

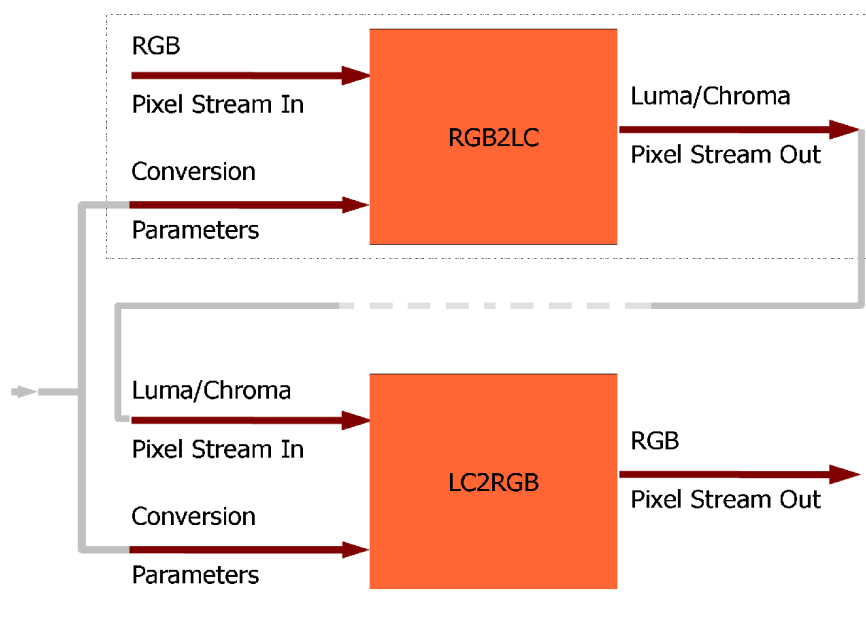
Color Space Converter

Product Outline

A couple of IP blocks that convert between RGB color space and Y'CrCb color space

The DIAPLOUS Color Space Conversion blocks provide fully configurable conversion from/to a stream of Red, Green, Blue (RGB) pixels to/from a stream of pixels encoded as Luma/Chroma (YUV or Y'CrCb). The RGB2LC block performs RGB to luma/chroma while the LC2RGB converts luma/chroma back to RGB.

Conversion is based on a set of user-configurable parameters. Default reset values of these parameters correspond to standard conversions.

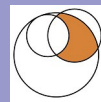


RGB Pixel Streams: The RGB2LC unit expects a stream of pixels formatted as 24bit RGB. The stream can be synchronized to "frame valid" and "data valid" inputs. An equivalent stream is generated as the output of the LC2RGB unit (including "frame valid" and "data valid" signals).

Luma/Chroma Pixel Streams: The output of the RGB2LC and the input to the LC2RGB units is a stream of 24bit pixels with the same synchronization signals ("data_valid" and "frame valid") but with a different color coding. The 24 bits are organized as 1 luminance byte (Y) and two chroma bytes (Cr and Cb). The format of the output stream is equivalent to the YUV444 structure.

Color Conversion Parameters: The parameters used for color space conversion are stored in register sets. Four register sets exist, so that the user can choose on-the-fly which conversion parameters to apply. The default reset values of all registers are calculated so that they provide conversion for standard color spaces, namely: ITU-R BT.601 (standard definition TV) , ITU-R BT.709 (HDTV), SMPTE 240M and SimpleYUV (an approximation with very small hardware overhead but reasonably good results).

Core Configuration: The code can be configured for various pixel sizes and various color conversion parameter accuracies. There is also an option for fixed color conversion parameters which will yield considerably smaller hardware.



Features:

- Two-way Color space conversion between RGB and Y'CrCb
- Configurable or Fixed Conversion Parameters
- Default reset values
- Easy integration in various pixel flow architectures.

Target Applications:

- Image sensor interfacing
- Display drivers

Size: 450 LEs, 310 FFs (Altera Cyclone III)

Speed: Pixel Clock 190MHz.

Interfaces:

- RGB or YUV444 Pixel-flow Input
- Status/Control Registers
- YUV444 or RGB Pixel-flow Output

Software (option):

Color Space Conversion Parameter Generator

Status:

Working FPGA Implementation.

Demonstration:

Development board including:

- FPGA with RISC Core, Ethernet 10/100 MAC, Sensor Interface, I2C, Memory Interface
- Memories (SDRAM & Flash)
- Ethernet Phy & Connector
- 3Mpixel Color Image Sensor

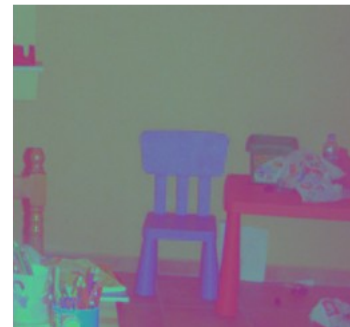
RGB



Y' (luma)



CrCb (BT.601 color coded)



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