

D10-082

作品名稱 **支援超高解析度、立體影像與影像串流之可調變影像與多視角影像的影像解碼器**

A 59.5mW Scalable/Multi-view Video Decoder Chip for Quad/3D Full HDTV and Video Streaming Applications

隊伍名稱 **最佳解 Optimal Solution**

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作品摘要

本次作品主要實現出世界第一顆單晶片高效能、低頻寬、低耗電的支援H.264/AVC High Profile、SVC High Profile、以及MVC High Profile的多標準影像解碼器。

我們提出了擁有目前最佳解碼硬體2.3倍處理量的Branch Selection CABAD架構，讓我們能夠解碼H.264以及MVC兩大標準中的最大解碼規格。在移動補償的部分，我們提出快取記憶體式的移動補償架構，並結合DRAM指令最佳化的方法，我們能大幅減少76%移動補償所需要的記憶體頻寬。在SVC的Spatial Scalability以及Quality Scalability解碼時，我們提出了Frame-level to MB-level解碼流程以及層錯列解碼流程，這種方法能減少33%~51%的記憶體頻寬以及34%的解碼時間。在耗電量上面，我們採用了系統及模組兩層面低耗電設計方法及低頻寬解碼，減少47%的晶片耗電量以及33%~51%的DRAM存取耗電量。

本晶片能支援QFHD解碼能力，提供超大畫面、超高畫質的影像相關應用。此外因支援SVC High Profile解碼，我們能夠提供不同畫面頻率、不同大小影像、不同影像品質等三個維度的影像可調變解碼，支援如影像串流及影像廣播等應用。因支援多視角影像解碼，我們能提供三個視角的1080p Full HDTV影像或者六個視角的720p HDTV影像，完整的支援目前最流行的3D相關應用。

Abstract

This work is to implement the world's first single-chip high-performance, low-bandwidth, low power consumption Multi-standard video decoder for H.264/AVC High Profile, SVC High Profile, and MVC High Profile.

We propose a high throughput Branch Selection CABAD structure that has 2.3 times higher decoding capacity than the state-of-the-art hardware accelerator. In the motion compensation, we propose a cache-based motion compensation architecture with DRAM-friendly data mapping and access control scheme. We can significantly reduce 76% of motion compensation memory bandwidth. For Spatial Scalability and Quality Scalability in SVC decoding, we propose a Frame-level to MB-level decoding scheme and layer-interleaving decoding scheme. These methods can reduce 31%~51% of overall decoding bandwidth and 34% of the decoding time. For low power consumption, we adopt several system-level and module-level of low-power design techniques. With our low bandwidth decoding strategy, we can reduce 47% of chip power and 33%~ 51% of DRAM access to power, to achieve high performance, low-bandwidth, low power design goals.

Our chip can support QFHD decoding to provide high definition, high-quality applications. Additionally, with the ability to decode SVC, it provides Temporal Scalability, Spatial Scalability, and Quality Scalability to support different frame-rate, different frame resolution video decoding with various bitrate-quality-power decoding trade-off points for Video Streaming and Video Broadcasting applications. View scalability for 3D and multi-view applications is also provided with MVC decoding. Three views in Full HD and six views in 720p HD are provided for the most popular 3D-related applications.