Video Display Processor
with 4K UHD Input/Output

MDIN-400

Macro Image Technology

MDIN-400

◆ **MDIN-400 is a highly integrated System-On-Chip for format conversion, deinterlacing, video enhancement and graphic OSD with embedded MCU.**

◆ **MDIN-400 receives any format of interlaced scan video up to 1080i and progressive scan video up to 4K30P and performs deinterlacing and format conversion to produce any desired format of interlaced or progressive scan video up to 4K30P with excellent signal quality preservation.**

◆ **MDIN-400 provides dual channel video processing for two input video source and generates PIP, POP and dual video output.**

◆ **MDIN-400 supports external lock function for broadcasting systems.**

◆ **MDIN-400 provides a versatile 2-D graphics engine with bitmap and character mode.**

◆ **MDIN-400's high quality format conversion, deinterlacing, video enhancement and OSD capability are suitable for digital display applications such as video converter, Pro AV device, various converter box, Video Wall & Matrix.**

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Main Features

- Two Digital Video Input Ports for Interlaced or Progressive Scan Video up to 4K30P

- Digital Video Output with CMOS Parallel or Serialized LVDS Interface and CVBS Video Output

- Four I²S Audio Input and Output for Audio Delay

- Motion Adaptive 2D/3D Noise Reduction

- External Lock Function for Brodcasting Systems.

- Main and Auxiliary Video Paths for PIP or Dual Video Output

- Independent Horizontal and Vertical Scaling with Anti-aliasing Interpolation Filter

- Horizontal and Vertical Peaking Filter and Color Enhancement Processing for Crisper Picture Quality

- 2 OSD Layers with 4 Sprites Per Layer (Bitmap and Character Mode)

- Embedded 32-bit MCU and SDRAM

Specifications

Video Input

Digital Format with up to 10-bit Precision
  Input Resolution : 4K30P Support
    Progressive Video : up to 3840x2160p (8M Pixels)
    Interlaced Video : up to 1920x1080i (1920x1152i)
  Video Format
    Sub-Sampling Type: RGB / YCbCr 4:4:4 or YCbCr 4:2:2
    Y/C type : Multiplexed (BT.656) or Separated (BT.601)
    Sync Type : Separate or Embedded (BT.1120 or BT.656)
    Digital Input : 36/30/24-bit (4:4:4) or 8/10/16/20/24-bit (4:2:2)
            BT.656, BT.601 or BT.1120 Format
            Single / Dual-Wide / Dual-Edge mode

Video Output

Digital CMOS Parallel Output
  Programmable standard or non-standard video format
  Sub-sampling type : RGB/YCbCr 4:4:4 or YCbCr 4:2:2
  Resolution : Progressive scan up to 4096x2160@30fps (4K30P)
              Interlaced scan up to 1920x1080i (1920x1152i)
  Format : YC 4:2:2 8/10/16/20-bit(Multiplexed or separated),
        YC/RGB 4:4:4 24/30-bit, BT.1120, BT.601 and BT.656 standard
        Single / Dual-Wide / Dual-Edge Mode
  Dual digital video output

Serialized LVDS Output
  Max 2-port single lvds mode output or dual lvds mode output
  Sub-sampling type : RGB/YCbCr 4:4:4 24/30-bit or YCbCr 4:2:2 16/20-bit
  Resolution : up to 1920x1080@30fps in singe mode
         and 1920x1080@60fps in dual mode
  PLL requires no external components

Composite Video Output : NTSC / PAL : 720H or 960H

Deinterlacing and Noise Reduction

Motion Adaptive 3D Deinterlacing
Motion Adaptive 2D / 3D Noise Reduction

Format Conversion

Independent Horizontal and Vertical Scaling with Anti-aliasing Interpolation Filter
Format Conversion From One Format to Another Format with an Arbitrary Scaling Ratio
Scaling Ratio : x1/15 ~ Unlimited
Non-uniform Scaling for Panorama Mode
Programmable Size & Position Zoom In / Out

Frame Rate Conversion

Frame Rate Conversion from 3-250Hz to 3-250Hz
Conversion Ratio : x1/31 ~ x31

Display Functions

Brightness, Contrast, Hue, Saturation and Color Space Conversion
Programmable Output Sync Generation
Lock-to-input Sync Mode or Free-run Mode
Video Overlay on Background Video
PIP and POP Display
Multi-Window with One Active Video

Video Enhancement

High Order Programmable Horizontal and Vertical Peaking Filter
Filter for Color Component Enhancement
Independent Color Control (ICC)
Dynamic Contrast Enhancement (DCE)

OSD

Four Layers : Two Layers with 4 Sprites per Layer
            One Cursor and One Background Layer
Up to 256-color Palette Mode Bitmap
16, 24 or 32-bit Full Color Mode Bitmap
Sprite, Palette or Pixel Based Alpha Blending
Up to 32 x 63 Font Size and 1-bpp, 2-bpp or 4-bpp Font Color
32-row x 16-col or 16-row x 32-col Character Map
Bitmap Fill, Copy and Run-Length Decoding

MCU and Communication Interface

Embedded 32-bit MCU
External Serial Flash memory Interface (4-wire SPI Master)
External Interface with 4-wire SPI and 2-wire I²C

Frame Buffer Memory

Embedded Frame Buffer Memory

Miscellaneous

Auto Detection of Input Video / Sync
Internal Programmable PLLs
Genlock to Background Video Sync
Built-in Test Pattern Generation Logic

Electrical and Mechanical Characteristics

1.2V, 1.8V, 2.5V & 3.3V Supply Voltage
Low Power Consumption
256-ball FBGA Package (14mm x 14mm / 0.8mm pitch)