Fastwel

VIM301

PC/104-*Plus*
Graphics Controller Module

User Manual

Rev. 002

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Rev. Index	Brief Description of Changes	Module Index	Date of Issue
001	Initial preliminary version	VIM301	July 2009
001a	Amended: weight, dimensions, consumption current, software compatibility; corrections to the text and illustrations	VIM301	November 2009
001b	Minor additions to subsections 3.2.5, 3.2.11	VIM301	November 2009
002	Compliance assessment	VIM301	December 2015

Contact Information

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Notation Conventions

Warning, ESD Sensitive Device!

This symbol draws your attention to the information related to electro static sensitivity of your product and its components. To keep product safety and operability it is necessary to handle it with care and follow the ESD safety directions.

Warning!

This sign marks warnings about hot surfaces. The surface of the heatsink and some components can get very hot during operation. Take due care when handling, avoid touching hot surfaces!

Caution: Electric Shock!

This symbol warns about danger of electrical shock (> 60 V) when touching products or parts of them. Failure to observe the indicated precautions and directions may expose your life to danger and may lead to damage to your product.

Warning!

Information marked by this symbol is essential for human and equipment safety.
Read this information attentively, be watchful.

Note...

This symbol and title marks important information to be read attentively for your own benefit.

General Safety Precautions

This product was developed for fault-free operation. Its design provides conformance to all related safety requirements. However, the life of this product can be seriously shortened by improper handling and incorrect operation. That is why it is necessary to follow general safety and operational instructions below.

Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.

Warning!

When handling this product, special care must be taken not to hit the heatsink (if installed) against another rigid object. Also, be careful not to drop the product, since this may cause damage to the heatsink, CPU or other sensitive components as well.

Please, keep in mind that any physical damage to this product is not covered under warranty.

Note:

This product is guaranteed to operate within the published temperature ranges and relevant conditions. However, prolonged operation near the maximum temperature is not recommended by Fastwel or by electronic chip manufacturers due to thermal stress related failure mechanisms. These mechanisms are common to all silicon devices, they can reduce the MTBF of the product by increasing the failure probability. Prolonged operation at the lower limits of the temperature ranges has no limitations.

Caution, Electric Shock!

Before installing this product into a system and before installing other devices on it, always ensure that your mains power is switched off.

Always disconnect external power supply cables during all handling and maintenance operations with this module to avoid serious danger of electrical shock.

Unpacking, Inspection and Handling

Please read the manual carefully before unpacking the module or mounting the device into your system. Keep in mind the following:

ESD Sensitive Device!

Electronic modules and their components are sensitive to static electricity. Even a non-perceptible by human being static discharge can be sufficient to destroy or degrade a component's operation! Therefore, all handling operations and inspections of this product must be performed with due care, in order to keep product integrity and operability:

■ Preferably, unpack or pack this product only at EOS/ESD safe workplaces. Otherwise, it is important to be electrically discharged before touching the product. This can be done by touching a metal part of your system case with your hand or tool. It is particularly important to observe anti-static precautions when setting jumpers or replacing components.

■ If the product contains batteries for RTC or memory back-up, ensure that the module is not placed on conductive surfaces, including anti-static mats or sponges. This can cause short-circuit and result in damage to the battery and other components.

■ Store this product in its protective packaging while it is not used for operational purposes.

Unpacking

The product is carefully packed in an antistatic bag and in a carton box to protect it against possible damage and harmful influence during shipping. Unpack the product indoors only at a temperature not less than +15°C and relative humidity not more than 70%. Please note, that if the product was exposed to the temperatures below 0°C for a long time, it is necessary to keep it at normal conditions for at least 24 hours before unpacking. Do not keep the product close to a heat source.

Following ESD precautions, carefully take the product out of the shipping carton box. Proper handling of the product is critical to ensure correct operation and long-term reliability. When unpacking the product, and whenever handling it thereafter, be sure to hold the module preferably by the front panel, card edges or ejector handles. Avoid touching the components and connectors.

Retain all original packaging at least until the warranty period is over. You may need it for shipments or for storage of the product.

Initial Inspection

Although the product is carefully packaged, it is still possible that shipping damages may occur. Careful inspection of the shipping carton can reveal evidence of damage or rough handling. Should you notice that the package is damaged, please notify the shipping service and the manufacturer as soon as possible. Retain the damaged packing material for inspection.

After unpacking the product, you should inspect it for visible damage that could have occurred during shipping or unpacking. If damage is observed (usually in the form of bent component leads or loose socketed components), contact Fastwel's official distributor from which you have purchased the product for additional instructions. Depending on the severity of the damage, the product may even need to be returned to the factory for repair. DO NOT apply power to the product if it has visible damage. Doing so may cause further, possibly irreparable damage, as well as result in a fire or electric shock hazard.

If the product contains socketed components, they should be inspected to make sure they are seated fully in their sockets.

Handling

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

In order to keep Fastwel's warranty, you must not change or modify this product in any way, other than specifically approved by Fastwel or described in this manual.

Technical characteristics of the systems in which this product is installed, such as operating temperature ranges and power supply parameters, should conform to the requirements stated by this document.

Retain all the original packaging, you will need it to pack the product for shipping in warranty cases or for safe storage. Please, pack the product for transportation in the way it was packed by the supplier.

When handling the product, please, remember that the module, its components and connectors require delicate care. Always keep in mind the ESD sensitivity of the product.

Three Year Warranty

Fastwel Co. Ltd. (Fastwel), warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the currently established warranty period. Fastwel's only responsibility under this warranty is, at its option, to replace or repair any defective component part of such products free of charge.

Fastwel neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Fastwel shall have no liability for direct or consequential damages of any kind arising out of sale, delay in delivery, installation, or use of its products.

If a product should fail through Fastwel's fault during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.

Warranty period for Fastwel products is 36 months since the date of purchase.

Guaranteed shelf life of the product in manufacturer's packaging is 12 months since the date of production.

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.

1   Introduction

This document presents general information on VIM301 graphics controller module, the details of its proper and safe installation, configuration and operation. The issues of PC/104 modules and external devices connection are also considered.

1.1   Module Introduction

VIM301 is a PC/104-Plus graphics controller module based on the low power mobile display controller SM722G8 (Lynx3DM8+) from Silicon Motion with 8 MB of integrated video memory. The module has RGB, 24/18/12/9-bit Flat Panel, and LVDS interfaces. For communication with other modules in stack VIM301 uses PCI bus (PC/104-Plus connector). The module is designed for embedded applications requiring low power consumption and capable to operate within temperature range from –40°C to +85°C.

Depending on version, VIM301 allows connection of the following displays:

- Analog CRT monitor with RGB interface;
- Up to two LCD panels with Flat Panel (FP) interface;
- Up to two LCD panels with single channel LVDS interface;
- Electroluminescent (EL) monochrome display from Planar with SGD 4-bit LCD interface;
- Up to four analog video cameras;

Supported resolutions:

- LCD panels with resolutions 640×480, 800×600, 1024×768, 1280×1024 (*TBA*), 9/12/18/24-bit color (single channel interface only)
- Planar EL monochrome display with resolution 320×240.
  Starting from version 2.0 it is possible to have two grades of gray on monochrome display.

ESD Sensitive Equipment!

This product comprises electrostatically sensitive components. Please follow the ESD safety instructions to ensure module's operability and reliability:

- Use grounding equipment, if working at an anti-static workbench. Otherwise, discharge yourself and the tools in use before touching the sensitive equipment.
- Try to avoid touching contacts, leads and components.

Extra caution should be taken in cold and dry weather.

Figure 1.1:   **VIM301 Module Appearance**

VIM301-05 version is shown. The appearance vary for different versions and generations of the module.

1.2   VIM301 Versions

The table below presents description of the module versions.

Table 1.1:   **VIM301 Versions**

	Version	CRT	FP	LVDS	4-bit SGD for Planar panel	Video Input Channels

VIM301:
   Lynx3DM8+,
   8 MB RAM,
   PC/104-Plus connectors
	VIM301-01	1	1	1	–	–

	VIM301-02	–	2	2	–	–
	VIM301-03	1	1	1	–	4
	VIM301-04	1	1	1	1	–
	VIM301-05	1	2	2	1	4

1.3   Delivery Checklist

Depending on the version the supplied with the module accessories set differ:

Table 1.2:   VIM301 Supplied Set

Description	Manufacturer's Part Number		VIM301 Version				
			01	02	03	04	05
Mounting spacers set	–	–	1	1	1	1	1
XP9 (and XP10) headers counterpart for connection of LVDS LCD panel	Hirose	DF13-20DS-1.25C	1	2	1	1	2
Contacts for crimping for Hirose DF13-20DS-1.25C connector	Hirose	DF13-2630SCF	25	50	25	25	50
XP5 (and XP6) headers counterpart for connection of FP LCD panel	AMP	111196-9	1	2	1	1	2
IDC-10 – D-SUB-15 adapter cable for connection of a CRT monitor	Fastwel	IMES.685611.123 (ACS00027)	1	–	1	1	1
XP11 header counterpart for connection of up to four video cameras	Leotronics	2067-2122	–	–	1	–	1
Contacts for crimping for Leotronics 2067-2122 connector	Leotronics	2066-2000	–	–	14	–	14
Ribbon cable connector for connection of 4-bit Planar panel to XP4 header	Samtec	TCSD-10-01	–	–	–	2	2
Ribbon cable for Samtec TCSD-10-01 connectors; 2 mm pitch, 500 mm	AMP	1-57051-9	–	–	–	1	1

Additional accessories for are not included in the supplied set, they are options purchased separately.

Table 1.3:   Additional Accessories for VIM301

Description	Manufacturer	Part Number
Cable for connection of Sharp LQ150X1LW71 LVDS TFT LCD panel; 20 threads, 18" (457 mm)	Quadrangle Products, Inc.	QD4280CLR
Inverter for 10" Sharp panels; 2 lamps	TDK	CXA-P1212B-WJL-1
Inverter for 15" Sharp panels; 4 lamps	Zippy Technology Corp.	FC04-12-06L

Note:

Keep the antistatic bag and the original package at least until the warranty period is over. It can be used for future storage or warranty shipments.

2 Technical Specifications

2.1 General

- Video processor: Lynx3DM8+ (SM722G8):
  - 32-bit VGA core;
  - 128-bit Drawing Engine (100 MHz);
  - PCI 2.1 compatible controller, 33 MHz, Master/Slave modes;
  - 200 MHz RAMDAC;
  - Simultaneous operation with three displays;
- Video memory: 8 MB, 64-bit, 100 MHz, integrated in processor;
- Video BIOS:
  - Soldered 64 KB BIOS chip;
  - ACPI 1.0 compatible;
- Interface connectors:
  - PCI/104 (PCI);
  - PC/104 (ISA);
  - One RGB interface;
  - Up to two LVDS interfaces;
  - Up to two Flat Panel (FP) interfaces;
  - One SGD 4-bit LCD interface for Planar EL panel;
  - Up to four video input channels;
- Support for LCD panels with resolutions 640×480, 800×600, 1024×768, 1280×1024 and 9, 12, 18, 24-bit color;
- TFT/DSTN LCD support;
- Support for Planar monochrome EL displays with resolution 320×240;
- Software compatibility:
  - MS DOS® 6.22, FDOS 6.22, QNX 6.3, Windows 98, Me, NT, 2K, XP, CE 4.2, and Linux 2.6 operating systems.

2.2 Power Requirements

The power to the module is supplied via PCI/104 and PC/104 (if installed) connectors.

Note...

The auxiliary power connector (XP1) is optional. If the module is powered via the auxiliary power connector, +5V and +12V voltages are supplied to PC/104-Plus connectors as well. Make sure that not more than one power supply unit is connected to +5V and +12V lines.

Table 2.1:   Power Supply Requirements

Connector	Power Voltage, V	Power Voltage Range, V	Version	Consumption Current, A
PC/104 and PCI/104	+5	from +4.75 to +5.25	VIM301-01	0.6
			VIM301-02	1
			VIM301-03	0.6
			VIM301-04	0.6
			VIM301-05	1

The +12 V voltage is not used by the module itself, it is routed to XP4 and XP11 connectors. The consumption current and voltage limits depend on the Planar display type and power consumption of video cameras.

2.3 Environmental

- Operating temperatures: from –40ºC to +85ºC;
- Storage temperature: –55°C to +90°C;
- Relative humidity: 5% to 90% at +25°C, noncondensing

2.4 Mechanical

- Vibration – 10g;
- Single shock, peak acceleration – 150 g;
- Multiple shock, peak acceleration – 50 g.

2.5 Dimensions and Weight

- Weight: 0.12 kg

Overall and mounting dimensions are presented in the figure below.

Figure 2.1:   **VIM301-05: Overall and Mounting Dimensions**
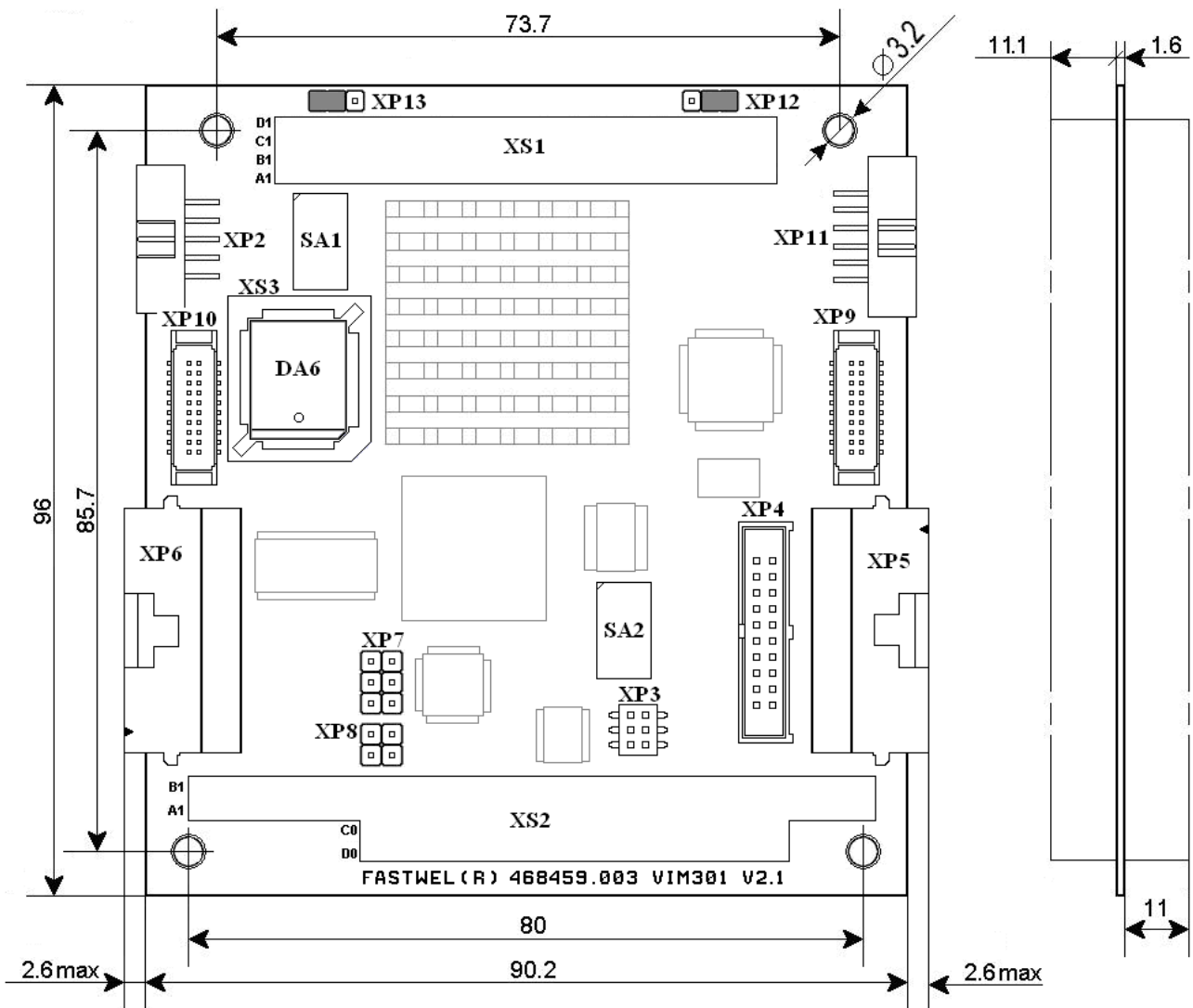
2.6   MTBF

■   MTBF for VIM301 is 100000 hours.

The value is calculated according to: Telcordia Issue 1 model, Method I Case 3, for continuous operation at a surface location, at normal environmental conditions and at ambient temperature 30 °C.

3 Functional Description

3.1 Structure and Layout

Functional diagram of VIM301 is presented below:

Figure 3.1:   VIM301 Block Diagram
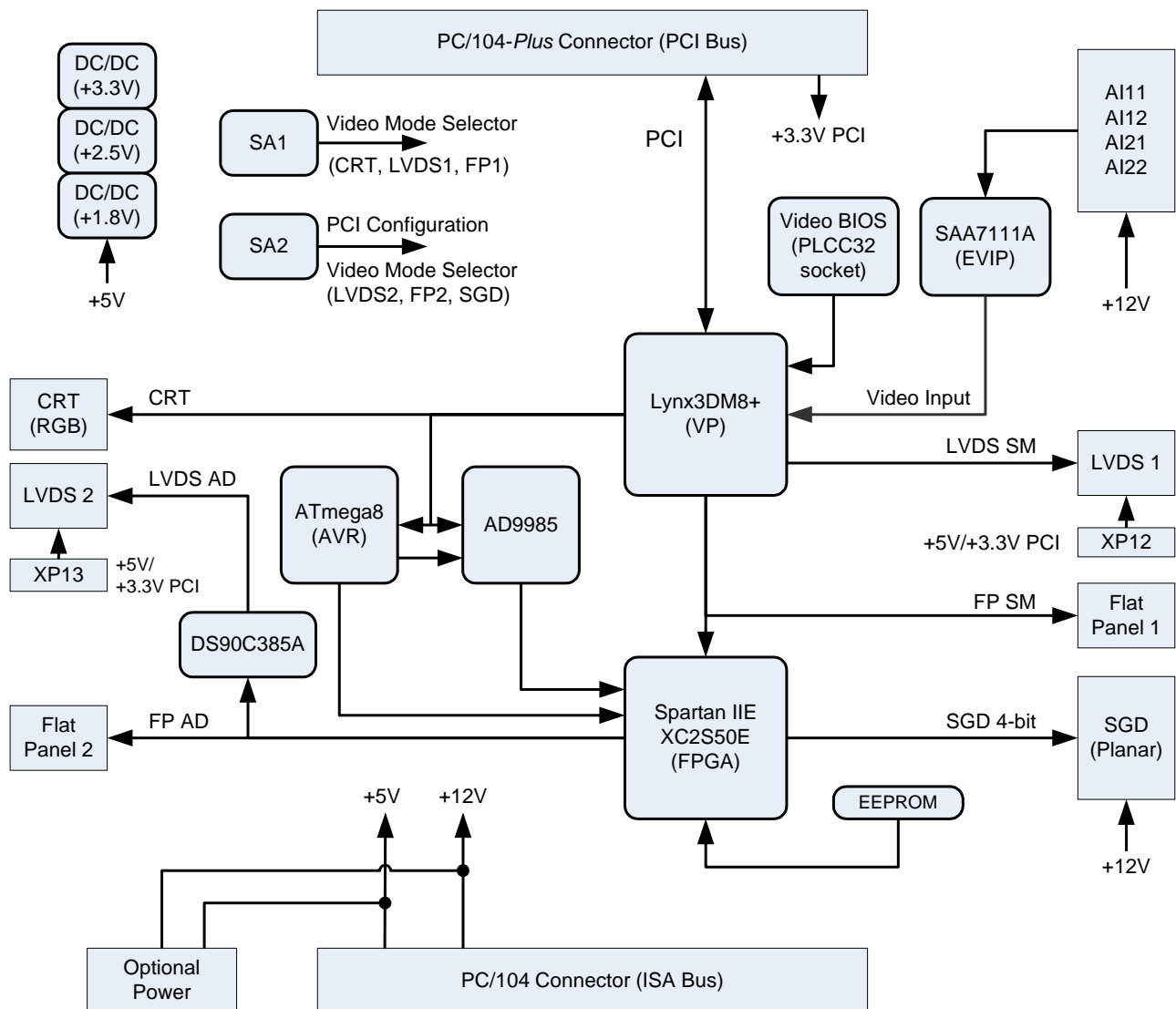
Main functional units of VIM301:

- SM722G8 (Lynx3DM8+) graphics processor;
- Video BIOS;
- Video mode selector;
- PCI configuration switch;
- RGB connector;
- LVDS1 and LVDS2 connectors;
- Flat Panel1and Flat Panel2 connectors;
- SGD 4-bit connector for EL Planar panel;
- Video input connector, 4 channels;
- PCI/104 (PCI bus) and PC/104 (ISA bus) connectors;
- Optional power connector.

The figure below shows the layout of the module's components.

External connections are illustrated in Chapter 4.

Figure 3.2:   Top Side: Connectors and Main Components Layout
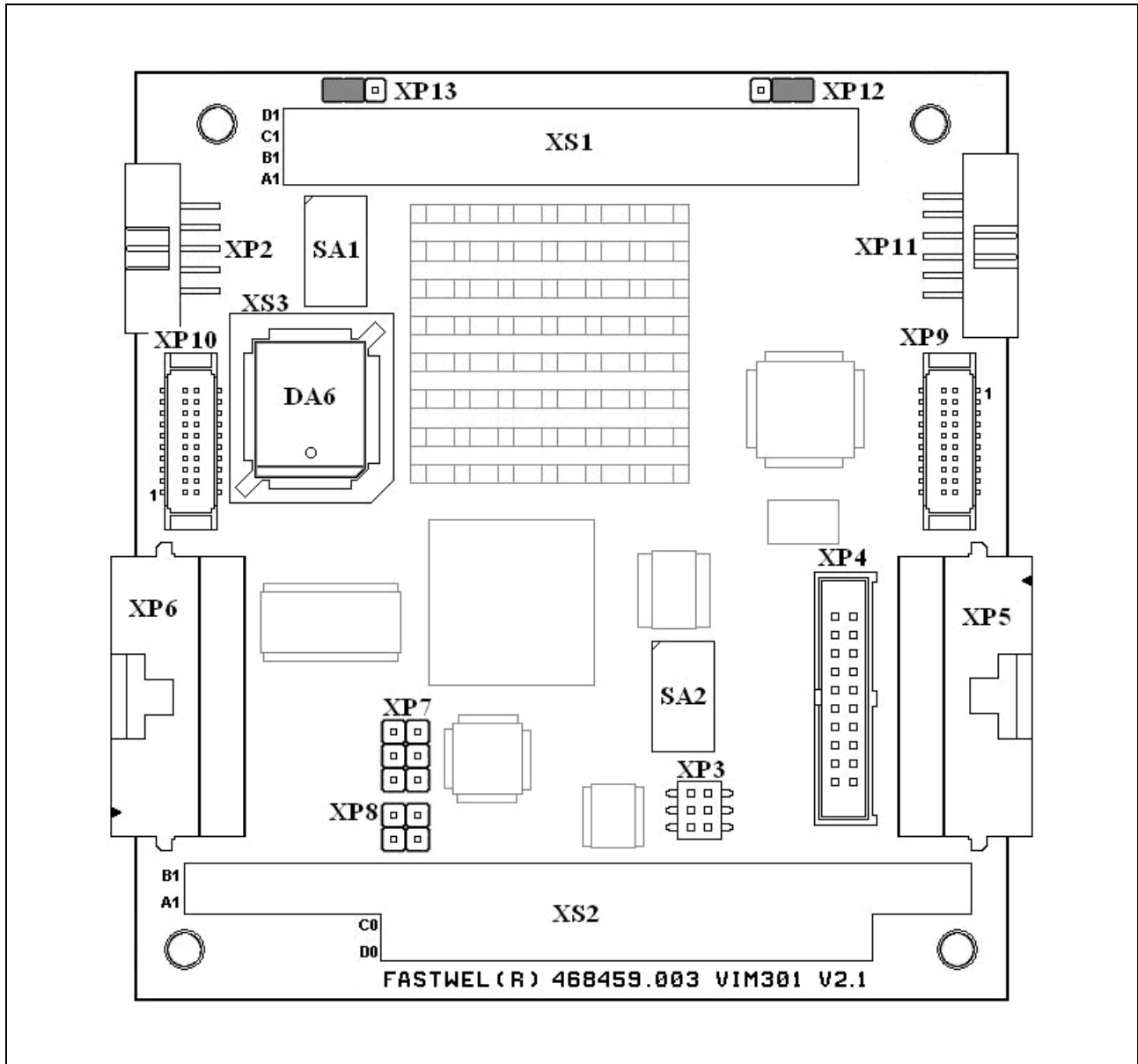
The layout differ for various versions of the module. The figure above presents VIM301-05.

3.2   Functional Description

3.2.1   SM722G8 Display Controller

The Lynx3DM+ (SM722G8) is a low power display controller from Silicon Motion incorporating 8 MB of video memory. It communicates with other modules in stack via PCI bus (PC/104-Plus connector). The display controller features the 32-bit VGA core, 200 MHz RAMDAC, and ability to work with three displays (RGB, FP, and LVDS interfaces) simultaneously. The details can be found at http://www.siliconmotion.com.

3.2.2   Video BIOS

Video BIOS is stored in a soldered chip. It provides ACPI 1.0 support as well as support for MS DOS® 6.22, FDOS 6.22, QNX 6.3, Windows 98, Me, NT, 2K, XP, CE 4.2, and Linux 2.6 operating systems.

3.2.3   Video Mode Selector

Video mode selector (SA1) is a 8-position DIP switch (Tyco Electronics GDH08STR). Video modes switching is allowed only when the power is off. The SA1 settings and corresponding video modes are described in the table below.

Table 3.1:   SA1 Settings and Corresponding Video Modes

Switch Number, Switch Position			Adjusted Parameters
1			Flat Panel 1: interface type
«0»			Color TFT
«1»			Color STN
2			Flat Panel 1: clock frequency type
«0»			No inversion
«1»			Inverted
4	3		Flat Panel 1: resolution
«0»	«0»		640 × 480
«0»	«1»		800 × 600
«1»	«0»		1024 × 768
«1»	«1»		1280 × 1024
7	6	5	Flat Panel 1: color depth
«0»	«0»	«0»	9-bit
«0»	«0»	«1»	12-bit
«0»	«1»	«0»	18-bit
«0»	«1»	«1»	24-bit
«1»	«0»	«0»	Not used
«1»	«0»	«1»	Analog TFT and RGB
«1»	«1»	«0»	Not used
«1»	«1»	«1»	Not used
8			DSTN panel: color depth
«0»			16-bit
«1»			24-bit

In the table above: «0» corresponds to ON position; «1» corresponds to the opposite position

Figure 3.3:   SA1 DIP Switch

3.2.4   PCI Configuration and Video Mode Selector

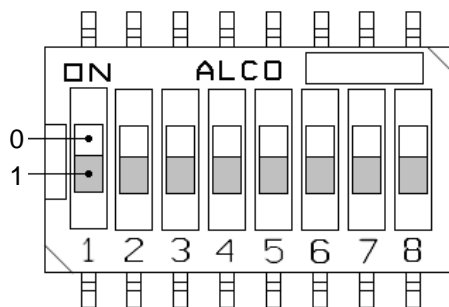PCI configuration and video mode selector (SA2) is a 8-position DIP switch (Tyco Electronics GDH08STR). Switching is allowed only when the power is off. The SA2 settings are described in the table below.

Table 3.2:   **SA2 Settings**

Switch Number, Switch Position		Adjusted Parameters
1	2	PCI configuration (PC/104-*Plus* connector)
«0»	«0»	IDSEL0, INTA#, GNT0#, REQ0#, CLK0
«0»	«1»	IDSEL1, INTB#, GNT1#, REQ1#, CLK1
«1»	«0»	IDSEL2, INTC#, GNT2#, REQ2#, CLK2
«1»	«1»	IDSEL3, INTD#, GNT3#, REQ3#, CLK3
3		Flat Panel 2 and LVDS2: clock frequency type
«0»		No inversion
«1»		Inverted
4		Flat Panel 2: color depth
«0»		18-bit
«1»		24-bit
5		SGD and LVDS2 source signal selection
«0»		Flat Panel 2
«1»		Flat Panel 1
6		Planar display operation mode (for module version 2.0 and higher)
«0»		Monochrome mode
«1»		Shades of gray
7		Flat Panel 2 and LVDS2 operation mode
«0»		Graphics mode for DOS operating system
«1»		Graphics mode for other operating systems
8		Not used
«0»		Not used
«1»		Not used

In the table above: «0» corresponds to ON position; «1» corresponds to the opposite position

**Figure 3.4:**   **SA2 DIP Switch**
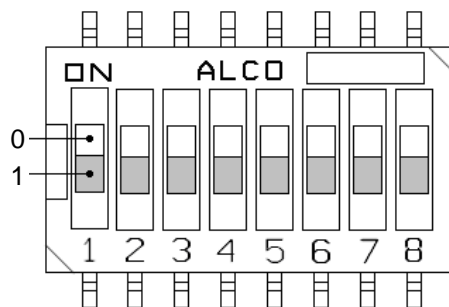
3.2.5   RGB Connector

CRT display with analog RGB interface can be connected to VIM301 (except VIM301-02) via the XP2 header (Leotronics 4447-3100 plug, counterpart – Leotronics 2040-3102 socket for ribbon cable). It is recommended to provide additional fastening of the connector's counterpart when using VIM301 in high-level vibration environment.

Table 3.3:   **CRT (XP2) Connector Pinout**

Pin#	Signal	Pin#	Signal
1	RED	2	GND
3	GREEN	4	GND
5	BLUE	6	GND
7	HSYNC	8	VSYNC
9	SCL	10	SDA

**Figure 3.5:**   **XP2 Connector**
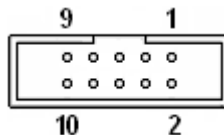
3.2.6   LVDS1 Connector

A display with single channel LVDS interface (up to four differential data pairs and one differential clock pair) can be connected via XP9 header (Hirose DF13-20DP-1.25V, mating connector – Hirose DF13-20DS-1.25C socket with Hirose DF13-2630SCF contacts for crimping).

9 / 12 / 18 / 24-bit panels are supported. Panel type is selected using SA1 DIP switch, while the power is off. XP9 header pinout is presented in the table below.

Table 3.4:   **LVDS1 (XP9) Connector Pinout**

Pin#	Signal	Pin#	Signal
1	VCC_LVDS1	2	VCC_LVDS1
3	GND	4	GND
5	TX0-	6	TX0+
7	GND	8	TX1-
9	TX1+	10	GND
11	TX2-	12	TX2+
13	GND	14	TXCLK -
15	TXCLK+	16	GND
17	TX3-	18	TX3+
19	GND	20	GND

Figure 3.6:   **LVDS1 (XP9) Connector**
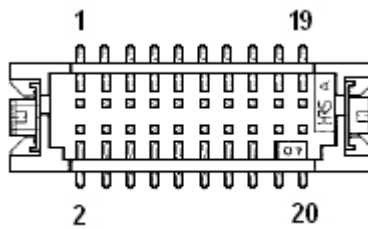
VCC_LVDS1 panel power voltage is set with the help of XP12 jumper switch. +5 V voltage is supplied from PC/104 and PCI/104 connectors; +3.3 V voltage – from PCI/104 connector. To power a panel requiring +3.3 V, a PC/104-Plus power supply unit is needed providing this voltage to the PCI/104 connector.

> **Warning!**
>
> The panel power voltage is specified in documentation accompanying the panel. Incorrect voltage setting can damage the panel. It is allowed to set the voltage only when the power of both the panel and the module is switched off.

Table 3.5:   **XP12 Jumper Contacts Designation**

Pin#	Function
1	+5V
2	VCC_LVDS1
3	+3.3V

Figure 3.7:   **XP12 Jumper Switch**
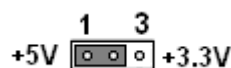
Table 3.6:   **LVDS1 Power Voltage Selection**

| XP12 Jumper Position	VCC_LVDS1 Voltage at XP9 Connector
1-2 closed	+5V
2-3 closed	+3.3V
Jumper removed	No voltage supplied to LVDS1

3.2.7   LVDS2 Connector

LVDS2 interface is a result of Flat Panel 1 or Flat Panel 2 interface signals processing by the National Semiconductor DS90C385A chip. A display with single channel LVDS interface can be connected to the module versions VIM301-02 and VIM301-05 via XP10 header (Hirose DF13-20DP-1.25V, mating connector – Hirose DF13-20DS-1.25C socket with Hirose DF13-2630SCF contacts for crimping).

18 or 24-bit panels are supported. Panel color depth is selected using SA2 DIP switch, while the power is off. XP10 header pinout is presented in the table below.

Table 3.7:   LVDS2 (XP10) Connector Pinout

Pin#	Signal	Pin#	Signal
1	VCC_LVDS2	2	VCC_LVDS2
3	GND	4	GND
5	TX0-	6	TX0+
7	GND	8	TX1-
9	TX1+	10	GND
11	TX2-	12	TX2+
13	GND	14	TXCLK -
15	TXCLK+	16	GND
17	TX3-	18	TX3+
19	GND	20	GND

Figure 3.8:   LVDS2 (XP10) Connector
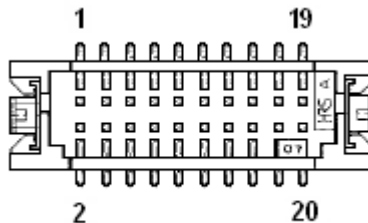
VCC_LVDS2 panel power voltage is set with the help of XP13 jumper switch. +5 V voltage is supplied from PC/104 and PCI/104 connectors; +3.3 V voltage – from PCI/104 connector. To power a panel requiring +3.3 V, a PC/104-Plus power supply unit is needed providing this voltage to the PCI/104 connector.
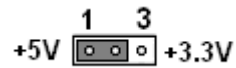
⚠️ **Warning!**

The panel power voltage is specified in documentation accompanying the panel. Incorrect voltage setting can damage the panel. It is allowed to set the voltage only when the power of both the panel and the module is switched off.

Table 3.8:   XP13 Jumper Contacts Designation

Pin#	Function
1	+5V
2	VCC_LVDS2
3	+3.3V

Figure 3.9:   XP13 Jumper Switch

Table 3.9:   LVDS2 Power Voltage Selection

| XP13 Jumper Position	VCC_LVDS2 Voltage at XP10 Connector
1-2	+5V
2-3	+3.3V
Jumper removed	No voltage supplied to LVDS2

3.2.8   Flat Panel 1 Connector

A display with parallel discrete Flat Panel interface can be connected to the module using XP5 header (AMP 104069-6, mating connector AMP 111196-9). 9 / 12 / 18 / 24-bit panels are supported. Panel type is selected using SA1 DIP switch, while the power is off. XP5 header pinout is presented in the table below.

Table 3.10:   **Flat Panel 1 (XP5) Connector Pinout**

Pin#	Signal	Pin#	Signal
1	GND	2	GND
3	VBIASEN	4	FPVDDEN
5	DATA0	6	DATA1
7	DATA2	8	DATA3
9	DATA4	10	DATA5
11	DATA6	12	DATA7
13	DATA8	14	DATA9
15	DATA10	16	DATA11
17	DATA12	18	DATA13
19	DATA14	20	DATA15
21	DATA16	22	DATA17
23	DATA18	24	DATA19
25	DATA20	26	DATA21
27	DATA22	28	DATA23
29	EN	30	DE
31	SCLK	32	VSYNC
33	GND	34	HSYNC
35	+5V	36	+5V
37	–	38	–
39	–	40	–

In the table above: «–» – Not used.

Figure 3.10:   **Flat Panel 1 (XP5) Connector**
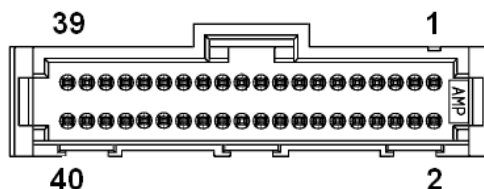
### 3.2.9   Flat Panel 2 Connector

Flat Panel 2 interface is a result of the RGB interface signals processing by the Analog Devices AD9985 chip for versions VIM301-02 and VIM301-05. A display with parallel discrete Flat Panel interface can be connected to the module using XP6 header (AMP 104069-6, recommended mating connector is AMP 111196-9). 18 or 24-bit panels are supported; settings can be changed using SA2 DIP switch, while the power is off. XP6 header pinout is presented in the table below.

Table 3.11:   Flat Panel 2 (XP6) Connector Pinout

Pin#	Signal	Pin#	Signal
1	GND	2	GND
3	VBIASEN	4	FPVDDEN
5	DATA0	6	DATA1
7	DATA2	8	DATA3
9	DATA4	10	DATA5
11	DATA6	12	DATA7
13	DATA8	14	DATA9
15	DATA10	16	DATA11
17	DATA12	18	DATA13
19	DATA14	20	DATA15
21	DATA16	22	DATA17
23	DATA18	24	DATA19
25	DATA20	26	DATA21
27	DATA22	28	DATA23
29	EN	30	DE
31	SCLK	32	VSYNC
33	GND	34	HSYNC
35	+5V	36	+5V
37	-	38	-
39	-	40	-

In the table above: «–» – Not used.

Figure 3.11:   Flat Panel 2 (XP6) Connector
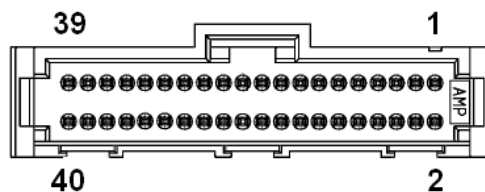
3.2.10   SGD 4-bit Connector for Planar EL Panel

Electroluminescent Planar display with parallel discrete SGD 4-bit interface can be connected to the module via XP4 connector (versions VIM301-04 and VIM301-05 only). Series EL320.240.36 monochrome displays with resolution 320×240 are supported.

SGD 4-bit interface is derived from one of the Flat Panel interfaces depending on the position of switch 5 at SA2 DIP switch. Source Flat Panel interface signals are processed by Xilinx Spartan2E FPGA chip. For correct display operation it is necessary to set resolution 640×480 and 18 or 24-bit mode for Flat Panel 1 or 2 depending on what interface is selected (SA2, switch 5) as a source for conversion.

For VIM301 generations 2.0 and higher it is possible to set the SGD interface operation mode to "Monochrome" and "Shades of Gray" using switch #6 of SA2 DIP switch. The latter mode allows to show color image on a monochrome display by setting the luminance to 0%, 50%, or 100%.

XP4 connector type is Samtec STMM-110-02-G-D-SM-K, recommended mating connector is Samtec TCSD-10-01. The table below presents the pinout of this connector.

Table 3.12:   XP4 Connector Pinout

Pin#	Signal	Pin#	Signal
1	+12V	2	+12V
3	GND (SELFTEST)	4	–
5	+5V	6	GND
7	VSYNC	8	GND
9	HSYNC	10	GND
11	VCLK	12	GND
13	DATA0	14	GND
15	DATA1	16	GND
17	DATA2	18	GND
19	DATA3	20	GND

In the table above: «–» – Not used.

Figure 3.12:   SGD 4-bit (XP4) Connector
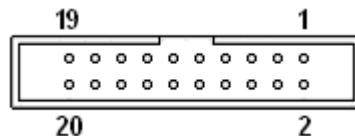
3.2.11 Video Input: Four Channels

Up to four analog video cameras (NTSC/PAL/SECAM) can be connected to XP11 header (versions -03 and -05). Their signals are routed to Philips Semiconductor SAA7111A EVIP (Enhanced Video Input Processor); digital signal is then transmitted to the Video Input Port of Lynx3DM8+ video processor.

Video data stream can be sent to screen directly using the Hardware video window function realized in SM722 controller. The video window is scalable and its position on screen can be adjusted to combine the video image with software-generated information.

Video frame can also be saved to disk or processed (e.g. compressed), however, video capture frame rate is limited by the performance rate of VIM301 operating in Slave mode via PCI bus and CPU processing power: at maximum resolution of 720×576 video capture frame rate is not more than 4 fps. Thus, the Hardware video window output is considered the main purpose of the video input subsystem.

For WinXP/WinXPe operating systems the video capture function of VIM301 is enabled with DirectShow driver from Silicon Motion.

+12 V power voltage for video cameras is supplied to XP11 connector from PC/104-Plus connectors. If +12 V voltage is not supplied via the stack connectors, an auxiliary power supply unit can be used to supply this voltage via the optional XP1 connector. A common ground bus is required for an external power supply and for the power supply unit in stack.

NTSC, PAL or SECAM video signals are received from four multiplexed analog channels. Video is captured with the following parameters:

- Video input frame rate: NTSC – 30 fps, PAL/SECAM – 25 fps;
- Maximum resolution and color depth: NTSC – 720×504, 16 bpp, PAL/SECAM – 720×576, 16 bpp;
- Video capture frame rate in PCI-slave mode for NTSC/PAL/SECAM signal with maximum resolution – not more than 4 fps.

XP11 connector type is Leotronics 4447-3120. Recommended mating connectors for the cable: Leotronics 2040-3122 IDC connector or Leotronics 2067-2122 connector with Leotronics 2066-2000 contacts for crimping

XP11 connector pinout is presented in the table below.

Table 3.13: XP11 Connector Pinout

Contact	Signal	Contact	Signal
1	+12V	2	AI11
3	GND	4	+12V
5	AI12	6	GND
7	+12V	8	AI21
9	GND	10	+12V
11	AI22	12	GND

Figure 3.13: XP11 Connector
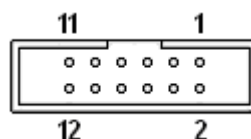
3.2.12   PCI/104 Connector (PCI bus)

PCI/104 connector (XS1) allows installation of VIM301 into a PC/104-Plus stack and connection of PCI buses of graphics controller and a processor module. The PCI bus controller of VIM301 conforms to PCI 2.1 specification. The connector mounted on VIM301 is AMP 1375799-1.

The pinout of XS1 connector is presented in the table below.

**Table 3.14:   XS1 Connector Pinout**

Contact	Signal	In/Out	Contact	Signal	In/Out
A1	GND	Power	B1	–	–
A2	–	–	B2	AD2	In/Out
A3	AD5	In/Out	B3	GND	Power
A4	C/BE0#	In/Out	B4	AD7	In/Out
A5	GND	Power	B5	AD9	In/Out
A6	AD11	In/Out	B6	–	–
A7	AD14	In/Out	B7	AD13	In/Out
A8	–	–	B8	C/BE1#	In/Out
A9	–	–	B9	GND	Power
A10	GND	Power	B10	–	–
A11	STOP#	In/Out	B11	–	–
A12	–	–	B12	TRDY#	In/Out
A13	FRAME#	In/Out	B13	GND	
A14	GND	Power	B14	AD16	In/Out
A15	AD18	In/Out	B15	–	–
A16	AD21	In/Out	B16	AD20	In/Out
A17	–	–	B17	AD23	In/Out
A18	IDSEL0	In	B18	GND	Power
A19	AD24	In/Out	B19	C/BE3#	In/Out
A20	GND	Power	B20	AD26	In/Out
A21	AD29	In/Out	B21	+5V	Power
A22	+5V	Power	B22	AD30	In/Out
A23	REQ0#	Out	B23	GND	Power
A24	GND	Power	B24	REQ2#	Out
A25	GNT1	In	B25	–	–
A26	+5V	Power	B26	CLK0	In
A27	CLK2	In	B27	+5V	Power
A28	GND	Power	B28	INTD#	Out
A29	+12V	Power	B29	INTA#	Out
A30	–	–	B30	REQ3#	Out
C1	+5V	Power	D1	AD0	In/Out
C2	AD1	In/Out	D2	+5V	Power
C3	AD4	In/Out	D3	AD3	In/Out

Contact	Signal	In/Out	Contact	Signal	In/Out
C4	GND	Power	D4	AD6	In/Out
C5	AD8	In/Out	D5	GND	Power
C6	AD10	In/Out	D6	M66EN (GND)	
C7	GND	Power	D7	AD12	In/Out
C8	AD15	In/Out	D8	–	–
C9	–	–	D9	PAR	In/Out
C10	–	–	D10	–	–
C11	–	LOCK#	D11	GND	Power
C12	GND	Power	D12	DEVSEL#	In/Out
C13	IRDY#	In/Out	D13	–	–
C14	–	–	D14	C/BE2#	In/Out
C15	AD17	In/Out	D15	GND	Power
C16	GND	Power	D16	AD19	In/Out
C17	AD22	In/Out	D17	–	–
C18	IDSEL1	In	D18	IDSEL2	In
C19	–	–	D19	IDSEL3	In
C20	AD25	In/Out	D20	GND	Power
C21	AD28	In/Out	D21	AD27	In/Out
C22	GND	Power	D22	AD31	In/Out
C23	REQ1#	Out	D23	–	–
C24	+5V	Power	D24	GNT0#	In
C25	GNT2#	In	D25	GND	Power
C26	GND	Power	D26	CLK1	In
C27	CLK3	In	D27	GND	Power
C28	+5V	Power	D28	RST#	In
C29	INTB#	Out	D29	INTC#	Out
C30	GNT3#	In	D30	GND	Power

In the table above:

> *«–» – not used;*
> *«In/Out» - data transfer direction;*
> *«Power» – Power circuits*

Figure 3.14: **XS1 Connector**
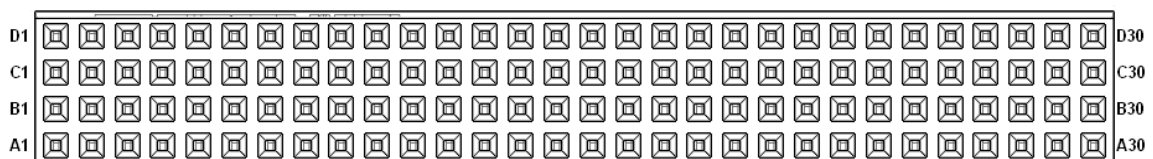
3.2.13   PC/104 Connector (ISA Bus)

XS2 connector is used for building a PC/104 stack. ISA bus is not used by VIM301 module, contacts of this header are connected to +5 V, +12 V, and GND signals. The connector installed on the module is AMP 1375795-2. Its pinout is presented in the table below.

Table 3.15:   **XS2 Connector Pinout**

Contact	Signal	In/Out	Contact	Signal	In/Out
A1	–	–	B1	GND	Power
A2	–	–	B2	–	–
A3	–	–	B3	+5V	Power
A4	–	–	B4	–	–
A5	–	–	B5	–	–
A6	–	–	B6	–	–
A7	–	–	B7	–	–
A8	–	–	B8	–	–
A9	–	–	B9	+12V	Power
A10	–	–	B10	GND	Power
A11	–	–	B11	–	–
A12	–	–	B12	–	–
A13	–	–	B13	–	–
A14	–	–	B14	–	–
A15	–	–	B15	–	–
A16	–	–	B16	–	–
A17	–	–	B17	–	–
A18	–	–	B18	–	–
A19	–	–	B19	–	–
A20	–	–	B20	–	–
A21	–	–	B21	–	–
A22	–	–	B22	–	–
A23	–	–	B23	–	–
A24	–	–	B24	–	–
A25	–	–	B25	–	–
A26	–	–	B26	–	–
A27	–	–	B27	–	–
A28	–	–	B28	–	–
A29	–	–	B29	+5V	Power
A30	–	–	B30	–	–
A31	–	–	B31	GND	Power
A32	GND	Power	B32	GND	Power
C0	GND	Power	D0	GND	Power
C1	–	–	D1	–	–

Contact	Signal	In/Out	Contact	Signal	In/Out
C2	–	–	D2	–	–
C3	–	–	D3	–	–
C4	–	–	D4	–	–
C5	–	–	D5	–	–
C6	–	–	D6	–	–
C7	–	–	D7	–	–
C8	–	–	D8	–	–
C9	–	–	D9	–	–
C10	–	–	D10	–	–
C11	–	–	D11	–	–
C12	–	–	D12	–	–
C13	–	–	D13	–	–
C14	–	–	D14	–	–
C15	–	–	D15	–	–
C16	–	–	D16	+5V	Power
C17	–	–	D17	–	–
C18	–	–	D18	GND	Power
C19	–	–	D19	GND	Power

In the table above:

       «–» – not used;

       «In/Out» - data transfer direction;

       «Power» – Power circuits

Figure 3.15:   **XS2 Connector**
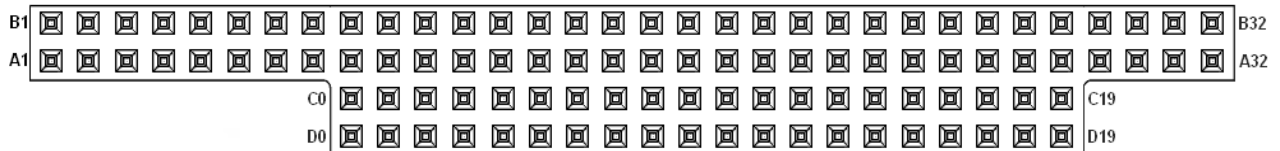
3.2.14   Auxiliary Power Connector

The module itself uses only +5 V power voltage. +12 V circuit is connected to the appropriate contacts of the following connectors: XS1 (PCI/104), XS2 (PC104), XP1 (power), XP4 (EL display), and XP11 (video cameras). +12 V voltage is not used by the module, it is intended to power a Planar EL display (for VIM30104 and VIM30105 versions) and video cameras connected to XP11 header (for VIM30103 and VIM30105 versions). If a PC/104 or PC/104-Plus power supply unit is installed in the stack, the module is powered via PC/104-Plus connectors' contacts.

The auxiliary power connector (XP1) is optional, it is not installed on basic versions of VIM301.

XP1 connector type is AMP 4-171826-4. Recommended mating connector is AMP 171822-4, with AMP 170262-1 contacts set or other contacts appropriate to 171822-4 (AMP) connector type. Please, find details on manufacturer's web site: www.tycoelectronics.com

Table 3.16:   **XP1 Connector Pinout**

Contact	Signal
1	+5V
2	GND
3	GND
4	+12V

For stable operation of the module a power supply unit should provide +5 V ±5% and not less than 0.5 A current.

Figure 3.16:   **XP1 Connector**
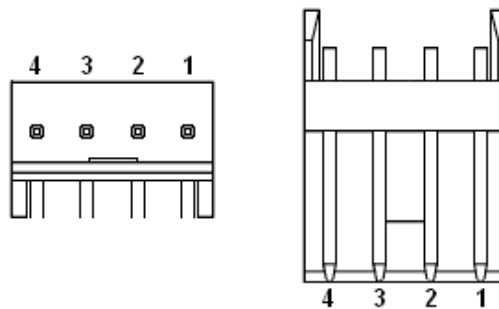
4   External Connections

The following precautions must be observed to ensure proper installation and to avoid damage to the module, other system components, or harm to personnel.

4.1   Safety Regulations

The following safety regulations must be observed when installing or operating the module. Fastwel assumes no responsibility for any damage resulting from infringement of these rules.

ESD Sensitive Equipment!

This product comprises electrostatically sensitive components. Please follow the ESD safety instructions to ensure module's operability and reliability:

- ■ Use grounding equipment, if working at an anti-static workbench. Otherwise, discharge yourself and the tools in use before touching the sensitive equipment.
- ■ Try to avoid touching contacts, leads and components.

Extra caution should be taken in cold and dry weather.

Attention!

Never connect or disconnect neither expansion modules nor displays while the power is on. Never disconnect an external power supply when the module is on. This can damage the module.

4.2 Connection of Peripheral Devices

The following diagram illustrates external connections:

Figure 4.1: External Devices Connection
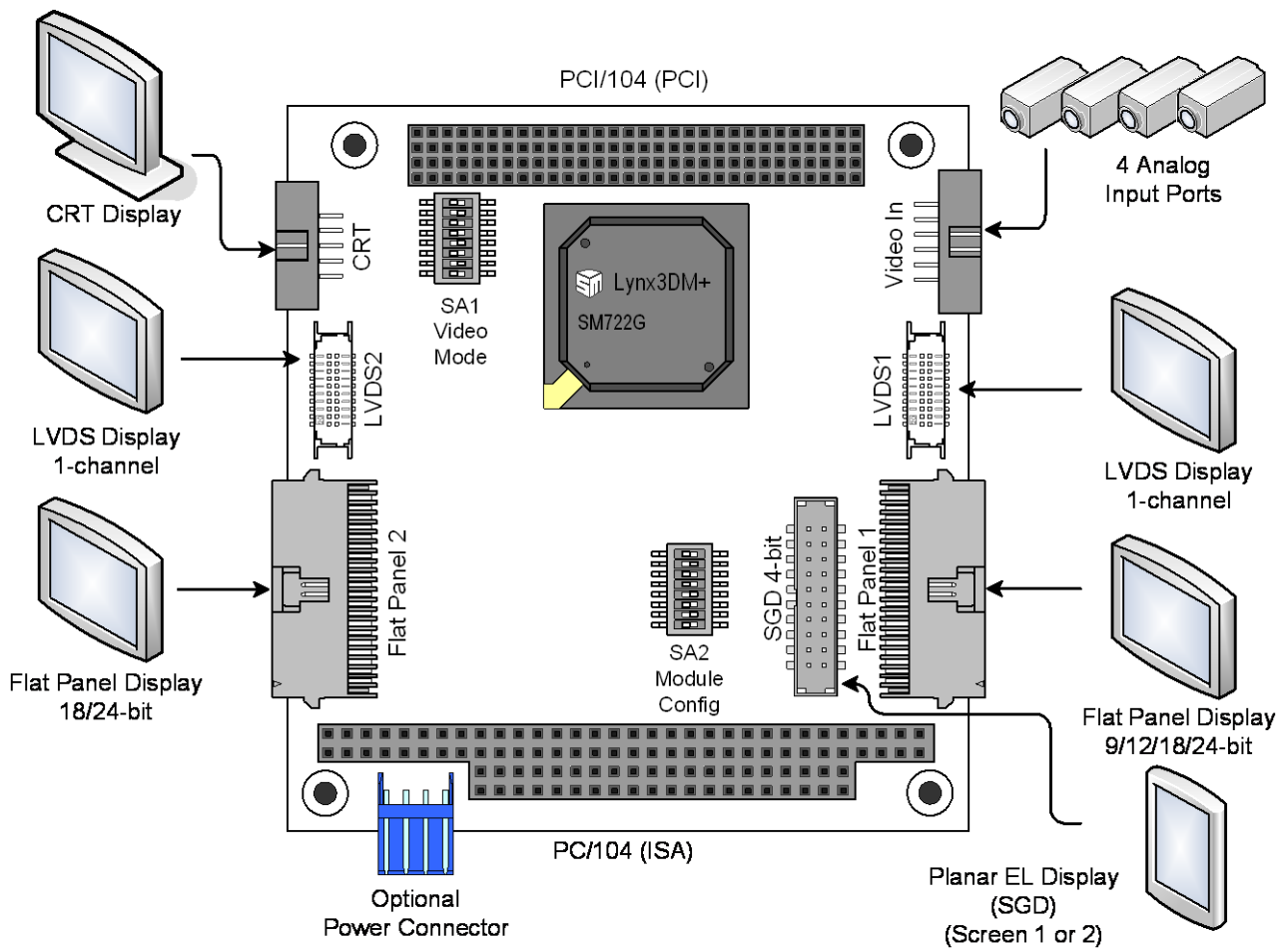
The following is necessary to put the module into operation:

- ■ Power voltage (+5 V, 0.5A) provided at PC/104-Plus connectors;

- ■ To use Planar EL panel it is necessary to provide a +12VDC source with current output sufficient for the operation of the panel. The power can be supplied via PC/104-Plus connectors or through the optional power connector XP1;

- ■ The following devices may be connected to the module to serve as a display unit:

  - ▪ CRT display with analog RGB interface connected to XP2 header (except VIM301-02);

  - ▪ LCD panel with FP interface (9/12/18/24-bit color, resolutions 640×480, 800×600, 1024×768, 1280×1024) connected to XP5 header;

  - ▪ LCD panel with LVDS interface (1 channel; 9/12/18/24-bit color, resolutions 640×480, 800×600, 1024×768, 1280×1024) connected to XP9 header;

  - ▪ LCD panel with FP interface (24-bit color, resolutions 640×480, 800×600, 1024×768, 1280×1024) connected to XP6 header (for VIM301-02, -05);

  - ▪ LCD panel with LVDS interface (1 channel; 24-bit color, resolutions 640×480, 800×600, 1024×768, 1280×1024) connected to XP10 header (for VIM301-02, -05);

  - ▪ Planar EL panel with SGD interface (4-bit color, resolution 320×240) connected to XP4 header (for VIM301-03, -05);

- ■ To enable the video input function, it is necessary to have at least one video camera connected to XP11 header.

5   Installation of Drivers for Windows XP / XPe

5.1   Lynx3dm+ Graphics Controller Driver Installation

Graphics controller drivers for different operating systems, as well as the driver for Windows XP can be found at: ftp://ftp.prosoft.ru/pub/Hardware/Fastwel/CPx/VIM301/Software/Drivers/.

To install the driver in Windows XP/XPe select Start => Settings => Control Panel:
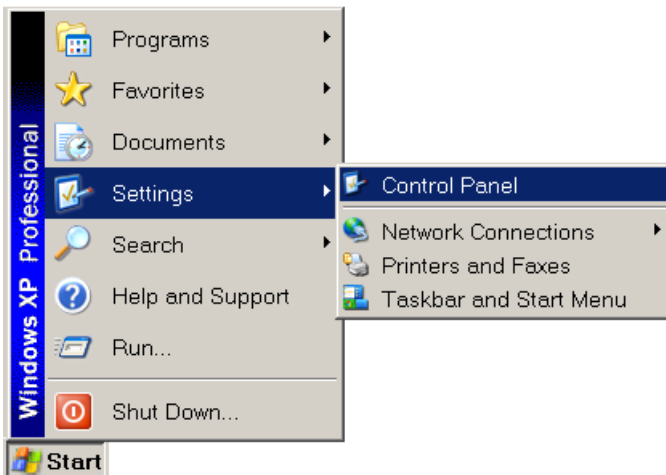
In Control Panel window type "Desktop" in the address string and press "Enter":
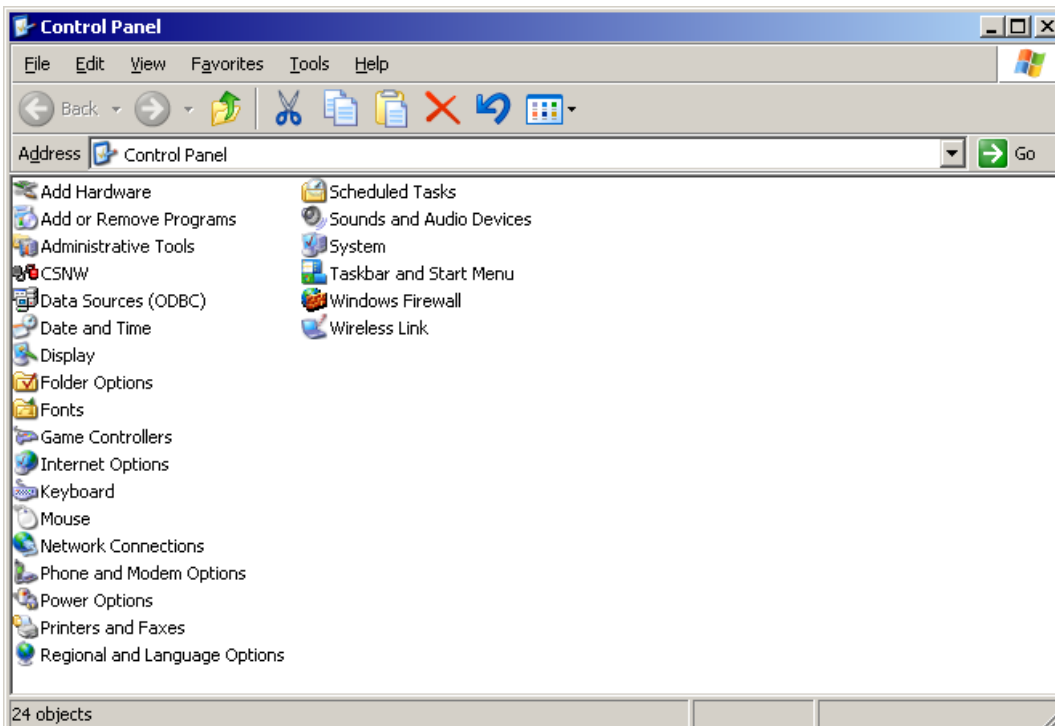
In the "Desktop" window select "My Computer":
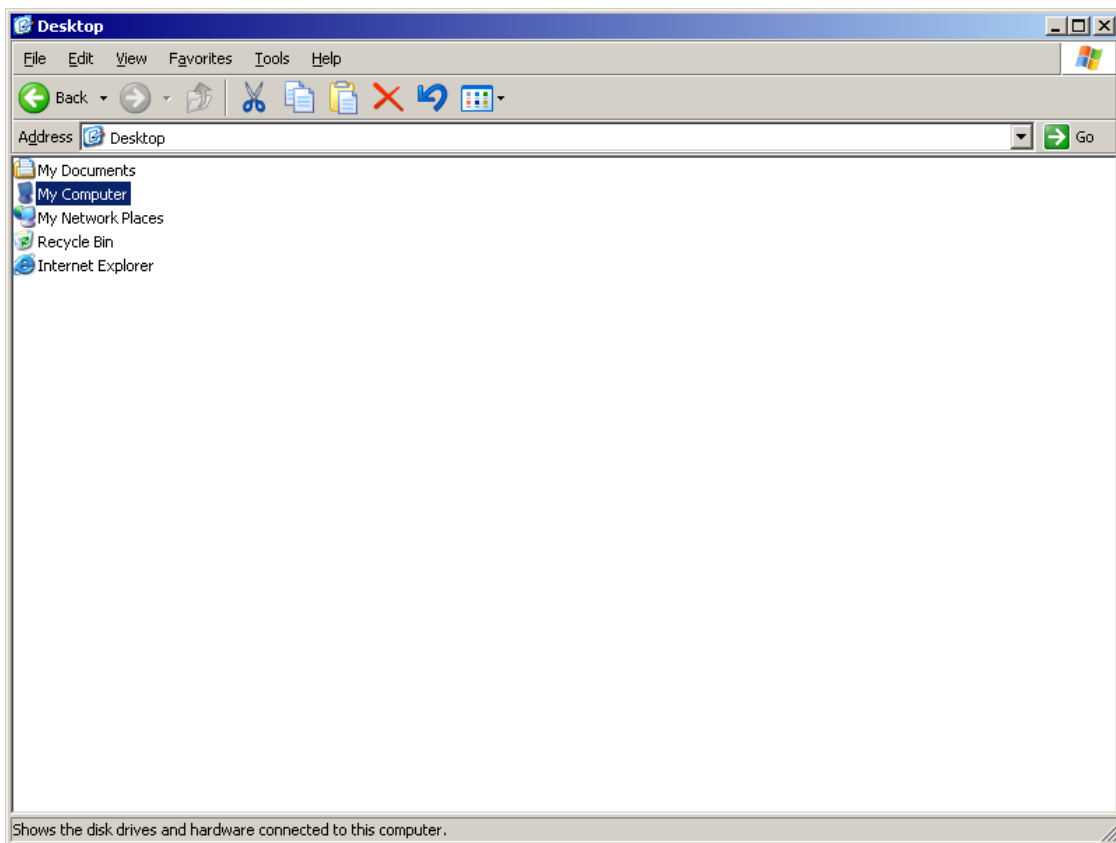
In "File" menu select "Manage":
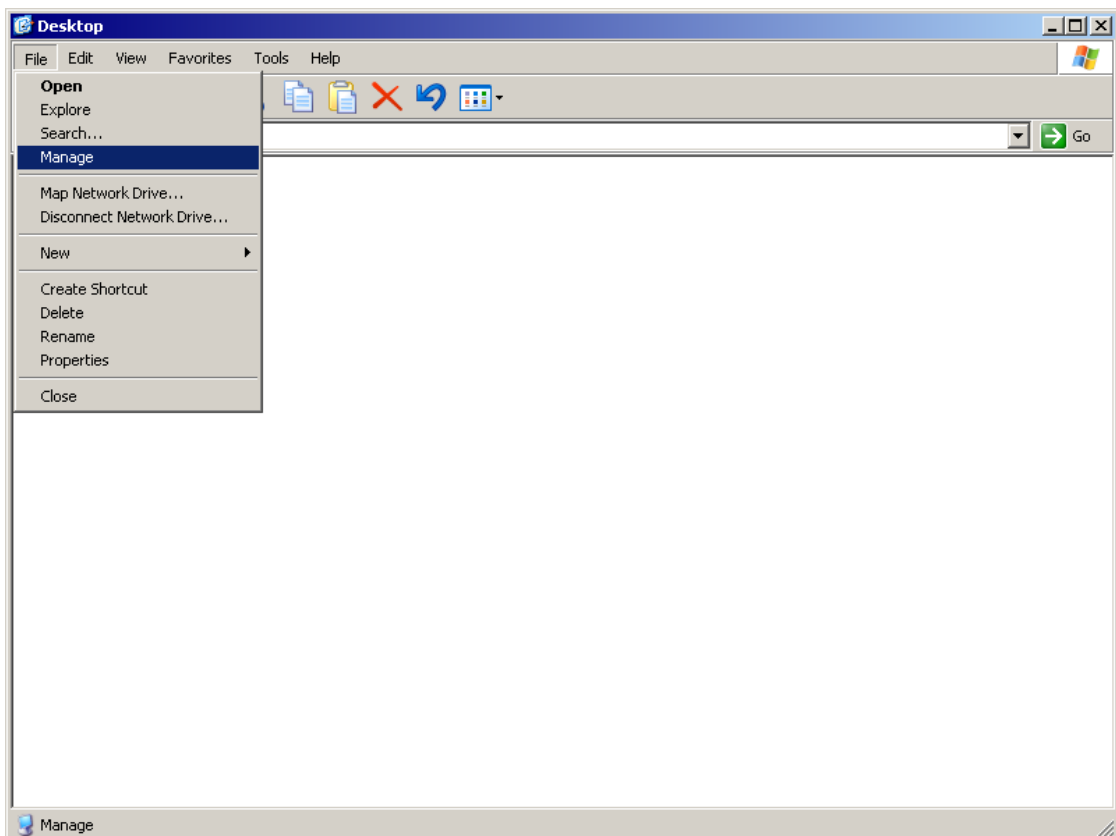
In the "Computer Management" window select "Device Manager":
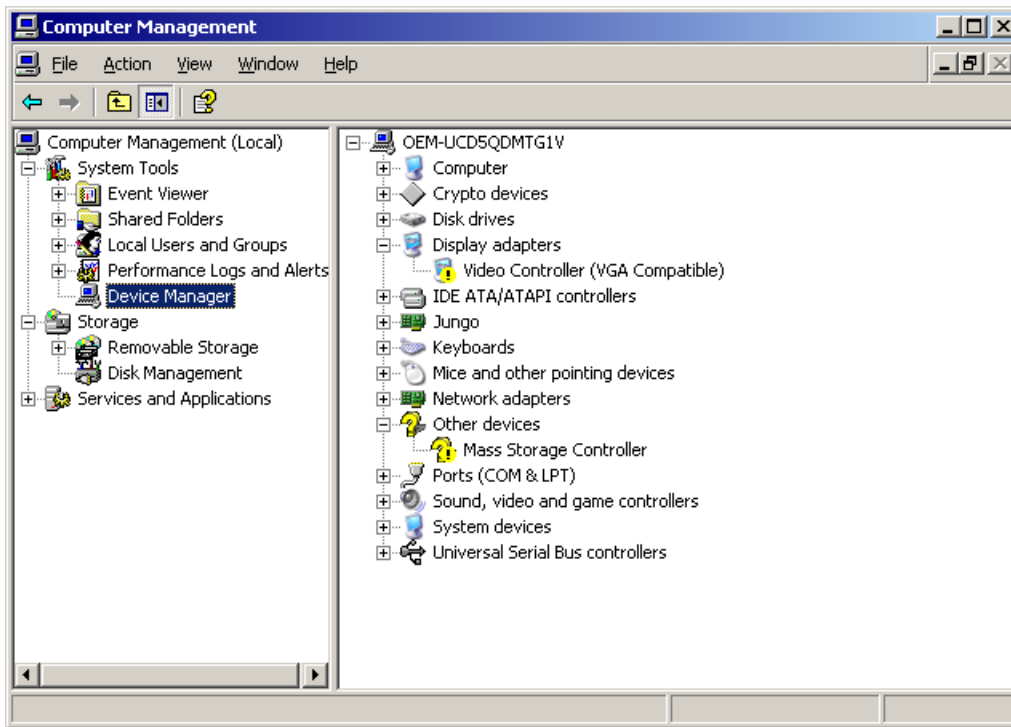
In the right pane open the "Display adapters" item, select "Video Controller (VGA Compatible)" and click the right mouse button. In the contextual menu select "Update Driver…".

In Windows XPe this menu is available from the main menu "Action".
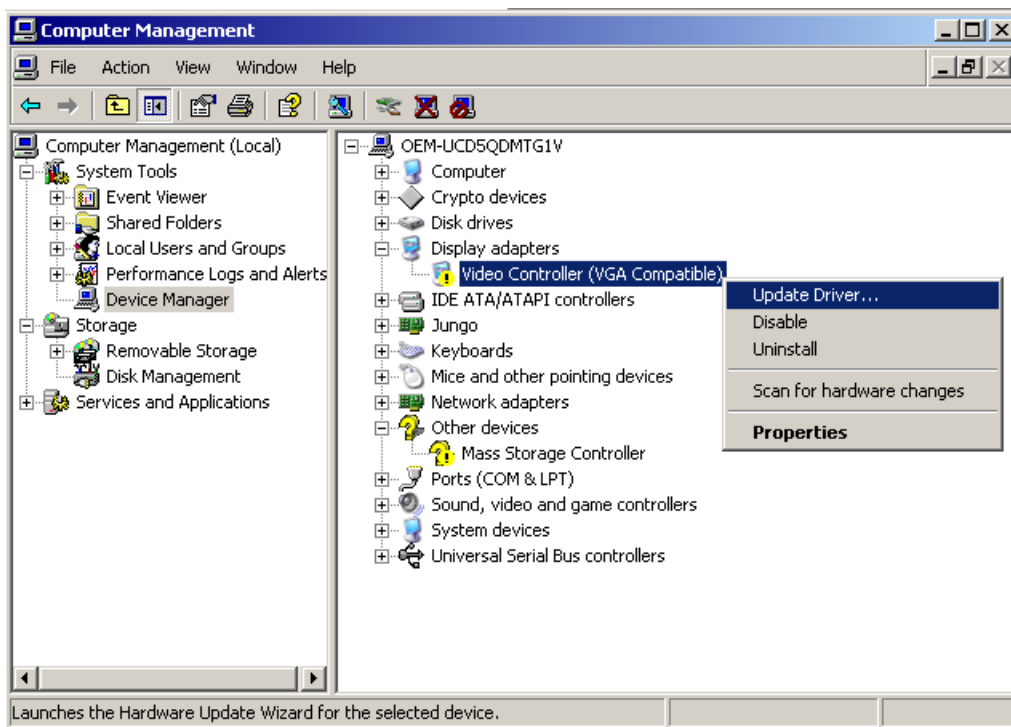
The window "Hardware Update Wizard" opens. In this window check the option "No, not this time" and press the "Next" button:

In the next "Hardware Update Wizard" window check the option "Install from a list or specific location (Advanced)" and press "Next":
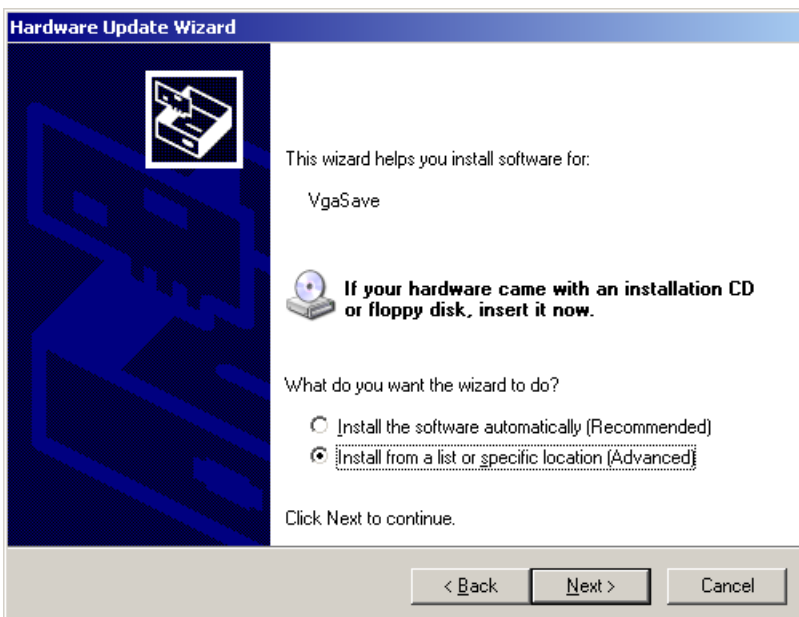
In the next "Hardware Update Wizard" window check the option "Don't search. I will choose the driver to install" and press "Next" to proceed:
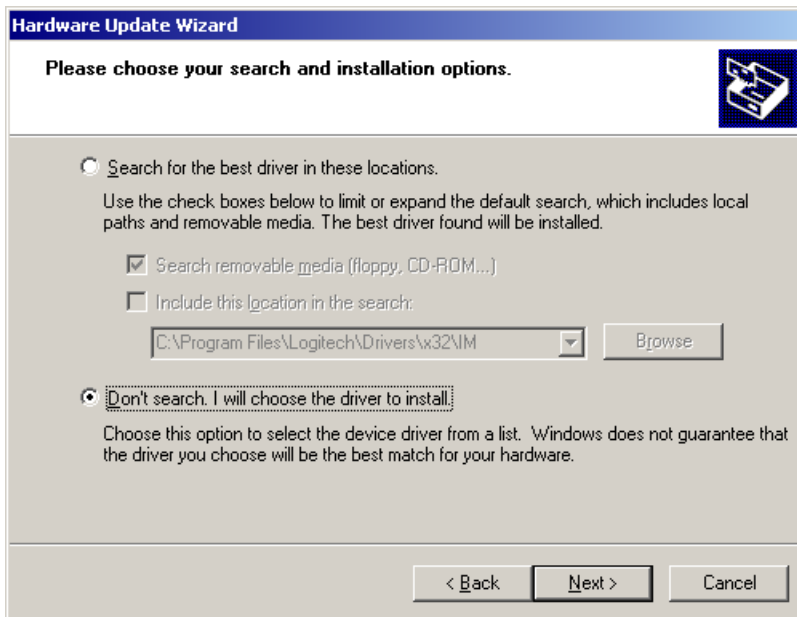
In the "Install from disk" window press "Browse" button:
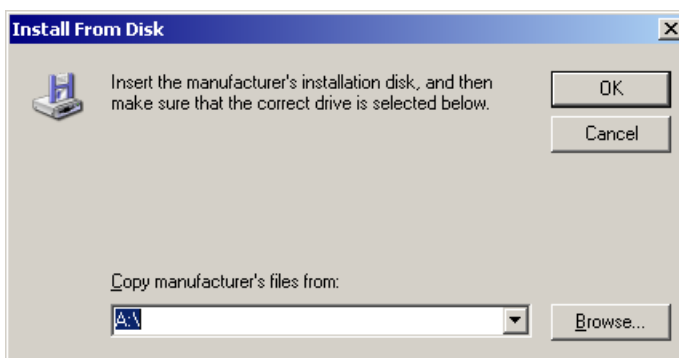
The window "Locate File" appears. In this window find the folder where the driver is located, select the file and press "Open". In the sample below the file *smisetup.inf* is found in the folder C:\Utils\sm7xx\WinXP_722\.
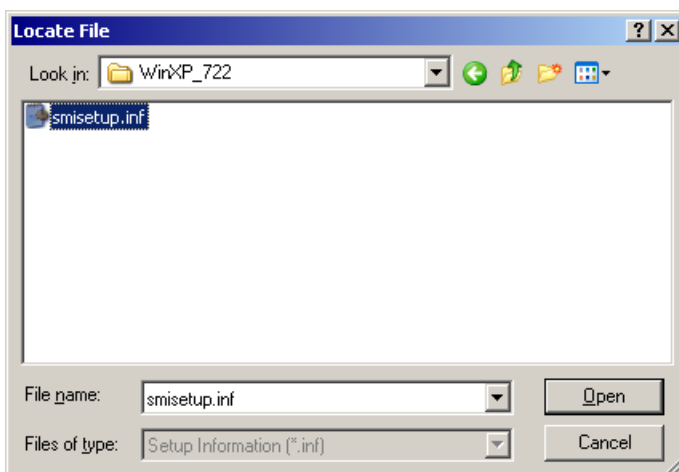
In "Install from disk" window press "OK":

In "Hardware Update Wizard" window select "Silicon Motion Lynx3DM" from the "Model" list and press "Next":
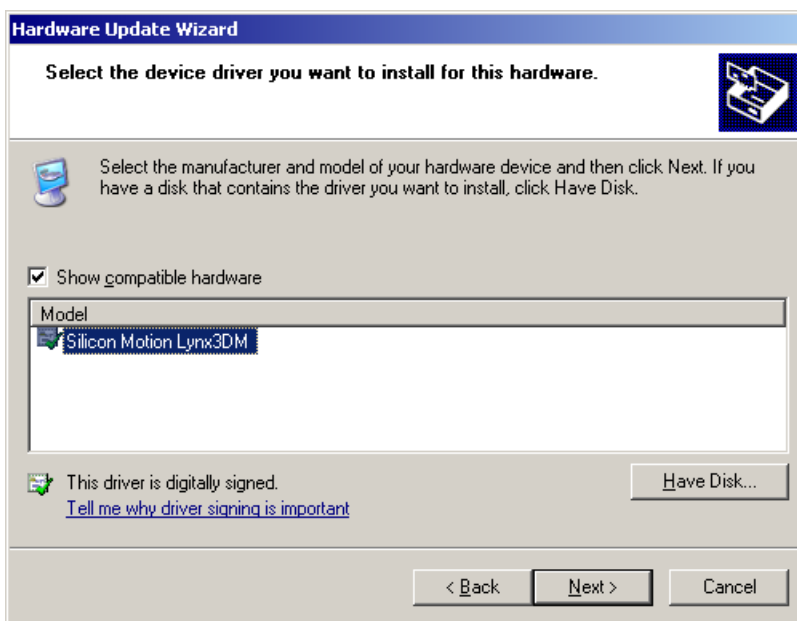
In the next "Hardware Update Wizard" window press "Finish":
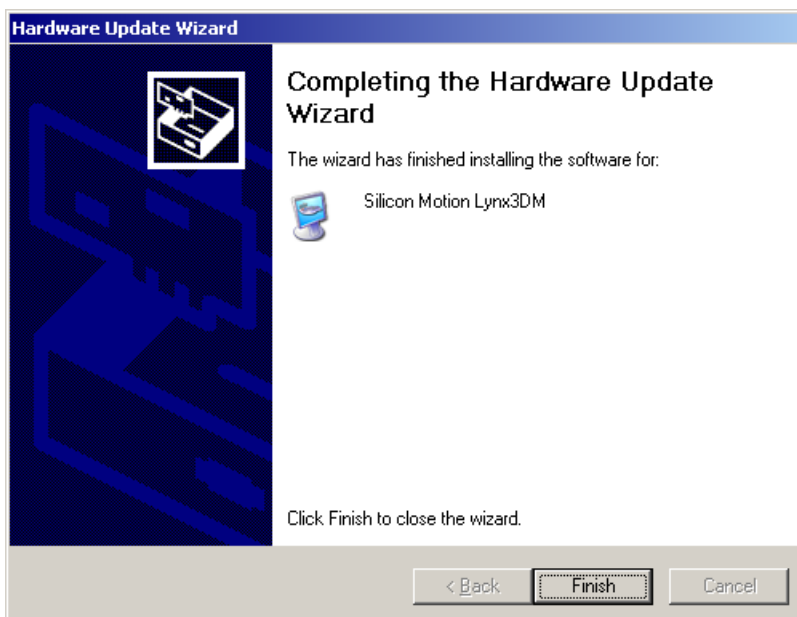
Restart Windows. After restart, the driver "Silicon Motion Lynx3DM" is enabled.

5.2 Lynx3DM+ Controller Control Panel Installation

Setup.exe is the Control Panel installation utility for Silicon Motion Lynx3DM/Lynx3DM+ controllers. It is located at: ftp://ftp.prosoft.ru/pub/Hardware/Fastwel/CPx/VIM301/Software/Utils/ . Run setup.exe and press "Next" in "Welcome" window shown below:
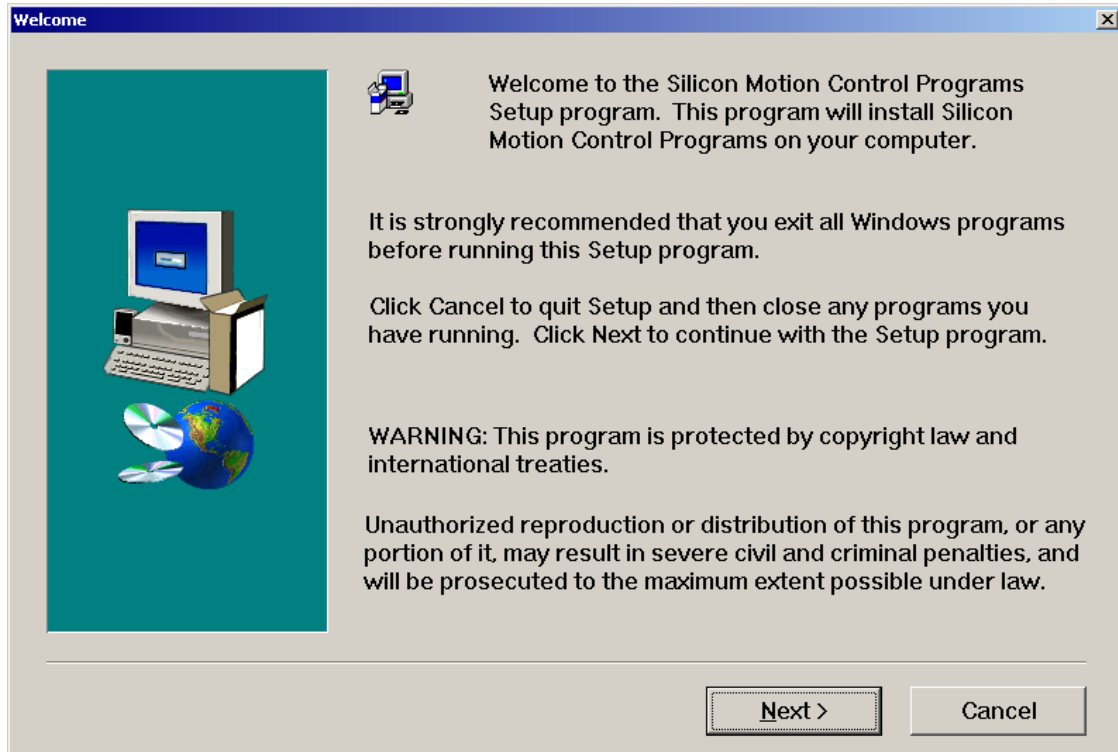
Press "Next" in "Select Program Folder" window. The Control Panel installation process starts:
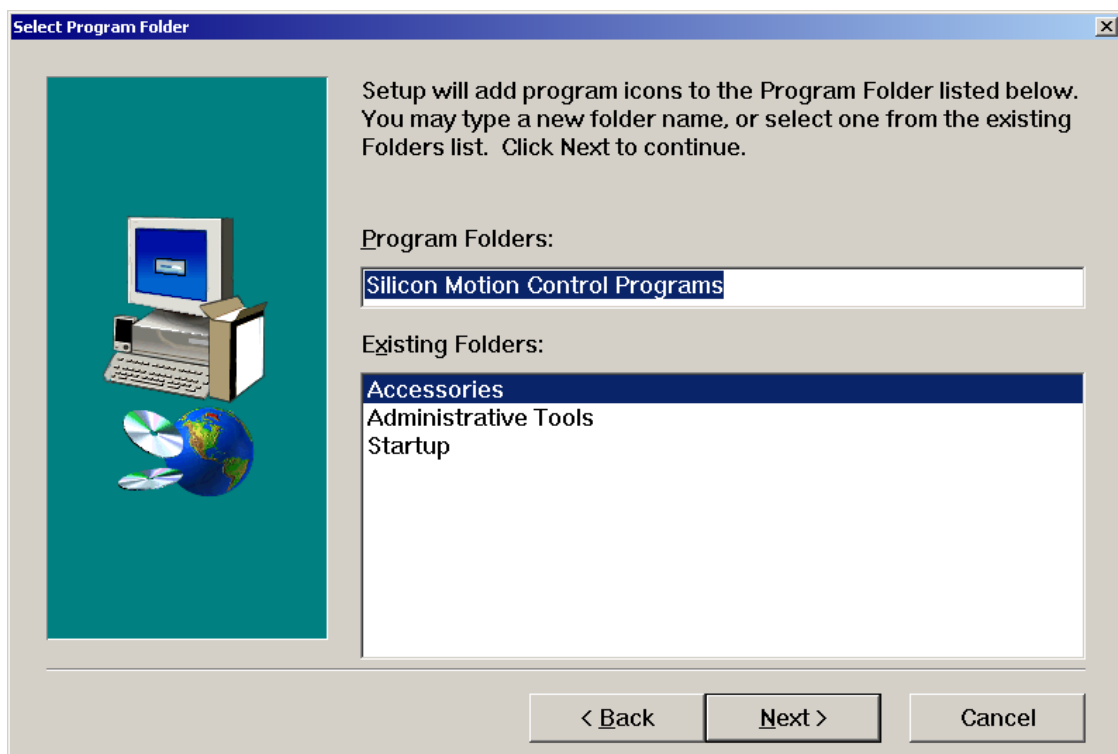
Press "Finish" in the "Setup Complete" window:
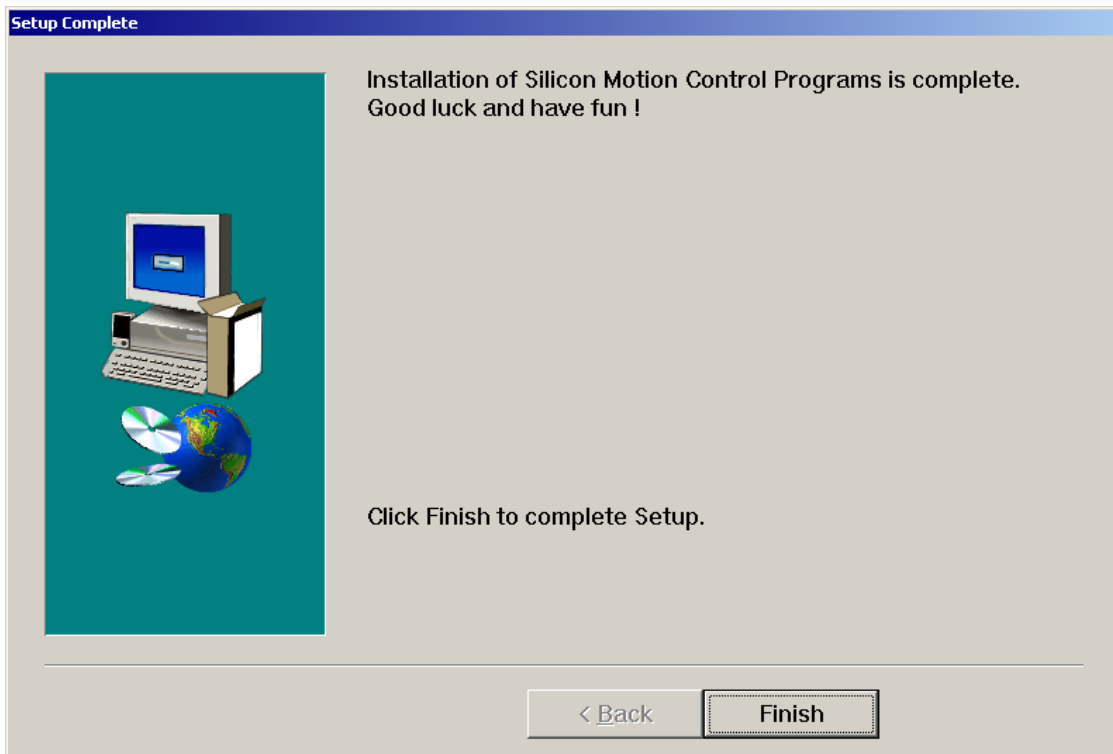
The Control Panel is now installed.

5.3   Lynx3DM+ Controller Video Input Driver Installation

The video capture driver is located at:
ftp://ftp.prosoft.ru/pub/Hardware/Fastwel/CPx/VIM301/Software/Drivers/.

In Windows XP/XPe select Start > Settings > Control Panel:
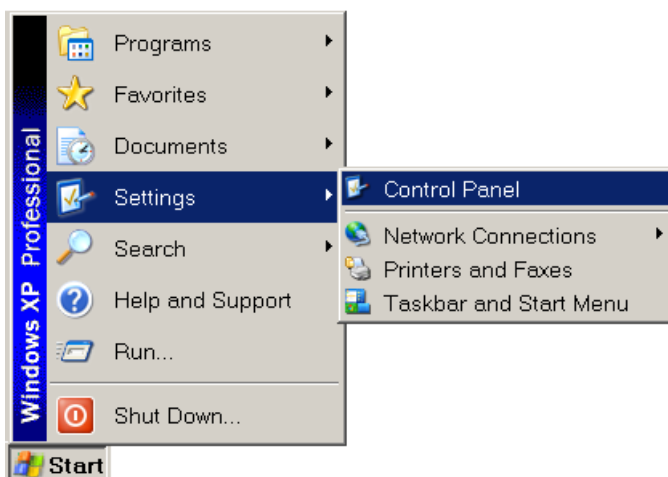
In the Control Panel window select "Add Hardware" item:
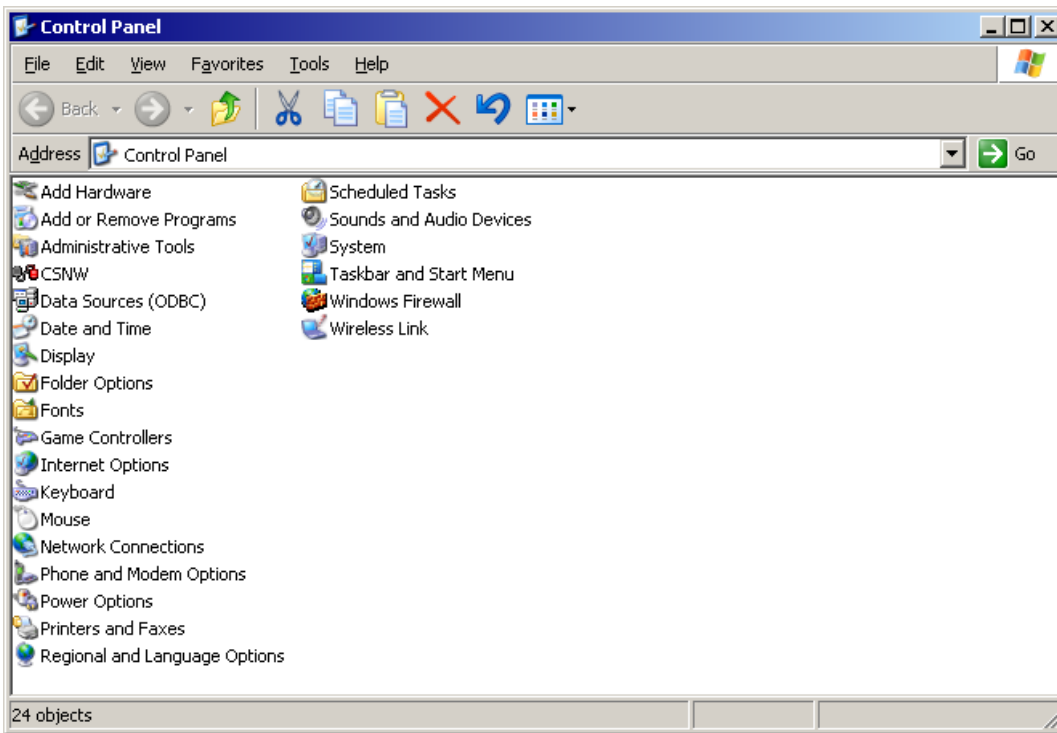
"Add Hardware Wizard" window appears. Click on "Next" button:

If you see "Hardware Update Wizard" windows appear, click "Cancel" to close these windows:

In "Add Hardware Wizard" window select "Yes, I have already connected the hardware" option and click "Next":
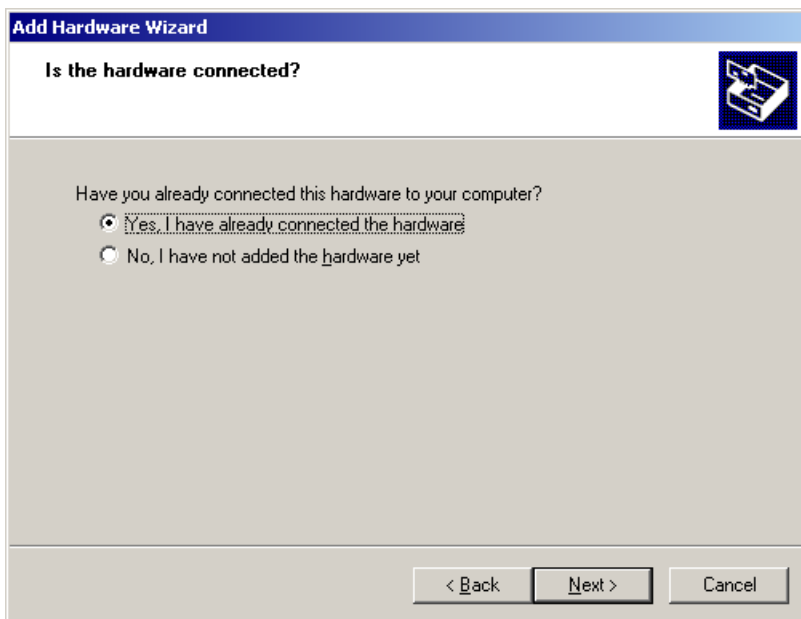
In the next "Add Hardware Wizard" window select "Add a new hardware device" item from the "Installed hardware:" list and click "Next":
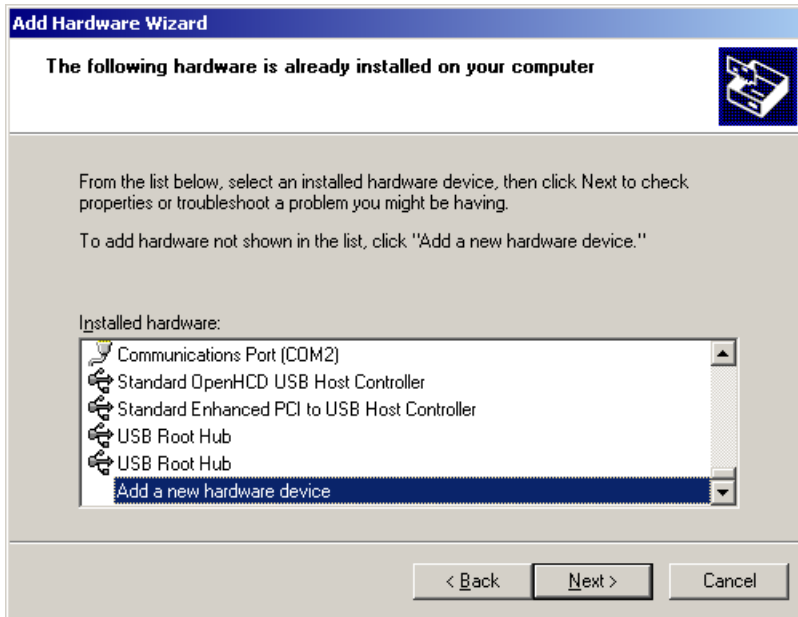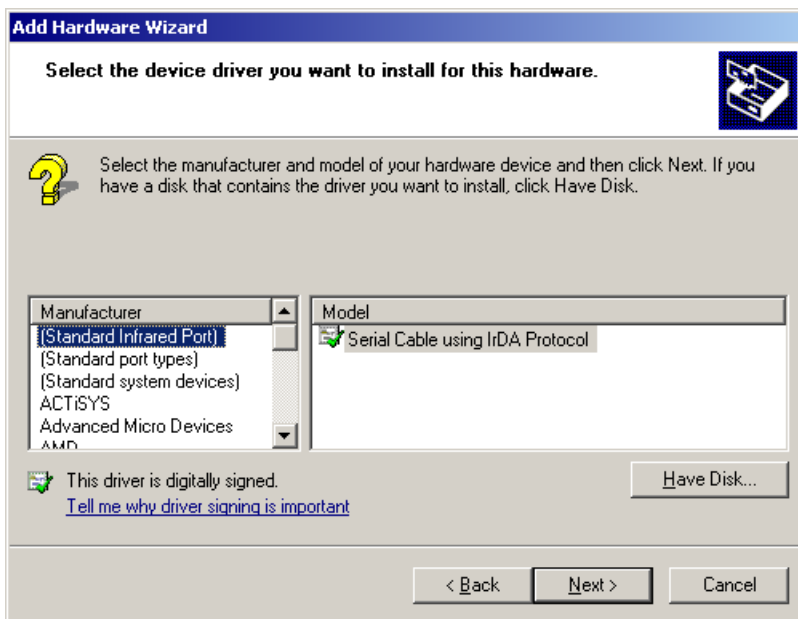

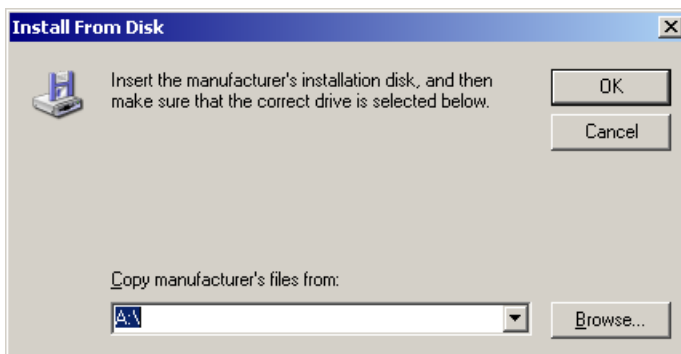In the next "Add Hardware Wizard" window select "Install the hardware that I manually select from a list (Advanced)" option and click "Next":
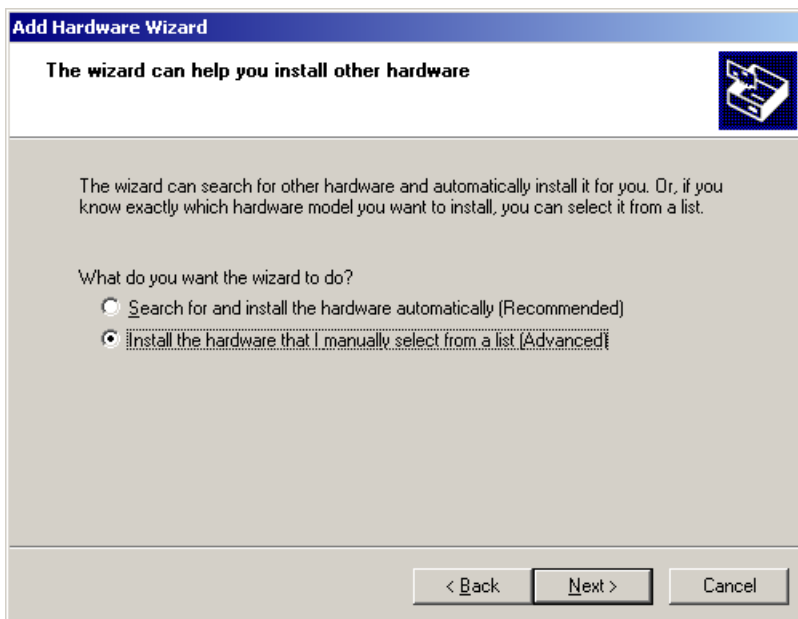
In the opened "Add Hardware Wizard" window select "Show All Devices" item from the "Common hardware types:" list and click "Next":
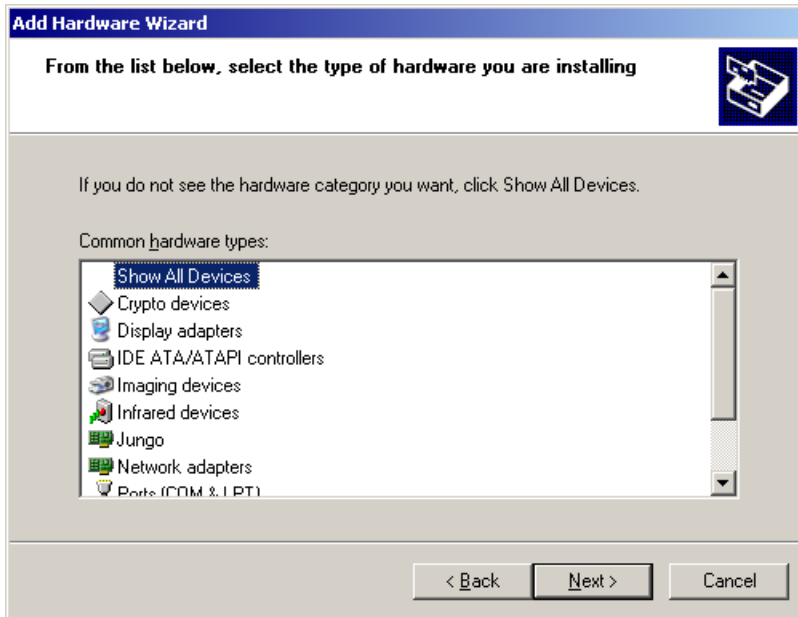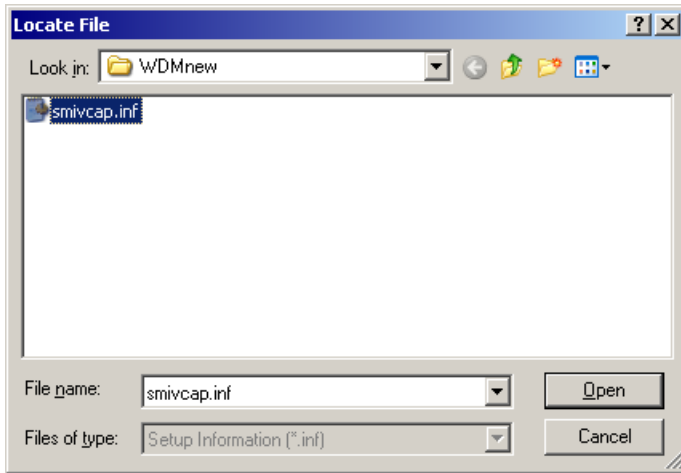
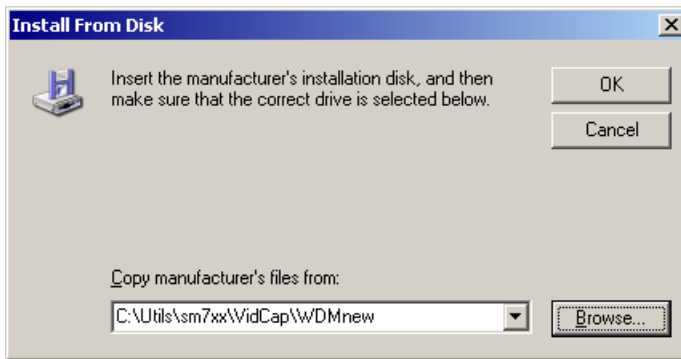In the next "Add Hardware Wizard" window click "Have Disk…" button:

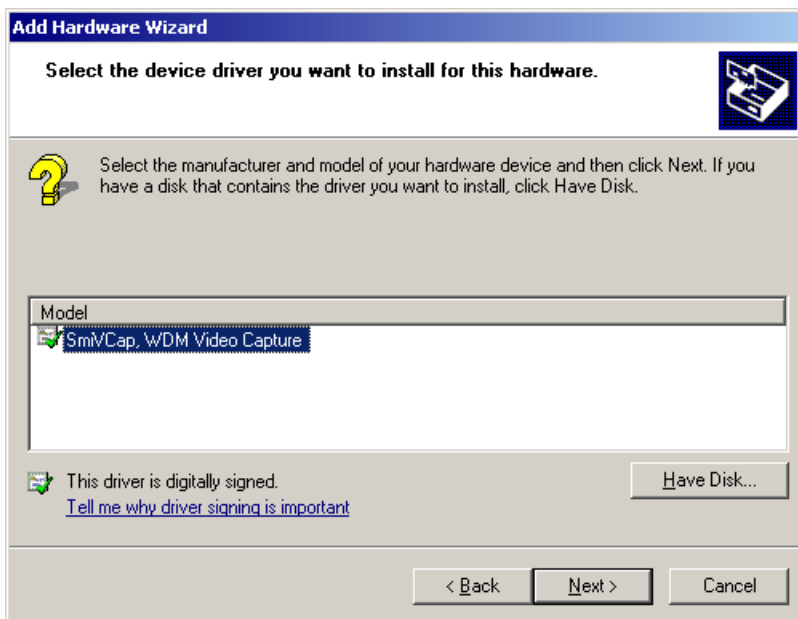In "Install from disk" window click "Browse…":

In "Locate File" window find a folder where the target file is stored and click "Open" (in the sample below the file *smivcap.inf* is located in C:\Utils\sm7xx\VidCap\WDMnew\ folder):
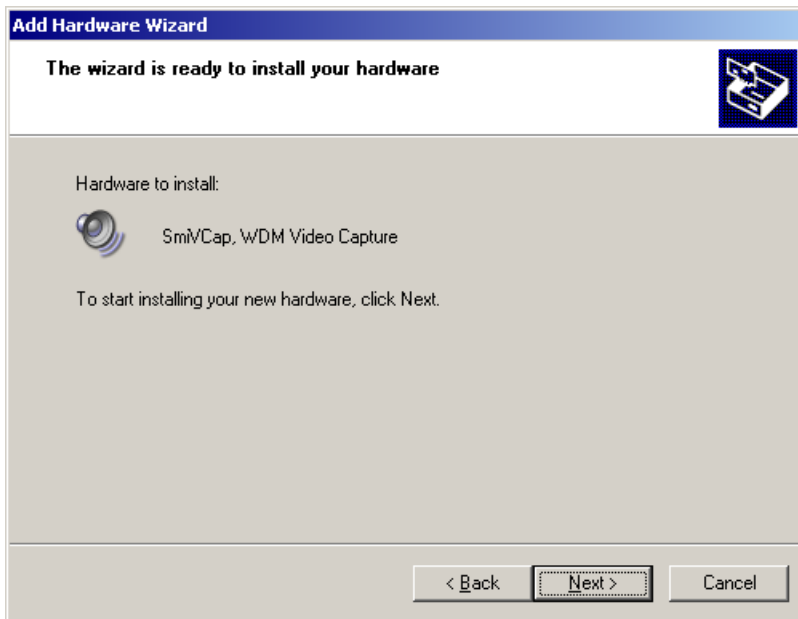

Click "OK" in "Install from disk" window:

In "Add Hardware Wizard" window select "SmiVCap, WDM Video Capture" in "Model" list and click "Next":

In the next "Add Hardware Wizard" window confirm your selection by clicking on "Next" button:

In "Hardware Installation" window click "Continue Anyway":

In the process of installation the operating system may require to locate some missing system files. For the files with ".sys" extention ("*stream.sys*", "*ks.sys*", etc.) it is necessary to specify "SYSTEM32\DRIVERS" folder in Windows XP/XPe system folder, for example "C:\Windows\SYSTEM32\DRIVERS". For the files with ".dll" extention ("*ksuser.dll*", "*tsbyuv.dll*", etc.) – "SYSTEM32" folder in Windows XP system folder, for example "C:\Windows\SYSTEM32".
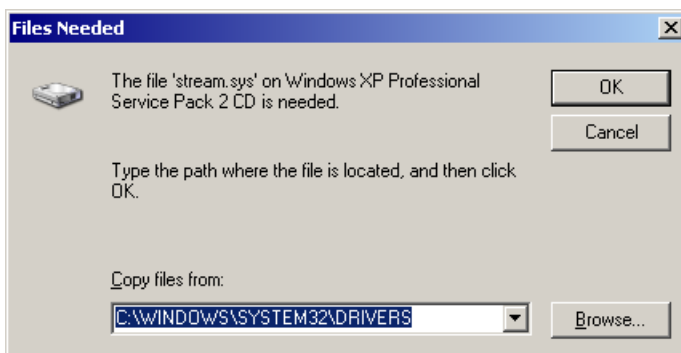
In "Add Hardware Wizard" window click "Finish" to complete the software installation:


## 5.4 Lynx3DM+ Controller Video Input Functional Test

To check the video input subsystem functionality, it is necessary to have a video signal source (PAL, NTSC or SECAM) connected to VIM301-03 or VIM301-05 video input. The sample below describes manupulations with a PAL video signal source.

Copy the folder "DXUtils" from ftp://ftp.prosoft.ru/pub/Hardware/Fastwel/CPx/VIM301/Software/Utils/ folder to the disk, on which Windows XP/XPe is installed (for example, to "C:\").

Start "graphedt.exe" program located in "DXUtils" folder:
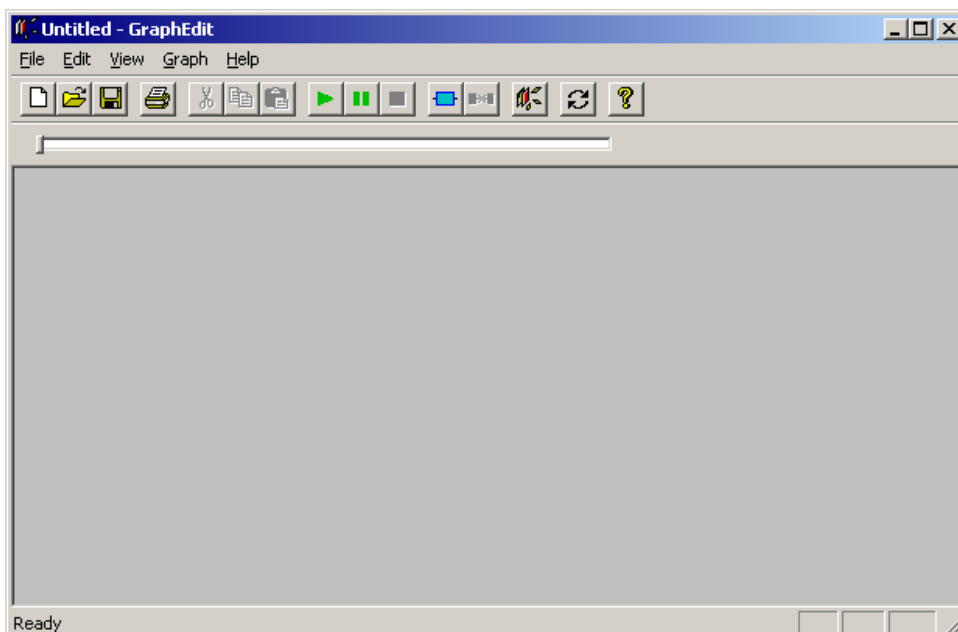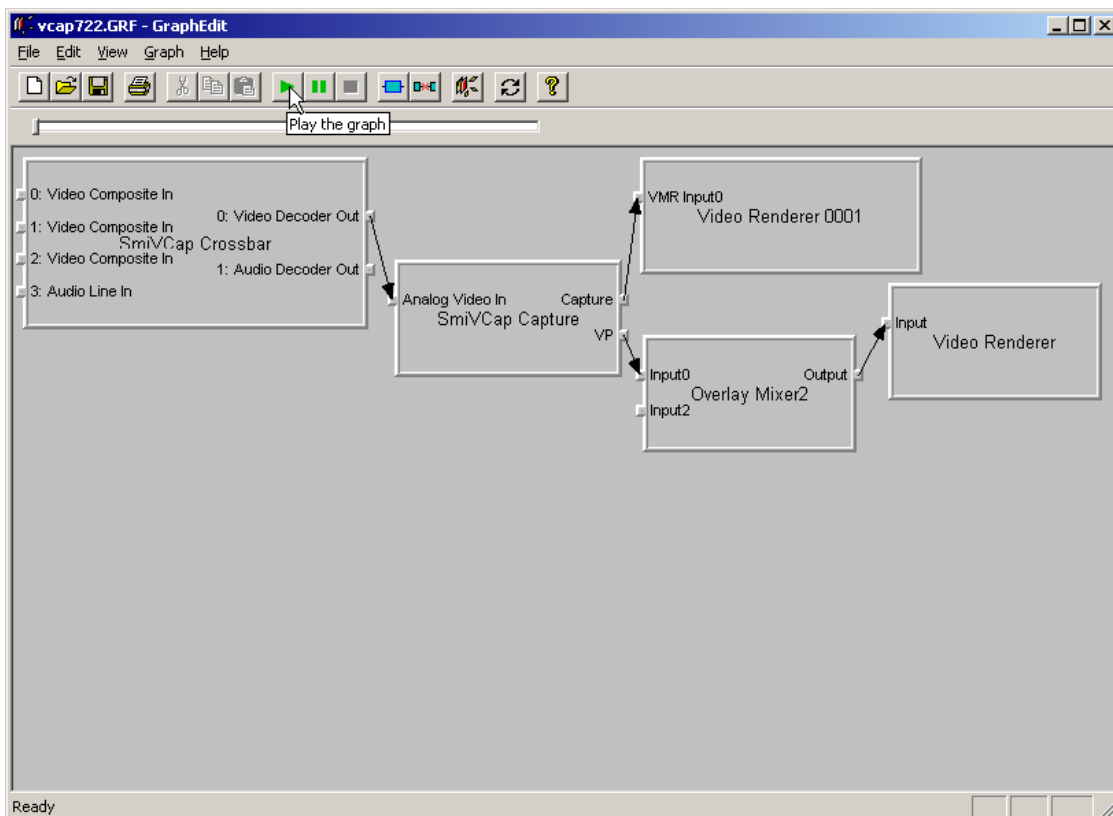
Using the "File" menu open the file "*vcap722.GRF*" located in DXUtils folder:
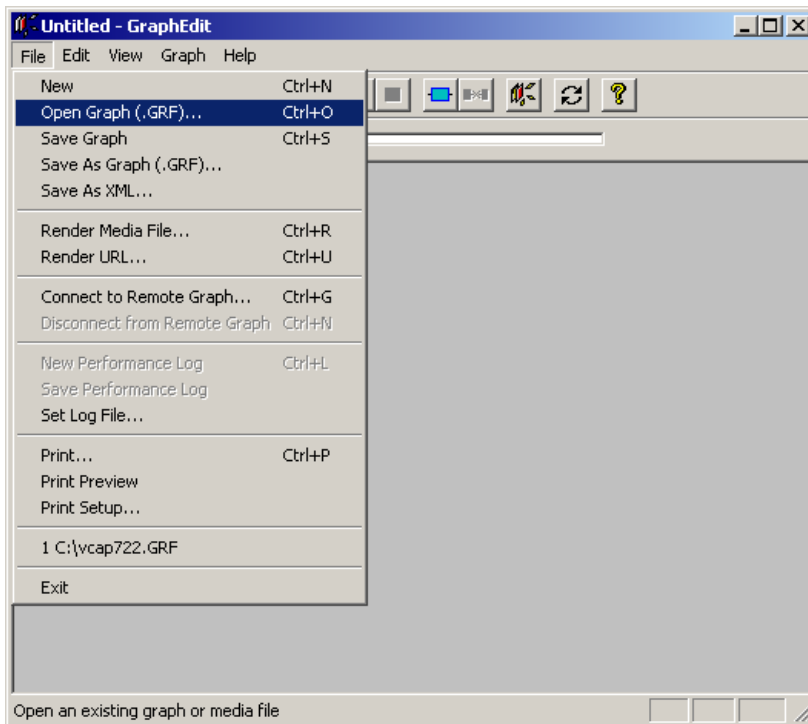
After loading the file *vcap722.GRF*, the graph representing a video capture channel using SmiVCap driver is displayed in the GraphEdit program main window. By default, the input is performed from channel "0".

To start video preview, click the "Play" button:

This opens two new ActiveMovie windows on screen:
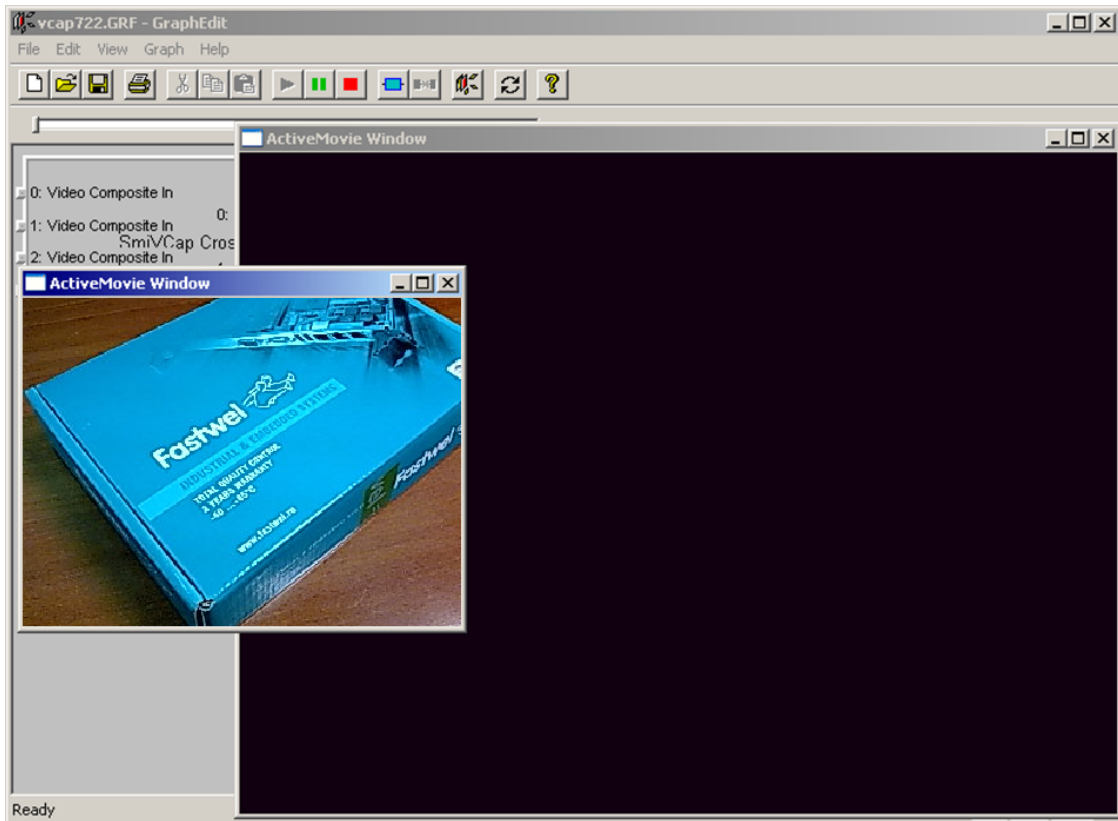
APPENDIX A: DISCLAIMER

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.