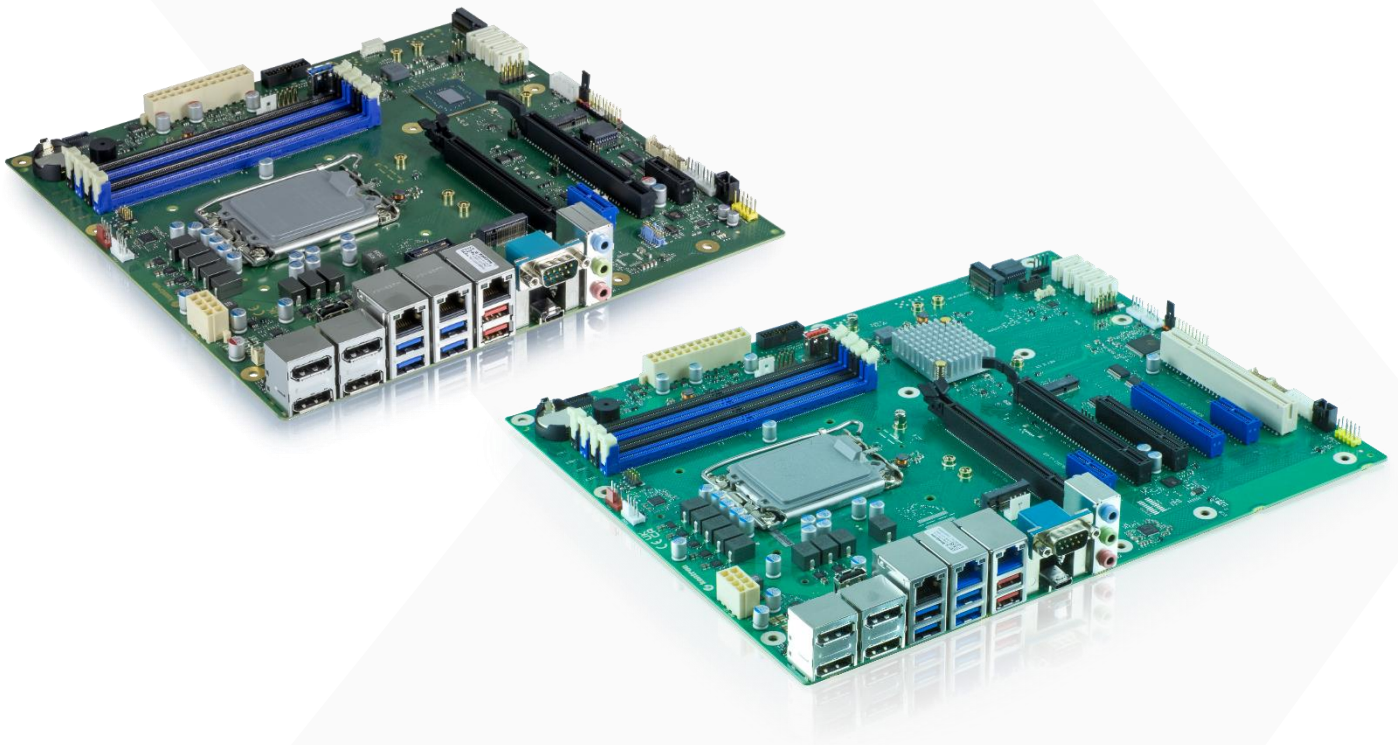


Technical Manual

K384x μ ATX and K3851 ATX Motherboard



Alder Lake μ ATX / ATX Series

- ▶ K3841-Q μ ATX
- ▶ K3842-Q μ ATX
- ▶ K3843-B μ ATX
- ▶ K3851-R ATX

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1 Safety Instructions / Important Notes

Do not connect or disconnect any cables or modules to or from any onboard connectors (including the the rear connectors for DC-IN and COM) until the motherboard is completely powered down.

Any damage caused to the motherboard by misuse of the onboard connectors is excluded from the standard warranty. Kontron cannot be held liable for any damage that results from incorrect use of any onboard connectors.

The system integrator is fully responsible for the usage of appropriate connectors and cables to fulfill the technical requirements (electrical contact, durability, power/current levels, signal integrity etc.)



Risk of Explosion if battery is replaced by an incorrect type

Dispose of used batteries according to the instructions

Technical data are subject to change without prior notice. Kontron accepts no responsibility with regards to technical or editorial mistakes or omissions.

2 Feature Overview

2.1 Motherboard Versions

Feature	K3841-Q	K3842-Q	K3843-B	K3851-R	Notes
Industrial Series	√			√	
Extended Lifecycle Series (XLC)		√	√		
Form Factor	μATX	μATX	μATX	ATX	
Operating Temperature	-10°C...+60°C	+10°C ...+50°C		-10°C ...+60°C	Motherboard Ambient Temperature
Chipset (PCH)	Q670E	Q670	B600	R680E	Incl. PCH heatsink
CPU TDP	Max. 125W				
Memory Support	4 x DDR5 4800, Dual Channel, max. 128GB				Effective speed: up to 4400 @1DPC up to 4000 @2DPC
ECC Support	--	--	--	√	
Graphics Support	4 x DisplayPort V1.4a				all ports support DP++
HDMI / DVI / eDP / LVDS	--				HDMI/DVI via DPP dongle
Support for D3653 VGA converter board	--			(√)	Only K3851-R PCIe slot #4
LAN1: i219LM	√				1.0 GbE
Intel Standard Manageability	√	√	--	√	
LAN2/LAN3: i225LM	√/√	(√) ^{***} / --	--/--	√/√	2.5 GbE
TSN / TCC Support	(√)	--	--	(√)	Validation planned
WoL / LAN Teaming	√ / √	√ / (√) ^{***}	√ / --	√ / √	
Slot #1	PCIe x16 Gen5				PEG slot, close to CPU Max. load: 75W
Bifurcation Support	(√) [*]		--	√	PCIe x16 or 2 x PCIe x8
Slot #2	PCIe x1 Gen3, open		PCIe x1 Gen3, closed	PCIe x1 Gen3, open	Max. load: 10W / 25W ^{**}
Slot #3	PCIe x16 @4 lanes, Gen4		PCIe x16 @1 lane, Gen4	PCIe x16 @4 lanes, Gen4	Max. load: 75W
Slot #4	PCIe x1 Gen3, closed			PCIe x8 @4 lanes, Gen3, closed	Max. load: 10W (μATX) Max. load: 25W (ATX)
Slot #5	n.a.			PCIe x8 @4 lanes, Gen4, open	Max. load: 25W
Slot #6	n.a.			PCIe x1 Gen3, open	Max. load: 10W / 25W ^{**}
Slot #7	n.a.			PCI 32Bit 33MHz, Rev. 2.3	Max. load: 25W

*) Requires upcoming HW revision K384x Rev.02xx **) 10W: Card length ≤ 168mm / 25W: Card length ≥ 178mm

***) Additional LAN2 on K3842-Q2 only

2.2 Motherboard Versions (cont.)

Feature	K3841-Q	K3842-Q	K3843-B	K3851-R	Notes
SATA 6G / SATA RAID	4 Ports / √				RAID 0/1/5 (VMD)
First M.2 Key-M Socket	PCIe Gen4 2230/2242/2280		PCIe Gen4 2280	PCIe Gen4 2230/2242/2280	Attached to CPU
Second M.2 Key-M Socket	PCIe Gen4 2230/2242/2280		PCIe Gen4 2280	PCIe Gen4 2230/2242/2280	Attached to PCH
NVME RAID	√		--	√	RAID 0/1/5 (VMD)
Intel Optane Support	√				“Pyramid Glacier” (H20)
M.2 2230 Key-E Socket for WLAN/BT	√		--	√	Incl. CNVi Support
M.2 Key-B Socket	--				
Rear USB 2.0	--		2	--	Type A Port (black)
Rear USB 3.2 Gen1	4		2	4	Type A Port (blue)
Rear USB 3.2 Gen2	2		2	2	Type A Port (red)
Rear USB 3.2 Gen2	1		--	1	Type C Port
Internal USB 2.0	2				= 1 x Header @ 2 Ports
Internal USB 3.2 Gen1	2				= 1 x Header @ 2 Ports
Internal Stick Socket	√		--	√	USB 2.0 (black)
2 nd Internal Stick Socket	√	--		√	USB 3.2 Gen2 (red)
Integrated iTPM V2.0 / TPM (SPI) Header	√ / √		√ / --	√ / √	Header for Infineon (TCG approval)
Supported Fans	4		2	4	4 Pin PWM
Error LED Support	√**	--		√**	Fan or Temperature Error
HW Watchdog	√***		--	√***	System Reset after Timeout
GPIO Port	√	--		√	8 Bit
External COM1	√				RS-232
Internal COM2/COM3/COM4	√ / √ / √	-- / -- / --		√ / √ / √	RS-232****
RS-422/RS-485 Support	--				
PS2 Port / Parallel Port	√ / --	-- / --		√ / --	PS/2: Keyboard and Mouse supported
Chassis Intrusion Support	√				
Buzzer / SPDIF Support	√ / √	--	√ / --	√ / √	Digital Output
SCSI LED Header	√	--		√	
VRM Heatsink (2x)	√	--		√	CPU Voltage Regulator

**) Requires BIOS > R1.1.0

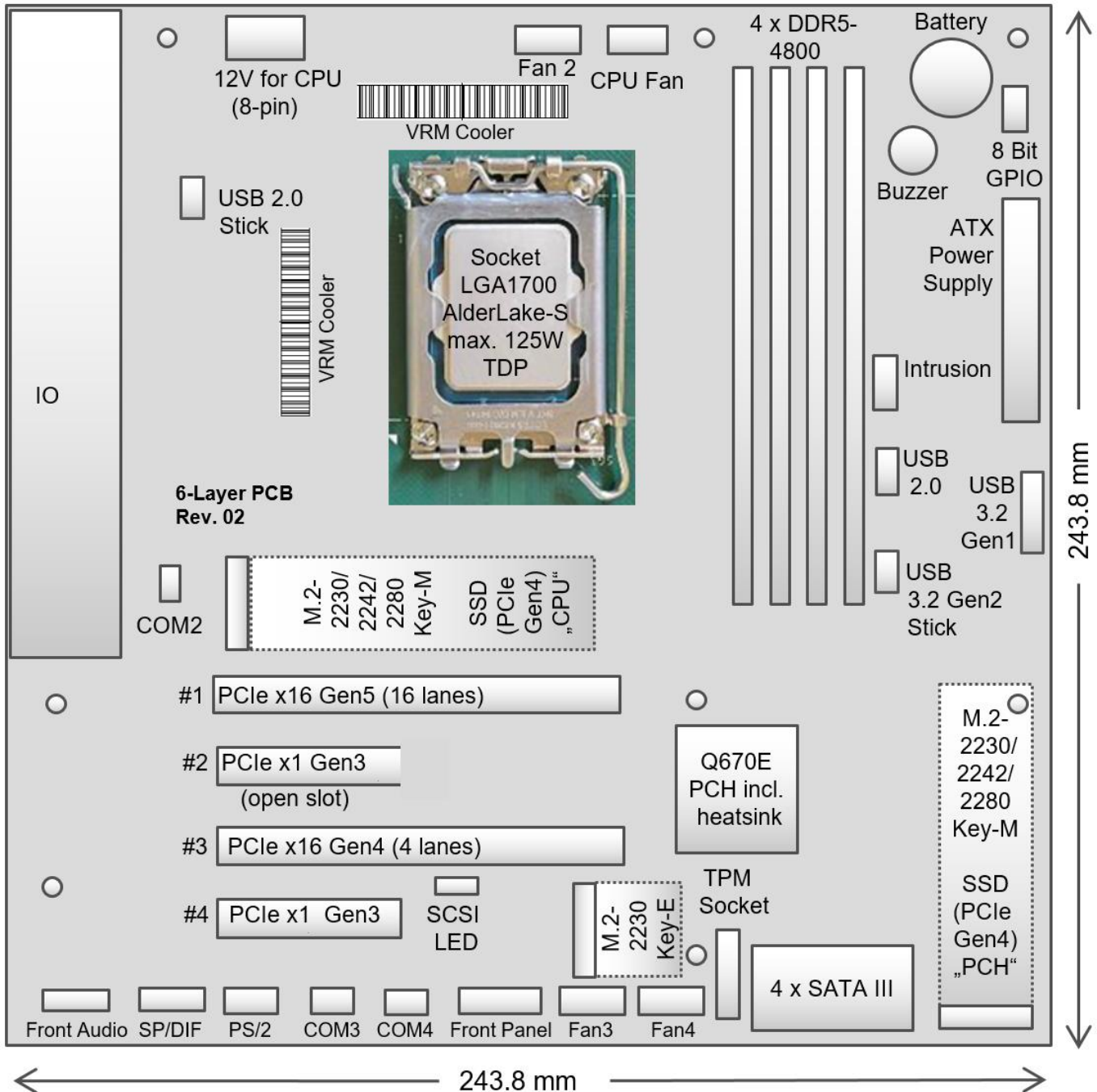
***) requires upcoming HW revision 02xx

****) Full featured COM port (COM3+4 only) requires upcoming HW revision 02xx

Feature Overview

2.3 Basic Layout & Connectors

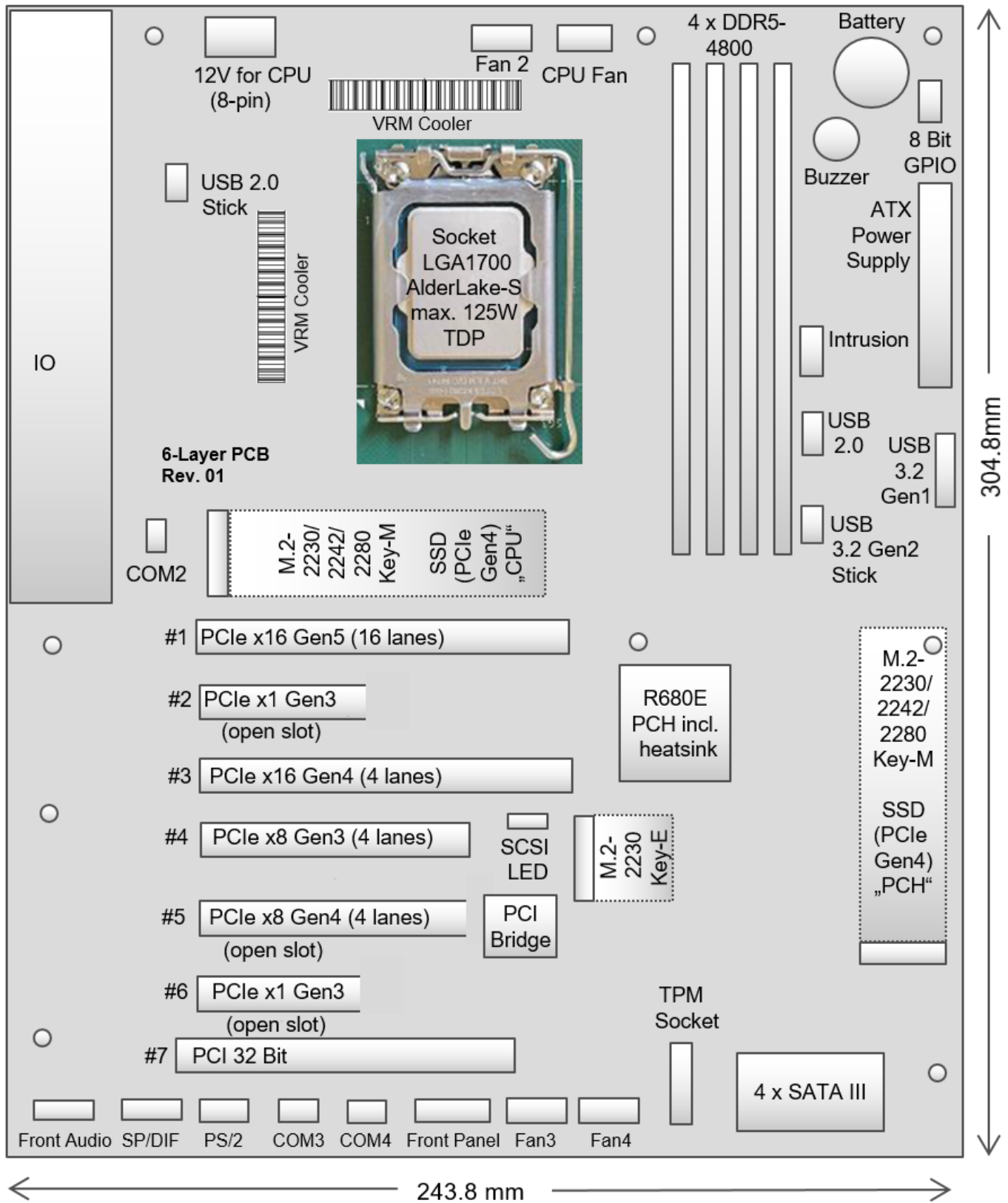
2.3.1 K384x (µATX)



Note: Picture shows full configuration; detailed stuffing depends on specific motherboard version.
See feature overview on previous pages for details.

Feature Overview

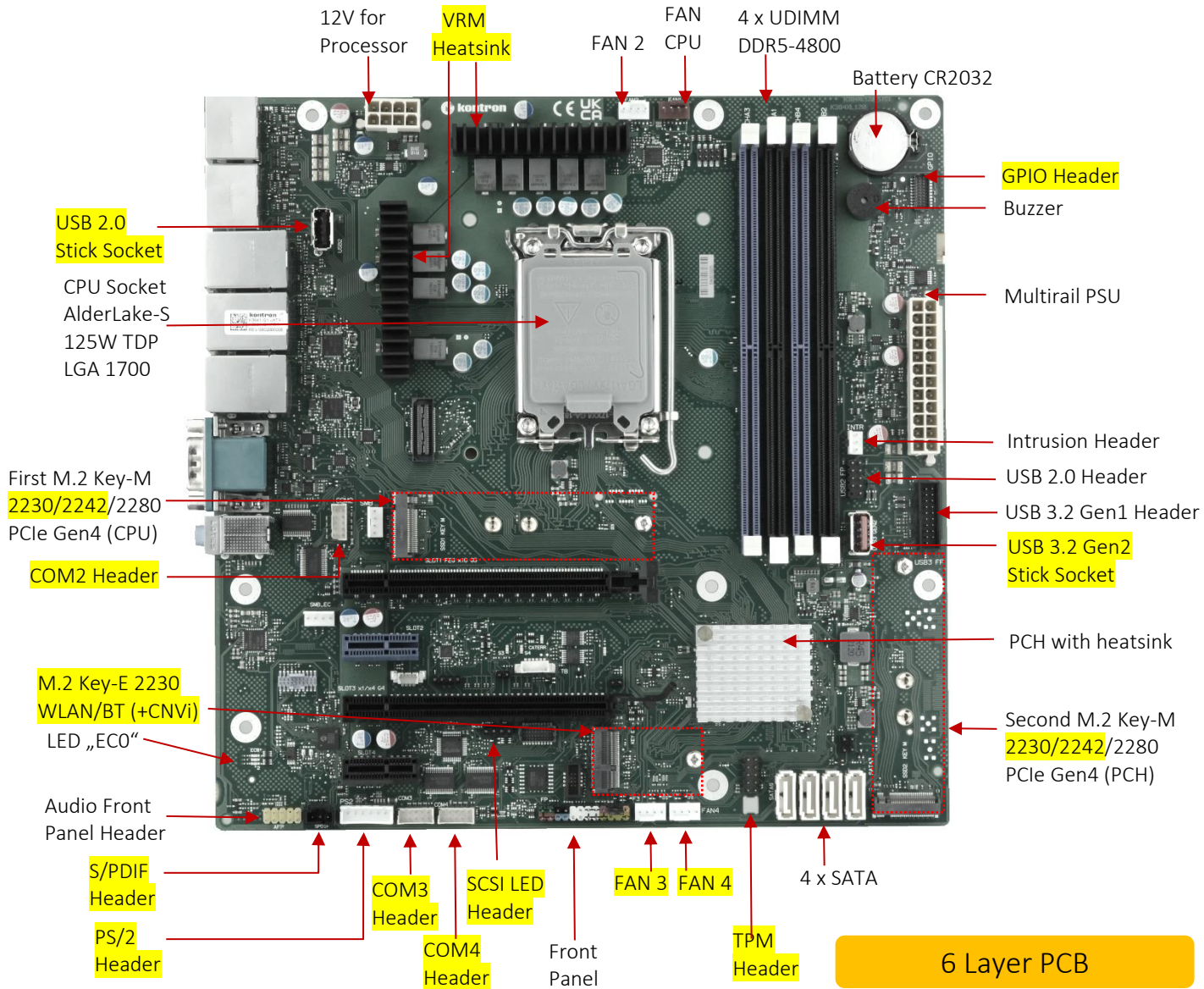
2.3.2 K3851 (ATX)



Feature Overview

2.4 Onboard Components

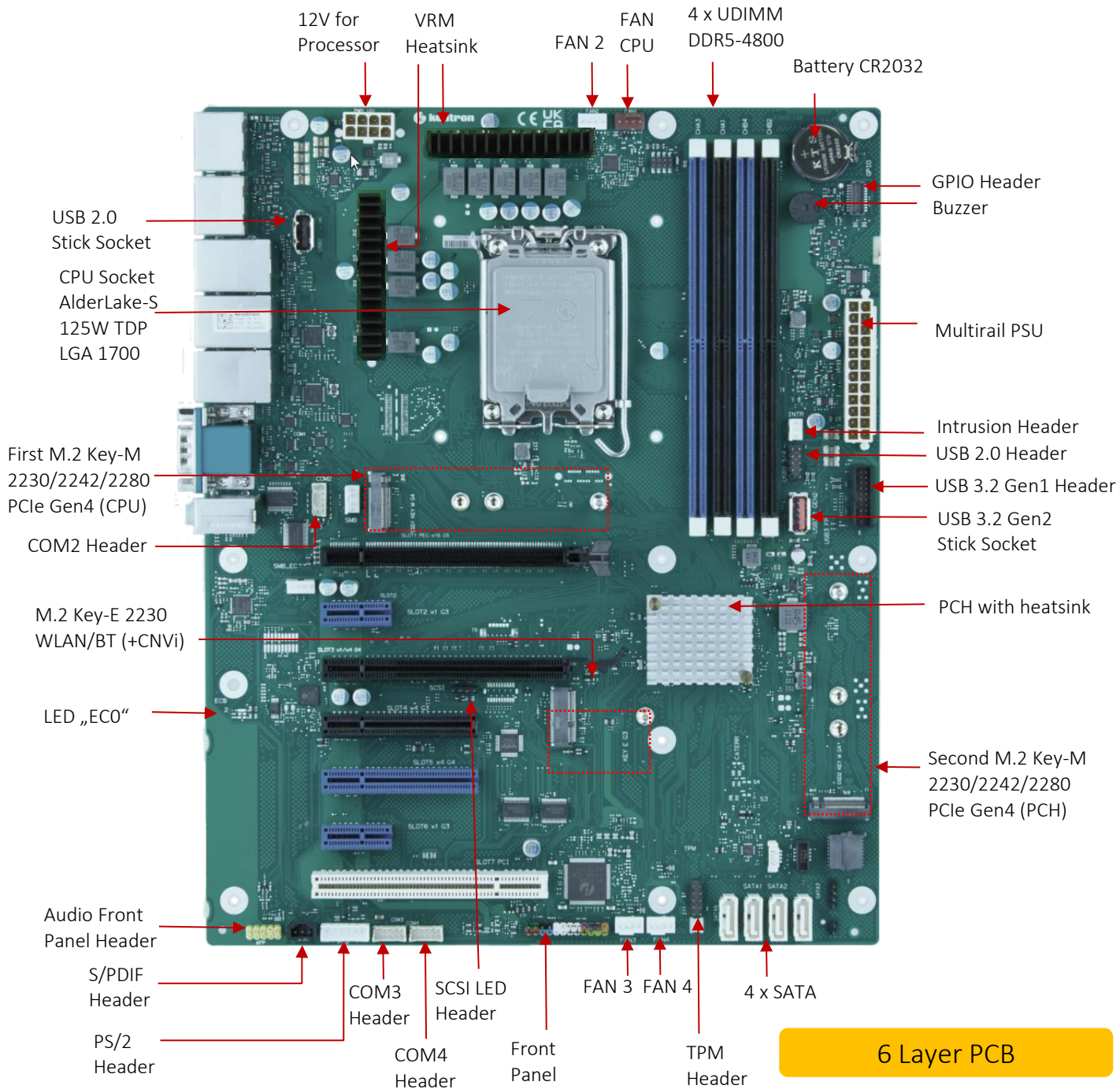
2.4.1 K384x (µATX)



xxx = optional component
(depends on motherboard version)

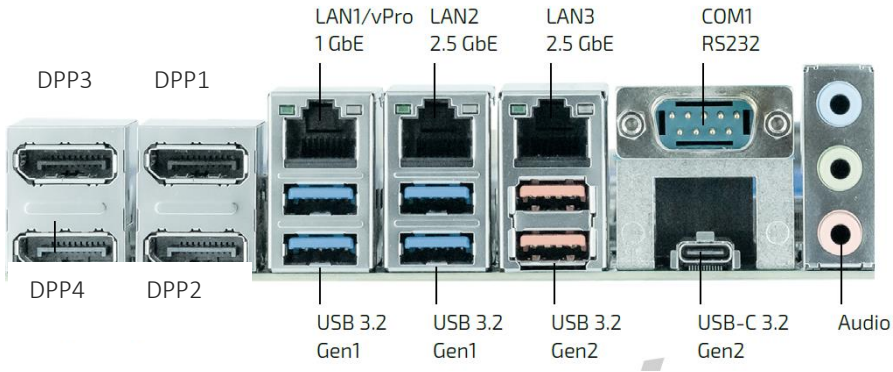
Feature Overview

2.4.2 K3851 (ATX)

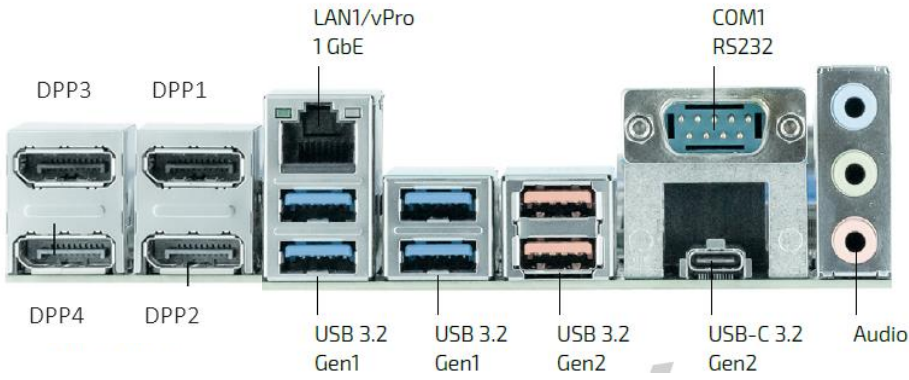


Feature Overview

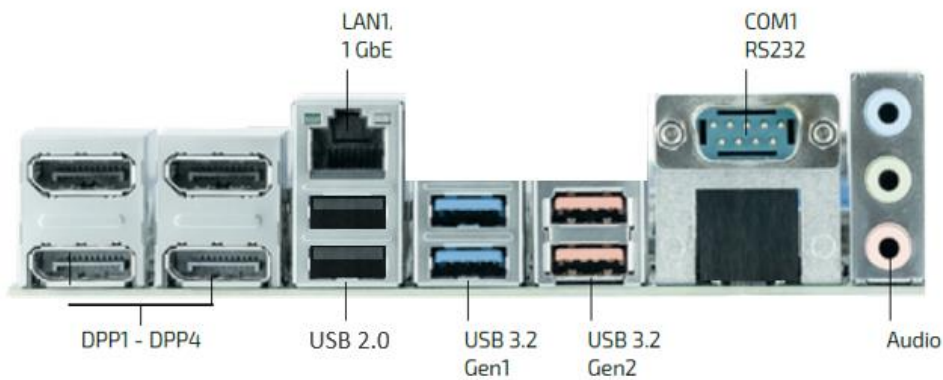
2.5 Rear I/O Connectors



K3841-Q / K3851-R



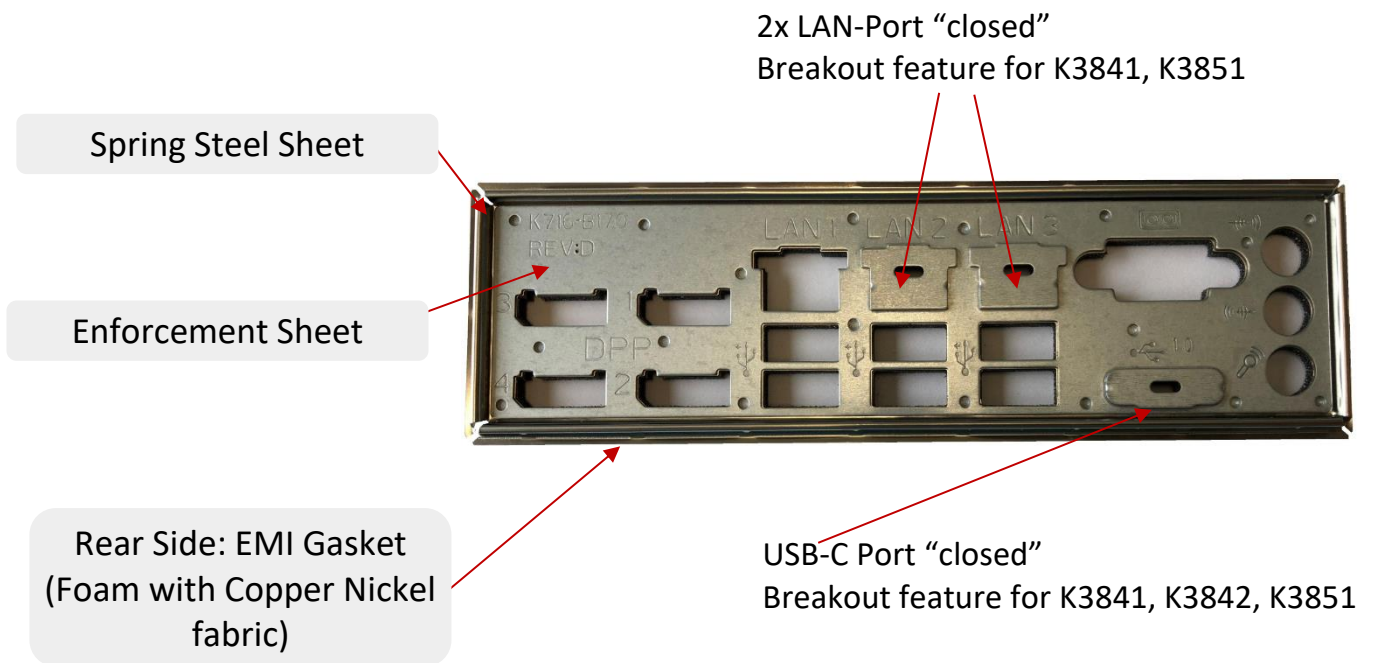
K3842-Q



K3843-B

Feature Overview

2.6 I/O Shield



Nominal insertion force: ~ 75 N
for specified ATX IO "letterbox"

Note: ATX Chassis "letterbox" for I/O shield:
Nom. size = 158.75 x 44.45mm
Tolerance = +/- 0.2mm

Feature Overview

2.7 M.2 Installation Notes

M.2 Key-M sockets:

Supports PCIe x4 (Gen4) for NVME SSD modules

Mechanical support for 2230, 2242, and 2280 modules (K3843-B: 2280 only!).

SATA mode is not supported!

M.2 Key-E socket:

Supports PCIe x1 and USB 2.0 for WLAN and Bluetooth modules

Mechanical support for 2230 modules.

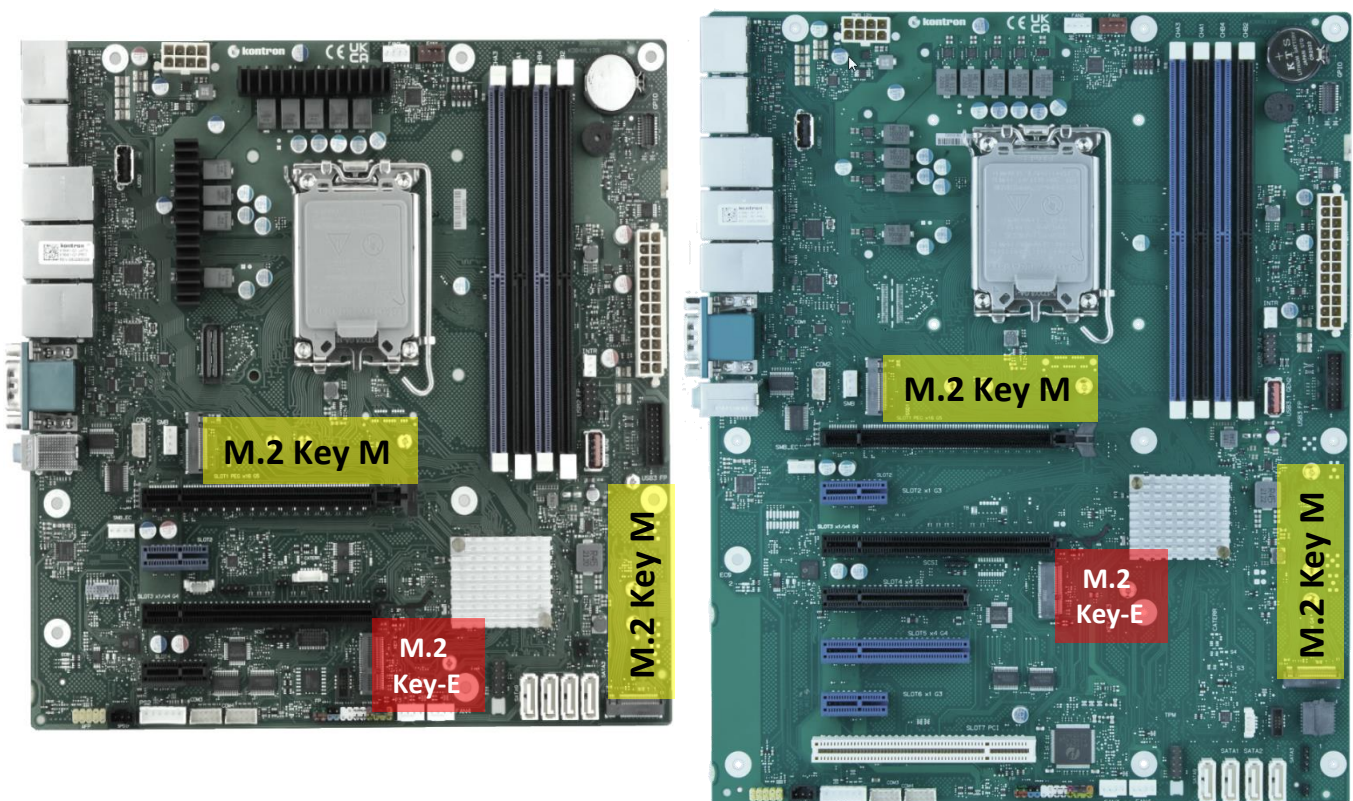
CNVi modules supported!

Important Note:

Recommended torque for M.2 screw is 0.2Nm, and 0.3Nm for the nut.

Max. torque must never be exceeded, otherwise the motherboard (solder nuts) may be damaged.

Damaged solder nuts are **not** covered by any warranty!



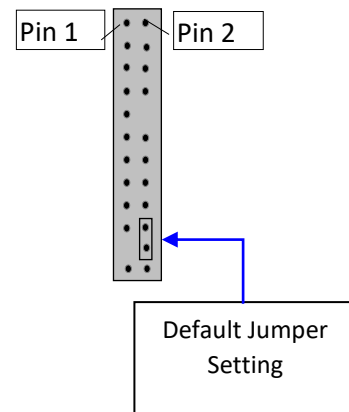
3 Interfaces & Connectors

3.1 Board

3.1.1 Front Panel Connector

Pin	Signal	Pin	Signal
1	HD-LED + ¹⁾	2	Power LED + ¹⁾
3	HD-LED - ²⁾	4	Power LED - ²⁾
5	GND	6	Power_Button
7	Reset_Button	8	GND
9	reserved	X	Key
11	reserved	12	GND
13	BMC Alert LED + ³⁾	14	GND
15	reserved	16	reserved
17	Speaker +	18	BIOS Testmode (reserved)
19	GND	20	reserved
X	Key	22	reserved / Recover BIOS -
23	Speaker -	24	Recover BIOS +

1) Constant current output (13mA)
 2) Switched signal (GND)
 3) Constant current output (13mA) if BMC alert is active.



Power LED:

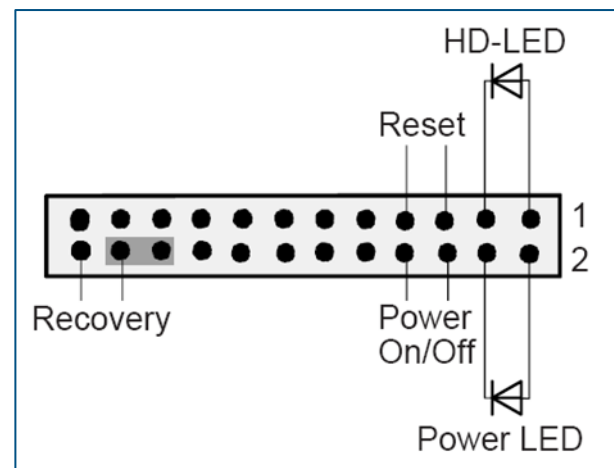
Anode: Pin 2 – current source 13mA up to 4V
 Cathode: Pin 4 (suitable for various LED colors)

HDD LED:

Anode: Pin 1 – current source 13mA up to 4V
 Cathode: Pin 3 (suitable for various LED colors)

BMC Alert LED

Anode: Pin 13 – current source 13mA up to 4V
 Cathode: any GND (e.g. Pin 14)



Note: Pinning is compatible to Intel 10 pin header

Speaker Output:

Mono; typ. 0.5W at 8 Ohm load

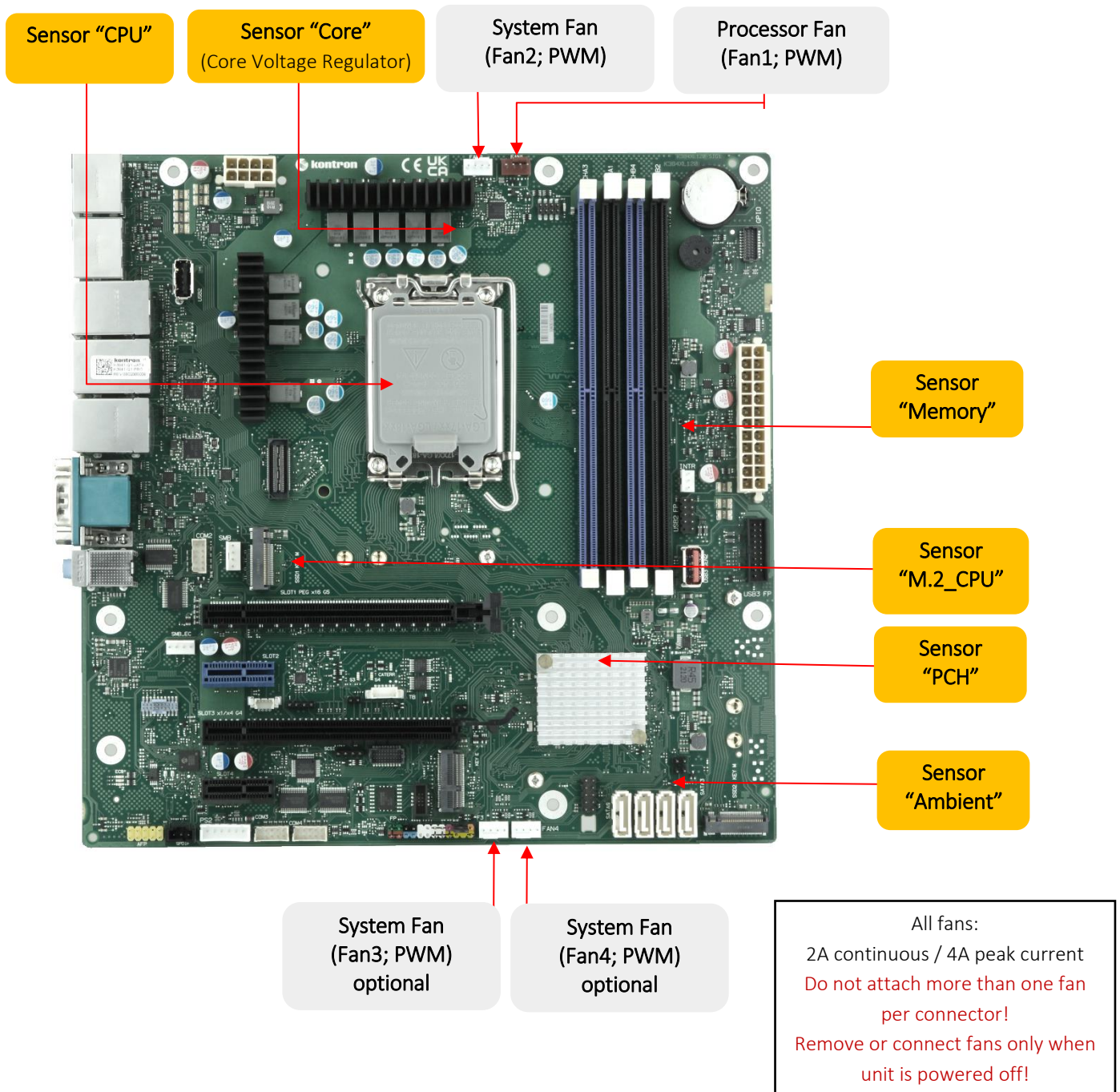
Note:

System beeps are only audible via the onboard buzzer

4 System Monitoring

- Temperature Sensors and Fans
- SystemGuard: Fan / Temperature Monitor

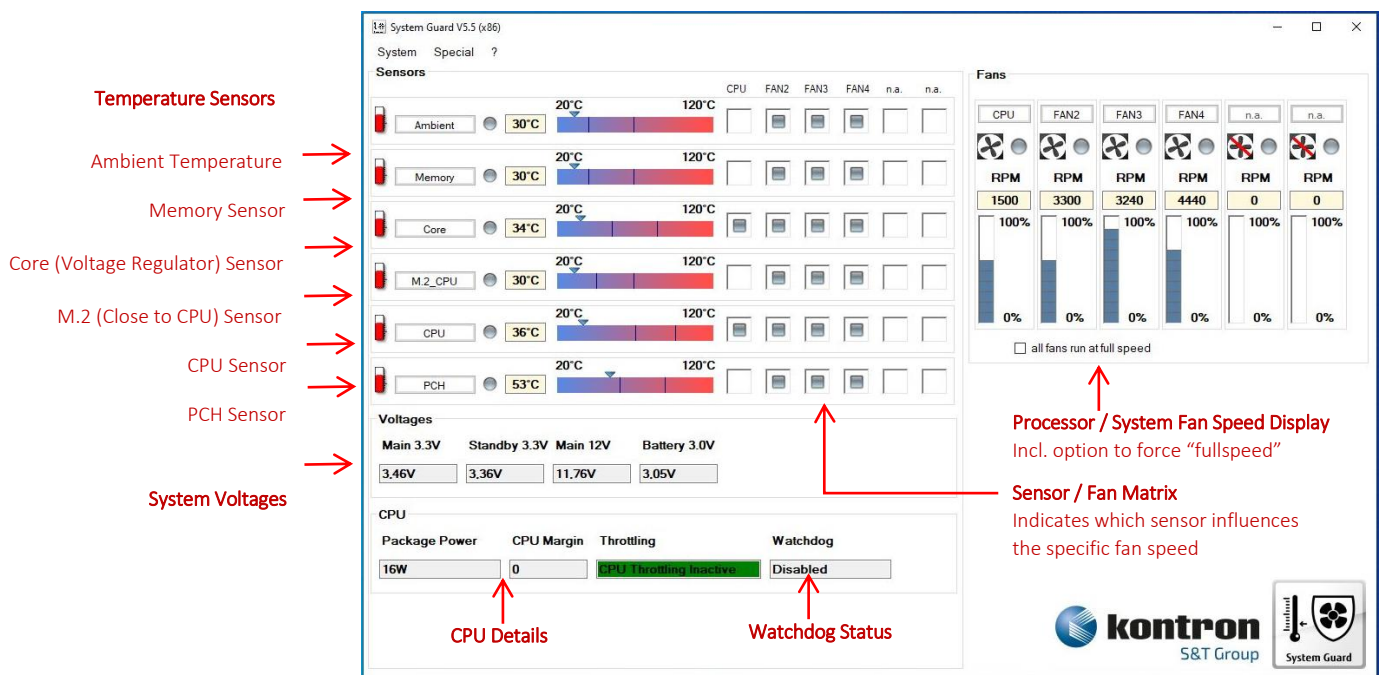
4.1 Temperature Sensors and Fan Connectors



4.2 SystemGuard – Monitoring Tool

MS Windows-based System Monitoring Tool

- Visualize temperature sensor data
- Display current speed for attached fans
- Display current voltage data and CPU power data
- User can configure fan aging control (menu “Special”)
- SystemGuard provides warnings if a fan or sensor fails
- User can configure system watchdog (menu “Special”)
- User can enable “full fan speed”

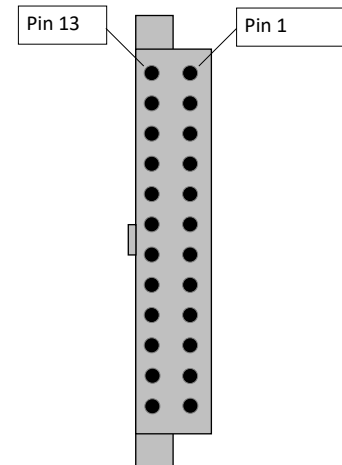


FTP-Link [SystemGuard](#)

5 Power Supply

5.1 “ATX” Multirail Power Supply Connector

Pin	Signal	Pin	Signal
13	+ 3.3V	1	+ 3.3V
14	- 12V	2	+ 3.3V
15	GND	3	GND
16	PS_ON (low asserted)	4	+ 5V
17	GND	5	GND
18	GND	6	+ 5V
19	GND	7	GND
20	- 5V (not used)	8	PWR_OK (high asserted)
21	+ 5V	9	+ 5V Aux*
22	+ 5V	10	+ 12V
23	+ 5V	11	+ 12V
24	GND	12	+ 3.3V

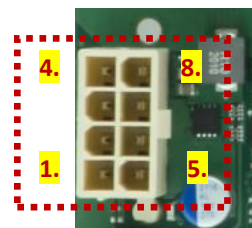


Minimum power supply load = 0A

*On some PSU models the 5V aux voltage does not drops off for several minutes after PSU main is switched off. “Power Failure Recovery” feature only works, after the 5V aux voltage drops down to 0V!

5.2 Internal Power Supply Connector (12V for Processor)

Pin	Signal	Pin	Signal
4	GND	8	+12V
3		7	
2		6	
1		5	



Minimum power supply load = 0A

5.3 Power Supply Requirements

Source	Voltage	Min. PSU Load	Max.Voltage Tolerance	Motherboard Capacitive Load	Motherboard max. Current (continuous) *)
Main Power Supply	+ 12V	0A	± 5 %	2.500µF	26A **)
	- 12V	0A	± 10 %	--	0.3A
	+ 5V	0A	± 5 %	1.900µF	6.0A
	+ 3.3V	0A	± 5 %	1.100µF	0.5A
Aux. Power	+ 5Vaux	0A	± 5 %	1.900µF	2.5A

*) Max. motherboard input current incl. processor and DRAM memory

Note: Additional power for drives, USB devices, PCIe cards etc. is **not** included!

**) Processor 125W TDP: Max. cont. current = 26A; max. surge current = 39A (< 10ms)

Processor 65W TDP: Max. cont. current = 23A; max. surge current = 34A (< 10ms)

Processor 35W TDP: Max. cont. current = 11A; max. surge current = 19A (< 10ms)

Power consumption can be reduced by limiting PL1 / PL2 CPU settings (BIOS setup option)

See section Miscellaneous / Processor TDP Setting for details

6 Display Options

6.1 Video Output Options

All DisplayPort outputs are compatible with DP++

- DPP to HDMI (passive / active)
- DPP to DVI (passive / active)
- DPP to VGA (active)

Maximum common screen resolution	Number of simultaneous displays
8k @ 60Hz HDR or 5k @ 120Hz HDR	1
8k @ 60Hz SDR or 5k @ 60Hz HDR	2
4k @ 60Hz HDR	4



HDR = High Dynamic Range Video

All DPP output ports are equivalent
SDR = Standard-Dynamic-Range-Video

Note: Intel Genlock feature is not supported

6.2 Display output order

Multimonitor output in GOP driver is enabled. Therefore screen output in BIOS and UEFI shell, as well boot logo during system boot is shown at two displays simultaneous (clone view). Depending on which DisplayPorts are used, only two displays are selected, as shown in the following table. Lowest "Priority" wins, if more than two monitors are connected.

Priority	1	2	3	4	5	6
Primary display	DPP1	DPP1	DPP1	DPP2	DPP2	DPP3
Secondary display	DPP2	DPP3	DPP4	DPP3	DPP4	DPP4

Miscellaneous

6.3 Various LED states / Error Status Messages

The power indicator (Power LED, Front panel pin 2/4) shows the various operating modes and error states of the system:

Status	Description
LED off	The system is switched off or unpowered
LED on	The system is in operation
LED flashes steady (50 % on, 50 % off)	The system is in sleep mode
LED flashes 2x short, repeated after pause	There is a fault in the CPU power supply, the CPU or the BIOS
LED flashes 4x short, 1x long, 4x short - repeated after pause	Failure in Power Supply

The BMC alert LED (Front panel pin 13) shows System Monitoring alert events.

Status	Description
LED off	No Alert event – Fan and temperature sensor values are in their defined range.
LED on	There is an alert event. Please check for failed fans or overheated temperature sensor. *Reset alert via SystemGuard or by rebooting the system after solving the issue.

The EC status LED (EC0) shows the current system state.

Status	Description
LED off	System is powerless or in deep sleep (G3, S4*, S5*)
LED on	System is running (S0)
LED flashes steady (50 % on, 50 % off)	System is ready for power-on (S3, S4*, S5*)

*) Depending on the power settings of BIOS, LED is off or blinking in S4 or S5 power state. If any wake-up source or USB standby power is enabled, motherboard will not enter “deep sleep” and therefore is able to blink the LED.

Note: Sleep states (G3, S0, S3, S4, S5) as defined in ACPI: https://uefi.org/specs/ACPI/6.4/16_Waking_and_Sleeping/sleeping-states.html



About Kontron

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). Kontron offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

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