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Intel® Digital Video Recorder Reference Design

The low power Intel® Atom™ processor D510 processes up to four full D1 resolution channels while executing video analytics for surveillance and retail applications

Cost-Effective Platform

Now, manufacturers of mid-range digital video recorders (DVRs) can dramatically lower development and product cost by using the Intel® Digital Video Recorder Reference Design. Starting with schematics for a validated Intel® Atom™ processor-based platform, developers can avoid resource-intensive and time-consuming hardware design tasks. The platform delivers ample performance for analytics applications, and it includes an integrated display engine that eliminates the need for a stand-alone video card. The Intel Atom processor efficiently displays and records real-time video, and runs software-based encoders, all at the same time.

Reference Design Model

The reference design is available through a royalty-free license granted by Intel. Equipment manufacturers may request the schematic, which can be modified or converted as-is to a layout suitable for manufacturing. A number of systems were built for validation purposes and are available for a limited time; please contact your Intel Field Sales representative for more information. Intel is not manufacturing or selling systems based on the reference design. They developed the reference design for the sole purpose of helping DVR vendors reduce hardware development cost and accelerate time to market.

Exceptional Mid-Range Performance

Performing high-performance video encoding and decoding in software, the flexible Intel® Digital Video Recorder supports a wide range of video file formats and compression algorithms. As a real-time PAL system, it simultaneously displays up to four channels of MPEG4 (full D1 resolution) and records with MPEG4 or H.264 compression. This is achievable at 100 frames per second (FPS),[1] or 25 FPS per channel, as shown in Figure 1.

Since the workload from processing four MPEG4 channels consumes less than half of the Intel Atom processor's computing capacity, there is ample processing head room to run video analytics applications, such as virtual fence, motion detection, object detection and flow counting, on one to two channels. Running CIF-based software, the design is also capable of displaying and recording 8-16 channels concurrently at a 320x240 pixel resolution.
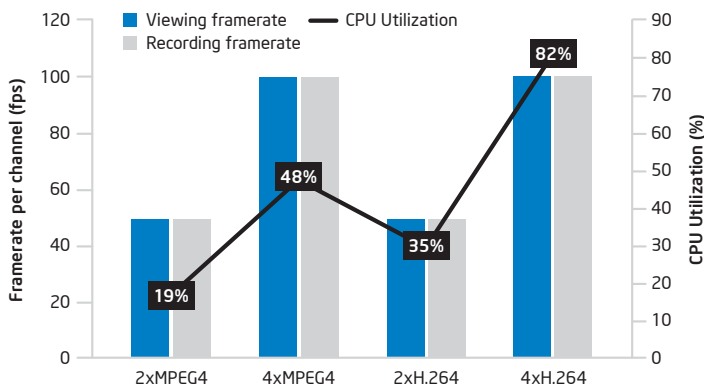

Figure 1. Intel® Digital Video Recorder Reference Design Performance Benchmarks[1]

Reference Design Highlights

The reference design (Figure 2) is based on the Intel® Atom™ processor D510△ with integrated enhanced graphics and memory controller, which increases the throughput rate and speed when accessing memory and the display engine. This dual-core processor, paired with the Intel® 82801HM I/O Controller, consumes less power, delivers greater performance and requires less board space than the previous Intel® Atom™ processor N230.[1] The integrated display engine eliminates the need for a discrete graphic controller for display purposes, thus saving cost. This platform features embedded lifecycle support that protects system investment by enabling extended product availability for embedded customers.

An Intel Atom processor D510-powered surveillance DVR is ideal for continuous 24/7 operation. End users can record and store large amounts of video via three SATA interfaces that directly attach to hard disk drives. There are six PCI Express* by 1 links for scaling up to 8-16 channels with lower video resolution than full D1. The DVR connects to a central monitoring system, server or backend storage through either a 10/100/1000 LAN controller or an add-in PCI Express Mini Card with a wireless LAN module. Connectivity is an important feature for standalone recording devices since it allows them to send notifications and alarms to remote systems.

Software Features Advantage

Software-based encoders and DVR applications written for the Intel Atom processor D510 will also run on other Intel® processor-based solutions. As a result, system developers can leverage a common software code base from one
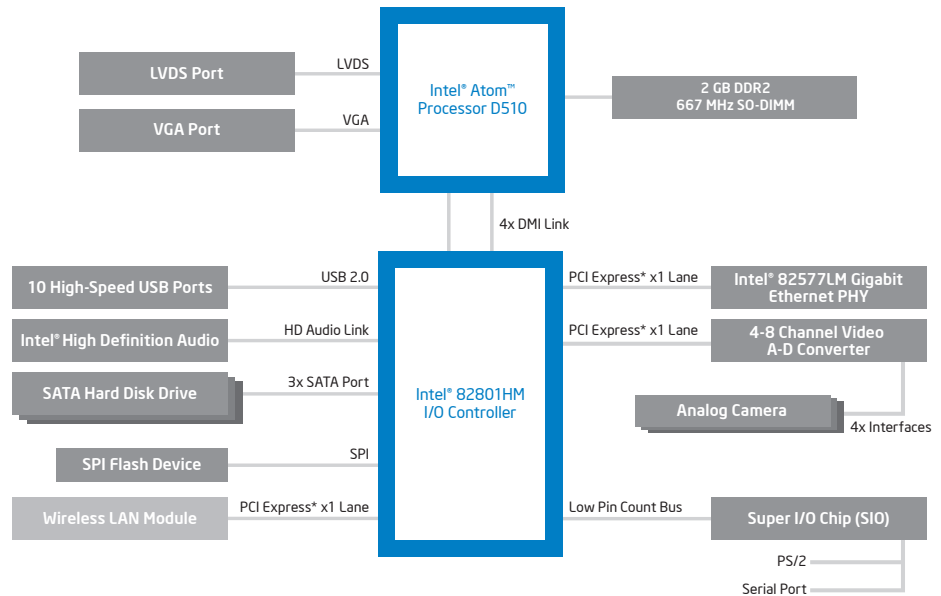

Figure 2. Intel® Digital Video Recorder Reference Design

generation of processor to the next, thereby shortening development cycles for follow-on products. Developers can also optimize software performance by taking advantage of the Intel® multi-core technology, Intel® Hyper-Threading Technology (Intel® HT Technology)[2] and Intel® Streaming SIMD Extensions 3 (Intel® SSE3) support provided by the Intel Atom processor D510. With Intel HT Technology, each physical core is seen as two logical processors that execute two threads simultaneously; this technology improves performance-per-watt and system responsiveness in multi-tasking environments.

High-Performance and Headroom

The dual-core Intel Atom processor D510 with Intel HT Technology (four software threads) enables surveillance DVR manufacturers to deliver exceptional

performance, scalability and flexibility in a low-power, affordable, all-in-one solution. It supports high-resolution video imaging and maximizes storage capacity using advanced compression algorithms. In addition, the Intel Atom processor has the computing headroom to run video analytics software used by mid-range and business intelligent installations such as residential, small retail store and small office/home office environments.

To learn more about Intel's solutions for digital security surveillance, please visit http://www.intel.com/design/intarch/platforms/dss/index.htm.

Please contact your Intel sales representative to access the reference design assets.