

IMAGE PROCESSORS

4K60Hz Quad Input 4K Multiple Input/Output De-Interlacer/Scaler LSI

Product Description

The IP00C331 is a true 4K60Hz up/down scaler with minimal interface requirements. It features 4 input ports up to 4K60Hz each, and 2 output ports up to 4K60Hz each. This allows it to take up to four 4K60Hz sources and scale each one independently to any size and position on a composite 4K60Hz output. Its internal architecture consists of 8 up/down scaler cores plus 4 de-interlacer cores to support interlaced input on each input port. The IP00C331 also features many other high-performance functions such as 90-degree rotation, mirror-flip, PQ and HLG HDR systems (10-bit), and 3DLUT for color management. It makes use of the high-speed serial V-by-One bus interface which is only 8 lanes in order to minimize board footprint. The IP00C331 can be used as a single or dual 4K60Hz scaler, or as a 4K display controller chip supporting multiple inputs.

Features

Input (4K60Hz, 4-port)

- RGB 30bit/YUV4:4:4 30bit/YUV4:2:0 30bit/YUV4:2:2 20bit/YUV4:2:2 10bit(BT656)
@V-by-One 4Gbps, 8-lane 2-port
- @LV-CMOS 166MHz supporting dual (EVEN/ODD) and DDR inputs 4-port
- 4K60Hz input up to 4-port
- 4K120Hz input supported

Output (4K60Hz, 2-port)

- RGB 30bit/YUV4:4:4 30bit/YUV4:2:2 20bit/YUV4:2:2 10bit(BT656)
@V-by-One 4Gbps, 8-lane 2-port
- 4K60Hz dual output (all the time, fully independent)
- 4K120Hz output supported

Input & Output Image Size

- Horizontal sync signal 16,384 pixels (max) @1ch
- Horizontal image active area 2,176 pixels (max) @1ch

External Memory

DDR3-SDRAM 64bit PC1600 (4G/2G/1G x16) x4

External/Internal Sync

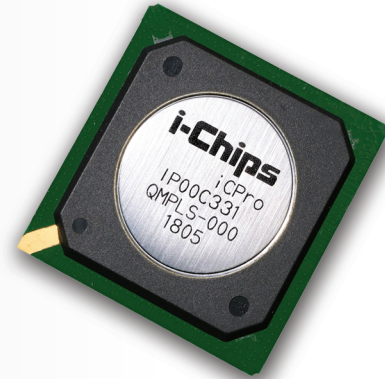
- Output sync is compatible only with internal signal
- Independent sync mode is available at each input & output port

Input/Output Sync/Asynchronous Behavior

- Frame rate conversion
- Tearing protection
- External force synchronization
- Genlock

De-Interlacer

- Motion adaptive filter based on Y, U, V, YUV 4:2:2
- All major cadences supported
- Low latency processing (4-port)



Scaler

- Zoom/shrink 6-symbol programmable FIR filter (10bit/pixel)
- Embedded ROM (64set)

Noise Reduction

- 3DNR (H, V, Temporal)
- MPEG-NR (Mosquito/Block)
- Chroma error filter

Bit Map OSD

- 256 colors/High color OSD (64K colors)
- Embedded font engine (65536 words)
- Blinking and semi-transparent (4 colors OSD)
- 90-degree rotation, OSD scroll
- Serial flash to bitmap

Image Quality Control

- Color management (full color gamma)
- 3DLUT (4K60Hz 2-input supported)
- Uniformity correction (by region and per-pixel)
- Bias/Gain/Gamma correction
- H edge enhancement (9symbol) , V edge enhancement (5 to 9symbol)
- Dithering for 10 or 8 bit output

Image Manipulation

- Mirror/flip/90-degree image
- Vertical keystone
- 4-ch overlay, alpha blending, color key blending

CPU Interface

8-bit parallel/4-wire serial

xvYCC/Bt-2020

Fully supported

HDR Standard

SMPTE ST2084(PQ) and HLG both methods supported (RGB 10-bit each)

Power Supply

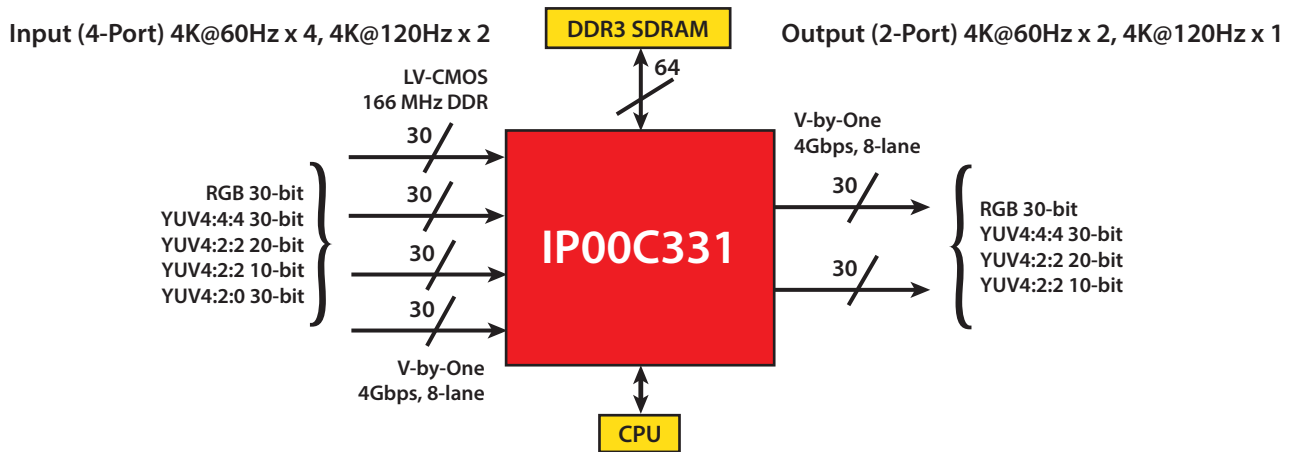
3.3V/1.5V/1.1V

Package

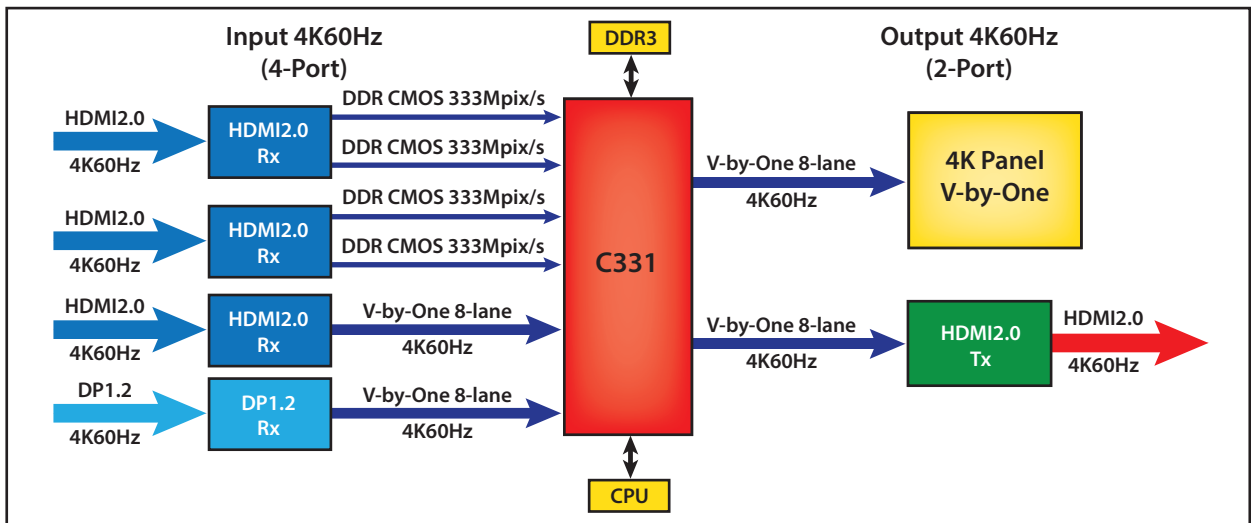
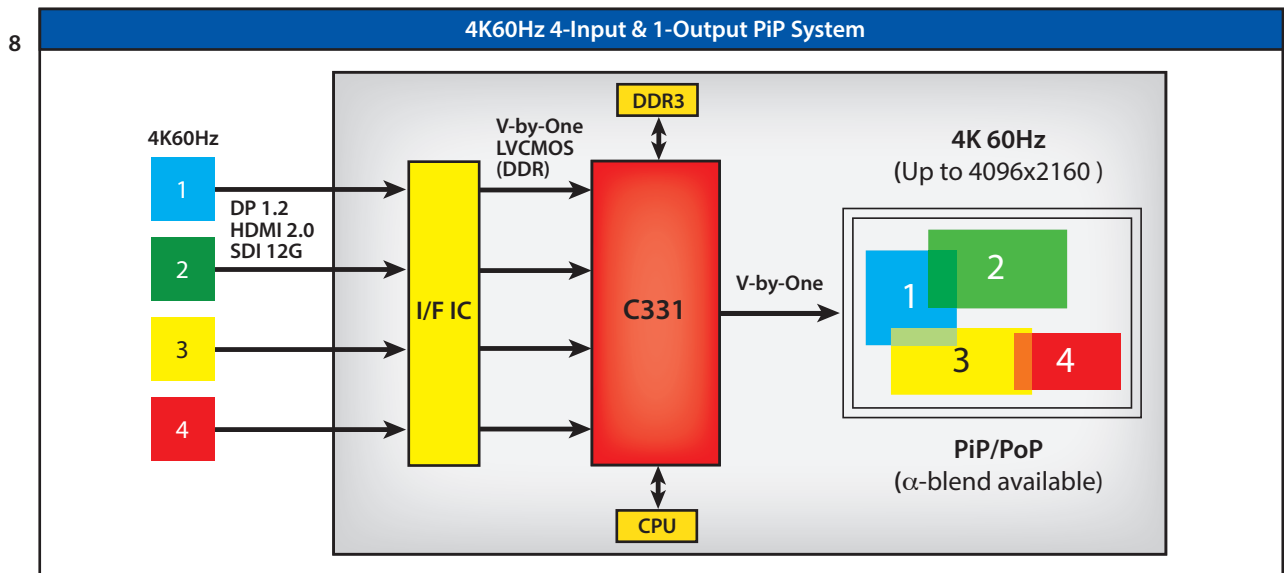
684-pin BGA (0.8mm pitch), 27mmx27mm

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IP00C331 Block Diagram



Application Diagrams



"V-by-One" is a trademark of Thine Electronics, Inc.

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