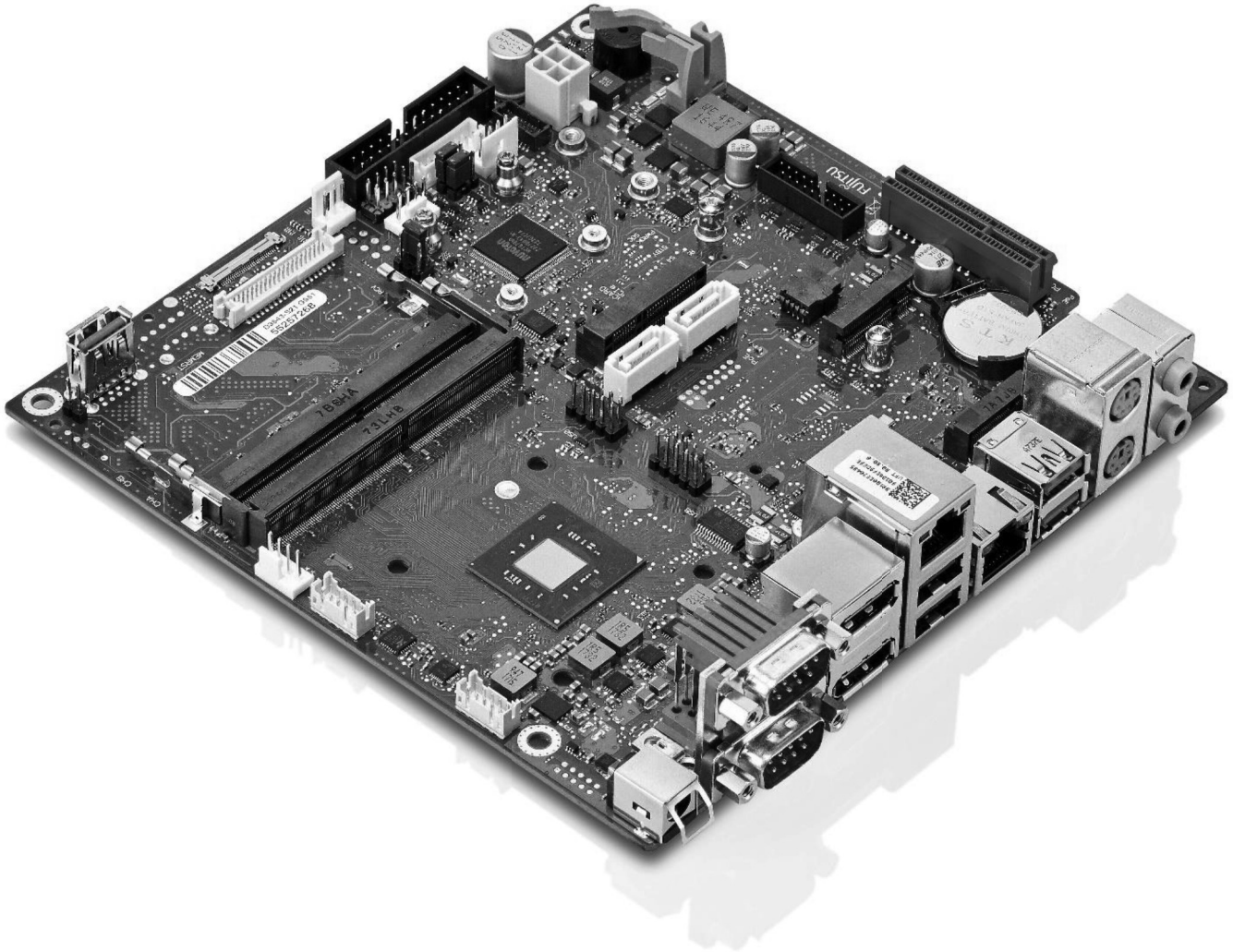
Industrial Mainboard Series
D3543-S



TechNotes V1.0

Content

1	Safety Instructions / Important Note	**6**
2	Feature Overview	**7**
2.1	Summary: Feature overview D3543-S	7
2.2	Basic Layout & External Connectors D3543-S	9
2.3	Block Diagram	10
2.4	Onboard components D3543-S	11
2.5	Heatsink Installation Notes	12
2.6	M.2 and Mini PCIe Installation Notes	14
2.7	I/O-Shield D3543-S	15
3	Interfaces & Connectors	**16**
3.1	Frontpanel Connector	16
3.2	LVDS Panel Connector	17
3.3	LVDS Backlight Connector and LVDS Panel Voltage Selector	18
3.4	Embedded DisplayPort Connector	19
3.5	eDP Panel Voltage Selector	20
3.6	DrivePower Connector	20
3.7	Internal Serial (COM3 & COM4) Port Connector	21
3.8	External Serial Port Connector	21
3.9	Internal Parallel Port Connector	22
3.10	Internal USB2.0 Connector (2 Ports)	22
3.11	Internal USB3.1 Gen1 Pin Connector (2 Ports)	23
3.12	Internal USB3.1 Gen1 Stick Socket	23
3.13	External USB3.1 Gen1 Connector	24
3.14	PS/2 Keyboard Port	25
3.15	PS/2 Mouse Port	25
3.16	LAN Connector	26
3.17	DisplayPort V1.2 Connector	27
3.18	Serial ATA Connectors	27

3.19	Mini-PCIe Pinout	28
3.20	Mini-PCIe Assembly Notes	29
3.21	M.2 Key B	30
3.22	M.2 Key E	31
3.23	Fan Connectors	32
3.24	Internal Power Supply Connector D3543-S	33
3.25	Rear Audio / Frontpanel Audio Connector	33
3.26	Mainboard Audio Connectors	34
3.27	S/PDIF Connector	35
3.28	Onboard Buzzer	35
3.29	GPI/O (Feature Connector)	36
3.30	Chassis Intrusion	37
4	System Monitoring	**38**
4.1	Temperature Sensors and Fan Connectors	39
4.2	Temperature Reference Points D3543-S	40
4.3	Temperature Reference Points D3543-S (rear)	41
4.4	SystemGuard	42
4.5	SystemGuard - Details	43
4.6	SilentFanConfigManager – Customize System Monitoring Settings	44
4.7	Components for continous 24/7 operation @ +60°C	45
4.8	Capacitor Endurance Time Comparison	46
4.9	BMC – BIOS Default Settings D3543-S	47
5	Power Supply	**48**
5.1	Power Supply D3543-S	48
5.2	Requirements for 8-36V Operation / Power Distribution	49
5.3	Drive Power Connector	51
6	USB Implementation	**52**
6.1	USB Ports & USB Power Fuses (D3543-S)	52
7	Display Options	**54**
7.1	Summary: Video Output Options D3543-S	54
7.2	Video Output – Details D3543-S	55
8	Operating System Support	**56**
8.1	Support for Windows 10	56
8.2	Linux Support	57
9	Mainboard Tools	**58**

Common Mainboard Tools		58
9.1	BIOS Boot Logo Tool	58
9.2	Change BIOS Setup Default Settings	58
9.3	OEMIDENT	58
9.4	SystemGuard	59
Industrial Tools		60
9.5	LVDS Tool	60
9.6	SilentFanConfig-Manager	60
9.7	Windows System-Monitoring API (BMCAPI)	60
9.8	Linux System-Monitoring Driver ("LM-Sensors")	60
10	Known Issues & Important Notes	**61**
10.1	Operating System Installation	61
10.2	Internal Serial Ports	61
10.3	M.2 @ SATA SSD & SATA Port 1	61
10.4	Processor (SoC) Temperature via SystemGuard Tool	62
10.5	BIOS Beep Codes	62
11	Miscellaneous	**63**
11.1	Battery Lifetime	63
11.2	RealTime Clock (RTC) Accuracy	64
11.3	BIOS integrated Erase Disk Tool	64
11.4	System Watchdog (WD)	65
11.5	BIOS Update / BIOS Recovery	68
11.6	BIOS integrated HW Diagnostic Tool	69

Revision History:

Version	Issue	Date
V1.0	First released version	Apr.2018

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

1 Safety Instructions / Important Note

Do not connect or disconnect any cables or modules to or from any onboard connectors (including the the rear connectors for DC-IN, COM, PS/2) until the mainboard is completely powered down.

Any damage caused to the mainboard by misuse of the onboard connectors is excluded from the standard warranty. Fujitsu Technology Solutions 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.)

Important note for OS installation:

Due to Intel restrictions, D3543-S *(GeminiLake)* is the first platform that necessarily requires an UEFI/GPT-based OS installation.

Legacy Boot support (e.g. USB Stick- DOS Boot, MBR-based OS installation) as used on previous mainboard models is no longer supported.

2 Feature Overview

2.1 Summary: Feature overview D3543-S

Feature	D3543-S1	D3543-S2	D3543-S3	Notes
SoC (System on Chip) Intel® silver Pentium ® / Intel® Celeron® (10W TDP)	Intel® Celeron® J4005 (Dual Core) 2.0GHz / 2.7GHz	Intel® Celeron® J4105 (Quad Core) 1.5GHz / 2.5GHz	Intel® Pentium® Silver J5005 (Quad Core) 1.5GHz / 2.8GHz	Clock: Base Frequency / Burst Frequency
Graphic	Intel® UHD 600 12EUs; max. 8GB 250MHz / 700MHz	Intel® UHD 600 12EUs; max. 8GB 250MHz / 750MHz	Intel® UHD 605 18EUs; max. 8GB 250MHz / 800MHz	Clock: Base Frequency / max. Dynamic Frequency
Memory Sockets / max. RAM	2 / 24GB DDR4-2400/2133 Non-ECC [1]			SO DIMM
TPM V2.0	Intel integrated			
Mini-PCIe Socket / 8 Bit GPIO	X / X			halfsize / fullsize possible, incl. USB2.0
M.2 Key B	1 socket; Support for 2242 / 2260 / 2280			M.2 Key B: Sata & PCIe
M.2 Key E	1 socket; Support for 2230			M.2 Key E: PCIe & USB
USB2.0 Ports internal / external	4 / 2			
USB3.1 Gen1 Ports internal / external / Stick Socket onboard	2 / 2 / 1			
Fan 1 / 2	X / X			4 Pin PWM

[1] Max. memory configuration: 1 x 16GB plus 1 x 8GB → 24GB

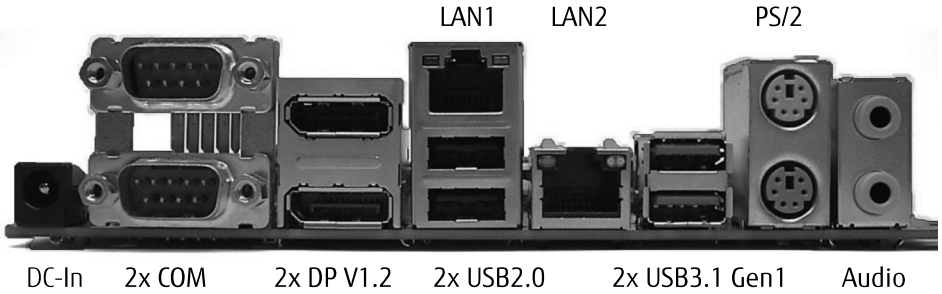
Feature Overview

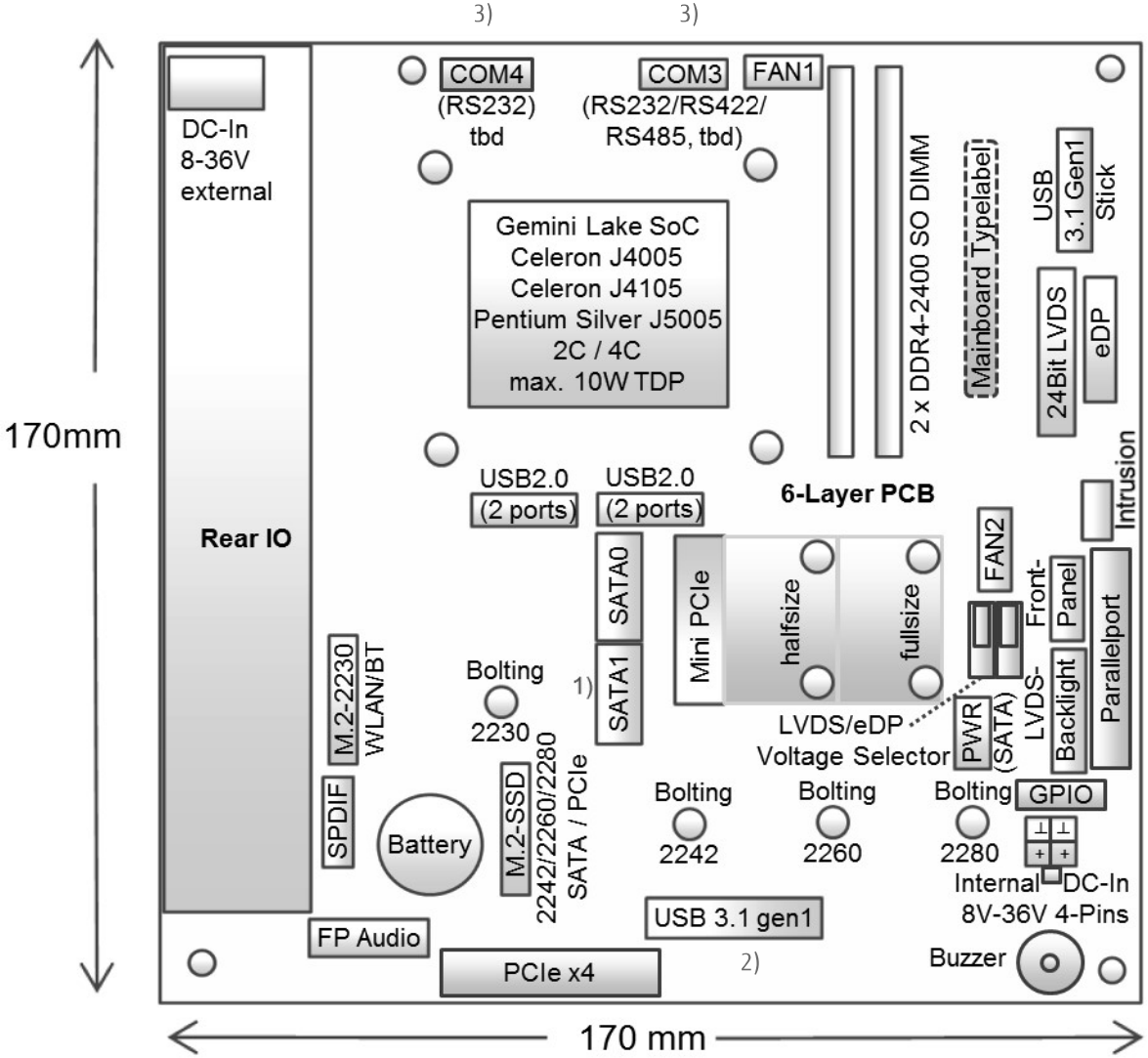
Summary: Feature overview D3543-S (continued)

Feature	D3543-S1	D3543-S2	D3543-S3	Notes
SATA Gen 3 / RAID Support	2 / --			SATA Port1 shared with M.2-SATA
S/P-DIF / Intrusion	X / X			
Slot #1: PCIe x4 (Riser Slot)	Gen2			
COM-Port external / COM-Port internal / Parallel Port internal	2 / 2 / 1			Internal COM (=COM4: RS-232/RS-422/RS-485 and COM3: RS-232) Not yet supported due to missing software/driver support!
Graphics Options	2 x DP V1.2a 1 x eDP V1.4 (two lanes) 1 x LVDS (dual channel; 24Bit)			Up to 3 independent displays
LAN1 / LAN2	Intel i210 / Realtek RTL8111G			
BIOS-POST / BIOS-Boot / OS – HW Watchdog onboard	X / X / X			
Approved for 24/7 operation @ 60°C / full load	X			
EraseDisk (BIOS Feature)	License included			

Feature Overview

2.2 Basic Layout & External Connectors D3543-S



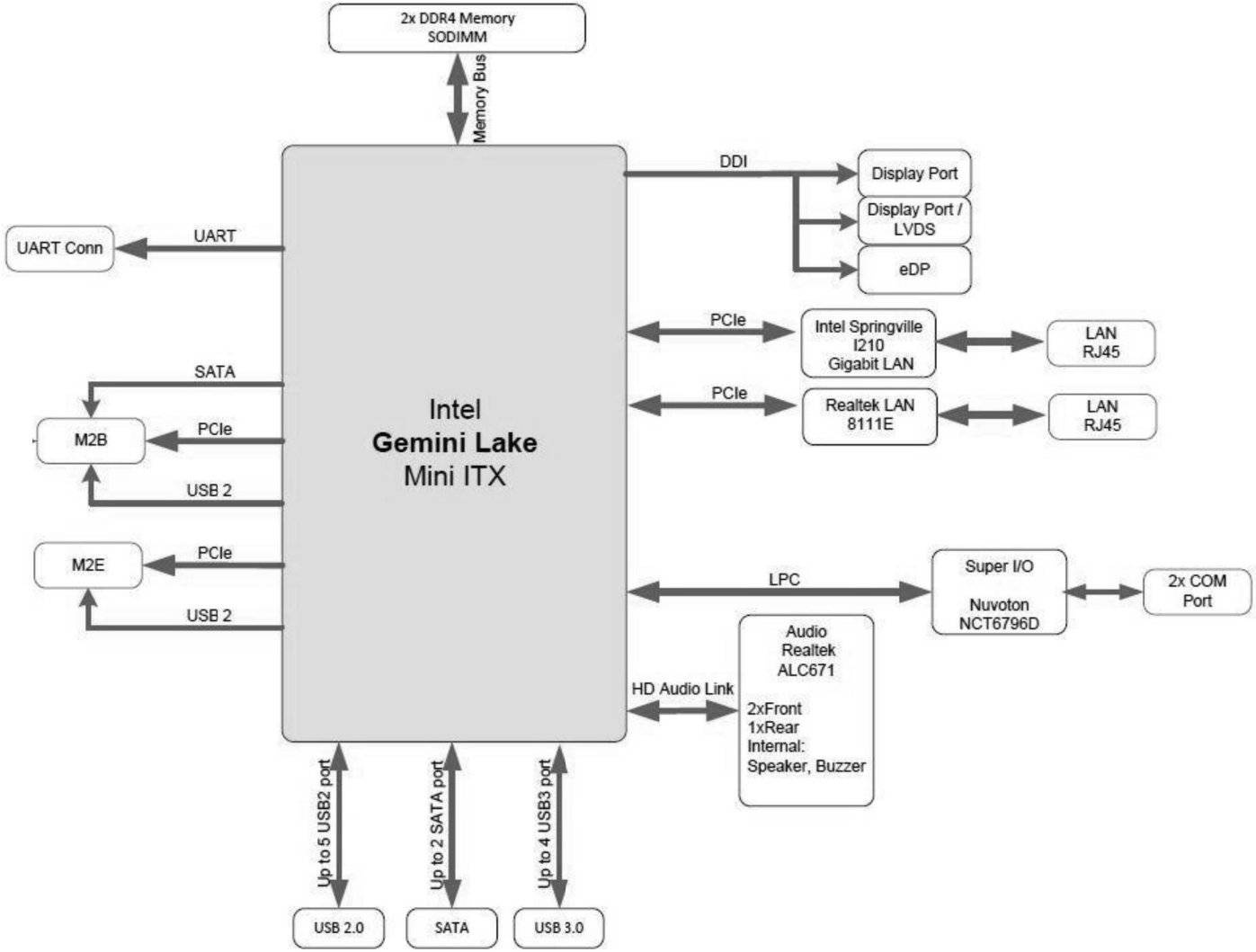


Mechanical dimensions of the board in B x L x H in mm:
Without heat sink: 170 x 170 x 33.07

1) SATA Port1 shared with SATA-based M.2 SSD
2) Optional USB Type-C extension cable (USB 3.1/gen1) planned for Fujitsu ITX chassis kit
3) COM3 & COM4 port: Reduced feature set; SW driver support currently under investigation.

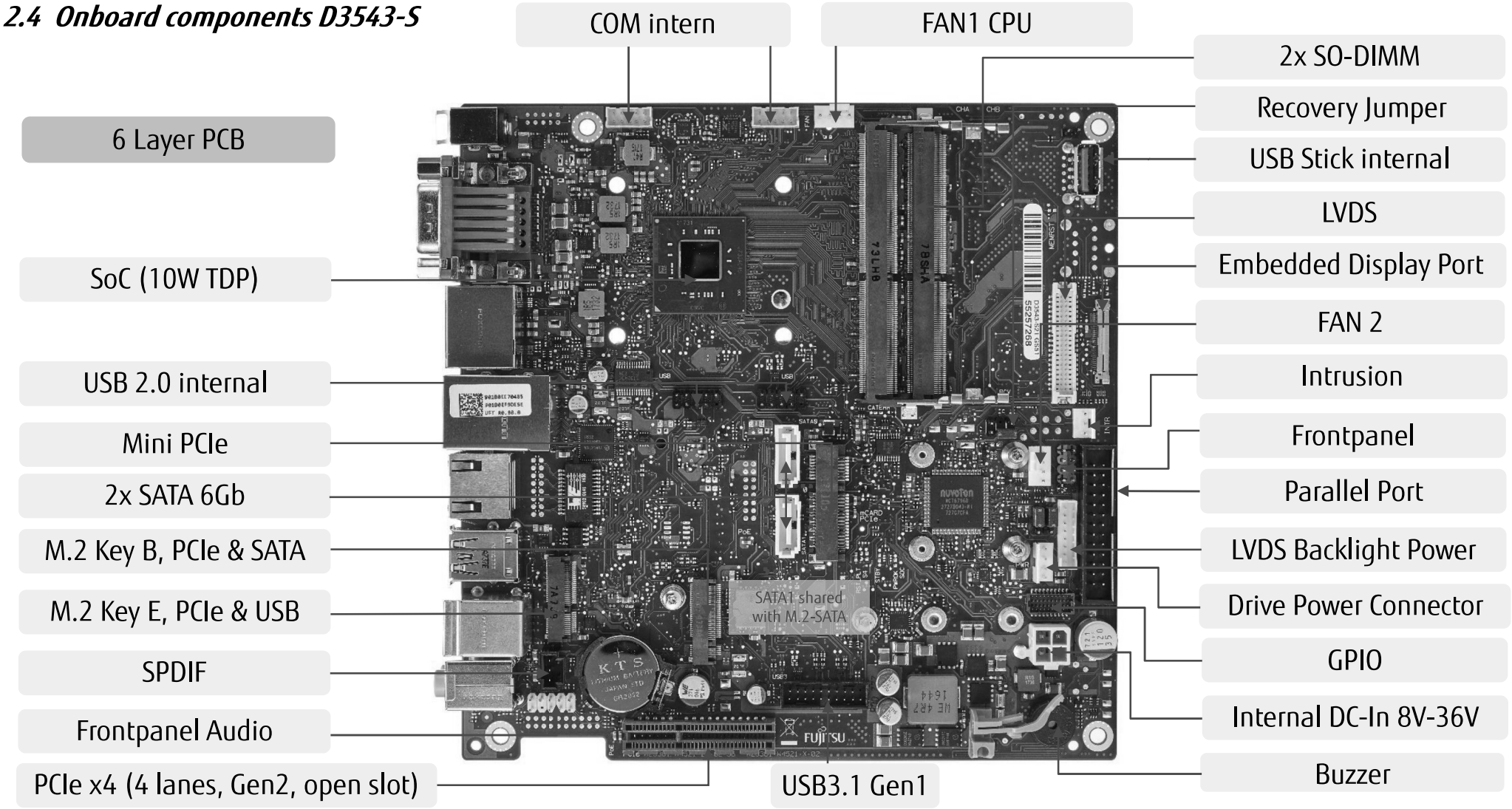
Feature Overview

2.3 Block Diagram



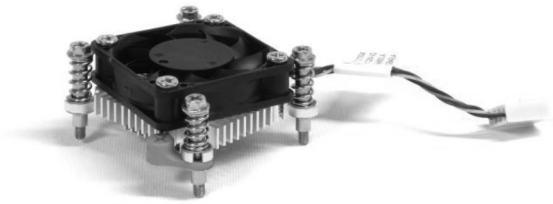
Feature Overview

2.4 Onboard components D3543-S

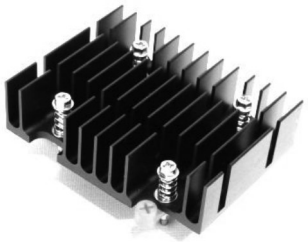


Feature Overview

2.5 Heatsink Installation Notes



Active heatsink for D3543-Sx



Passive heatsink for D3543-Sx

Heatsink mounting backplate

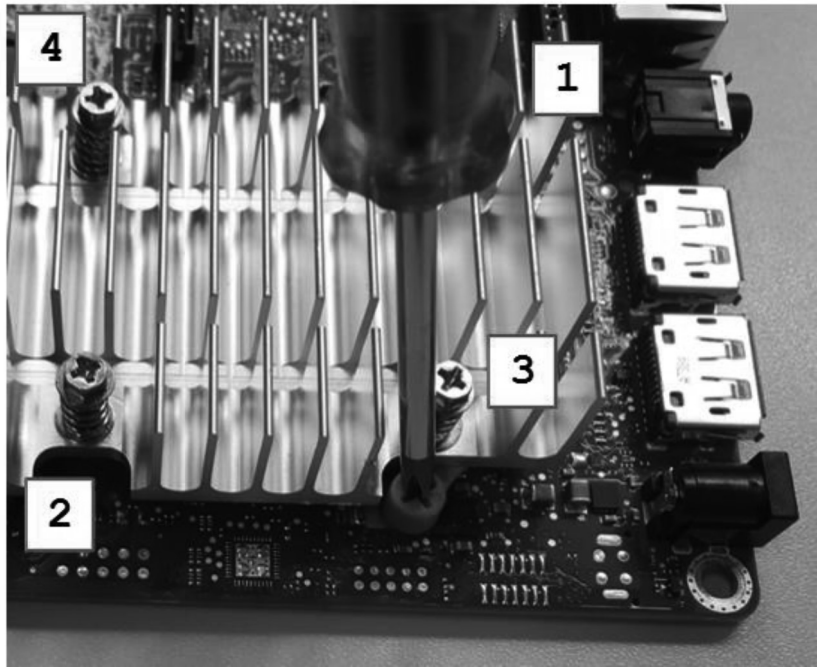
Note:
Recommended mounting torque for heatsink screws: 0.6Nm (max. 0.8Nm)

Passive heatsink positioning:
Gaps of the passive heatsink must be located towards the border of the mainboard

Mounting Backplate:
Do **not** remove the insulating foil of the backplate, otherwise the mainboard may be damaged due to possible short circuit

Feature Overview

Heatsink installation Notes



Assembly Notes:

- Do not remove the insulating foil of the backplate, otherwise the mainboard may be damaged due to possible short circuit
- Hold the heatsink with one hand so that it doesn't tilt while installing the screws
- Assemble all 4 screws according to the order shown left-hand
- Finally, remove the coloured plastic part by turning it carefully clockwise.

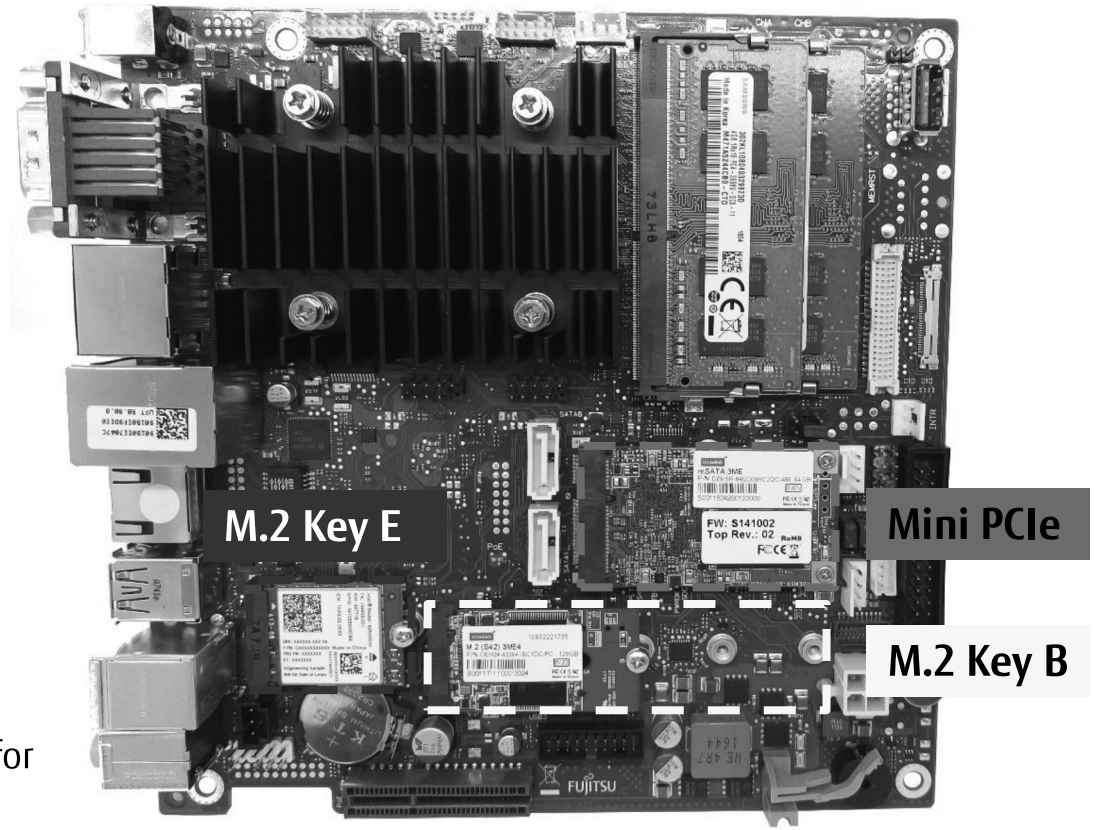
  This coloured plastic part is used for secure assembly of the heatsink in order not to damage the CPU die ("die crack protection").

Note: The assembly solution with the coloured plastic part as shown above may be replaced by an alternative "SoC die-crack-protection" implementation in future.

Feature Overview

2.6 M.2 and Mini PCIe Installation Notes

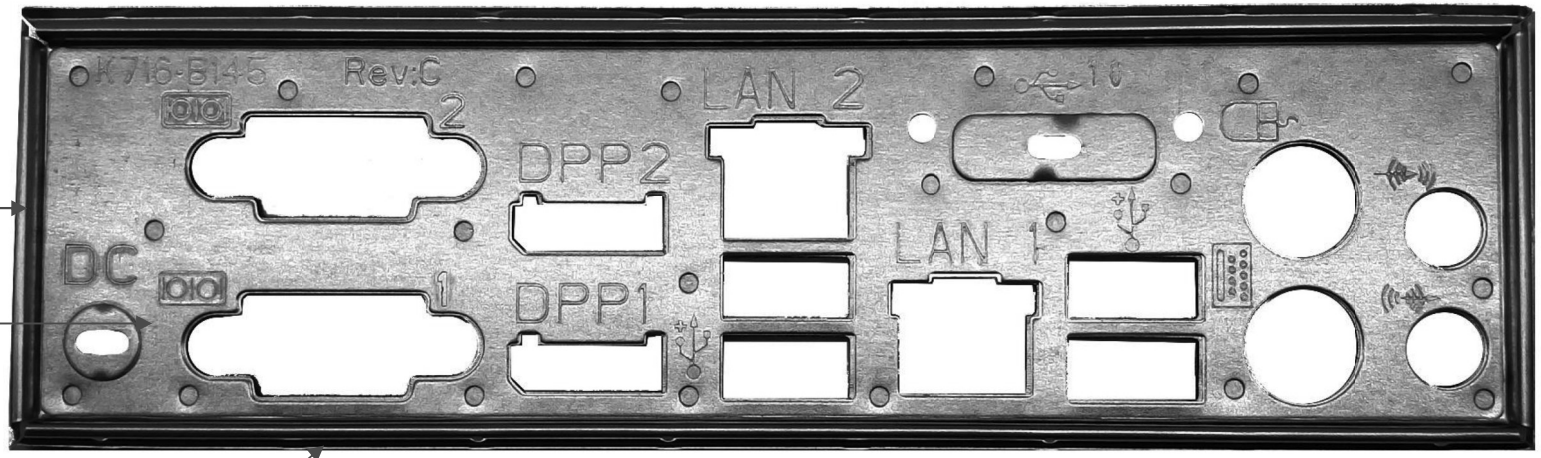
Options for using M.2 and Mini PCIe	M.2 Key B	M.2 Key E	Mini PCIe
Possible configurations	2280	2230	Half- and Fullsize
	2260	2230	
	2242	2230	



Important Note:
Recommended torque for M.2 screw is 0.2Nm and 0.3Nm for the nut.
When installing a M.2 Key B 2280 module and a M.2 Key E 2230 module then one screw is shared for fixing both modules.
Recommended torque for Mini-PCIe screw is 0.2Nm.

Feature Overview

2.7 I/O-Shield D3543-S



Spring Steel Sheet

Enforcement Sheet

Rear Side: EMI Gasket (Foam with Copper Nickel fabric)

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

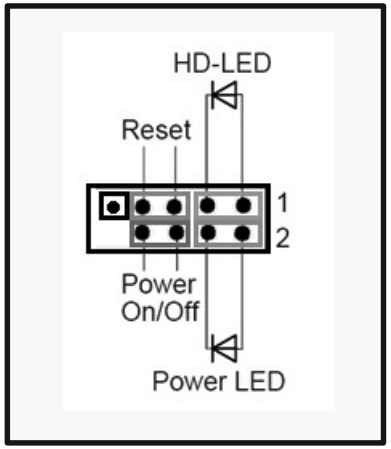
Note: ATX Chassis "letterbox" for I/O shield:
Nom. size = 158.75 x 44.45mm
Tolerance = +/- 0.2mm

3 Interfaces & Connectors

3.1 Frontpanel Connector

Pin	Signal
1	HD-LED +
3	HD-LED -
5	GND
7	RST_L
9	reserved

Pin	Signal
2	Power LED +
4	Power LED -
6	Power_Button
8	GND
10	Key

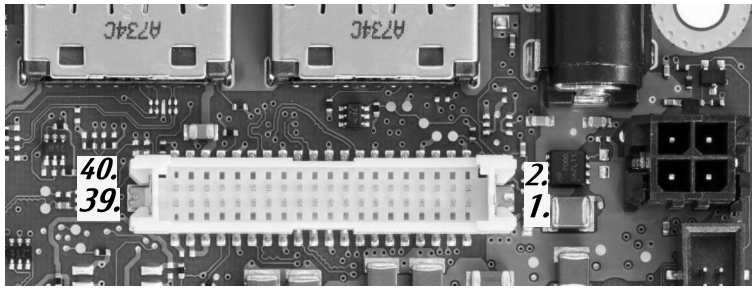


Power LED:
Anode: Pin 2 – current source 10mA up to 4V
Cathode: Pin 4 (suitable for various LED colors)

HDD LED:
Anode: Pin 1 – current source 6mA up to 4V
Cathode: Pin 3 (suitable for various LED colors)

Interfaces & Connectors

3.2 LVDS Panel Connector



LVDS Connector: Hirose DF13-40 (or compatible)

Note:
LVDS pinning is compatible to D2703-S / D2963-S / D3003-S / D3313-S / D3243-S / D3433-S / D3434-S

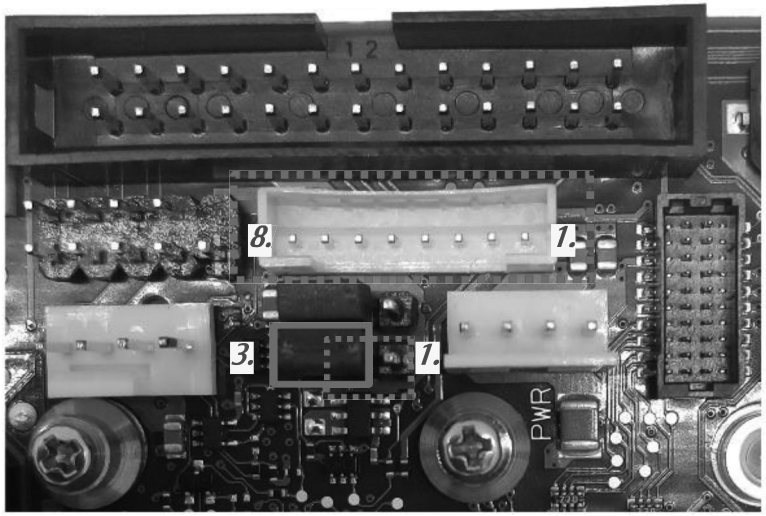
For single channel displays the ODD channel should be used!

PIN	SIGNAL	SIGNAL	PIN
2	Ground	Ground	1
4	LVDS_H3+ (EVEN_3+)	LVDS_L3+ (ODD_3+)	3
6	LVDS_H3- (EVEN_3-)	LVDS_L3- (ODD_3-)	5
8	Ground	Ground	7
10	LVDS_H2+ (EVEN_2+)	LVDS_L2+ (ODD_2+)	9
12	LVDS_H2- (EVEN_2-)	LVDS_L2- (ODD_2-)	11
14	Ground	Ground	13
16	LVDS_H1+ (EVEN_1+)	LVDS_L1+ (ODD_1+)	15
18	LVDS_H1- (EVEN_1-)	LVDS_L1- (ODD_1-)	17
20	Ground	Ground	19
22	LVDS_H0+ (EVEN_0+)	LVDS_L0+ (ODD_0+)	21
24	LVDS_H0- (EVEN_0-)	LVDS_L0- (ODD_0-)	23
26	Ground	Ground	25
28	LVDS_CLK_H+ (CLK_EVEN_+)	LVDS_CLK_L+ (CLK_ODD_+)	27
30	LVDS_CLK_H- (CLK_EVEN_-)	LVDS_CLK_L- (CLK_ODD_-)	29
32	Ground	Ground	31
34	DDC-Data	DDC-Clock	33
36	LCD-Power 1)	LCD-Power 1)	35
38	Ground	LCD-Power 1)	37
40	LCD_Power_Enable	Ground	39

1) Selectable via Jumper

Max. load: 1 A per LVDS pin!

3.3 LVDS Backlight Connector and LVDS Panel Voltage Selector



Pin	LVDS Panel Voltage Selector
1	+5V
2	VDD DIG LVDS
3	+3V

LVDS Panel Operating Voltage:

3.3V or 5V
Default jumper setting = 3.3V

Backlight Inverter Connector: JST PHR-8

Pin	Signal Backlight Connector
1	GND
2	GND
3	PWM Backlight Brightness Control
4	+ 5V
5	+ 5V
6	Backlight On/Off Control
7	+12V
8	+12V

Backlight Brightness Control:

PWM based
Basically the brightness level can be selected by BIOS Setup or a specific application for MS Windows 10 (not yet available).

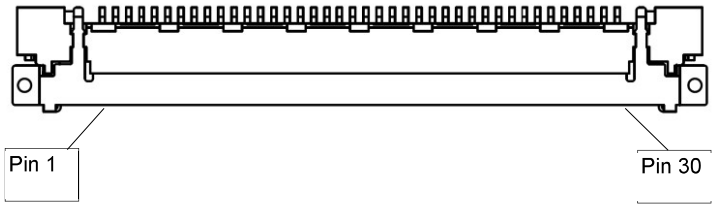
Backlight On/Off Control:
Active High; 3.3V

Max. load: 2 A per backlight pin!

3.4 Embedded DisplayPort Connector

Pin	Signal Assignment	Comment
1	NC	
2	GND	
3	Link1-	
4	Link1+	
5	GND	
6	Link0-	
7	Link0+	
8	GND	
9	AUX+	
10	AUX-	
11	GND	
12	VCC	3.3V or 5V
13	VCC	
14	NC	
15	GND	

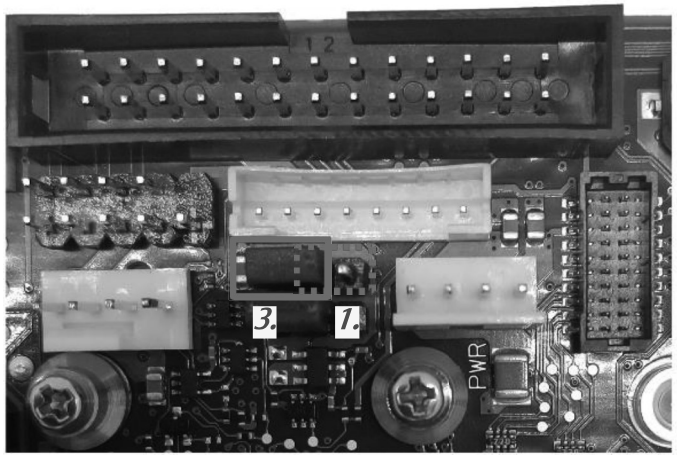
Pin	Signal Assignment	Comment
16	GND	
17	Hotplug detect	
18	GND	
19	GND	
20	GND	
21	GND	
22	Backlight enable	activ high
23	Backl PWM / Dimm	
24	NC	
25	NC	
26	+12V	Backlight power
27	+12V	
28	+12V	
29	+12V	
30	NC	



Connector type:

Onboard: I-PEX: 20455-030E-12 (or compatible)
eDP Cable (mating housing): I-PEX: 20453-030T-11 (or compatible)
Cable requires 1:30 connection (pin 1 to pin 30, pin2 to pin29 etc.)

3.5 eDP Panel Voltage Selector



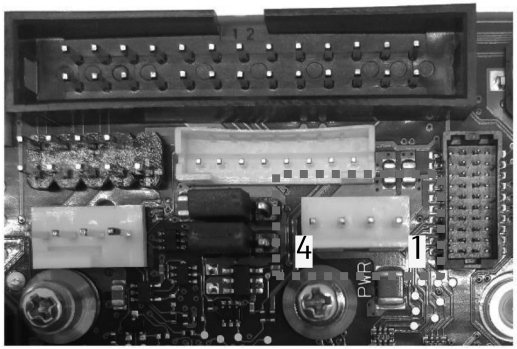
Pin	LVDS Panel Voltage Selector
1	+5V
2	VDD eDP
3	+3V

eDP Panel Operating Voltage:

3.3V or 5V
Default jumper setting = 3.3V

3.6 DrivePower Connector

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

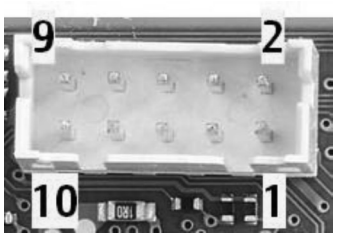


3.7 Internal Serial (COM3 & COM4) Port Connector

Onboard connector: JST B10B-PHDSS (LF)(SN) or compatible; mating connector = PHDR-10VS or compatible

Pin	Signal
1	reserved
3	RXD
5	TXD
7	reserved
9	GND

Pin	Signal
2	reserved
4	RTS
6	CTS
8	reserved
10	reserved

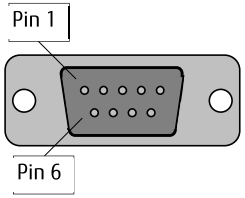


Note: COM 3 and COM 4 not yet supported due to missing SW driver support!

3.8 External Serial Port Connector

Pin	Signal
1	DCD
2	SIN
3	SOUT
4	DTR
5	GND

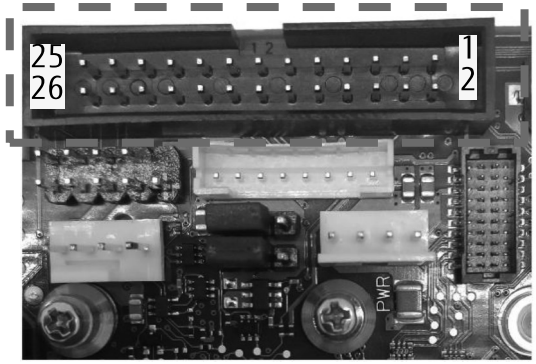
Pin	Signal
6	DSR
7	RTS
8	CTS
9	RI



3.9 Internal Parallel Port Connector

Pin	Signal
1	Strobe
3	Data0
5	Data1
7	Data2
9	Data3
11	Data4
13	Data5
15	Data6
17	Data7
19	ACK
21	Busy
23	Empty
25	Select

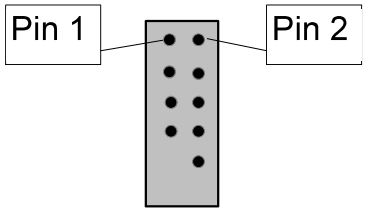
Pin	Signal
2	AutoFD
4	Error
6	Init
8	Sel_L
10	GND
12	GND
14	GND
16	GND
18	GND
20	GND
22	GND
24	GND
26	GND



3.10 Internal USB2.0 Connector (2 Ports)

Pin	Signal
1	+5V (fuse protected)
3	USB2 Data negative (Port 1)
5	USB2 Data positive (Port 1)
7	GND
9	NC

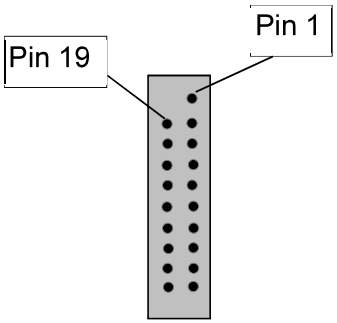
Pin	Signal
2	+5V (fuse protected)
4	USB2 Data negative (Port 2)
6	USB2 Data positive (Port 2)
8	GND
10	NC



3.11 Internal USB3.1 Gen1 Pin Connector (2 Ports)

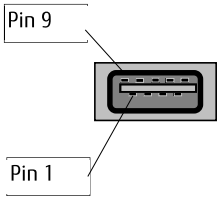
Pin	Signal
19	+5V (fused protected)
18	USB3 RX negative (Port2)
17	USB3 RX positiv (Port2)
16	GND
15	USB3 TX negative (Port2)
14	USB3 TX positive (Port2)
13	GND
12	USB2 Data negative (Port2)
11	USB2 Data positive (Port2)

Pin	Signal
1	+5V (fuse protected)
2	USB3 RX negative (Port1)
3	USB3 RX positive (Port1)
4	GND
5	USB3 TX negative (Port1)
6	USB3 TX positive (Port1)
7	GND
8	USB2 Data negative (Port1)
9	USB2 Data positive (Port1)
10	USB Connection



3.12 Internal USB3.1 Gen1 Stick Socket

Pin	Signal
1	+5V (fused protected)
2	USB2 Data negative
3	USB2 Data positive
4	GND
5	USB3 RX negative
6	USB3 RX positiv
7	GND
8	USB3 TX negative
9	USB3 TX positive

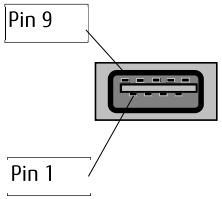


Note:
All USB3 connectors provide separate signal lines for USB3.1 Gen1 and USB2.0!

All "fused" ports provide max. 500mA (USB2.0) resp. . 900mA (USB3.1 Gen1) for each port

3.13 External USB3.1 Gen1 Connector

Pin	Signal
1	+5V (fused protected)
2	USB2 Data negative
3	USB2 Data positive
4	GND
5	USB3 RX negative
6	USB3 RX positiv
7	GND
8	USB3 TX negative
9	USB3 TX positive

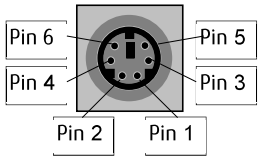


Note:
All USB3 connectors provide separate signal lines for USB3.1 Gen1 and USB2.0!

All "fused" ports provide max. 500mA (USB2.0) resp. . 900mA (USB3.1 Gen1) for each port

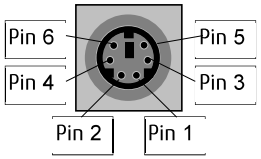
3.14 PS/2 Keyboard Port

Pin	Signal
1	KBD Data
2	NC
3	GND
4	+5V (fuse protected)
5	KBD CLK
6	Keyboard_On (low asserted pulse)



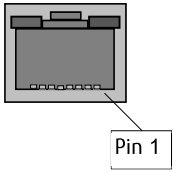
3.15 PS/2 Mouse Port

Pin	Signal
1	MOUSE Data
2	NC
3	GND
4	+5V (fuse protected)
5	MOUSE CLK
6	NC



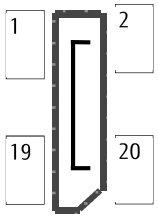
3.16 LAN Connector

Pin	Signal with 10/100/1000	Signal with 10/100
1	MX1 +	TX +
2	MX1 -	TX -
3	MX2 +	RX +
4	MX3 +	TERMPLANE
5	MX3 -	TERMPLANE
6	MX2 -	RX -
7	MX4 +	TERMPLANE
8	MX4 -	TERMPLANE



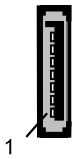
3.17 DisplayPort V1.2 Connector

Pin	Signal	Pin	Signal
1	Link0+	2	GND
3	Link0-	4	Link1+
5	GND	6	Link1-
7	Link2+	8	GND
9	Link2-	10	Link3+
11	GND	12	Link3-
13	**DVI dongle detect** / (GND (N/A))	14	**GND** / (CEC for HDMI (N/A))
15	AUX+	16	GND
17	AUX-	18	Hotplug detect
19	GND (Return)	20	+3.3V (fuse protected)

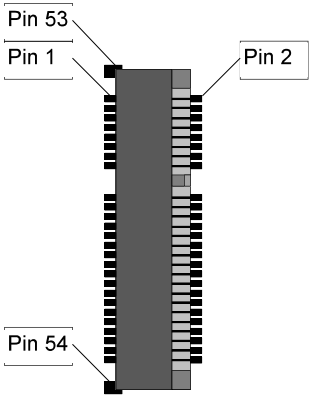


3.18 Serial ATA Connectors

Pin	Signal	Pin	Signal
1	GND	2	Transmit data positive
3	Transmit data negative	4	GND
5	Receive data negative	6	Receive data positive
7	GND		



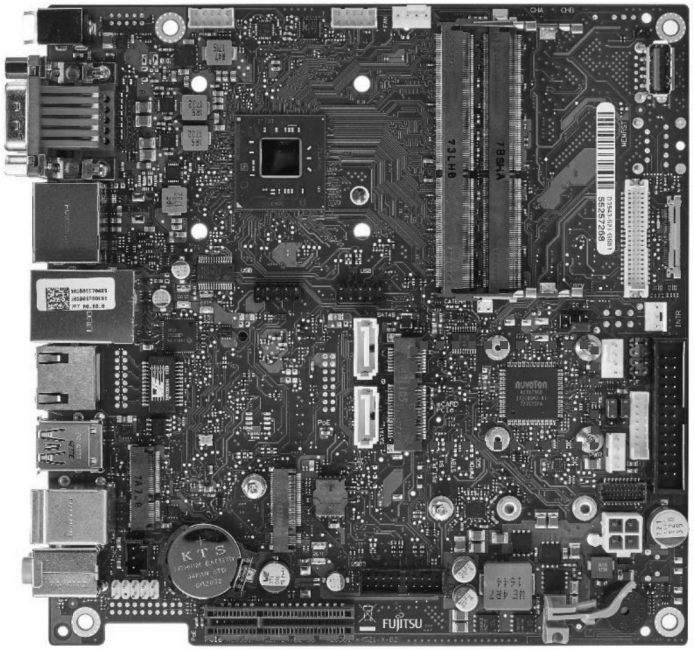
3.19 Mini-PCIe Pinout



Pin	Signal	Pin	Signal
	mPCIe		mPCIe
1	WAKE_SOC_PCIE_1_MCARD_L	2	+3.3V AUX
3	NC	4	GND
5	NC	6	+1.5V
7	CLKREQPCIE_SOC_P01_MCARD_L	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	WAKE_3G_L
17	NC	18	GND
19	NC	20	EN WLAN
21	GND	22	RST#
23	PCIe RX-	24	+3.3V AUX
25	PCIe RX+	26	GND
27	GND	28	+1.5V
29	GND	30	NC
31	PCIe TX-	32	NC
33	PCIe TX+	34	GND
35	GND	36	USB D-
37	GND	38	USB D+
39	+3.3V AUX	40	GND
41	+3.3V AUX	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V AUX
53	NC	54	NC

Halfsize/Fullsize socket can be used for Mini-PCIe.
Auto detection mode supported (selectable via BIOS Setup).

3.20 Mini-PCIe Assembly Notes



Mandatory torque for mounting screw: 0.25Nm +/- 0.05Nm

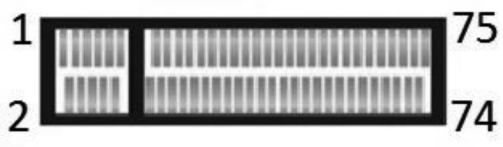
Max. torque must never be exceeded, otherwise the mainboard (solder nuts) may be damaged.

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

(mounting screw)

(spacer)

3.21 M.2 Key B

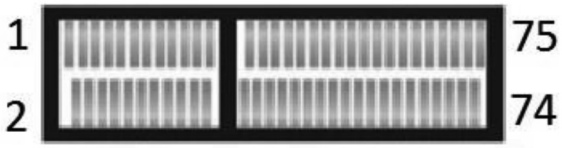


Key B and Key B+M cards installable.

D3543-S: Key B SATA and PCIe.

Pin	Signal	Signal	Pin
1	GND	P3V3P	2
3	GND	P3V3P	4
5	GND	NC	6
7	USB_SOC_KEYB	DIS_WWAN_RF_1	8
9	USB_SOC_KEYB	NC	10
11	GND		
21	GND	NC	20
23	NC	NC	22
25	NC	NC	24
27	GND	DIS_WWAN_RF_2	26
29	NC	NC	28
31	NC	RST_SIM	30
33	GND	CLK_SIM	32
35	NC	IO_SIM	34
37	NC	VCC_SIM	36
39	GND	DEVSLP_SOC_P01	38
41	SATA_M2_KEYB_PCIE_P00_UP	NC	40
43	SATA_M2_KEYB_PCIE_P00_UP	NC	42
45	GND	NC	44
47	SATA_M2_KEYB_PCIE_P00_DWN	NC	46
49	SATA_M2_KEYB_PCIE_P00_DWN	NC	48
51	GND	RST_M2_KEYB	50
53	CLK_100_PCIEBRDG	NC	52
55	CLK_100_PCIEBRDG	WAKE_SOC_PCIE_KEYB	54
57	GND	NC	56
59	NC	NC	58
61	NC	COEX3	60
63	NC	COEX_TXD	62
65	NC	COEX_RXD	64
67	RST_WWAN_MODEM	SIM_DETECT	66
69	IFDET_M2_PCIE_SATA	CLK_32K_M2_KEYB	68
71	GND	P3V3P	70
73	GND	P3V3P	72
75	GND	P3V3P	74

3.22 M.2 Key E



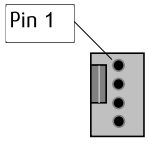
Key E and Key A+E cards installable.

D3543-S: WLAN and Bluetooth

Pin	Signal	Signal	Pin
1	GND	P3V3P_STBY	2
3	USB_SOC_P04	P3V3P_STBY	4
5	USB_SOC_P04	NC	6
7	GND	NC	8
9	CNV_WGR_D1	CNV_RF_RST	10
11	CNV_WGR_D1	NC	12
13	GND	XTAL_CLKREQ	14
15	CNV_WGR_D0	NC	16
17	CNV_WGR_D0	GND	18
19	GND	NC	20
21	CLK_CNV_WGR	CNV_BRI_RSP	22
23	CLK_CNV_WGR		
33	GND	CNV_RGI_DT	32
35	PCIE_SOC_P01_KEYE_DWN	CNV_RGI_RSP	34
37	PCIE_SOC_P01_KEYE_DWN	CNV_BRI_DT	36
39	GND	NC	38
41	PCIE_SOC_P01_KEYE_UP	NC	40
43	PCIE_SOC_P01_KEYE_UP	NC	42
45	GND	COEX3	44
47	CLK_100_PCIe_KEYE	COEX_TXD	46
49	CLK_100_PCIe_KEYE	COEX_RXD	48
51	GND	CLK_32K_M2_KEYE	50
53	CLK_PCIe_SOC	RST_M2_KEYE	52
55	WAKE_SOC_PCIE_KEYE	EN_M2_BT	54
57	GND	EN_M2_WLAN	56
59	CNV_WT_D1	NC	58
61	CNV_WT_D1	NC	60
63	GND	NC	62
65	CNV_WT_D0	CLK_38M4_XTAL_LCP	64
67	CNV_WT_D0	NC	66
69	GND	NC	68
71	CLK_CNV_WT	NC	70
73	CLK_CNV_WT	P3V3P_STBY	72
75	GND	P3V3P_STBY	74

3.23 Fan Connectors

Pin	Signal
1	GND
2	12V
3	FAN Sense
4	FAN PWM

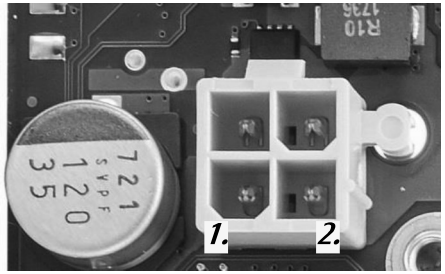


Fan speed control is supported for 4 pin (PWM) fans.
3-pin fans (voltage controlled) will always operate at full speed resp. 12V supply voltage!
Fan current: max. 0.8A continuous / 1A peak

3.24 Internal Power Supply Connector D3543-S

Pin	Signal
3	8V - 36V
4	8V - 36V

Pin	Signal
1	GND
2	GND

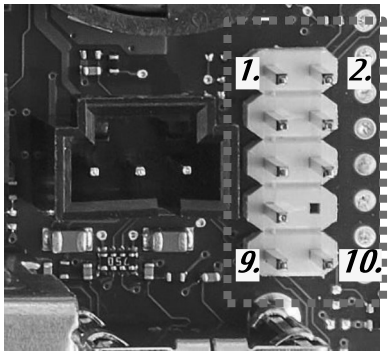


3.25 Rear Audio / Frontpanel Audio Connector

Internal High Definition Front Panel Audio Connector

Pin	Signal
1	Microphone Left
3	Microphone Right
5	Headphone Out Right
7	Analog Ground
9	Headphone Out Left

Pin	Signal
2	Analog GND
4	FP Presence Detect
6	Jack Detect Microphone
8	Key
10	Jack Detect Headphone

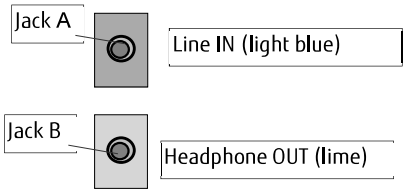


3.26 Mainboard Audio Connectors

Rear Audio Connectors D3543

Jack	Signal
A	Line input

Jack	Signal
B	Headphone output



Electrical input characteristics

Microphone: Supports electret microphones
w/o Mic boost →1.3 Vrms (Gain=0dB)
with Mic boost → 0.13 Vrms (Gain=20dB)

Note: Microphone input can be configured as Line-In

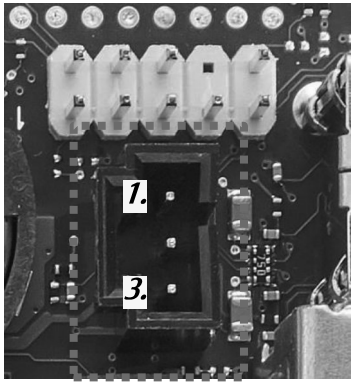
Electrical output characteristics

Headphone: Stereo; max. 1.2 Vrms output voltage at 32 Ohm load

Note: Headphone output can be configured as Line-Out

Interfaces & Connectors

3.27 S/PDIF Connector



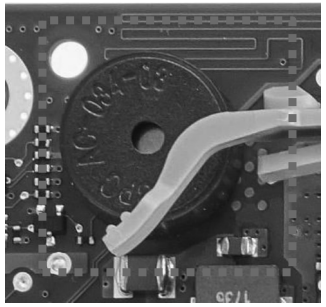
Pin	Signal
1	+5V
2	SPDIF out
3	GND

Note:
Standard connector bracket should directly connect to SPDIF out and GND pins (no signal converter required).

(Sample S/PDIF connector bracket)

3.28 Onboard Buzzer

The onboard buzzer provides beep codes only, no audio playback.



Interfaces & Connectors

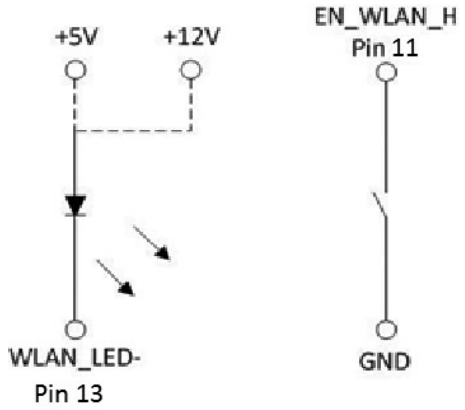
3.29 GPI/O (Feature Connector)

Feature Connector:
CompuPack C-ACNWF420027
or Aces 50238 or equivalent

1	GPI/O_0	GPI/O_1	2
3	GPI/O_2	GPI/O_3	4
5	GPI/O_4	GPI/O_5	6
7	GPI/O_6	GPI/O_7	8
9	+3.3V	GND	10
11	EN_WLAN	+5V STBY	12
13	LED_WLAN	GND	14
15	P12VP	P5VP	16
17	I2C_CLK	NC	18
19	I2C_DAT	NC	20

Note: Current max. 1.5 A per power pin!

WLAN *LED & SWITCH* wiring



LEDs with Uf<2,4Vconnect with 5V
LEDs with Uf>2,4V connect with 12V

GPIO access is provided via the SM-Bus controller PCA9554A
Specification PCA9554A
Note: SM-Bus address: 0x78h (8-bit)

During boot the GPI/O pins are set to logic level "High" due to the chip internal 100k pullup resistor.

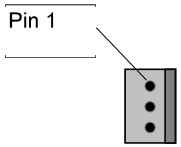
For Windows OS, the FTS BMC API provides easy access to the GPIO: IndustrialTools_D354x-S

Parameter	Range
GPI/O Input Low Voltage	-0.5V ... 0.8V
GPI/O Input High Voltage	2V ... 5.5V
GPI/O Output Low Voltage	max. 0.7V
GPI/O Output High Voltage	min. 2.5V

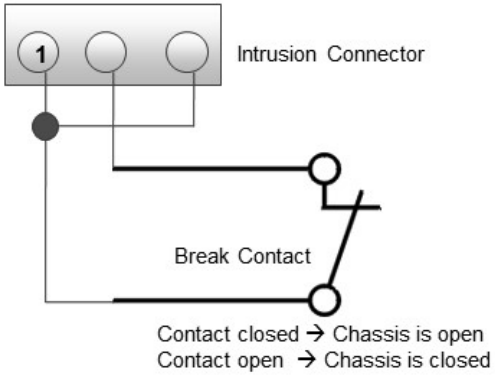
Note: max. load per GPI/O pin: 10mA
(overall current for all GPI/O pins must be < 85mA)
Each GPI/O pin has an integrated serial resistor of 22 Ohm

3.30 Chassis Intrusion

Pin	Signal D3543
1	GND
2	Case open (low asserted)
3	Intrusion switch present (low asserted)



Note:
The intrusion supervision feature needs to be enabled in BIOS Setup first (Menu „Security" → „Cabinet Monitoring").
This BIOS option is only available if pin 3 („Intrusion Switch Present") is connected to GND!



Note:
Chassis intrusion is active even if the system is switched off (S5 state) or disconnected from mains power.
The intrusion event is monitored by the SoC and stored in the BIOS Eventlog during the next Boot.
A timestamp (Boot date/time) will be added then.
Note: This timestamp does not represent date/time of the intrusion event!
If a Supervisor Password is enabled in BIOS Setup, the system will stop during BIOS POST if an intrusion event has been detected. In order to continue, the Supervisor Password must be entered to confirm the intrusion event.

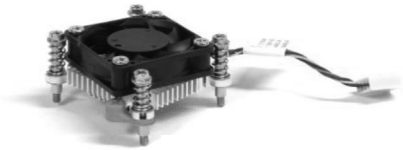
The intrusion status can be easily monitored by using the BMCAPI (Windows):
IndustrialTools_D354x-S

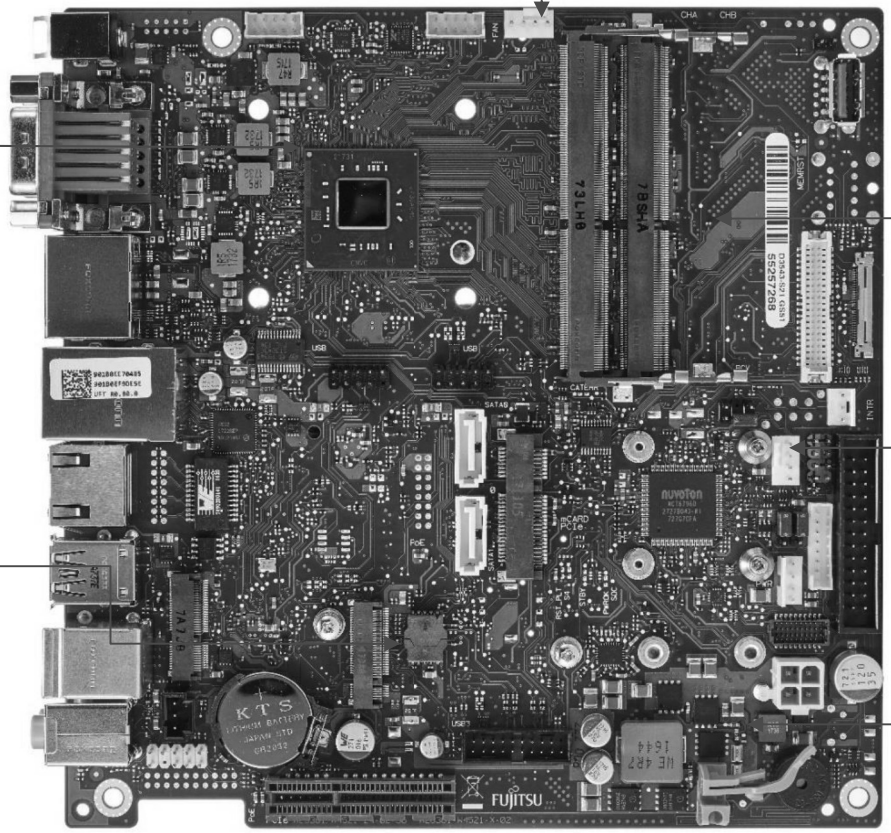
4 System Monitoring

- Temperature Sensors and Fans
- SystemGuard: Fan / Temperature Monitor
- SilentFanConfig-Manager
- Temperature Reference Points
- BMC – BIOS Default Settings

System Monitoring

4.1 Temperature Sensors and Fan Connectors



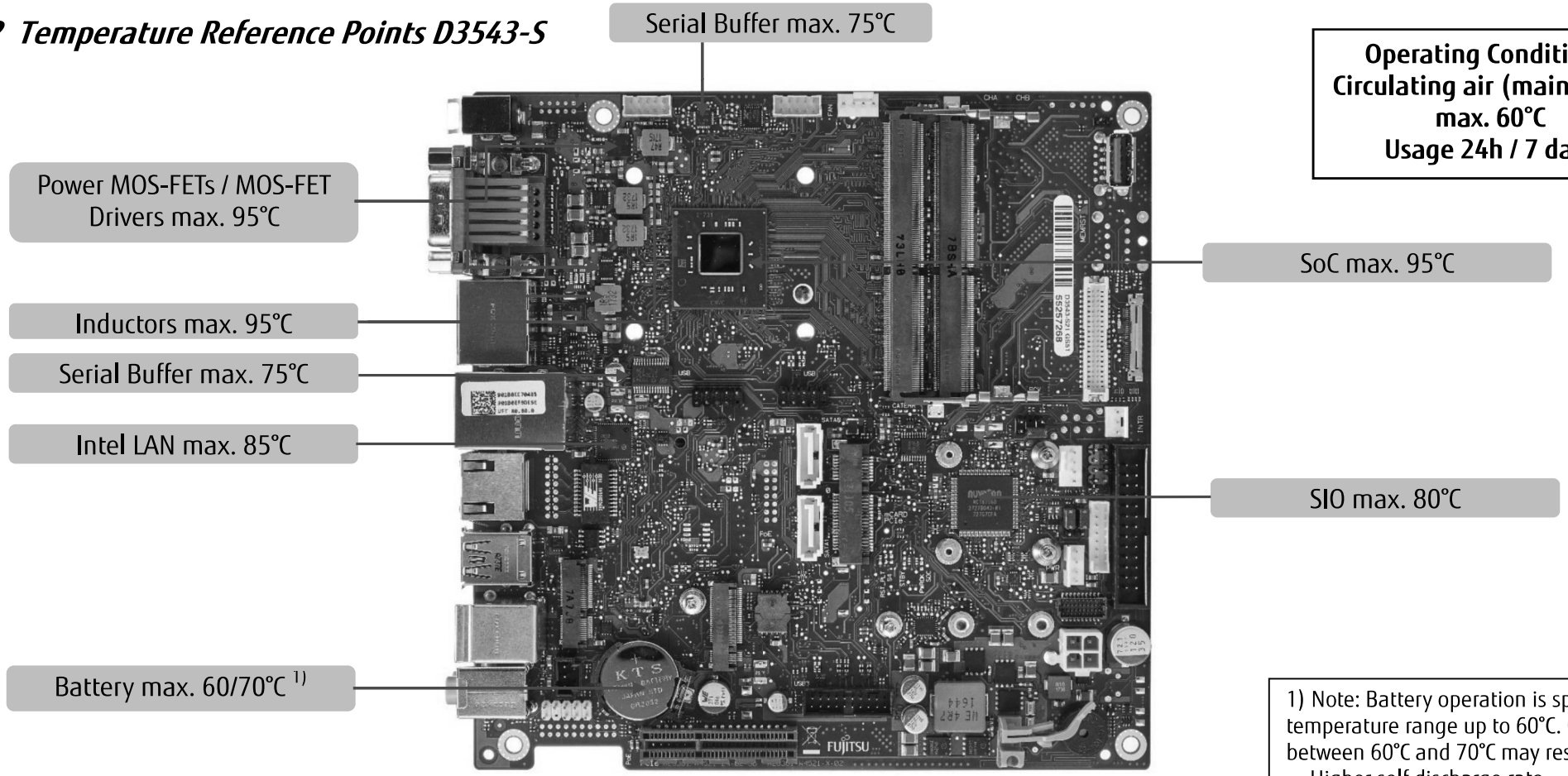


Note: Do not attach more than one fan per connector!
Remove or connect fans only when unit is powered off!

1) 0.8A continuous / 1A peak current

System Monitoring

4.2 Temperature Reference Points D3543-S



Operating Conditions:
Circulating air (mainboard)
max. 60°C
Usage 24h / 7 days

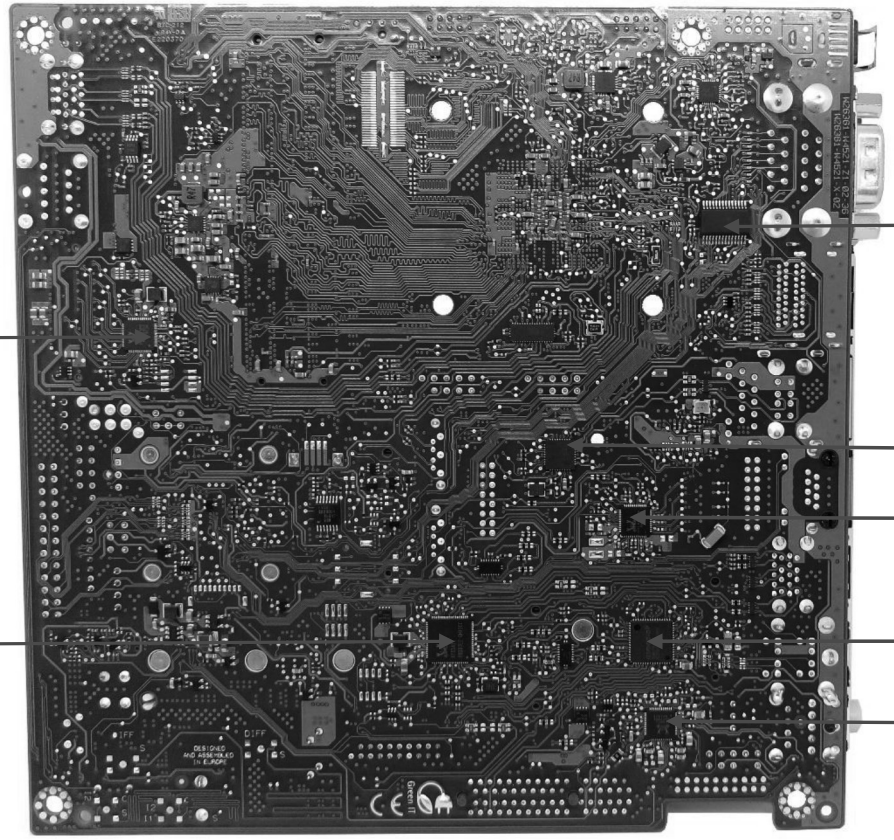
1) Note: Battery operation is specified in temperature range up to 60°C. Operation between 60°C and 70°C may result in:
- Higher self discharge rate
- Decline of specified characteristics
- Danger of leakage increases

Reference Point Limit Temperatures (Component Surface) must not be exceeded!

System Monitoring

4.3 Temperature Reference Points D3543-S (rear)

Operating Conditions:
Circulating air (mainboard)
max. 60°C
Usage 24h / 7 days



Serial 2 Buffer max. 75°C

LVDS Converter max. 80°C

USB2 Hub max. 85°C

Realtek LAN max. 80°C

USB3 Hub max. 85°C

PCIe Switch max. 95°C

Audio Codec max. 80°C

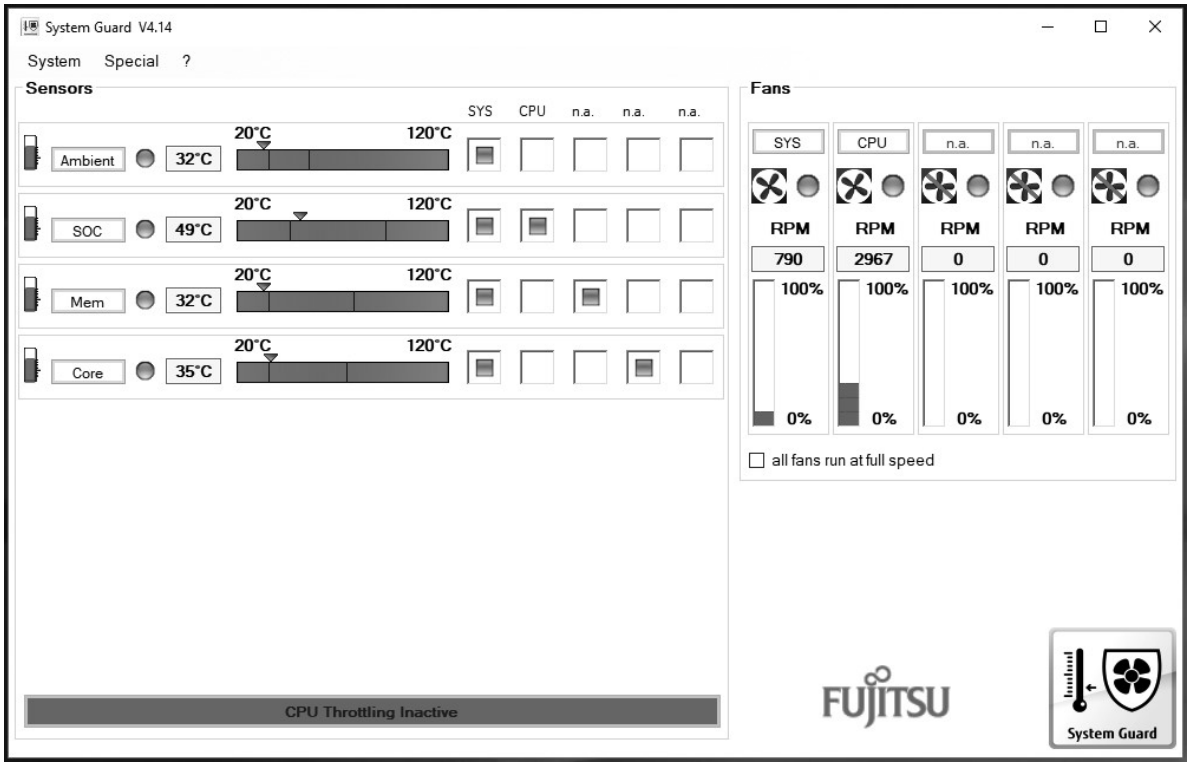
Reference Point Limit Temperatures (Component Surface) must not be exceeded!

System Monitoring

4.4 SystemGuard

MS Windows-based System Monitoring Tool:

- Visualize temperature sensor data
- Display current speed for attached fans
- User can configure fan aging control (menu "Special")
- SystemGuard provides warnings if a fan fails
- User can configure system watchdog (menu "Special")
- User can enable "full fan speed"



System Monitoring

4.5 SystemGuard - Details

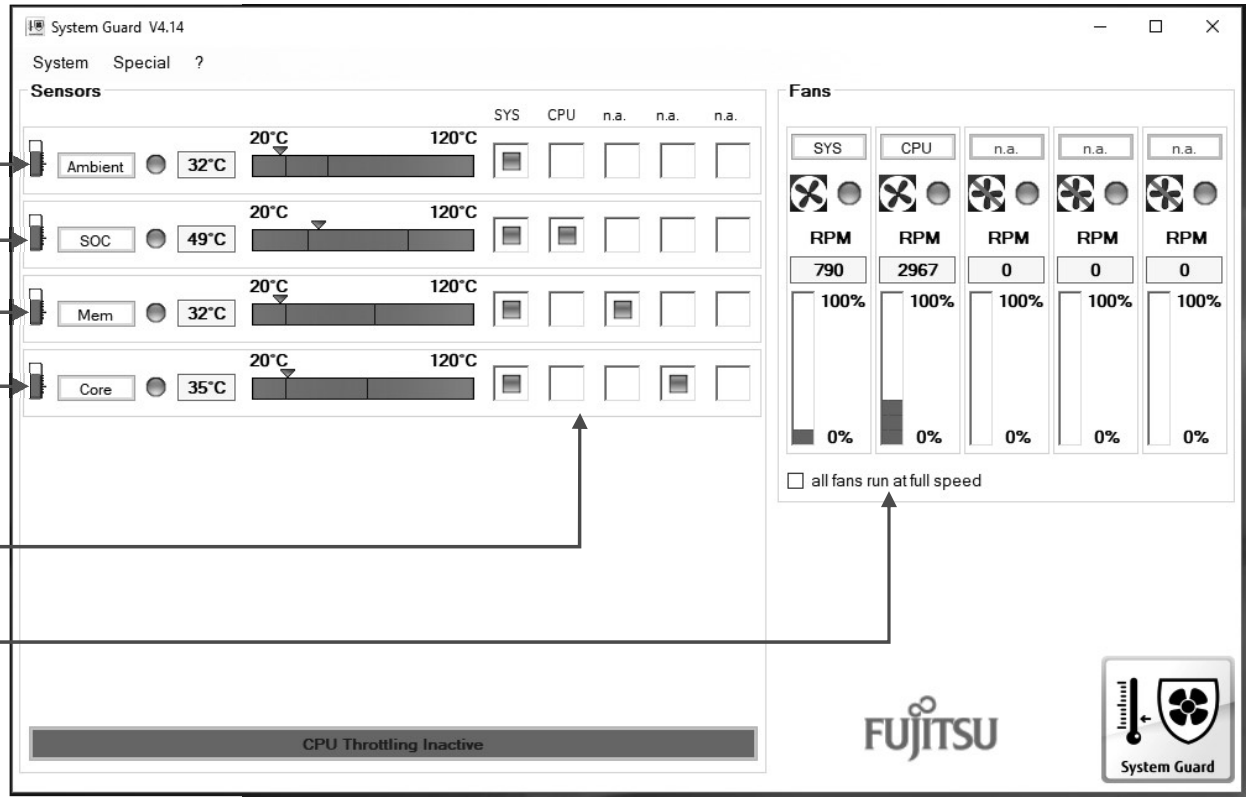
Temperature Sensors

Ambient Temperature

SoC / Core Sensor [1)]

Memory Sensor

M.2 Socket Sensor



Sensor / Fan Matrix
Indicates which sensor influences the specific fan speed

Processor / System Fan Speed
Incl. option to force "fullspeed"

1) This temperature sensor is located close to the processor (SoC) and the related core voltage regulator. It does <u>not</u> provide the inside temperature of the processor!

System Monitoring

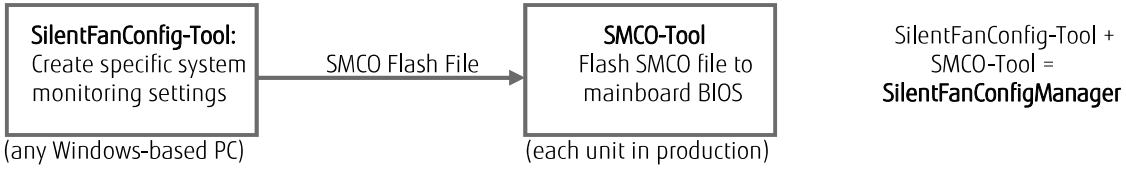
4.6 SilentFanConfigManager – Customize System Monitoring Settings

Windows-based System Management Configuration Tool

ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/SilentFanConfig-Manager/

1. Windows-based configuration tool (SilentFanConfig) to create customized system monitoring settings like minimum fan speed and temperature sensor influence. These customized settings are stored in a specific "SMCO" flash file.

2. DOS-based tool "SMCO" to flash the customized system monitoring settings (SMCO file) to the system BIOS of the target unit.



Note: New settings are written permanently to system BIOS.
Any BIOS update will not reset the new settings

SilentFanConfig **V1.85.0** or higher required for D354x-S

Please see documentation in ZIP file (link below) for further details.
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/SilentFanConfig-Manager/

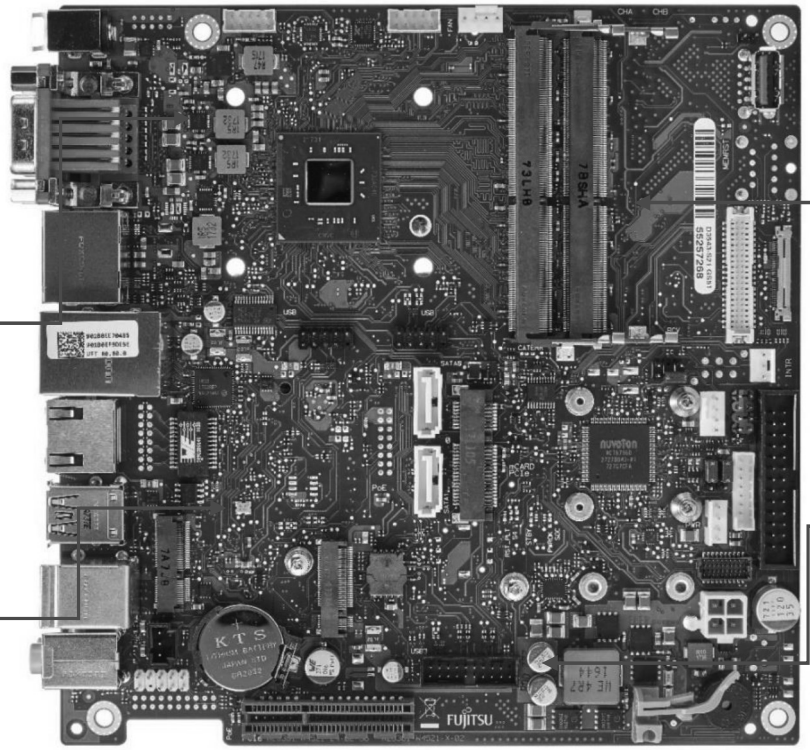
System Monitoring

4.7 Components for continous 24/7 operation @ +60°C

Operating Conditions:
Circulating air (mainboard) max. 60°C
Usage 24h / 7 days

High Efficiency Processor Core Voltage Regulator for reduced thermal dissipation loss

Oscillators with enhanced operating temperature range



6-layer PCB for improved signal quality within full operating temperature range

All onboard electrolyte capacitors: Polymer type only (= solid electrolyte)

Capacitor Endurance Time

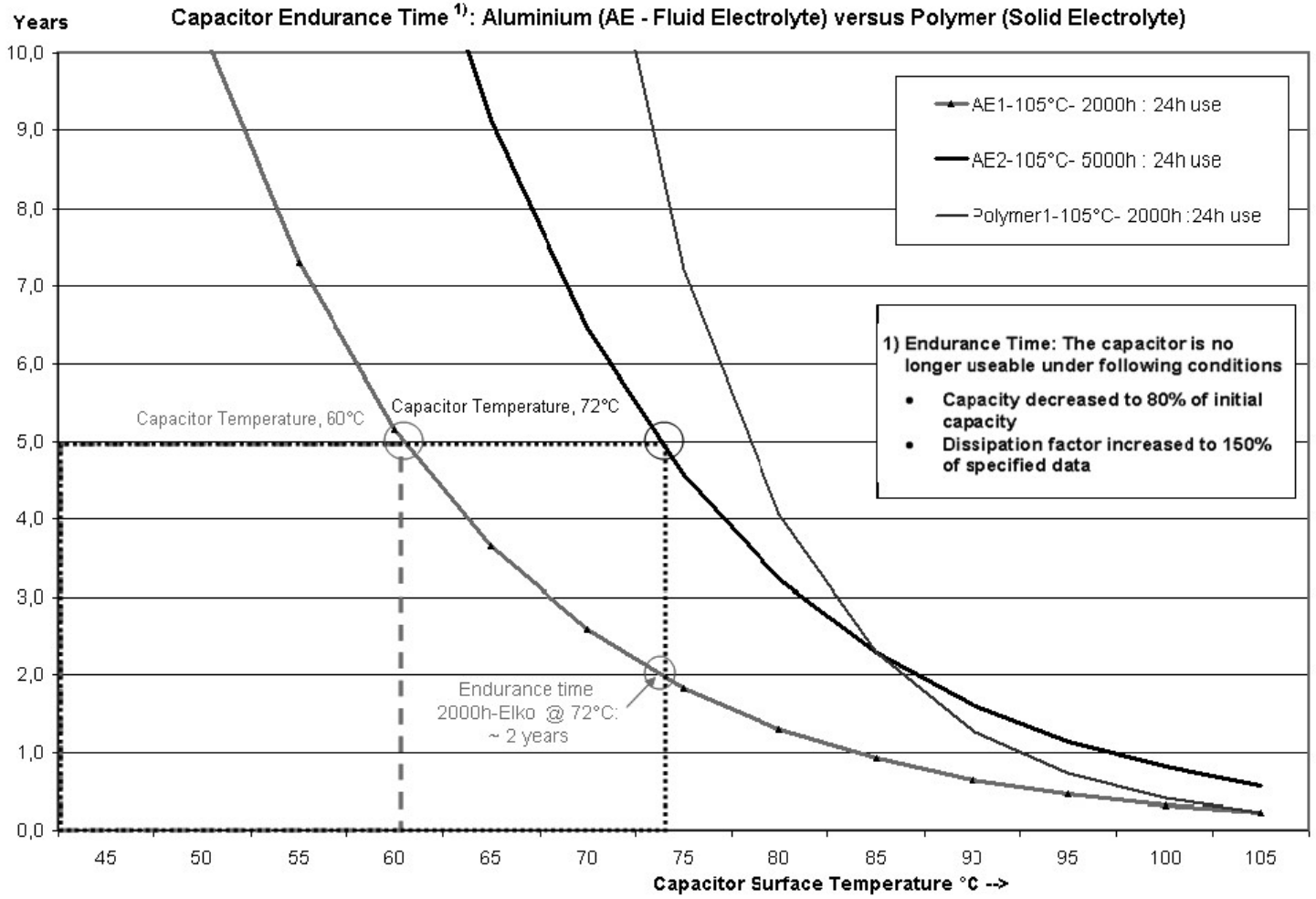
Solid Electrolyte: $Lx = Lo * 10^{\left(\frac{to-tx}{20}\right)}$

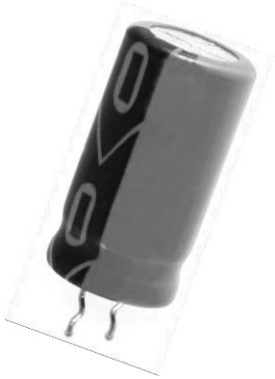
Fluid Electrolyte: $Lx = Lo * 2^{\left(\frac{to-tx}{10}\right)}$

Lx = effective endurance time
Lo = endurance time @ 105°C (e.g. 2.000hrs)
to = 105°C
tx = capacitor surface temperature (e.g. 68°C)

System Monitoring

4.8 Capacitor Endurance Time Comparison





System Monitoring

4.9 BMC – BIOS Default Settings D3543-S

The default system monitoring settings (fan speed, sensor influence) are fixed by the system BIOS.
All relevant settings can be customized by system builders via the SilentFanConfig-Manager tool.

Sensors →	Ambient	SoC/Core	Memory	M.2 Socket
Fan CPU		X		
Fan Sys	X	X	X	X

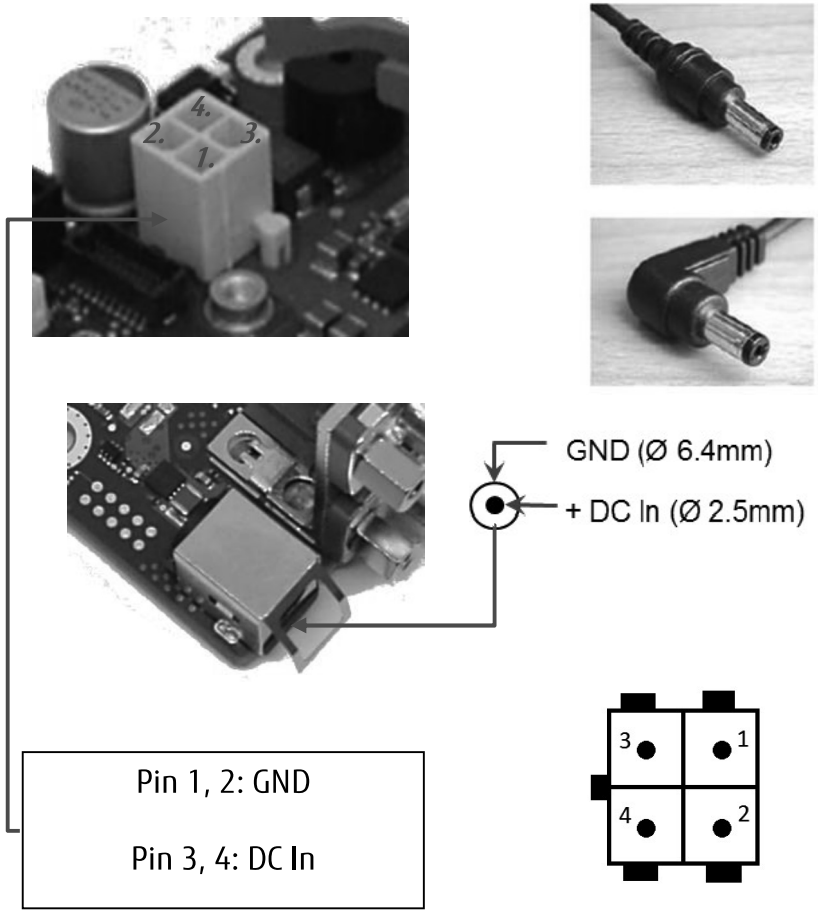
"X" indicates that this specific sensor influences the speed of this specific fan

	StartUp [1)]	FullSpeed [2)]	Note
Ambient	35°C	67°C	These settings are implemented for the current BIOS version and may be changed for upcoming BIOS versions! Default minimum fan speed = 30% (all fans).
SoC/Core	45°C	90°C	
Memory	35°C	75°C	
M.2 Socket	35°C	72°C	

1) If the sensor temperature is below "StartUp" the fan rotates a its defined minimum fan speed
2) Between "StartUp" and "FullSpeed" the fan speed increases linear

5 Power Supply

5.1 Power Supply D3543-S



Internal <u>and</u> external DC input can be powered by 8V – 36V (wide range).

Internal and external DC input must never be powered simultaneously!

Note: Power plug must only be attached to D3543-S while the external power source it switched off!

Input current for <u>external</u> DC connector: max. 5A
Input current for <u>internal</u> DC connector: max. 8A

➔ Max. Mainboard Input Load:

100W must not be exceeded!

Recommended plug for external AC adapter:

Ø 2.5mm / 5.5mm

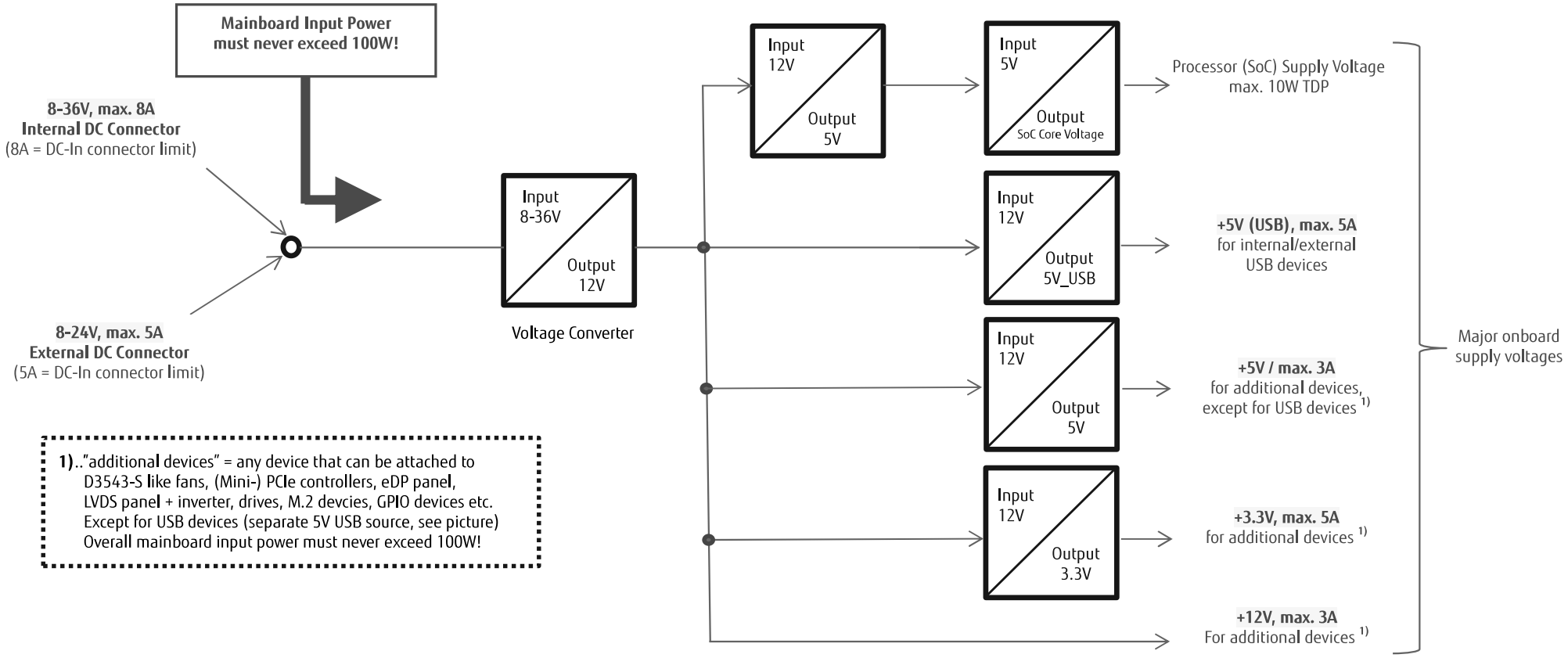
contact length ~ 10-11mm

Angle plug or straight plug

Power Supply

5.2 Requirements for 8-36V Operation / Power Distribution

Simplified functional diagram for major onboard voltage converters



Power Supply Options

Requirements for 8-36V Operation / Power Distribution

Summary of internal power sources

Onboard Source →	**+3.3V**	**+5V**	**+5V$_{USB}$**	**+12V**
Max. overall Source Load	4A	3A	5A	3A
Drive Power Connector	---	1A	---	1A
LVDS Connector	1A	1A	---	1A
LVDS Backlight	---	2A	---	1A
Embedded DisplayPort	1A	1A	---	1A
Feature Connector	1.5A	1.5A	---	1.5A
Fan Connector	---	---	---	1A
Int./ext. USB connectors	---	---	5A	---
M.2 connectors	1A	---	---	---

Power Supply

5.3 Drive Power Connector

Connector 1
(to mainboard)

Connector 2
(for SATA harddisk 2.5" / 3.5")

Connector 3
(for slimeline SATA optical drive)

171822-4 AMP
or equivalent

15 1
COMAX C1212K32
or equivalent

6 5 4 3 2 1
Molex SD-47328-100
or equivalent

Note:
overall max. current via connector 1 limited to
+5V / 1A
+12V / 1A

Cable Ordercode:
S26361-F5000-K1

connector pinning			
Conn. 1	**Conn. 2**	**Conn. 3**	**Note**
1	7, 8, 9	2, 3	**+5V, red**
2	4, 5, 6	5, 6	**GND, black**
3	10, 11, 12		**GND, black**
4	13, 14, 15		**+12V, yellow**

6 USB Implementation

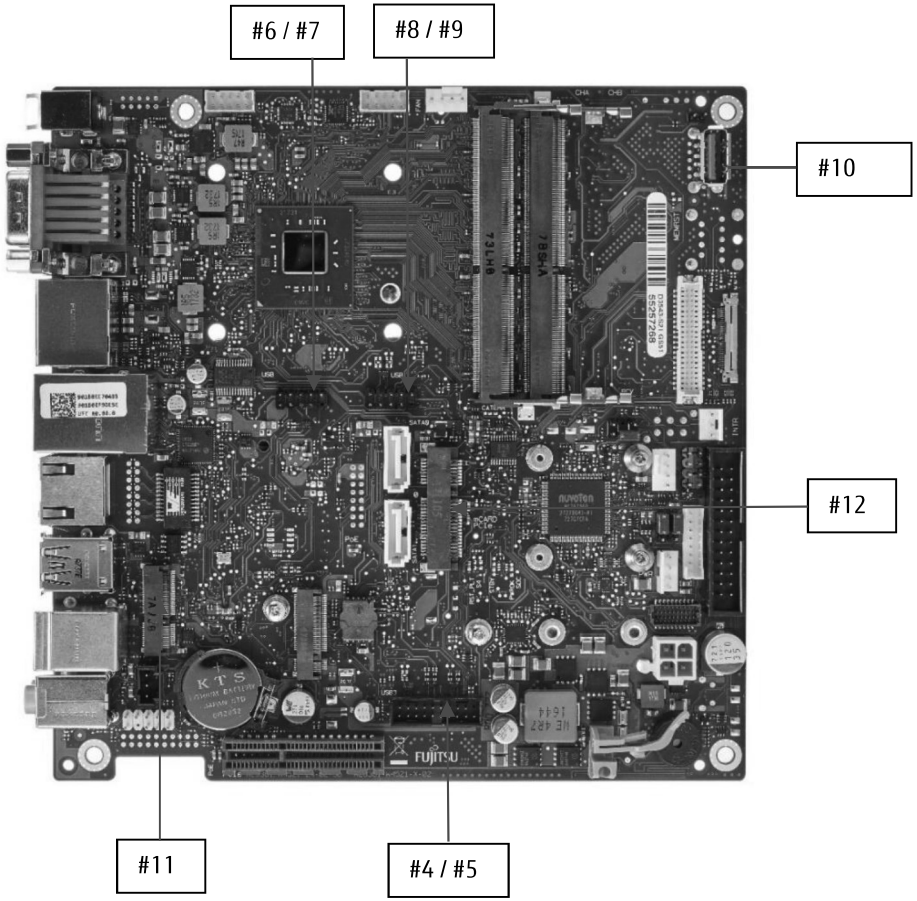
6.1 USB Ports & USB Power Fuses (D3543-S)

D3543: There are two USB controller (SoC and Hub) for all USB ports

Description	USB Port #	Common Fuse	Max. Current per Port	Note
USB 3.1 Gen1 Frontpanel	#4 / #5	2A	900mA	Connected to SoC
USB 2.0 Internal	#6 / #7	tbd	500mA	Connected to USB Hub
USB 3.1 Gen1 Rear (right)	#2 / #3	2A	900mA	
USB 2.0 Rear (left)	#0 / #1	2A	900mA	
USB 2.0 Internal	#8 / #9	tbd	500mA	Connected to SoC
USB 3.1 Gen1 Stick Socket	#10	2A	900mA	for internal devices [1)]
USB 2.0 Key E	#11	(not fused)	500mA	Connected to SoC
USB 2.0 mini-PCIe	#12	(not fused)	500mA	Connected to SoC

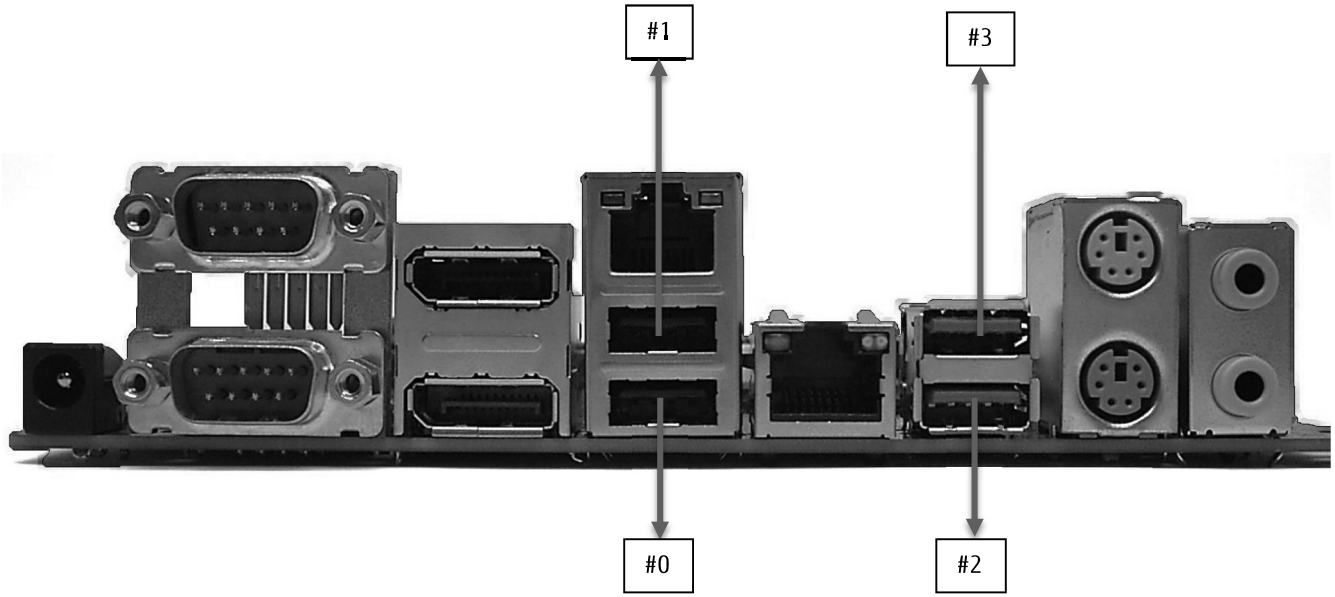
1) Note: These "internal" ports do not provide "Windows Device Eject"

USB Ports:



USB Implementation

Rear USB Ports for D3543-S:



7 Display Options

7.1 Summary: Video Output Options D3543-S

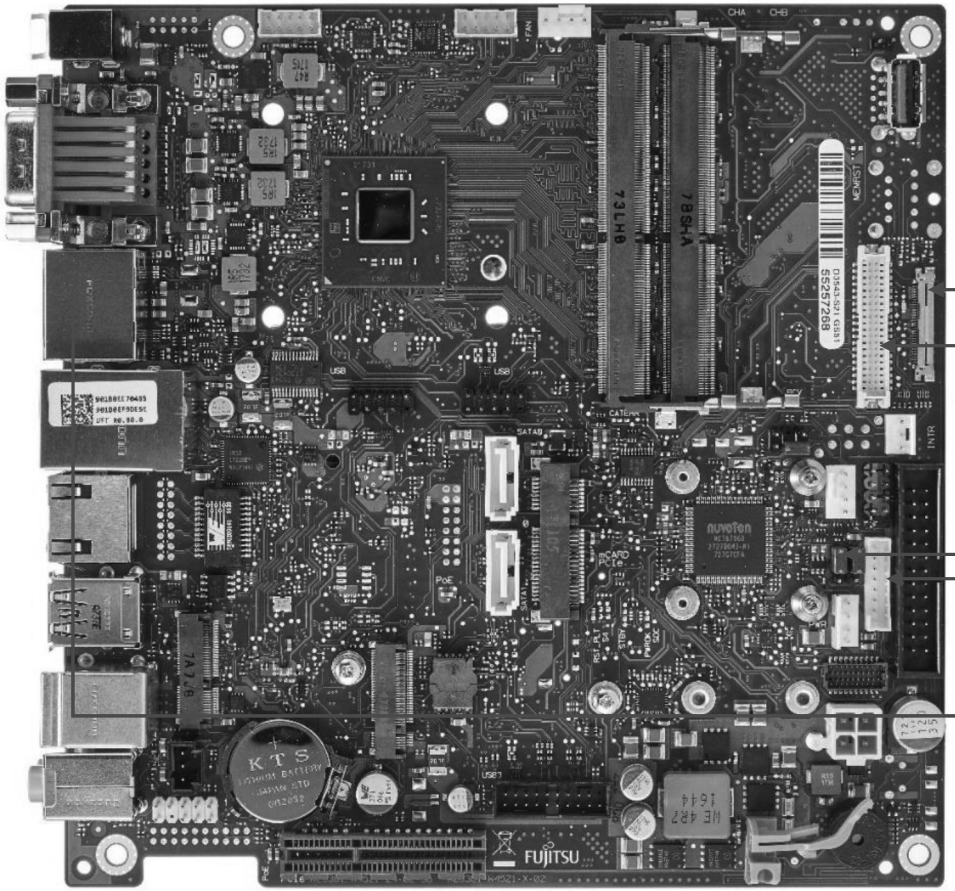
- Integrated Intel® UHD Graphics 600/605
- 2 x DisplayPort V1.2a / 1 x embedded DisplayPort (eDP) 1.4 / 1 x Dual-Channel 24bit LVDS
- Supports up to 3 x independent display
- Following max. display combinations are supported:
  - 1 x DisplayPort (DP, external) + 1 x LVDS (internal) + 1 x embedded DisplayPort (eDP, internal)
  - 2 x DisplayPort (DP, external) + 1 x embedded DisplayPort (eDP, internal)

  Note: Simultaneous use of LVDS and DP2 (upper port) is not supported
- DisplayPort is compatible with following adapters: (Dual Mode / DisplayPort++)
  - *DP to HDMI* (passive + active)
  - *DP to DVI* (passive + active)
  - *DP to VGA* (active)

DP = Display Port
eDP = embedded Display Port
LVDS = Low Voltage Differential Signaling

Display Options

7.2 Video Output – Details D3543-S



Embedded Display Port V1.4

2 lanes max.1920 x 1200 @ 60Hz

LVDS 24 bit dual channel

LVDS: max. resolutions 1920 x 1200

LVDS Power (white)
Left Jumper: LVDS Power 3V / 5V
Right Jumper: eDP 3V / 5V

2x Displayport V1.2

DP: max. 4096 X 2160 @ 60 Hz

8 Operating System Support

8.1 Support for Windows 10

Operating System	"Runnable"	"Tested/Released by Fujitsu"
MS Windows 10-64 RS1	X	--
MS Windows 10-64 RS2 [1)]	X	--
MS Windows 10-64 RS3	X	X
Linux-64	X	tbd

1) Longterm driver support (driver updates) for RS2 is not guaranteed!

- **Mainboards D3543-S are designed according to the Microsoft Guidelines for Windows 10**

- **MS certified drivers are available via OEM DU-DVD and OEM FTP Server**

ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3544-S_Mini-STX/Drivers_D3544/

Operating System Support

8.2 Linux Support

To be added soon

9 Mainboard Tools

Common Mainboard Tools

Note: DOS based tools aro no longer supported (Intel restriction)

9.1 BIOS Boot Logo Tool

Tool to integrate a customized boot logo
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/Common-Mainboard-Tools/BootLogo_4_UEFI/
Note: BootLogo tool ≥ V1.05 required!

9.2 Change BIOS Setup Default Settings

BiosSet (included in Deskview-Instant BIOS Management; Version ≥ V6.76 required):
MS Windows based production tool to change BIOS settings and freeze customized BIOS settings (= customized default settings).
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/Common-Mainboard-Tools/Deskflash/

Note: The link mentioned above also provides a Linux based evaluation version.

9.3 OEMIDENT

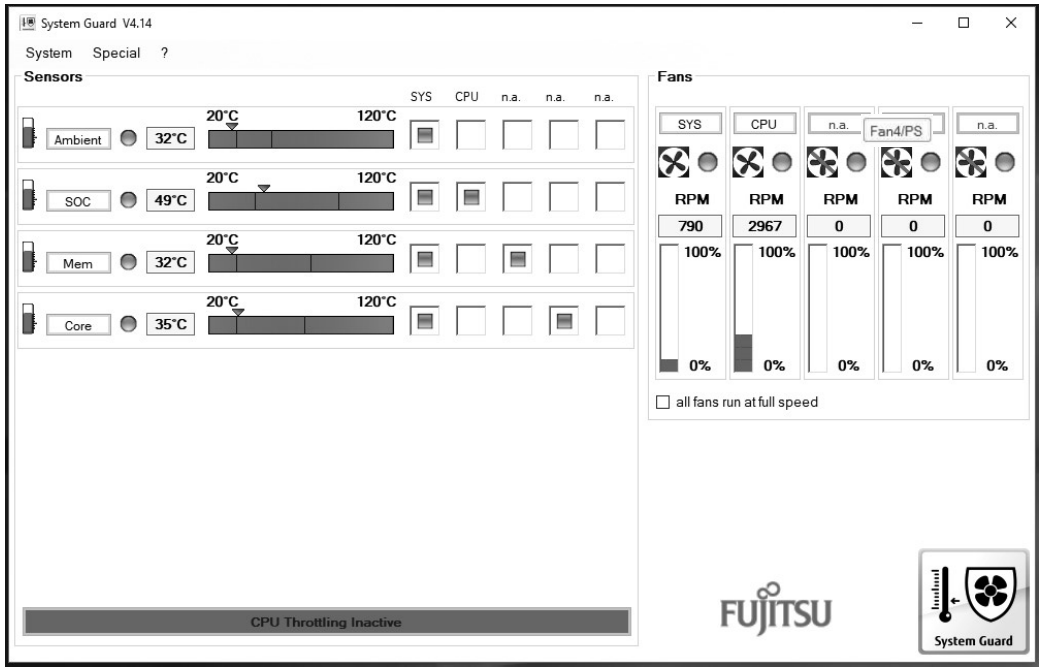
Production tool to add MS OEM licence data / add an individual customer serial no / add a chassis asset tag and patch several DMI data
Disable and hide TPM feature in BIOS Setup
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/Common-Mainboard-Tools/OEM-Ident/

MS Windows based version available; Linux based version available upon request...

9.4 SystemGuard

- Windows-based tool to monitor temperatures and fan speed of FTS mainboards
- Option to configure automatic fan ageing supervision
- Provides access to the System Watchdog

ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Services/Software&Tools/Common-Mainboard-Tools/SystemGuard/



Note: SystemGuard V4.14 (or higher) required for D3543-S

Mainboard Tools

Industrial Tools

9.5 LVDS Tool

MS Windows / Linux based tool to implement customized LVDS settings.
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3544-S_Mini-STX/Industrial_Tools_D354x/
LVDS Tool ≥ V4.0.0.0 reqired

9.6 SilentFanConfig-Manager

MS Windows-based configuration tool to implement customized fan characteristics and temperature parameters.
Includes MS Windows based tool "SMCO32/64" to flash the configuration file permanently into the system BIOS.
Required version SilentFanConfigManager ≥ V1.85.0 (incl. SMCO32/64 ≥ V5.0.0.0)
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3544-S_Mini-STX/Industrial_Tools_D354x/

9.7 Windows System-Monitoring API (BMCAPI)

BMC-Management-Controller to access and adjust System Monitoring parameters like
fan speed and temperatures. This API also provides access to the mainboard watchdog, the 8Bit GPIO interface and
the intrusion feature of the mainboard.
Required version FTS BMC-API ≥ V2.48
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3544-S_Mini-STX/Industrial_Tools_D354x/

9.8 Linux System-Monitoring Driver ("LM-Sensors")

Details to be added soon...

10 Known Issues & Important Notes

10.1 Operating System Installation

Due to Intel restrictions, D3543-S (GeminiLake) is the first platform that necessarily requires an UEFI/GPT-based OS installation.
Legacy Boot support (e.g. USB Stick- DOS Boot, MBR-based OS installation) as used on previous mainboard models is no longer supported.

10.2 Internal Serial Ports

The internal COM 3 & COM 4 port is derived directly from the *GeminiLake* SoC.
It provides a limited feature set (see COM3 & COM4 connector description)
This port requires a specific COM software driver (MS Windows OS), which is not yet available.
Driver support for Linux: tbd

10.3 M.2 @ SATA SSD & SATA Port 1

The **M.2 socket (SATA interface only)** is shared with **SATA Port 1**. They can not be used simultaneously.
In order to use up to three memory devices, following configuration is possible:

- SATA port 0: 2.5" HDD / SSD
- SATA port 1: 2.5" HDD / SSD
- M.2 socket: PCIe-based M.2 module (2242 or 2260 or 2280)

Note: Due to GeminiLake platform restrictions, the M.2 socket provides one PCIe lane (gen2) only.
For best performance, the usage of SATA-based M.2 modules is recommended.

Known Issues & Important Notes

10.4 Processor (SoC) Temperature via SystemGuard Tool

The *SystemGuard* Monitoring Tool provides amongst others a temperature sensor called "SoC/Core".
Please note:
This sensor is a separate temperature sensor located close to the processor ("SoC") and the related core voltage regulator, but not inside the SoC. It provides quite accurate the SoC temperature (only few degrees deviation) in case the cooling solutions provided by FTS are installed (active or passive cooling).
For any 3rd party cooling solutions the SoC temperature indicated by *SystemGuard* may differ considerably from the real SoC temperature!
e.g. *SystemGuard* indicates ~ 70°C whereas the real SoC temperature may be around 95°C.

Alternative options to visualize the real SoC temperature for customized system evaluation are currently under investigation.

10.5 BIOS Beep Codes

Beep codes are provided simultaneously by the onboard buzzer and the (optional) mono speaker, if connected.
The speaker sound is louder than the onboard buzzer.
Please note that early BIOS beep codes (e.g. failing RAM module) are provided by the buzzer only (less volume).

11 Miscellaneous

11.1 Battery Lifetime

The typical battery lifetime is designed for 5 years.

This is based on following usage profile:

- G3 → 28% / two days per week
  (System Off, Power disconnected)
- Deep S5/S4/S3 → 48% / 17 hrs per working day
  (System Off, Power connected)
- S0 → 24% / 8 hrs per working day
  (System Working)

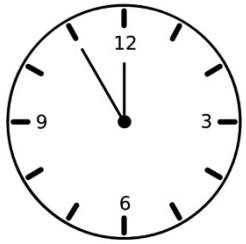
On-Temperature (S0): 70°C
Off-Temperature (G3, S5/S4/S3): 23°C

Note: If the system is never in G3 mode or if the S0 "working" temperature is lower than 70°C, this may result in much higher battery lifetime.

If the mainboard is just stored (no operating voltage attached), the typical battery lifetime is also 5 years.
Due to tolerances of the installed battery, the effective battery lifetime may be in the range of 4.5 years – 6 years

11.2 RealTime Clock (RTC) Accuracy

The onboard realtime clock is approved for an accuracy of +/-30ppm (= max. 75sec deviation per month).



The RTC crystal itself is specified with +/-10ppm
(= max. 26 seconds deviation per month).
Each year of ageing adds around +/-3ppm on top of this.

11.3 BIOS integrated Erase Disk Tool

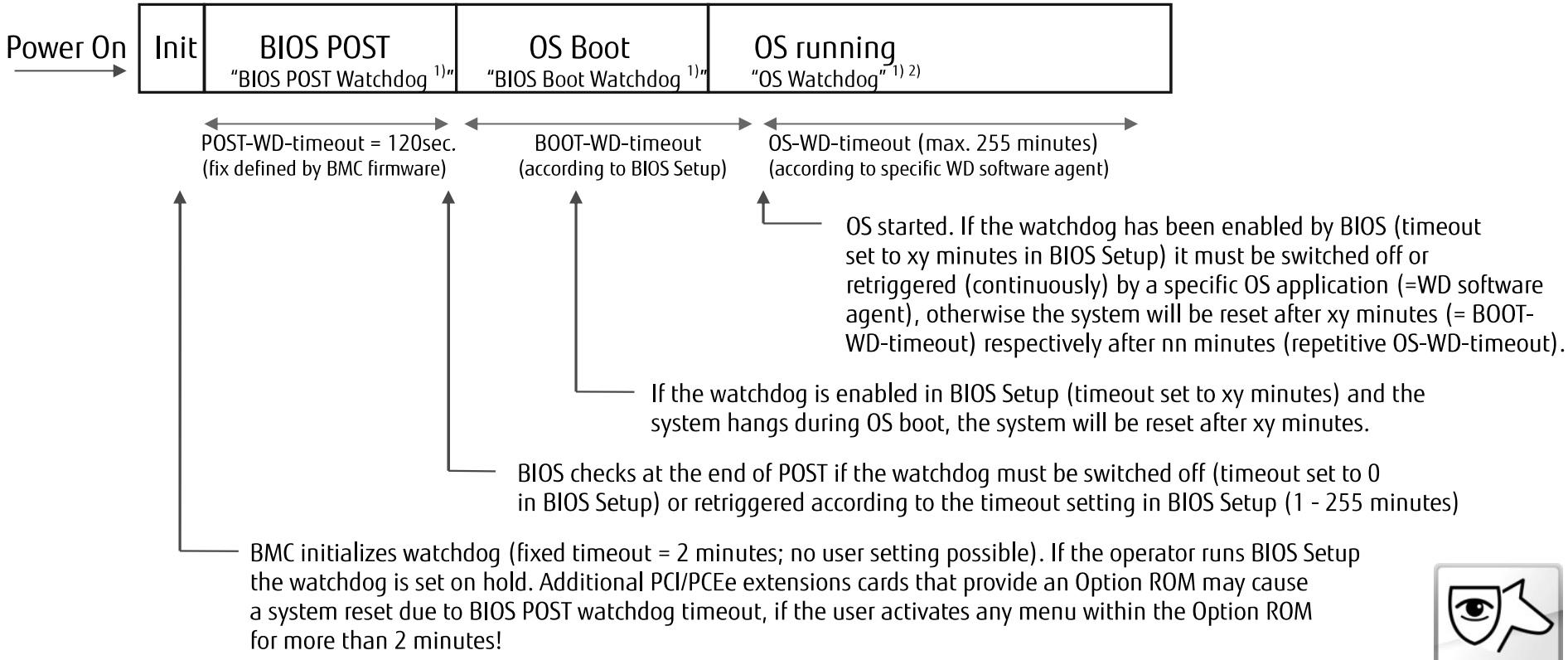
All Industrial Mainboard include the BIOS tool “EraseDisk” for easy and secure deletion of any data on the harddisk / SSD

Detailed information:
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3544-S_Mini-STX/Documentation/

Miscellaneous

11.4 System Watchdog (WD)

Mainboards provide full BIOS POST-, Operating System Boot-, and Operating System-Runtime watchdog supervision.



1) Note: All three watchdogs are physical identical, but they are handled from different application levels
2) As the SystemGuard tool offers access to the watchdog it can be used as "WD software agent" to retrigger the watchdog during OS runtime

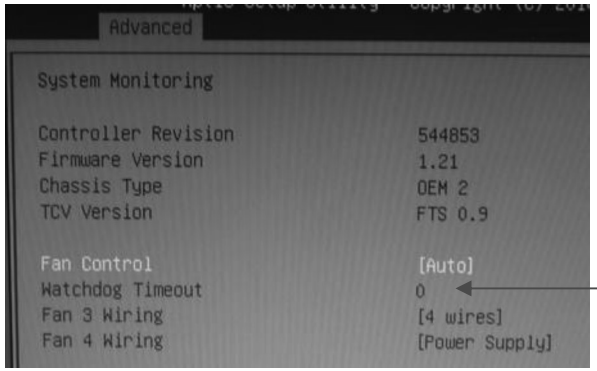
Miscellaneous

System Watchdog (WD)

How to handle the different watchdog levels

- **BIOS POST Watchdog**
  - No user interaction possible – POST Watchdog is always enabled!

- **BIOS Boot Watchdog**
  - Set Watchdog in BIOS Setup



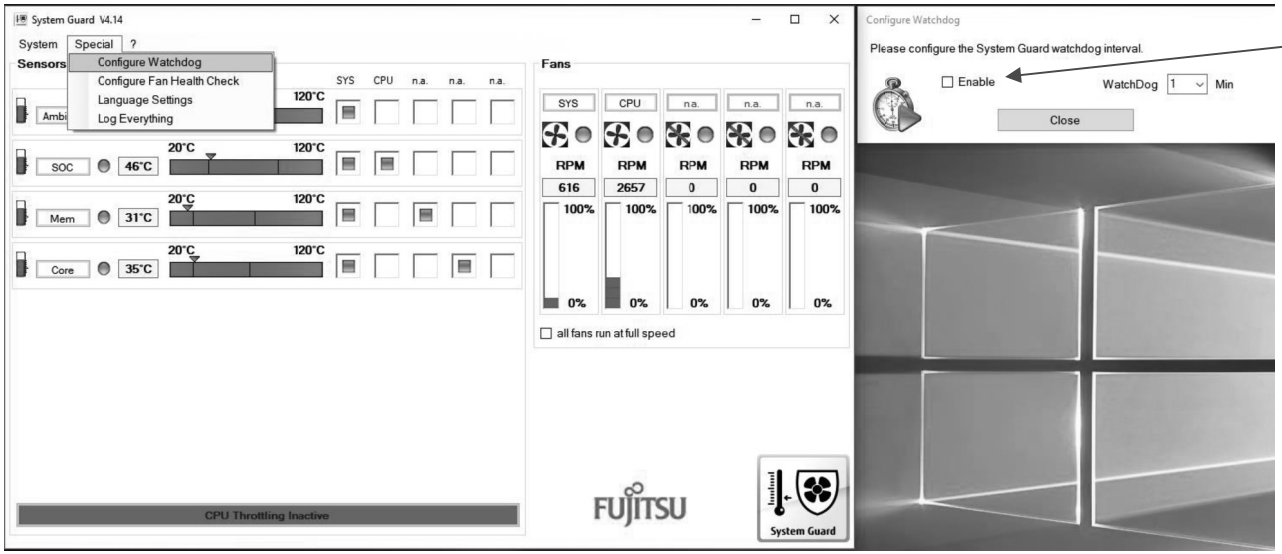
0 = WD disabled
1 – 255 = WD enabled (timeout = 1 – 255 minutes)

Miscellaneous

System Watchdog (WD)

- **OS Watchdog**
  - Use "WD software agent" to stop or retrigger the watchdog during OS runtime
    Note: This "agent" needs to be provided by the customer, dependent on his needs.
    For easy access to the watchdog functions, the Windows API (BMCAPI) or the related Linux driver (lm-sensors) can be used.
    ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D343x-S_Mini-ITX/IndustrialTools_D343x-S/

  - For easy testing, the SystemGuard tool provides access to the OS Watchdog. After enabling the Watchdog, SystemGuard retriggers the WD continuously. In case the system freezes, SystemGuard does no longer provide the retrigger signal and the watchdog resets the system after the timeout.
    Note: When SystemGuard is closed, the WD is stopped in order to avoid a unwanted system reset!



Menu "Special":
- ➔ Enable WD
- ➔ Set timeout to 1 – 8 minutes

Miscellaneous

11.5 BIOS Update / BIOS Recovery

BIOS update options

- **EFI-based Flash update (Bootable USB stick)**
- **MS Windows-based Flash update**
- **Auto-BIOS Update via Fujitsu Server**
- **Linux-based BIOS update (upon request)**
- **BIOS Recovery (restoring a corrupted BIOS)**

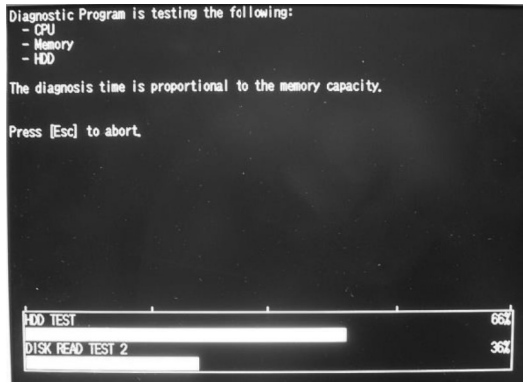
FTP link to related BIOS update files:
ftp://ftp.ts.fujitsu.com/pub/Mainboard-OEM-Sales/Products/Mainboards/Industrial&ExtendedLifetime/D3543-S_Mini-ITX/BIOS_D3543-S/

A detailed description of the different options is available in the BIOS-Info document (see FTP link above)

Miscellaneous

11.6 BIOS integrated HW Diagnostic Tool

There is a hardware test module integrated in the system BIOS.
In order to run the tool, please select “Diagnostic Program” as boot device and follow the instructions on the screen.
This test module analyzes CPU, Memory and HDD.



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