Digital Blocks
Semiconductor IP

DB1892AXI
RGB to CCIR601/656 Encoder

General Description

The Digital Blocks DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder interfaces RGB data along with synchronization signals from a LCD Controller (or any LCD display timing & control unit) to a TFT LCD Panel by-way-of a CCIR 601 / CCIR 656 interface.

Figure 1 depicts the system view of the DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder IP Core embedded within an integrated circuit device. The DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder accepts 24-bit RGB data and VSYNC, HSYNC, and DE synchronization signals and converts the RGB & sync signals to the CCIR ITU-R BT.601 & BT.656 standards, for driving a CCIR 601 / CCIR 656 compliant LCD panel.

The DB1892AXI is a system-level IP Core which optional interfaces to the ARM AMBA AXI fabric for programming of internal parameters. The DB1892 is offered with AHB, OCP, PLB, and Avalon fabrics as options, as well as no fabric interface with hard-coding of the video transformation parameters.

The DB1892 interfaces to Digital Blocks' DB9000 TFT LCD Controller, for a full system solution of transforming Frame Buffer RGB data to CCIR 601 / CCIR 656 standard video.
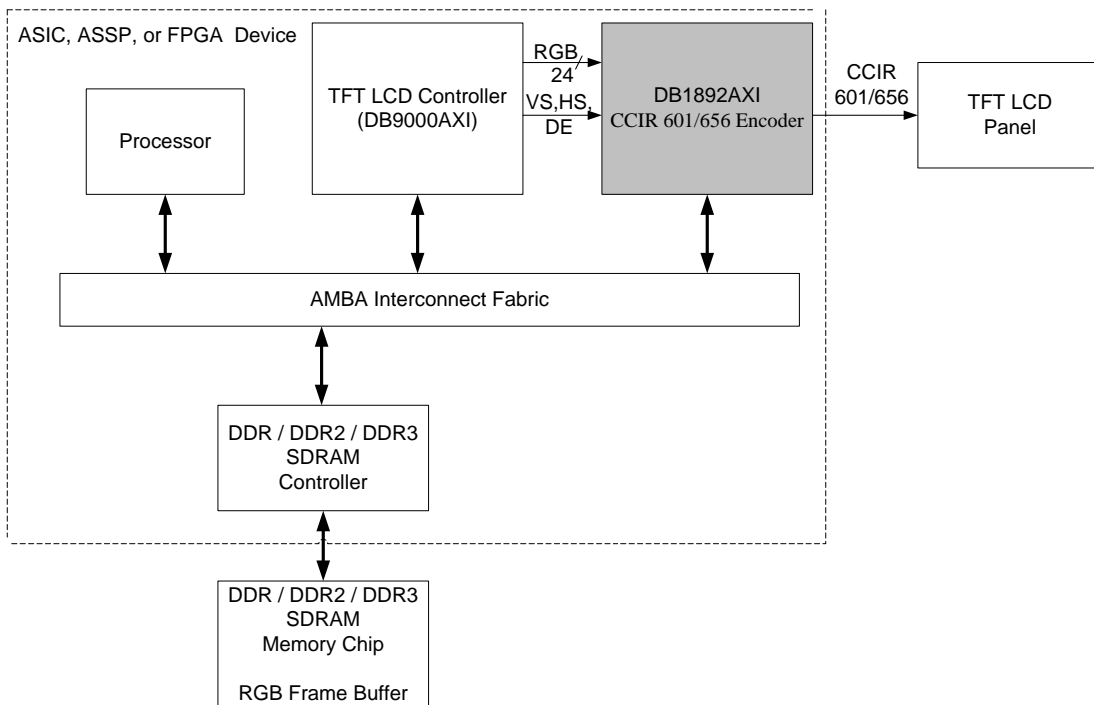

Figure 1: DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder – System Diagram

DB1892AXI CCIR 601/656 Encoder

Figure 2 depicts the DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder. The DB1892 performs the following video signal processing functions:

1. Color Space Converter: RGB 24-bit data and sync signals VSYNC, HSYNC, & DE input from a LCD Controller. The Color Space Converter converts the 4:4:4 sampled RGB pixels to component luma and chroma digital video 4:4:4 YCbCr.

2. Chroma Resampler: The Chroma Resampler down converts the 4:4:4 Y'CbCr to 4:2:2 Y'CbCr, in order to meet the ITU-R BT.601 requirements of the ITU-RBT.656 Encoder.

3. BT.656 Encoder: Encodes the 4:2:2 Y'CbCr component digital video with synch signals to conform to the ITU-RBT.656 digital coding standard.

Note the DB1892 system-level solution builds on Digital Blocks DB1810 Color Space Converter, DB1820 Chroma Resampler, and the DB1830 BT.656 Encoder.
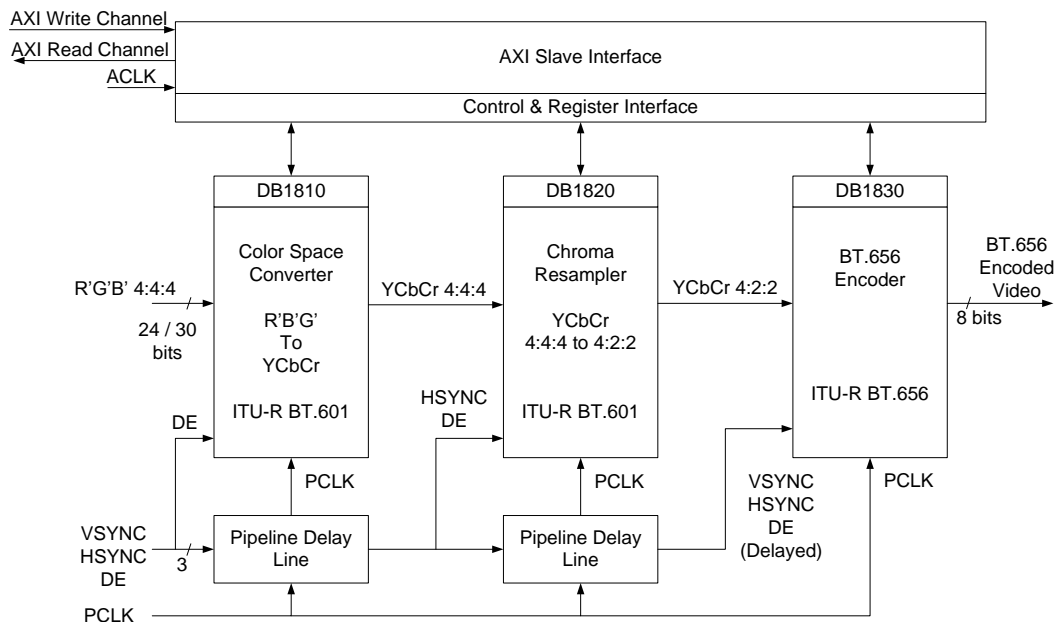
Figure 2: DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder

Pin Description

DB1892AXI RGB to CCIR 601 / CCIR 656 Encoder contains an ARM AMBA AXI fabric for processor programming of internal parameters. The DB1892 is offered with AXI4-Lite, AHB, OCP, PLB, and Avalon fabrics as options, as well as no fabric interface with hard-coding of the video transformation parameters.

The DB1892 contains the following interface to the TFT LCD Controller (such as Digital Blocks DB9000 LCD Controller IP Core):

Name	Type	Description
Input Interface		
LCD_PCLK	Input	Pixel Clock
LCD_HSYNC	Input	Horizontal Sync Pulse
LCD_VSYNC	Input	Vertical Sync Pulse
LCD_DE	Input	Display Enable
LCD_PE	Input	Power Enable
LCD_R[7:0]	Input	Red Data
LCD_G[7:0]	Input	Green Data
LCD_B[7:0]	Input	Blue Data

Table 1: DB1892 – I/O Pin Description of Input Interface from LCD Controller

The DB1892 ITU-R BT.656 Encoded output contains the following interface:

Name	Type	Description
Output Interface		
BT656E_CLK	Output	BT656E Clock
BT656E_DATA[7:0]	Output	BT656E Data

Table 2: DB1892 – I/O Pin Description of BT656 Output Interface

Verification Method

The DB1892 contains a test suite with AXI Bus functional models that program the DB1892 control & status registers, drives the DB1892 with LCD Controller output timing & RGB data, and checks expected results.

The DB1892 has been verified in an FPGA driving a 320x240 CCIR 601/CCIR 656 compliant LCD panel.

Customer Evaluation

Digital Blocks offers a variety of methods for prospective customers to evaluate the DB1892. These include Verilog simulations, encrypted FPGA models, or the DB1892 Demo System, which includes an Altera FPGA and 320x240 TFT LCD panel.

Deliverables

The DB1892 is available in FPGA netlist or synthesizable RTL Verilog, along with Synopsys Design Constrains, a simulation test bench with expected results, reference design, and user manual.

Support

The DB1892 IP Core is warranted against defects. One year of phone and email technical support is included, starting with the first interaction. Additional maintenance and support options are available.

Ordering Information

Please contact Digital Blocks for additional technical, pricing, evaluation, and support information.

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