The 5th Gen. Full HD In/Out Video Display Processor with Embedded Memory and HDMI/CVBS Output

**MDIN-380**

- **MDIN-380** is a highly integrated single chip implementation of deinterlacing, format conversion, video enhancement and graphic OSD.
- **MDIN-380** receives any format of interlaced scan video up to 1080i and progressive scan video up to full-HD, and performs deinterlacing and format conversion to produce any desired format of interlaced or progressive scan video up to full-HD with excellent signal quality preservation.
- **MDIN-380** provides high quality edge preserving deinterlacing with the 5th generation motion adaptive 3-D deinterlacing algorithm and performs proper processing for various speed motion and film video sources. And especially it has 3-D NR, PIP/POP, 4Ch. D1 in/out and frame rate conversion functions.
- **MDIN-380** provides a versatile 2-D graphics engine with bitmap and character mode and true color OSD(2-layers) with PCI/parallel host interface.
- **MDIN-380**’s high quality deinterlacing, format converting, video enhancement and OSD capability are suitable for digital display applications such as digital video recorder(DVR), IP camera, set-top-box, DVD player, Blu-ray player, TV box, AV receiver and scan converter system.
Main Features

- Two digital video input ports for up to 10-bit precision interlaced or progressive scan video up to Full HD
- 4 I/Ps and one S/PDIF audio input ports
- HDMI ver. 1.3 output, analog VGA/component, digital video output and CVBS video output
- Pixel-by-pixel level motion adaptive 3-D deinterlacing
- Advanced multi-directional edge preserving deinterlacing
- Deinterlacing with various speed motion and still image detection and processing
- Robust film sequence, bad-edit and subtitle detection and processing
- 3-D and MPEG noise reduction filter with cross-color suppression
- 4-channel D1 video processing with 3-D deinterlacing & noise reduction
- Main and auxiliary video paths for PIP or dual video output
- Automatic chroma upsampling error(CUE) detection and correction
- Independent horizontal and vertical scaling with anti-aliasing interpolation filter
- Horizontal peaking filter and color enhancement processing for crisper picture quality
- Programmable brightness, contrast, hue, saturation control with adaptive contrast enhancement
- 2 layer OSD with 4 sprites per layer(bitmap and character mode)
- Configurable 8/16 bit data parallel, PCI slave and serial(\textit{I}C) host bus interface
- Cost and size effective embedded frame memory
- 240-pin FBGA package(12mm x 16mm)

Specifications

### Video Input
- Digital format with up to 10-bit precision
- Input resolution : Full HD support
  - Interlaced video up to 1920x1080(1920x1152i)
  - Progressive video up to 1920x1080p(1920x1152p)

### Video Output
- Digital and analog format with triple 10-bit DACs
- Output resolution : Full HD support
  - Interlaced video up to 1920x1080(1920x1152i)
  - Progressive video up to 1920x1080p(1920x1152p)
- 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 : Separated or embedded(BT.1120 or BT.656)
- Digital input : 24/30/36-bit(4:4:4) or 8/10/16/20/24-bit(4:2:2)
- 4Ch. BT.656 time-multiplexed input
- Analog video output with triple 10-bit DACs(separate sync or sync on G/Y)
- CVBS(NTSC/PAL)
- HDMI(ver. 1.3)/DVI output

### Deinterlacing
- Motion adaptive 3-D deinterlacing on a per-pixel basis
- Advanced multi-directional edge preserving
- Various speed motion and still image detection
- Motion boundary preserving
- Film mode support for 3:2 and 2:2 pull-down
- Bad-edit/subtitle detection and adaptation

### Noise Reduction and Cross Color Suppression
- High quality 3-D noise reduction with motion detection
- MPEG noise(block noise and mosquito noise) reduction
- Cross-color suppression for 2-D comb-filtered input(CCS)
- Automatic chroma upsampling error(CUE) detection and correction

### Format Conversion
- Independent horizontal and vertical scaling with anti-aliasing interpolation filter
- 8(H) x 4(V) taps for luma, 4(H) x 4(V) taps for chroma
- 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

### Display Functions
- CSC for brightness, contrast, hue, saturation
- 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

### Communication Interface
- Configurable 8/16-bit data parallel host interface
- PCI slave interface for true color OSD
- 2-wire serial interface(\textit{I}C)

### Electrical and Mechanical Characteristics
- 1.2, 1.8V & 3.3V supply voltage
- Low power consumption
- 240-pin FBGA package(12mm x 16mm / 0.8mm pitch)