The 4th Generation SD to SXGA Up-converter with Embedded Memory and CVBS Encoder

- **MDIN-270/275** is a highly integrated single chip which has deinterlacing, format conversion and video enhancement. It converts SD video to higher resolution format, up to SXGA.
- **MDIN-270/275** provides two digital input ports. It has analog video output and digital video output ports. It receives any format of input video and performs deinterlacing and format conversion to produce any desired format of progressive and interlaced scan video with excellent signal quality preservation.
- **MDIN-270/275** provides high quality edge preserving deinterlacing with the 4th generation motion adaptive 3-D deinterlacing algorithm and performs proper processing for fast motion and film video sources.
- **MDIN-270/275**'s high quality deinterlacing, format converting and video enhancement capability are suitable for digital display applications such as IP camera, set-top-box, digital video recorder(DVR), DVD player, TV Box and scan converter system.

Macro Image Technology

Main Features

- Two digital video input ports for 8-bit precision interlaced or progressive scan video
- Digital video output or analog video output with progressive or interlaced scan video
- Motion adaptive 3-D deinterlacing with pixel-by-pixel level motion adaptive interpolation
- Advanced multi-directional edge preserving deinterlacing
- Deinterlacing with fast motion, slow motion and still image detection and processing
- Deinterlacing with film mode, bad-edit and subtitle detection and processing
- 3-D noise reduction filter with cross-color suppression for interlaced video input
- 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
- 1 layer OSD with 16 colors and 4 sprites(bitmap and character mode)
- Cost and size effective embedded frame memory
- Serial I^2C bus interface
- MDIN-270 : 144-pin FBGA package
  (12mm x 12mm : Footprint Compatible with MDIN-221)
  MDIN-275 : 100-pin FBGA package(8mm x 8mm)

Specifications

Video Input

Digital video input with 8-bit precision

Input resolution : Interlaced scan 720x480i or 720x576i
Progressive scan up to 1024x768p@60Hz(XGA)

Video format : 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.656/BT.1120)
Digital input : 24-bit(4:4:4) or 8/16-bit(4:2:2)

Video Output

Digital and analog video output

Output resolution : Progressive up to 1280x1024p@60Hz(SXGA)
Interlaced video up to 1920x1080i

Video format :
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.656/BT.1120)
Digital output : 24-bit(4:4:4) or 8/10/16/20-bit(4:2:2) - ***MDIN-270 Only***

Analog video output with triple 10-bit DACs(Separated sync or Sync on G/Y)

CVBS output supports NTSC/PAL - ***MDIN-275 Only***

Deinterlacing

Deinterlacing for interlaced scan video

Motion adaptive 3-D deinterlacing on a per-pixel basis

Programmable motion detection and adaptation control

Adaptive motion-weighted interpolation for eliminating non-motion artifact

Advanced multi-directional edge preserving

Fast motion, slow motion and still image detection

Motion boundary preserving

High frequency area detection and adaptation

Film mode support for 3:2 and 2:2 pull-down

Bad-edit detection and adaptation

Programmable setting of subtitle area and artifact elimination

Programmable inter-only area for OSD graphics
(Up to 5 anti-flicker areas for OSD graphics)

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

Programmable size & position zoom in/out

Frame Rate Conversion

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

Conversion ratio : x1/31 ~ x31, Utilizes embedded memory as frame buffer

Noise Reduction and Cross Color Suppression

High quality 3-D noise reduction with motion detection for interlaced video inputs

Cross-color suppression for 2-D comb-filtered input

Signal Enhancement

High order programmable horizontal peaking filter

Filter for color component enhancement

LTI and CTI for edge enhancement

Programmable gain control & coring

Adaptive contrast enhancement

Dithering down to 5 bits

Display Functions

Brightness, contrast, hue and saturation control

Programmable display size and position

Horizontal and vertical mirroring

OSD

Bitmap and character mode OSD

One layer with 4 sprites

16-color with 32-level alpha blending

Up to 32x63 font size, and 1-bpp or 4-bpp font color

32-row x 16-col or 16-row x 32-col character map

Bitmap copy and run-length decoding

Frame Buffer Memory

Embedded frame buffer memory

Communication Interface

2-wire serial interface-I^2C

Miscellaneous

Auto detection for input video/sync

Support composite sync and non-standard sync signal

Lock-to-input sync mode or free-run mode

Programmable output sync signal generation

Built-in test pattern generation logic

Electrical and Mechanical Characteristics

1.2V & 3.3V supply voltage

3.3V I/O signal interface

Power consumption : Under 1.0W

MDIN-270 : 144-pin FBGA package(12mm x 12 mm/0.8mm pitch)
Footprint compatable with MDIN-221

MDIN-275 : 100-pin FBGA package(8mm x 8mm/0.75mm pitch)

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