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

MDIN-270/275

- 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.
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 inputs
- 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 I²C bus interface
- MDIN-270 : 144-pin FBGA package
- MDIN-275 : 100-pin FBGA package
(12mm x 12mm : Footprint Compatible with MDIN-221)

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.665/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.665/BT.1120)
  Digital output: 24-bit(4:4:4) or 8/10/16-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-I²C

### 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 12mm/0.8mm pitch)
  Footprint compatible with MDIN-221
- MDIN-275 : 100-pin FBGA package(8mm x 8mm/0.75mm pitch)

---

**East Bldg., 6th Floor, IT Venture Tower, 135, Jundae-ro, Songpa-Gu, Seoul, Korea 05717**

**TEL : +82-2-2142-4000**
**FAX : +82-2-2142-4099**
**http://www.mitinc.co.kr**
**E-mail:sales@mitinc.co.kr**