SK515

COM Express® Type 6 Carrier Board
+ MXM Graphics System +PCIe/104

User's Manual

Revision Date: Apr. 22. 2021
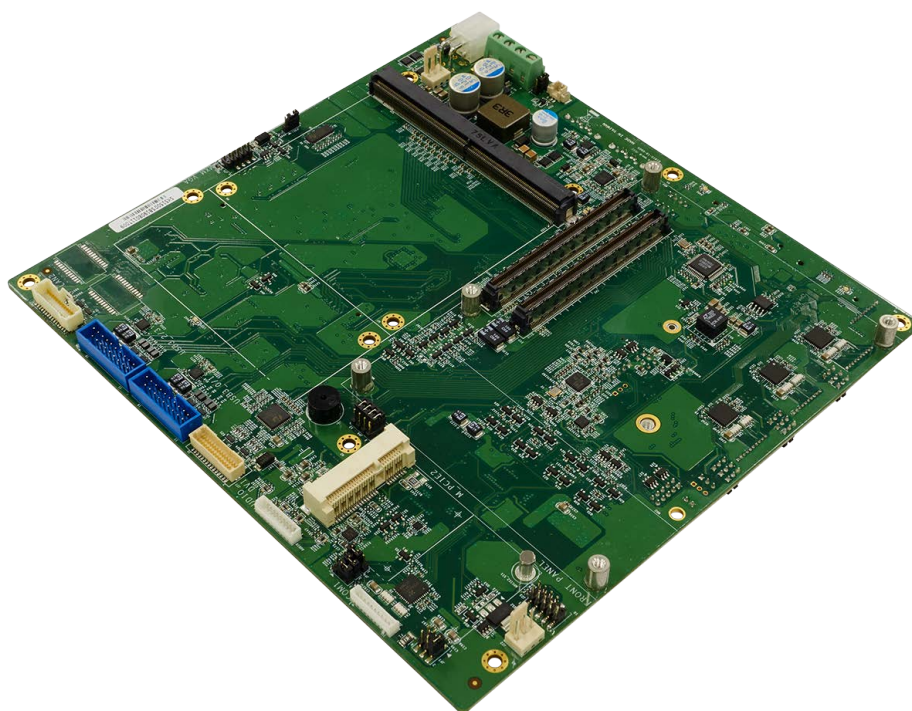
Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area.
- If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter any technical problems with the product, contact your local distributor

Statement

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- All product specifications are subject to change without prior notice

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Revision History

Revision	Date (yyyy/mm/dd)	Changes
V1.0	2019/11/1	Initial release

Packing list

☐ COM Express + MXM carrier board

☐ Accessories

Item	Description	Q'ty
1	Driver CD	1
2	Screw for fixing COM Express/ MXM module	7

If any of the above items is damaged or missing, please contact your local distributor.

Ordering information

Model Number	Description
SK515	COM Express Type 6 carrier board w/PCIe104, MXM, 9~36V DC-in, operating Temp -40 to 85°C

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Chapter 1: Product Introduction

1.1 Key Features

COM Express CPU Options(Type6)
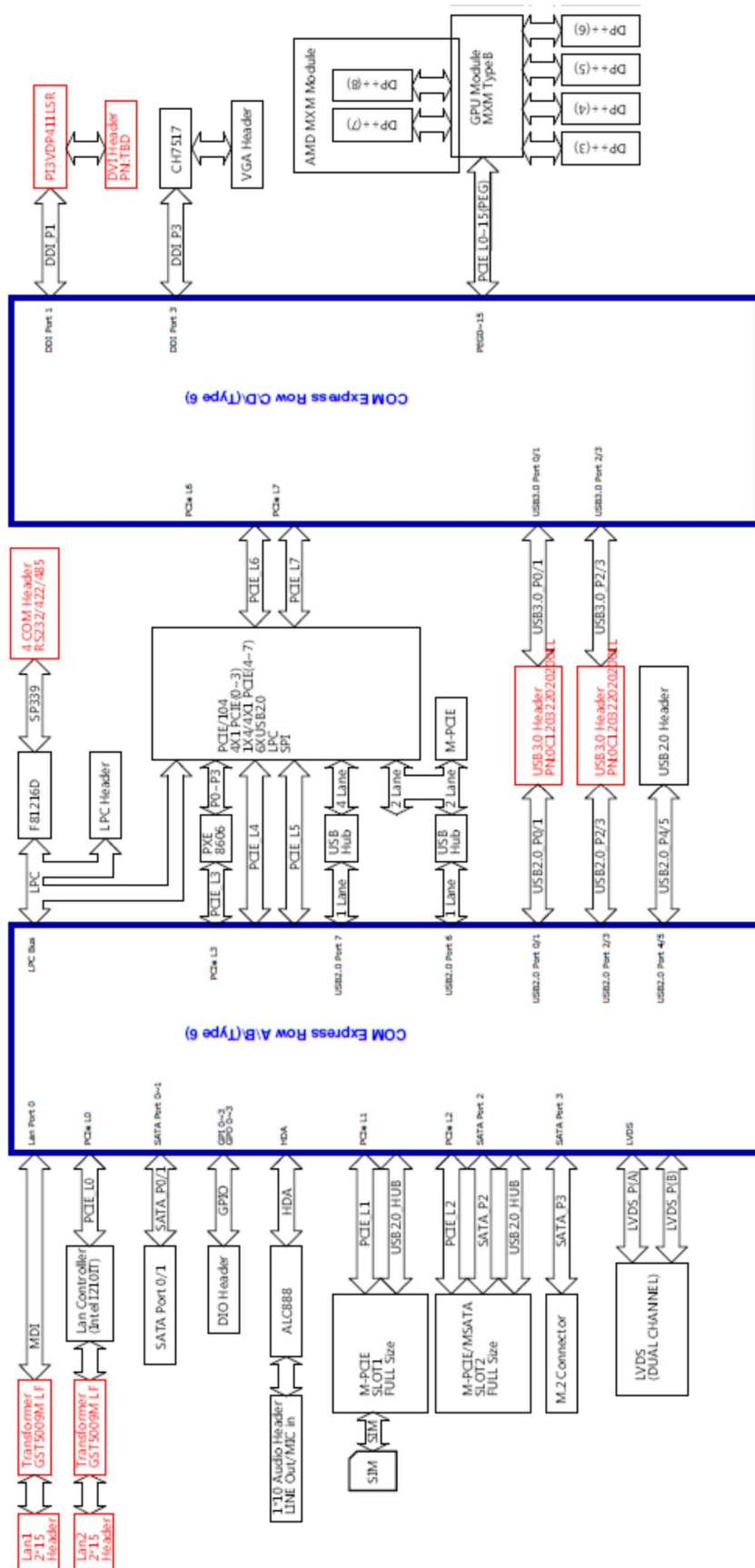
	CPU		SPEC
9th CPU	Intel® Xeon® E-2276M	45W	Coffee Lake 9th Gen, 6 x 2.8 / 4.7 GHz, 12MB cache
9th CPU	Intel® Core™ i7-9850EQ	45W	Coffee Lake 9th Gen, 6 x 2.7 / 4.4 GHz, 9MB cache
9th CPU	Intel® Core™ i7-9850HE	45W	Coffee Lake 9th Gen, 6 x 2.7 / 4.4 GHz, 9MB cache
7th CPU	Intel® Core™ i7-7820EQ	45W	Kaby Lake 7th Gen, 4 x 3.0 / 3.7 GHz, 8MB cache
6th CPU	Intel® Core™ i7-6822EQ	25W	Sky Lake 6th Gen, 4 x 2.0 / 2.8 GHz, 8MB cache
6th CPU	Intel® Core™ i7-6820EQ	25W	Sky Lake 6th Gen, 4 x 2.0 / 2.8 GHz, 8MB cache
6th CPU	Intel® Xeon® E3-1505M v6	45W	Kaby Lake 6th Gen, 4 x 3.0 / 4.0 GHz, 8MB cache
6th CPU	Intel® Xeon® E3-1505L v6	25W	Kaby Lake 6th Gen, 4 x 2.2 / 3.0 GHz, 8MB cache

COM Express CPU Options(Type7)

	CPU		SPEC
Intel® Xeon® D	Express-BD7-D1559	45 W	Basic COM Express Type7 module with Intel Broadwell-DE D1559, 12C (eTEMP)
Intel® Xeon® D	Express-BD7-D1539	35 W	Basic COM Express Type7 module with Intel Broadwell-DE D1539, 8C (eTEMP)
Intel® Pentium®	Express-BD7-D1519	25 W	Basic COM Express Type7 module with Intel Broadwell-DE D1519, 4C (eTEMP)
Intel® Xeon® D	Express-BD7-D1577	45 W	Basic COM Express Type7 module with Intel Broadwell-DE D1577, 16C
Intel® Xeon® D	Express-BD7-D1548	45 W	Basic COM Express Type7 module with Intel Broadwell-DE D1548, 8C
Intel® Xeon® D	Express-BD7-D1527	35 W	Basic COM Express Type7 module with Intel Broadwell-DE D1527, 4C
Intel® Pentium®	Express-BD7-D1508	25 W	Basic COM Express Type7 module with Intel Broadwell-DE D1508, 2C

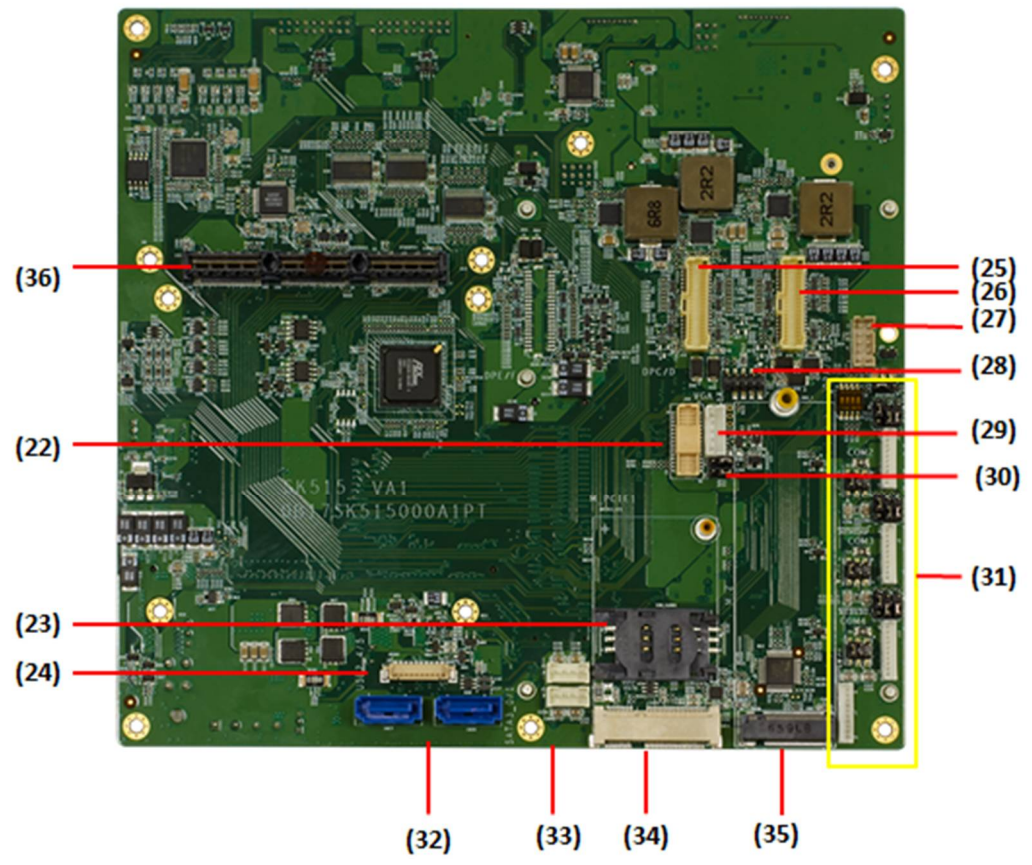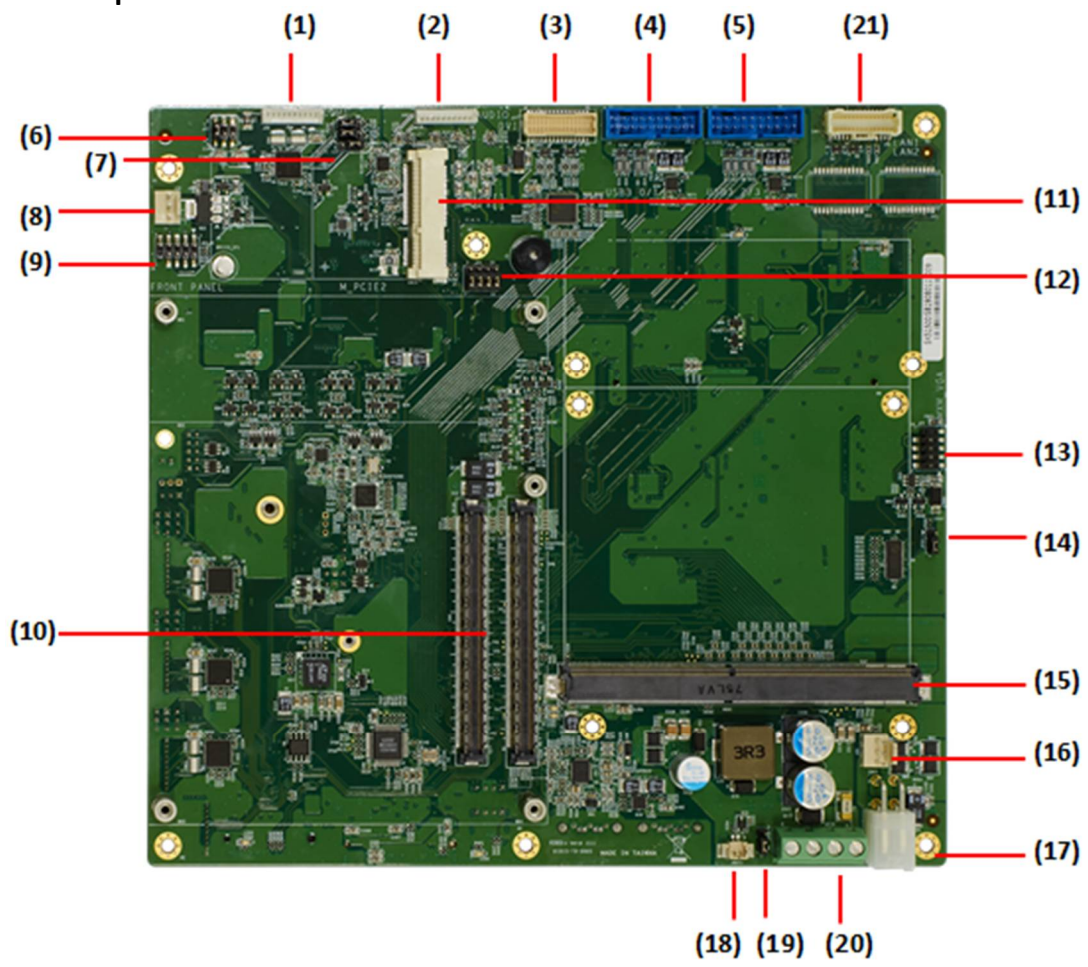7STARLAKE

GPU Module Options	NVIDIA® GeForce™ GTX 950M – (Maxwell, 640 CUDA Cores, 55W) NVIDIA® GeForce™ GTX 1050 – (Pascal, 640 CUDA Cores, 50W) NVIDIA® GeForce™ GTX 1050Ti – (Pascal, 768 CUDA Cores, 60W) NVIDIA® GeForce™ GTX 1060M – (Pascal, 1280 CUDA Cores, 80W) NVIDIA® GeForce™ GTX 1070M – (Pascal, 2048 CUDA Cores, 120W) NVIDIA® GeForce™ GTX 1080M – (Pascal, 2560 CUDA Cores, 150W)
COM Express Compatibility	COM Express® Type-6
MiniPCIe Expansion	2 x Full-size mini PCIe (1 with mSATA supported)
M.2 Expansion	1 x 2280 M key (SATA only)
PCIe/104 Expansion	4 x PCIe x 1 1 x PCIe x 4 5 x USB 2.0 1 x LPC 1 x SPI
DisplayPort	2 x DisplayPort outputs from COM Express®, 4 x outputs from GPU, 6 total
VGA	1 x output from COM Express®, 1 x output from GPU
LVDS	1 x dual channel 18/24-bit LVDS
Gigabit Ethernet	2 x 10/100/1000 Ethernet Ports
USB	4 x USB 3.0, 2 x USB 2.0
Audio	1 x Line-out, 1 x MIC-In
COM Port	4 x RS232/422/485 (function select by jumper)
Input Power_SYS	9~36V (4P Terminal Block)
Input Power_MXM	12V (ATX 4P)
Power Consumption	Varies per COM Express /MXM with different CPU and GPU models
RTC Battery	3V CR2032
Dimensions	190 x 185 mm
Operating Temperature Range	-40 to 85°C
Storage Temp.	-40 to 85°C
Relative Humidity	10% to 90%, non-condensing

1.2 Block Diagram

1.3 Connector & pin header
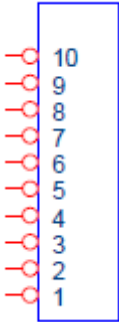
1	J26
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Chapter 2: Jumpers and Connectors

2.1 Connector & Pin Definitions
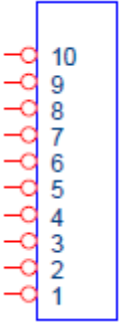
J26: COM1

Pin	RS232	RS422	RS485
1	5V	NC	NC
2	GND	GND	GND
3	COM_P9	NC	NC
4	DTR-	RX-	Data-
5	CTS-	NC	NC
6	TXD	RX+	Data+
7	RTS-	NC	NC
8	RXD	TX+	NC
9	DSR-	NC	NC
10	DCD-	TX-	NC
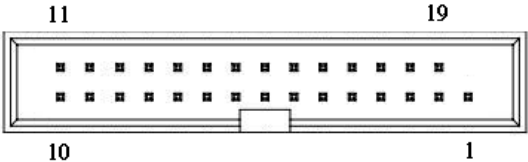
AUDIO

Pin	Function
1	GND
2	MIC_JD
3	MIC_R
4	MIC_L
5	FRONT_JD
6	FRONT_R
7	FRONT_L
8	N/C
9	N/C
10	N/C
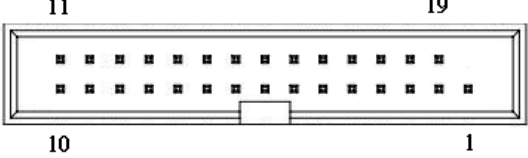
JUSB3_1: USB 3.0 Port

Pin	Function	Pin	Function
1	+5V_USB0	11	USB2_DP1
2	USB3_RXN0	12	USB2_DN1
3	USB3_RXP0	13	GND
4	GND	14	USB3_TXP1
5	USB3_TXN0	15	USB3_TXN1
6	USB3_TXP0	16	GND
7	GND	17	USB3_RXP1
8	USB2_DN0	18	USB3_RXN1
9	USB2_DP0	19	+5V_USB1
10	N/C		

JUSB3_2: USB 3.0 Port

Pin	Function	Pin	Function
1	+5V_USB2	11	USB2_DP3
2	USB3_RXN2	12	USB2_DN3
3	USB3_RXP2	13	GND
4	GND	14	USB3_TXP3
5	USB3_TXN2	15	USB3_TXN3
6	USB3_TXP2	16	GND
7	GND	17	USB3_RXP3
8	USB2_DN2	18	USB3_RXN3
9	USB2_DP2	19	+5V_USB3
10	N/C		
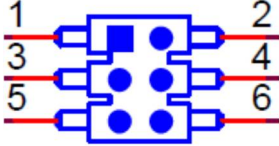
J27: DVI

Pin	Function	Pin	Function	Pin	Function
1	VCC5	11	TMDSD_DATA1-	21	GND
2	GND	12	N/C	22	N/C
3	GND	13	TMDSD_DATA1+	23	TMDSD_CLK
4	TMDSD_SCL	14	N/C	24	N/C
5	TMDSD_DATA2-	15	GND	25	TMDSD_CLK+
6	TMDSD_SDA	16	N/C	26	N/C
7	TMDSD_DATA2+	17	TMDSD_DATA0-	27	GND
8	GND	18	N/C	28	N/C
9	GND	19	TMDSD_DATA0+	29	N/C
10	TMDSD_HPD	20	N/C	30	N/C

JP7: COM1 Pin9 select

Pin	Function
(1-2) Closed	RI
(3-4) Closed	+5V
(5-6) Closed	+12V

JP8, JP9: COM1 Mode select

JP8	JP9	Mode
(2-3)	(2-3)	RS232
(1-2)	(2-3)	RS485 Half Duplex
(1-2)	(1-2)	RS485/422 Full Duplex
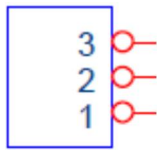
JP10: Enable COM1 RS-485/422 Receiver Termination

Pin	Function
(1-2) Closed	High
(2-3) Closed	Low
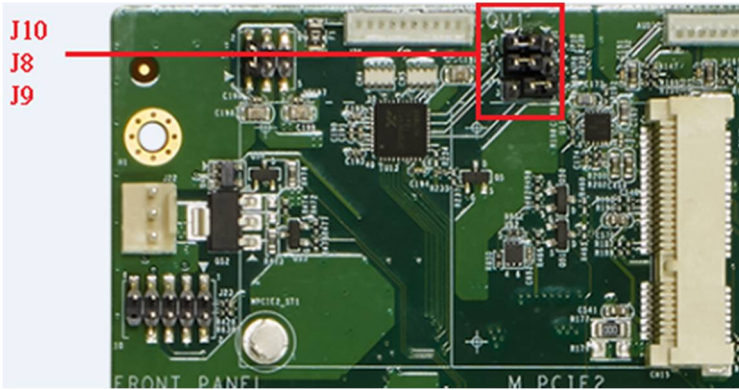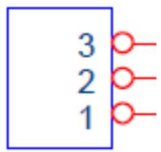
J22: CPU FAN Connector

Pin	Function
1	GND
2	CPUFANOUT
3	+12V
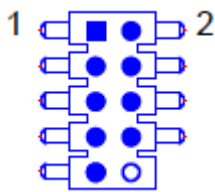
J25: MXM FAN connector

Pin	Function
1	GND
2	
3	+12V

J23: Front Panel

Pin	Function
1	HDLED+
2	PWLED+
3	HDLED-
4	GND
5	GND
6	PWRBTN#
7	RESET
8	GND
9	NC

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CN1,CN2: COM Express Connector
Support COM Express Basic Size Type 6 Module
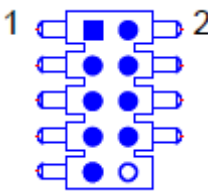
CN15: M_PCIE2 (mini PCIe Slot)
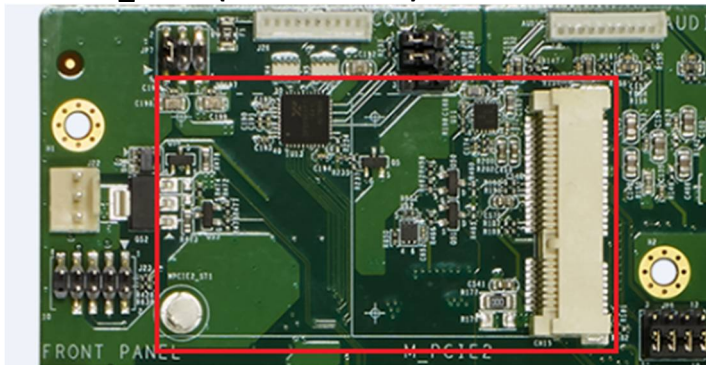
JP6: miniPCIe1 function select

PCIex1	SATA	
(1-2) Closed	(2-3) Closed	

J20: MXM_VGA

Pin	Function	
1	MVGA_VS	
2	MVGA_SCL	
3	MVGA_HS	
4	MVGA_SDA	
5	GND	
6	MVGA_VCC	
7	MVGA_R	
8	MVGA_B	
9	MVGA_G	

JP30: MXM Type select
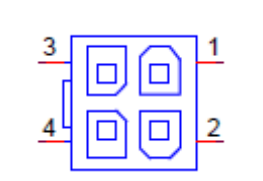
Pin	Function
(1-2) Closed	MXM v3.0
(2-3) Closed	MXM v3.1

MXM1: MXM socket
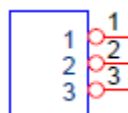
CN21: MXM DC-IN

Pin	Definition
1	12V
2	12V
3	GND
4	GND

JP28: Clear CMOS

Pin	Function
(1-2) Closed	Normal(default)
(3-4) Closed	Clear CMOS

DCIN: System DC-IN

Pin	Definition
1	12V
2	12V
3	GND
4	GND

LAN1: LAN1/LAN2

Pin	Function	Pin	Function	Pin	Function
1	MDI2_0PX	12	MDI1_2NX	23	3V3SB
2	MDI1_0PX	13	MDI2_3PX	24	3V3SB
3	MDI2_0NX	14	MDI1_3PX	25	LAN2_LED_100#
4	MDI1_0NX	15	MDI2_3NX	26	GBE_LED_100-
5	MDI2_1PX	16	MDI1_3NX	27	LAN2_LED_1000#
6	MDI1_1PX	17	GND	28	GBE_LED_1000-
7	MDI2_1NX	18	GND	29	GND
8	MDI1_1NX	19	VCC_1V5	30	GND
9	MDI2_2PX	20	GB0_CTREF	31	GND
10	MDI1_2PX	21	LAN2_LED_ACT#	32	GND
11	MDI2_2NX	22	GBE_ACT-		

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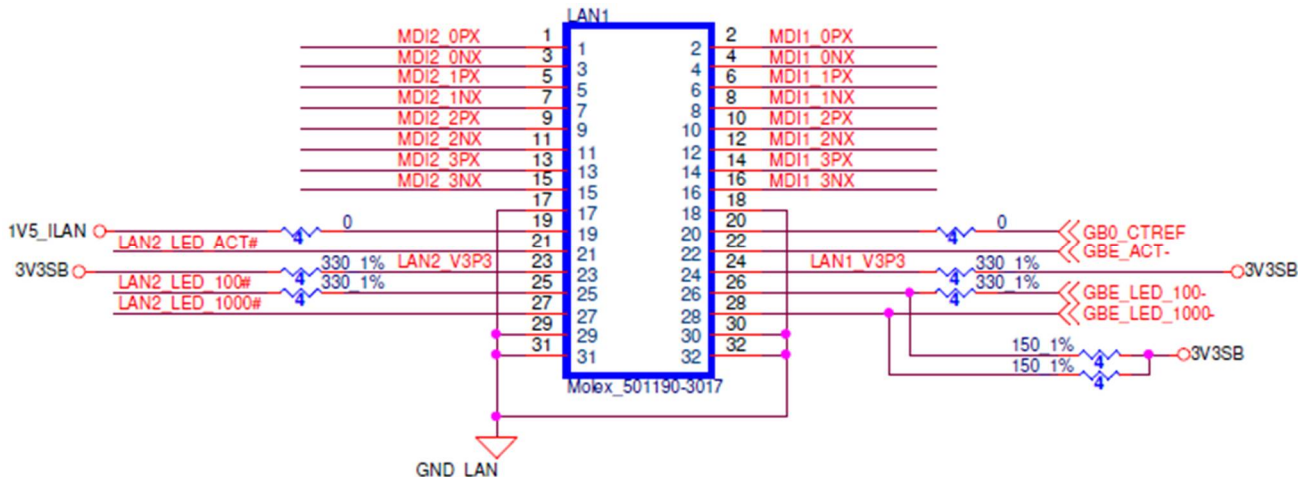
J18: MXM_DP(C/D)

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	GND	11	DPC_TN1	21	DPC_TP3	31	DPC_AUXP_CLK
2	GND	12	DPD_TN1	22	DPD_TP3	32	DPD_AUXP_CLK
3	DPC_TP0	13	GND	23	DPC_TN3	33	DPC_AUXN_DAT
4	DPD_TP0	14	GND	24	DPD_TN3	34	DPD_AUXN_DAT
5	DPC_TN0	15	DPC_TP2	25	GND	35	GND
6	DPD_TN0	16	DPD_TP2	26	GND	36	GND
7	GND	17	DPC_TN2	27	DPC_AUX_SEL	37	DPC_DET
8	GND	18	DPD_TN2	28	DPD_AUX_SEL	38	DPD_DET
9	DPC_TP1	19	GND	29	GND	39	DPC_PWR
10	DPD_TP1	20	GND	30	GND	40	DPD_PWR

J17: MXM_DP(A/B)

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	GND	11	DPA_TN1	21	DPA_TP3	31	DPA_AUXP_CLK
2	GND	12	DPB_TN1	22	DPB_TP3	32	DPB_AUXP_CLK
3	DPA_TP0	13	GND	23	DPA_TN3	33	DPA_AUXN_DAT
4	DPB_TP0	14	GND	24	DPB_TN3	34	DPB_AUXN_DAT
5	DPA_TN0	15	DPA_TP2	25	GND	35	GND
6	DPB_TN0	16	DPB_TP2	26	GND	36	GND
7	GND	17	DPA_TN2	27	DPA_AUX_SEL	37	DPA_DET
8	GND	18	DPB_TN2	28	DPB_AUX_SEL	38	DPB_DET
9	DPA_TP1	19	GND	29	GND	39	DPA_PWR
10	DPB_TP1	20	GND	30	GND	40	DPB_PWR

J10: LVDS

Pin	Function	Pin	Function	Pin	Function
1	LVDSB_CLK+	11	LVDSB2+	21	LVDSB0-
2	GND	12	LVDSA_CLK-	22	LVDSA1-
3	LVDSB_CLK	13	LVDSB2-	23	GND
4	LVDSA3+	14	GND	24	LVDSA0+
5	GND	15	LVDSB1+	25	LVDS_SCLK
6	LVDSA3-	16	LVDSA2+	26	LVDSA0-
7	LVDSB3+	17	LVDSB1-	27	LVDS_SDATA
8	GND	18	LVDSA2-	28	GND
9	LVDSB3-	19	LVDSB0+	29	LVDS_VCC
10	LVDSA_CLK+	20	LVDSA1+	30	LVDS_VCC

SIM_CARD1

Pin	Function	Pin	Function
1	UIM_PWR	4	GND
2	UIM_RESET	5	UIM_VPP
3	UIM_CLK_R	6	UIM_DATA

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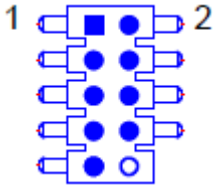
JUSB2: USB2.0 (USB4/USB5)

Pin	Function	Pin	Function
1	5V_USB4	6	5V_USB5
2	USB2_DN4	7	USB2_DN5
3	USB2_DP4	8	USB2_DP5
4	GND	9	GND
5	GND	10	GND
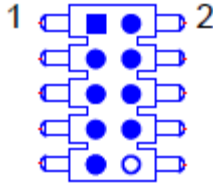
J8: VGA

Pin	Function
1	VGA_VS
2	VGA_SCL
3	VGA_HS
4	VGA_SDA
5	GND
6	VGA_VCC
7	VGA_R
8	VGA_B
9	VGA_G

J9: DIO

Pin	Function
1	GPI0
2	GPO0
3	GPI1
4	GPO1
5	GPI2
6	GPO2
7	GPI3
8	GPO3
9	5V
10	GND

J11: LVDS Backlight

Pin	Function
1	BKL_VOL
2	LBKLT_CTRL
3	GND
4	GND
5	Backlight_EN

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JP23: LVDS Backlight Power select

Pin	Function
(1-2) Closed	5V
(2-3) Closed	12V

JP24: LVDS Signal Power select

Pin	Function
(1-2) Closed	5V
(2-3) Closed	3.3V

No31: LPC/COM2/3/4
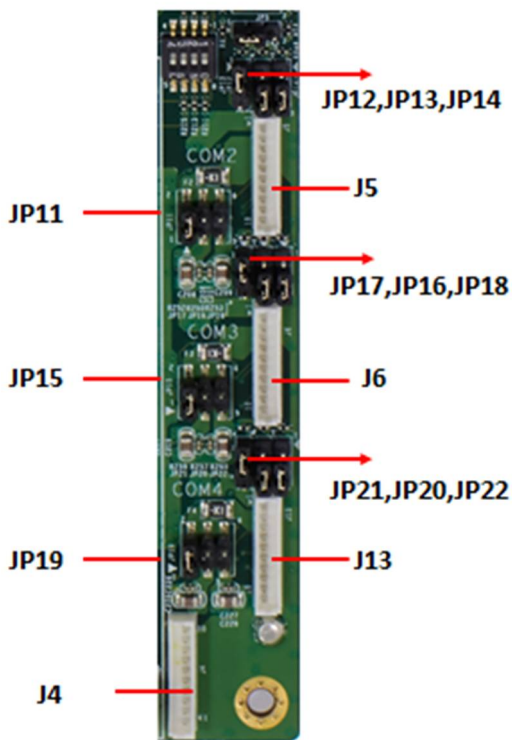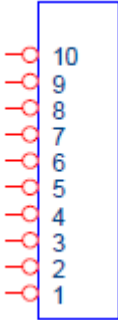
J4: LPC

Pin	Function
1	GND
2	GND
3	3V3
4	LPC_AD0
5	LPC_AD1
6	LPC_AD2
7	LPC_AD3
8	LPC_FRAME-
9	LPC_RST#
10	CLK_DBG

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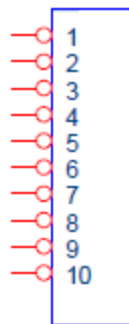
J5: COM2 / J6: COM3 / J13: COM4

Pin	RS232	RS422	RS485
1	5V	NC	NC
2	GND	GND	GND
3	COM_P9	NC	NC
4	DTR-	RX-	Data-
5	CTS-	NC	NC
6	TXD	RX+	Data+
7	RTS-	NC	NC
8	RXD	TX+	NC
9	DSR-	NC	NC
10	DCD-	TX-	NC

JP12, JP13: COM2 Mode select

JP8	JP9	Mode
(2-3)	(2-3)	RS232
(1-2)	(2-3)	RS485 Half Duplex
(1-2)	(1-2)	RS485/422 Full Duplex

JP14: Enable COM2 RS-485/422 Receiver Termination

Pin	Function
(1-2) Closed	High
(2-3) Closed	Low

JP11: COM2 Pin9 select

Pin	Function
(1-2) Closed	RI
(3-4) Closed	+5V
(5-6) Closed	+12V

JP16, JP17: COM3 Mode select

JP8	JP9	Mode
(2-3)	(2-3)	RS232
(1-2)	(2-3)	RS485 Half Duplex
(1-2)	(1-2)	RS485/422 Full Duplex

JP18: Enable COM3 RS-485/422 Receiver Termination

Pin	Function
(1-2) Closed	High
(2-3) Closed	Low

JP15: COM3 Pin9 select

Pin	Function
(1-2) Closed	RI
(3-4) Closed	+5V
(5-6) Closed	+12V

JP20, JP21: COM4 Mode select

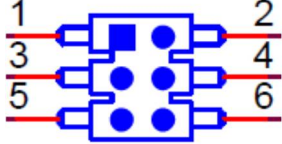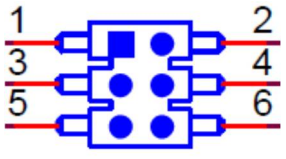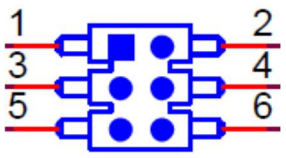| JP8	JP9	Mode
(2-3)	(2-3)	RS232
(1-2)	(2-3)	RS485 Half Duplex
(1-2)	(1-2)	RS485/422 Full Duplex

JP22: Enable COM4 RS-485/422 Receiver Termination

Pin	Function
(1-2) Closed	High
(2-3) Closed	Low

JP19: COM4 Pin9 select

Pin	Function
(1-2) Closed	RI
(3-4) Closed	+5V
(5-6) Closed	+12V

CN26, CN27: SATA

Pin	Function
1	GND
2	SATA_TP
3	SATA_TN
4	GND
5	SATA_RN
6	SATA_RP
7	GND

J2, J3: SATA Power

Pin	Definition
1	12V
2	GND
3	GND
4	5V

7STARLAKE

CN14: M_PCIE1 (mini PCIe Slot)
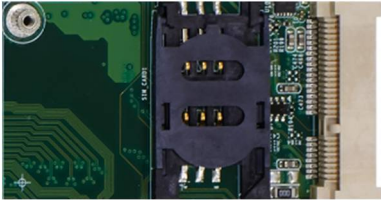
CN3: M.2 (2280 M key, SATA only)

CN36: StackPC1

STACKPC1C

Pin	Signal
53	STK0/WAKE#
55	Type_DETECT#
57	ETH_0_MDI(0)p
59	ETH_0_MDI(0)n
61	GND
63	ETH_1_MDI(0)p
65	ETH_1_MDI(0)n
67	GND
69	ETH_0_MDI(1)p
71	ETH_0_MDI(1)n
73	GND
75	ETH_1_MDI(1)p
77	ETH_1_MDI(1)n
79	ETH_1_LINK_ACT#
81	SATA_T1p
83	SATA_T1n
85	GND
87	USB_3p
89	USB_3n
91	GND
93	USB_5p
95	USB_5n
97	GND
99	ETH_1_CTREF
101	SPI_MOSI
103	SPI_MISO

STK0
TYPE_DET#

USB_HUB_DN4_P
USB_HUB_DN4_M

USB_HUB_DN6_P
USB_HUB_DN6_M

CONNECTOR A TOP

STACKPC1F

Pin	Signal
106	LPC_CLK
108	GND
110	PEx4_0R(0)p
112	PEx4_0R(0)n
114	GND
116	PEx4_0R(1)p
118	PEx4_0R(1)n
120	GND
122	PEx4_0R(2)p
124	PEx4_0R(2)n
126	GND
128	PEx4_0R(3)p
130	PEx4_0R(3)n
132	PE_PRSNT0#
134	SATA_R0p
136	SATA_R0n
138	GND
140	FBUS_0p
142	FBUS_0n
144	GND
146	LPC_DRQ#
148	LPC_SERIRQ#
150	GND
152	LPC_FRAME#
154	RTC_Battery
156	FBUS_0RTS#

STK_LPC

PCIE_RX4P
PCIE_RX4N

PCIE_RX5P
PCIE_RX5N

PCIE_RX6P
PCIE_RX6N

PCIE_RX7P
PCIE_RX7N

LPC_DRQ#
LPC_SERIRQ

LPC_FRAME-
VCC_RTC

R440
8.2K_1%

CONNECTOR A TOP

+3.3V = 3.6A
+5V_StackPC = 3.6A
+12V_StackPC = 8.4A

5V

+5V   159
+5V   158
+12V 157

0603 C479   0603 C480   0402 C481
10u_25V   10u_25V   0.1u_16V

+12V

0603 C484   0402 C485
10u_25V   0.1u_16V