VIM552

Graphics Processor Module

User Manual

Revision 1.3

July 2013

The product described in this manual is compliant with all related CE standards.

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1.0	Initial version of the User Manual	VIM552	October 2012
1.1	Commercial versions are excluded	VIM552	November 2012
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Safety Requirements

This product of Fastwel Group Co. Ltd has been developed and tested with the purpose of ensuring its compliance with electrical safety requirements. Its design provides long-term trouble-free functioning. The product service life can be significantly shortened because of its incorrect handling during unpacking and installation. Therefore, for your safety and ensuring of the correct operation of the product you should adhere to the recommendations given below.

High Voltage Safety Rules

Any work with this device must be performed only by sufficiently skilled personnel.

Before installing the board into your system, make sure that the mains power supply is disconnected. This is also true for the installation of expansion boards.

There is a serious hazard of electrocution in the process of the product installation, repair and maintenance; therefore, always unplug the power cord during work performance. This is also true for other power cables.

Board Handling Instructions

Electronic boards and their components are static sensitive. Therefore, special attention is needed to ensure safety and normal operation while handling those devices.

- Do not leave the board without protective package when it does not operate.
- Always work with the board on static-safe workplaces if possible. If it is impossible, the user must remove static charge from him/herself before touching the product with his/her hands or tools. This is best done by touching a metal part of the system body.
- It is especially important to observe precaution while replacing expansion boards, jumpers, etc. Since there is a battery powering memory and real-time clock on the board, do not put it on conductive surfaces, like antistatic carpets or sponges. They may cause a short circuit and inflict damage to the battery and the board conductors, as well as loss of real-time clock (RTC) data.

General Board Operation Rules

- To preserve the manufacturer's guarantee, the product must not be reworked or altered in any way. Any alterations and improvements not authorized by Fastwel Group Co. Ltd company, except those described in this Manual or obtained from the Fastwel Group Co. Ltd technical support service in the form of a set of instructions describing their performance cancel the guarantee.
- This device must be only installed into and connected to systems meeting all necessary technical and climatic requirements. This relates to the operating temperatures range of the specific board design version. The temperature limitations of the batteries installed on the board should be taken into account as well.
- Please follow only the instructions of this Manual while performing all necessary installation and configuring operations.
- Keep original package to store the product in the future or to transport it in case of a guarantee event. Should it become necessary to transport or store the board, pack it in the same way it was packed upon receipt.
- Take particular care during handling the product and its unpacking. Act in accordance with the instructions of the above section and Chapter Transportation, Unpacking and Storage.

The Manufacturer's Guarantees

Guarantee Liabilities

The Manufacturer hereby guarantees the product conformity with the requirements of TU 4013-004-52415667-05 specifications, provided the Consumer abides by the conditions of operation, transportation, storage, installation and assembly established by the accompanying documents.

The Manufacturer hereby guarantees that the products supply thereby are free from defects in workmanship and materials, provided operation and maintenance norms were observed during the currently established guarantee period. The Manufacturer's obligation under this guarantee is to repair or replace free of charge any defective electronic component being a part of a returned product.

Products that broke down through the Manufacturer's fault during the guarantee period will be repaired free of charge. Otherwise the Consumer will be invoiced as per the current labor remuneration rates and expendable materials cost.

Liability Limitation Right

The Manufacturer shall not be liable for the damage inflicted to the Consumer's property because of the product breakdown in the process of its utilization.

Guarantee Period

The guarantee period for the products made by the manufacturer company is 36 months since the sale date (unless otherwise provided by the supply contract).

The guarantee period for the products made to special order is 60 months since the sale date (unless otherwise provided by the supply contract).

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Fastwel personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Fastwel.
2. Products, which have been subject to power supply reversal, misuse, neglect, accident, or improper installation.

Returning a product for repair

1. Apply to Fastwel company or to any of the Fastwel's official representatives for the Product Return Authorization.
2. Attach a failure inspection report with a product to be returned in the form, accepted by customer, with a description of the failure circumstances and symptoms.
3. Carefully package the product in the antistatic bag, in which the product had been supplied. Failure to package in antistatic material will VOID all warranties. Then package the product in a safe container for shipping.
4. The customer pays for shipping the product to Fastwel or to an official Fastwel representative or dealer.

TRANSPORTATION, UNPACKING AND STORAGE

a. Transportation

The module should be transported in a separate packaging box (transport packaging) of the manufacturing facility, which consists of an individual antistatic bag and a cardboard box, in the closed transport (automobile, railway, air transportation in heated and pressurized compartments) in storage conditions 5 defined in the GOST standard 15150-69 or in storage conditions 3 during sea transportation.

It is possible to transport modules, packaged in individual antistatic packages, in multiple packaging (transport packaging) of the manufacturing facility.

The packaged modules should be transported in accordance with the shipping rules, operating with this particular type of transport.

During handling and transportation operations, the packaged modules should not undergo sharp pounding, falls, shocks and exposure to atmospheric precipitation. Method of stowing packaged modules to the carrier vehicle should exclude their moving.

b. Unpacking

Prior to unpacking, before transportation at subzero temperature of ambient air the modules should be kept within 6 hours under storage conditions 1 defined in the GOST standard 15150-69.

It is prohibited to place the packaged module close to the heat source, prior to unpacking.

While unpacking, it is required to comply with all safety precautions, which ensure its safety, as well as marketable condition of consumer packaging of the manufacturing company.

At the time of unpacking it is required to check the module that it has no external mechanical damages after transportation.

c. Storage

Module storage conditions for group 1 are defined in the GOST standard 15150-69.

APPLICATION NOTES AND GUIDELINES

The modules should be used in the modes and under conditions set by the present User Manual, as well as technical specifications (TU 4013-006-52415667-05).
Connection (disconnection) of external devices to the modules (from the module) in the running mode **is not allowed**.
Connection (disconnection) of the module to the direct current external source (from the external source) in running mode **is not allowed**.

1. INTRODUCTION

1.1 The Purpose of the Product

This user manual (hereinafter referred to as the Manual) is meant for the insight into the device, its operation principle and general information required for the commissioning, intended use and maintenance of VIM552 (hereinafter referred to as the Module).

NOTE: **THIS DOCUMENT PRESENTS THE ACTIVE VERSION 1.3 OF THE MANUAL[1].**

The Module is designed and suitable for the use on platform based on the CompactPCI ® PlusIO specification (e.g. on the basis of CPC506, CPC508 Modules), and on platforms based on CompactPCI ® Serial specification (e.g. on the basis of CPC510 Module). It enables to expand graphics capabilities as compared to the processor module integrated video subsystem and can connect two monitors via DVI-I and VGA interfaces.

SM750 graphics controller, used in the module, has a low power consumption, which enables to do without the passive cooling and place SATA 2.5” Storage Carrier in the module.

WARNING: **THE MODULE OPERATION WITHOUT OBSERVING SAFETY REQUIREMENTS, UTILIZATION AND OPERATION INSTRUCTION IS NOT PERMITTED![2]**

ATTENTION: **THE MODULE CONTAINS STATIC SENSITIVE COMPONENTS! [3]**

FORBIDDEN: **OPERATION, MAINTENANCE AND REPAIRS OF THE MODULE BY PERSONS LACKING THE RESPECTIVE SKILLS AND THE REQUIRED LEVEL OF SPECIAL TRAINING! [4]**

[1] The graphic symbol (sign) is hereinafter used together with the explanatory word "Note" and the explanation text

[2] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "WARNING" and the warning text (as per GOST 2.601-2006).

[3] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "ATTENTION" and the warning text (as per GOST 2.601-2006).

[4] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "FORBIDDEN" and the warning text (as per GOST 2.601-2006).

2. SPECIFICATIONS

The Module has the following I/O channels structure:

- DVI-I output (DVI1+RGB1) + USB (contacts 12, 13, option)
- VGA output (RGB0) on the front panel
- USB output on the front panel
- 1xSATA + SATA Power corner on the board
- Compact PCI Plus Type A (Power 12V, x1 PCI-E, 1 SATA, 1 USB)
- Compact PCI Plus Type B (option, RearIO 16 lines, rooted to RGB0, DVI1, I2C)

2.1. MODULE FUNCTIONALITIES

- **LynxExp SM750 Graphics Processor:**
  - 1x PCI-Express 1.1 (up to 2.5 GB/s)
  - 16 MB internal DDR RAM (32 bit)
  - DDR RAM interface, 64 bits, up to 64 MB
  - 2x independent RGB outputs
  - 1x digital 24-bit output
- **System memory:**
  - DDR333 SDRAM 64 MB, soldered
- **Video output:**
  - VGA connector (resolution up to 1920x1440 @ 60Hz), rooted to the front panel
  - DVI-I connector (resolution up to 1920x1200 @ 60Hz, one channel mode) rooted to the front panel
  - Further optionally to RearIO via CPCI Plus Type B connector:
  - Copy of DVI (digital) output
  - Copy of VGA0 output
  - 2x channels I2C (DDC), rooted to RearIO via SA1 switch
- **PCI-E bus**
  - 1x PCI-Express in accordance with PlusIO PICMG 2.30 specification
  - Compatibility with PCI-E 1.1 specification (2.5 Gb/sec.)
- **SATA interface:**
  - 1 x onboard corner SATA connector with power
  - The revision type and the interface speed are defined by the CPU board;
  - The power consumption is limited by 1 A @ +5 V
- **USB ports:**
  - 1x USB port is rooted to the front panel
  - T1xUSB port can be rooted to DVI connector (upon request);
- **FLASH BIOS:**
  - 512 kbit SPI-Flash
- **Supported OS:**
  - Windows XP (Embedded)
  - Linux 2.6
  - Windows 7

2.2. GENERAL VIEW AND DIMENSIONS

General view and dimensions of the devices are shown on Figure 2.1:

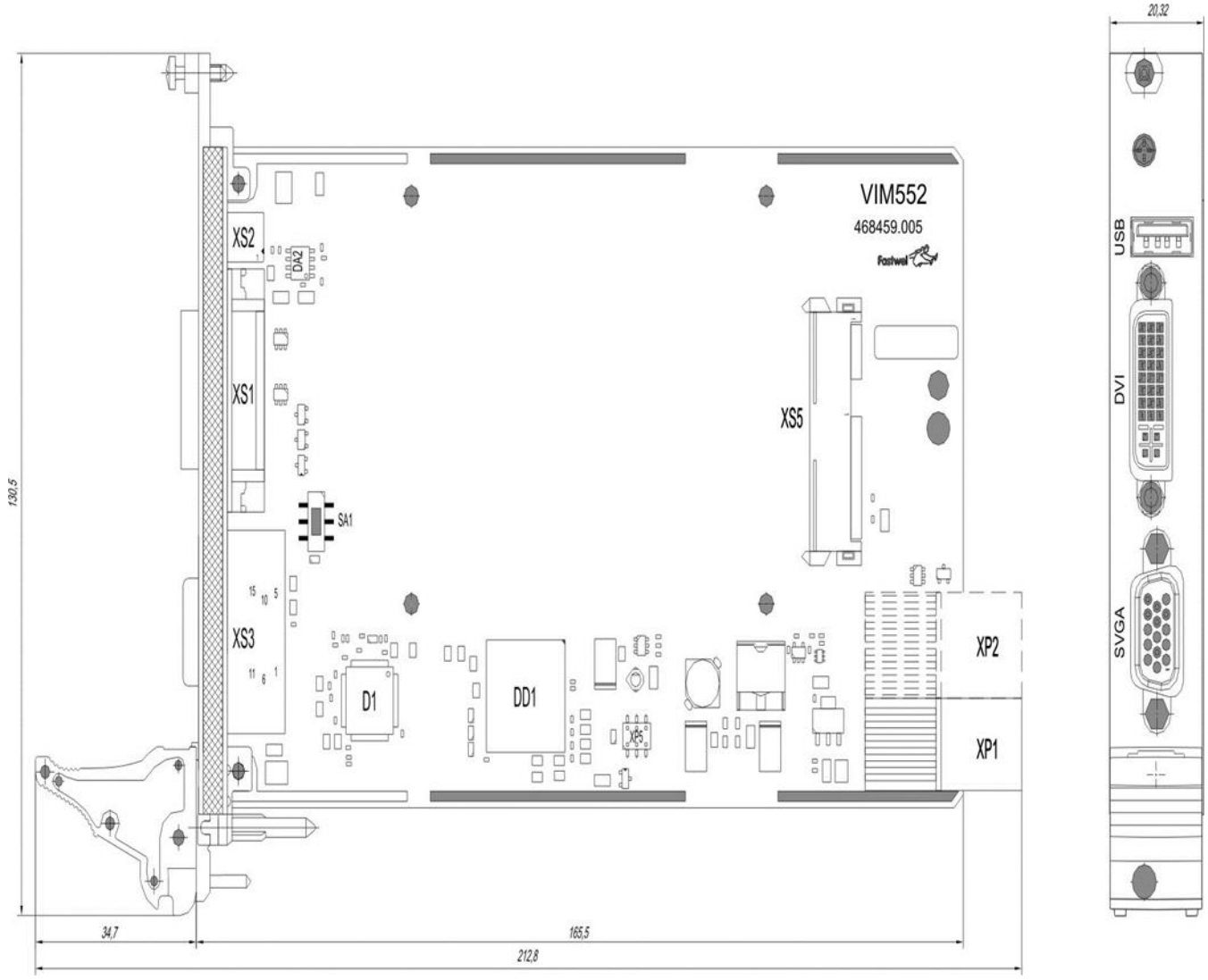

Figure 2.1 – General view of the module

2.3. BLOCK DIAGRAM (BOARD LAYOUT)

The block diagram of the module is shown on 2.2., the spot lines mark elements installed only in VIM552-02 versions.

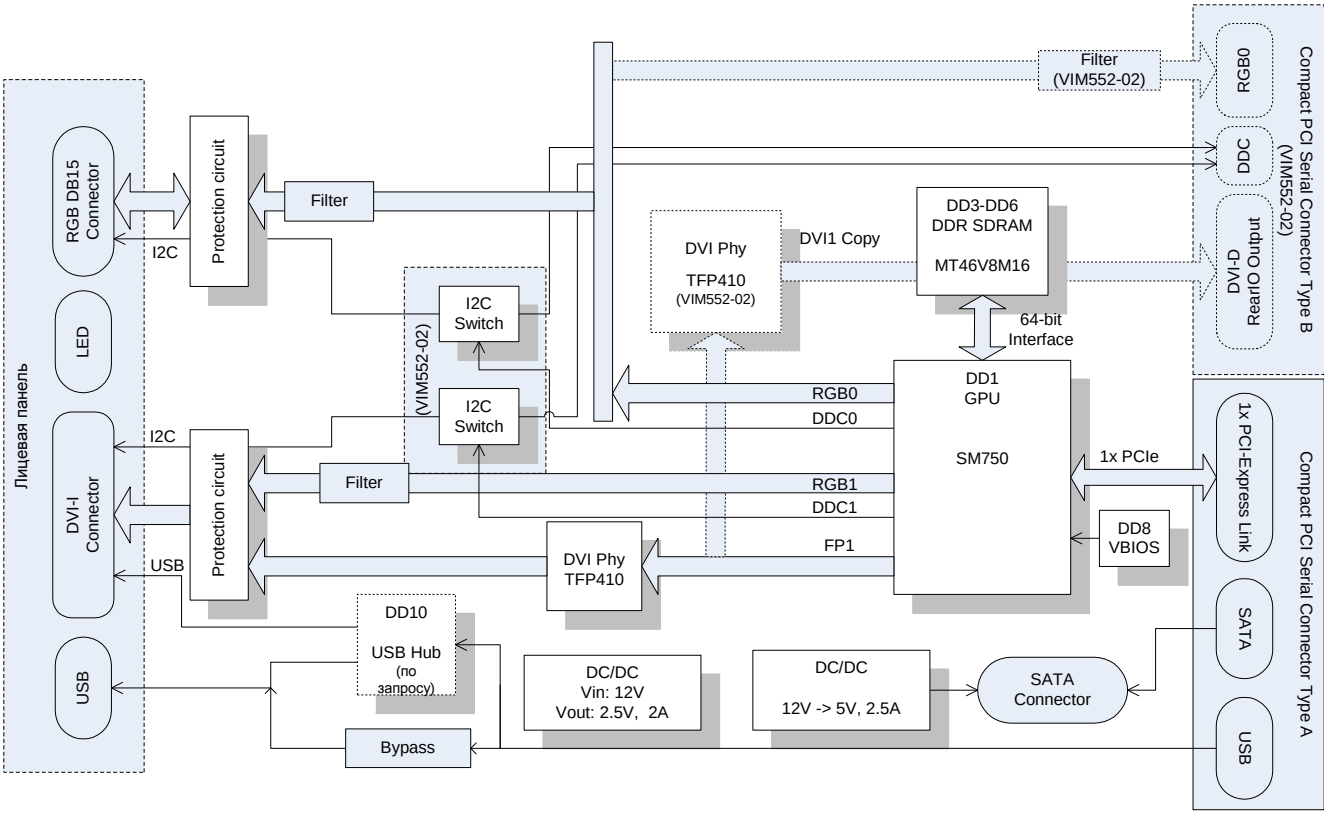

Figure 2.2 – Module block diagram

2.4. HARDWARE VERSIONS, ORDERING INFORMATION, DELIVERY CHECKLIST

2.4.1. Hardware versions, ordering information

Module hardware versions and notations (ordering information) in FASTWEL product catalogs are specified in table 2.1.

Table 2.1. – Module structure depending on the hardware version

Name	Notation at the time of order	Note
Module VIM552	VIM552-01-I	VIM552 64Mb RAM, DVI-I, VGA, USB, SATA, industrial temperature range (–40°C to +85°C)
	VIM552-02-I	VIM552 64Mb RAM, DVI-I, VGA, USB, SATA; DVI-D, VGA on RearIO, industrial temperature range (–40°C to +85°C)

Available options:

/COATED – Conformal coating

2.4.2. Delivery checklist

1. VIM552 module
2. Antistatic bag
3. Package
4. Installation kit: 4 × M3×5 DIN7985 screws

3. TECHNICAL CHARACTERISTICS

3.1. POWER SUPPLY

The board is supplied with a voltage of +12V. Electric power supply of the module must meet the requirements cited in the table below.

Voltage (V)	Minimum (V)	Maximum (V)	Consumption current (A)
+12 B	11.4	12.6	0.4

To provide the voltage +5 V for SATA and USB, use the pulse converter from +12 V to +5 V with a design efficiency of 85%. The current in the SATA power supply circuit is limited to 1 A, USB – to 0.5 A.

3.2. SOFTWARE REQUIREMENTS

The device is compatible with the following OS:

Windows XP (Embedded)
Windows 7
Linux 2.6

Drivers for Windows XP (in binary form) and for Linux (with source code) are provided by the manufacturer of SM750 - Silicon Motion company.

3.3. OPERATING CONDITIONS

The module must be used under the following operating conditions:

-Operating temperature range: Industrial: - 40° C to + 85° C
-Relative air humidity: 5 to 95 % at + 25° C (noncondensing);
-Use of **\COATED** option for increased humidity environment.

3.4. MECHANICAL CHARACTERISTICS

Vibration resistance for frequencies from 10 to 50 Hz – amplitude 0,5 mm
Vibration resistance for frequencies from 50 to 500 Hz acceleration – 5 g;
Resistance to single shocks, peak acceleration – 100 g;
Resistance to multiple shocks, peak acceleration – 50 g.

NOTE: MECHANICAL CHARACTERISTICS DO NOT APPLY TO REMOVABLE CONNECTIONS. UNDER SEVER OPERATING CONDITIONS AND RESONANCE PHENOMENA, THE REMOVABLE CONNECTIONS SHOULD BE ADJUSTED.

RESONANCE PHENOMENA ASSOCIATED WITH THE CRATE ELEMENTS FIXING RIGIDITY AT FREQUENCIES 100-300 HZ WITH A 5 TIME INCREASE IN THE ACCELERATION RATE.

3.5. WEIGHT AND DIMENSIONS

Module weight should not exceed the values specified in table 3.1.

Table 3.1 – Module weight

Hardware version	Weight, kg, no more than	Weight with packaging, kg, no more than
VIM552-01-I	0,15	0,47
VIM552-02-I	0,16	0,48

Module dimensions: 212,8 x 130,5 x 20,3 mm.

Packaging dimensions: 350,0 x 260,0 x 70,0 mm.

3.6. MEAN TIME BETWEEN FAILURES (MTBF)

MTBF value for the module is: 340 000 hours.

NOTE: THIS MTBF VALUE HAS BEEN CALCULATED ACCORDING TO THE TELCORDIA ISSUE 1 CALCULATION MODEL, METHOD I CASE 3 CALCULATION PROCEDURE, FOR CONTINUOUS OPERATION ON EARTH UNDER THE CONDITIONS MEETING UKHL4 UNDER GOST 15150-69, AT AMBIENT TEMPERATURE +30°C.

4. DESCRIPTION AND OPERATION

4.1. DESIGNATION AND PINOUTS OF CONNECTORS

The Module has the following structure of I/O channels:

DVI-I output (DVI1+RGB1) + USB (option, contacts 12, 13)
VGA output (RGB0) on the front panel
USB output on the front panel
1 SATA + SATA Power corner on the board
Compact PCI Plus Type A (Power 12V, x1 PCI-E, 1 SATA, 1 USB)
Compact PCI Plus Type B (option, RearIO 16 lines, rooted to RGB0, DVI1, I2C)

Designation of **XP1** and **XP2** connectors according to PICMG CPCI-S.0 3U specification is stated in the table 4.1:

Table 4.1 – Designation of XP1 and XP2 connectors

XP2 - 08	GND	HOT PLUG DETECT	DVI_ANALOG VERT. SYNC	GND	DVI_DDC CLOCK	DVI_DDC DATA
XP2 - 07	IO	IO	GND	T.M.D.S DATA 1-	T.M.D.S DATA 1+	GND
XP2 - 06	GND	IO	IO	GND	IO	IO
XP2 - 05	IO	IO	GND	IO	IO	GND
XP2 - 04	GND	IO	IO	GND	IO	IO
XP2 - 03	IO	IO	GND	IO	IO	GND
XP2 - 02	GND	1_PE_Tx06+	1_PE_Tx06-	GND	1_PE_Rx06+	1_PE_Rx06-
XP2 - 01	1_PE_Tx04+	1_PE_Tx04-	GND	1_PE_Rx04+	1_PE_Rx04-	GND
XP1 - 06	GND	1_PE_Tx02+	1_PE_Tx02-	GND	1_PE_Rx02+	1_PE_Rx02-
XP1 - 05	1_PE_Tx00+	1_PE_Tx00-	GND	1_PE_Rx00+	1_PE_Rx00-	GND
XP1 - 04	GND	1_USB2+	1_USB2-	GND	PE_CLKIN+	PE_CLKIN-
XP1 - 03	1_USB3_Tx+	1_USB3_Tx-	GA0	1_USB3_Rx+	1_USB3_Rx-	GA1
XP1 - 02	GND	I2C_SCL	I2C _SDA	GND	reserved	reserved
XP1 - 01	+12V	STNDBY	GND	+12V	+12V	GND
Pin	**A**	**B**	**C**	**D**	**E**	**F**

Table 4.1 (continued) – Designation of XP1 and XP2 connectors

XP2 - 08	IO	GND	IO	IO	GND	DVI_ANALOG BLUE	DVI_ANALOG HORZ SYNC
XP2 - 07	GND	T.M.D.S DATA 2-	T.M.D.S DATA 2+	GND	T.M.D.S CLOCK-	T.M.D.S CLOCK+	GND
XP2 - 06	IO	GND	DVI_ANALOG RED	DVI_ANALOG GREEN	GND	VGA_DDC CLOCK	VGA_DDC DATA
XP2 - 05	GND	IO	IO	GND	IO	IO	GND
XP2 - 04	IO	GND	IO	IO	GND	IO	IO
XP2 - 03	GND	IO	IO	GND	IO	IO	GND
XP2 - 02	1_PE_Rx06-	GND	1_PE_Tx07+	1_PE_Tx07-	GND	1_PE_Rx07+	1_PE_Rx07-
XP2 - 01	GND	1_PE_Tx05+	1_PE_Tx05-	GND	1_PE_Rx05+	1_PE_Rx05-	GND
XP1 - 06	1_PE_Rx02-	GND	1_PE_Tx03+	1_PE_Tx03-	GND	1_PE_Rx03+	1_PE_Rx03-
XP1 - 05	GND	1_PE_Tx01+	1_PE_Tx01-	GND	1_PE_Rx01+	1_PE_Rx01-	GND
XP1 - 04	PE_CLKIN-	GND	1_SATA_Tx+	1_SATA_Tx-	GND	1_SATA_Rx+	1_SATA_Rx-
XP1 - 03	GA1	SATA_SDI	SATA_SDO	GA2	SATA_SCL	SATA_SL	GA3
XP1 - 02	reserved	GND	RST_IN#	WAKE_OUT#	GND	PCIE_EN#	SYSEN# *)
XP1 - 01	GND	+12V	+12V	GND	+12V	+12V	GND
Pin	**F**	**G**	**H**	**I**	**J**	**K**	**L**

Designation of XS1 connector (DVI output) is stated in table 4.2.

Table 4.2 – Designation of XS1 connector

Output No.	Signal notation	Output No.	Signal notation
1	T.M.D.S DATA 2-	16	HOT PLUG DETECT
2	T.M.D.S DATA 2+	17	T.M.D.S DATA 0-
3	GND	18	T.M.D.S DATA 0+
4	NC	19	GND
5	NC	20	NC
6	DDC CLOCK	21	NC
7	DDC DATA	22	GND
8	ANALOG VERT. SYNC	23	T.M.D.S CLOCK+
9	T.M.D.S DATA 1-	24	T.M.D.S CLOCK-
10	T.M.D.S DATA 1+	C1	ANALOG RED
11	GND	C2	ANALOG GREEN
12	USB DATA-	C3	ANALOG BLUE
13	USB DATA+	C4	ANALOG HORZ SYNC
14	USB +5V POWER	C5	ANALOG GROUND
15	GND	-	-

XS5 connector designation (SATA 2.5”) is described in table 4.3.

Table 4.3 – Designation of XS5 connector

Contact No.	Signal Designation	Signal Description	Contact No.	Signal Designation	Signal Description
1	GND	Ground	P5	GND	Ground
2	A+	Transmit +	P6	GND	Ground
3	A-	Transmit -	P7	V5	5v Power
4	GND	Ground	P8	V5	5v Power
5	B-	Receive -	P9	V5	5v Power
6	B+	Receive +	P10	GND	Ground
7	GND	Ground	P11	DAS/DSS	Pulled low-immediate spin-up
P1	V33	3.3v Power	P12	GND	Ground
P2	V33	3.3v Power	P13	V12	12v Power
P3	V33	3.3v Power	P14	V12	12v Power
P4	GND	Ground	P15	V12	12v Power

4.2. Switching the graphics output to RearIO

Switching the graphics output from the front panel to the board of Rear I/O (only in VIM552-02 versions) is carried out via SA1 switch. Switch position opposite to R symbol that conforms to rooting to RIO, position F – to rooting to the front panel.

NOTE: IN THE BOARD VERSION 1.1 THE SWITCH IS NOT INSTALLED.

4.3. USB connector

The USB connector is rooted to the module front panel enables to connect various external devices. The permitted cable length for some peripheral devices may be limited as compared to the standard one.