

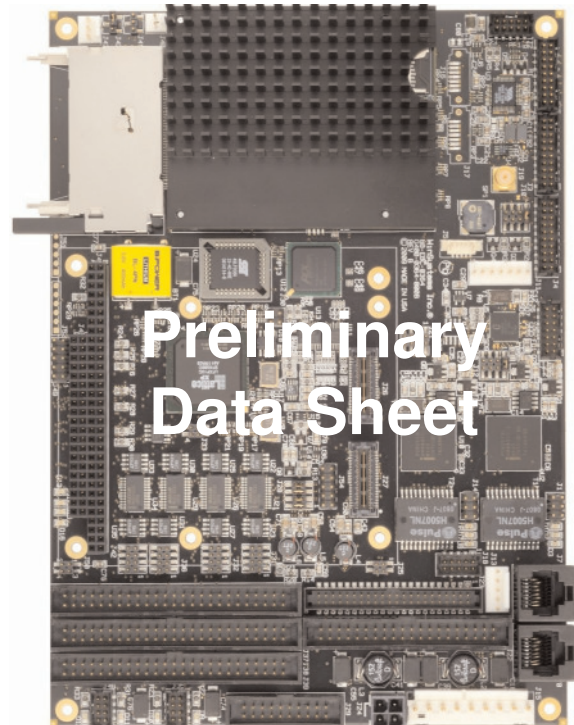
### FEATURES

- Intel® Atom™ 1.1GHz or 1.6GHz Processor
- Supports COMIT™ 1.1 modules
- EBX-size board, 5.75" x 8.00" (146mm x 203mm)
- 512MB DDR2 SDRAM (533MHz FSB)
- Type I and II CompactFlash (CF) cards supported
- PC-compatible supports Linux and XP embedded plus other x86-compatible RTOS
- Intel® Graphics Media Accelerator 500 supports resolutions up to 1920 x 1080
- Simultaneous CRT and LVDS flat panel supported
- Backlight power supported
- Custom splash screen on start up
- Two 10/100/1000 Intel PCIe Ethernet ports
- Four serial ports; all with RS-232/422/485 interfaces
- 48 bi-directional TTL digital I/O lines
- Bi-directional LPT port
- Four USB 2.0 ports plus two more on SUMIT
- IDE controller supports 40- and 44-pin hard disk drives and CompactFlash memory socket
- Wireless supported via miniPCIe socket
- PC/104 and SUMIT™-AB expansion connectors
- PS/2 keyboard and mouse support
- High definition audio support
- Real time clock
- Activity LEDs onboard for visual status
- Up to 256 second or minute reset with watchdog timer
- +5 volt only operation
- Supports ACPI and APM power management
- Industrial Operating Temperature Range
  - 40° C to +60° C: 1.6GHz Atom™ SBC
  - 40° C to +70° C: 1.1GHz Atom™ SBC

The EBC-Z5xx-G is a highly integrated, single board computer (SBC) designed for rugged, performance driven applications. It is based on the low power Intel® Atom™ Pulsbo chipset mounted on a Computer On Module Interface Technology™ (COMIT™) module.

WinSystems' design is based upon chipsets from Intel's long life embedded road map to ensure longevity of the core technology. Both the 1.1GHz and 1.6GHz processor speeds are supported with 512KB of L2 cache.

This SBC will operate over an industrial temperature range without a fan and is designed for applications including industrial automation, security, medical/diagnostic equipment, MIL/COTS, test and measurement, and transportation.



- Performance and long-term upgrade to WinSystems' EBC-C3 and EBC-855 single board computers
- RoHS compliant
- Long-term product availability
- Starter Kits for software development

WinSystems' knowledgeable applications engineers are available to provide technical support with initial board selection and assistance during the design-in and production phase of your project.

### FUNCTIONAL CAPABILITY

This product is a full-featured, x86 high-performance single board computer with a variety of on-board peripherals plus I/O expansion options. It supports both industry standard SUMIT and PC/104-based I/O expansion cards available from WinSystems and numerous vendors worldwide.

# Preliminary Data Sheet

**Intel® Atom™ Processor Z5xx Series for Embedded Applications** - This board is based upon the Intel two-chip solution with the Intel® Atom™ processor and System Controller Hub SCH-US15W mounted on a Computer on Module called COMIT.

These single-core Atom™ processors are ideal for small form factor (SFF), embedded applications that do not need a fan. Using hafnium-based 45nm Hi-k metal gate silicon technology reduces power consumption, increases switching speed, and significantly increases transistor density over previous 65nm technology. Improved features and capabilities include a new C6 state (Deep Power Down Technology) that removes power from the processor core and caches, resulting in less leakage than C4 state. This technology is transparent to the operating system and meets existing mobile C-state exit latencies. It also includes an enhanced Intel SpeedStep® technology to reduce average system power. And also it supports the SSE3 instruction set that enables software to accelerate data processing in specific areas, such as complex arithmetic and video decoding.

The SCH-US15W integrates the Intel® Graphics Media Accelerator 500 (Intel® GMA 500), memory controller, and I/O controller onto a single chip. Its features include an advanced 3D graphics, hardware video decode acceleration, and Intel® High Definition Audio2 along with extensive I/O capabilities, such as USB 2.0, GPIO, PATA, LPC, and PCI Express.

**CPU Speed** - The SBC is configured as either the EBC-Z510-G, which uses the 1.1GHz CPU, or the EBC-Z530-G that uses the 1.6GHz CPU. The 1.6GHz Z530-based unit also supports Hyper-Threading (HT) technology which provides high performance-per-watt efficiency in an in-order pipeline for increased system responsiveness in multi-tasking environments. One execution core is seen as two logical processors, and parallel threads are executed on a single core with shared resources. When both board configurations have the identical features supported, it is referred to as the EBC-Z5xx.

**COMIT** - The Atom™ and SCH along with the system memory, power supplies, and BIOS are on a 62x75mm COMIT board that plugs onto the EBC-Z5xx baseboard. This module contains PCIExpress, USB, video, HD audio, LPC Bus, SPI, SMBus, and I2C signals from the Intel chipset. The purpose of this COMIT module is to provide flexibility, with an upward migration path, and to ensure long-term availability.

**Advanced Thermal Management** - The processors are soldered directly to the COMIT board and have an advanced heat sink and thermal dissipation design. The heat sink material, fin size and density have been carefully engineered to provide a low thermal impedance interface so that heat can be efficiently removed from the devices. This allows it to operate from -40°C to +70°C without the need for a fan or the necessity to slow down the CPU clock frequency.

The Phoenix BIOS supports the Enhanced Intel® SpeedStep® technology that enables the processor to switch between multiple frequency and voltage points. This allows optimal performance and the lowest power. It also supports the circuitry for catastrophic thermal protection. If detected, the Vcc supply to the processor is turned off to prevent permanent silicon damage due to thermal runaway.

**System Memory** - 512MB of 533MHz FSB system memory is soldered directly to the board. A suffix at the end of the EBC-Z5xx designates the population option.

**CompactFlash** - A connector is on the board that will accept both Type I and II CompactFlash (CF) cards. The connector is wired to the IDE controller. A designer can use CompactFlash cards as data storage for applications where the environment is too harsh for rotational hard disks. The EBC-Z5xx can boot directly from a CompactFlash device.



WinSystems' Industrial CompactFlash Card

WinSystems offers industrial-grade CompactFlash cards that provide operational SSD storage from -40° to +85°C for high capacity harsh embedded applications. The sustained data transfer rate is very fast, plus an on-card wear leveling algorithm extends the number of write cycles to the part. These RoHS-compliant cards will fit into any

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# Preliminary Data Sheet

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computer, SBC, instrument or camera with a CF socket. These CF cards are available in either standard or in dual-channel, high-speed configurations. For further information, please visit [www.industrialcompactflash.com](http://www.industrialcompactflash.com)

**BIOS** - The EBC-Z5xx uses the Phoenix Trusted core BIOS. It supports advanced features such as custom splash screen, APM 1.2 and ACPI 1.0b power management modes, PXE remote boot and multi-language support. The BIOS also supports legacy operation of a USB keyboard and mouse, as well as booting from a USB key and other USB-connected mass storage devices.

The BIOS is located in an EEPROM that can be customized without removing the storage device from the board. It will support diskless, keyboardless, and video-less operation. Other customizable features such as a customer logo displayed during startup and customizable BIOS setup parameters are supported.

**IDE Interface** - The EBC-Z5xx incorporates a fast IDE interface for hard disks. The PATA Host Controller supports Programmed I/O (PIO), Multi-word DMA (ATA-5) and Ultra DMA. UDMA 100/66/33 is supported. The controller is wired to a 40-pin 0.100" header and 44-pin 2mm header as well as the CompactFlash connector. An LED blinks automatically while data is transferred to provide visual status information.

**Video** - The Intel® SCH supports full hardware acceleration of video decode standards, such as H.264, MPEG2, MPEG4, VC1, and WMV9. It provides integrated graphics (2D and 3D) and high-definition video decode capabilities with minimal power consumption. The highly compact Intel Graphics Media Adapter contains an advanced shader architecture (model 3.0+) that performs pixel shading and vertex shading within a single hardware accelerator. The processing of pixels is deferred until they are determined to be visible, which minimizes access to memory and improves render performance.

The EBC-Z5xx supports both a LVDS flat panel interface as well as a standard analog SVGA interface simultaneously. The controller also will allow separate, independent video to be displayed on LVDS and SVGA displays. Resolutions up to 1920 x 1080 are supported.

**Video Interface** - The CRT video output signals are wired to a 14-pin dual-in-line connector at the edge of the board. An optional CBL-234-G-1-1.375 interface cable adapts it to a standard female 15-pin "D-Sub" type connector commonly used for VGA. Simultaneous operation of the CRT and LCD is supported with two different video images can be displayed as well while running Windows XPe.

**Flat Panel Display Support** - The EBC-Zxx supports most flat panel display technologies. The board properly sequences the power for logic voltage and the backlight inverter to provide intelligent and safe power sequencing to the panel. Go to [www.winsystems.com](http://www.winsystems.com) or contact a factory application engineer for the most up-to-date listing. The LVDS interface supports pixel color depths of 18 and 24 bits.

WinSystems uses a LVDS flat panel interface system that connects to different panel technologies and suppliers. It has power, timing, and control signals for various panel types. The logic levels are 3.3 volts but are 5.0V tolerant.

**Connectivity** - The EBC-Z5xx has both onboard and PC/104 module population options for wired and wireless communications. Two Gigabit Ethernet, four USB 2.0 ports, four RS-232/422/485 serial channels, and a mini-PCIExpress connector for wireless are supported.

**10/100/1000 Ethernet** - The board has two Intel 82573L PCIExpress gigabit Ethernet controllers plus the associated PHY. They are wired to two separate RJ-45 connectors on the board. There are three LEDs on board that provide status information.

**USB 2.0** - The EBC-Z5xx supports four USB 2.0 ports that comply with the Universal Serial Bus Specification revision 2.0 and Open Host Controller Interface (OHCI) Specification for full-/low-speed signaling and Intel's Enhanced Host Controller Interface (EHCI) Specification for high-speed signaling.

Each port has overcurrent and in-rush protection provided by a National Semiconductor LM3526 power switch. Each device is a dual stage design including a thermal protection circuit. During a short-circuit/over-current event, the switch dissipating excessive heat is turned off, allowing the second switch to continue to function uninterrupted. Therefore, a fault on one channel will not affect the other. No fuses are required since protection is done electronically by the circuit.

The Intel® SCH supports USB client functionality. This permits the platform to attach to a separate USB host as a peripheral mass storage volume or RNDIS device.

The four USB ports are wired to two, 8-pin 2mm connectors. The CBL-356-G-1-1.0 is the optional interface cable adapter that has two standard female USB connectors.

Two additional USB 2.0 ports are available and are wired to the first two USB channels on the SUMIT-A connector. These two channels do not have the LM3526 power switch as defined by the SUMIT specification.

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# Preliminary Data Sheet

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**Serial Communications** - Four independent, full-duplex, RS-232 serial asynchronous channels are onboard. All serial channels are configured as Data Terminal Equipment (DTE). Both the send and receive registers of each channel have a 16-byte FIFO. This device is a dual 16C550 compatible UART that offers software compatibility with PC-type driver programs.

Independent control of transmit, receive, line status, and data set interrupts are on all channels. Each channel is setup to provide internal diagnostics such as loopback and echo mode on the data stream. Plus an independent on-chip software programmable baud rate generator is selectable from 50 through 115.2 kbits/sec. Modem hand-shake control signals are supported for all channels.

All of the serial ports support selectable RS-232/422/485 interface levels. The RS-232 drivers have an on-chip charge pump to generate the plus and minus voltages so that the EBC-Z5xx only requires +5 volts to operate.

**Wireless** - The EBC-Z5xx is shipped with an empty MiniPCIe socket so that a user can install their own card from a 3rd party vendor. Normally wireless cards are automatically recognized by operating systems such as Windows® XP. Also, the individual miniPCIe card manufacturer will typically have drivers either with their card or at their web site. Please contact them directly for specific operating systems that their card will support.

**48-line Parallel I/O** - The EBC-Z5xx contains a highly versatile digital I/O controller. Each I/O line is individually programmable for input, output, or output with read-back operation. Each output channel is latched and has an open collector driver (with a pull-up resistor) capable of sinking 12mA of current.

The major feature of this controller is its ability to monitor 24 of the 48 lines for both rising and falling digital edge transitions, latch them and then interrupt the processor notifying it that a change-of-input status has occurred. Transition polarity is programmable and enabled on a bit-by-bit basis. Each line's transition is latched by the event so that even short duration pulses will be recognized. An interrupt ID register is maintained for each line for writing more efficient Interrupt Service Routines. This is an efficient way of signaling the CPU of real-time events without the burden of polling the digital I/O points.

The EBC-Z5xx has its I/O lines connected to two, 50-pin connectors. Twenty-four data lines are alternated with 24 ground lines for reduced noise and crosstalk. Also +5 volts and ground are included in the cable. The pinout is compatible with the industry standard 4 to 24 position I/O module mounting racks for use with

high-level AC and DC optically isolated solid state relays. An optional CBL-115-4, 50-pin conductor ribbon cable, connects the EBC-Z5xx to one I/O rack.

**Line Printer Port** - The EBC-Z5xx has a parallel port that may be operated in Standard (SPP) bi-directional and Enhanced Parallel Port (EPP) modes.

The printer port can also be used as two additional general-purpose I/O ports. The first port can be configured as eight input or output only lines. The other port can be configured as five input and three output lines.

**HD Audio** - The EBC-Z5xx has a high definition audio controller. An 18-pin, 2mm connector provides access to Line Out, stereo Audio In, and stereo Microphone In.

**Keyboard/Mouse Controller** - An 80C42-type controller supports a PS/2-compatible keyboard. Also, a standard PS/2 mouse is supported through a separate I/O cable. The mouse and keyboard also can be attached via the USB cable if the operating system you choose supports this feature.

**Status LED** - A green status LED is also available to monitor system activity. Under a user's program control, it can indicate error conditions or blink different patterns to provide a visual indication of system status.

**Real Time Clock** - An MC146818A-compatible clock supports a number of features including periodic and alarm interrupt capabilities. The time and date keeping information is stored in its CMOS RAM which can be battery backed up by an optional 1600mAH or 2700mAH battery pack that can be plugged into the EBC-Z5xx.

**Watchdog Timer** - A software enabled, retriggerable watchdog timer is provided. The timeout period is software adjustable with options of 1 or 256 seconds or minutes available from the CMOS setup for boot. If enabled, it must be updated at least once during the period otherwise a failure is assumed and the board will be reset. This circuit is important for use in remote and unattended applications.

**Speaker** - An onboard speaker is available for sound generation. A beep code is generated that corresponds to any BIOS error codes (if required) during the power up or reset sequence

**Power** - Power is supplied to the board through a 9-pin Molex connector. Both  $\pm 12$  volts are wired directly to the PC/104 and SUMIT connectors. The +12V is also wired to the switch for the panel back light control. The  $\pm 12$ V power is not used on the board. ATX style signaling is supplied through a separate 4-pin connector.

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# Preliminary Data Sheet

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**Battery** - An optional off-board battery supplies the EBC-Z5xx board with standby power for the real time clock and CMOS setup RAM. The power supervisory circuit senses the off-board voltage and automatically switches to internal power when it drops below normal.

The board will operate without a battery since there is an EEPROM on board to store the CMOS set up data. However, current time and date information would not be maintained when the main +5V power is not present.

**Reset** - A precision voltage comparator monitors the +5 volt status. Upon detection of an out-of-tolerance condition, the board is reset. This action is critically important in order to detect brownout or power fail conditions. The reset circuit also ensures that the power is nominal before executing a power-on reset.

**I/O Module Expansion** - The EBC-Z5xx supports both SUMIT and PC/104 expansion connectors. It has mounting holes to accept a 90mm x 96mm industry standard module with either or both of these connectors.

The Stackable Unified Module Interconnect Technology (SUMIT™) Specification defines the electrical and connector characteristics of a stackable expansion bus for single-board computers and expansion modules. SUMIT defines two identical 52-pin connectors "A" and "B", which together carry up to six lanes of PCI Express, four USB 2.0 ports, ExpressCard™ support, a LPC (low pin count) parallel bus, SPI/uWire and SMBUS/I2C serial buses plus various power and ground supplies.

PC/104 is a well known I/O expansion bus that is basically the 16-bit ISA bus. Both PC/104 and SUMIT connectors can be placed on an Industry Standard Module (ISM). ISM is defined as a 90mm x 96mm board outline plus mounting holes. ISM modules are small, rugged, easy-to-use, and scalable. They provide powerful building blocks for diverse applications and markets. With a variety of industry standard interfaces available, ISM boards can be stacked on top of one another to expand or customize system solutions. This reduces cost and bulk while increasing mounting and packaging options for small form factor embedded systems.

The EBC-Z5xx provides a baseboard from which engineers can add off-the-shelf or user-designed, application-specific PC/104 and SUMIT-ISM expansion I/O modules. These modules are self-stacking and plug together in a "piggy back" configuration to serve as a mezzanine expansion bus. The modules are offered by WinSystems and a number of third party companies worldwide.

Module functions include communications specialty serial I/O, digital I/O, analog I/O, GPS, GSM or CDMA cellular modems, ZigBee, SCSi, etc.

**Engineering Support** - WinSystems provides free technical phone support to assist customers with system integration of our SBCs and I/O modules in your design.

**Long Life Availability** - This board is based on chipsets from Intel's long life embedded roadmap to ensure longevity of the core technology.

**Software** - The EBC-Z5xx is an x86-compatible SBC. It is designed to run both 16-bit and 32-bit x86 instruction set software and is compatible with Microsoft's Windows® XP embedded operating systems as well as the applications that run on them. It also supports Linux and many other PC-compatible x86 operating systems such as QNX, VxWorks, DOS or other real-time executives that require a PC hardware environment.

**Starter Kit** - WinSystems offers a kit that provides the necessary hardware, software and cables to begin program development with the EBC-Z5xx board. The packaging permits easy access to the board, SUMIT-ISM and PC/104 modules, and peripherals during program development. The unit consists of a DVD drive, hard disk drive and power supply mounted in a black, light-weight, aluminum enclosure. Also included are the operating system, I/O cables, and a PCM-POST (PC/104) module for debugging support.

Board Support Packages (BSP) for select operating systems (OS) are available with our Starter Kit. Windows XP embedded, Linux, and DOS/Sockets are currently supported. Additional support may be offered for other operating systems in the future. Ask a WinSystems' Applications Engineer if you need support for an OS that is not listed here.

In general, a Starter Kit provides a specific OS "sample image" that is preloaded on a Flash Disk and is ready to run right out of the box. Most Starter Kits also include documentation designed to lead you through the process of recreating the embedded OS sample image that was provided in the kit. This documentation provides a wealth of valuable, time-saving information that will help you quickly overcome a large portion of the learning curve if you are new to a particular OS. See the Developer section of our website for more details about each kit.

# Preliminary Data Sheet

## SPECIFICATIONS

### Electrical

EBC-Z510-G CPU Clock: 1.1GHz Atom™ CPU  
EBC-Z530-G CPU Clock: 1.6GHz Atom™ CPU  
PC/104 Interface: 16-bit, non-stackthrough  
Ethernet: Two 10/100/1000 Mbits/second  
USB 2.0: Four ports with overcurrent protection  
Serial Interface: Four serial channels all with RS-232/422/485 levels  
802.11: User installed miniPCIe card  
Audio: HD Audio with MIC, six speakers and Line In  
LPT Interface: Bidirectional LPT with EPP  
Parallel Interface: 48 I/O lines, TTL compatible  
EIDE Interface: Supports two drives  
Keyboard: Standard PS/2 or USB interface  
Mouse: Standard PS/2 or USB interface  
Power: +5V required, 2.1A typical

### System Memory

Addressing: 512MB SDRAM soldered on COMIT module

### Solid State Disk

CompactFlash: Types I and II supported

### Mechanical

Dimensions: 5.75" x 8.0" (147mm x 203mm)  
Jumpers: 2mm square post compatible

### I/O Connectors

Serial, Parallel, Keyboard: 50-pin on 0.100" grid  
COM3 & 4: 20-pin on 0.100" grid  
EIDE Interface: 40-pin on 0.100" grid (Primary)  
44-pin on 2mm grid (Primary)  
50-pin 2mm CFlash connector  
Parallel I/O: Two, 50-pin on 0.100" grid  
CRT: 14-pin on 2mm grid  
LVDS: Two, 20-pin on 0.100" grid  
Ethernet: Two RJ-45  
PC/104 Bus: 64-pin 0.100" socket  
40-pin 0.100" socket  
SUMIT: Two, 52-pin  
USB: Two, 8-pin 2mm  
Audio: 18-pin, 2mm  
PS/2 Mouse: 5-pin in-line Molex  
Main Power: 9-pin in-line Molex  
ATX Control Signals: 4-pin in-line Molex

External Battery: 3-pin in-line Molex  
Backlight Power: 4-pin in-line Molex

### Environmental

Operating Temperature:  
EBC-Z530-G: -40° C to +60° C  
EBC-Z510-G: -40° C to +70° C  
Non-condensing relative humidity: 5% to 95%

## ORDERING INFORMATION

EBC-Z530-G-512M-1: 1.6GHz Atom™ SBC with 512MB SDRAM  
EBC-Z510-G-512M-1: 1.1GHz Atom™ SBC with 512MB SDRAM

### Cables

CBL-115-4: Opto rack interface cable, 4ft.  
CBL-126-G-10-2.0: ATA100 IDE disk cable  
CBL-270-G-3-1.5: Basic audio cable  
CBL-355-G-1-1.5: Auxiliary audio cable  
CBL-SET-364-G-1: Cable set and external battery for the EBC-Z5xx-G  
CBL-173-G-1-1.0: 20-pin ribbon to two, 9-pin male D (COM3 and COM4) adapter cable  
CBL-234-G-1-1.375: 14-pin ribbon to 15-pin D-sub CRT adapter cable  
CBL-236-G-2-1.5: Unterminated power cable  
CBL-247-G-1-1.0: 1 ft., Multi-I/O adapter cable  
CBL-270-G-2-1.5: Stereo audio cable  
CBL-343-G-1-1.375: PS/2 mouse adapter cable  
CBL-356-G-1-1.0: Dual USB to 8-pin, 2mm cable  
BAT-LTC-E-36-16-1: External 3.6V, 1600mAH battery with plug-in connector

### Optional Battery

BAT-LTC-E-36-27-1: External 3.6V, 2700mAH battery with plug-in connector

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