



VIM552

Graphics Processor Module

User Manual

Revision 1.4

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

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TABLE OF CONTENTS

| | |
|---|-----------|
| CONTENTS | 3 |
| Trademarks..... | 7 |
| Ownership Rights..... | 7 |
| Copyright..... | 7 |
| Safety Requirements | 8 |
| High Voltage Safety Rules | 8 |
| Board Handling Instructions | 8 |
| General Board Operation Rules..... | 9 |
| The Manufacturer's Guarantees | 9 |
| a. Transportation..... | 11 |
| b. Unpacking..... | 11 |
| c. Storage..... | 11 |
| APPLICATION NOTES AND GUIDELINES | 12 |
| 1. INTRODUCTION | 13 |
| 1.1 The Purpose of the Product..... | 13 |
| 2. SPECIFICATIONS | 14 |
| 2.1. MODULE FUNCTIONALITIES..... | 14 |
| 2.2. GENERAL VIEW AND DIMENSIONS | 15 |
| 2.3. BLOCK DIAGRAM (BOARD LAYOUT) | 16 |
| 2.4. HARDWARE VERSIONS, ORDERING INFORMATION, DELIVERY CHECKLIST | 17 |
| 2.4.1. Hardware versions, ordering information | 17 |
| 3. TECHNICAL CHARACTERISTICS | 18 |
| 3.1. POWER SUPPLY | 18 |
| 3.2. SOFTWARE REQUIREMENTS | 18 |
| 3.3. OPERATING CONDITIONS | 18 |
| 3.4. MECHANICAL CHARACTERISTICS..... | 18 |
| 3.5. WEIGHT AND DIMENSIONS | 19 |
| 3.6. MEAN TIME BETWEEN FAILURES (MTBF)..... | 19 |
| 4. DESCRIPTION AND OPERATION | 20 |
| 4.1. DESIGNATION AND PINOUTS OF CONNECTORS | 20 |
| 4.2. Switching the graphics output to RearIO..... | 22 |
| 4.3. USB connector..... | 22 |
| ANNEX A DISCLAIMER | 22 |

List of Tables

| | |
|---|----|
| Table 2-1: Module structure depending on the hardware version..... | 15 |
| Table 3-0: Power supply..... | 16 |
| Table 3-1: Module weight..... | 17 |
| Table 4-1: Designation of XP1 and XP2 connectors..... | 19 |
| Table 4-1: (Continued) – Designation of XP1 and XP2 connectors..... | 20 |
| Table 4-2: Designation of XS1 connector..... | 20 |
| Table 4-3: Designation of XS5 connector..... | 21 |

List of Figures

| | |
|---|----|
| Fig. 2-1: General view of the Module..... | 14 |
| Fig. 2-2: Module block diagram..... | 15 |

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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 MANUAL¹⁾.

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
 - 1xUSB 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:

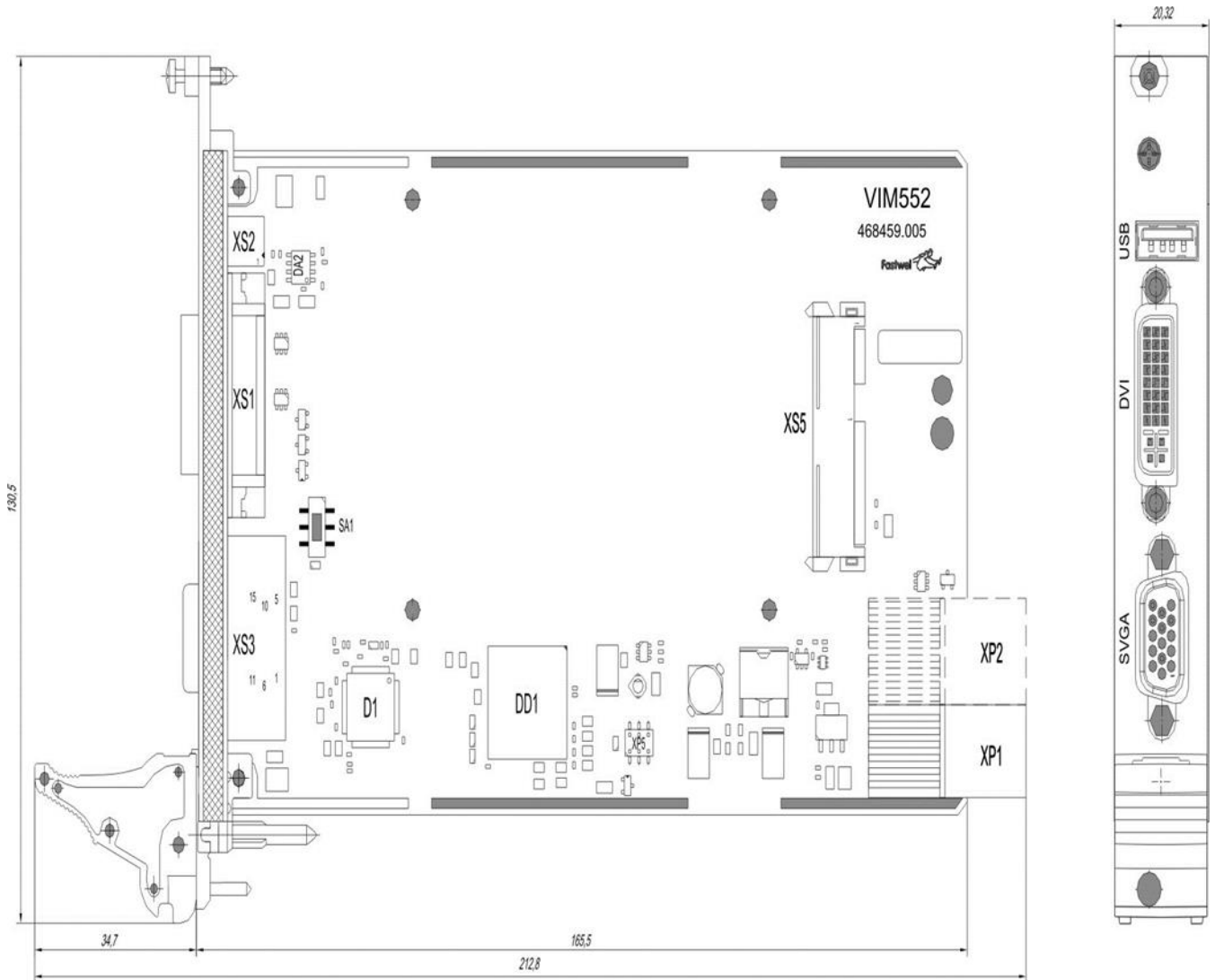


Figure 2.1 – General view of the module

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.

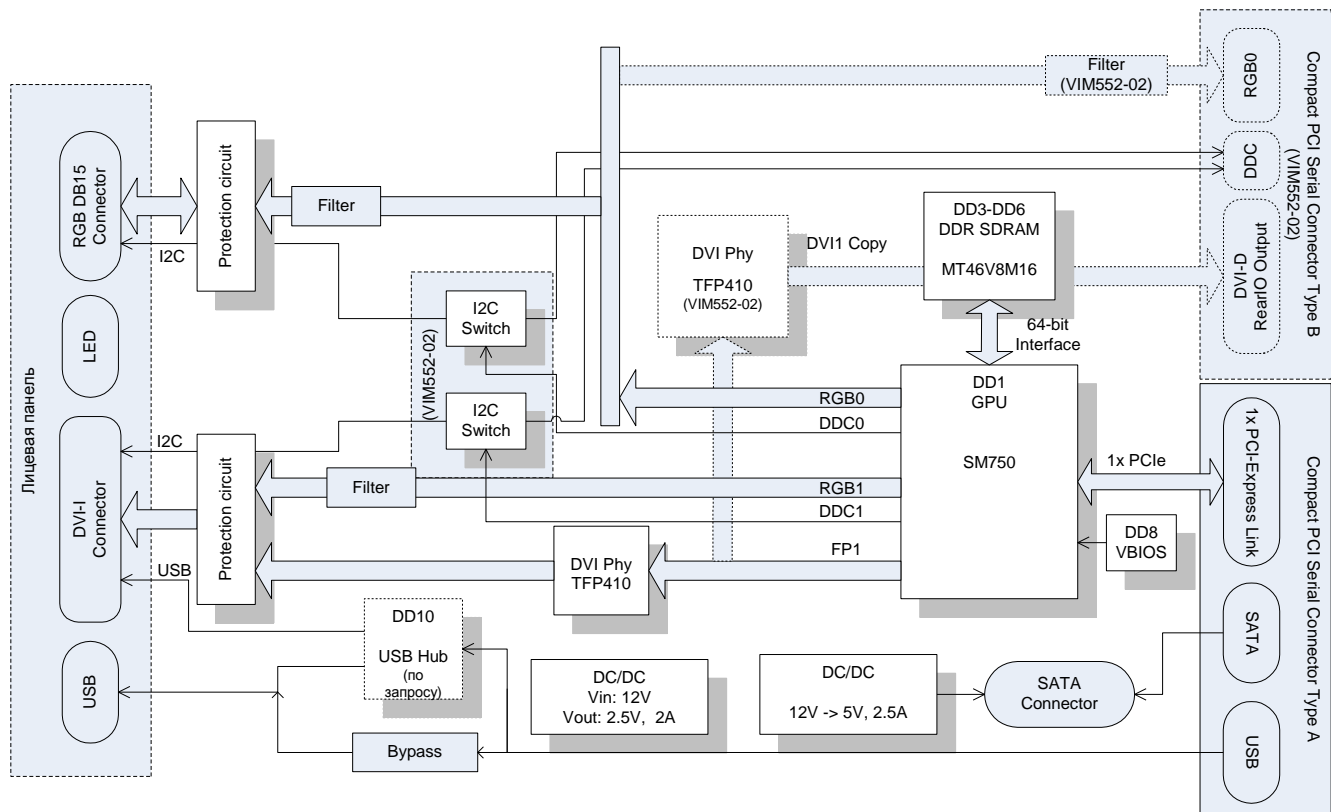


Figure 2.2 – Module block diagram

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 **ICOATED** 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_Tx0 4+ | 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_Tx0 0+ | 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_T x+ | 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 routing to RIO, position F – to routing 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.

APPENDIX A: DISCLAIMER

This Disclaimer contains special operating conditions of Fastwel in the following areas: intellectual property, warranty policy, conditions of the order and delivery.

1 INTELLECTUAL PRORETY

1.1 If any infraction, interference, improper use, illegitimate exploitation and/or violation of the industrial and/or intellectual property rights of any third party and/or property, exploitation during the use of Fastwel Embedded Module will take place – Fastwel does not guarantee to replace the materials, computer programs, procedures or equipment affected by the complaint and under no circumstances doesn't bear responsibility in any form for possible refusal in case of such a replacement.

1.2 Use of the Fastwel products as well as the objects of intellectual property containing in them, in the ways and for the purposes, not provided by the present user manual and datasheet isn't allowed without preliminary written approval of Fastwel.

1.3 Fastwel is not responsible for possible incidents and losses, related to the operation of end devices, in which the original Fastwel equipment is used.

2 WARRANTY POLICY

2.1 When the detected flaws in an element can be corrected without decreasing the foreseen technical features and functionality for it, User may demand Fastwel the urgent correction of the failures in additionally agreed period and an increasing of the period of the guarantee of the element equal as the time elapsed from the formal request to repair the failures, until the receipt of the repaired element. All costs associated to the correction of failures, included those of assembly, dismantle, transport, tests, etc, if they exist, shall be prosecuted according the Warranty Policy of Fastwel.

3 ORDER AND DELIVERY CONDITIONS

3.1 The general rule is that all Fastwel equipment prices are determined with due consideration of delivery under the EXW terms and conditions (Incoterms 2010). Delivery of the products under other terms and conditions should be preliminary agreed and stated in writing between the parties.

3.2 Unless otherwise expressly agreed with Fastwel, all the deliveries of Fastwel equipment will be carried out only after the official purchase order is obtained and provided that the ordered products have been prepaid in full. Other terms and conditions of cooperation should be made in writing.

3.3 Any delivery of Fastwel electronics is submitted with the right package in accordance with the current rules and standards in the Member States of the European Economic Area. The purchaser independently bears all risks regarding the compliance of package and marking of Fastwel products with legislation requirements being in effect at the place of purchased products destination (in the buyer's country). The specified condition excludes unequivocally any liability of Fastwel for possible non-compliance of package and marking of products with the requirements of legislation of the country of products destination.

3.4 In general, all components of the supply are properly protected with respect to freight, in order to avoid any damage to the supply, third parties, environmental damages or unrelated goods, as consequence of wrong packaging.

3.5 Each package unit is labeled on the exterior area with the indications of product's Part Number and Serial Number.

3.6 The support documents for the order should be made either in English or in Russian unless otherwise agreed between parties in writing.

3.7 Fastwel does not pay penalties and does not cover costs associated with delay in the delivery of the products caused by actions of the third parties, force-majeure etc. - Fastwel doesn't bear any responsibility for non-execution or inadequate execution of the obligations in a case when it is caused by actions of the third parties (for example producers or suppliers of accessories), force majeure etc.

3.8 Fastwel declares that independently and at any time without damage, it has an exclusive right to define and change functionality architecture, bill of materials of its products without any preliminary coordination and approvals of the third parties.

4 OTHER CONDITIONS

4.1 Fastwel has the obligation to respect the current Russian legislation (including, but not limited to environmental, labor, social laws) in each moment and to apply it to its embedded electronics considering all and each execution phase, that is to say, from the design until the commissioning and subsequent maintenance. In this regard Fastwel is not liable to the user or other persons in connection with possible changes of the company's rules (including, but not limited to warranty, ordering policy) caused by changes of the Russian legislation.

4.2 Unless otherwise expressly agreed in writing, Fastwel provides no training for assembly\installation\adjustment\operation of its equipment.