GATEWORKS
INNOVATIONS FOR EMBEDDED DESIGNS

Gateworks' Ventana Single Board Computers

For the Next Generation of Digital Signage Applications

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Demand for Digital Signage is exploding. The latest market research shows the Digital Signage market at over $13 billion in sales by 2016. Digital Signage is working its way into a wide variety of applications in the consumer, industrial, medical services and transportation markets. New innovative applications appear daily from exterior advertising displays on busses and taxis to interactive outdoor digital billboards. The number of applications for Digital Signage has become unbounded as the popularity of smart phones and tablets has created the expectation of a rich, interactive user experience in all aspects of our lives.

A common requirement for these new application areas is a small, powerful and very low power Single Board Computer (SBC). The hardware must be rugged, able to handle severe shock, vibration and extreme temperatures. In addition to having rich display capabilities, the hardware must be full-featured to allow connection with sensors and other user inputs. Below are some of the hardware features and considerations required for supporting the next generation of Digital Signage applications.

Small Size and Weight – Size and weight are crucial requirements as many of the new applications require the electronics to be embedded inside the actual display or embedded into a vehicle. Traditional OEM hardware is not optimized for size or weight. Distributed implementations are becoming more popular where each display is self-contained and includes all the Digital Signage electronics. This also adds an extra level of redundancy for large deployments.

Low Power and Wide-Input Operating Voltage – Digital Signage applications are rapidly expanding into non-traditional areas such as the outside of a vehicle or at a remote location where standard AC power is not available and the hardware must run on batteries or solar panels. These applications require very low power operation. Additionally, hardware that can support a wide-input voltage range is ideal to allow use with batteries, solar or direct vehicle power. Most OEM solutions cannot support wide-input voltage ranges along with the load dump transients found in these types of applications. Typically, costly power conditioning circuitry must be used to handle these types of applications.

Rugged: Vibration & Shock – As Digital Signage applications migrate to all types of vehicles, shock and vibration become big considerations. Designs that allow for secure mounting of all hardware, expansion modules and connectors should be used. Designs should also avoid using large and heavy components which are susceptible to being damaged. Locking connectors should also be used to secure all cables.

Industrial Temperature Operation – Environments encountered in these new application areas require operation over extreme temperature ranges. The hardware must be able to handle the low temperatures in the middle of the winter and high temperatures in the heat of summer. Artic and desert environments also create additional restrictions. Industrial temperature operation

(-40 to +85 ºC) is needed in many cases. Additionally, industrial rated hardware can allow for a fanless design which helps to increase reliability by eliminating another potential point of failure (fan).

Network Interface (Cellular, Wi-Fi, Ethernet) – Remote locations and areas without easy access to the internet create challenges for Digital Signage applications. Cellular and Wi-Fi connections are becoming more common to allow unwired operation. Ethernet is still widely used for hardwired interfaces or for communication over a network in multi-sign deployments. Hardware that provides Mini-PCIe expansion connectors allows the OEM to choose a radio to meet their needs. Many times OEMs will want to support multiple cellular and Wi-Fi radios to allow for expanded coverage with failover should one communication channel go down or in areas where one cellular provider may have limited service.

Communication and Interface Ports (RS485, RS232, CAN Bus, USB, Digital I/O) – New interactive applications require inputs and outputs to various sensors for tailoring the signage content and providing additional user interaction. Many of these sensors use standard interfaces so a platform that can support a wide variety of interfaces can simplify the overall design, thus reducing overall power, cost and size.

Position & Orientation Info (GPS, Accelerometer/ Magnetometer) – As applications become more mobile, positional information is essential for tailoring signage content. As an example, a city bus, may display a location based ad for a restaurant when it is within a specified distance from that restaurant. Integration of these sensors into the hardware reduces the overall size and cost.

Video Inputs & Outputs (HDMI, Composite, LVDS) – Multiple video inputs and outputs are becoming popular as new features and capabilities are added to Digital Signage applications. It is now very common to have an input camera which allows advanced software to identify the viewer and determine age, sex and level of interest. Many applications also need to drive multiple monitors; for example, a local console is used to drive a small LVDS touchscreen which in turn controls the content on a larger HDMI LCD display.

Watchdog and System Monitors – Down time cannot be tolerated for many applications where critical information is being provided to the user. Hardware which supports monitoring of critical system parameters, such as voltage and temperature, can be used with watchdog circuitry to provide increased reliability and advanced service notification should problems arise.

Robust Media Storage – A robust method to store local media content is essential for high shock and vibration mobile environments. Industrial temperature rated solid state mSATA

drives can be used to address these requirements. mSATA drives use the Mini-PCIe form factor which provides for secure mounting in a very compact form factor.

Expansion Capability – As applications become more complex, hardware that can be easily expanded is essential. Expansion can be provided through different common interfaces such as Mini-PCIe slots or other mezzanine interfaces. Mini-PCIe has many advantages in that it provides both PCIe and USB signaling which are widely supported by different peripherals. It is also compact in size and securely mounts to the board. A wide variety of vendors provide Mini-PCIe expansion cards that cover a wide range of interfaces ranging from digital I/O to graphics cards.

Unfortunately, many of today's Digital Signage solutions are based on standard solutions not designed specifically to address the above requirements. This forces OEMs to make design compromises or to add in additional hardware to compensate for the sub-optimal hardware.

To address these tough requirements, Gateworks has developed the Ventana Family of Single Board Computers (SBCs). These SBCs have been designed to specifically address these needs and provide OEMs a platform for expanding into these next generation applications.

The Ventana Family of SBCs are based upon the Freescale i.MX 6 Cortex-A9 ARM processor and consists of six standard board

Gateworks GW5400 Ventana Full Featured SBC

models ranging from a miniature 35 x 100 mm up to a full featured 140 x 100 mm board size. Features and performance increase as the board size increases allowing OEMs to choose a SBC which meets their exact needs. Some of the key features of the Ventana Family are:
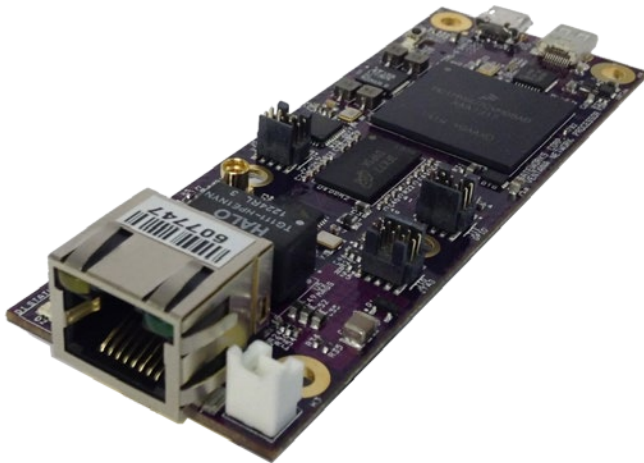
Gateworks Miniature GW5100
A full featured SBC at only 35 x 100 mm size

- Freescale i.MX 6 ARM Cortex A-9 processor up to 1.2GHz quad core
- Up to 2GBytes soldered onboard Flash for rugged media
- Up to 4Gbytes soldered onboard DDR3 DRAM memory
- Support for multiple video inputs/outputs – HDMI In/Out, LVDS Out, CVBS In/Out
- Support for audio input/output
- Up to six Mini-PCIe expansion connectors for radio and peripheral support, Wi-Fi, cellular, mSATA, Digital I/O, etc.
- Up to two Gigabit Ethernet ports for hardwired network interfaces
- Wide variety of interface ports – USB, CAN, RS485/RS232, Digital I/O, etc.
- Advanced system monitoring for board status and preventative maintenance
- Onboard SIM socket for LTE/GSM cellular radio support

- All models come standard industrial temperature rated (-40 to +85 ºC)
- Small size and weight – Sizes ranging from 35 x 100 mm to 140 x 100 mm
- Very low power – Typical operating power ranging from 3 W to 5 W with dynamic voltage and frequency scaling (DVFS) power management
- Rugged design for use in high-shock and high-vibration environments
- Wide-input voltage range ranging from 8 to 60 VDC with transient protection
- GPS & Magnetometer/Accelerometer for location and positional information
- Android and OpenEmbedded Yocto Open Source Linux BSP's
- Long life, 10 year product availability
- Made in USA

The Gateworks' Ventana family raises the bar and gives OEMs a standard yet flexible hardware platform that is powerful enough to drive the next generation of Digital Signage applications. With six standard models the OEM can select a price/performance solution to meet their needs. Gateworks easy customization program also allows OEMs to cost and feature optimize the Ventana boards for volumes starting as low as 100 pieces. Low cost development kits are available for all models to help OEMs start developing quickly.

For more information on the Ventana Family,
see the Gateworks website at:

www.gateworks.com

For pricing, availability and additional
technical information please contact
your Avnet Embedded Account Manager today!