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Haier
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INDUSTRY

Smart TVs

CHALLENGES

Smart TV technology was stifled by conventional embedded hardware and software platforms as well as limited application support, hindering video/graphics performance and TV feature sets

Achieving optimal time to market in the competitive consumer electronics market required an ultra-efficient design and development platform

SOLUTION

x86 embedded hardware and software featuring AMD Embedded G-Series APUs and Windows® Embedded Standard 7

RESULTS

Haier's Smart TV delivers stunning 2560x1080 picture resolution via a 58-inch widescreen LED TV display and supports over 10,000 applications spanning Internet browsing, online gaming, streaming media, social networking and more

End-to-end design and development of Haier's flagship Smart TV took only four months

AMD TECHNOLOGY AT A GLANCE

AMD Embedded G-Series APUs



Smart TVs

Haier Taps AMD Embedded G-Series APUs and Windows® Embedded Standard to Pioneer Next-generation x86-optimized Smart TV

New Haier Smart TVs deliver superior system performance and advanced web-based features with seamless support for rich x86 application ecosystem

Consistently recognized as the world's #1 major appliance brand, claiming over 7.8% share of the global "white goods" market in 2011, Chinese multinational consumer electronics and home appliances company Haier Group (www.haier.com) has earned a reputation as a leading innovator across a wide range of consumer product categories spanning air conditioners, mobile phones, computers, microwave ovens, washing machines, refrigerators, televisions and beyond. Haier's leadership in the fiercely competitive Chinese electronics market is a testament to the company's ability to respond quickly to emerging market trends and technology breakthroughs, speeding time to market with high-quality, cost-competitive products that customers all over the world rely on every day.

Anticipating the recent emergence of a new breed of televisions that fuse TV, PC and Internet capabilities in a single device, Haier quickly marshaled its research and development resources to capitalize on the market potential for "Smart TVs" and establish an early and lasting leadership foothold in this high-growth product category. Indeed, the evolution of Smart TV technology heralds the renewed dominance of TVs as the "total access" media hubs to the modern digital home – a role that has been threatened in recent years with the accelerating proliferation of mobile media devices, which has challenged the long-standing supremacy of the TV as the preeminent in-home multimedia consumption platform.

By bringing together traditional television programming, Internet browsing, online gaming, web applications, streaming media and social networking within a single device, Haier could transform the TV viewing experience from passive to fully interactive and, in so doing, meet the rising expectations of consumers who have come to expect more from the TV viewing experience. For Haier, investing in Smart TV technology was a strategic priority for the company, and they moved quickly to capitalize on the opportunity.

SMART TVs GETTING SMARTER WITH x86

Haier's Smart TV design team evaluated a host of embedded hardware and software platform options during the initial planning phases. Seeking to achieve an ideal balance of system performance and functionality, design efficiency, application support, power consumption, cost and a host of other factors, Haier's designers ultimately decided to utilize an x86 embedded computing platform leveraging AMD Embedded G-Series accelerated processing units (APUs) and Windows® Embedded Standard 7. The combination of these solutions equipped Haier's Smart TV designers to realize PC-caliber performance and application agility complemented by a rich ecosystem of industry-standard, x86-optimized software, applications and development environments. This x86 platform also ensured smooth interoperability with x86 Internet backbone infrastructure, enabling Haier's Smart TVs to deliver a 'true Internet' experience and not just a limited subset of web capabilities.

By selecting an AMD and Windows Embedded Standard 7 powered x86 platform for its Smart TVs, Haier could streamline and accelerate its design and development cycles to achieve the fastest possible time to market, without compromising product quality or feature set. This platform ensured seamless x86 hardware and software compatibility, and long-term product reliability and product roadmap stability, backed by world-class technical support from AMD and Microsoft.

ULTRA HIGH PERFORMANCE HD GRAPHICS AND MULTIMEDIA PROCESSING

When it came time to select the processing platform that would underpin Haier's new Smart TVs, Haier's designers considered AMD's solutions as well as other x86 and non-x86 processor. At the end of the day, AMD's Embedded G-Series APUs emerged as the clear choice for Haier's Smart TVs, countering the application interoperability limitations of non-x86 processors as well as the performance deficiencies of other x86 processors, while offering a host of other benefits spanning form factor, power consumption and cost.

Achieving the requisite level of HD graphics and multimedia processing performance was a critical concern for Haier's Smart TV designers, who were challenged to reproduce PC monitor-caliber video resolution via a massive 58-inch widescreen LED TV to ensure a visually seamless fusion of TV, computing, and Internet capabilities. If a lesser performing integrated processing platform were used, then Haier's designers would be unable to bridge the gap between the typical 2 foot user-to-PC viewing distance and the approximate 10 foot viewer-to-TV viewing

distance without significant picture quality degradation. Applications and games optimized for higher-resolution computer monitors simply won't display as crisply on a widescreen TV without sufficient graphics processing support.

AMD Embedded G-Series APUs combine a low-power CPU and a discrete-level GPU on a single die with a high-speed bus architecture to deliver an unprecedented HD visual experience. Combining a GPU core on the same silicon die as the CPU enables the system to offload computation-intensive pixel data processing from the CPU to the GPU. Freed from this task, the CPU can serve I/O requests with much lower latency, dramatically improving real-time video and graphics processing performance. This integration of general purpose, programmable scalar and vector processor cores for high-speed parallel processing establishes a new foundation for high-performance multimedia content delivery, and ultimately equipped Haier's designers to achieve stunning video and graphics resolution.

SMALL SIZE, LOW POWER

The combination of CPU and GPU into a single, high-performing APU eliminates the need for additional ad hoc processors and/or bulky add-on graphics cards, which enabled Haier's designers to conserve precious board and system space. Providing native, high-performance graphics processing at the silicon level, the AMD Embedded APU architecture reduces the footprint of a traditional three-chip platform to just two chips – the APU and the companion controller hub. This two-chip solution simplifies design complexity through a reduction in board layers and power needs, equipping Haier's designers to achieve aggressive form factor goals while driving down overall system costs.

The performance-per-watt gains enabled by AMD Embedded G-Series APUs assured Haier's designers greater power efficiency and lower heat dissipation than could be achieved with comparable chipsets. Supporting thermal design power (TDP) profiles from 5.5W to 18W, with typical power consumption below 6 W, AMD G-Series APUs equip designers to keep board-level total power dissipation to within 35 W approximately.

X86 OPTIMIZATION WITH MICROSOFT WINDOWS EMBEDDED STANDARD 7

Haier's selection of Windows Embedded Standard 7 as the underlying software platform for its new Smart TVs yielded numerous advantages, from design and development to product feature set. Complemented by a vast ecosystem of Windows-supported software and development tools and featuring the widest range of supported x86 applications, Windows Embedded Standard 7 afforded Haier's designers the agility to meet their ambitious design goals while speeding overall time to market and minimizing development costs.

Rather than undertake the development, testing and delivery of the applications that would be integrated within their new Smart TVs – a lengthy process that could slow product development and limit the number of applications available at launch – Haier tapped into its

established network of independent software vendors (ISVs) to develop applications for the system in parallel with Haier's own hardware development cycles. The familiar Windows development environment and APIs equipped these ISVs to use Microsoft Visual Studio® to build applications for Haier's Smart TV quickly, porting existing Windows PC applications to Windows Embedded Standard 7 with little to no code modification. Windows Embedded Standard 7 also integrates rich multimedia and network application components like Windows Media® Center, digital audio effects, and the Internet Explorer® browser, which allowed Haier's ISVs to apply these features for functions like media file management and playback, and web surfing.

Key integrated features within Haier's Smart TVs, which include TV, DVR, Internet surfing, online gaming, streaming media and social networking, are augmented with a wide range of applications offered via the Haier application store, including video chat, instant messaging, photo albums, online news services, home appliance monitoring and many more. In addition, thanks to Windows Embedded Standard 7's user interface customization capabilities and extensive support for peripheral hardware devices, Haier's design team enabled users to

control their Haier Smart TVs with their mobile phones and/or tablet computers, which are naturally more efficient than traditional keyboard-less remote controls when inputting text and menu commands.

ULTRA DEFINITION TV WITH 10,000 SUPPORTED APPS IN JUST 4 MONTHS

Publicly unveiled in 2011, Haier's flagship x86 Smart TV – the Casarte Smart Social TV – established new benchmarks for performance and features within the Smart TV product category. Delivering 2560x1080 picture resolution – 33% higher resolution than full HD TV – and supporting over 10,000 applications, Haier's Casarte Smart Social TV unlocked the full combined potential of the AMD Embedded G-Series APU and Windows Embedded Standard 7 platform. This product has transformed the TV market overnight after a mere four months of development – a staggering achievement in the consumer electronics industry.

About Haier Group

Haier Group is the world's #1 major appliance brand as ranked by Euromonitor International 2011, and a global leader in consumer electronics. Haier employs more than 70,000 people around the world and distributes products in more than 165 countries and regions with global revenues reaching \$23.3 billion in 2011. For more information, visit www.haier.com.

About AMD

AMD is a semiconductor design innovator leading the next era of vivid digital experiences with its groundbreaking AMD Accelerated Processing Units (APUs) that power a wide range of computing devices. AMD Embedded Solutions give designers ample flexibility to design scalable, x86- based, low-cost and feature-rich products, and drive energy conservation into their systems without compromising application performance or compatibility, graphics performance or features. For more information, visit www.amd.com/embedded.



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¹ For complete test and configuration information please refer to the AMD "Brazos" Platform Performance and Power Optimization Guide Publication # 48109 Rev 2.01 available on the AMD Embedded Developers Support Web site.