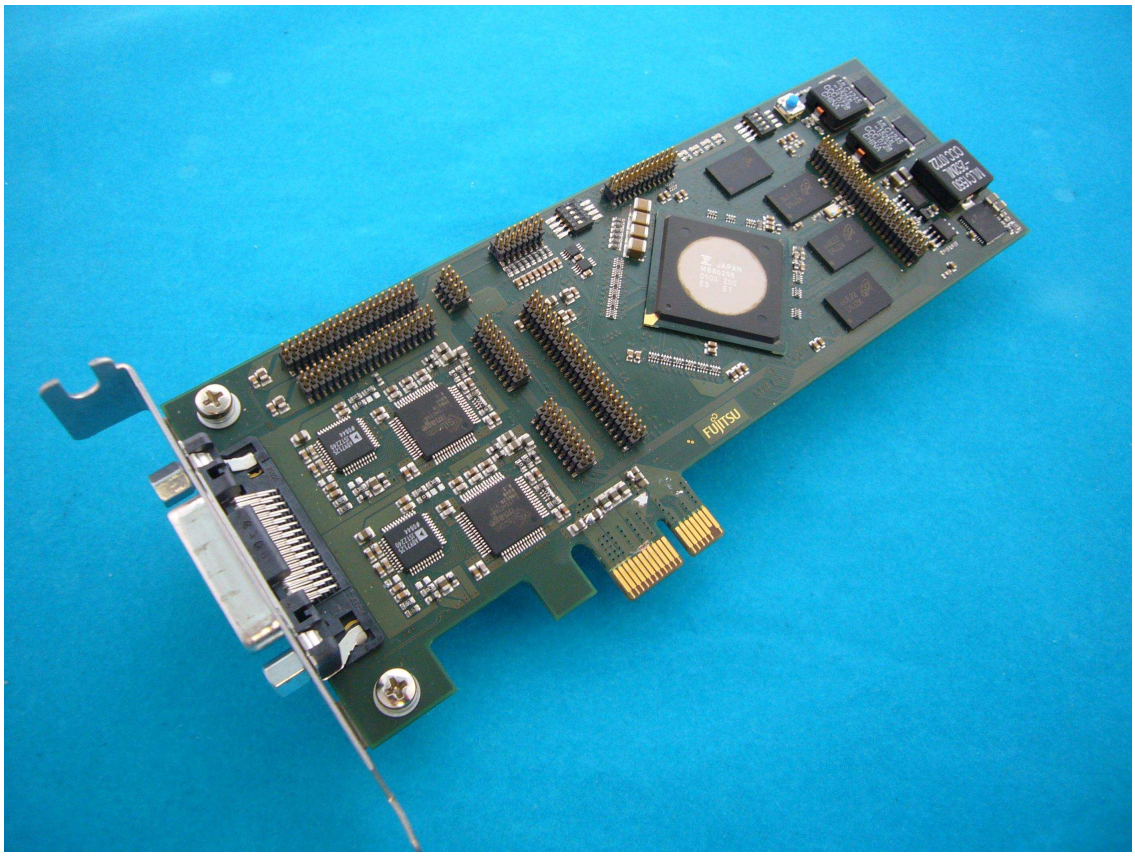
FUJITSU

MB86298-EB01
Ruby Evaluation Board
Documentation



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Document Revision History

Date	Revision	Changes
02/10/09	1.00	First Version for Board Revision 01
02/17/09	1.10	Diagram of Ruby evaluation board connection to analog video input slot added
03/13/09	1.11	First Page changed
04/30/09	2.0	First Version for Board Revision 02
06/16/09	2.1	Information added for Analog Video Input Slot, Video In Adapter Board and APIX Adapter Board
03/01/10	3.0	First Version for Board Revision 03 Information added for DVI-Transmitter Configuration20
20/04/10	3.1	Information added for Video Input Board VIDEO02 (4x CAM functionality)

Evaluation Board Revision History

Date	Revision	Changes
02/09/09	01	First Version
04/30/09	02	Second Version
03/01/10	03	Third Version

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1. Ruby Evaluation Board

1.1. Overview

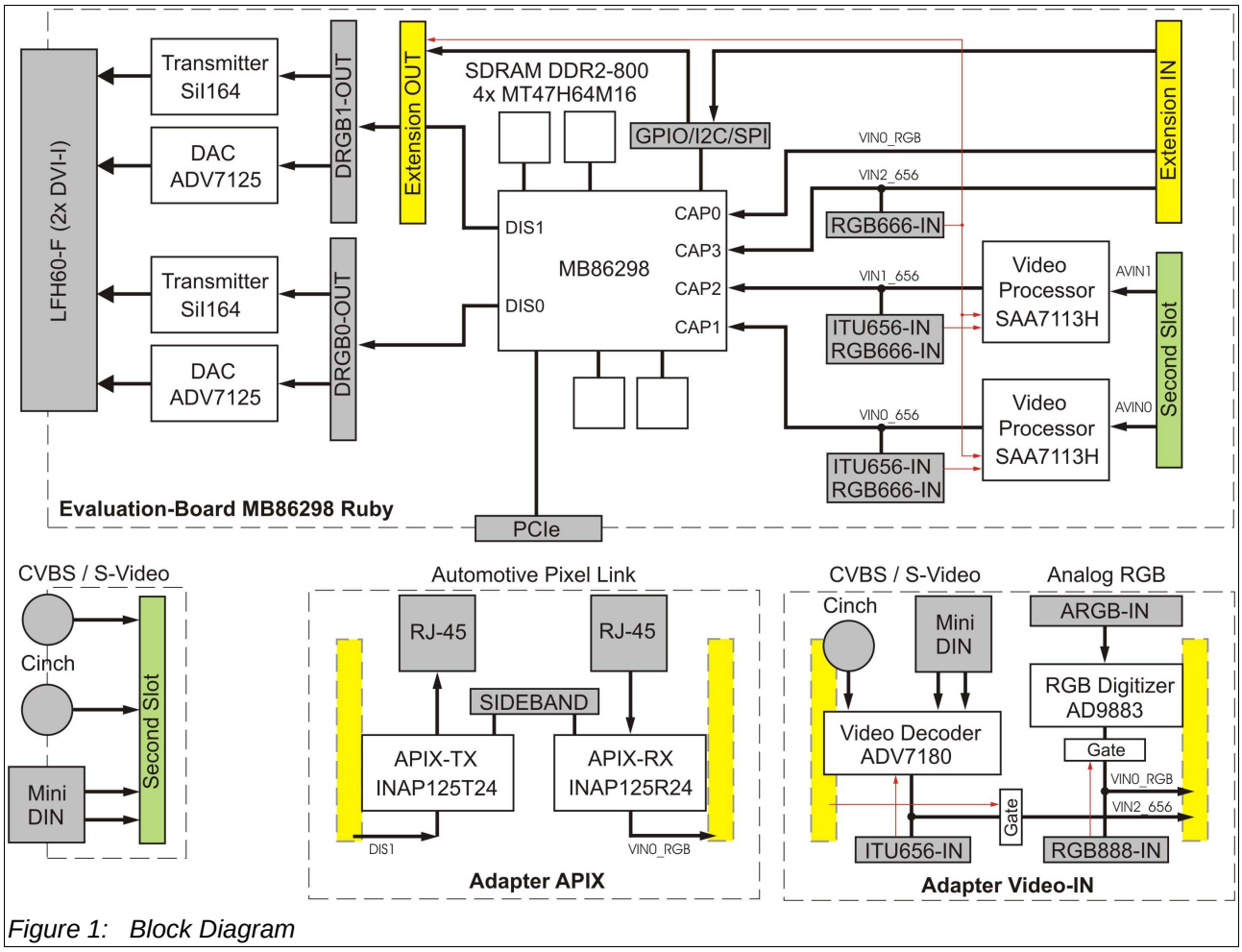

Figure 1: Block Diagram

1.2. Main Board External Appearance

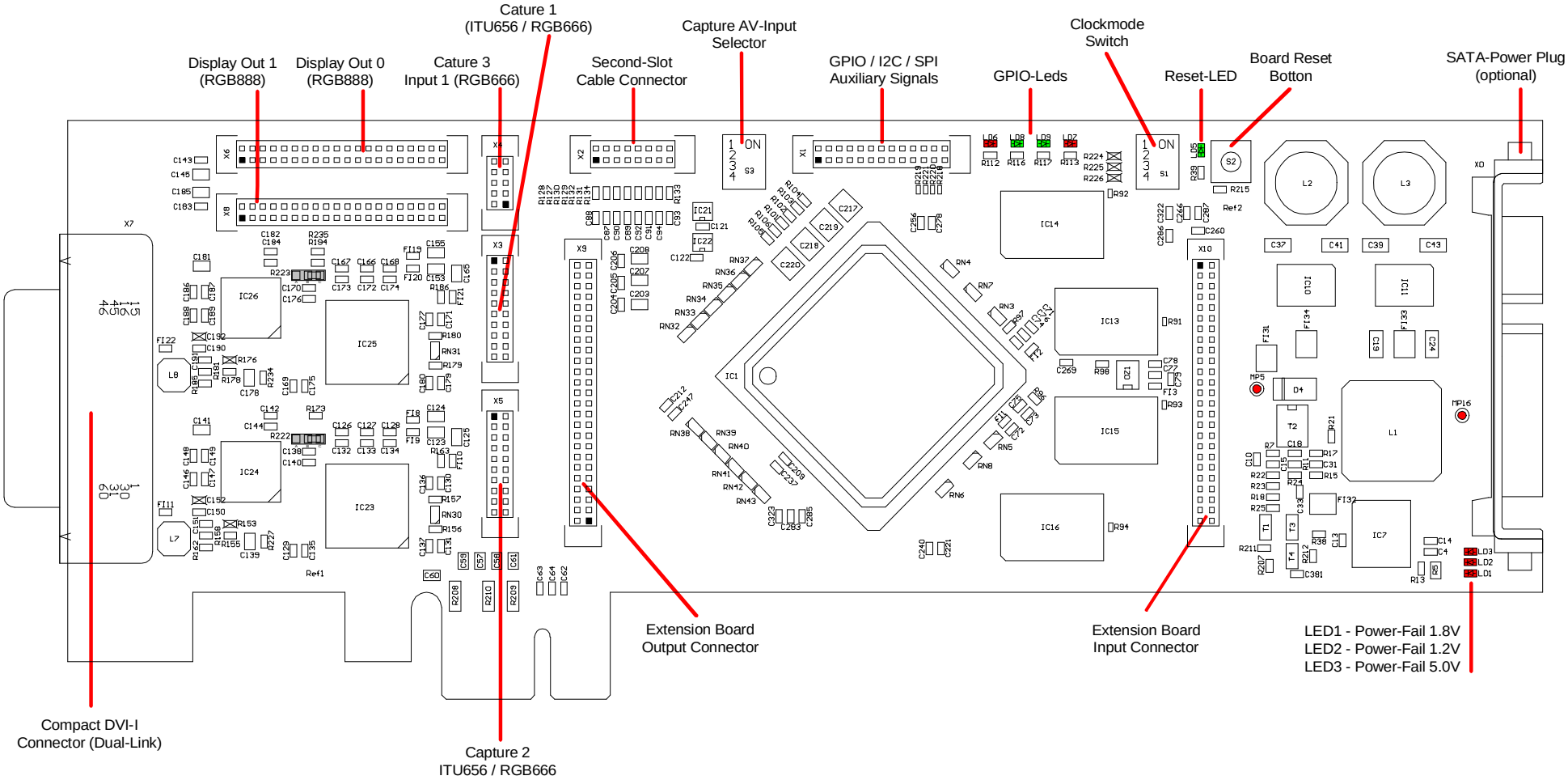

Figure 2: Interfaces and configurations on the Ruby Evaluation Board top side

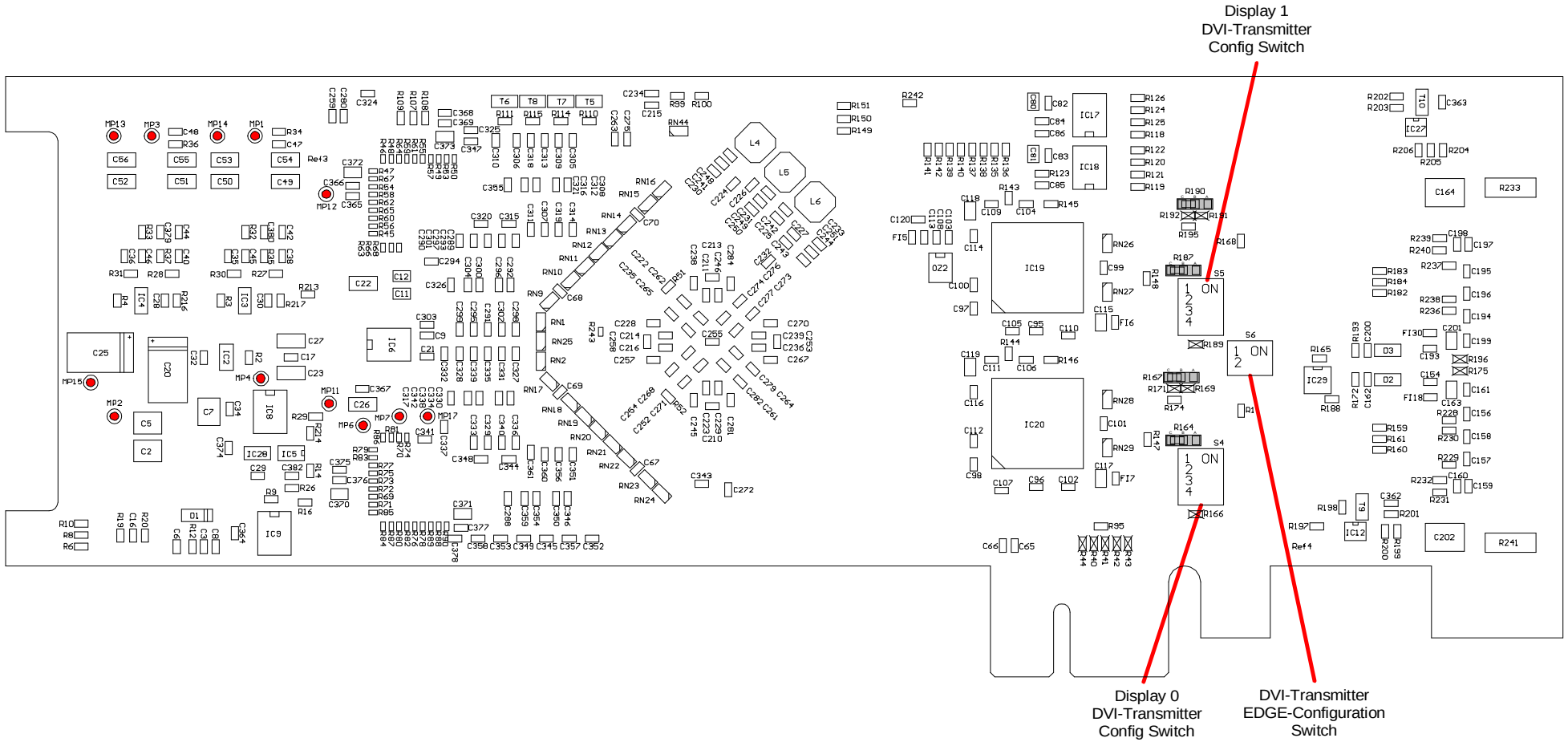

Figure 3: Test points and configurations on the Ruby Evaluation Board bottom side

1.3. Test Points

The following table shows the assignment of the test points on bottom side of the evaluation board to their corresponding signals.

MP	Signal	MP	Signal
1	1.8V (Ruby-Core-Voltage)	6	VTTDDR2 (DDR2-RAM Terminator Voltage)
2	5.0V	7	VREFDDR2 (DDR2-RAM Reference Voltage)
3	1.2V (Ruby-Core-Voltage)	11-17	Ground
4	3.3V (Board-I/O-Voltage)		
5	3.3V (From PCI-Express)		

Table 1: Description of Test Points on Ruby Evaluation Board

1.4. LEDs

The evaluation board contains various LED's on the top side to visualize different board conditions. The following table contains a description of functionality of all on board LED's.

LED	Function	Color	OK-Condition	Description
LD1	Power-Fail 1.8VCore	Red	Off	LED is light up, if the DC-DC-Converter output produces no stable 1.8V. In OK condition the LED should be switched off.
LD2	Power-Fail 1.2VCore	Red	Off	LED is light up, if the DC-DC-Converter output produces no stable 1.2V. In OK condition the LED should be switched off.
LD3	Power-Fail 5.0V	Red	Off	LED is light up, if the DC-DC-Converter output produces no stable 5.0V. In OK condition the LED should be switched off.
LD5	MB86298-XRST-Reset	Green	On	LED is light up, if XRST-Reset is released (OK condition).
LD6	GPIO0-Led	Red	-	LED is light up, if GPIO0 is configured as output and programmed to high level.
LD7	GPIO2-Led	Red	-	LED is light up, if GPIO2 is configured as output and programmed to high level.
LD8	GPIO1-Led	Green	-	LED is light up, if GPIO1 is configured as output and programmed to high level.
LD9	GPIO3-Led	Green	-	LED is light up, if GPIO3 is configured as output and programmed to high level.

Table 2: Description of functionality of Ruby evaluation board LED's

1.5. DIP-Switches

Switch S1 settings are responsible for the Ruby clock configuration.

Switch	Function	Description
S1A (1)	Unused	-
S1B (2)	CLKMODE0	**CLKMODE0** is **low** level if switched to position **ON**.
S1C (3)	CLKMODE1	**CLKMODE1** is **low** level if switched to position **ON**.
S1D (4)	CLKSEL0	**CLKSEL0** is **low** level if switched to position **ON**.

Table 3: Switch S1 settings on Ruby evaluation board

With switch S3 it is possible to disable the on board video input processors circuits SAA7113H, which are connected to the Ruby video capture inputs units. With disabled SAA7113H it is possible to source the video capture inputs units directly with digital signals via corresponding interface connectors.

Switch	Function	Description
S3A (1)	Disable AV-Input 0 to 2 (CAP1 to 3)	If set to condition **ON**, on signal **AVIN_OFF#** (sheet 7) appears **low** level. This leads to a **disable** of both video input processors SAA7113H (IC19 and IC20). The signal appears also on the extension connector (sheet 10).
S3B (2)	Disable AV-Input 1 (CAP2)	If set to condition **ON**, IC20 (SAA7113H) will be **disabled**.
S3C (3)	Disable AV-Input 0 (CAP1)	If set to condition **ON**, IC19 (SAA7113H) will be **disabled**.
S3D (4)	Unused	-

Table 4: Switch S3 settings on Ruby evaluation board

With switch S4, S5 and S6 it is possible to configure the De-Skewing and EDGE-features of the Silicon Image SiI164 Panel Link Transmitter (IC23, IC25) separately without the need of the I^2C-Interface, if **ISEL/RST# = Low** and **DKEN = High**. For more Information please refer to Silicon Image SiI164 Data Sheet.

Switch	Function	Description
S4A-C, S5A-C (1-3)	DK[3:1]	Setting of De-Skewing Time. The default setting is **DK[3:1] = '100'** (recommended setting, T_{CD}=±0ns). Switch to **ON** is binary **Zero**, Switch to **OFF** is binary **One**.
S4D, S5D (4)	DKEN	De-Skewing Enable. If switch is set to condition **OFF**, De-Skewing setting is **enabled**.
S6A, S6B	EDGE / HTPLG	DVI-Hot-Plugin- / EDGE-Configuration.

Table 5: Switch S4, S5, S6 settings on Ruby evaluation board

In Addition to Switch S4, S5 and S6 settings please refer to Ruby schematics page 8 and 9 for additional configuration possibilities with SiI164 Panel Link Transmitter signals **ISEL/RST#**, **BSEL/SCL**and **DSEL/SDA**and there respective zero-ohm jumpers.

The dual edge mode is by default enabled. The DVI outputs are configured to work with clocks rising edge. The High Speed Video DAC ADV7125JSTZ240, responsible for the analog output is by default configured to work with clocks falling edge. For using four displays at the same time, simply connect two splitter cables from DVI-I to VGA/DVI to the DVI bridge.

1.6. GPIO's

On the evaluation board there are some auxiliary signals. With use of connector X1 it is possible to connect these signal with the Ruby GPIO lines if necessary.

Description	Name	Pin	Pin	Name	Description
Ruby-GPIO0	GPIO0	1	2	DIS0_AUX	Display Out0 AUX-Signal to connector X6 (sheet 8)
Ruby-GPIO1	GPIO1	3	4	DIS1_AUX	Display Out1 AUX-Signal to connector X8 (sheet 9)
Ruby-GPIO2	GPIO2	5	6	EXT_AUX_A	AUX-Signal A to Extension Connector X9 (sheet 10)
Ruby-GPIO3	GPIO3	7	8	EXT_AUX_B	AUX-Signal B to Extension Connector X9 (sheet 10)
Ruby-GPIO4, enable signal for I2C-Bridge, Monitor0 on DVI-Connector (sheet 8)	GPIO4 (EN_DDC0#)	9	10	EXT_AUX_C	AUX-Signal C to Extension Connector X10 (sheet 10)
Ruby-GPIO5, enable signal for I2C-Bridge, Monitor1 on DVI-Connector (sheet 9)	GPIO5 (EN_DDC1#)	11	12	APIX_TX_ERR	APIX TX-Error-Signal from APIX-Board (if present on X9/X10)
Ruby-GPIO6	GPIO6_COMP_RETRIG	13	14	APIX_RX_ERR	APIX RX-Error-Signal from APIX-Board (if present on X9/X10)
Ruby-GPIO7	GPIO7_INT_OUT	15	16	I2C_SDA	Ruby I2C SDA-Signal
Ruby I2C SCL-Signal	I2C_SCL	17	18	GND	Ground
Ruby SPI CLK-Signal	SPI_CLK	19	20	GND	Ground
Ruby SPI MOSI-Signal	SPI_MOSI	21	22	GND	Ground
Ruby SPI MISO-Signal	SPI_MISO	23	24	GND	Ground
Ruby SPI CS-Signal	SPI_CS	25	26	+3.3V	Supply Voltage

Table 6: Connector X1 on Ruby evaluation board

The AUX-signals are responsible for various auxiliary functions.
With a plugged APIX adapter board the APIX status signals **TX-Error** and **RX-Error** can be observed and with the signal **EXT_AUX_A** a manipulation of **APIX reset signals** is possible.
With a plugged video in adapter board instead, on pin **EXT_AUX_C** the signal **VIN2_656_IRQ** from the **ADV7180** circuit appears.

1.7. Analog Video Input Slot

1.7.1. Overview

The Analog Video Input Slot is the needed extension board to supply Ruby's Capture 1 - and Capture 2 - Input Ports with video signals from the S-Video- or CVBS-Connectors.

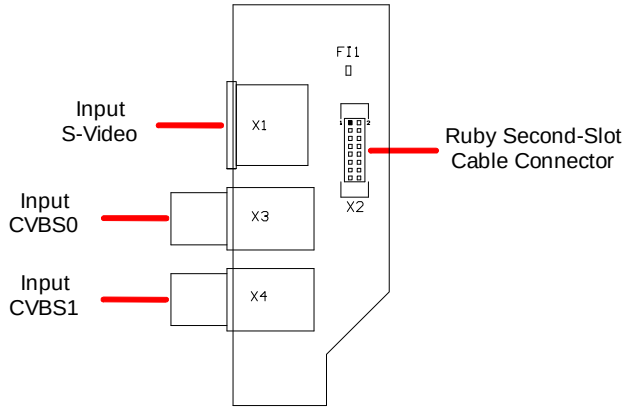

Figure 4: Interfaces on the analogue video input slot

1.7.2. Connection to Ruby Evaluation Board

The following diagram shows how to connect the Ruby Evaluation Board and the Analog Video Input Slot correctly with the provided red marked flat cable.

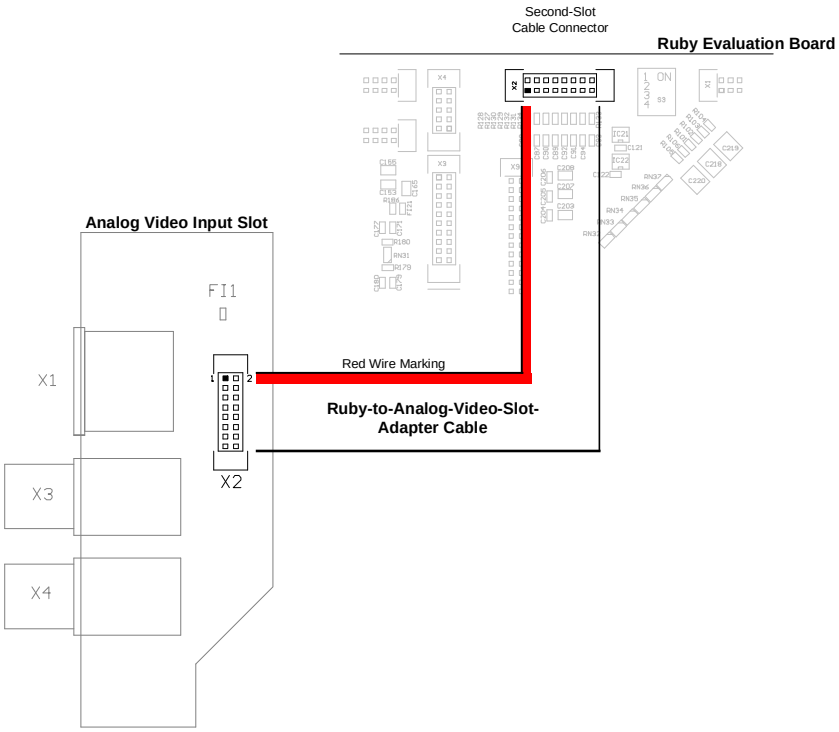

Figure 5: Connection between Ruby evaluation board and Analog Video Input Slot

2. Adapter Boards

2.1. Video In Adapter Board 01 (MB86298-VIDEO01)

This Video In Adapter Board supports additional video signal connectors to supply Ruby's Video Input Capture Ports. The board contains an Analog Interface Circuit (AD9883) and a SDTV Video Decoder chip (ADV7180), connected to one S-Video- (X4), one CVBS- (X6) and one analog RGB connector (X2) for analogue signal supply. It is also possible to supply alternatively digital ITU656-signals and RGB888-signals to the board with connectors X5 and X1. The operation mode is configurable via switch S1.

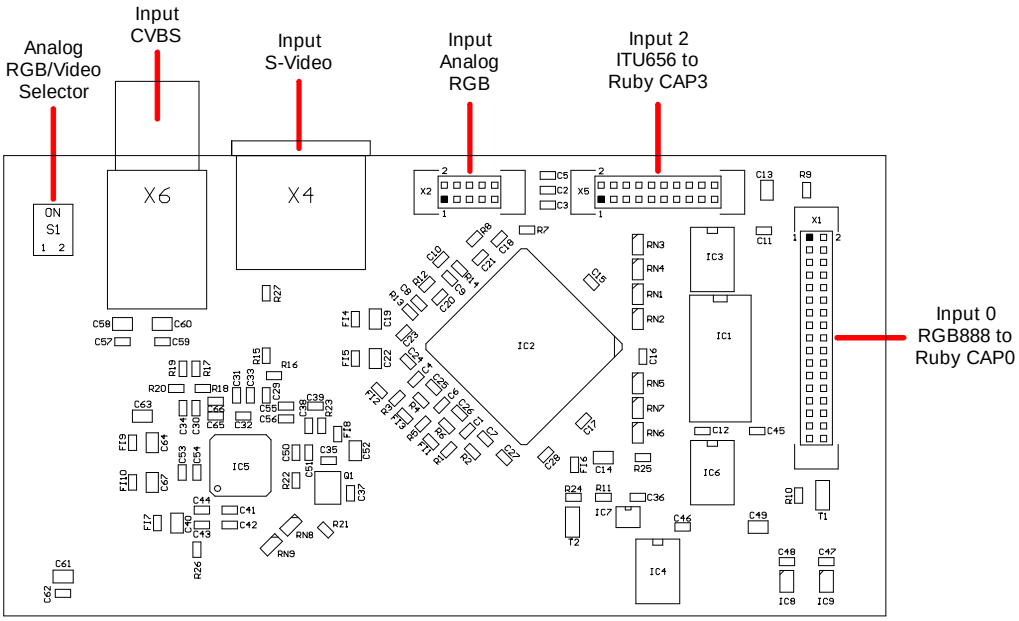

Figure 6: Interfaces and configurations on the Video In Adapter Board 01

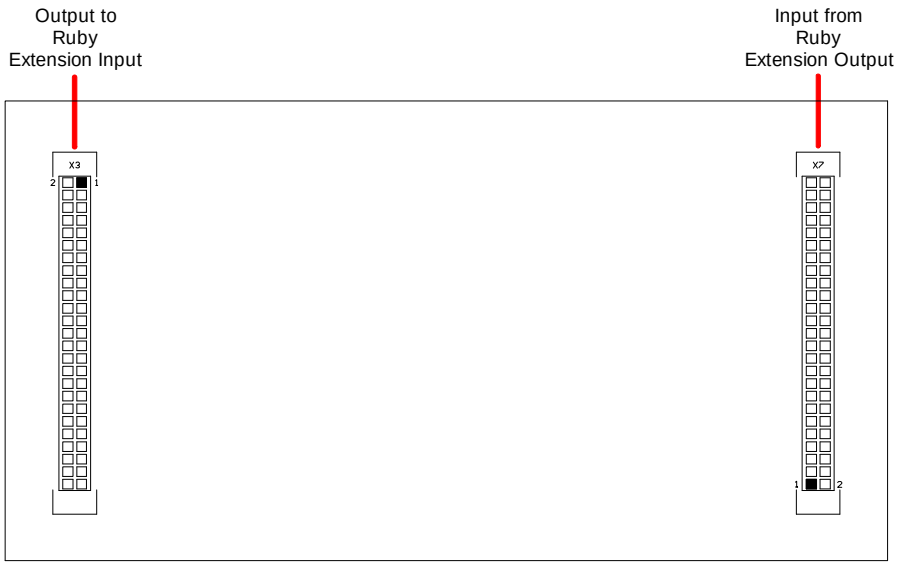

Figure 7: Interfaces on the Video In Adapter Board 01 bottom side

Switch	Function	Description
S1A (1)	Disable Analog RGB Input (AD9883)	If set to condition **OFF (Default)**, the AD9883 output supply Ruby's Capture 0 Input Port. If set to condition **ON**, the bus switches connected to the Analog Interface circuit (AD9883) is **High-Z (OFF)**. The interface is configured to use digital RGB888-signals via connector **X1**. Alternatively the switch setting can be override with hard-wired to GNDD on **X1 pin33**.
S1B (2)	Disable Analog Video Input (ADV7180)	If set to condition **OFF (Default)**, the ADV7180 output supply Ruby's Capture 3 Input Port. If set to condition **ON**, on signal **VDEC_OFF#** appears **low** level. The interface is configured to use digital ITU656-signals via connector **X5**. Alternatively the switch setting can be override with hard-wired to GNDD on **X5 pin19**.

Table 7: Switch S1 on Video In Adapter Board

Furthermore both video inputs (analog from X4 and X6 or digital from X5) can be disabled by setting switch **S3A(1)** to condition **ON** (on signal **AVIN_OFF#** appears low level) on Ruby Evaluation Board. This mode is needed for use of Ruby's Video Input Capture Ports 1, 2 and 3 with RGB666-signal input together (supplied thru Ruby X3, X4 and X5).

2.2. Video In Adapter Board 02 (MB86298-VIDEO02)

This Video In Adapter Board supports additional video signal connectors to supply Ruby's Video Input Capture Ports. The board contains two SDTV Video Decoder chips (ADV7180), each is connected to one S-Video- (X1,X4) and one CVBS-Connector (X2, X5). So , together with the two capture ports supplied with second slot adapter of Ruby Evalboard it is possible to use 4x CVBS (or S-Video) inputs.
Please note that here is used a different package type of ADV7180 (LQFP), programming is not 100% compatible to BGA package (used for MB86298-VIDEO01).

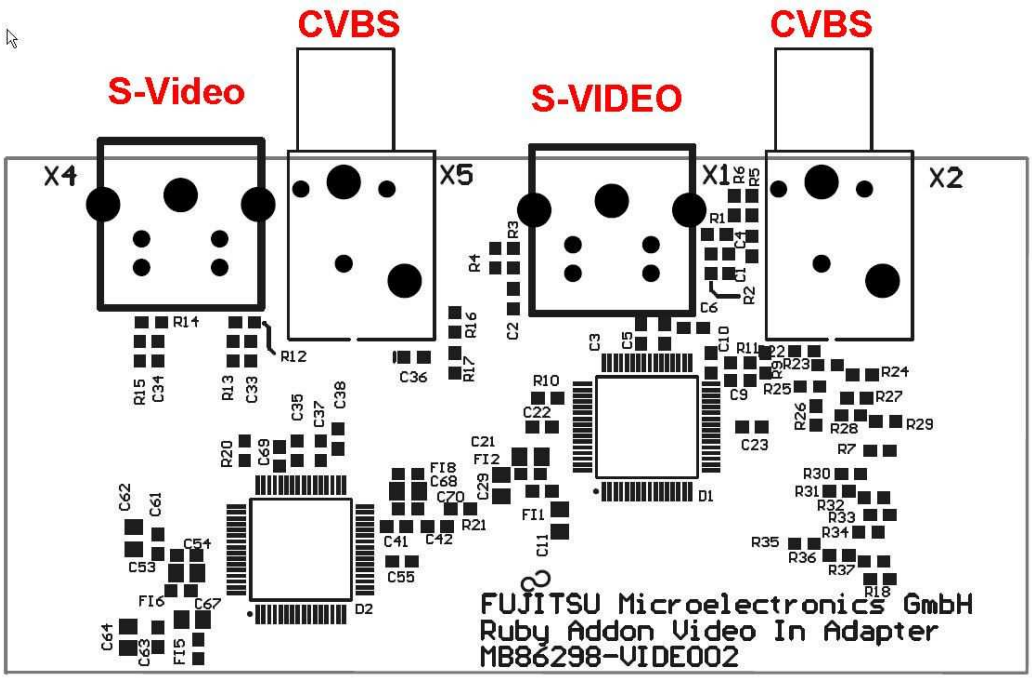

Figure 8: Interfaces on the Video In Adapter Board 02

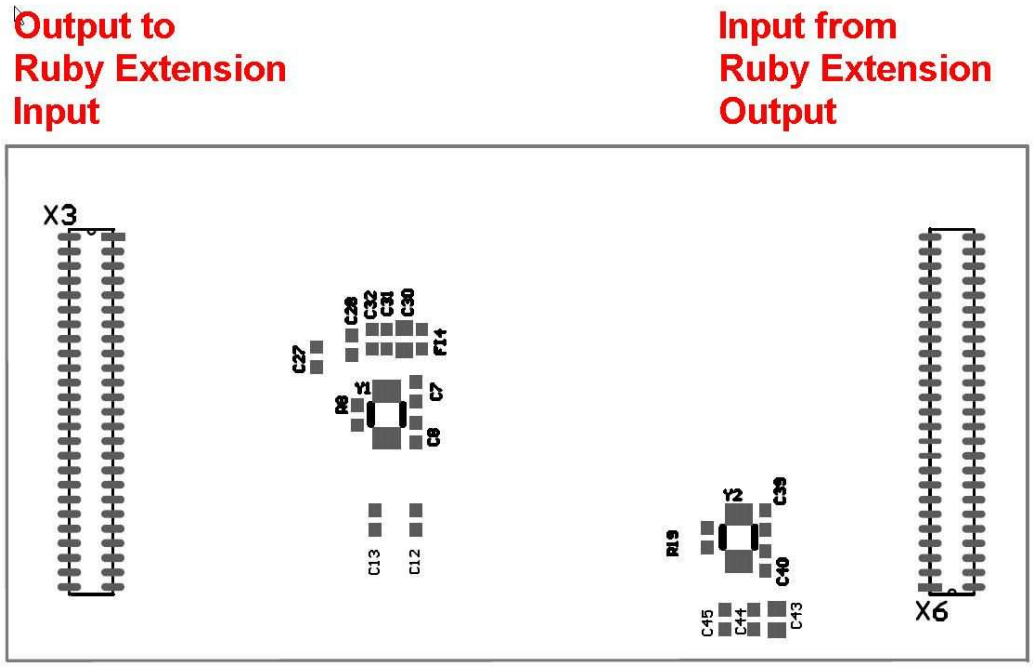

Figure 9: Interfaces on the Video In Adapter Board 02 bottom side

2.3. APIX Adapter Board

The APIX Adapter Board supports Inova's Digital Automotive Pixel Link Interface. The board contains transmitter and receiver chips for bidirectional data transfer via two RJ45-connectors (X2, X4). The APIX Sideband Signals are available on a separate connector (X5). The APIX Adapter Board uses Video Input Capture 0 Port and Display Output 1 on Ruby Evaluation Board.

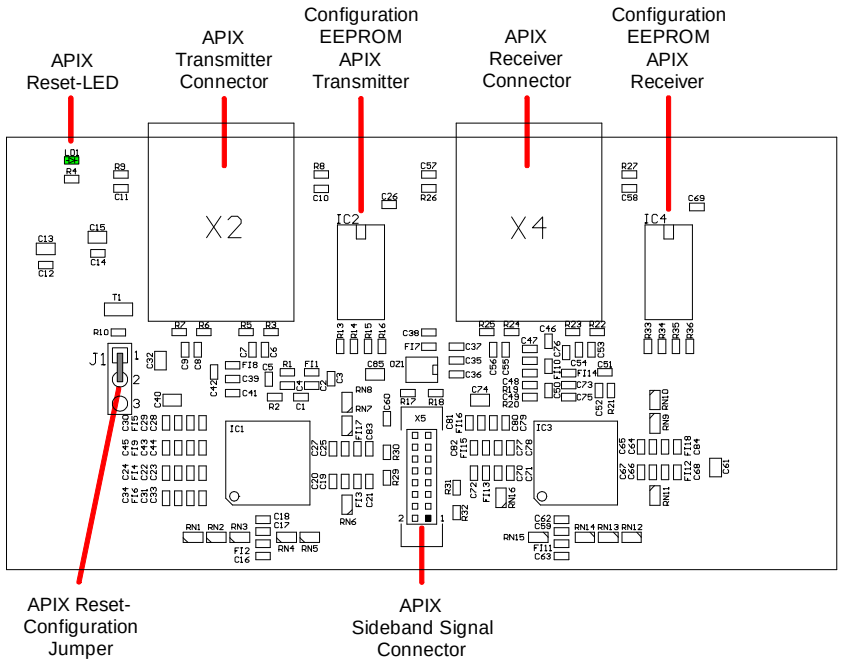

Figure 10: Interfaces and configurations on the APIX Adapter Board

Jumper J1 setting is responsible for APIX reset generation. The following table contains the description of configurations. At release of reset Inova's APIX circuits read the configuration data from corresponding EEPROMs which are placed on sockets.

Closed Connection	Setting	Description
1 - 2	Default	APIX reset generation occur via **EXT_AUX_A** signal from Ruby Evaluation Board. In this case the signal **EXT_AUX_A** must be connected to a **GPIO** signal on Ruby Evaluation Boards X1 connector and the user can manipulate the APIX reset in software.
2 - 3	-	APIX reset generation with Ruby Evaluation Board reset signal **XRST#**.

Table 8: Jumper J1 on APIX Adapter Board

Figure 11: Interfaces on the APIX Adapter Board bottom side