

## » 2011 Motherboards & SBCs «

- » Pico-ITX 2.5" to 3.5" SBCs
- » Mini-ITX to full size ATX
- » Accessories



## » Single Board Computers «



### Advantages of SBCs

Single Board Computers (SBCs) are designed to work right out of the box, allowing development to begin immediately and the final application to get to market quickly.

Kontron SBCs are highly integrated with all key system interfaces and functionalities already onboard. This means that only application-specific I/O needs to be added for the complete solution. Readily available standard accessories make customization easy and delivers efficient system set-up and system development – no specialized R&D knowledge or extra development time is required.

#### Plug and Go.

SBCs are standard, off-the-shelf computer boards that come in various industry compliant form factors. Some can deliver customized features for the total solution when paired with PCI-104 expansion boards.

Whatever your needs are – low power consumption with passive (fanless) cooling or high CPU speed, excellent graphics performance or a full featured industrial PC on

an extremely small footprint – you will find it here. Additionally, all Kontron SBCs offer scalability and a long life-time as well as superior MTBF. These benefits apply to both Kontron's JRExplus family of 3.5-inch SBCs as well as the Pico-ITX 2.5-inch SBCs.

#### Kontron is your partner every step of the way.

Kontron knows that keeping tabs on a designed in element of the application is key to safeguarding the overall investment in the solution. We know that communication between partners is essential and we strive for this at all stages of the product lifecycle. Starting with the availability of prototype Early Field Test Units (EFTs), Kontron gets sample units into the hands of early adopters. As the products go into production, Kontron keeps you informed about HW and SW revision updates with regular Product Change Notifications (PCNs). When it becomes necessary to discontinue a product, you'll receive an official End of Life (EOL) Notification with the last time buy (LTB) and last time delivery (LTD) schedule, as well as guidance from your Kontron representative about recommended replacements and migration options.

### JRExplus 3.5" SBCs



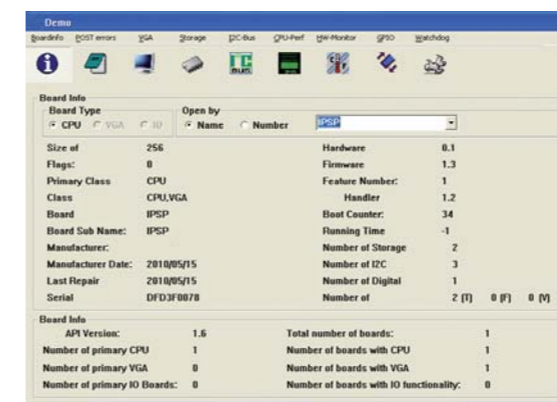
- » From AMD-LX800 up to Intel® Atom™
- » Chassis re-use
- » Expansion via PCI-104

### Pico-ITX 2.5" SBCs



- » Intel® Atom™ and AMD Ultra Low Power CPUs
- » Industry standard pico-ITX form factor
- » Extensive onboard features
- » High performance combined with lowest power consumption
- » Ideal for ultra small and mobile applications

### Additional tools for easy and effective platform development

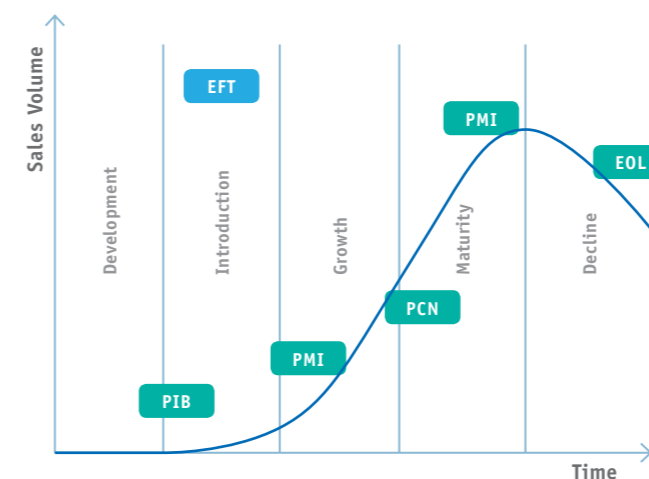


The API Demo offers board status information.



The Display Editor allows easy display integration.

### Complete lifecycle management for all SBCs



- » **PIB** = Product Introduction Bulletin contains regular information about introduction status of new products
- » **EFT** = Early Field Test, means availability of engineering prototypes for interested customers for pre-implementation
- » **PMI** = Product Marketing Information is a regular information about product news, special pricing, etc.
- » **PCN** = Product Change Notification, includes information about technical changes (HW & SW), improvements and restrictions when necessary
- » **EOL** = The End of Life Notification informs customers about LTB (Last Time Buy) and LTD (Last Time delivery) schedule and recommended replacements

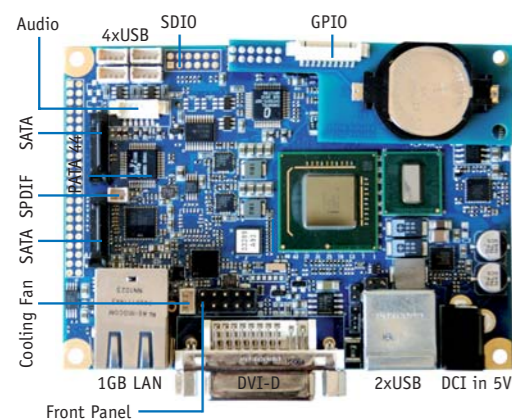
**Safety for your investment decisions!**

reduced  
to the max!

## Pico-ITX – the small, powerful and cost-effective 2.5" SBC family.

With the Pico-ITX form factor, Kontron supports a new definition of small (100 x 72 mm), powerful and cost-effective 2.5" SBCs. The *pITX-SP*, Kontron's first 2.5" SBC based on the Pico-ITX in-

dustry standard, features the Intel® Atom™ Z5xx series processors US15W chipset, along with multiple I/O options and microSD-Card boot.



### Pico-ITX standard cooling concept – perfect for Box-PC-Design.



### Kontron's Pico-ITX

ACCESSORY  
KIT  
AVAILABLE



### *pITX-SP*

- » Intel® Atom™ Z5xx series processor up to 1.6 GHz
- » Small Form Factor 10 x 7.2 cm
- » Intel® US15W chipset
- » Low power consumption with the latest energy-saving 45nm technology



### 2,5" Pico-ITX



#### *pITX-SP*

<b>CPU</b>	Intel® Atom™ Z510 / Z530 1.1 / 1.6 GHz
<b>Chipset</b>	Intel® System Controller Hub US15W
<b>DRAM</b>	1x DDR2 SO-DIMM up to 2 GByte
<b>Audio</b>	HD Audio analog / SPDIF *
<b>USB</b>	6x USB 2.0 (2x at front panel, 4x on board) *
<b>Serial Ports</b>	-
<b>Ethernet</b>	Intel® 82574L Gigabit Ethernet
<b>I/O Features</b>	8 Bit GPI/O TTL *, SDIO *
<b>Graphics Controller</b>	Integrated decoders in Intel® System Controller Hub US15W for MPG2 and H.264 / MPEG-4 AVC
<b>Graphics</b>	DVI-D, JILI30 single channel LVDS (24 Bit) interface
<b>Dimensions (H x W x D)</b>	100 x 72mm (Pico-ITX)
<b>Special Features</b>	TPM 1.2 *, 1x microSD socket *
<b>Temperature/Humidity</b>	Operating: 0°C - 60°C (32°F ~140°F) Storage: tbd
<b>Power Consumption (typ.)</b>	5V DC, 5W typical
<b>Storage</b>	2x SATA II (chipset option) *, 1x PATA 44 Master / Slave *, mSD-Card-Slot



#### *KTLX800/pITX*

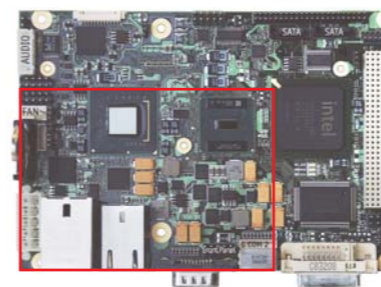
<b>CPU</b>	AMD Geode™ LX800 / 0.5 GHz
<b>Chipset</b>	CS5536 AD
<b>DRAM</b>	1x DDR SODIMM up to 1 GByte
<b>Audio</b>	Audio Codec 97 (AC97) Controller
<b>USB</b>	4x USB 2.0
<b>Serial Ports</b>	2x RS232 (RX/TX)
<b>Ethernet</b>	Intel 82551ER PCI 10/100 Mbit LAN
<b>I/O Features</b>	16 configurable GPIO
<b>Graphics Controller</b>	internal graphics controller
<b>Graphics</b>	CRT (DSUB-15) , JILI30 LVDS (24 Bit) interface
<b>Dimensions (H x W x D)</b>	100 x 72mm (Pico-ITX)
<b>Special Features</b>	1x microSD socket *
<b>Temperature/Humidity</b>	Operating: 0°C - 60°C (32°F ~140°F) Storage: tbd
<b>Power Consumption (typ.)</b>	5V DC, tbd
<b>Storage</b>	1x SATA II *, mSD-Card-Slot

For full technical details including datasheet and manual visit [www.kontron.com](http://www.kontron.com)

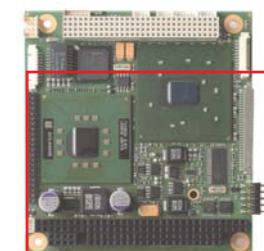


## Small Size Embedded SBCs

Highly integrated, compact SBCs support quick time to market for your application



JRExplus 3.5"  
(147 x 102 mm)



PC/104  
(90 x 96 mm)



Pico-ITX 2.5"  
(100 x 72 mm)

## PC/104

**Try a JReplus 3.5-inch SBC today and kick start your embedded design.**

The lower socket is used as JILI (LVDS) interface for connecting LCD flatpanels. The on chip Graphics+ Controller supports CRT and TFT. A Kontron chipDISK (IDE compatible flash disk) with capacity up to 1 GByte can be plugged directly onto the 2.5" harddisk interface. If you're transitioning from a previous MOPS solution, it's easy. All MOPS PC/104 SBCs provide the same pinout for keyboard, COM1 and COM2, 44pin IDE, 2x USB, LPT as well as LAN. Additional PC/104 products are available as part of Kontron's MICROSPACE product family.

- » Short development time
- » Reduction of manufacturing costs
- » Best price-performance ratio
- » Maximum system reliability
- » Space-saving



## JRexplus-DC

CPU	AMD® Geode™ LX800	Intel® Atom™ N270 processor
CPU Clock	500 MHz	1.6 GHz
Front Side Bus	-	533 MHz
Cache	L2: 128 KByte	L2: 1x 512 KByte
BIOS	Phoenix™	AMIBIOS®
Chipset	AMD CS5536	Intel® 945GSE, Intel® ICH7M
DRAM	1 GByte DDR SDRAM	2 GByte DDR2 SDRAM
DRAM socket	SDRAM-SODIMM	SDRAM-SODIMM
CompactFlash	yes	yes
Audio	AC'97	HD Audio
Hard Disk	EIDE (UMDA-66)	EIDE (UMDA-133)
USB	4x USB 2.0 (2 on front panel, two internal)	6x USB 2.0 (2 on front panel, 4 internal)
Ethernet	1x 10/100/1000	1x 10/100, 1x 10/100/1000
Graphics Controller	AMD on chip graphic	Integrated with Intel® GMA950 (DirectX® 9, PS 2.0)
Graphics Memory	on-chip shared 8-256 MByte VRAM	shared memory
Graphics	CRT/LCD, JILI30 (LVDS)-interface (optional), TTL (FLEX32)	CRT/DVI, JILI30
Supply Voltage	5V single supply	ATX / 5V single supply
IEEE 1394 Firewire	-	-
Serial Channels	1x DSUB RS232, 1x RS232 internal	1x DSUB RS232, 1x RS232 internal
Drives	1x 1.44/2.88	-
Watchdog	yes	yes
System Monitoring	yes	yes
Expansion	PCI-104 compliant (PCI)	PCI-104 compliant (PCI), MiniPCIe
Special Features	2x SATA, 1x PATA, CF-Socket	2x SATA, 1x PATA, CF-Socket, TPM 1.2, 4bit Digital I/O, Dual Independent Display
Power Management	APM 1.2 / ACPI 2.0	APM 1.2 / ACPI 2.0
Cooling	fanless	passive / active depending on application
Dimensions H x W x D	102 x 147 mm	102 x 147 mm
I/O Expansion Type	PCI-104 compliant (PCI)	PCI-104 compliant (PCI)
Operating Temperature	0°C to 60°C	0°C to 60°C
RoHS compliant	yes	yes

## PC/104 Plus CPUs



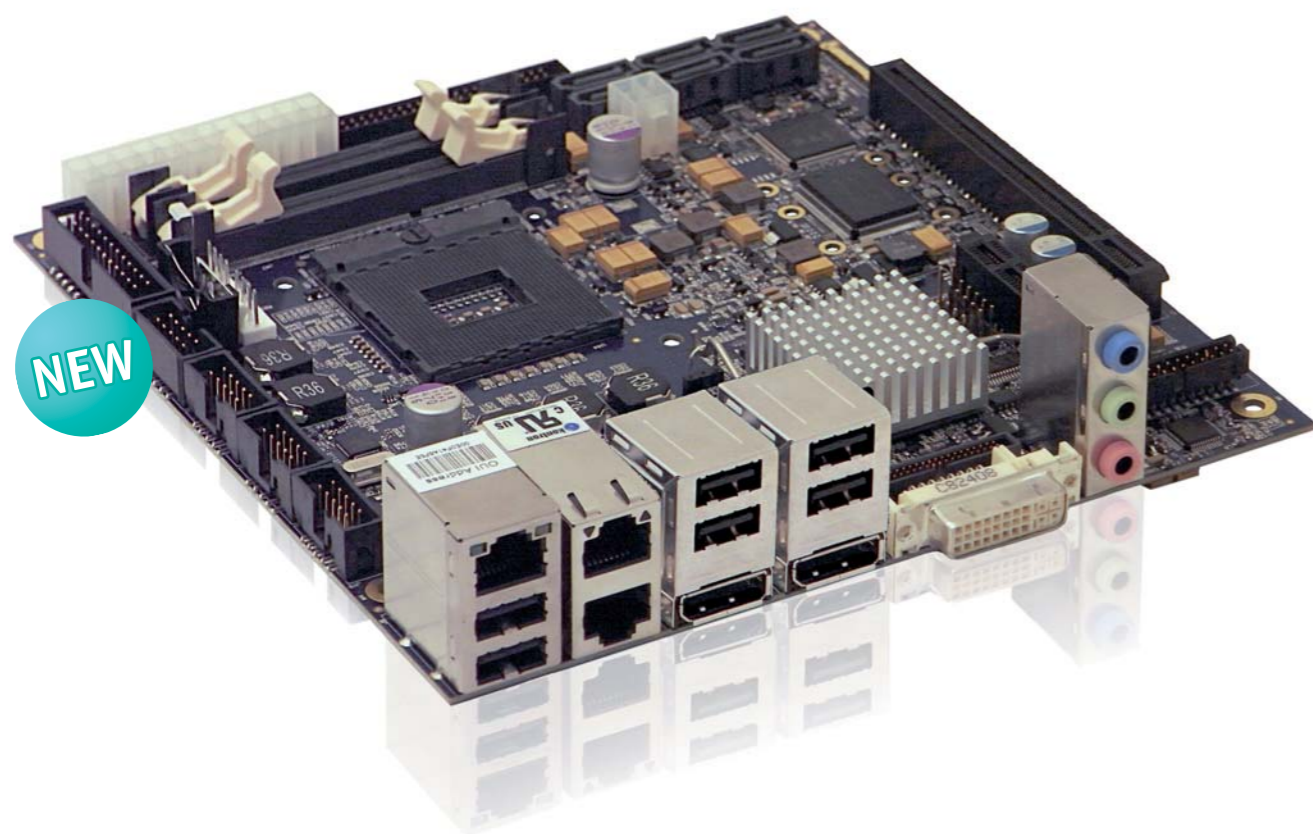
See MICROSPACE product family  
for additional PC/104 products.

## MOPSIcdLX

Processor/Performance	AMD Geode™ LX800 / 0.5GHz
Chipset	CS5536 AD
Bus	PC/104-Plus: Option
Memory	128-1024 MByte
Video Controller	int. graphic Controller
Video Memory	16 MByte (UMA)
LCD Interface	24bit, 240 x 320 to 1600 x 1200
CRT Interface	yes
IDE Interface P-ATA	1x EIDE (UDMA-33)
IDE Interface S-ATA (SII 3132)	-
COM1 / COM2	RS232C / RS232C
COM3 / COM4	-
USB	2x 2.0
Ethernet	10/100 BASE-T
Sound	-
RTC Battery onboard	-
Standard Temperature	0°C to +60°C
Extended Temperature	-
Dimensions (W x L in mm)	90 x 96
Special Features	chipDISK, Lan Boot, Watchdog, JIDA-Support, JRC-Support, Dark Boot, 32 MByte - 1 GByte

[kontron.com/sbc](http://kontron.com/sbc)

## » Longlife Motherboards «



### KTQM67/mITX Mini-ITX Motherboard

with 2nd Generation Intel® Core™ i7-,i5,-i3 processors  
2Core and 4Core CPUs and Intel® QM67 Chipset



Supports  
Intel AMT 7.0

### KTQM67/mITX

2nd Generation Intel® Core™ i7-,i5,-i3 processors – 2Core & 4Core CPUs & Intel® QM67 Chipset

- » Long term availability on embedded Mini ITX-Motherboard
- » High graphics performance incl. 2x Display Port, LVDS & DVI
- » 6x SATA (incl. 2x SATA III), 14x USB 2.0, 3x Intel® GB LAN incl. Intel® AMT 7.0 support
- » mSATA interface highspeed compact SSD storage
- » ATX and single 12V power supply
- » Gen 2.0 PCIe x16 & PCIe x1
- » Unique multipurpose KT Feature Connector for the tailoring of your required I/Os

#### Typical Applications

- » **Digital Signage:** High graphics performance and multi-display support
- » **Gaming/POS/POI:** High graphics and high CPU performance
- » **Medical:** High Graphics performance & longevity
- » **Industrial Automation:** wide range of I/Os and longevity
- » **Future-oriented Devices** due to Display Port and mSATA/compact SSD support

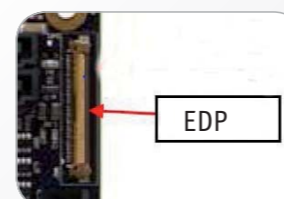


### Wide range of interfaces: KTQM67/mITX

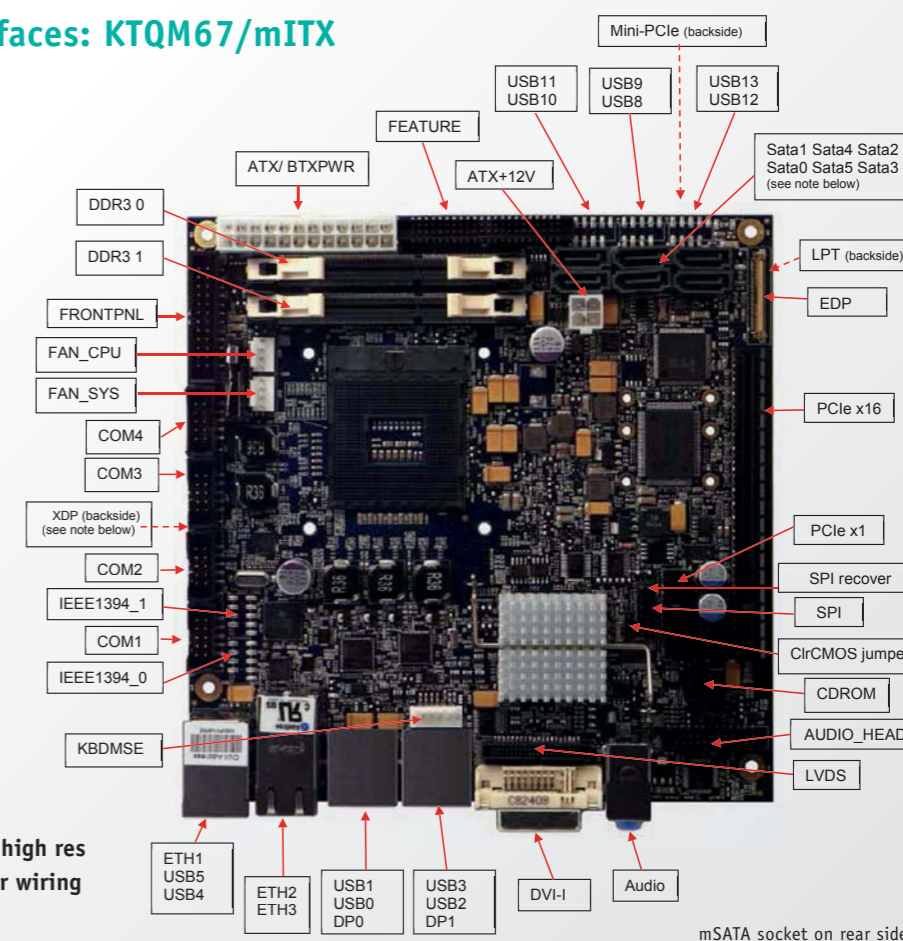
#### mSATA interface for compact SSD



#### eDP



- » High through put to support high res
- » Less wires than LVDS – easier wiring
- » Less EMI



mSATA socket on rear side

Motherboards

Kontron offers a broad range of high-quality embedded motherboards from Mini-ITX to full size ATX. This variety of motherboards serves the needs of our customers in the industrial and medical fields, point of sales technology, lottery systems, gaming and other applications. These products are based on state-of-the-art processors and chipset platforms and utilize advanced technology components.

These embedded and industrial motherboards follow international industry size standards with well-defined mounting holes and standard I/O bracket areas. In addition, Kontron offers value-added services like product longevity, detailed documentation, display support and complete life cycle management. The embedded motherboards offer up to seven years availability from the release date, based on embedded key components.

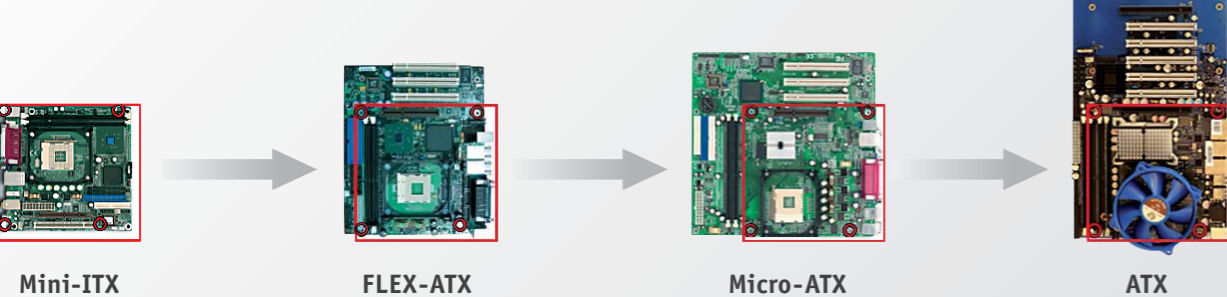
Find more details and feature charts from page 12 to 17.

Services beyond Hardware

- » Up to seven years lifecycle and long term service and support
- » Extensive validation, verification and testing
- » Extended technical support and documentation
- » Flat panel display support expertise including LVDS, DVI, CRT, HDMI and ADD2/PCIe Cards
- » Quick time-to-market with standard form factors
- » Remote hardware and hard disk monitoring/control by original API software
- » Advanced technologies such as solid capacitors and up to 12 multilayer PCBs
- » Boards are tested and approved to UL 60950 – Information Technology Equipment (ITE) for easy validation efforts on behalf of customers and system integrators when system-level products must go through UL / CE safety testing

Embedded Motherboards

Full Mechanical Compatibility from Mini-ITX to Full Size ATX

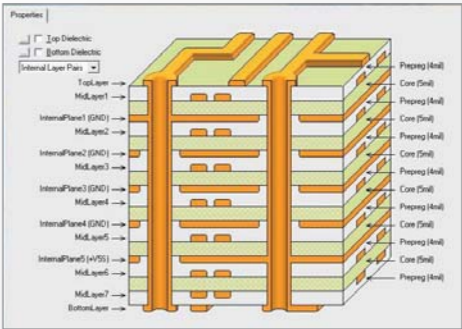


The use of Solid CAPs offers the following advantages:

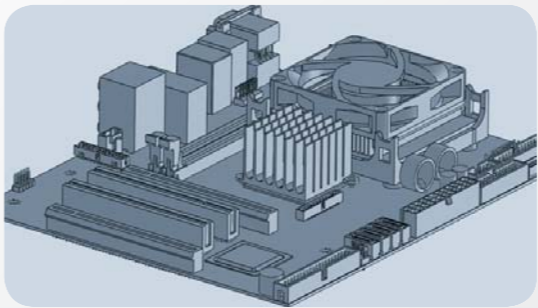
- » Long-life cycle – enhanced MTBF
- » Liquid free – no drying out
- » Improved resistance against higher ambient temperature
- » Optimized electric strength



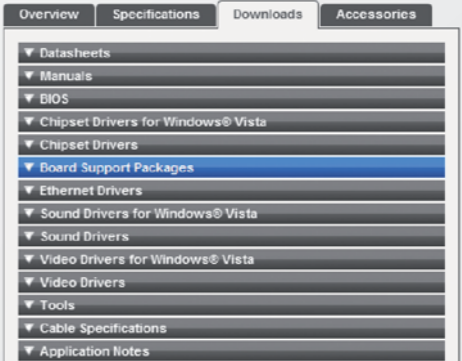
Up to 12 Multilayer PCBs support more features on smaller form factors with the highest signal quality



The availability of 3D-Drawings at early introduction for all available boards allows an instant start of housing design



Extended Documentation and Drivers – ready for download via Website



All Motherboards are designed and tested for Industrial Operating Temperature Range 0-60 °C



All Motherboards are tested for their shock resistance, to be prepared for rugged environments



Embedded Mini-ITX Motherboards

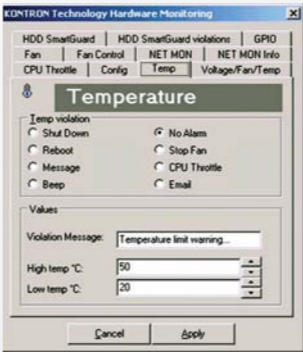
Mini-ITX has become a very successful embedded motherboard form factor. Key features including multi LAN and a wide range of I/O options make these products ideal for many applications. The compact and space-saving footprint (17cm x 17cm) meets the growing need for a small form factor board-level solution and allows the customer to design a compact system without sacrificing the requirement of standard ATX mounting holes and the I/O bracket area.

The Mini-ITX form factor fills the gap between small SBCs (i.e. 3.5" SBCs) and full-size Flex and ATX motherboards.

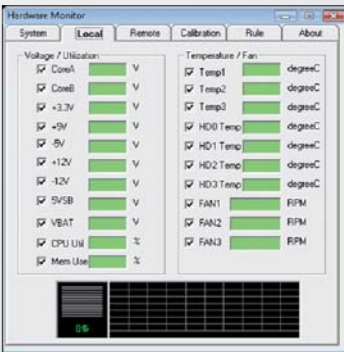
Whatever your needs are – low power consumption with passive (fanless) cooling or high CPU speed, excellent graphics performance, TCO reduction by Intel® AMT remote control or a wide range of extension slots and accessories – you will find it here. Additionally, all Kontron MiniITX boards offer longevity, low to high-end performance and high MTBF.

Additional tools for an easy and effective handling, monitoring and integration

Temperature monitoring example



API's and sample code for Hardware Monitoring, GPIO, Watchdog Timer, Fan Speed Control and SMBUS access



Embedded Mini-ITX Motherboards



986LCD-M/mITX(BGA)



986LCD-M/mITX



KT690/mITX



KT690/mITX (BGA)



KTUS15/mITX - 1.1 / 1.6 GHz



KTGM45/mITX



KTQM67/mITX

NEW: BGA-version with improved price performance ratio!

Supports Intel AMT 5.0

Supports Intel AMT 7.0

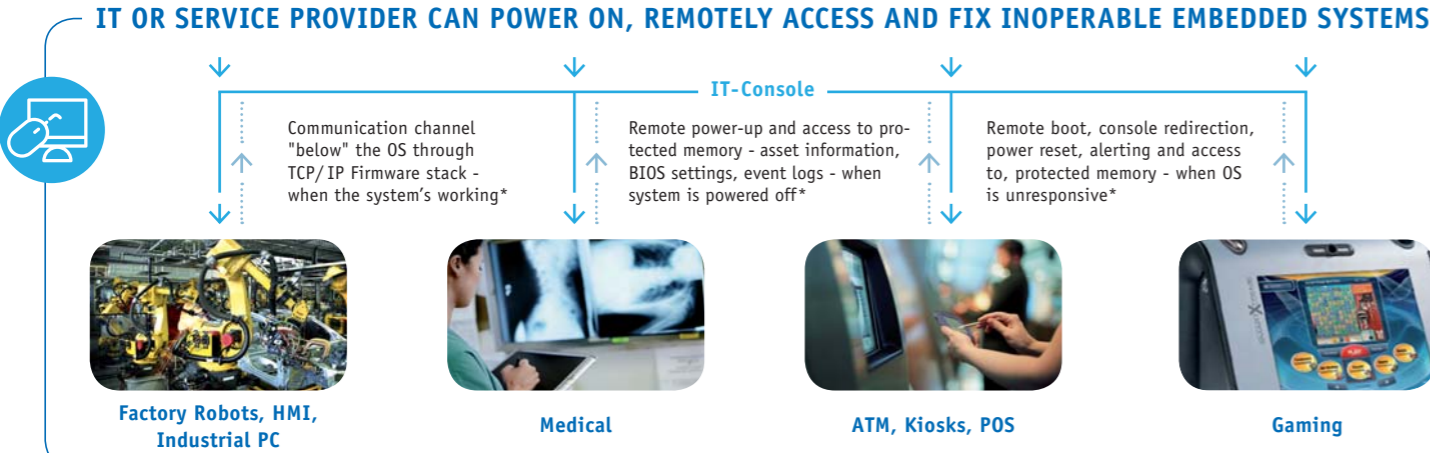
	986LCD-M/mITX(BGA)	986LCD-M/mITX	KT690/mITX	KT690/mITX (BGA)	KTUS15/mITX - 1.1 / 1.6 GHz	KTGM45/mITX	KTQM67/mITX
CPU	Intel® ULV Celeron® M / LV Core Duo	Intel® Core™ 2 Duo, Intel® Core™ Duo and Intel® Core™ Solo (mPGA478, mBGA479 prepared)	Mobile AMD Sempron™ single core and AMD Turion™ dual core	Single core mobile AMD Sempron™ U210 and dual core AMD Athlon™ X2 Neo L325	Intel® Atom™ Z510 CPU BGA /Intel® Atom™ Z530 CPU BGA	Intel® Core™ 2 Quad & Intel® Core™ 2 Duo	Intel® Core™ i7-,i5-,i3 2Core and 4Core CPUs & Intel® QM67 Chipset
CPU Clock	1.06 GHz / 1.66 GHz Other BGA CPU's available on request	Up to 2.16 GHz	Up to 2.0 GHz	Up to 2.0 GHz	1.1 GHz Basic / 1.1 GHz Std / 1.6 GHz Std / 1.6 GHz Plus	Up to 3.06 GHz	Up to 3.1 GHz
Front Side Bus	533 / 667 MHz	533 / 667 MHz	16 Lane Hyper Transport	16 Lane Hyper Transport	400 MHz / 533 MHz	667 / 800 / 1066 MHz	DMI
Chipset	Intel® 945GM + ICH7R	Intel® 945GM + ICH7R	AMD M690T + SB600	AMD M690T + SB600	Intel® US15 Embedded	Intel® GM45 + ICH9M-E	Intel® QM67
DRAM	Up to 3 GByte DDR2 533/667	Up to 3 GByte DDR2 533/667, 2x DIMM-240	Up to 8 GByte DDR2 533/667 - 200 Pin, 2x SODIMM	Up to 8 GByte DDR2 533/667 - 200 Pin, 2x SODIMM	Up to 2 GByte, SO-DIMM 200-Pin, 1x SODIMM	Up to 8 GByte DDR3, 2 pcs. DIMM 240 pin	Up to 8 GByte DDR3 x 2 DIMM-240 (max. 16 GByte)
Video Memory	Up to 192 MByte shared video memory	Up to 192 MByte shared video memory	Up to 256 MByte shared video memory	Up to 256 MByte shared video memory	Up to 256 MByte shared video memory	Up to 256 MByte shared video memory	tbd
IDE / SATA HDD-Interface	4x SATA 150/300 w. RAID 0,1,5,10, 1x ATA100	4x SATA 150/300, 1x ATA100	4x SATA 150/300 w. RAID 0,1,10, 1x ATA133	4x SATA 150/300 w. RAID 0,1,10, 1x ATA133	1x ATA100 / 1x ATA100, 2x SATA 150/300	4x SATA 150/300 w. RAID 0,1, 1x ATA133	6x SATA (2x Gen3) w. RAID -Support
USB	8x USB 2.0	8x USB 2.0	10x USB 2.0	10x USB 2.0	8x USB 2.0	12x USB 2.0	14x USB 2.0
Ethernet	Up to 3x GbE LAN	Up to 3x GbE LAN	Up to 2x GbE LAN	Up to 2x GbE LAN	1x GbE Intel® LAN	Up to 3x GbE LAN	Up to 3x GbE LAN (incl. AMT 7.0 support)
Form Factor	Mini-ITX 170mm x 170mm (6.7" x 6.7")	Mini-ITX 170mm x 170mm (6.7" x 6.7")	Mini-ITX 170mm x 170mm (6.7" x 6.7")	Mini-ITX 170mm x 170mm (6.7" x 6.7")	Mini-ITX, 170mm x 170mm (6.7" x 6.7")	Mini-ITX 170mm x 170mm (6.7" x 6.7")	Mini-ITX 170mm x 170mm (6.7" x 6.7")
Available I/Os	1x PCI, 4x COM, 1x mini PCI-Express	1x PCI, 4x COM, 1x mini PCI-Express	1x PCI, 2x COM, 1x mini PCI-Express	1x PCI, 2x COM, 1x mini PCI-Express	2x COM / 1x PCI, 4x COM	1x PCI, 4x COM, 1x mini PCI-Express	1x PCI Express x 16, 1 PCI Express x 1, 4x COM, 2 x mini PCI-Express, Internal PS/2 Mouse/Keyboard connector, LPT Parallel Port in FFC Connector
Graphics Controller	Intel® GMA950, LVDS onboard	Intel® GMA950, LVDS onboard	Radeon X1250, LVDS onboard	Radeon X1250, LVDS onboard	Intel® GMA 500 , LVDS on board	Intel® GMA4500 MHD, LVDS onboard	integrated
Graphic Interface	CRT / LVDS / PCI-Express x16 / SDVO	CRT / LVDS / PCI-Express x16 / SDVO	DVI / CRT / LVDS / TV-Out (optional) / PCI-Express x8	DVI / CRT / LVDS / TV-Out (optional) / PCI-Express x8	CRT / DVI / LVDS / 2x PCI-Express x1	2x Display Port, CRT / LVDS / PCI-Express x16 / SDVO	2x Display Port, 1 DVI-I, LVDS / Embedded DP,
Rear I/O	COM1, CRT, IEEE1394, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, IEEE1394, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, DVI, TV-Out (optional), Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, DVI, TV-Out (optional), Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	DVI or CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 keyboard	COM1, CRT, IEEE1394, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	2x (Dual USB + Displayport), Dual USB + Ethernet, Dual Ethernet, DVI, Audio 3x
Special Feature	GPIO, IEEE1394, HDD RAID 0/1/5/10 support	GPIO, IEEE1394, HDD RAID 0/1/10 support	GPIO, HDD RAID 0/1/5/10 support, TPM Onboard	GPIO, HDD RAID 0/1/5/10 support, TPM Onboard	GPIO, 2x SDIO, TPM Onboard (Plus)	GPIO, IEEE1394, HDD RAID 0/1 support, AMT 4.0, TPM 1.2	GPIO, IEEE1394, HDD RAID 0,1,5,10 support, AMT 7.0, TPM 1.2, mSATA, ATX and single +12V power supply
Additional	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD, S-Video TV-out (optional), HD Audio, SPDIF	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD, S-Video TV-out (optional), HD Audio, SPDIF	Up to 7 years availability, S-Video TV-out (optional), HD Audio, SPDIF	Up to 7 years availability, S-Video TV-out (optional), HD Audio, SPDIF	Up to 7 years availability	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD, S-Video TV-out (optional), HD Audio, SPDIF	Up to 7 years availability, KT Embedded Feature Connector with ADC, DAC up to 160 GPIO
Partnumber	810203-4500 / 810201-4500	810200-4500	810280-4500	810284-4500 / 810283-4500	810290-4500 / 810292-4500 / 810290-4500 / 810292-4500	810350-4500	tbd

Embedded Motherboards

Embedded Motherboards											Supports Intel AMT 5.0	Supports Intel AMT 7.0
	986LCD-M/FLEX	986LCD-M/ATXE	986LCD-M/ATXP	KTGM45/FLEX	KTGM45/ATXE	KT965/FLEX	KT965/ATXE	KT965/ATXP	KTQ45/Flex	KTQ45/ATXE	KTQ67/FLEX	
CPU	Intel® Core™ 2 Duo, Intel® Core™ Duo and Intel® Core™ Solo (mPGA478, mBGA479 prepared)	Intel® Core™ 2 Duo, Intel® Core™ Duo and Intel® Core™ Solo (mPGA478, mBGA479 prepared)	Intel® Core™ 2 Duo, Intel® Core™ Duo and Intel® Core™ Solo (mPGA478, mBGA479 prepared)	Intel® Core™ 2 Quad & Intel® Core™ 2 Duo	Intel® Core™ 2 Quad & Intel® Core™ 2 Duo	Intel® Core™ 2 Quad, Intel® Core™ 2 Duo Desktop, Pentium® 4 / D	Intel® Core™ 2 Quad, Intel® Core™ 2 Duo Desktop, Pentium® 4 / D	Intel® Core™ 2 Quad, Intel® Core™ 2 Duo Desktop, Pentium® 4 / D	Intel® Core™ 2 Duo E8400 and Intel® Core™ 2 Quad Q9400	Intel® Core™ 2 Duo E8400 and Intel® Core™ 2 Quad Q9400	Intel® Core™ i7/Xeon 4C /Core i5/Xeon 4C / i3 2C	
CPU Clock	Up to 2.16 GHz	Up to 2.16 GHz	Up to 2.16 GHz	Up to 3.06 GHz	Up to 3.06 GHz	Up to 3.8 GHz	Up to 3.8 GHz	Up to 3.8 GHz	Up to 3.0 GHz	Up to 3.0 GHz	Up to 3.8 GHz	
Front Side Bus	533 / 667 MHz	533 / 667 MHz	533 / 667 MHz	667 / 800 / 1066 MHz	667 / 800 / 1066 MHz	533 / 800 / 1066 MHz	533 / 800 / 1066 MHz	533 / 800 / 1066 MHz	800/1066/1333 MHz	800/1066/1333 MHz	up to 5GT/s (GEN2 speed)	
Chipset	Intel® 945GM + ICH7R	Intel® 945GM + ICH7R	Intel® 945GM + ICH7R	Intel® GM45 + ICH9M-E	Intel® GM45 + ICH9M-E	Intel® Q965 + Intel® ICH8DO	Intel® Q965 + Intel® ICH8DO	Intel® Q965 + Intel® ICH8DO	Intel® Q45 Express	Intel® Q45 Express	Intel® Q67	
DRAM	Up to 3 GByte DDR2 533/667, 2x DIMM-240	Up to 3 GByte DDR2 533/667, 2x DIMM-240	Up to 3 GByte DDR2 533/667, 2x DIMM-240	Up to 8 GByte DDR3, 2 pcs. DIMM 240 pin	Up to 8 GByte DDR3, 2 pcs. DIMM 240 pin	Up to 8 GByte, DDR2 800, 4x DIMM-240	Up to 8 GByte, DDR2 800, 4x DIMM-240	Up to 8 GByte, DDR2 800, 4x DIMM-240	Up to 8 GByte DDR3, 4x DIMM-240	Up to 8 GByte DDR3, 4x DIMM-240	Up to 8 GByte DDR3, 4x DIMM-240 (max. 32 GByte)	
Video Memory	Up to 192 MByte shared video memory	Up to 192 MByte shared video memory	Up to 192 MByte shared video memory	Up to 256 MByte shared video memory	Up to 256 MByte shared video memory	Up to 256 MByte Dynamic shared memory	Up to 256 MByte Dynamic shared memory	Up to 256 MByte Dynamic shared memory	Up to 256 MByte Dynamic shared memory	Up to 256 MByte Dynamic shared memory	tbd	
IDE / SATA HDD-Interface	4x SATA 150/300 w. RAID 0,1,5,10, 1x ATA100	4x SATA 150/300 w. RAID 0,1,5,10, 1x ATA100	4x SATA 150/300 w. RAID 0,1,5,10, 1x ATA100	4x SATA 150/300 w. RAID 0,1, 1x ATA133	4x SATA 150/300 w. RAID 0,1, 1x ATA133	6x SATA150/300 w. RAID 0/1/5/10	6x SATA150/300 w. RAID 0/1/5/10	6x SATA150/300 w. RAID 0/1/5/10	5x SATA150/SATA300 w. RAID 0/1/5/10, 1x eSATA	5x SATA150/SATA300 w. RAID 0/1/5/10, 1x eSATA	6 x SATA150/SATA300 w. RAID 0/5/10	
USB	8x USB 2.0	8x USB 2.0	8x USB 2.0	12x USB 2.0	12x USB 2.0	10x USB 2.0 (2x internal)	10x USB 2.0 (2x internal)	10x USB 2.0 (2x internal)	12x port USB 2.0 (4x internal)	12x port USB 2.0 (4x internal)	14 x port USB 2.0	
Ethernet	2x GbE LAN	2x GbE LAN	3x GbE LAN	Up to 3x GbE LAN	Up to 3x GbE LAN	2x GbE LAN	2x GbE LAN	2x GbE LAN	2x GbE LAN	2x GbE LAN	3x GbE LAN (incl. AMT 7.0 support)	
Form Factor	Flex-ATX 228.6mm x 190.5mm (9" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	Flex-ATX 228.6mm x 190.5mm (9" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	Flex-ATX 228.6mm x 190.5mm (9" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	Flex-ATX 228.6mm x 190.5mm (9" x 7.5")	ATX 300.5mm x 190.5mm (12" x 7.5")	Flex-ATX 228.6mm x 190.5mm (9" x 7.5")	
Available I/Os	1x PCI Express x4, 2x PCI, 4x COM	1x PCI Express x4, 5x PCI, 4x COM	1x mini PCI Express, 6x PCI, 4x COM	1x PCI Express x4, 2x PCI, 4x COM	1x PCI Express x4, 5x PCI, 4x COM	1x PCI Express x4, 2x PCI, 2x COM	1x PCI Express x4, 5x PCI, 2x COM	1x mini PCI Express, 6x PCI, 2x COM	1x PCI Express x4, 2x PCI, 2x COM	1x PCI Express x4, 4x PCI, 2x COM	1x PCIe x4 (In x16 connector), 2x PCI 32bits/33MHz, 1x Mini-PCIe, 1x mSATA 4x COM, Internal PS/2 Mouse/Keyboard connector, LPT Parallel Port in FFC Connector	
Graphic Interface	CRT / LVDS / PCI-Express x16 / SDVO	CRT / LVDS / PCI-Express x16 / SDVO	CRT / LVDS / PCI-Express x16 / SDVO	CRT / LVDS / PCI-Express x16 / SDVO	CRT / LVDS / PCI-Express x16 / SDVO	CRT / PCI-Express x16 / SDVO	CRT / PCI-Express x16 / SDVO	CRT / PCI-Express x16 / SDVO	CRT / PCI-Express x16 / SDVO	CRT / PCI-Express x16 / SDVO	1x PCIe x16, 2x Display port, 1x LVDS, 1x CRT	
Rear I/O	COM1, CRT, Ethernet, USB, S-video (Optional), line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, S-video (Optional), line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, S-video (Optional), line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	COM1, CRT, Ethernet, USB, line-in, line-out, speaker, PS/2 mouse/keyboard	DB9 serial port, DB15 VGA, Audio stacked 2x3 mini Jack tower, 6x USB, 2x Display port, 3x RJ45 LAN	
Special Feature	IEEE1394, GPIO, HDD RAID 0/1/5/10 support, HD Audio, SPDIF, TV-out (optional)	IEEE1394, GPIO, HDD RAID 0/1/5/10 support, HD Audio, SPDIF, TV-out (optional)	IEEE1394, GPIO, HDD RAID 0/1/5/10 support, HD Audio, SPDIF, TV-out (optional)	GPIO, HDD RAID 0/1 support, AMT 4.0, TPM 1.2	GPIO, HDD RAID 0/1 support, AMT 4.0, TPM 1.2	HDD RAID, GPIO, LPT, HD Audio	HDD RAID, GPIO, LPT, HD Audio	HDD RAID, GPIO, LPT, HD Audio	HDD RAID, GPIO, LPT, HD Audio, AMT 5.0	HDD RAID, GPIO, LPT, HD Audio, AMT 5.0	HDD RAID, GPIO, LPT, HD Audio, Mini-PCIe; AMT 7.0 mSATA for SSD storage	
Additional	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, ADD2-Cards for SDVO Interface for 2nd LCD	Up to 7 years availability, mSATA, KT Embedded Feature Connector with ADC, DAC up to 160 GPIO	

Hardware-based remote Diagnosis and Repair with Intel® vPro™ Technology with Active

Management Technology:




- Intel® AMT is part of the Intel® Management Engine, which is built into PCs with Intel® vPro™ technology. Intel® AMT is running in a ME integrated into the PCH (Platform Controller Hub) and is independent of the host CPU. This deep level hardware-based AMT Remote Troubleshooting and Recovery for distributed applications offers:
- » Remote monitoring, maintenance and installation via existing network connections
  - » Hardware-based management does not depend on the presence of the OS or the power state of the system.
  - » Remote power up / power down
  - » Support of full KVM remote control
  - » Remote boot and BIOS Update

- » Remote status information
  - » Remote BIOS parameter changes and firmware updates
  - » Proactive Alerting
  - » For enhanced security HW-based encryption is included
- This means:**
- » Significant reduction of on-site-findings and field work
  - » Decrease of downtime and minimized time-to-repair
  - » Increased efficiency of IT technical staff
  - » **Reduced Total Cost of Ownership (TCO)**
- Currently available for KTGM45, KTQ45- and Q(M)67 Motherboard families**

\* Different examples for remote management and security capabilities depending on system status

## ADD2/PCIe-cards

These embedded motherboards target applications with faster innovation cycles and high demands on computing and graphics performance. Equipped with only the latest and most demanded interfaces, Kontron embedded motherboards are extremely cost-effective, making them a good match for high-volume applications with fast innovation cycles such as Gaming/Entertainment, Digital Signage, POS/POI, Hospitality (check-in terminals, ticketing machines, hotel multimedia terminals) and even industrial shop floor applications managing quality control.

ADD2-cards				
	ADD2-CRT-Internal	ADD2-DVI-DUAL-Internal	ADD2-DVI-DUAL-Internal-External	ADD2-LVDS-Internal
	ADD2-Card	ADD2-Card	ADD2-Card	ADD2-Card
	CRT	Single or Dual DVI	Single or Dual DVI	Single output LVDS
	Up to 1600x1200	1600x1200 / 1920x1080	1600x1200 / 1920x1080	1600x1200 / 1920x1080
Applicable Motherboards				
	986LCD-M, KT965, KTQ45, KTG41 and KTM45 families	986LCD-M, KT965, KTQ45, KTG41 and KTM45 families	986LCD-M, KT965, KTQ45, KTG41 and KTM45 families	986LCD-M, KT965, KTQ45, KTG41 and KTM45 families
Height				
	Low Profile	Low Profile	Low Profile	Low Profile
Interface				
	PCI-Express/SDVO	PCI-Express/SDVO	PCI-Express/SDVO	PCI-Express/SDVO
Partnumber				
	820954	820951	820952	820953

ADD2-cards			
			
<b>ADD2-LVDS-DUAL-Internal</b>	<b>KT-PCIE-DVI-HDMI</b>	<b>KT-PCIE-DVI-HDMI-I</b>	
<b>Series</b>	ADD2-Card	AMD PCIE Card	Intel® PCIE Card
<b>Video Output</b>	Single or dual output LVDS	DVI & HDMI	DVI & HDMI
<b>Resolution</b>	1600x1200 / 1920x1080	Up to 1920x1200	Up to 1920x1200
<b>Applicable Motherboards</b>	986LCD-M, KT965, KTQ45, KTG41 and KTMG45 families	KT690/mITX and KT780/ATX	KTQ45 and KTMG45 families
<b>Height</b>	Low profile	Low Profile	Low Profile
<b>Interface</b>	PCI-Express/SDVO	PCI-Express	PCI-Express
<b>Partnumber</b>	820950	820957	820977

imaging, simulation, storage, multimedia telecom and data center markets. They also offer leading-edge remote management tools with support for KVM and VM over IP for real time access.

## Display Cables for Motherboards

For application notes, cable specification drawings and a regularly updated LVDS display cable list visit: [www.kontron.com](http://www.kontron.com)

NO.	PARTS	DESCRIPTION	Q'TY
1	WIRE	UL20276 30AWG±20PAIRS(TWISTED WIRE) PH:0.635mm	1
2	10C	C-8029-WHITE, BLAU-WHITE, BLAU-GRAY W/50mm	1
3	TERMINAL	R6029-40P (W/2CM, COLOR:BLACK) PH:1.27mm W/D SW	1
4	HOUSING	R6023-TG-03G PHOSPHOR BRONZE GOLD PLATED 3u"	18
5	H.S.T	R4100-050015 BLACK 5.0±x10mm	1
6	H.S.T	R4100-030010 BLACK 3.0±x10mm	2
7	H.S.T	R4100-000010 BLACK 0.8±x10mm	1
8	PULL-TAB	R4201-40P-R127-J-3W 3400-2 PULL-TAB WHITE W=25.0mm L=76.2mm	1
9	LABEL	PRINT "1027-2831"	1
10	PE BAG	TRANSPARENT W=100mmH=350mmT=0.05mm	1

Packing: 1PCS in a POLY BAG 350

Pin Out Diagram:

P1	P2	P1	P2
6	18	20	12
8	17	21	10
9	20	22	9
10	16	23	7
11	4	24	6
16	14	27	11
17	16	28	8
18	15	30	5
19	13	29	3

## A Small Graphics Compendium...

**Finding the right graphics solution is becoming an increasingly important factor in the success of any application. Kontron SBCs and Motherboards, with a wide range of interfaces, signals and protocols can make your design process more efficient. The following compendium goes into further explanation to help you find the perfect fit for your final application.**

### Graphics interfaces for external devices

**Uniform connector systems and longer transmission distances are defined in graphical interfaces for external devices, as you find them on the rear I/O of the motherboards or the front plate of the SBCs.**

#### HDMI



High Definition Multimedia Interface (HDMI) is in widespread use in the entertainment industry. HDMI exist in several versions from 1.0 to 1.4a and beside the option to transmit up to 8 channel audio, it transmits images with resolutions up to 2560 x 1600@75Hz or even 4096 x 2160@24Hz. Color resolutions up to 24 bit (HDMI 1.0 - 1.2a) or 48 bit (HDMI 1.3 - 1.4a). The HDMI 1.4 also support an 100Mb/s Ethernet channel. Electrically, the TMDS signal is used; adapters/cables converting from HDMI to DVI-D are available. The maximum transmission range is defined as 5 meters, but up to 15 meters is possible if resolution is in the lower end (up to 74.5MHz clock speed). The connectors are defined for five different sizes according to application: From Type A (typically for TV sets) up to Type E, which is Automotive Connection System. HDMI is not a free standard; appropriate license fees must be paid to the HDMI Organization.

#### DVI



DVI (Digital Visual interface) is the first serious standard to be a successor for the analogue VGA. Several connector types are used. DVI-A connector is used for analog VGA signals only, DVI-D connector is used for digital TMDS (Time Minimized Differential Signals) only and finally DVI-I is used for both analogue VGA and TMDS signals. The TMDS signals (in the DVI) is possible as a Single-Link or as a Dual-Link and still using the same connector (DVI-D or DVI-I): Single-Link transmits up to 1920 x 1200@60Hz and Dual-Link transmits up to 2560 x 2048@60Hz. DVI support hot plug and up to 5 meter cables. Longer cables might be possible when using lower resolution display or alternatively use Dual-Link instead of Single-Link. DVI standard is slowly being taken over by

the HDMI standard and Adapters/Cables from DVI-D to HDMI are very simple and inexpensive.

#### DisplayPort



DisplayPort (DP) is a new, serial and digital standard that logically transmits the data in packetbased form. As well as image data, further data such as audio can be transmitted, and there is also a back 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 good fixing possibilities and it is directly supported by the latest Intel® chip sets. The range is defined up until around 15 meters, the maximum resolution is up to 4096 x 2560. DisplayPort Dual Mode offers in addition the possibility to output DVI and HDMI signals. This achieves better interoperability and the possibility of inexpensive passive adapters from the DisplayPort to DVI or HDMI.

### Graphics interfaces at board level

**These interfaces are intended for use at board level in the housing. For this reason, connector systems are usually not standard as for external I/Os, but usually the matching cable-adapters are available and offered by Kontron.**

#### LVDS

Low Voltage Differential Signaling (LVDS) is a serial, digital interface standard for data transmission. Current displays support LVDS directly, so that if a suitable choice is made, no conversion is necessary. Due to bandwidth limitation, only a resolution up to 1366 x 768 can be transmitted over one LVDS channel. With two bundled channels (A and B), a display with higher resolutions, up to 1600 x 1200 or 1920 x 1200, can be addressed. For color resolutions more than 18 bit, two color coding techniques exist, VESA (SPWG) and JEIDA (OpenLDI). Display panels having up to 4 LVDS channels 30 bit of colors each exist on the market. To support these panels it is recommended to use SBCs and Motherboards

#### Kontron's COST EFFICIENT FLAT PANEL CABLES FOR SBCs

##### KAB-FLEX32

Low cost TTL flat panel cable type for JRExplus-LX



##### JILI30

Low cost LVDS flat panel cable type for all JRExplus and pITX boards (for TTL Displays please use KAB-ADAPT-LVDS to TTL P/N 61029 + KAB-FLEX32-xxx)



supporting DP (DisplayPanel standard) and to convert the DP to LVDS (4 channel) near the display. The maximum recommended length is for flatfoil cable 50 cm and for specific TMDS/LVDS twisted pair cable 5 meter. For LVDS, Kontron uses special interface connectors.

#### PEG/ADD2

PCI Express for Graphics (PEG) is a PCI-Express interface that is specially intended for the use of dedicated graphic cards. The graphics image is first produced in the graphics card (GPU) and then output to another interface (for example DVI or LVDS). PEG is multiplexed with SDVO in current Intel® chip sets. If the SDVO signal is output via the PEG slots in place of PEG, these slots are frequently also known as ADD2. This allows corresponding ADD2 converters to be used in order to convert SDVO to other interfaces.

#### eDP

The eDP (embedded DisplayPort) is based on the specification of DisplayPort. For use at the system level, the specification is expanded in areas such as power supply or backlighting. Embedded DP is expected to become the successor to LVDS.

#### DDI

Digital Display Interface (DDI) is a generic term promoted by Intel® for a graphics interface that can transmit SDVO, DisplayPort, embedded DisplayPort, DVI or HDMI as desired. However DDI does not specify that all optional interfaces must be always truly available.

#### DVO/SDVO

Serial Digital Video Out (SDVO) is an Intel® technology and the serial continuation of the earlier parallel Digital Video Out (DVO). From the SDVO signal, one can convert to almost all conceivable interfaces such as LVDS, DVI, HDMI or CRT. Only the GPU integrated into the chip set imposes restrictions. Because display devices do not support DVO/SDVO directly, conversion to another interface standard is necessary. Since the SDVO signals are mostly multiplexed on the PEG slot, cards for the converter are generally available as ADD2 cards. The maximal range is defined as 17.5 cm (7 inches).

### Protocols and Codecs

#### Codecs

Codecs are specific logical descriptions of pictures or films with the help of mathematical methods. Codecs (compress, encode, code) serve mainly, in addition to reducing storage requirements, to make transmission simpler. Higher computing power is however needed to subsequently decode the picture or film and display it in full. Because the decoding requires a great deal of CPU computing power, this is often swapped out to the graphics kernel where specialized hardware accelerators are used. The video can then be played back without jerks even though the CPU is hardly loaded.

#### MPEG

Motion Picture Experts Group (MPEG) describes codes for film and audio. MPEG-2 is used for video CDs and also normal DVB

television. MPEG-4 is planned for high-resolution films (HD-DVD, Blu-Ray) and high resolution television (HDTV). In MPEG, it is important to pay attention to the version number.

#### TMDS

Transition Minimized Differential Signaling (TMDS) was developed by Silicon Image in order to transport uncompressed image data digitally and serially to a device. TMDS is an electrical transmission procedure and therefore not an independent external graphics interface, but rather the basis for DVI and HDMI.

#### VC-1, H.264

Both are Codecs especially for high-resolution films. H.264 is in the meanwhile part of MPEG-4. VC-1 is the current Codec for Blu-Ray storage media.

#### WMV-9

WMV-9 is a Codec from Microsoft® for normal and high resolution films and is distributed by means of Windows® systems.

#### DirectX®/OpenGL

Both describe software interfaces that among other things permit graphics kernel commands to be addressed in standardized fashion independently of the manufacturer. 3-D graphics calculations in particular can be easily and efficiently swapped out to the GPU. DirectX® is distributed by Microsoft®, OpenGL is an open standard from the industry consortium Khronos Group.

#### 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, restricts itself to external devices based on VGA, DVI or HDMI. EDID has restricted applicability to the important LVDS interface and is therefore not common. EDID describes, among other things, the manufacturer and display size and the optimal as well as the supported resolutions with the associated timing, color and transmission characteristics.

#### DisplayID

DisplayID is the most current VESA standard for monitor recognition and defines, in contrast to EDID, an expanded data structure, which makes important Information such as channel distribution or mapping information more flexible and easier to use. Through the contribution of Kontron in the VESA standard, it is possible to describe the necessary information for a display in a DisplayID data record. DisplayID and the JILI interface form an ideal solution for the Embedded industry.

#### HDCP/DPCP

High bandwidth Digital Content Protection (HDCP) and DisplayPort Content Protection (DPCP) are encryption procedures that protect the transmission between player (here the module) and display device. This prevents the contents being output to unauthorized devices such as Blu-Ray writers. HDCP is defined for DVI-D, HDMI and DisplayPort, DPCP only for DisplayPort. In practice, HDCP prevents the digital copying of Blu-Ray media. The technologies belong to the area of Digital Rights Management (DRM).

## About Kontron

Kontron is a global leader in embedded computing technology. With more than 30% of its employees in Research and Development, Kontron creates many of the standards that drive the world's embedded computing platforms. Kontron's product longevity, local engineering and support, and value-added services, helps create a sustainable and viable embedded solution for OEMs and system integrators. Kontron works closely with its customers on their embedded application-ready platforms and custom solutions, enabling them to focus on their core competencies. The result is an accelerated time-to-market, reduced total-cost-of-ownership and an improved overall application with leading-edge, highly-reliable embedded technology.

Kontron is listed on the German TecDAX stock exchange under the symbol "KBC".  
For more information, please visit: [www.kontron.com](http://www.kontron.com)

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