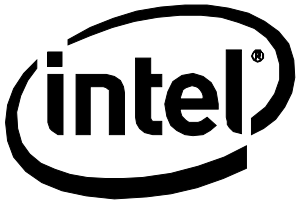

Intel® Compute Stick STCK1A32WFC

STCK1A32FC

STCK1A8LFC

Technical Product Specification

September 2015
Order Number: H91229-001

Revision History

Revision	Revision History	Date
001	First release	September 2015

Disclaimer

This product specification applies to only the standard Intel® Compute Stick with BIOS identifier FCBYT10H.86A.

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Current characterized errata, if any, are documented in a separate Specification Update. See http://www.intel.com/ComputeStickSupport for the latest documentation.

Preface

This Technical Product Specification (TPS) specifies the layout, components, connectors, power and environmental requirements, and the BIOS for Intel Compute Stick STCK1A32WFC, STCK1A32FC and STCK1A8LFC.

NOTE

In this document, the use of "Intel Compute Stick" will refer to the STCK1A32WFC, STCK1A32FC and STCK1A8LFC versions of the Intel Compute Stick.

Intended Audience

The TPS is intended to provide detailed technical information about Intel Compute Stick STCK1A32WFC, STCK1A32FC and STCK1A8LFC and its components to the vendors, system integrators, and other engineers and technicians who need this level of information. It is specifically *not* intended for general audiences.

What This Document Contains

Chapter	Description
1	A description of the hardware used on Intel Compute Stick STCK1A32WFC, STCK1A32FC and STCK1A8LFC
2	A map of the resources of the Intel Compute Stick
3	The features supported by the BIOS Setup program

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 Notation

#	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.

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3 Overview of BIOS Features

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1 Product Description

1.1 Overview

1.1.1 Version Summary

There are three different versions of this model of Intel® Compute Stick available which are summarized in Table 1. Unless otherwise noted in this document all features are available on all versions of the Intel Compute Stick.

Table 1. Version Summary

Version	Processor	OS Pre-installed
STCK1A32WFC	Intel® Atom™ Z3735F	Yes, Windows*
STCK1A32FC	Intel® Atom™ Z3735F	No
STCK1A8LFC	Intel® Atom™ Z3735F	Yes, Linux*

1.1.2 Feature Summary

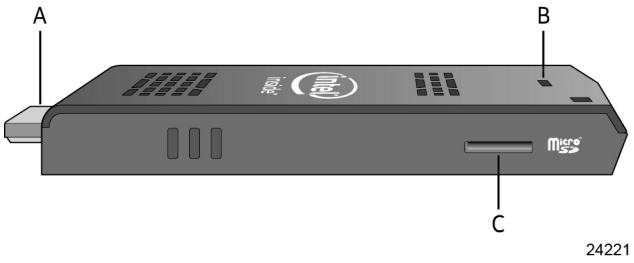
Table 2 summarizes the major features of the Intel Compute Stick.

Table 2. Feature Summary

Form Factor	103.4 millimeters by 37.6 millimeters by 12.5 millimeters (4.0709 inches by 1.44803 inches by 0.4921 inches)
Processor	• Soldered-down Intel® Atom™ processor — Integrated graphics — Integrated memory controller — Integrated PCH
Memory	• Soldered-down single-channel DDR3L/L-RS 1.35 V 1333 MHz memory • 2 GB total memory on STCK1A32WFC and STCK1A32FC • 1 GB total memory on STCK1A8LFC
Graphics	• Integrated graphics support with Intel® HD Graphics Technology: — High Definition Multimedia Interface* (HDMI*)
Audio	Intel® High Definition (Intel® HD) Audio via the HDMI v1.4a interface
Peripheral Interfaces	One full size USB 2.0 port
Storage	• 32 GB soldered-down Embedded MultiMediaCard (eMMC) onboard storage on STCK1A32WFC and STCK1A32FC • 8 GB soldered-down Embedded MultiMediaCard (eMMC) onboard storage on STCK1A8LFC • One Micro SD card slot (SDXC v3.0 with UHS-I support)
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)
Wireless LAN	Soldered-down Single Band Wireless-N module • 802.11g/n, Single Band, 1x1 Wi-Fi + Bluetooth* 4.0

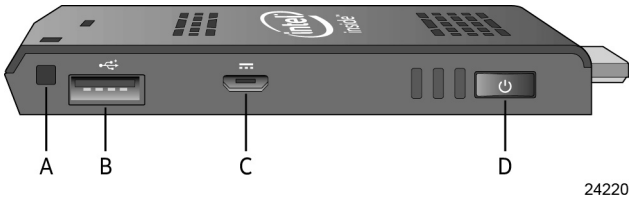
1.1.3 Location of Components

Figures 1 and 2 show the location of the components on the Intel Compute Stick.



Item	Description
A	HDMI Connector
B	Power LED
C	Micro SD Card Reader Slot

Figure 1. Left-Side View of Intel Compute Stick



Item	Description
A	Security Loop
B	USB 2.0 Connector
C	5 V DC Connector
D	Power On/Off Button

Figure 2. Right-Side View of Intel Compute Stick

1.1.4 Block Diagram

Figure 3 is a block diagram of the major functional areas of the Intel Compute Stick.

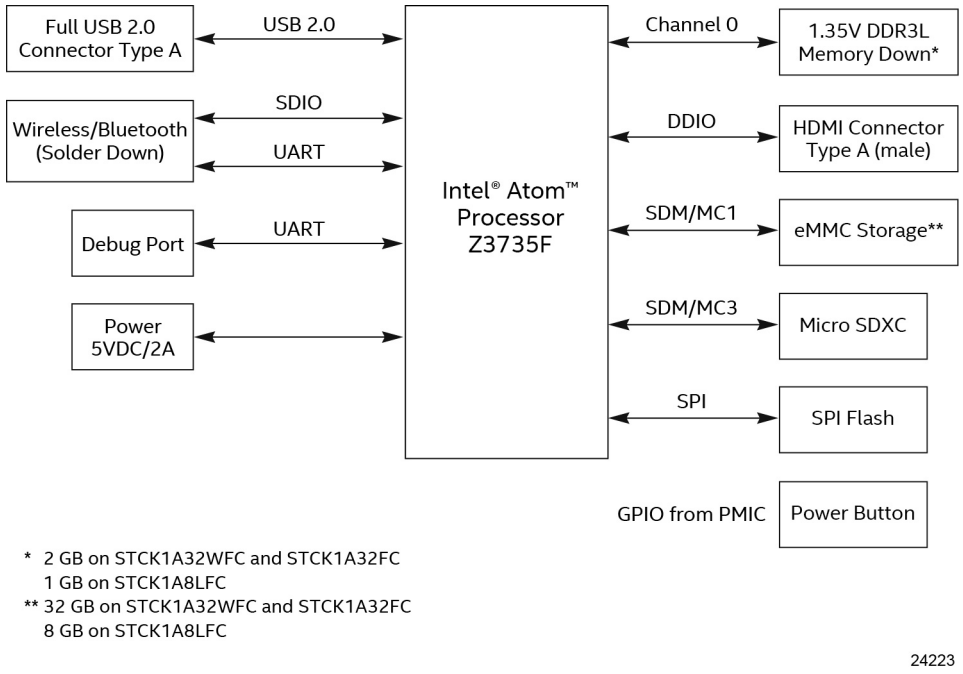


Figure 3. Block Diagram

1.2 Online Support

To find information about...	Visit this World Wide Web site:
Intel Compute Stick	http://www.intel.com/computesticksupport

1.3 Operating System Overview

The Intel Compute Stick STCK1A32WFC has Windows pre-installed with all necessary drivers.

Product Code	MM#	SA #	OS Pre-installed
BOXSTCK1A32WFCR	943239	H69761-xxx	Windows 8.1 with Bing (32-bit)
BOXSTCK1A32WFC	941865	H79551-xxx	Windows 8.1 with Bing (32-bit)
BOXSTCK1A32WFCL	944466	H85498-xxx	Windows 10 Home (32-bit)

The Intel Compute Stick STCK1A8LFC has Ubuntu 14.04 LTS 64-bit pre-installed with all necessary drivers.

The Intel Compute Stick STCK1A32FC supports the following Operating Systems.

- Windows* 10 Home
- Windows 10 Pro
- Windows 10 Enterprise
- Windows 10 Education
- Windows 8.1 Retail
- Windows 8.1 Pro
- Windows 8.1 Enterprise

Installation of any of the above operating systems will require a wired USB mouse and keyboard along with a USB flash drive or USB optical drive. The USB flash drive or USB optical drive will need the operating system installation media.

To find information about...	Visit this World Wide Web site:
Intel Compute Stick drivers	http://downloadcenter.intel.com

1.4 Processor

The Intel Compute Stick has a soldered-down System-on-a-Chip (SoC), which consists of an Intel Atom Processor Z3735F.

- Integrated graphics
- Integrated memory controller
- Integrated PCH

1.5 System Memory

The Intel Compute Stick has soldered-down memory and supports the following memory features:

- DDR3L/L-RS 1.35 V 1333 MHz
- Single-channel memory
- 2 GB memory on STCK1A32WFC and STCK1A32FC
- 1 GB memory on STCK1A8LFC.

Refer to Section 2.1.1 on page 17 for information on the total amount of addressable memory.

1.6 System Storage

The Intel Compute Stick has soldered-down storage using an Embedded MultiMediaCard (eMMC) component. Storage sizes are as follows:

- STCK1A32WFC and STCK1A32FC have 32 GB of total storage
  - STCK1A32WFC uses a portion of this total storage for the operating system
- STCK1A8LFC has 8 GB of total storage
  - A portion of this total storage is used for the operating system

1.7 Processor Graphics Subsystem

The Intel Compute Stick supports graphics through Intel HD Graphics.

1.7.1 Integrated Graphics

The Intel Compute Stick supports integrated graphics via the processor.

1.7.1.1 Intel® High Definition (Intel® HD) Graphics

The Intel HD graphics controller features the following:

- HDMI 1.4a
- 3D graphics hardware acceleration supporting DirectX*11, OpenCL 1.1, OGL ES2.0, OpenGL 3.0
- Video decode hardware acceleration for 1080p60 supporting H.264, VC1, WMV9 and VP8 formats
- Video encode hardware acceleration for 1080p30 supporting H.264, VP8, WMV9and VC1 formats
- High-Bandwidth Digital Content Protection (HDCP) 1.4/2.1 support for content protection

1.7.1.2 Video Memory Allocation

Intel® Dynamic Video Memory Technology (DVMT) is a method for dynamically allocating system memory for use as graphics memory to balance 2D/3D graphics and system performance. If your computer is configured to use DVMT, graphics memory is allocated based on system requirements and application demands (up to the configured maximum amount). When memory is no longer needed by an application, the dynamically allocated portion of memory is returned to the operating system for other uses.

1.7.1.3 High Definition Multimedia Interface* (HDMI*)

The HDMI port supports standard, enhanced, or high definition video, plus multi-channel digital audio on a single cable. The port is compatible with all ATSC and DVB HDTV standards and supports eight full range channels at 24-bit/96 kHz audio of lossless audio formats. The maximum supported resolution is 1920 x 1080 @ 60 Hz, 24 bpp. The HDMI port is compliant with the HDMI 1.4a specification.

1.7.1.3.1 Integrated Audio Provided by the HDMI Interfaces

The following audio technologies are supported by the HDMI 1.4a interfaces directly from the SoC:

- AC3 - Dolby* Digital
- Dolby Digital Plus
- LPCM, 192 kHz/24-bit, 8 Channel

1.8 USB

The Compute Stick has one full size USB 2.0 port with maximum current of 500 mA. The USB port is high-speed, full-speed, and low-speed capable.

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 a shielded cable that meets the requirements for full-speed devices.

1.9 Wireless LAN Subsystem

The wireless LAN subsystem consists of the following:

- Single Band Wireless module
- 1216 BGA soldered-down

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

1.9.1 Wireless Network Module

The Single Band Wireless-N module provides hi-speed wireless connectivity with the following capabilities:

- 802.11g/n, Single Band, 1x1
- Bluetooth 4.0

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

1.10 Hardware Management Subsystem

The hardware management features enable the Compute Stick to be compatible with the Wired for Management (WfM) specification. The Compute Stick has several hardware management features, including thermal and voltage monitoring.

For information about	Refer to
Wired for Management (WfM) Specification	www.intel.com/design/archives/wfm/

1.11 Power Management

Power management is implemented at several levels, including:

- Software support through Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  - Power Input
  - Instantly Available PC technology

1.11.1 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 Intel Compute Stick 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

Table 3 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 3. 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)	More than six seconds	Fail safe power-off (ACPI G2/G5 – Soft off)
Sleep (ACPI G1 – sleeping state)	More than six seconds	Power-off (ACPI G2/G5 – Soft off)

Note: Depending on power management settings in the operating system.

1.11.1.1 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 4 lists the power states supported by the Intel Compute Stick along with the associated system power targets. See the ACPI specification for a complete description of the various system and power states.

Table 4. 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
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 and peripherals powered by the system power supply.
2. Dependent on the standby power consumption of wake-up devices used in the system.

1.11.1.2 Wake-up Devices and Events

Table 5 lists the devices or specific events that can wake the Intel Compute Stick from specific states.

Table 5. Wake-up Devices and Events

Devices/events that wake up the system…	…from this sleep state	Comments
Power switch	S5	
RTC alarm	N/A	Wake from RTC is not supported
Wireless LAN	N/A	Wake from Wireless LAN is not supported
USB	N/A	Wake from USB is not supported
Bluetooth	N/A	Wake from Bluetooth is not supported

1.11.2 Hardware Support

Power management hardware features include:

- Wake from Power Button signal
- Instantly Available PC technology

1.11.2.1 Power Input

When resuming from an AC power failure, the Intel Compute Stick may return to the power state it was in before power was interrupted (on or off). The Intel Compute Stick's response can be set using the Last Power State feature in the BIOS Setup program's Boot menu.

1.11.2.2 Intel® Virtualization Technology

Intel Virtualization Technology (Intel VT) is a hardware-assisted technology that, when combined with software-based virtualization solutions, provides maximum system utilization by consolidating multiple environments into a single server or client.

NOTE

A processor with Intel VT does not guarantee that virtualization will work on the Intel Compute Stick. Intel VT requires enabling software and/or operating system, device drivers, and applications designed for this feature.

For information about	Refer to
Intel Virtualization Technology	http://www.intel.com/technology/virtualization/technology.htm

2 Technical Reference

2.1 Memory Resources

2.1.1 Addressable Memory

The Intel Compute Stick utilizes up to 4 GB of addressable system memory. Typically the address space that is allocated for PCI Conventional bus add-in cards, PCI Express configuration space, BIOS (SPI Flash device), and chipset overhead resides above the top of DRAM (total system memory). On a system that has 8 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 device (64 Mbit)
- Local APIC (19 MB)
- Direct Media Interface (40 MB)
- PCI Express configuration space (256 MB)
- SoC base address registers PCI Express ports (up to 256 MB)
- Integrated graphics shared memory (up to 512 MB; 64 MB by default)

The Intel Compute Stick provides the capability to reclaim the physical memory overlapped by the memory mapped I/O logical address space. Physical memory is remapped from the top of usable DRAM boundary to the 4 GB boundary to an equivalent sized logical address range located just above the 4 GB boundary. All installed system memory can be used when there is no overlap of system addresses.

2.2 Connectors

This section describes the connectors available on the Intel Compute Stick.

2.2.1 USB 2.0 Connector

The Intel Compute Stick has a single full size USB 2.0 connector that supports compliant USB devices. Bootable USB devices are supported.

Figure 4. USB 2.0 Connector

NOTE

It is recommended to only use a powered USB Hub with the Compute Stick's USB port.

2.2.2 Micro SD Card Reader

The Intel Compute Stick has a microSecure Digital (SD) card reader that supports the Secure Digital eXtended Capacity (SDXC) format. . Micro SD card 8 GB, 16 GB, 32 GB, 64 GB and 128GB sizes are supported.

Figure 5. Micro SD Card Reader

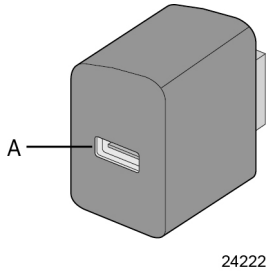
2.2.3 Power Adapter Connector

The Intel Compute Stick is powered through a 5V DC connector on the side. The maximum current rating is 2A.

Figure 6. Power Adapter Connector

2.2.4 Power Adapter

The Intel Compute Stick uses a 5V 2A AC to DC power adapter. The power adapter is connected to the Intel Compute Stick via a three foot USB Type A to B cable.



Item	Description
A	5V 2A Connector

Figure 7. Power Adapter

NOTE

The supplied power adapter and cable is required to power the Intel Compute Stick. Powering the Intel Compute Stick via any other power source is not supported.

2.3 Reliability

The Mean Time Between Failures (MTBF) prediction is calculated using component and subassembly random failure rates. The MTBF prediction is used to estimate repair rates and spare parts requirements. The MTBF for the Intel Compute Stick, minus the fan, is 65,785 hours. The Mean Time to Failure (MTTF) for the fan is 46,855 hours.

2.4 Environmental

Table 6 lists the environmental specifications for the Intel Compute Stick.

Table 6. Environmental Specifications

Parameter	Specification		
Temperature			
Non-Operating	-40 °C to +60 °C		
Operating	0 °C to +35 °C The operating temperature of the Intel Compute Stick may be determined by measuring the air temperature from the outside of the chassis while the system is in operation[1].		
Shock			
Unpackaged	80cm drop		
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	5 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		

[1] Before attempting to operate the Intel Compute Stick, the overall temperature of the Intel Compute Stick must be above the minimum and below the maximum operating temperatures specified. The operating and non-operating environment must avoid condensing humidity.

3 Overview of BIOS Features

3.1 Introduction

The Intel Compute Stick 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, and Plug and Play support. The initial production BIOSs are identified as FCBYT10H.86A.

The BIOS Setup program can be used to view and change the BIOS settings for the computer, and to update the system BIOS. 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.

3.2 BIOS Flash Memory Organization

The Serial Peripheral Interface Flash Memory (SPI Flash) includes a 64 Mb (8192 KB) flash memory.

3.3 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 information can be found in the BIOS under the Additional Information header under the Main BIOS page.

3.4 BIOS Updates

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

- 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 hard drive), or a CD-ROM.
- Intel F7 switch during POST allows a user to select where the BIOS .bio file is located and perform the update from that location/device.

All 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://www.intel.com/support/motherboards/desktop/sb/CS-035442.htm

3.4.1 Language Support

The BIOS Setup program and help messages are supported in US English. Check the Intel web site for support.

3.5 BIOS Recovery

It is unlikely that anything will interrupt a BIOS update; however, if an interruption occurs, the BIOS could be damaged. Table 7 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 7. Acceptable Drives/Media Types for BIOS Recovery

Media Type (Note)	Can be used for BIOS recovery?
Hard disk drive (connected to USB)	Yes
CD/DVD drive (connected to USB)	Yes
USB flash 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 recovery	http://www.intel.com/support/motherboards/desktop/sb/CS-035445.htm

3.6 Boot Options

In the BIOS Setup program, the user can choose to boot from local storage or a removable drive. The default setting is for the local storage to be the first boot device.

3.6.1 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 Display
- Keyboard
- Mouse

3.6.2 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. Table 8 lists the boot device menu options.

Table 8. Boot Device Menu Options

Boot Device Menu Function Keys	Description
<↑> or <↓>	Selects a default boot device
<Enter>	Exits the menu, and boots from the selected device
<Esc>	Exits the menu and boots according to the boot priority defined through BIOS setup

3.6.3 Power Button Menu

The Power Button Menu is accessible via the following sequence:

1. System is in S5 (not G3)
2. User pushes the power button and holds it down for approximately 3 seconds
3. Release immediately
4. User releases the power button before the 4-second shutdown override

If this boot path is taken, the BIOS will use default settings, ignoring settings in VPD where possible.

At the point where Setup Entry/Boot would be in the normal boot path, the BIOS will display the following prompt and wait for a keystroke:

[ESC] Normal Boot

[F2] Intel BIOS

[F4] BIOS Recovery

[F7] Update BIOS

[F8] Operating System Recovery

[F10] Enter Boot Menu

3.7 BIOS Error Messages

Table 9 lists the error messages and provides a brief description of each.

Table 9. 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.