

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 I²S 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

Specifications

Video Input

Digital format with up to 10-bit precision

Input resolution : Full HD support

Interlaced video up to 1920x1080i(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

Video Output

Digital and analog format with triple 10-bit DACs

Output resolution : Full HD support

Interlaced video up to 1920x1080i(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 output : 24/30-bit(4:4:4) or 8/10/16/20/24-bit(4:2:2)

BT.656, BT.601 or BT.1120 format output

Single/dual mode output

4Ch. BT.656 time-multiplexed output

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

- ◆ 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(I²C) host bus interface
- ◆ Cost and size effective embedded frame memory
- ◆ 240-pin FBGA package(12mm x 16mm)

Frame Rate Conversion

Frame rate conversion from 3-250Hz to 3-250Hz

Conversion ratio : x1/31 ~ x31

Uses double frame buffer

Video Enhancement

High order programmable horizontal peaking filter

Filter for color component enhancement

LTI and CTI for edge 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 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

HDMI/DVI Transmitter

Industrial standard compliant HDMI 1.3, DVI 1.0, EIA/CEA-861D and HDCP 1.2

Deep color(36-bit) and xvYCC support

I²C master interface for DDC connection

Integrated HDCP cipher engine and pre-programmed HDCP keys

Hot plug detection for monitor/TV interface

Four I²S audio inputs : 2Ch. 192kHz or 8-ch 96kHz

Audio up-sampling for HDMI standard

Industrial audio standard support :

IEC60958 for PCM

IEC61937 compressed audio(Dolby Digital, DTS and etc.)

Adjustable audio delay for A/V synchronization(up to 680ms at 48kHz)

Built in consumer electronics control(CEC) support

Frame Buffer Memory

Embedded frame buffer memory

Communication Interface

Configurable 8/16-bit data parallel host interface

PCI slave interface for true color OSD

2-wire serial interface-I²C

Miscellaneous

Auto detection of input video/sync

Internal programmable PLLs

Genlock to background video sync

Built-in test pattern generation logic

Auxiliary scaler with OSD for CVBS output

PWM control for flat panel display

DDC control for analog monitor

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)