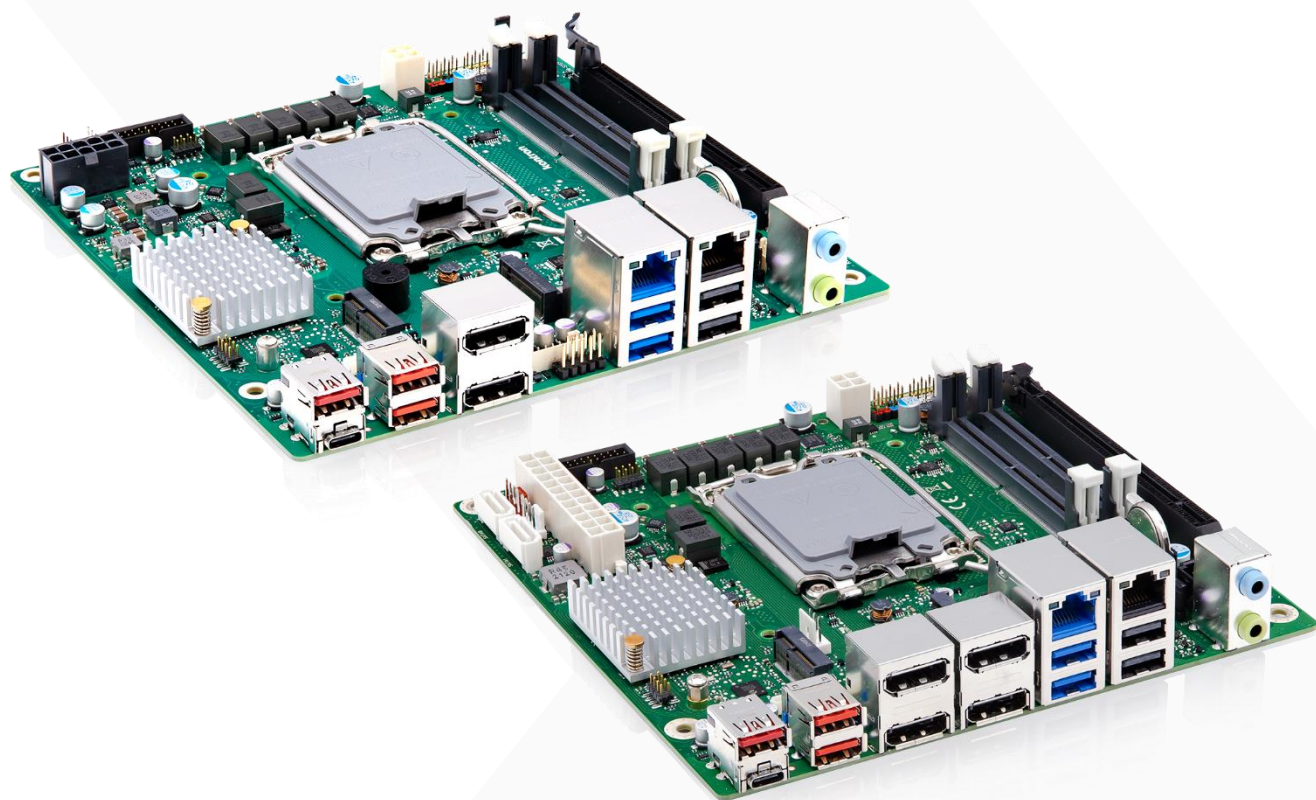


Technical Manual

Alderlake-S mini-ITX Series



Alderlake mITX series

- K3832-Q mini-ITX
- K3833-Q mini-ITX

Content

CONTENT	1
1 SAFETY INSTRUCTIONS / IMPORTANT NOTES	2
2 FEATURE OVERVIEW	3
2.1 MOTHERBOARD VERSIONS	3
2.2 K3832-Q OVERVIEW	5
2.2.1 Basic Layout	5
2.2.2 Onboard components	6
2.3 K3833-Q OVERVIEW	7
2.3.1 Basic Layout	7
2.3.2 Onboard components	8
2.4 REAR I/O CONNECTORS	9
2.5 I/O SHIELD	10
2.6 M.2 INSTALLATION NOTES	11
3 INTERFACES & CONNECTORS	12
3.1 BOARD	12
3.1.1 Front Panel Connector	12
3.2 STORAGE & CONNECTIVITY	13
3.2.1 Drive Power Connector (K3832 only)	13
4 SYSTEM MONITORING	14
4.1 TEMPERATURE SENSORS AND FAN CONNECTORS	14
4.2 SYSTEMGUARD – MONITORING TOOL	15
5 POWER SUPPLY	16
5.1 “ATX12VO” AND 12V-DC POWER SUPPLY ON K3832	16
5.1.1 Main power connector (10pin)	16
5.1.2 CPU power connector +12V2 (4 pin)	16
5.1.3 Single 12V-DC power supply wiring information	16
5.1.4 Wiring adaption from wire harness for D363x mITX to K3832 connector	17
5.1.5 Power Supply Requirements	17
5.2 ATX MULTIRAIL POWER SUPPLY ON K3833	18
5.2.1 Main power connector (24 pin)	18
5.2.2 CPU power connector +12V2 (4 pin)	18
5.2.3 ATX Power Supply Requirements	18
5.3 ATX PSU COMPATIBILITY / CROSS LOAD / LOW LOAD	19
6 DISPLAY OPTIONS	20
6.1 VIDEO OUTPUT OPTIONS	20
6.2 DISPLAY OUTPUT ORDER	20
7 BIOS RELATED TOPICS	21
7.1 BIOS UPDATE / BIOS RECOVERY	21
7.2 KSC FIRMWARE (EMBEDDED CONTROLLER)	21
8 MISCELLANEOUS	22
8.1 VARIOUS LED STATES / ERROR STATUS MESSAGES	22
ABOUT KONTRON	23

1 Safety Instructions / Important Notes

Do not connect or disconnect any cables or modules to or from any onboard connectors 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 fulfil 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	K3832-Q	K3833-Q	Notes
Industrial Series	✓	✓	
Extended Lifecycle Series (XLC)	--	--	
Form Factor	Mini-ITX	Mini-ITX	
Operating Temperature	0°C...+60°C		Motherboard Ambient Temperature
Chipset (PCH)	Q670E		Incl. PCH heatsink
CPU TDP	Max. 65W		
Memory Support	2 x DDR5 4800/5600, Dual Channel, max. 64GB		Support for DDR5-5600 pending. Requires Intel® Core™ i7 or i9 processor (13 th gen) and single rank SO-DIMM modules
ECC Support	--	--	
Graphics Support	2 x DisplayPort V1.4a	4 x DisplayPort V1.4a	all ports support DP++
HDMI / DVI / eDP / LVDS	-- / -- / ✓ / ✓	-- / -- / ✓ / --	HDMI/DVI via DPP dongle. eDP V1.4b
Support for D3653 VGA converter board	--		
LAN1: i219LM	✓		1.0 GbE
Intel Standard Manageability	✓		
Intel AMT / vPRO	✓ / --		
LAN2: i226LM	✓		2.5 GbE
TSN / TCC Support	(✓) / (✓)		Validation planned
WoL / LAN Teaming	✓ / ✓		
Slot #1	PCIe x16 Gen5		PEG slot, Max. load: 75W Gen5 support prepared, but not validated
Bifurcation Support	✓		PCIe x16 or 2 x PCIe x8 <i>Note: It is recommended to limit the PCIe link speed with Bifurcation = Enabled.</i>
SATA 6G / SATA RAID	-- / --	2 Ports / ✓	RAID 0/1 (VMD)
M.2 Key-M Socket	PCIe Gen4 2242	PCIe Gen4 2242	Attached to CPU
NVME RAID	(✓)	(✓)	RAID 0/1/5 (VMD) Only with a second NVMe via PCIe M.2 adapter card.
Intel Optane Support	--		
M.2 2230 Key-E Socket for WLAN/BT	✓		Incl. CNVi Support
M.2 Key-B Socket	--		

Motherboard Versions (cont.)

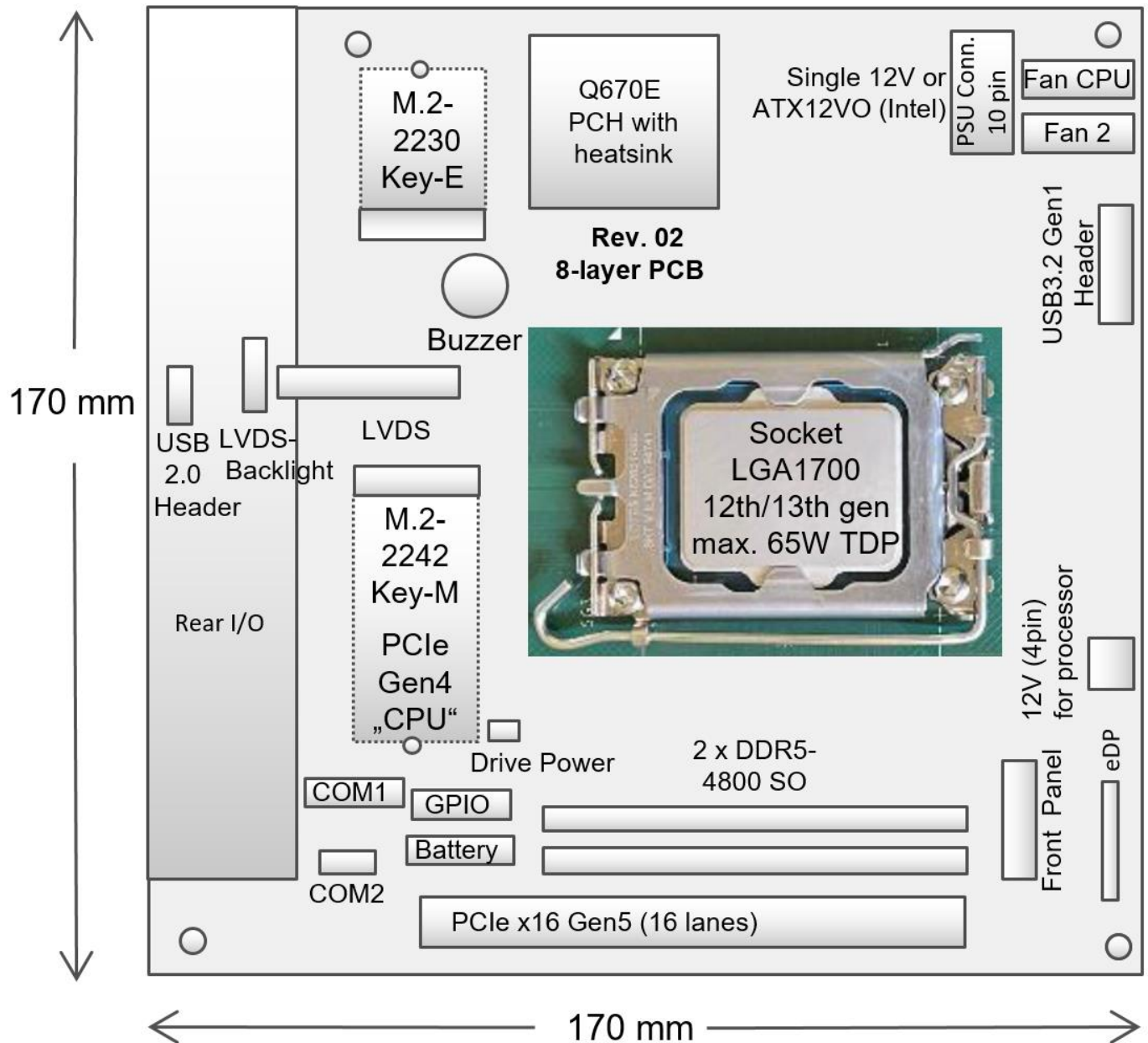
Feature	K3832-Q	K3833-Q	Notes
Rear USB 2.0		2	Type A Port (black)
Rear USB 3.2 Gen1		2	Type A Port (blue)
Rear USB 3.2 Gen2		3	Type A Port (red)
Rear USB 3.2 Gen2		1	Type C Port Note: Power delivery not supported
Internal USB 2.0	1	--	= 1 x Header @ 2 Ports
Internal USB 3.2 Gen1		1	= 1 x Header @ 2 Ports
Internal Stick Socket		--	
Integrated iTPM V2.0 / TPM (SPI) Header		√ / --	
Supported Fans		2	4 Pin PWM
Error LED Support		√	Fan or Temperature Error
HW Watchdog		√	System Reset after Timeout
GPIO Port		√	8 Bit
External COM		--	RS-232
Internal COM1*/COM2**	√ / √	√ / --	RS-232
RS-422/RS-485 Support		--	
PS2 Port / Parallel Port		-- / --	
Chassis Intrusion Support	--	√	
Buzzer / internal Speaker		√ / √	Internal Speaker: Mono
S/PDIF / Front Panel HD Audio	-- / --	√ / --	
SCSI LED Header		--	
Drive Power Connector	√	--	2-pin; +5V/GND @ 2A
VRM Heatsink		--	CPU Voltage Regulator

*) COM1: Full RS-232 feature support; requires extension cable with integrated COM transceiver (signal level converter) e.g. F5000-K011

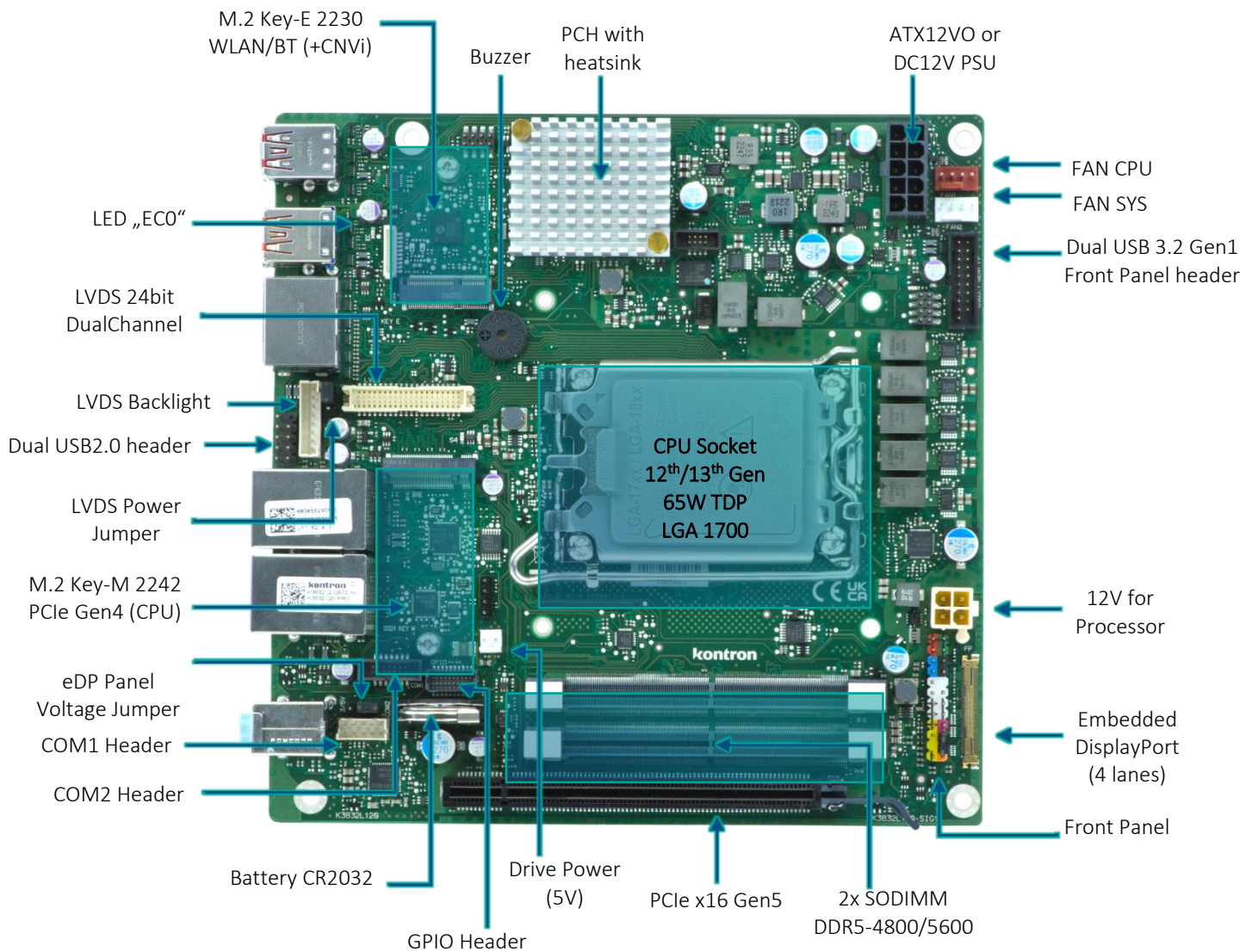
**) COM2: Reduced RS-232 feature set without DCD/DTR/DSR/RI (flow control)

2.2 K3832-Q Overview

2.2.1 Basic Layout



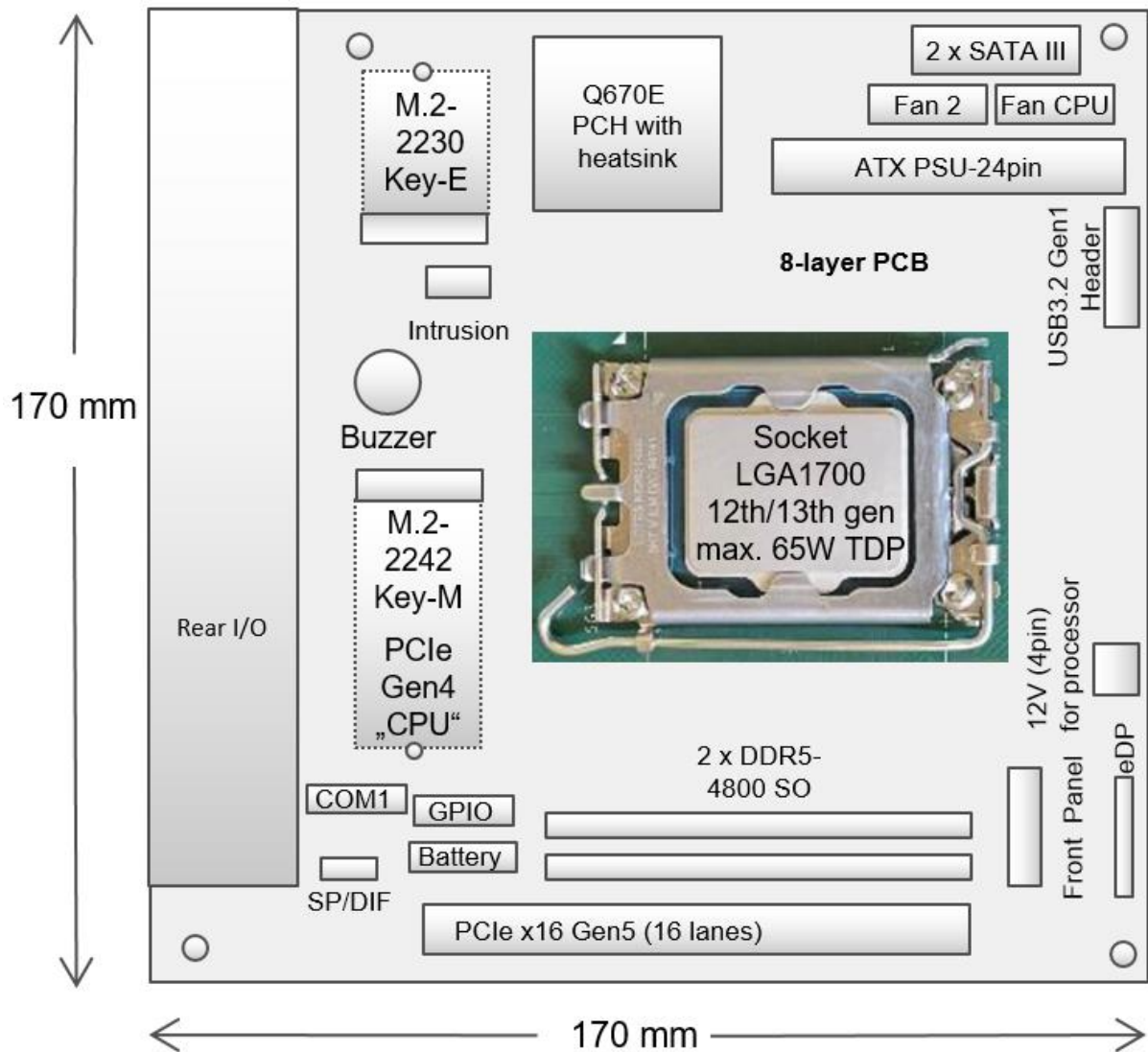
2.2.2 Onboard components



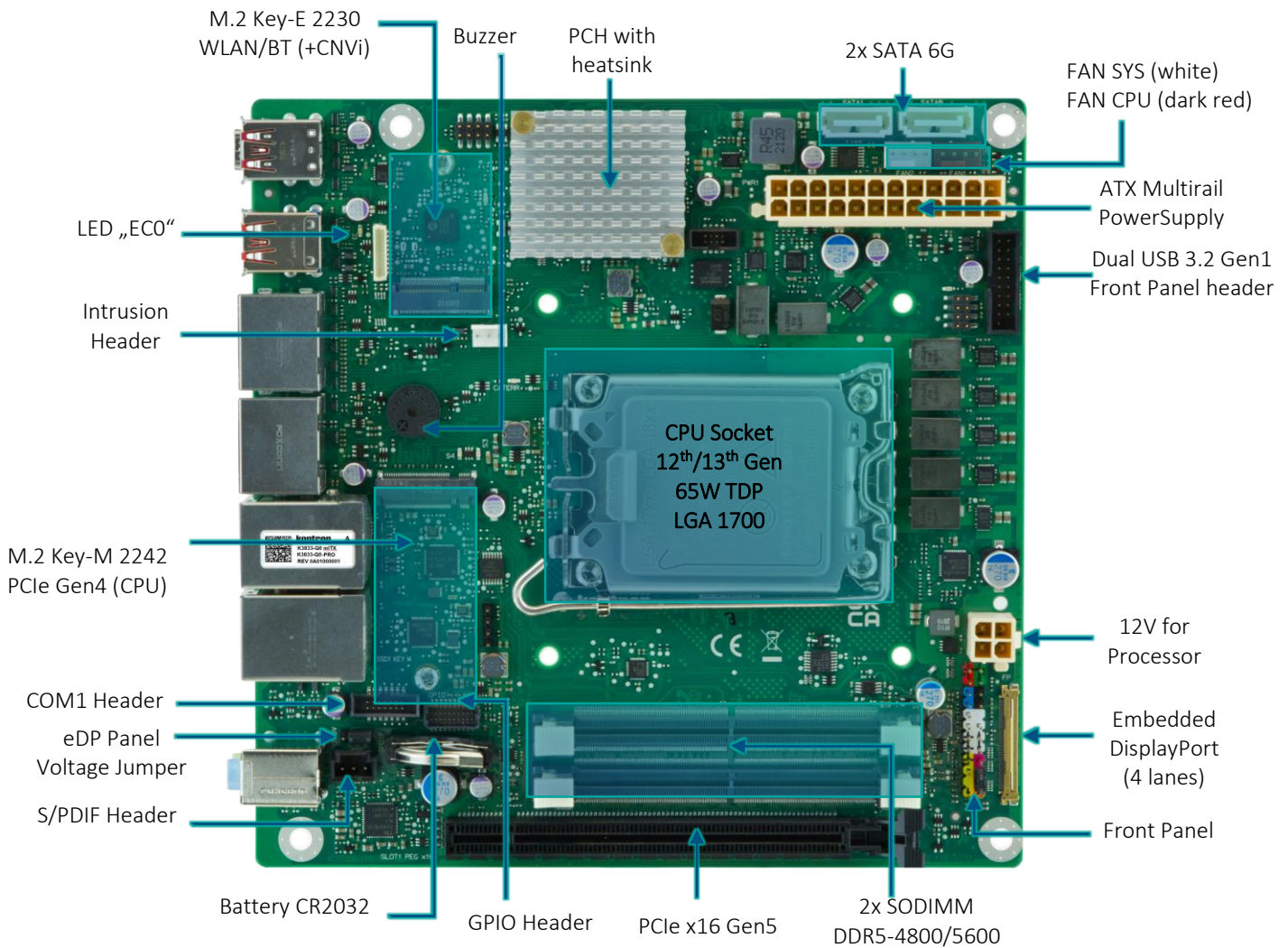
8 Layer PCB

2.3 K3833-Q Overview

2.3.1 Basic Layout

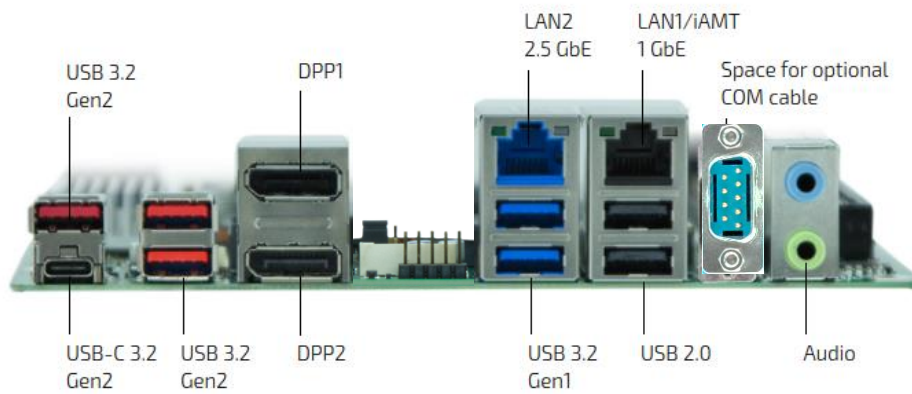


2.3.2 Onboard components

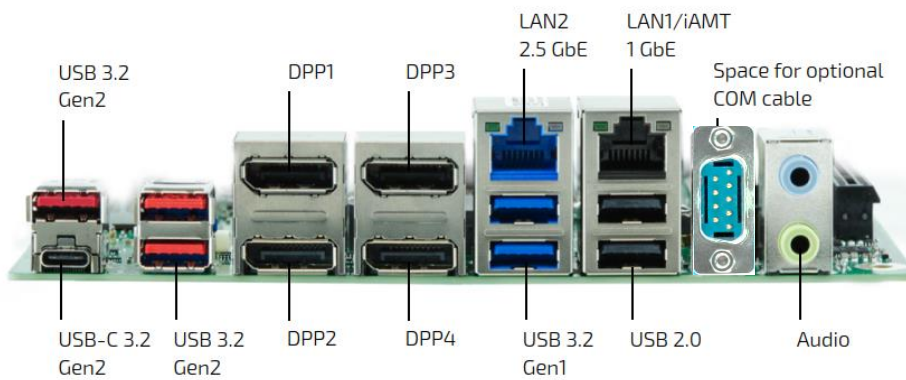


8 Layer PCB

2.4 Rear I/O Connectors



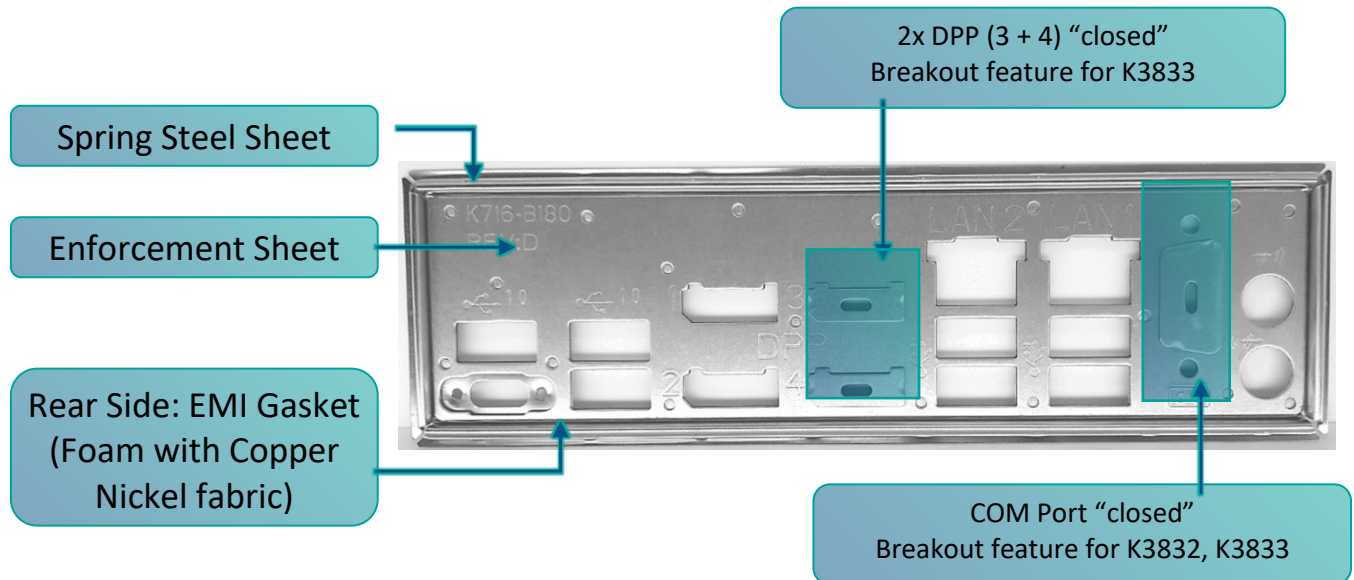
K3832-Q



K3833-Q

2.5 I/O Shield

IO shield p/n	K716-B180
Current revision	Rev:D



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

2.6 M.2 Installation Notes

M.2 Key-M sockets:

Supports PCIe x4 (Gen4) for NVME SSD modules

Mechanical support for 2242 modules only.

SATA mode not supported!

M.2 Key-E socket:

Supports M.2 Key E+A extension cards with PCIe x1 and USB 2.0 interface:

- PCIe based WLAN modules (+ Bluetooth via USB)
- CNVio based WLAN modules (+ Bluetooth via USB)
- Common PCIe based extension cards (Key-E and Key-A+E), like upcoming SATA AddOn card.

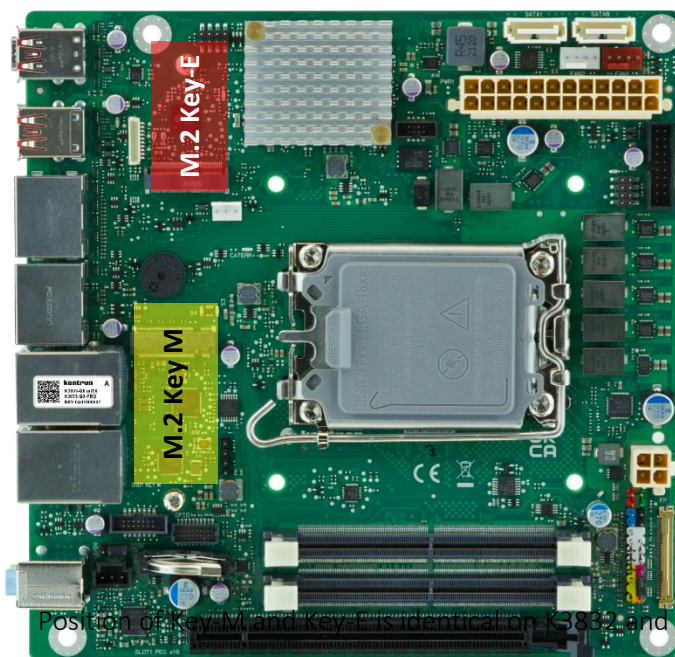
Mechanical support for 2230 modules.

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 **not** covered by any warranty!



Position of Key M and Key E is identical on K3832 and K3833.

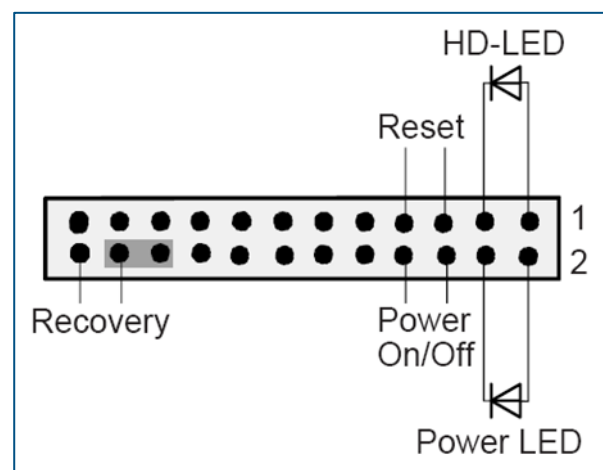
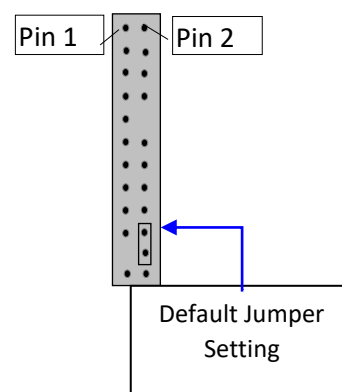
3 Interfaces & Connectors

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.



Note: Pinning is compatible to Intel 10 pin header

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)

Speaker Output:

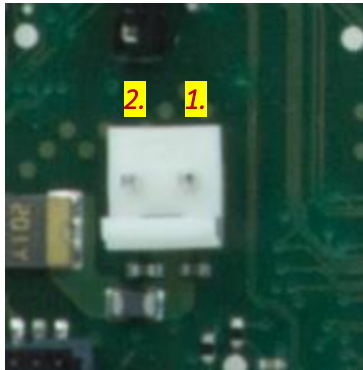
Mono; typ. 0.5W at 8 Ohm load

Note:

System beeps are only audible via the onboard buzzer

3.2 Storage & Connectivity

3.2.1 Drive Power Connector (K3832 only)



Pin	Signal
1	+5V (max. current 2A)
2	GND

Connector (onboard): AMP 171825-2 (2.5mm pitch)

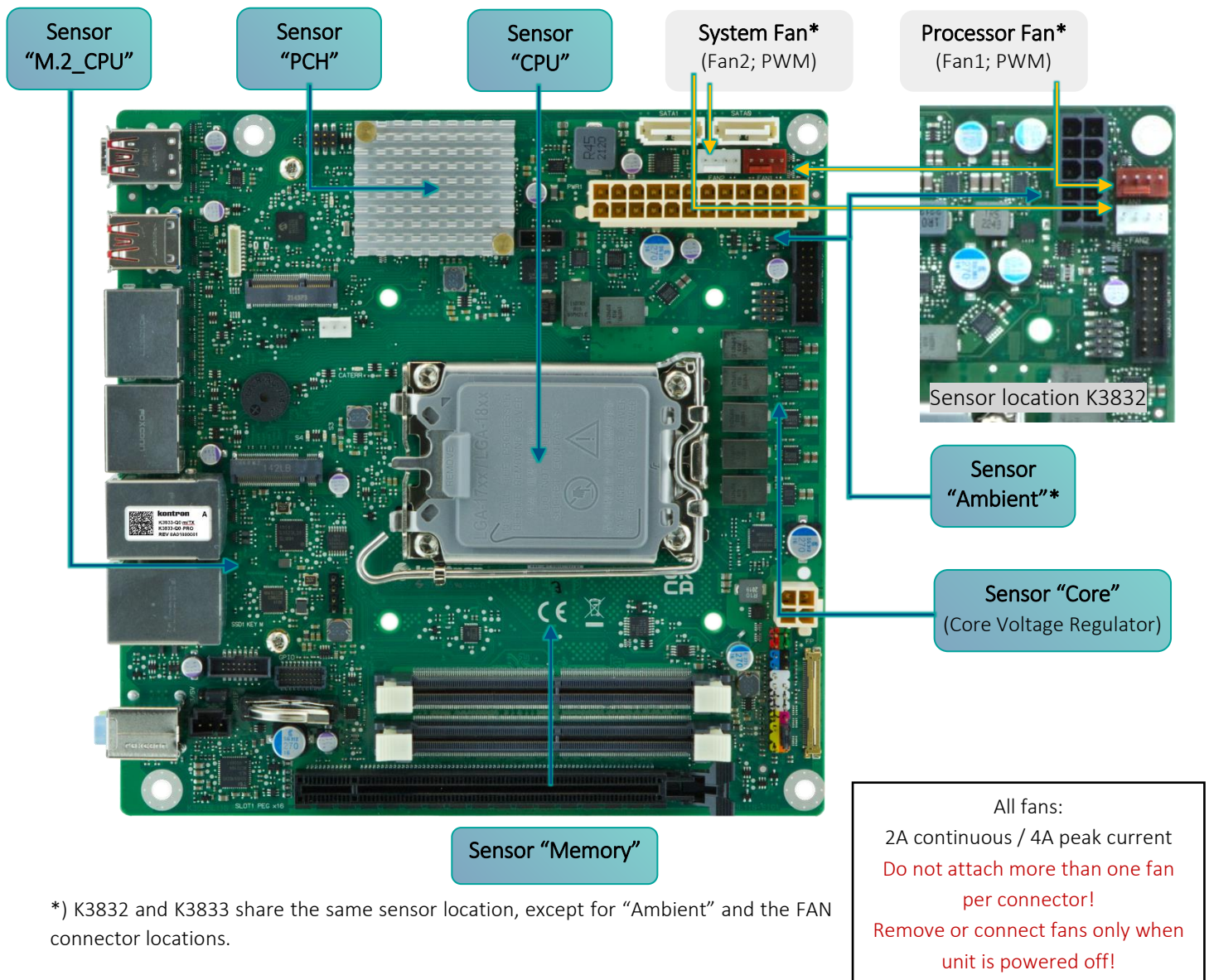
Mating connector (power cable): AMP 171822-2, Joint Tech A2540H-02P or compatible

Available adapter cable: [F5000-K016](#) (DrivePowerCable_5V: 2x SATA, 1x Slim drive power)

4 System Monitoring

- [Temperature Sensors and Fan connectors](#)
- [SystemGuard: Fan / Temperature Monitor](#)

4.1 Temperature Sensors and Fan Connectors

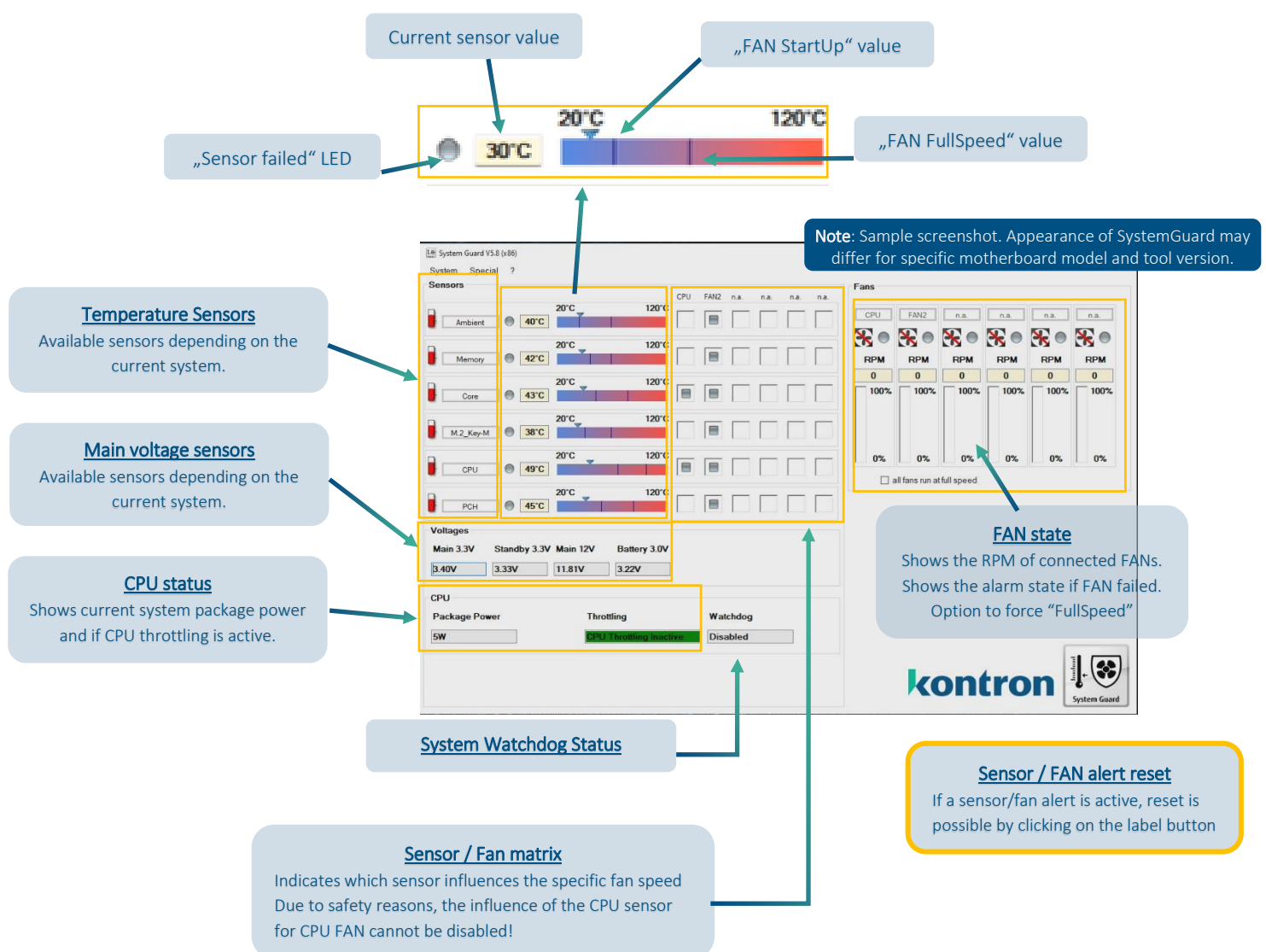


*) K3832 and K3833 share the same sensor location, except for "Ambient" and the FAN connector locations.

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](#)

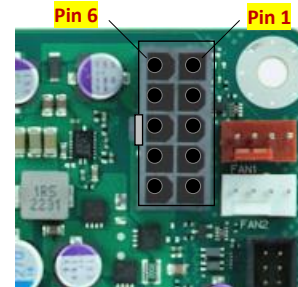
5 Power Supply

5.1 “ATX12VO” and 12V-DC Power Supply on K3832

5.1.1 Main power connector (10pin)

Pin	Signal	Pin	Signal
6	PWR_OK (high asserted)	1	PS_ON (low asserted)
7	+ 12V Aux	2	GND
8	+ 12V1	3	GND
9	+ 12V1	4	GND
10	+ 12V1	5	I_PSU%

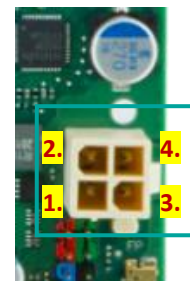
Minimum power supply load = 0A



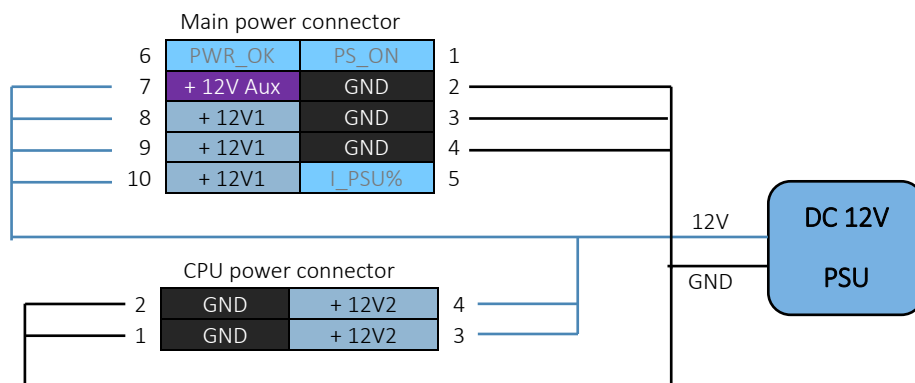
5.1.2 CPU power connector +12V2 (4 pin)

Pin	Signal	Pin	Signal
2	GND	4	+ 12V2
1	GND	3	+ 12V2

Minimum power supply load = 0A



5.1.3 Single 12V-DC power supply wiring information



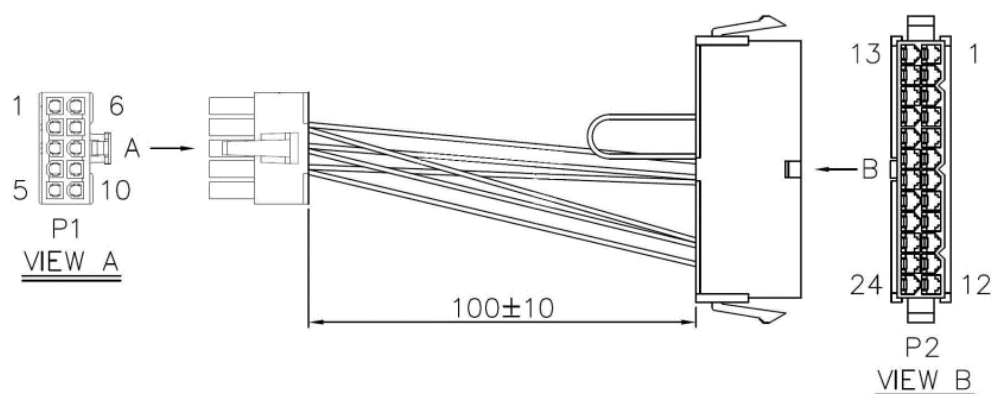
A universal adapter cable with the 10pin plug and open wires is available by Kontron:

Datasheet: [F5000-K014 \(Universal DC-In Adapter 10 pin open\)](#)

5.1.4 Wiring adaption from wire harness for D363x mITX to K3832 connector

Kontron provides an adapter cable to connect 24 pin single 12V wire harness of D363x motherboards or a standard ATX24 PSU to 10pin power connector of K3832.

Datasheet: [F5000-K015 \(DC-In Adapter 10pin-24pin\)](#)



Pin P1 ²	Signal P1	Signal P2	Pin P2 ²
		PS_ON	16 ¹
2	GND	GND	18 ¹
3	GND	GND	19
4	GND	GND	
7	+ 12V Aux	+ 12V	10
8	+ 12V1	+ 12V	
9	+ 12V1	+ 12V	11

1) PS_ON signal (for multirail PSU) is hardwired to GND (power on mode)

2) Pins not shown in this table are not connected.

In order to operate the motherboard, the onboard 4-pin power connector (+12V/GND for processor) must be connected by a separate cable. This component is not included in F5000-K015. In case a multirail PSU is used for K3832-Q, all voltage rails (except for +12V) must support zero load.

When using F5000-K015 to connect an existing single 12V DC-In solution previously designed for D343x-S or D363x-S motherboards (24-pin power connector) to K3832-Q (10-pin power connector), please consider that K3832-Q provides no output power (+5V/+3.3V) via the 10-pin power connector.

5.1.5 Power Supply Requirements

Source	Voltage	Min. PSU Load	Max.Voltage Tolerance	Motherboard Capacitive Load	Motherboard max. Current (continuous) *)
Single 12V	+ 12V	0A	+5 %	3000μF	13 A **)
ATX12VO	+ 12V	0A	+5 %/-7 %	3000μF	13 A **)
	+ 12Vaux	0A	5 %/-7 %	3000μF	1.5 A

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

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

**) Processor 65 W TDP: Max. Cont. Current < 13 A; max. Surge Current = 26 A (full Turbo Mode)

Processor 35 W TDP: Max. Cont. Current < 8 A; max. Surge Current = 20 A (full Turbo Mode)

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

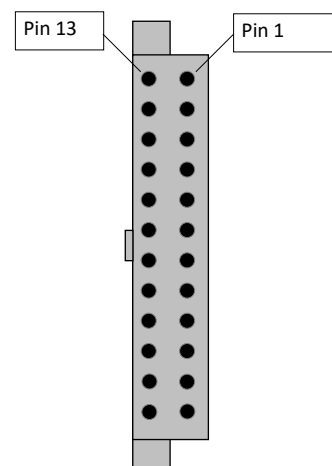
See section Miscellaneous / Processor TDP Setting for details

5.2 ATX Multirail Power Supply on K3833

Important note: K3833-Q does not support single 12V DC power supply!

5.2.1 Main power connector (24 pin)

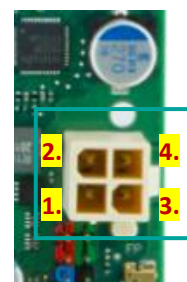
Pin	Signal	Pin	Signal
13	+ 3.3V	1	+ 3.3V
14	- 12V (not used)	2	+ 3.3V
15	GND	3	GND
16	PS_ON (low asserted)	4	+ 5V
17	GND	5	GND
18	GND	6	+ 5V
19	GND	7	GND
20	- 5V (not used)	8	PWR_OK (high asserted)
21	+ 5V	9	+ 5V Aux
22	+ 5V	10	+ 12V1
23	+ 5V	11	+ 12V1
24	GND	12	+ 3.3V



Minimum power supply load = 0A

5.2.2 CPU power connector +12V2 (4 pin)

Pin	Signal	Pin	Signal
2	GND	4	+ 12V2
1		3	



Minimum power supply load = 0A

5.2.3 ATX Power Supply Requirements

Source	Voltage	Min. PSU Load	Max.Voltage Tolerance	Motherboard Capacitive Load	Motherboard max. Current (continuous) *)
Main Power Supply	+ 12V	0A	± 5 %	1.800µF	< 10 A **)
	- 12V	--	--	--	--
	+ 5V	0A	± 5 %	1.600µF	5.0 A
	+ 3.3V	0A	± 5 %	500µF	0.5 A
Aux. Power	+ 5Vaux	0A	± 5 %	1.600µF	2.0 A

*) Max.

motherboard input current incl. processor and DRAM memory

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

**) Processor 65W TDP: Max. Cont. Current < 10A; max. Surge Current = 24A (full Turbo Mode)

Processor 35W TDP: Max. Cont. Current < 5A; max. Surge Current = 12A (full Turbo Mode)

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

See section Miscellaneous / Processor TDP Setting for details

5.3 ATX PSU compatibility / cross load / low load

The PSU must be capable to support cross load conditions or low load conditions for any voltage rail.

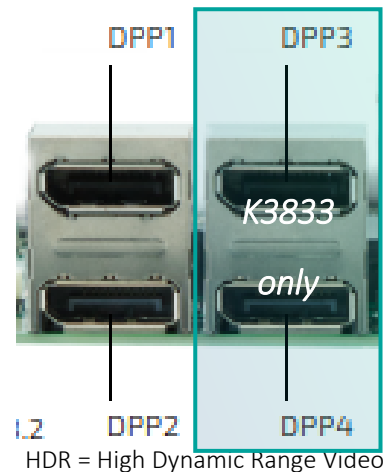
It's recommended to use power supplies with latest ATX power supply standard ATX 3.0 to support all power saving features (S0 Idle, CPU C10, ...).

6 Display Options

6.1 Video Output Options

- Up to 4x DisplayPort V1.4a (K3832: 2x DisplayPort V1.4a)
- 1x embedded DisplayPort (eDP) V1.4b supporting 4 lanes
- 1x DualChannel 24bit eDP-LVDS converter (K3832 only)
- 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



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

DPP3 and DPP4 only on K3833!

Note: Intel Genlock feature is not supported

6.2 Display output order

Multimonitor output in GOP driver is enabled. In POST, BIOS and UEFI environment a maximum of two monitor outputs is possible (in clone view mode), even more displays are connected to the system.

Output priority chain:

- K3832: eDP -> LVDS -> DPP1 -> DPP2
- K3833: eDP -> DPP1 -> DPP2 -> DPP3 -> DPP4

Example:

- Displays connected to eDP, DPP1 and DPP4 (K3833)
 - Output on eDP and DPP1
- Displays connected to LVDS, DPP1 and DPP2
 - Output on LVDS and DPP1

7 BIOS related topics

7.1 BIOS Update / BIOS Recovery

BIOS update options

- EFI-based Flash update (Bootable USB stick)
- MS Windows-based Flash update
- Linux-based BIOS update (planned)
- BIOS Recovery (restoring a corrupted BIOS)

FTP link to related BIOS update files and documentation:

- [BIOS-K3832](#)
- [BIOS-K3833](#)

For detailed information about BIOS update, requirements, special handling, etc... check BIOS-Release document in FTP BIOS path and as well our documentation of BIOS flash tools:

- [BIOS-Flash-Tools](#)

7.2 KSC Firmware (Embedded Controller)

An embedded controller (Microchip MEC1521) is used for System Management functions, watchdog support, and various other features.

For updating the firmware of the Embedded Controller, please use the dedicated update script, which is part of the BIOS update standard package: **"ec-update-[efi.nsh|win.bat]"**.

Follow the screen instructions of the update script.

Note: This operation will update the embedded controller firmware only, not the system BIOS!

8 Miscellaneous

8.1 Various LED states / Error Status Messages

The “Power LED” (Front Panel pin 2+4) shows the various operating modes and error states:

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
LED fast blinking (100ms on/off)	CPU catastrophic error detected (“CATERR”. Maybe unsupported CPU or defect of CPU or Motherboard detected.

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 (blocked or defect) or overheated temperature sensor. Reset alert via SystemGuard or by rebooting the system after solving the issue. Important: PowerOff system before you disconnect/connect any FAN to the system.

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.

For more information, please visit: www.kontron.com

Global Headquarters

Kontron Europe GmbH

Gutenbergstraße 2
85737 Ismaning, Germany
Tel.: + 49 821 4086 0
Fax: + 821 4086 111
pcmb-sales@kontron.com