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

MDIN-325/325A

MDIN-325/325A is a highly integrated single chip implementation of deinterlacing, format conversion, video enhancement and graphic OSD.

MDIN-325/325A 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 progessive scan video up to full-HD with excellent signal quality preservation.

MDIN-325/325A 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-325/325A provides a versatile 2-D graphics engine with bitmap and character mode.

MDIN-325/325A'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.

Macro Image Technology

Main Features

- Two digital video input ports for up to 10-bit precision interlaced or progressive scan video up to Full HD
- Analog RGB/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
- MPEG noise(block noise and mosquito noise) reduction
- 3-D noise reduction filter*(MDIN-325A only)*
- 4-channel D1 video processing with 3-D deinterlacing & noise reduction*(MDIN-325A only)*

- Cross-color suppression(CCS) for 2-D comb-filter video decoder
- 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)
- Cost and size effective embedded frame memory
- Serial(I²C) host bus interface
- 144-pin FBGA packages(12mm x 12mm)

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-bit(4:4:4) or 8/10/16/20/24-bit(4:2:2)
          4Ch. BT.656 time-multiplexed input*(MDIN-325A only)*

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-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*(MDIN-325A only)*
Analog video output with triple 10-bit DACs(separate sync or sync on G/Y)
CVBS(NTSC/PAL) with anti-flickering filter

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*(MDIN-325A only)*
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*(MDIN-325A only)*

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

Frame Buffer Memory
Embedded frame buffer memory

Communication Interface
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

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