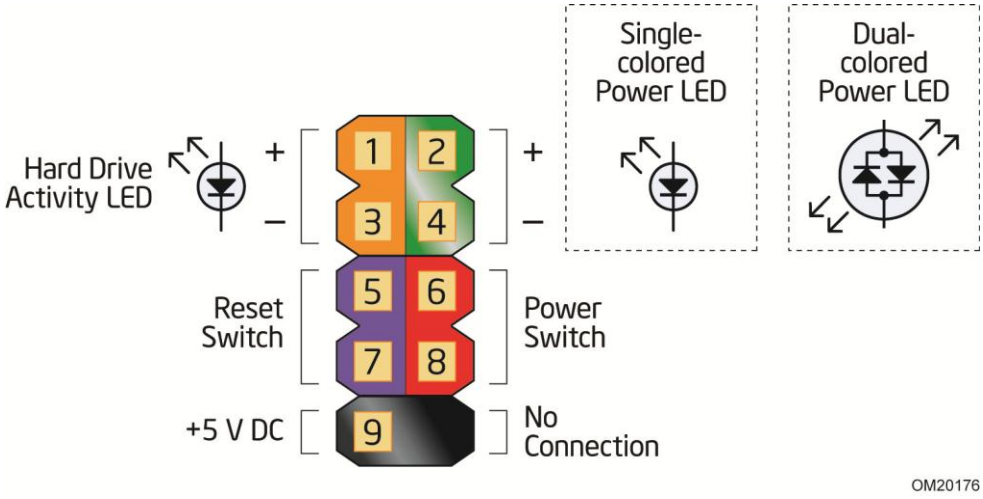


Figure 12. Connection Diagram for Front Panel Header

3.2.2.4.1 Hard Drive Activity LED Header

Pins 1 and 3 can be connected to an LED to provide a visual indicator that data is being read from or written to a hard drive.

3.2.2.4.2 Reset Switch Header

Pins 5 and 7 can be connected to a momentary single pole, single throw (SPST) type switch that is normally open. When the switch is closed, the board resets and runs the POST.

3.2.2.4.3 Power/Sleep LED Header

Pins 2 and 4 can be connected to a single- or dual-color LED. Table 29 shows the default states for a single-color LED.

Table 29. States for a One-Color Power LED

LED State	Description
Off	Power off/hibernate (S5/S4)
Blinking	Sleeping (S3)
Steady Green	Running/Away (S0)

NOTE

The LED states listed in Table 29 are default settings that can be modified through BIOS setup. Systems built with a dual-color front panel power LED can also use alternate color state options.

3.2.2.4.4 Power Switch Header

Pins 6 and 8 can be connected to a front panel momentary-contact power switch. The switch must pull the SW_ON# pin to ground for at least 50 ms to signal the power supply circuitry to switch on or off. (The time requirement is due to internal debounce circuitry on the board.) At least two seconds must pass before the power supply circuitry will recognize another on/off signal.

3.2.2.5 Front Panel USB 2.0 Headers

Figure 13 and Figure 14 are connection diagrams for the front panel USB 2.0 headers.

NOTE

- *The +5 VDC power on the USB 2.0 headers is fused.*
- *Use only a front panel USB connector that conforms to the USB 2.0 specification for high-speed USB devices.*

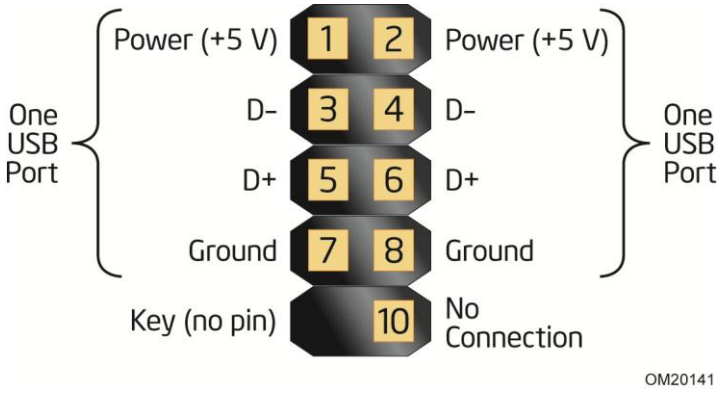


Figure 13. Connection Diagram for Front Panel USB 2.0 Header

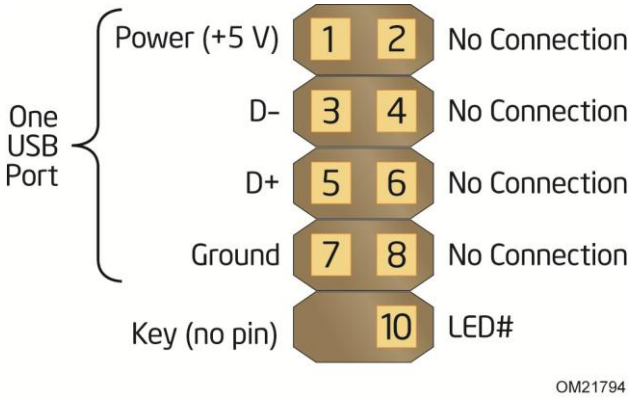


Figure 14. Connection Diagram for Front Panel USB 2.0 Header with Intel® Z-USB Solid-State Drive or Compatible Device Support

3.3 BIOS Configuration Jumper Block

CAUTION

Do not move the jumper with the power on. Always turn off the power and unplug the power cord from the computer before changing a jumper setting. Otherwise, the board could be damaged.

Figure 15 shows the location of the jumper block. The jumper determines the BIOS Setup program's mode. Table 30 lists the jumper settings for the three modes: normal, configure, and recovery.

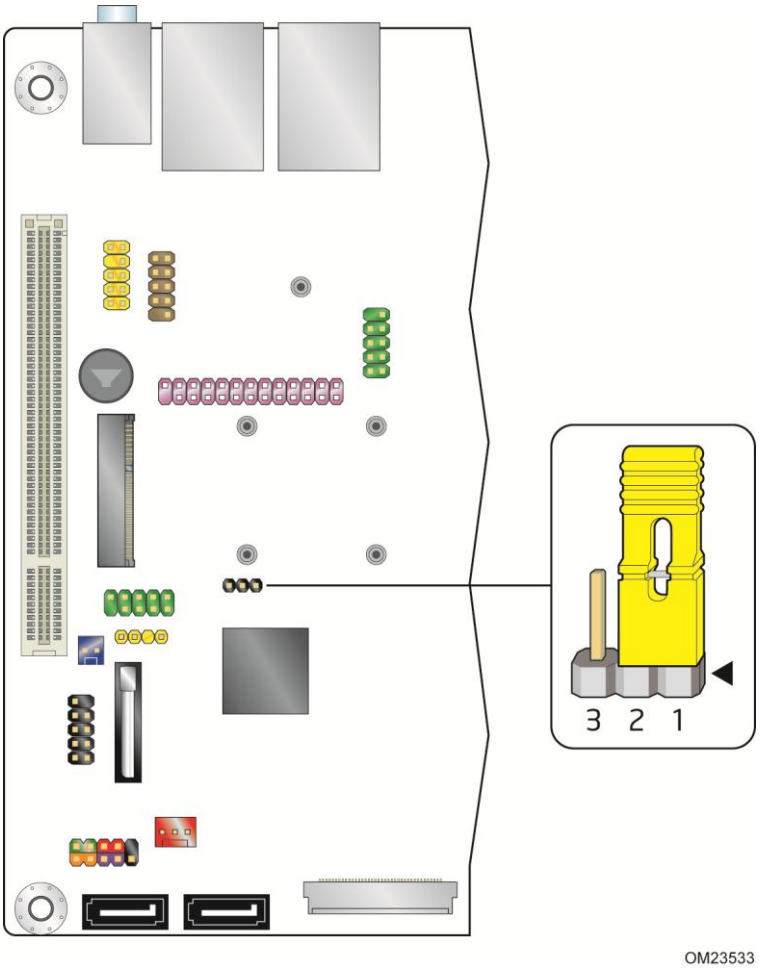


Figure 15. Location of the BIOS Configuration Jumper Block

Table 30. BIOS Configuration Jumper Settings

Function/Mode	Jumper Setting	Configuration
Normal	1-2	The BIOS uses current configuration information and passwords for booting.
Configure	2-3	After the POST runs, Setup runs automatically. The maintenance menu is displayed.
Recovery	None	The BIOS attempts to recover the BIOS configuration. See Section 4.6.1 for more information on BIOS recovery.

3.4 Mechanical Considerations

3.4.1 Form Factor

The board is designed to fit into a mini-ITX or microATX form-factor chassis. Figure 16 illustrates the mechanical form factor for the board. Dimensions are given in inches [millimeters]. The outer dimensions are 6.7 inches by 6.7 inches [170 millimeters by 170 millimeters]. Location of the I/O connectors and mounting holes are in compliance with the microATX specification.

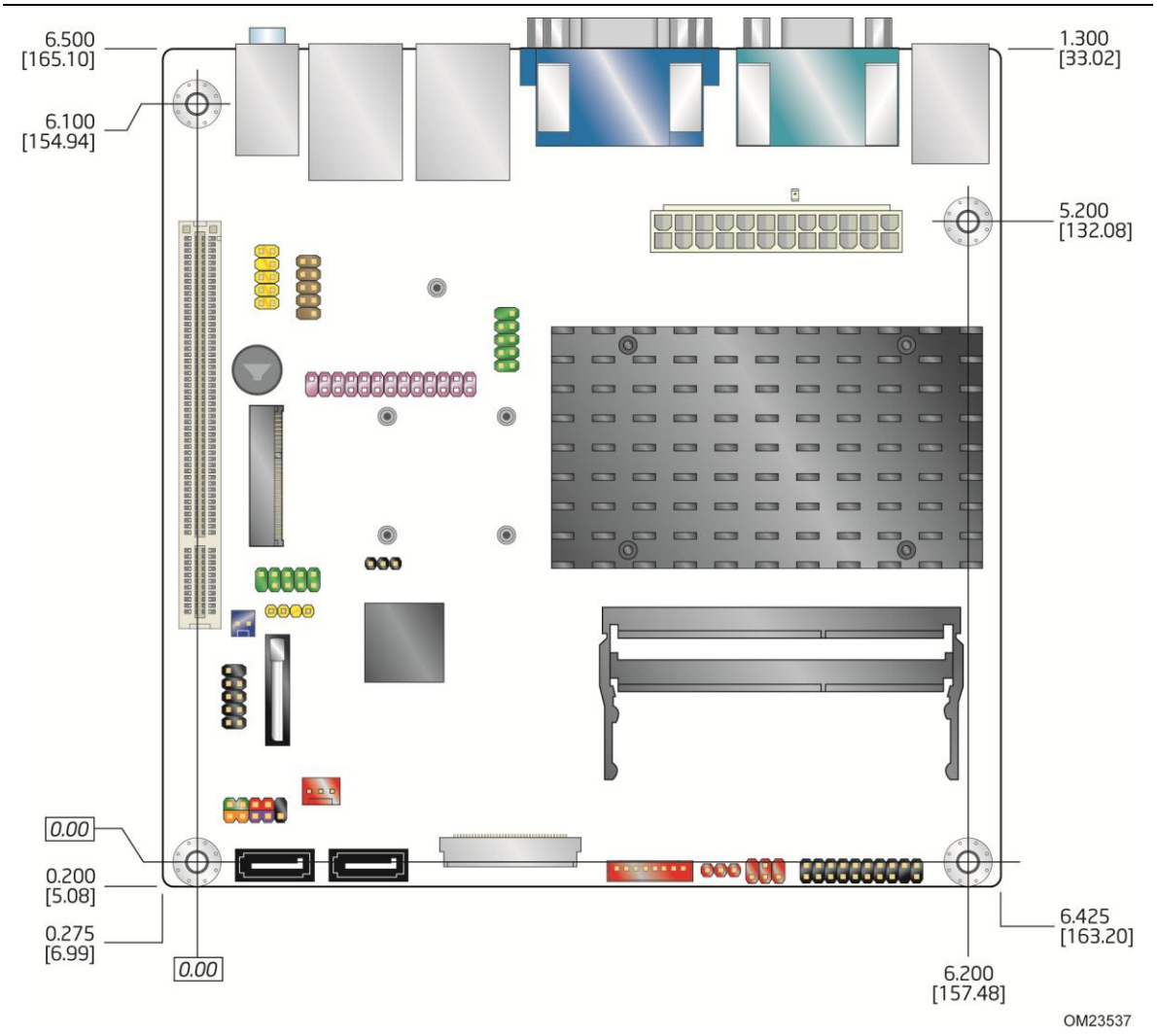


Figure 16. Board Dimensions

3.5 Electrical Considerations

3.5.1 Fan Header Current Capability

Table 31 lists the current capability of the fan header.

Table 31. Fan Header Current Capability

Fan Header	Maximum Available Current
System fan	1.5 A

3.5.2 Add-in Board Considerations

The board is designed to provide 2 A (average) of +5 V current for the Conventional PCI slot. The total +5 V current draw for the Conventional PCI expansion slot (total load) must not exceed 2 A.

3.6 Power Consumption

Power measurements were performed to determine bare minimum and likely maximum power requirements from the board, as well as attached devices, in order to facilitate power supply rating estimates for specific system configurations.

3.6.1 Minimum Load Configuration

Minimum load refers to the power demand placed on the power supply when using a bare system configuration with minimal power requirement conditions. Minimum load configuration test results are shown in Table 32. The test configuration was defined as follows:

- 2 GB DDR3/1066 MHz SO-DIMM
- USB keyboard and mouse
- LAN linked at 1000 Mb/s
- DOS booted via network (PXE); system at idle
- All on board peripherals enabled (serial, parallel, audio, …)

Table 32. Minimum Load Configuration Current and Power Results

Output Voltage	3.3 V	5 V	12 V	-12 V	5 VSB
Minimum Load	0.89 A	1.06 A	0.14 A	0.08 A	0.10 A

3.6.2 Maximum Load Configuration

Maximum load refers to the incremental power demands placed on the power supply, augmenting the minimum load configuration into a fully-featured system that stresses power consumption from all subsystems. Maximum load configuration test results are shown in Table 33. The test configuration was defined as follows:

- 4 GB DDR3/1066MHz SO-DIMM
- 14.1-inch LCD via LVDS
- SATA DVD-R/W
  - Load: DVD playback
- 3.5-inch SATA hard disk drive, running Microsoft Windows Vista Home Basic
  - Load: continuous read/write benchmark
- Intel® Z-U130 USB Solid-State Drive or compatible device on the USB flash drive header
  - Load: continuous read/write benchmark
- Wireless card on PCI Express Full-/Half-Mini Card slot, connected via 802.11n protocol
  - Load: continuous read/write benchmark on remote share
- Riser card on conventional PCI slot, populated with PCI LAN card, running file transfer through local network to SATA hard drive
- USB keyboard and mouse

- Back and front panel host-powered USB devices (other than keyboard and mouse)
  - Load: continuous read/write activity on external drive/peripheral
- LAN linked at 1000 Mb/s
  - Load: continuous read/write benchmark on remote share
- All on board peripherals enabled (serial, parallel, audio, …)

Table 33. Maximum Load Configuration Current and Power Results

Output Voltage	3.3 V	5 V	12 V	-12 V	5 VSB
Maximum Load	4.78 A	6.32 A	2.01 A	0.05 A	0.72 A

3.7 Reliability

The Mean Time Between Failures (MTBF) prediction is calculated using component and sub-assembly random failure rates. The calculation is based on the Telcordia SR-332, Method I Case 1 50% electrical stress, 55 ºC ambient. The MTBF prediction is used to estimate repair rates and spare parts requirements.

The MTBF data was calculated from predicted data at 55 ºC. The Intel® Embedded Board D2700 has an MTBF of at least 314,073 hours.

3.8 Environmental

Table 34 lists the environmental specifications for the board.

Table 34. Intel® Embedded Board D2700 Environmental Specifications

Parameter	Specification		
Temperature			
Non-Operating	-20 °C to +70 °C		
Operating	0 °C to +50 °C		
Shock			
Unpackaged	50 g trapezoidal waveform		
	Velocity change of 170 inches/second²		
Packaged	Half sine 2 millisecond		
	Product weight (pounds)	Free fall (inches)	Velocity change (inches/s²)
	<20	36	167
	21-40	30	152
	41-80	24	136
	81-100	18	118
Vibration			
Unpackaged	5 Hz to 20 Hz: 0.01 g² Hz sloping up to 0.02 g² Hz		
	20 Hz to 500 Hz: 0.02 g² Hz (flat)		
Packaged	10 Hz to 40 Hz: 0.015 g² Hz (flat)		
	40 Hz to 500 Hz: 0.015 g² Hz sloping down to 0.00015 g² Hz		

4 Overview of BIOS Features

4.1 Introduction

The board uses an Intel BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated using a disk-based program. The SPI Flash contains the BIOS Setup program, POST, the PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

The BIOS displays a message during POST identifying the type of BIOS and a revision code. The initial production BIOSs are identified as CCCDT10N.86A.

The BIOS Setup program can be used to view and change the BIOS settings for the computer. The BIOS Setup program is accessed by pressing the <F2> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins. The menu bar is shown below.

Maintenance	Main	Advanced	Security	Power	Boot	Exit

NOTE

The maintenance menu is displayed only when the board is in configure mode. Section 3.3 shows how to put the board in configure mode.

Table 35 lists the BIOS Setup program menu features.

Table 35. BIOS Setup Program Menu Bar

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Clears passwords and displays processor information	Displays processor and memory configuration	Configures advanced features available through the chipset	Sets passwords and security features	Configures power management features and power states options	Selects boot options	Saves or discards changes to Setup program options

Table 36 lists the function keys available for menu screens.

Table 36. BIOS Setup Program Function Keys

BIOS Setup Program Function Key	Description
<←> or <→>	Selects a different menu screen (Moves the cursor left or right)
<↑> or <↓>	Selects an item (Moves the cursor up or down)
<Enter>	Executes command or selects the submenu
<F9>	Load the default configuration values for the current menu
<F10>	Save the current values and exits the BIOS Setup program
<Esc>	Exits the menu

4.2 BIOS Flash Memory Organization

The Serial Peripheral Interface Flash Memory (SPI Flash) includes a 16 Mb (2048 KB) flash memory device.

4.3 Resource Configuration

4.3.1 PCI* Autoconfiguration

The BIOS can automatically configure PCI devices. PCI devices may be onboard or add-in cards. Autoconfiguration lets a user insert or remove PCI cards without having to configure the system. When a user turns on the system after adding a PCI card, the BIOS automatically configures interrupts, the I/O space, and other system resources. Any interrupts set to Available in Setup are considered to be available for use by the add-in card.

4.4 System Management BIOS (SMBIOS)

SMBIOS is a Desktop Management Interface (DMI) compliant method for managing computers in a managed network.

The main component of SMBIOS is the Management Information Format (MIF) database, which contains information about the computing system and its components. Using SMBIOS, a system administrator can obtain the system types, capabilities, operational status, and installation dates for system components. The MIF database defines the data and provides the method for accessing this information. The BIOS enables applications such as third-party management software to use SMBIOS. The BIOS stores and reports the following SMBIOS information:

- BIOS data, such as the BIOS revision level
- Fixed-system data, such as peripherals, serial numbers, and asset tags
- Resource data, such as memory size, cache size, and processor speed
- Dynamic data, such as event detection and error logging

Non-Plug and Play operating systems require an additional interface for obtaining the SMBIOS information. The BIOS supports an SMBIOS table interface for such operating systems. Using this support, an SMBIOS service-level application running on a non-Plug and Play operating system can obtain the SMBIOS information. Additional board information can be found in the BIOS under the Additional Information header under the Main BIOS page.

4.5 Legacy USB Support

Legacy USB support enables USB devices to be used even when the operating system's USB drivers are not yet available. Legacy USB support is used to access the BIOS Setup program, and to install an operating system that supports USB. By default, Legacy USB support is set to Enabled.

Legacy USB support operates as follows:

1. When you apply power to the computer, legacy support is disabled.
2. POST begins.
3. Legacy USB support is enabled by the BIOS allowing you to use a USB keyboard to enter and configure the BIOS Setup program and the maintenance menu.
4. POST completes.
5. The operating system loads. While the operating system is loading, USB keyboards and mice are recognized and may be used to configure the operating system. (Keyboards and mice are not recognized during this period if Legacy USB support was set to Disabled in the BIOS Setup program.)
6. After the operating system loads the USB drivers, all legacy and non-legacy USB devices are recognized by the operating system, and Legacy USB support from the BIOS is no longer used.
7. Additional USB legacy feature options can be accessed by using Intel Integrator Toolkit.

To install an operating system that supports USB, verify that Legacy USB support in the BIOS Setup program is set to Enabled and follow the operating system's installation instructions.

4.6 BIOS Updates

The BIOS can be updated using either of the following utilities, which are available on the Intel web site:

- Intel® Express BIOS Update utility, which enables automated updating while in the Windows environment. Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB drive), or an optical drive.
- Intel® Flash Memory Update Utility, which requires booting from DOS. Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB drive), or an optical drive.
- Intel® F7 switch allows a user to select where the BIOS .bio file is located and perform the update from that location/device. Similar to performing a BIOS Recovery without removing the BIOS configuration jumper.

Both utilities verify that the updated BIOS matches the target system to prevent accidentally installing an incompatible BIOS.

NOTE

Review the instructions distributed with the upgrade utility before attempting a BIOS update.

For information about	Refer to
BIOS update utilities	http://downloadcenter.intel.com

4.6.1 BIOS Recovery

It is unlikely that anything will interrupt a BIOS update. However, if an interruption occurs, the BIOS could be damaged. Table 37 lists the drives and media types that can and cannot be used for BIOS recovery. The BIOS recovery media does not need to be made bootable.

Table 37. Acceptable Drives/Media Types for BIOS Recovery

Media Type(Note)	Can be used for BIOS recovery?
Optical drive connected to the SATA interface	Yes
USB removable drive (a USB Flash Drive, for example)	Yes
USB diskette drive (with a 1.44 MB diskette)	No
USB hard disk drive	Yes

NOTE: Supported file systems for BIOS recovery:

- *NTFS (sparse, compressed, or encrypted files are not supported)*
- *FAT32*
- *FAT16*
- *FAT12*
- *ISO 9660*

For information about	Refer to
BIOS update instructions	http://www.intel.com/support/motherboards/desktop/sb/CS-022312.htm

4.6.2 Custom Splash Screen

During POST, an Intel® splash screen is displayed by default. This splash screen can be augmented with a custom splash screen. The Intel® Integrator Toolkit can be used to create a custom splash screen.

NOTE

If you add a custom splash screen, it will share space with the Intel branded logo.

For information about	Refer to
Intel® Integrator Toolkit	http://developer.intel.com/design/motherbd/software/itk/

4.7 Boot Options

In the BIOS Setup program, the user can choose to boot from a hard drive, optical drive, removable drive, or the network. The default setting is for the optical drive to be the first boot device, the hard drive second, removable drive third, and the network fourth.

4.7.1 Optical Drive Boot

Booting from the optical drive is supported in compliance to the El Torito bootable CD-ROM format specification. Under the Boot menu in the BIOS Setup program, the optical drive is listed as a boot device. Boot devices are defined in priority order. Accordingly, if there is not a bootable CD in the optical drive, the system will attempt to boot from the next defined drive.

4.7.2 Network Boot

The network can be selected as a boot device. This selection allows booting from the onboard LAN or a network add-in card with a remote boot ROM installed.

Pressing the <F12> key during POST automatically forces booting from the LAN. To use this key during POST, the User Access Level in the BIOS Setup program's Security menu must be set to Full.

4.7.3 Booting Without Attached Devices

For use in embedded applications, the BIOS has been designed so that after passing the POST, the operating system loader is invoked even if the following devices are not present:

- Video adapter
- Keyboard
- Mouse

4.7.4 Changing the Default Boot Device During POST

Pressing the <F10> key during POST causes a boot device menu to be displayed. This menu displays the list of available boot devices (as set in the BIOS setup program's Boot Device Priority submenu). Table 38 lists the boot device menu options.

Table 38. Boot Device Menu Options

Boot Device Menu Function Keys	Description
<↑> or <↓>	Selects a default boot device
<Enter>	Exits the menu, saves changes, and boots from the selected device
<Esc>	Exits the menu without saving changes

4.8 Adjusting Boot Speed

These factors affect system boot speed:

- Selecting and configuring peripherals properly
- Optimized BIOS boot parameters
- Enabling the new Fast Boot feature

4.8.1 Peripheral Selection and Configuration

The following techniques help improve system boot speed:

- Choose a hard drive with parameters such as "power-up to data ready" in less than eight seconds that minimizes hard drive startup delays.
- Select a CD-ROM drive with a fast initialization rate. This rate can influence POST execution time.
- Eliminate unnecessary add-in adapter features, such as logo displays, screen repaints, or mode changes in POST. These features may add time to the boot process.
- Try different monitors. Some monitors initialize and communicate with the BIOS more quickly, which enables the system to boot more quickly.

4.8.2 BIOS Boot Optimizations

Use of the following BIOS Setup program settings reduces the POST execution time.

- In the Boot Menu, set the hard disk drive as the first boot device. As a result, the POST does not first seek a diskette drive, which saves about one second from the POST execution time.
- In the Peripheral Configuration submenu, disable the LAN device if it will not be used. This can reduce up to four seconds of option ROM boot time.

NOTE

It is possible to optimize the boot process to the point where the system boots so quickly that the Intel logo screen (or a custom logo splash screen) will not be seen. Monitors and hard disk drives with minimum initialization times can also contribute to a boot time that might be so fast that necessary logo screens and POST messages cannot be seen.

This boot time may be so fast that some drives might be not be initialized at all. If this condition should occur, it is possible to introduce a programmable delay ranging from zero to 30 seconds by 5 second increments (using the Hard Disk Pre-Delay feature of the Advanced Menu in the Drive Configuration Submenu of the BIOS Setup program).

4.9 BIOS Security Features

The BIOS includes security features that restrict access to the BIOS Setup program and who can boot the computer. A supervisor password and a user password can be set for the BIOS Setup program and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all the Setup options in the BIOS Setup program. This is the supervisor mode.
- The user password gives restricted access to view and change Setup options in the BIOS Setup program. This is the user mode.
- If only the supervisor password is set, pressing the <Enter> key at the password prompt of the BIOS Setup program allows the user restricted access to Setup.
- If both the supervisor and user passwords are set, users can enter either the supervisor password or the user password to access Setup. Users have access to Setup respective to which password is entered.
- Setting the user password restricts who can boot the computer. The password prompt will be displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, the user can enter either password to boot the computer.
- For enhanced security, use different passwords for the supervisor and user passwords.
- Valid password characters are A-Z, a-z, and 0-9. Passwords may be up to 16 characters in length.

Table 39 shows the effects of setting the supervisor password and user password. This table is for reference only and does not display on the screen.

Table 39. Supervisor and User Password Functions

Password Set	Supervisor Mode	User Mode	Setup Options	Password to Enter Setup	Password During Boot
Neither	Can change all options (Note)	Can change all options (Note)	None	None	None
Supervisor only	Can change all options	Can change a limited number of options	Supervisor Password	Supervisor	None
User only	N/A	Can change all options	Enter Password Clear User Password	User	User
Supervisor and user set	Can change all options	Can change a limited number of options	Supervisor Password Enter Password	Supervisor or user	Supervisor or user

Note: If no password is set, any user can change all Setup options.

5 Board Status and Error Messages

5.1 BIOS Beep Codes

The BIOS uses audible beep codes to signal status messages and error messages indicating recoverable errors that occur during the POST. The beep codes are listed in Table 40. These beep codes can be heard through a speaker attached to the board's line out audio jack (see Figure 5, B on page 33).

Table 40. BIOS Beep Codes

Type	Pattern	Frequency
BIOS update in progress	None	
Video error (Note)	On-off (1.0 second each) two times, then 2.5-second pause (off), entire pattern repeats (beeps and pause) once and the BIOS will continue to boot.	932 Hz When no VGA option ROM is found.
Memory error	On-off (1.0 second each) three times, then 2.5-second pause (off), entire pattern repeats (beeps and pause) until the system is powered off.	932 Hz
Thermal trip warning	Alternate high and low beeps (1.0 second each) for eight beeps, followed by system shut down.	High beep 2000 Hz Low beep 1500 Hz

Note: Disabled per default BIOS setup option.

5.2 Front-panel Power LED Blink Codes

Whenever a recoverable error occurs during POST, the BIOS causes the board's front panel power LED to blink an error message describing the problem (see Table 41).

Table 41. Front-panel Power LED Blink Codes

Type	Pattern	Note
BIOS update in progress	Off when the update begins, then on for 0.5 seconds, then off for 0.5 seconds. The pattern repeats until the BIOS update is complete.	
Video error (Note)	On-off (1.0 second each) two times, then 2.5-second pause (off), entire pattern repeats (blink and pause) until the system is powered off.	When no VGA option ROM is found.
Memory error	On-off (1.0 second each) three times, then 2.5-second pause (off), entire pattern repeats (blinks and pause) until the system is powered off.	
Thermal trip warning	Each beep will be accompanied by the following blink pattern: .25 seconds on, .25 seconds off, .25 seconds on, .25 seconds off. This will result in a total of 16 blinks.	

Note: Disabled per default BIOS setup option.

5.3 BIOS Error Messages

Whenever a recoverable error occurs during POST, the BIOS displays an error message describing the problem. Table 42 lists the error messages and provides a brief description of each.

Table 42. BIOS Error Messages

Error Message	Explanation
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.

5.4 Port 80h POST Codes

During the POST, the BIOS generates diagnostic progress codes (POST codes) to I/O port 80h. If the POST fails, execution stops and the last POST code generated is left at port 80h. This code is useful for determining the point at which an error occurred.

Displaying the POST codes requires a PCI bus add-in card, often called a POST card. The POST card can decode the port and display the contents on a medium such as a seven-segment display.

NOTE

The POST card must be installed in the PCI bus connector.

The following tables provide information about the POST codes generated by the BIOS:

- Table 43 lists the Port 80h POST code ranges
- Table 44 lists the Port 80h POST codes themselves
- Table 45 lists the Port 80h POST sequence

NOTE

In the tables listed above, all POST codes and range values are listed in hexadecimal.

Table 43. Port 80h POST Code Ranges

Range	Subsystem
0x00 – 0x05	Entering SX states S0 to S5.
0x10, 0x20, 0x30	Resuming from SX states (0x10 – 0x20 – S2, 0x30 – S3, etc.)
0x11 – 0x1F	PEI phase pre MRC execution
0x21 – 0x29	MRC memory detection
0x2A – 0x2F	PEI phase post MRC execution
0x31 – 0x35	Recovery
0x36 – 0x3F	Platform DXE driver
0x41 – 0x4F	CPU Initialization (PEI, DXE, SMM)
0x50 – 0x5F	I/O Buses: PCI, USB, ATA etc. 0x5F is an unrecoverable error. Start with PCI.
0x60 – 0x6F	BDS
0x70 – 0x7F	Output devices: All output consoles.
0x80 – 0x8F	For future use
0x90 – 0x9F	Input devices: Keyboard/Mouse.
0xA0 – 0xAF	For future use
0xB0 – 0xBF	Boot Devices: Includes fixed media and removable media. Not that critical since consoles should be up at this point.
0xC0 – 0xCF	For future use
0xD0 – 0xDF	For future use

Table 44. Port 80h POST Codes

Port 80 Code	Progress Code Enumeration
	ACPI S States
0x00,0x01,0x02,0x03,0x04,0x05	Entering S0, S2, S3, S4, or S5 state
0x10,0x20,0x30	Resuming from S2, S3, S4, or S5 state
	PEI before MRC
	PEI Platform driver
0x11	Set boot mode, GPIO init
0x12	Early chipset register programming
0x13	Basic chipset initialization
0x14	LAN init
0x15	Exit early platform init driver
	PEI SMBUS
0x16	SMBUS driver init
0x17	Entry to SMBUS execute read/write
0x18	Exit SMBUS execute read/write
	Memory
0x21	MRC entry point
0x24	Detecting presence of memory DIMMs
0x25	Override Detected DIMM settings
0x27	Configuring memory.
0x28	Testing memory
	PEIMs/Recovery
0x31	Crisis Recovery has initiated
0x33	Loading recovery capsule
0x34	Start recovery capsule / valid capsule is found
	CPU Initialization
	CPU PEI Phase
0x41	Begin CPU PEI Init
0x42	XMM instruction enabling
0x43	End CPU PEI Init
	CPU PEI SMM Phase
0x44	Begin CPU SMM Init smm relocate bases
0x45	Smm relocate bases for APs
0x46	End CPU SMM Init

continued

Table 44. Port 80h POST Codes (continued)

Port 80 Code	Progress Code Enumeration
	CPU DXE Phase
0x47	CPU DXE Phase begin
0x48	Refresh memory space attributes according to MTRRs
0x49	Load the microcode if needed
0x4A	Initialize strings to HII database
0x4B	Initialize MP support
0x4C	CPU DXE Phase End
	CPU DXE SMM Phase
0x4D	CPU DXE SMM Phase begin
0x4E	Relocate SM bases for all APs
0x4F	CPU DXE SMM Phase end
	I/O BUSES
0x50	Enumerating PCI buses
0x51	Allocating resources to PCI bus
0x52	Hot Plug PCI controller initialization
	USB
0x58	Resetting USB bus
0x59	Reserved for USB
	ATA/ATAPI/SATA
0x5A	Resetting PATA/SATA bus and all devices
0x5B	Reserved for ATA
	BDS
0x60	BDS driver entry point initialize
0x61	BDS service routine entry point (can be called multiple times)
0x62	BDS Step2
0x63	BDS Step3
0x64	BDS Step4
0x65	BDS Step5
0x66	BDS Step6
0x67	BDS Step7
0x68	BDS Step8
0x69	BDS Step9
0x6A	BDS Step10
0x6B	BDS Step11
0x6C	BDS Step12
0x6D	BDS Step13
0x6E	BDS Step14
0x6F	BDS return to DXE core (should not get here)

continued

Table 44. Port 80h POST Codes (continued)

Port 80 Code	Progress Code Enumeration
	Keyboard (PS/2 or USB)
0x90	Resetting keyboard
0x91	Disabling the keyboard
0x92	Detecting the presence of the keyboard
0x93	Enabling the keyboard
0x94	Clearing keyboard input buffer
0x95	Instructing keyboard controller to run Self Test (PS/2 only)
	Mouse (PS/2 or USB)
0x98	Resetting mouse
0x99	Detecting mouse
0x9A	Detecting presence of mouse
0x9B	Enabling mouse
	Fixed Media
0xB0	Resetting fixed media
0xB1	Disabling fixed media
0xB2	Detecting presence of a fixed media (IDE hard drive detection etc.)
0xB3	Enabling/configuring a fixed media
	Removable Media
0xB8	Resetting removable media
0xB9	Disabling removable media
0xBA	Detecting presence of a removable media (IDE, CDROM detection etc.)
0xBC	Enabling/configuring a removable media
	DXE Core
0xE4	Entered DXE phase
	BDS
0xE7	Waiting for user input
0xE8	Checking password
0xE9	Entering BIOS setup
0xEB	Calling Legacy Option ROMs
	Runtime Phase/EFI OS Boot
0xF8	EFI boot service ExitBootServices ( ) has been called
0xF9	EFI runtime service SetVirtualAddressMap ( ) has been called

Table 45. Typical Port 80h POST Sequence

POST Code	Description
24	Detecting presence of memory DIMMs
27	Configuring memory
28	Testing memory
33	Loading recovery capsule
E4	Entered DXE phase
50	Enumerating PCI buses
51	Allocating resourced to PCI bus
92	Detecting the presence of the keyboard
90	Resetting keyboard
94	Clearing keyboard input buffer
95	Keyboard Self Test
EB	Calling Video BIOS
58	Resetting USB bus
5A	Resetting PATA/SATA bus and all devices
92	Detecting the presence of the keyboard
90	Resetting keyboard
94	Clearing keyboard input buffer
5A	Resetting PATA/SATA bus and all devices
28	Testing memory
90	Resetting keyboard
94	Clearing keyboard input buffer
E7	Waiting for user input
00	Ready to boot
A3	Legacy USB driver disconnect

6 Assembly/Disassembly Guide

6.1 Introduction

Please take a moment to read this manual before you start assembling or disassembling the enclosure. Often times, rushing into unit installation can result in damage to your enclosure, motherboard, and power supply.

CAUTION

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and mobile electronics, and with the safety practices and regulatory compliance required for using and modifying electronic equipment.
Disconnect the unit from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the unit or perform any procedures can result in personal injury or equipment damage. Some circuitry on the board can continue to operate even though the front panel power button is off.

Follow these guidelines before you begin installing the Embedded Board:

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your unit, such as model, serial numbers, installed options, and configuration information.
- Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an antistatic wrist strap and a conductive foam pad. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the unit's chassis.
- To avoid injury, be careful of:
  - Sharp pins on connectors or headers
  - Sharp pins on printed circuit assemblies
  - Rough edges and sharp corners on the inside of the chassis
  - Hot components (such as voltage regulators and heat sinks)
  - Damage to wires that could cause a short circuit

6.2 Required tools

- Phillips screwdriver

6.3 Board Installation Steps

1. To remove the top lid, remove the screw (encircled in red) from the back, in the right corner, see Figure 17. Push back the top lid ½ inches and after this, gently pull it up.

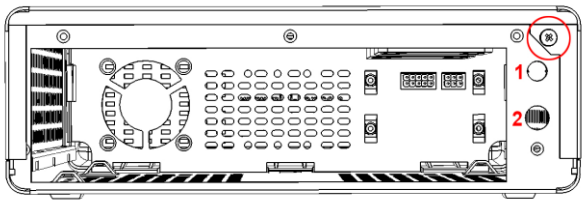


Figure 17 -- Removing the top lid

1 - WiFi antenna hole, 2 - DC Power jack hole

2. Install I/O motherboard shield on the back of the enclosure.
3. Install the motherboard on the base plate using four screws pictured below.

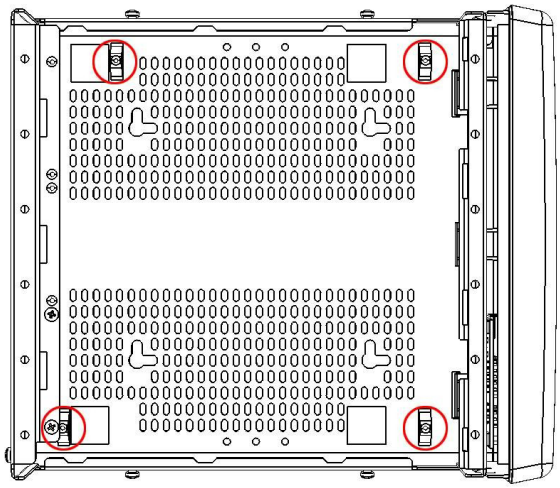


Figure 18—*Install Motherboard*

4. Connect the ON/OFF and Power LED cables (J3 in Figure 19) to the motherboard using the cable harness provided with the enclosure, see **Figure 19**. Also, you can connect the USB header (J2 in Figure 19), if needed. Connect the ON/OFF and Power LED cables (J3 in Figure 19) to the motherboard using the cable harness provided with the enclosure. Also, you can connect the USB header, if needed.

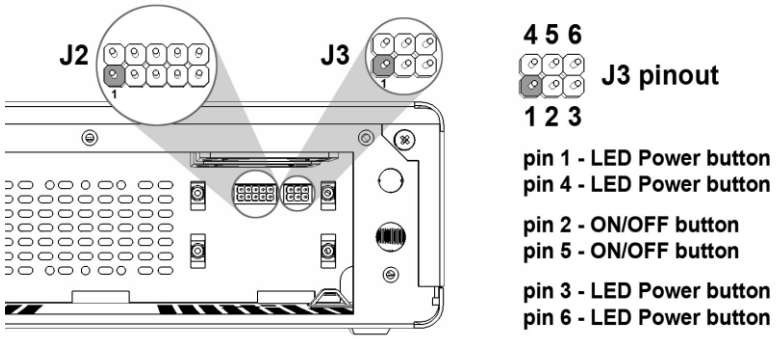


Figure 19 -- J2 (USB Header) and J3 (2x3) pin header, view from the back of Enclosure

6.4 Installing USB devices under the front plate

The face plate is designed to conceal USB flash drives, Bluetooth, USB WIFI modules or other USB devices. To add a USB device under the front plate, remove it by carefully pressing outwards and gently pushing, one by one, the plastic lids from the sides (see Figure 20).

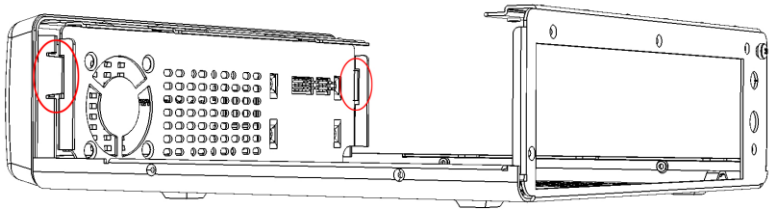


Figure 20 -- Removing the front plate by pressing the left and right plastic lids

Near the front USB connector there are 2 jumpers (pictured in Figure 21) which are used to customize how the board will start.

JP1: Disable On/Off power button (removing this jumper disables the power button).

JP2: Enable auto start (set power button on "ON" state always).

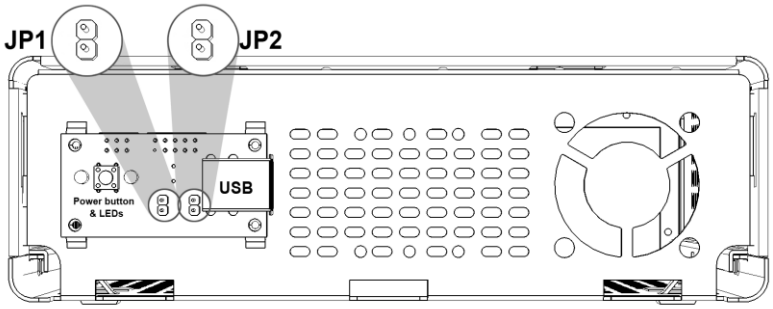


Figure 21 -- JP1, JP2 pin header and 2 x USB slots

Front view of the enclosure, with the front plate removed.

After installing the desired USB devices, snap back the front plate.

6.5 Installing SSD and Fans

Install the SSD using the provided screws. The SSD (and optional coolers) will be fastened onto the SSD Mounting Bracket see Figure 22. On the bracket you can install one 2.5" hard drive or two fans (40x40x10mm) pictured below.

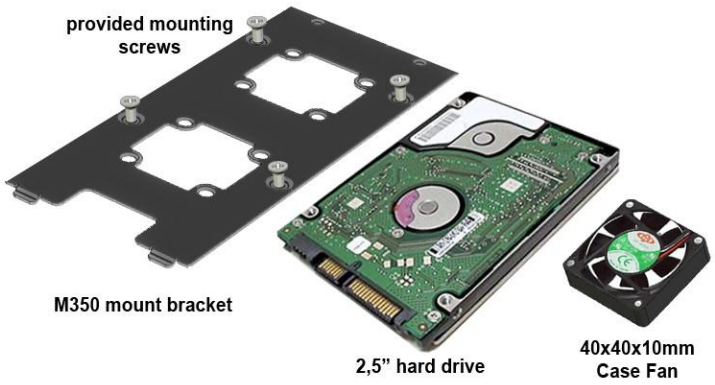


Figure 22: Mount Bracket for HDD, SSD, or Fan

7 Operating System Reference

7.1 Installing Windows* 7

This section provides step-by-step instructions for installing Windows* 7 on platforms based on the Intel® Atom™ Processor N2000 or D2000 Series and Intel® NM10 Express Chipset.

The instructions in this section have been validated with the Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset and Intel® Atom™ Processor N2800 with Intel® NM10 Express Chipset Development Kits. However, the information in this section is applicable to any Intel platform based on the Intel® Atom™ Processor N2000 or D2000 Series and Intel® NM10 Express Chipset.

For customers evaluating or using the Development Kit(s) as a basis for their embedded design and Windows 7 as their operating system, this is the primary guidance Intel provides for installing the drivers and operating system to deliver optimized performance.

Windows 7 is the 2009 release of Microsoft Windows which is a series of operating systems produced by Microsoft for use on all different types of personal computers, including home and business desktops, laptops, netbooks, tablet PCs, and media center PCs.

Windows 7 is an officially supported OS for this platform. Starter, Home Basic and Home Premium are the supported versions of this OS for this platform.

Note: Six additional plan of record operating systems exist for this platform as well: Windows XP, Windows XP Embedded (XPe), Yocto Project, MeeGo 1.2, VxWorks, Windows Embedded Compact 7, and Windows Embedded Standard 7 (WES7).

Hardware and software required for installation of Windows 7 and the drivers made by Intel on this platform include:

- A system designed to Intel's platform design guide recommendations
- 40 GB or larger blank hard disk drive (HDD) or SSD
- USB DVD-ROM drive (or USB flash drive depending on how Microsoft Windows 7 is downloaded and installed)

7.1.1 Downloading and installing Windows 7 onto the Target SSD/HDD

Windows 7 is a closed source platform that includes the kernel, core OS, UI libraries and tools, reference user experiences for multiple devices and applications, a standard set of APIs across all target device types, and the flexibility to support add-ons and applications. Since Windows 7 is the exclusive property of Microsoft, Intel is legally not allowed to distribute a BSP or full OS image with Intel drivers already pre-installed in

it. The purpose of this section is thus to provide the instructions necessary for downloading and creating the Microsoft Windows 7 OS and then installing the drivers created by Intel for this platform under Windows 7.

Before proceeding with the rest of this section which covers how to install Intel-created graphics, chipset and processor drivers into the target Windows 7 based platform, customers must first obtain a blank SATA based HDD or SSD (recommended size = 40 GB or more) and choose one of the acceptable methods in Table 46 to install Windows 7 from scratch.

Table 46. Windows 7 Installation Options

If you want to do this	Go here for more information
Format the HDD/SSD and install Windows 7.	http://windows.microsoft.com/en-us/windows7/Installing-and-reinstalling-Windows-7 See "Using the Custom installation option and formatting the hard disk" in this topic
Install Windows 7 on a HDD/SSD that did not previously have an operating system.	http://windows.microsoft.com/en-us/windows7/Installing-and-reinstalling-Windows-7 See "Using the Custom installation option if no operating system is installed" in this topic.
Install Windows 7 on a HDD/SSD based platform without using a DVD drive.	For information about downloading Windows 7, and then creating a USB flash drive to install Windows 7, go to: http://windows.microsoft.com/en-us/windows7/installing-windows-7-on-a-netbook

NOTE: Instructions are courtesy of Microsoft.

Once the SSD/HDD contains a fresh version of Windows 7, it is recommended that the latest service pack be downloaded and installed.

Note: This may not be necessary if the latest service pack is integrated into the original OS installation.

A service pack (SP) is a Windows update, often integrating previously released updates, that helps make Windows more reliable. Service packs, which are provided free of charge by Microsoft, can include security and performance improvements and support for new types of hardware. Installing the latest service pack helps keep Windows 7 up to date.

The easiest way to get any necessary service packs is to use the target platform's Windows 7 and turn on Windows Update for Windows 7. Step by step instructions on how to do this are posted here from Microsoft: http://windows.microsoft.com/en-US/windows7/learn-how-to-install-windows-7-service-pack-1-sp1

As of December 2011, the most recent service pack available for manual download is R2 SP1 (Service Pack 1). Download R2 SP1 from the Download Center here: http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=5842#overview

Turning on Automatic Updating is optional. If you are creating a golden image for prototyping or production purposes, having explicit control over operating system updates is recommended.

7.1.2 Downloading and installing processor, graphics, chipset and other optional drivers

Though the standard OS may contain several drivers compatible with the platform it is recommended that you install the latest platform drivers found here:

http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&ProductFamily=Desktop+Boards&ProductLine=Intel%c2%ae+NM10+Chipset+Family+Boards&ProductProduct=Intel%c2%ae+Desktop+Board+DN2800MT&DownloadType=Drivers

These drivers, in pre-release and release forms, are also available in the same package format from https://platformsw.intel.com. Please see your Intel field representative for access.

Driver files are generally available as an executable file. If you have downloaded the package file to your platform, and it is in ZIP format, extract the contents of the file using a file decompression program such as WinZip* or 7-Zip*.

7.2 Installing Windows* Embedded Standard 7

This section provides step-by-step instructions for installing Windows* Embedded Standard 7 on platforms based on the Intel® Atom™ Processor N2000 or D2000 Series and Intel® NM10 Express Chipset.

The instructions in this section have been validated with the Intel® Atom™ Processor D2700 with Intel® NM10 Express Chipset and Intel® Atom™ Processor N2800 with Intel® NM10 Express Chipset Development Kits. However, the information in this section is applicable to any Intel platform based on the Intel® Atom™ Processor N2000 or D2000 Series and Intel® NM10 Express Chipset.

For customers evaluating or using the Development Kit(s) as a basis for their embedded design, and Windows Embedded Standard 7 as their operating system, this is the primary guidance Intel provides for installing the drivers and operating system to deliver optimized performance.

Windows Embedded Standard 7, abbreviated WES7, is a Windows 7 compatible operating system from Microsoft designed specifically for use in embedded systems. With WES7 software developers and system engineers have the ability to customize the operating system by selecting components they most need to run their advanced commercial and consumer devices and existing Windows applications and drivers.

Developers can use Windows Embedded Standard 7 and the component selection menu built into it to create a custom, segment specific and highly space conscious OS build for a variety of connected, and service-oriented advanced commercial or consumer devices. Examples include operating system customizations for set-top boxes, full featured point of service appliances, gaming devices, industrial controls, multimedia internet devices, kiosks, digital signage, monitoring devices, and thin clients.

According to Microsoft, Windows Embedded Standard 7, is based on Windows 7 which was previously codenamed Windows Embedded 'Quebec'. Windows Embedded

Standard 7 includes Windows Vista and Windows 7 features such as Aero, SuperFetch, ReadyBoost, BitLocker Drive Encryption, Windows Firewall, Windows Defender, Address space layout randomization, Windows Presentation Foundation, Silverlight 2, Windows Media Center among several other packages. Windows Embedded Standard 7 is x86 compatible and applications that run under Windows 7 should perform equivalently under WES7.

Hardware and software required for installation of Windows 7 and the drivers made by Intel on this platform include:

- A system designed to Intel's platform design guide recommendations
- 40 GB or larger blank hard disk drive (HDD) or SSD
- USB DVD-ROM drive (or USB flash drive depending on how Microsoft Windows 7 is downloaded and installed)
- Windows Embedded Standard 7 DVD Image

7.2.1 Downloading, burning, and installing the WES7 DVD image

A DVD image for Windows Embedded Standard 7 SP1 with registration instructions for trial and full licenses can be found at:
http://www.microsoft.com/windowsembedded/en-us/downloads/download-windows-embedded-standard-7.aspx

Download the image per the instructions provided by Microsoft on the page and burn to a writeable DVD disc.

7.2.2 Install WES7

1. Ensure that the hard disk or SSD to be used is not bootable to any operating system, and that the USB DVD-ROM drive is connected to platform.

2. Boot the system with the WES7 DVD you have created. Choose Build an Image as shown in Figure 23.

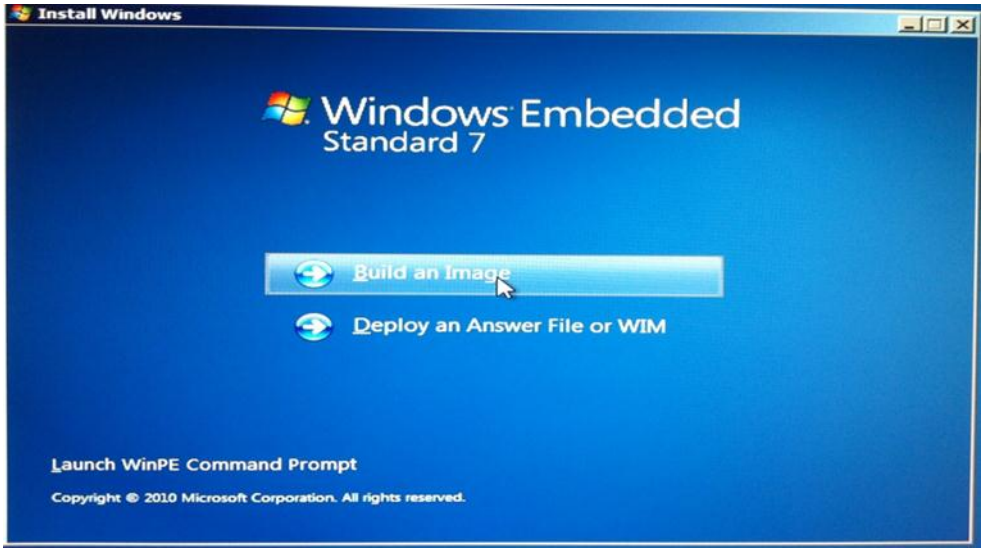


Figure 23: Build an image

3. Read and accept the license as shown in Figure 24. Click Next

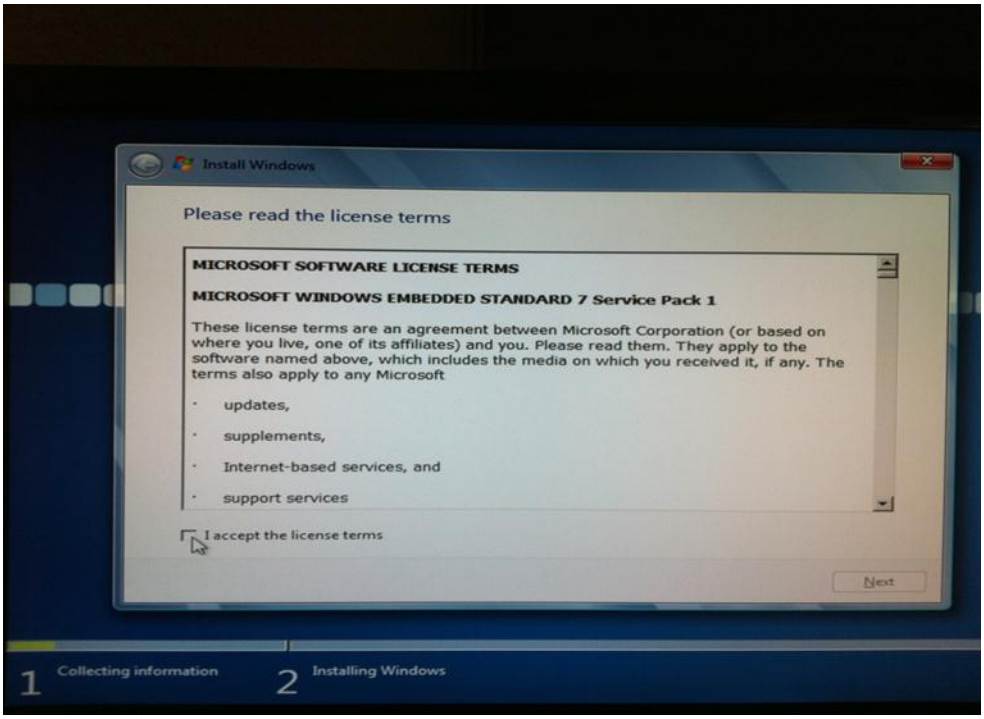


Figure 24: Accept the license terms

4. WES7 allows you to choose from several pre-configured templates when creating your image. Each selection has a different set of driver support and potentially different look and feel for the user interface. The default is Application Compatibility,

which installs many of the basic Windows applications (Media Player, Internet explorer, etc.) and drivers necessary for broad application support with the default windows desktop look and feel. Intel recommends that you click View Template on each as shown Figure 25.

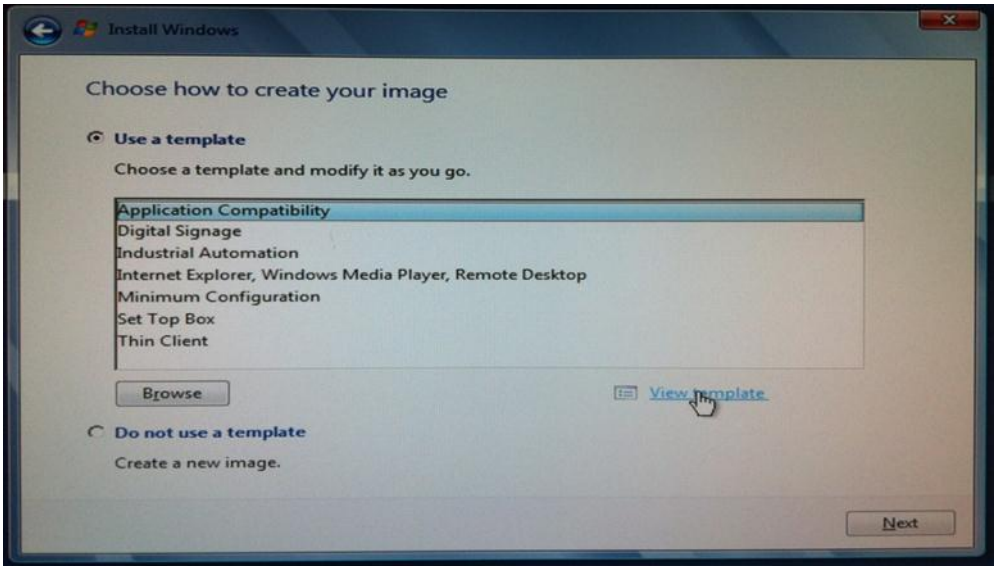


Figure 25: View template

5. The template view will show you a list of the applications, drivers, and feature packages selected by each template. An example of the Application Compatibility template view is in Figure 26. When you are satisfied with your choice of template, click Close. Intel recommends that you thoroughly review each of the templates before clicking Next.

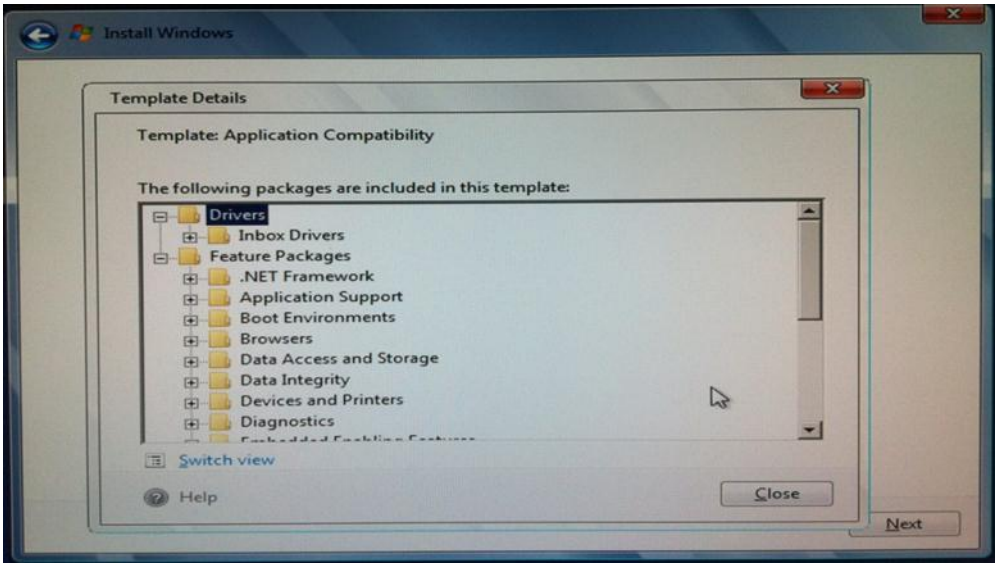


Figure 26: Template details

You may also choose Do not use a template to create your own customized image with only the drivers and features that you need for your specific product implementation. In that case, select the desired features that you need, and click Next.

6. Select your preferred language and keyboard region as shown in Figure 27.

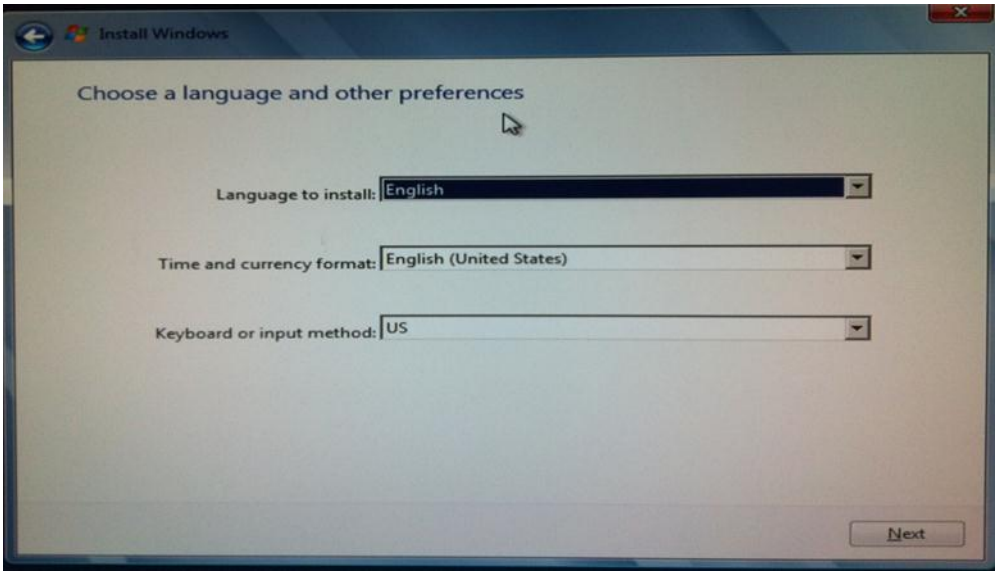


Figure 27: Choose a language and other preferences

7. Select a disk install location as shown in Figure 28. You may want to delete any existing partitions that appear in the list. If not, you can use an unallocated section or create one using the options. Note that you will likely need at least 8GB of free space for an install depending on which image options and features you chose in step 5. When you are finished, click Next.

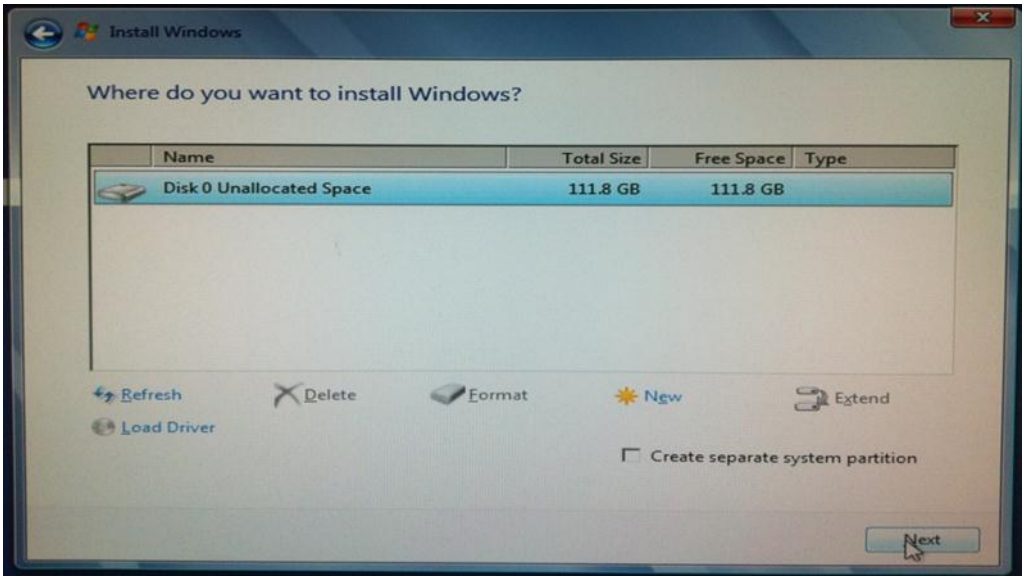


Figure 28: Where do you want to install Windows?

8. The installation will run for several minutes. During this time, the system may restart a number of times.

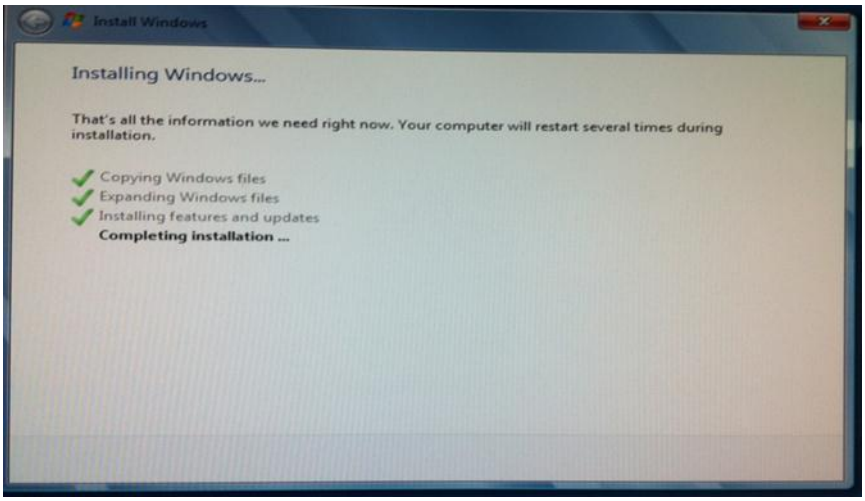


Figure 29: Installing Windows

9. When the install process completes, you will be presented with a login screen, where you can establish a user account and name for your system.

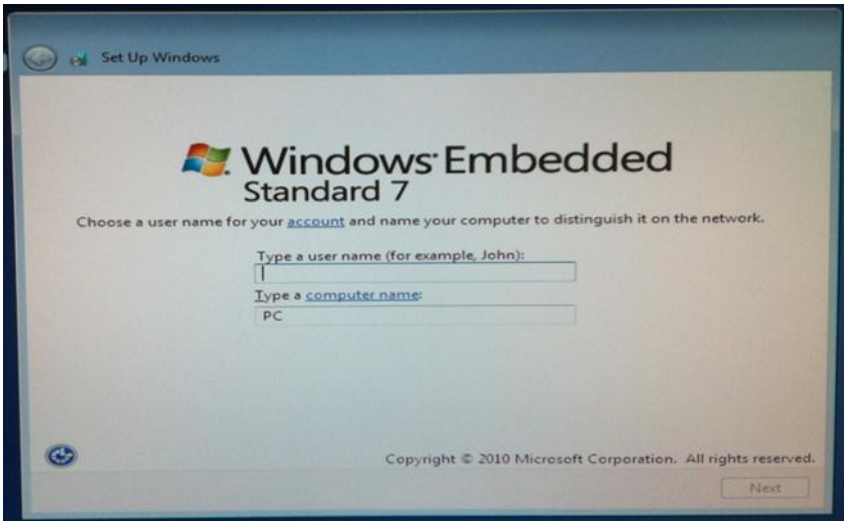


Figure 30: Set up Windows - Login

7.2.3 Downloading and installing processor, graphics, chipset and other optional drivers

Though the standard OS may contain several drivers compatible with the platform it is recommended that you install the latest platform drivers found here:

http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&ProductFamily=Desktop+Boards&ProductLine=Intel%c2%ae+NM10+Chipset+Family+Boards&ProductProduct=Intel%c2%ae+Desktop+Board+DN2800MT&DownloadType=Drivers

These drivers, in pre-release and release forms are also available in the same package format from https://platformsw.intel.com. Please see your Intel field representative for access.

Driver files are generally available as an executable file. If you have downloaded the package file to your platform and it is in ZIP format, extract the contents of the file using a file decompression program such as WinZip* or 7-Zip*.

7.3 Installing Windows Embedded Compact 7*

For customers requiring WEC7 BSPs for their boards, please contact the respective Adeneo (http://www.adeneo-embedded.com/en/Products/Board-Support-Packages) and BSquare (http://www.bsquare.com/board-support-packages.aspx) ISVs.

7.4 Installing Windows XP*

This section provides step-by-step instructions for downloading the drivers for platforms featuring the Intel® NM10 chipset and the Embedded Graphics Driver for the Intel® Atom™ Processor N2600/D2700/N2800, to properly install and configure the Microsoft Windows XP* with Service Pack 3 image.

These instructions have been used with the Intel Customer Reference Board (CRB) and are applicable to any Intel platform based on the Intel Atom Processor N2600/D2700/N2800 paired with Intel NM10 Express Chipset.

For customers evaluating or using the Development Kit as a basis for their embedded design, and Windows* XP as their operating system, this document is the primary guidance Intel provides for setting up the drivers and operating system.

7.4.1 Overview

Windows XP with Service Pack 3 does not provide drivers for all the SATA controllers, requiring an extra step during the install procedure. There are two different methods of performing the installation to accommodate for the missing SATA drivers.

The first method requires a USB floppy drive with the SATA drivers loaded on the floppy disk. This approach is typically referred to as an F6 Install since the user is required to press F6 early in the install to indicate the SATA drivers will be read from a floppy disk.

The second method requires a tool to produce a new Windows XP image typically referred to as slipstreamed image. The slipstreamed image eliminates the need for the floppy drive and floppy disk, but requires a software tool to create the image. The preferred approach is the slipstream method due to the limited availability of validated floppy drives. Both install methods require you download the SATA drivers from Intel separately from the Windows image. If you skip this step, you will get a blue screen

early in the installation sequence. Additional information about this issue can be found on the Microsoft website.

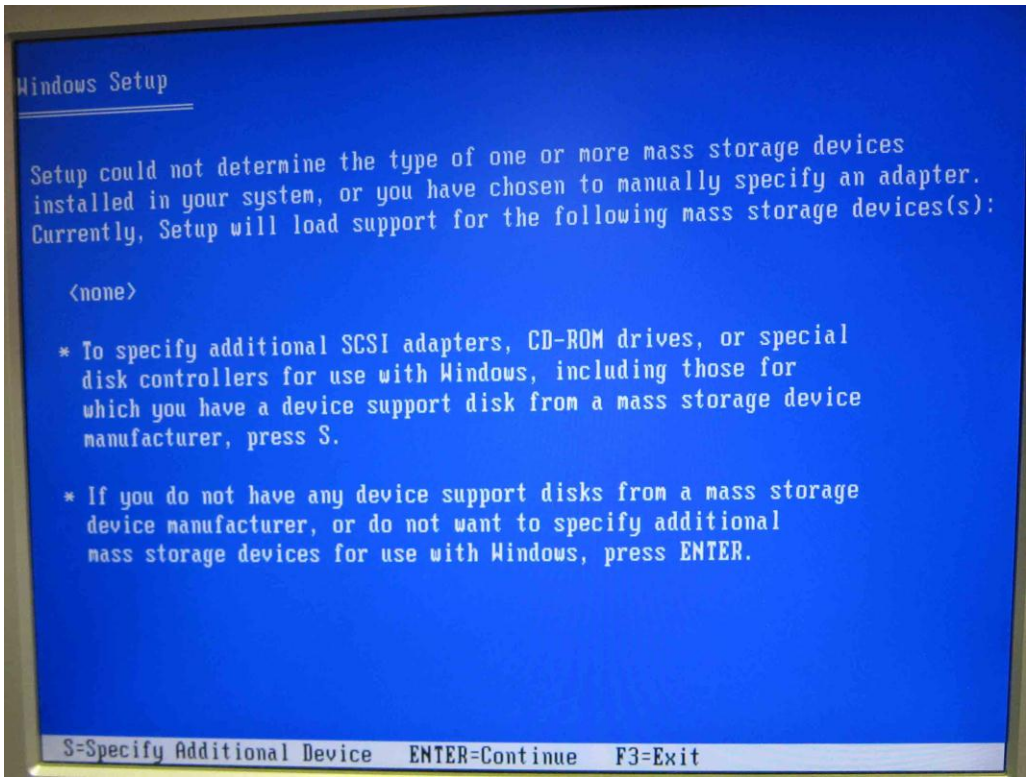
http://support.microsoft.com/kb/314859

http://support.microsoft.com/kb/916196

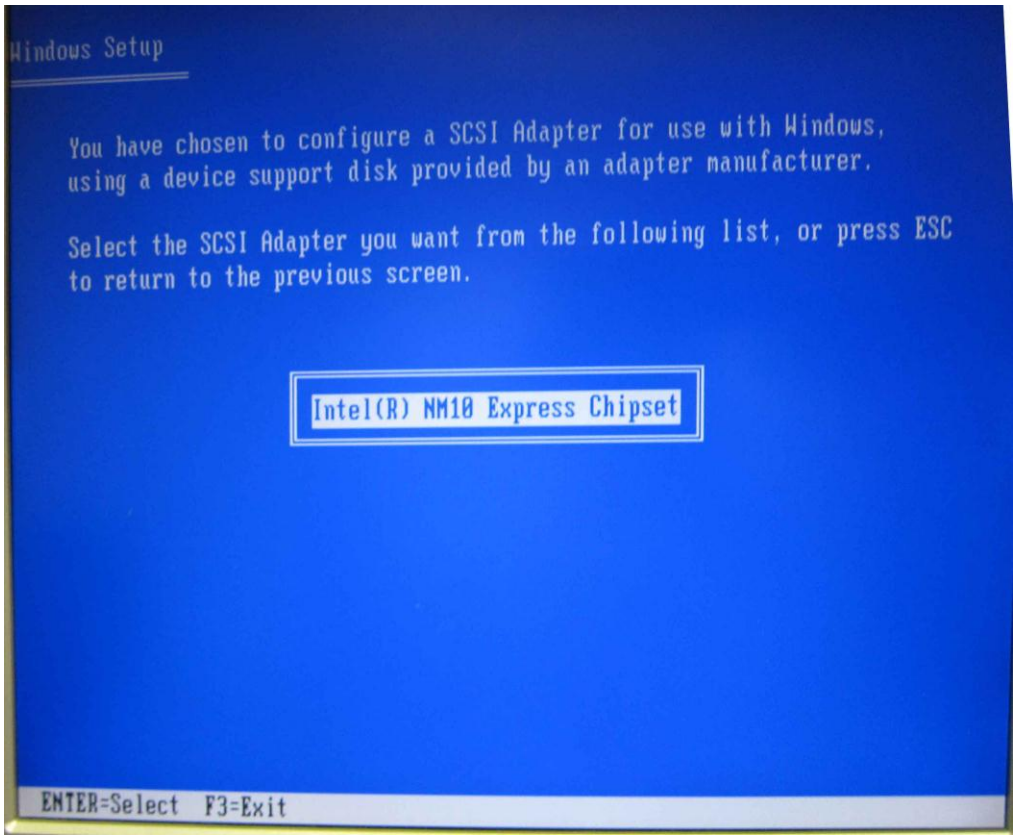
Note: Not all USB floppy disk drives are created equal. If you go this route, please read the above support documents from Microsoft to get a list of supported floppy drives.

7.4.2 F6 install with floppy

1. Download either the STOR_10.1.0.1008_f6flpy-x86.zip or STOR_10.1.0.1008_f6flpy-x64.zip SATA Driver files from here
2. Put the SATA drivers on a floppy disk.
    a) iaahci.cat
    b) iaAHCI.inf
    c) iastor.cat
    d) iaStor.inf
    e) iaStor.sys
    f) license.txt
    g) TXTSETUP.OEM
    h) F6Readme.txt
3. Attach the USB Floppy drive to the CRB.
4. Connect a SATA or USB CD or DVD drive with the Microsoft Windows XP with Service Pack 3 image.
5. Boot the CRB to initiate the Windows XP Setup process.
6. When the Windows XP Setup screen appears, you will soon see a message in the grey bar at the bottom of the screen. This message will say, "Press F6 if you need to install a third party SCSI or RAID driver…."
    a) Press F6.
    b) The installer will continue on for a minute or so before the F6 install screen will appear.

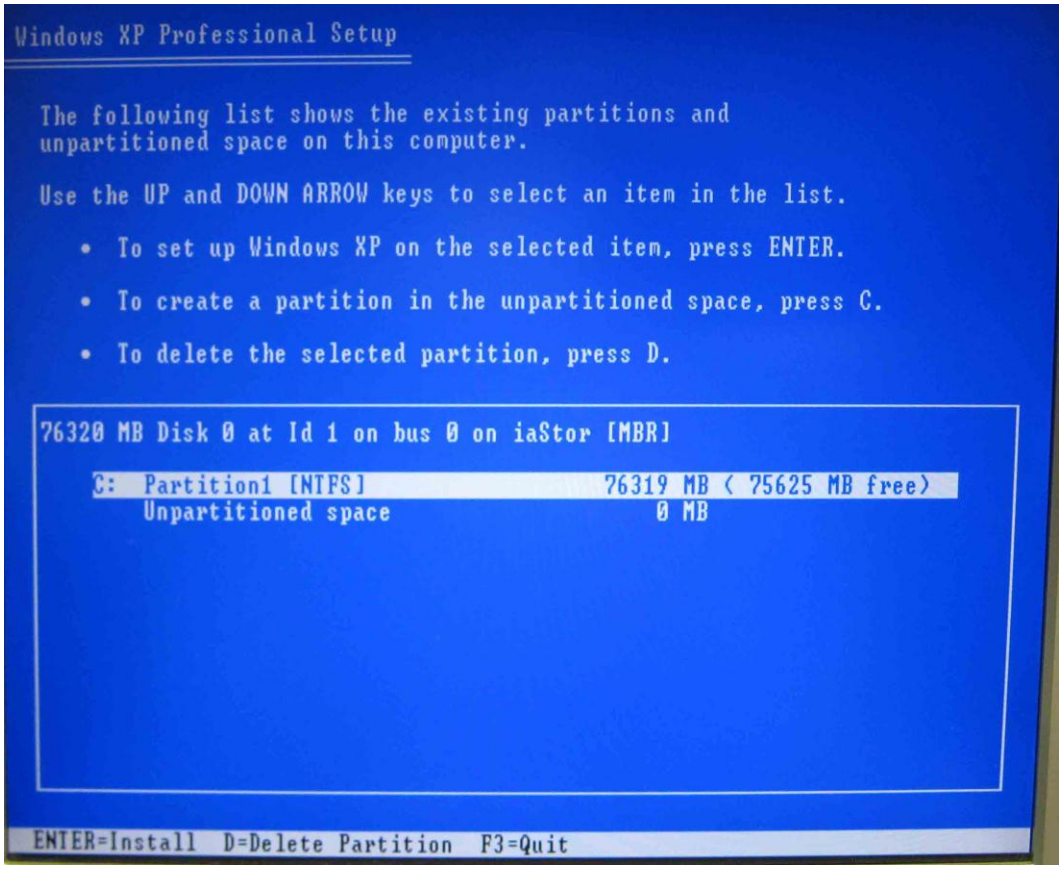


c) Press S to Specify Additional Device. The SCSI adapter screen will appear.



d) Press Enter to Select the Intel® NM10 Express Chipset. The screen titled "Setup will load support for Intel® NM10 Express Chipset" will appear.

e) Press Enter to continue. The partitions screen will appear.



f) Select the C: partition and press Enter. Setup will continue as normal.

7.4.3 Slipstream install

There are several tools available that can create a slipstream image. This document uses the nLite* 1.4.9.1 tool.

1. Download and install nLite from: http://www.nliteos.com/index.html.

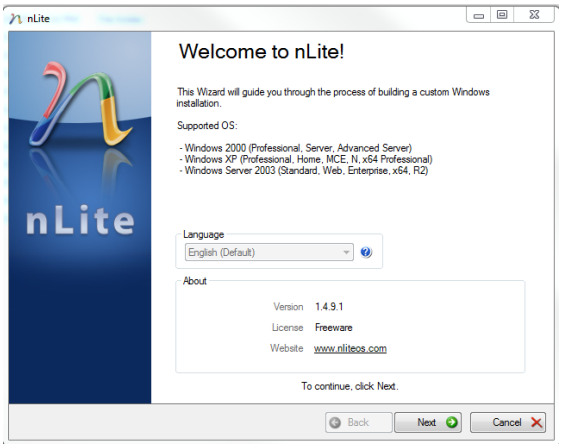
2. Download either the STOR_10.1.0.1008_f6flpy-x86.zip or STOR_10.1.0.1008_f6flpy-x64.zip SATA Driver files from here.

3. Extract the Intel® Rapid Storage Technology F6 Driver files.

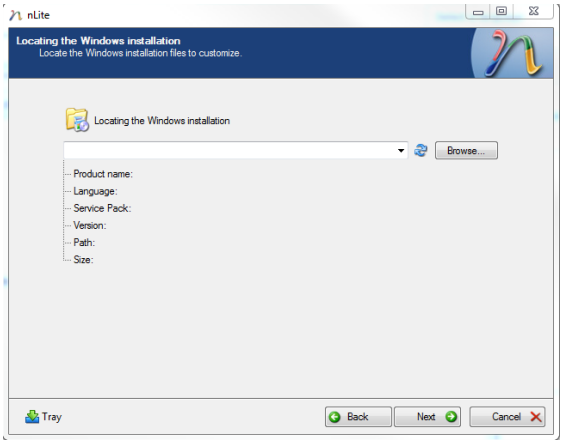
4. Download the Windows XP installation ISO or insert the Windows XP installation Disk into the disk drive.

5. Start the nLite tool.

   a. Select your language and click Next

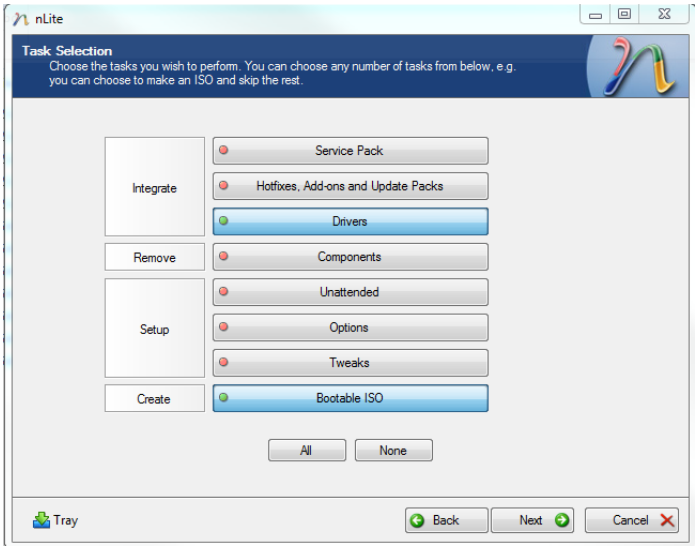


b. Click on Browse and point to the folder with the Windows XP installation files (from step 4). You will see the information fields populate. Click Next.



c. Click Next on the Presets page.

d. Select Drivers and Bootable ISO on the Task Selection page. Click Next.



e. Click Insert · Single Driver

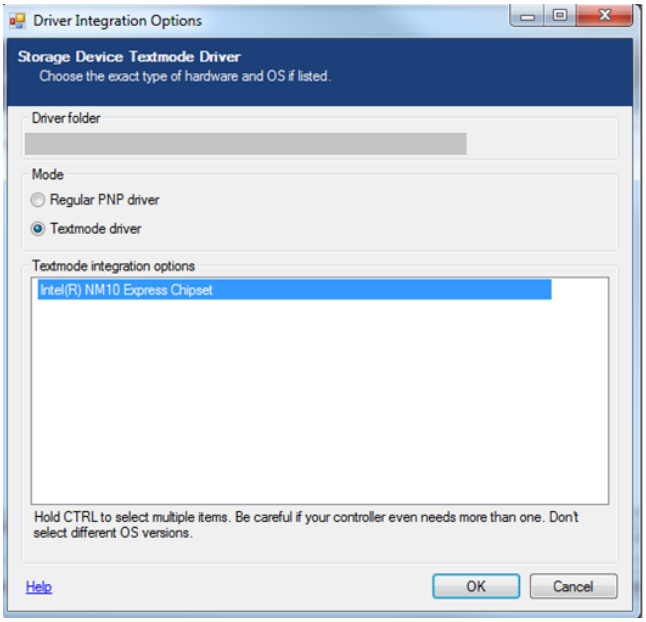
i. Browse to the Intel Rapid Storage Technology F6 Driver files.

ii. Select the iaAHCI.inf file.

f. Select the Textmode driver radio button.

g. Select the Intel® NM10 Express Chipset in the Textmode integration options pane.

h. Click OK.



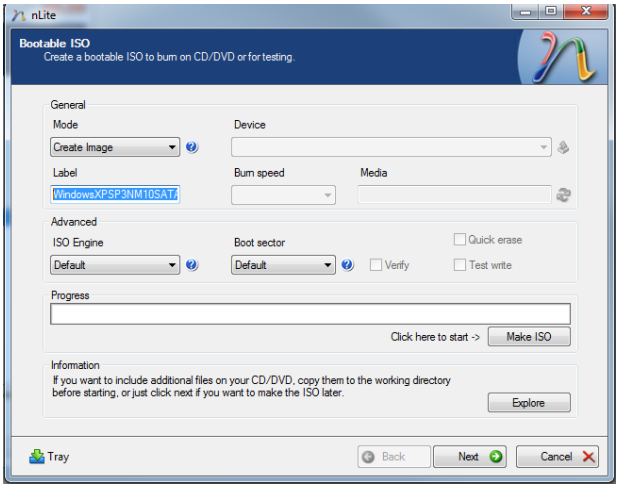
i. On the Drivers page, click Next.

j. Click Yes to start the process.

k. On the Processing… page, click Next.

l. On the Bootable ISO page, .abel your new Windows XP installation with something meaningful such as: WindowsXPSP3NM10SATA.

m. Click Make ISO.



n. Name your ISO with a meaningful name, such as: WindowsXPSP3WithNM10Sata.iso

o. Click Next.

p. Click Finish.

6. Burn the newly generated ISO file to a CD using your favorite tool.
7. Attach a SATA CD ROM or USB CD ROM to Intel's CRB.
8. Install Windows XP by selecting the appropriate options in the setup screens.

7.4.4 Install Device Drivers

The Rapid Storage Technology Drivers, Audio Drivers, LAN Drivers, and Chipset Drivers can be found here:

http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&ProductFamily=Desktop+Boards&ProductLine=Intel%c2%ae+NM10+Chipset+Family+Boards&ProductProduct=Intel%c2%ae+Desktop+Board+DN2800MT&DownloadType=Drivers

7.4.5 Install and configure EMGD

The Intel® Embedded Media and Graphics Driver (Intel® EMGD) comprises a suite of multi-platform graphics drivers designed to meet the requirements of embedded applications, featuring Intel® Dynamic Display Configuration Technology (DDCT).

The Intel® Embedded Media and Graphics Drivers support the following types of display devices:

- Analog CRT
- LVDS flat panels
- HDMI / DVI
- DisplayPort / Embedded DisplayPort

Intel® EMGD is designed to work with fixed-function systems, such as Point-of-Sale (POS) devices, ATMs, gaming devices, In-vehicle Information/Entertainment systems, etc. It can be configured to work with various hardware and software systems.

For more information, please refer to the EMGD User's Guide bundled with the EMGD Graphics Driver.

7.5 Using MeeGo*

This section provides step-by-step instructions for downloading, installing, and configuring MeeGo for the Intel® Atom™ Processor N2600/D2700/N2800.

These step-by-step instructions have been used with the Intel Customer Reference Board (CRB) and are applicable to any Intel platform based on the Intel Atom Processor N2600/D2700/N2800 paired with Intel NM10 Express Chipset.

For customers evaluating or using the Development Kit as a basis for their embedded design, and MeeGo* as their operating system, this is the primary guidance Intel provides for setting up the drivers and operating system.

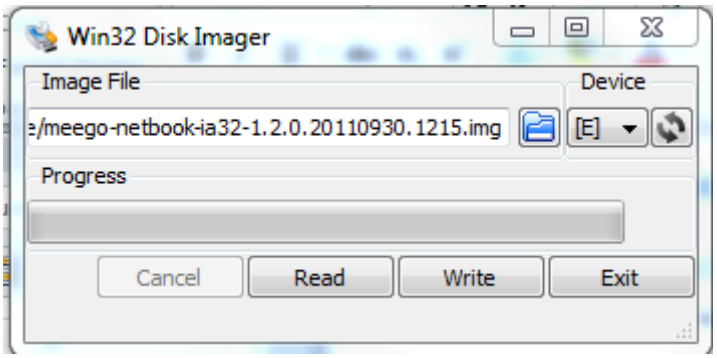
7.5.1 Booting MeeGo*

The MeeGo* project provides a Linux-based, open source software platform for the next generation of computing devices. The MeeGo software platform is designed to give developers the broadest range of device segments to target for their applications, including netbooks, handheld computing and communications devices, in-vehicle infotainment devices, smart TVs, tablets and more – all using a uniform set of APIs based on Qt. For consumers, MeeGo will offer innovative application experiences that they can take from device to device. For more information, visit the MeeGo website at https://meego.com/.

7.5.2 Live Image on USB stick

1. Insert and Format the USB stick.
   a. On Windows 7, right click on Computer.
   b. Click on Manage.
   c. On the Computer Management page, Select Storage>Disk Management on the Left hand side
   d. Remove any partitions or volumes. This is particularly important when you have used the USB stick for other Linux distributions or previous versions of MeeGo.
2. Download the Beta MeeGo image.
   a. http://download.meego.com/snapshots/latest-cedartrail/images/meego-netbook-ia32/
   b. Choose the meego-netbook-ia32-*.img file

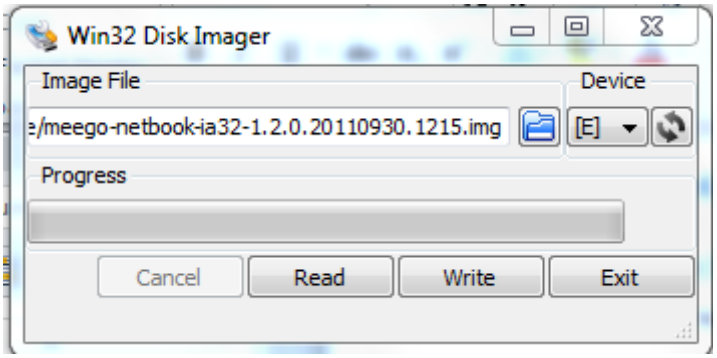
3. Download and install Win32 Disk Imager from:
    a. https://launchpad.net/win32-image-writer/+download
4. Use Win32DiskImager to put the image on your USB Stick



5. Write the image to the USB stick by selecting Write.
6. Insert the USB stick into the CRB.
7. When you boot the BIOS be sure to select the USB stick as the primary boot drive.
8. When the selection options appear, select the first option to Boot MeeGo.

7.5.3 Install with USB stick

1. Insert and format the USB stick.
    a. On Windows 7, right click on Computer.
    b. Click on Manage.
    c. On the Computer Management page, Select Storage>Disk Management on the left hand side
    d. Remove any partitions or volumes. This is particularly important when you have used the USB stick for other Linux distributions or previous versions of MeeGo.
2. Download the Beta MeeGo image.
    a. http://download.meego.com/snapshots/latest-cedartrail/images/meego-netbook-ia32/
    b. Choose the meego-netbook-ia32-*.img file
3. Download and install Win32 Disk Imager from:
    a. https://launchpad.net/win32-image-writer/+download
4. Use Win32DiskImager to put the image on your USB Stick



5. Write the image to the USB stick by selecting Write.
6. Insert the USB stick into the CRB.
7. When you boot the BIOS be sure to select the USB stick as the primary boot drive.
8. When the selection options appear, select the second option to Installation Only option.
9. Follow the prompts to install.

Note: MeeGo Bug number 23757 has been created recently due to a mismatch size of the GUI installer when BOTH the VGA and LVDS screens are attached. If you do not see the arrows or next buttons on the screen, you may press enter as the next buttons will be enabled by default. Or you can attach just one monitor for the installation procedure, and the GUI installer should size correctly.

7.5.4 Graphics Driver

The MeeGo Graphics driver is integrated into the MeeGo Alpha image. Since the graphics capabilities are integrated in the image, no additional installations are required, and no additional configuring is required to benefit from the Linux based hardware accelerated graphics drivers. The source file for the stand alone files for the graphics drivers in MeeGo are at:
http://download.meego.com/live/MeeGo:/1.2.0:/CedarTrail:/

7.5.5 Flash

Hardware accelerated flash for MeeGo can be downloaded from the following site:
https://registrationcenter.intel.com/RegCenter/ComForm.aspx?ProductID=1618.

7.6 Using Yocto Project*

This section provides step-by-step instructions for downloading the drivers for platforms featuring the Intel® NM10 chipset and the Embedded Graphics Driver for the Intel® Atom™ Processor N2600/D2700/N2800, to properly install and configure Yocto Project*.

The step-by-step instructions in this section have been used with the Intel Customer Reference Board (CRB). The information in this quick start guide is applicable to any

Intel platform based on the Intel Atom Processor N2600/D2700/N2800 paired with Intel NM10 Express Chipset.

For customers evaluating or using the Development Kit as a basis for their embedded design, and Yocto Project* to develop a custom Linux* operating system, as their operating system, this is the primary guidance Intel provides for setting up the drivers and operating system.

7.6.1 Booting Yocto Project*

The Yocto Project* is an open source collaboration project that provides templates, tools and methods to help you create custom Linux-based systems for embedded products regardless of the hardware architecture. The Yocto Project* BSP used in this quick start guide is a custom Linux-based BSP that was generated using the Yocto Project tools and methods. See http://www.yoctoproject.org/ for more information.

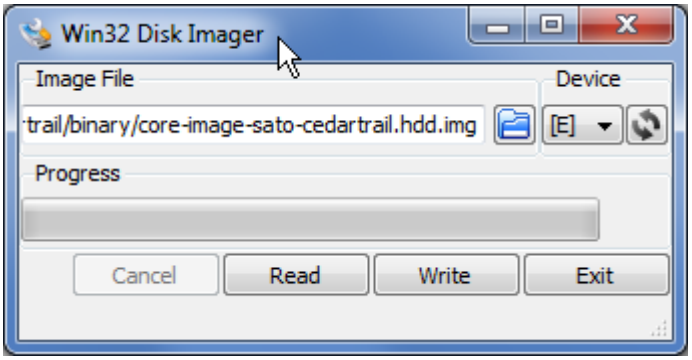
7.6.2 Live Image on USB stick

1. Insert and Format the USB stick.
   a. On Windows 7, right click on Computer.
   b. Click on Manage.
   c. On the Computer Management page, Select Storage>Disk Management on the Left hand side
   d. Remove any partitions or volumes on the USB Stick. This is particularly important when you have used the USB stick for other Linux distributions or previous versions of Yocto Project.
2. Download the Yocto Project image.
   a. http://www.yoctoproject.org/download/bsp/intel%C2%AE-atom%E2%84%A2-processor-n2000-and-d2000-series-based-platform-cedar-trail

3. The image (and other supporting files) will be contained within a TAR.BZ2 (also known as a tarball) archive. Use the latest version of WinZip or 7-Zip to extract the image.
   a. The image filename should be similar to the following:

   core-image-sato-cedartrail.hdd.img

   b. If necessary change the file extension to .IMG.
4. Download and install Win32 Disk Imager from:
   a. https://launchpad.net/win32-image-writer/+download
5. Use Win32DiskImager to put the image on your USB Stick



6. Write the image to the USB stick by selecting Write.
7. Insert the USB stick into the CRB.
8. When you boot the BIOS be sure to select the USB stick as the primary boot drive.
9. When the Boot: prompt appears, you can type boot at the prompt. If you do not type anything the default behavior will be to boot off of the USB stick.

7.6.3 Install with USB stick

1. Insert and Format the USB stick.
   a. On Windows 7, right click on Computer.
   b. Click on Manage.
   c. On the Computer Management page, Select Storage>Disk Management on the Left hand side
   d. Remove any partitions or volumes on the USB Stick. This is particularly important when you have used the USB stick for other Linux distributions or previous versions of Yocto Project.
2. Download the Yocto Project image.
   a. http://www.yoctoproject.org/download/bsp/intel%C2%AE-atom%E2%84%A2-processor-n2000-and-d2000-series-based-platform-cedar-trail

3. The image (and other supporting files) will be contained within a TAR.BZ2 (also known as a tarball) archive. Use the latest version of WinZip or 7-Zip to extract the image.
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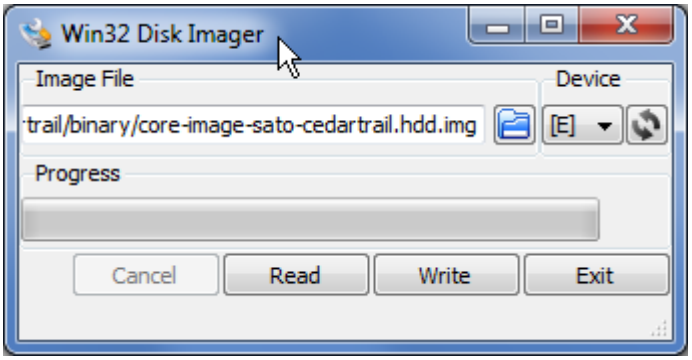
   a. https://launchpad.net/win32-image-writer/+download
5. Use Win32DiskImager to put the image on your USB Stick



6. Write the image to the USB stick by selecting Write.
7. Insert the USB stick into the CRB.
8. When you boot the BIOS be sure to select the USB stick as the primary boot drive.
9. When the Boot: prompt appears, you must type install to install to the attached SATA drive.
    a. Note this prompt only remains on the screen for a few seconds, so you need to be prepared for it.
10. You will be asked to confirm the drive you intend to install Yocto Project on. Type 'Y' at the prompt to complete the installation to the drive.

Note: The Yocto Project install will assume the entre drive will be used for Yocto Project. Dual boot options, discovery of existing partitions and OSs are not enabled.

7.6.4 Install with CD or DVD

Currently installing via CD or DVD is not enabled.

7.6.5 Graphics Driver

The preliminary Yocto Project* BSP graphics driver will be based on the standard Linux VESA driver. This VESA driver will not be able to take advantage of Intel's graphics engine. Closed source hardware accelerated graphics drivers will be incorporated into future releases of the Yocto Project* BSP.

8 Battery Disposal

CAUTION

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.

PRÉCAUTION

Risque d'explosion si la pile usagée est remplacée par une pile de type incorrect. Les piles usagées doivent être recyclées dans la mesure du possible. La mise au rebut des piles usagées doit respecter les réglementations locales en vigueur en matière de protection de l'environnement.

FORHOLDSREGEL

Eksplosionsfare, hvis batteriet erstattes med et batteri af en forkert type. Batterier bør om muligt genbruges. Bortskaffelse af brugte batterier bør foregå i overensstemmelse med gældende miljølovgivning.

OBS!

Det kan oppstå eksplosjonsfare hvis batteriet skiftes ut med feil type. Brukte batterier bør kastes i henhold til gjeldende miljølovgivning.

VIKTIGT!

Risk för explosion om batteriet ersätts med felaktig batterityp. Batterier ska kasseras enligt de lokala miljövårdsbestämmelserna.

VARO

Räjähdysvaara, jos pariston tyyppi on väärä. Paristot on kierrätettävä, jos se on maghdollista. Käytetyt paristot on hävitettävä paikallisten ympäristömääräysten mukaisesti.

VORSICHT

Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.

AVVERTIMENTO

Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.

PRECAUCIÓN

Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.

WAARSCHUWING

Er bestaat ontploffingsgevaar als de batterij wordt vervangen door een onjuist type batterij. Batterijen moeten zoveel mogelijk worden gerecycled. Houd u bij het weggooien van gebruikte batterijen aan de plaatselijke milieuwetgeving.

ATENÇÃO

Haverá risco de explosão se a bateria for substituída por um tipo de bateria incorreto. As baterias devem ser recicladas nos locais apropriados. A eliminação de baterias usadas deve ser feita de acordo com as regulamentações ambientais da região.

AŚCIAROŽZNAŚĆ

Існуе рызыка выбуху, калі заменены акумулятар неправільнага тыпу. Акумулятары павінны, па магчымасці, перепрацоўвацца. Пазбаўляцца ад старых акумулятараў патрэбна згодна з мясцовым заканадаўствам па экалогіі.

UPOZORNÌNÍ

V případě výměny baterie za nesprávný druh může dojít k výbuchu. Je-li to možné, baterie by měly být recyklovány. Baterie je třeba zlikvidovat v souladu s místními předpisy o životním prostředí.

Προσοχή

Υπάρχει κίνδυνος για έκρηξη σε περίπτωση που η μπαταρία αντικατασταθεί από μία λανθασμένου τύπου. Οι μπαταρίες θα πρέπει να ανακυκλώνονται όταν κάτι τέτοιο είναι δυνατό. Η απόρριψη των χρησιμοποιημένων μπαταριών πρέπει να γίνεται σύμφωνα με τους κατά τόπο περιβαλλοντικούς κανονισμούς.

VIGYÁZAT

Ha a telepet nem a megfelelő típusú telepre cseréli, az felrobbanhat. A telepeket lehetőség szerint újra kell hasznosítani. A használt telepeket a helyi környezetvédelmi előírásoknak megfelelően kell kiselejtezni.

注意

異なる種類の電池を使用すると、爆発の危険があります。リサイクル
が可能な地域であれば、電池をリサイクルしてください。使用後の電
池を廃棄する際には、地域の環境規制に従ってください。

AWAS

Risiko letupan wujud jika bateri digantikan dengan jenis yang tidak betul. Bateri sepatutnya dikitar semula jika boleh. Pelupusan bateri terpakai mestilah mematuhi peraturan alam sekitar tempatan.

OSTRZEŻENIE

Istnieje niebezpieczeństwo wybuchu w przypadku zastosowania niewłaściwego typu baterii. Zużyte baterie należy w miarę możliwości utylizować zgodnie z odpowiednimi przepisami ochrony środowiska.

PRECAUŢIE

Risc de explozie, dacă bateria este înlocuită cu un tip de baterie necorespunzător. Bateriile trebuie reciclate, dacă este posibil. Depozitarea bateriilor uzate trebuie să respecte reglementările locale privind protecţia mediului.

ВНИМАНИЕ

При использовании батареи несоответствующего типа существует риск ее взрыва. Батареи должны быть утилизированы по возможности. Утилизация батарей должна проводится по правилам, соответствующим местным требованиям.

UPOZORNENIE

Ak batériu vymeníte za nesprávny typ, hrozí nebezpečenstvo jej výbuchu.
Batérie by sa mali podľa možnosti vždy recyklovať. Likvidácia použitých batérií sa musí vykonávať v súlade s miestnymi predpismi na ochranu životného prostredia.

POZOR

Zamenjava baterije z baterijo drugačnega tipa lahko povzroči eksplozijo.
Če je mogoče, baterije reciklirajte. Rabljene baterije zavrzite v skladu z lokalnimi okoljevarstvenimi predpisi.

คำเตือน

ระวังการระเบิดที่เกิดจากเปลี่ยนแบตเตอรี่ผิดประเภท หากเป็นไปได้ ควรนำแบตเตอรี่ไปรีไซเคิล การทิ้งแบตเตอรี่ใช้แล้วต้องเป็นไปตามกฎข้อบังคับด้านสิ่งแวดล้อมของท้องถิ่น.

UYARI

Yanlış türde pil takıldığında patlama riski vardır. Piller mümkün olduğunda geri dönüştürülmelidir. Kullanılmış piller, yerel çevre yasalarına uygun olarak atılmalıdır.

ОСТОРОГА

Використовуйте батареї правильного типу, інакше існуватиме ризик вибуху. Якщо можливо, використані батареї слід утилізувати. Утилізація використаних батарей має бути виконана згідно місцевих норм, що регулюють охорону довкілля.

UPOZORNĚNÍ

V případě výměny baterie za nesprávný druh může dojít k výbuchu. Je-li to možné, baterie by měly být recyklovány. Baterie je třeba zlikvidovat v souladu s místními předpisy o životním prostředí.

ETTEVAATUST

Kui patarei asendatakse uue ebasobivat tüüpi patareiga, võib tekkida plahvatusoht. Tühjad patareid tuleb võimaluse korral viia vastavasse kogumispunkti. Tühjade patareide äraviskamisel tuleb järgida kohalikke keskkonnakaitse alaseid reegleid.

FIGYELMEZTETÉS

Ha az elemet nem a megfelelő típusúra cseréli, felrobbanhat. Az elemeket lehetőség szerint újra kell hasznosítani. A használt elemeket a helyi környezetvédelmi előírásoknak megfelelően kell kiselejtezni.

UZMANĪBU

Pastāv eksplozijas risks, ja baterijas tiek nomainītas ar nepareiza veida baterijām. Ja iespējams, baterijas vajadzētu nodot attiecīgos pieņemšanas punktos. Bateriju izmešanai atkritumos jānotiek saskaņā ar vietējiem vides aizsardzības noteikumiem.

DĖMESIO

Naudojant netinkamo tipo baterijas įrenginys gali sprogti. Kai tik įmanoma, baterijas reikia naudoti pakartotinai. Panaudotas baterijas išmesti būtina pagal vietinius aplinkos apsaugos nuostatus.

ATTENZJONI

Riskju ta' splużjoni jekk il-batterija tinbidel b'tip ta' batterija mhux korrett. Il-batteriji għandhom jiġu riċiklati fejn hu possibbli. Ir-rimi ta' batteriji użati għandu jsir skond ir-regolamenti ambjentali lokali.

OSTRZEŻENIE

Ryzyko wybuchu w przypadku wymiany na baterie niewłaściwego typu. W miarę możliwości baterie należy poddać recyklingowi. Zużytych baterii należy pozbywać się zgodnie z lokalnie obowiązującymi przepisami w zakresie ochrony środowiska.