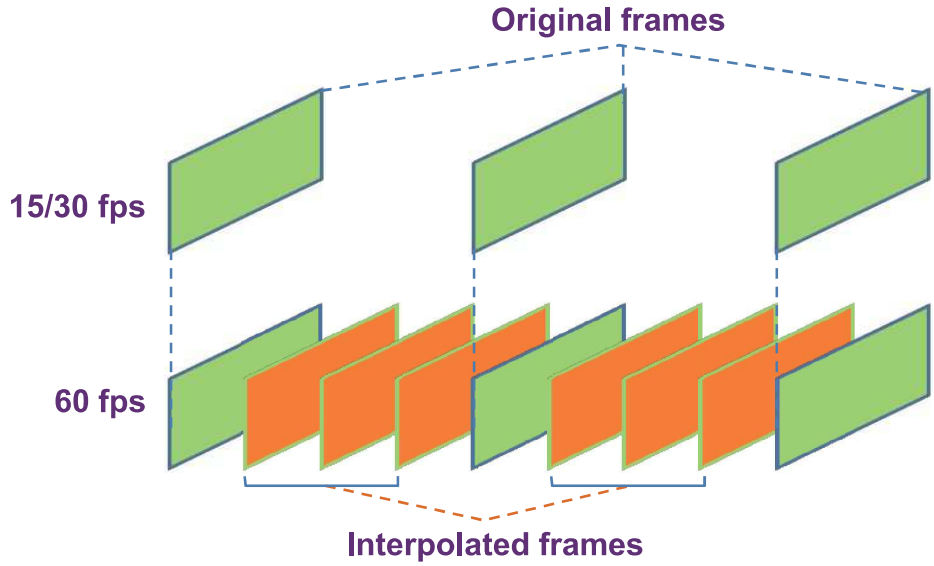
Frame Rate Converter
With Motion Estimation & Compensation

MDIN-F600

- MDIN-F600 is a highly integrated SoC implementation of frame rate converter with motion estimation and compensation.
- MDIN-F600 gives de-judder / de-blur effects for low frame rated video.
- MDIN-F600 has bi-directional and hierarchical motion estimation.
- MDIN-F600 has robust pixel level motion compensated pixel interpolation.



Main Feature

- Digital Input Port up to Full-HD 60Hz
- Digital, HDMI and VGA Output up to Full-HD 60Hz
- Frame Rate Conversion with Motion Estimation and Compensation
- De-judder for Scenes with Low Frame Rated Video
- De-blur for Motion Object with Low Frame Rated Video
- 3-frame Bi-directional Motion Estimation
- Multi-level Hierarchical Motion Search
- Motion Vector Tracking and Still Area Detection
- Robust Pixel Level Motion Vector Regeneration with 4 Set of ME Results for Motion Compensation
- Adaptive Motion Compensated Pixel Interpolation
- Multi-window Mode and Still Area Protection
- Embedded 32-bit MCU and SDRAM

Specifications

Video Input

Digital Format with 8-bit Precision

Input Resolution : up to 1920x1080p
Input Pixel Rate : up to 150MHz

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 8/16-bit (4:2:2)

Video Output

Digital, HDMI and VGA with 8-bit Precision

Output Resolution : up to 1920x1080p
Output Pixel Rate : up to 150MHz

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)
  BT.656 BT.601 or BT.1120 Format Output

HDMI Video Output (ver. 1.4)

Motion Estimation

- 3-frame Bi-directional Motion Estimation
- Max. 4-level Hierarchical Motion Search
- Various Speed Motion and Still Image Detection
- Dual Candidates of Motion Vector for the Case of Multi-Matching
- Motion Vector Filter to Reduce Faults of Motion Estimation
- Occlusion Area Detection and Small Object Protection
- Scene Change Detection
- Global Motion Vector Detection for Panning Scene
- Motion Vector Tracking Control with Object Motion History
- Still Area Detection with Multi-Frame History

Motion Compensation

- Robust Pixel Level MV Regeneration with 4 Set of ME Results
- Wide Motion Compensation Range
- Halo Artifact Reduction with Smart Multi-level Covered / Uncovered Region Detection and Handling
- Block Artifact Reduction with Smart Object Boundary Detection
- Adaptive Hole Region Processing with Neighbor / Panning Vectors
- Post Glitch Remove MV Regeneration Filter
- Glitch Removal with Alpha-Blending Based on MC Phase
- Special Considerations on Video Boundary Area
- Adaptive Motion Compensated Pixel Interpolation
- Programmable Phase Value of Each MC Frame

Multi-window and Display Control

- Multi-Window Configuration up to 6(h)x6(v)
- Multiple Window Frame and Boundary Control
- CSC for Brightness, Contrast, Hue and Saturation

Frame Rate Conversion

- Frame Rate Conversion from 3~250Hz to 3~250Hz
- Conversion Ratio : x1/127 ~ x127
- I/O Frame Lock and Unlock Mode
- Input Cadence Detection and Adaptive MC Phase Control
- Input Frame Drop / Repeat Detection and Compensation

Video Compression and Enhancement

- Video Compression for High Resolution / High Frame Rated Video
- Mosquito Noise Reduction
- Sharpness Control and Color Component 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 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 Fill, Copy and Run-Length Decoding

Frame Buffer Memory

- Embedded Frame Buffer Memory

MCU and Communication Interface

- Embedded 16-bit MCU with Internal SRAM
- External Flash Memory with SPI Interface
- External Interlace with 4-wire SPI and 2-wire I²C

Miscellaneous

- Auto Detection of Input Video Resolution and Frame Rate
- Internal Programmable PLLs
- Embedded HDMI Transmitter (ver. 1.4)
- Built-in Test Pattern Generation Logic

Electrical and Mechanical Characteristics

- 1.2, 1.8 & 3.3V Supply Voltage
- Low Power Consumption
- 256-ball BGA Package (14mmx14mm / 0.8mm pitch)

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