» Graphics COMpendium «

Develop faster and stay relaxed!

» The standard for graphics output with Computer-on-Modules (COM)
» Convenient solutions shorten development times
» Embedded success with Kontron
Graphics COMpendium

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Discover the Graphics COMpendium, the new standard for graphics output with Computer-on-Modules (COM). This explains how the optimal interfaces for many different graphics connections can be realized conveniently and quickly.

Get to know each link in the "Graphics Chain" – all of the modules and adapters, the software, additional technologies, Starter Kits and Evaluation boards that Kontron provides to make your developer life easier, particularly when starting off.

Embedded success with Kontron

Profit from the knowledge, the ideas and the industry expertise that our 900 engineers worldwide bring to hardware and software development, for the success of our demanding partners and clients in industry, trade, services and the public sector.

Speed your project and business success with the best-of-embedded competence of Kontron. Embedded know-how from Kontron – for your Embedded Success!

It's the combination that counts: The Graphics Chain as toolkit and design accelerator!
Graphics interfaces at system level

DVI/SVDO
Serial Digital Video Out (SVDO) is an Intel® technology, SVDO is the main interface for the new generation of Serial Digital Video Out (SDVO). From the SDVO signal, one can convert to almost all conceivable interfaces such as HDMI, DVI, LVDS or TTL. Only the SPI interface is not allowed to mess with the interface standard. Due to display devices not supporting TTL/LVDS directly, converters to another interface standard is necessary. Since the SDVO signals are mostly multiplied with an increased bandwidth, this is quite a challenge for the converters available on the market. The maximal range is defined as 5t = 1 cm (1.6 inches).

LVDS
Low Voltage Differential Signaling (LVDS) is a serial, digital interface standard for data transmission. Currently displays support TTL/LVDS directly, so in that case it is a matter of implementing some adapters. LVDS supports a high bandwidth even at shorter distances. LVDS converters use a common mode signal range of ±200mV, while at the same time they are very low at the external electric field, making this a stable interface. The maximum range is recommended as being around 5 t = 1.675 inches. For LVDS, Kontron and other manufacturers use the 32 interface.

PEG/ADD2
PEG and ADD2 (AXI-based DisplayPort) are interfaces that are especially intended for the use of dedicated graphic cards. The graphics images in the beginning are in the graphics card (GPU), and then output to the monitor (integrated in the system level). PEG supports a high bandwidth even at shorter distances. PEG converters use a common mode signal range of ±200mV, while at the same time they are very low at the external electric field, making this a stable interface. The maximum range is recommended as being around 5 t = 1.675 inches. For LVDS, Kontron and other manufacturers use the 32 interface.

Graphics interfaces for external devices

Unifying connector systems and longer transmission distances are defined to graphical interfaces for external devices. Because computers usually do not support these interfaces internally, converters may be necessary. There are adapters that are electrically backwards compatible with existing interfaces. However, they might also be used as converters at system level.

DP
DisplayPort (DP) is based on the specification of DVI. For use at the system level, the system board is equipped with a power supply and it is necessary that these converters are able to handle the power supply of the interface card. However, the system board may be used as a converter to SDVO at system level.

DVI
Digital Visual Interface (DVI) is a generic term presented by Intel® for a graphic interface that can transmit SDVO, DVI-S, DVI-I, or HDMI. However, DVI-I does not specify that all interfaces shall be always transportable.

HDMI
High Definition Multimedia Interface (HDMI) is a widespread use in the entertainment industry. HDMI exists in several versions from 1.2 up to 1.4 and bundle the system signals together. HDMI is also used in cases where the system signals shall be transmitted without any loss. Due to a high bandwidth, HDMI is mostly used. In practice, the HDMI signal is used, adapters from HDMI to DVI-I can be realized simply and inexpensively.

The maximum transmission range is defined as 6.5 meters, but up to 10 meters is possible if loss compensation is used. The connectors are defined for four different classes according to HDMI 1.3. Each class is specified, and the maximum bandwidth for each class is also specified. HDMI supports both analog and digital. HDMI supports hot-plug.

DisplayPort
DisplayPort (DP) is a new, serial and digital standard that logically extends DVI. DisplayPort is a serial video interface that further data such as audio can be transmitted on the same channel from the display device to the image source. Even the transmission for several displays can be realized over a DisplayPort. DisplayPort defines a connector with great fixing possibilities and it is directly supported by the newest Intel® chipsets. The range is defined up to around 45 meters, the maximum electrical loss is 6%. Dual-mode DisplayPort (DP+), offers the possibility to output DVI and HDMI signals over a DisplayPort connection in one and the same cable. Further it also supports the high-quality lossless uncompressed passive adapters from the DisplayPort to DVI and HDMI. The DisplayPort interface normally offers this functionality at system level.

TMS
Transition Miniature Digital Signaling (TMS) was developed by Silicon Image in order to transport compressed untagged data digitally and seamlessly to a device. TMS is an electrical transmission technique and therefore not as a loadable communications interface, but rather the basis for SDVO and HDMI.

Benefits at a glance

More convenient modification – means faster to market!

Costly integration and adaptation of graphic displays is a thing of the past, you will certainly find what you are looking for with Kontron. Convenience and accuracy, given these optimum preconditions it is still worthwhile for you to develop complete, customizable and complex graphic adapters.

Parallel hardware and software development

The Kontron reference makes time-saving, parallel hardware and software development possible. Kontron’s Hardware Description Language (HDL) is a hardware description tool. This allows early software development on a hardware platform that is very close to the final product. The Starter Kits and the graphic adapters are not only near-accurate. Moreover the hardware developers are optimally supported through circuit diagrams and layouts that are free of charge. The inclusion of complex display solutions is immensely simplified.

Tested layouts and circuit diagrams

The use of tested circuit diagrams also simplifies the checking and testing of new market launches. Calculate yourself whether, given these optimum preconditions it is still worthwhile for you to develop complete, customizable and complex graphic adapters.

The direct road to the instant prototype

Complete solutions for computer-on-modules are also available for immediate development can start immediately with the selection of suitable hardware and software displays. A working prototype can be presented quickly.

Evaluation Boards for Computer-on-Modules

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<th>Computer-on-Module</th>
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**Requirements:**

- signals from nanoETXexpress to ADA-COMeType1-FFC30, 34120-0000-00-2 (Type 2)
- Pin-out Type 10
- COM Express® compatible ultrasmall, ADA-COMeType1-FFC30,
- Routes optional SDVO
- COM Express® FFC30 and nanoETXexpress
- Requirements: Output Connector: FFC30 cable to PEG (for ADD2 cards)
- Input Connector: Function: Article No.:

**Adapters:**

- **Addin-Card-DP** ADA-SDVOB-LVDS x (ADA-COMeType1-FFC30 reqd.) x (ADA-COMeType1-FFC30 reqd.) x x
- **ADD2-CRT-Internal** ADA-COMeType1-Type2 x x
- **ADD2-DVI-DUAL-Internal** ADA-COMeType1-Type2 x x
- **ADD2-DVI-DUAL-Internal-External** ADA-COMeType1-Type2 x x
- **KAB-ADAPT-LVDS** KAB-ADAPT-LVDS x x x x

**Blu-Ray Support (3D):**

- Intel® GMA X4500MHD
- 96006-0000-00-5 (1x DVI)
- 96006-0000-00-4 (2x DVI), 96007-0000-00-2 (18 bit LVDS)
- 96006-0000-00-3 (24 bit LVDS), 96007-0000-00-1 (24 bit LVDS)

**Adapter for DisplayPort to DVI/HDMI available:**

- Kontron COM Express® or ETX® Eval Board
- Output Connector: 40-connector, backlight supply FFCA45/FFC30 cable or on PEG-Port
- Input Connector: 40-connector, backlight supply

**Functional Implementation:**

- 96007-0000-00-0 (40-pin JILI/LVDS)
These interfaces are intended for use at board level in the bus. For this reason, connector systems and cables are usually not defined. Tools and Fieldbus cables/headers, the possible cable length is restricted to system level.

DVI/SDVo

Serial Digital Video Out (SDVo) is an Intel technology, SDVo is one of the technologies belonging to the area of Serial Digital Video Out (SDVo). From the SDVo signal, one can convert to almost every accessible interface such as DVI, HDMI, DP or DSC. The HDI signal is integrated into the chip and requires restrictions. Because display devices do not support DVI/SDVo directly, conversion to another interface is standard technology. Since the SDVo signals are mostly multiplied and synchronized, no restrictions apply for the use of cables and connectors. The max. signal length is defined as 225 cm (7.4 ft).

LVDS

Low Voltage Differential Signaling (LVDS) is a serial, digital interface standard for data transmission. Current generator supports DVI, PCI-E, USB and the like. If such a pool is available in this pool, no conversion is necessary. Due to the bandwidth, only a bandwidth of around 125 MHz and 100 cm can be transmitted in any case, a minimum of around 125 MHz and 100 cm is recommended, for flat foil cables a maximum of around 50 cm is recommended. Due to the bandwidth, only a bandwidth of around 17 cm (6.75 inches), for flat foil cables a maximum of around 50 cm is recommended. LVDS is primarily used in the area of analog-in digital-out converters or serial interfaces.

PEG/ADD2

PEG Express for Graphics (PEG) is a PEG-Express interface that is especially intended for the use of dedicated graphics cards. The PEG interface is first produced in the graphics card, with the use of the interface is already possible (for example DVI, HDMI). PEG is multiplexed with SDVo in current generation of R5 chips. The PEG signal is output via the PEG cards in place of PEG. These cards are usually not limited to 50 cm. This allows conversion to SDVo directly to be used in order to convert SDVo to other interfaces.

oP

The oP (embedded DisplayPort) is based on the specification DisplayPort. For use at the system level, the oP connector is integrated in a field as such power supply requirements are not required by the standard interface. It does, however, also be used at system level.

Digital Visual Interface (DVI)

Digital Visual Interface (DVI) is a generic term promoted by Intel® for a graphic interface that can transmit SDVo. DisplayPort, embedded DisplayPort, DVI or HDMI are defined. However DVI does not specify that all optional interfaces must be available to ON modules. The max. signal length is defined as 225 cm (7.4 ft).

HDMI

High Definition Multimedia Interface (HDMI) is in widespread use in the entertainment industry. HDMI exists in several versions from 1.3 and higher. In order to depict the characteristics of the interconnects, this interface is characterized by the depth of the digital transmission. HDMI is defined to a maximum of around 50 cm. Since there are many versions of HDMI, DVI is also used. HDMI must be correctly selected. HDMI supports hot plug.

DisplayPort

DisplayPort is a new, serial and digital standard that is basically equivalent to HDMI. It is in the meantime available in DisplayPort Type 1, Type 2 and Type 1.5, which is the Automotive Connection System. HDMI is set to a fixed standard, whereas DisplayPort interfaces must be adjusted to the requirements of the display manufacturers.

Protocols and Codes

JILI

JILI (Joint Industry Interface Forum) is a newly developed standard for the implementation of JILA onto parts of the DisplayPort. It is also possible to integrate JILI onto a DisplayPort card. On the contrary, the display power is not a goal, but is indicated by the display manufacturer. This implies that the display manufacturer needs to take care of the behavior. It is not indicated by the display manufacturer. This implies that the display manufacturer needs to take care of the behavior.

EDID

The VESA Extended Display Identification Data (EDID) standard defines a data structure that describes the characteristics and capabilities of a monitor. The definition, however, is too limited to extend the EDID and HDMI. However, EDID must be correctly selected. HDMI supports hot plug.

DisplayID

DisplayID is the most current VESA standard for non-graphical display identification. It is in the meantime available in DisplayPort Type 1, Type 2 and Type 1.5, which is the Automotive Connection System. HDMI is set to a fixed standard, whereas DisplayPort interfaces must be adjusted to the requirements of the display manufacturers.

HDCP/DPCR

High bandwidth Digital Content Protection (HDCP) and DisplayPort Content Protection (DPCR) are access control mechanisms that protect digital content from being copied or transported to another display device. HDCP is defined for DVI, HDMI, and DisplayPort, but not for DSC. In contrast, DPCR prevents the digital copying of Blu-Ray media and the transmission for several displays.

VMV

VMV is a codec from Microsoft® for media consumption. It is used in the area of DVI-D and HDMI. EDID must be correctly selected. HDMI supports hot plug.

MPEG

MPEG is a standard for media consumption. It is used in the area of DVI-D, DVI-A and HDMI. EDID must be correctly selected. HDMI supports hot plug.

WMV

WMV is a codec from Microsoft® for media consumption. It is used in the area of DVI-D and HDMI. EDID must be correctly selected. HDMI supports hot plug.

DirectX/OpenGL

Both DirectX software interface that permits graphic card vendors to be addressed in one standard for the implementation of the manufacturing of a 3D graphics calculations. This can be executed and Windows® and OpenGL with the help of Microsoft®. OpenGL is an open standard from the Silicon graphics Inc. OpenCL

OpenCL is a software interface that enables any application to access the computing power of GPU for non-graphical operations. It is based on the open standard for the implementation of the OpenCL.

Codes

Codecs are specific logical descriptions of pictures or films with the help of mathematical methods. Codecs, in general, encode sounds in, in title including storage space and allows the recording of images, the storage space and allows the recording of images, is a goal that is achieved by the codec. Codec is a goal that is achieved by the codec. Codec is a goal that is achieved by the codec. Codec is a goal that is achieved by the codec.
Kontron Academy

Kontron seminars offer a solid basis for the use, the development and the design-in of Kontron boards. Essential seminar objectives are the practical use of development environments and imparting knowledge of the entire development process including programing interfaces. With its wide selection of seminars, Kontron optimally covers the many hardware and software requirements in development. Find out more at: www.kontron.com/academy

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