Embedded & Industrial Computing

LEC-2281 & LEC-2284

User Manual

Rev 1.1 January 10th, 2017

Revision History

Rev	Date	Descriptions
0.1	2015/09/16	Preliminary
0.2	2016/01/27	Incorporated LEC-2284 model
0.3	2016/02/02	Added riser cards LEK-EA7 and LEK-PB6
1.0	2016/02/23	Official release
1.1	2017/01/10	Added serial configuration jumpers Modified J2 PCIe jumper setting Modified hardware installations

Online Resources

The listed websites are links to the on-line product information and technical support.

Resource	Website
Lanner	www.lannerinc.com
Product Resources	www.lannerinc.com/support/download-center
RMA	http://eRMA.lannerinc.com

Acknowledgement

Compliances and Certification

CE Certification

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A Certification

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EMC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if

not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

Safety Guidelines

- Follow these guidelines to ensure general safety:
- Keep the chassis area clear and dust-free before, during and after installation.
- Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses/goggles if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.

LITHIUM BATTERY CAUTION:

Risk of explosion could occur if battery is replaced by an incorrect type. Please dispose of used batteries according to the recycling instructions of your country.

- Installation only by a trained electrician or only by an electrically trained person who knows all the applied or related installation and device specifications..
- Do not carry the handle of power supplies when moving to other place.
- The machine can only be used in a fixed location such as labs or computer facilities.

Operating Safety

- Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in

complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.

- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Mounting Installation Environment Precaution

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

Consignes de sécurité

Suivez ces consignes pour assurer la securite generale :

- Laissez la zone du chassis propre et sans poussiere pendant et apres l'installation.
- Ne portez pas de vetements amples ou de bijoux qui pourraient etre pris dans le chassis. Attachez votre cravate ou echarpe et remontez vos manches.
- Portez des lunettes de securite pour proteger vosmyeux.
- N'effectuez aucune action qui pourrait creer un dangermpour d'autres ou rendre l'equipement dangereux.
- Coupez completement l'alimentation en eteignant l'alimentation et en debranchant le cordon d'alimentation avant d'installer ou de retirer un chassis ou de travailler a proximite de sources d'alimentation.
- Ne travaillez pas seul si des conditions dangereuses sont presentes.

- Ne considerez jamais que l'alimentation est coupee d'un circuit, verifiez toujours le circuit. Cet appareil genere, utilise et emet une energie radiofrequence et, s'il n'est pas installe et utilise conformement aux instructions des fournisseurs de composants sans fil, il risque de provoquer des interferences dans les communications radio.

Avertissement concernant la pile au lithium

- Risque d'explosion si la pile est remplacee par une autre d'un mauvais type.
- Jetez les piles usagees conformement aux instructions.
- L'installation doit etre effectuee par un electricien forme ou une personne formee a l'electricite connaissant toutes les specifications d'installation et d'appareil du produit.
- Ne transportez pas l'unite en la tenant par le cable d'alimentation lorsque vous deplacez l'appareil.
- La machine ne peut etre utilisee qu'a un lieu fixe comme en laboratoire, salle d'ordinateurs ou salle de classe.

Sécurité de fonctionnement

- L'equipement electrique genere de la chaleur. La temperature ambiante peut ne pas etre adequate pour refroidir l'equipement a une temperature de fonctionnement acceptable sans circulation adaptee. Verifiez que votre site propose une circulation d'air adequate.
- Verifiez que le couvercle du chassis est bien fixe. La conception du chassis permet a l'air de refroidissement de bien circuler. Un chassis ouvert laisse l'air s'echapper, ce qui peut interrompre et rediriger le flux d'air frais destine aux composants internes.
- Les decharges electrostatiques (ESD) peuvent endommager l'equipement et gener les circuits electriques. Des degats d'ESD surviennent lorsque des composants electroniques sont mal manipules et peuvent causer des pannes totales ou intermittentes. Suivez les procedures de prevention d'ESD lors du retrait et du remplacement de composants.

- Portez un bracelet anti-ESD et veillez a ce qu'il soit bien au contact de la peau. Si aucun bracelet n'est disponible, reliez votre corps a la terre en touchant la partie metallique du chassis. Verifiez regulierement la valeur de resistance du bracelet antistatique, qui doit etre comprise entre 1 et 10 megohms (Mohms).

Consignes de sécurité électrique

- Avant d'allumer l'appareil, reliez le cable de mise a la terre de l'equipement a la terre.
- Une bonne mise a la terre (connexion a la terre) est tres importante pour proteger l equipement contre les effets nefastes du bruit externe et reduire les risques d'electrocution en cas de foudre.
- Pour desinstaller l'equipement, debranchez le cable de mise a la terre apres avoir eteint l'appareil.

- Un cable de mise a la terre est requis et la zone reliant les sections du conducteur doit faire plus de 4 mm2 ou 10 AWG.

Procédure de mise à la terre pour source d’alimentation CC Procédure de mise à la terre pour source d’alimentation CC

• Desserrez la vis du terminal de mise a la terre.

• Branchez le cable de mise a la terre a la terre.

• L’appareil de protection pour la source d’alimentation

CC doit fournir 30 A de courant. Cet appareil de protection doit etre branche a la source d’alimentation avant l’alimentation CC.

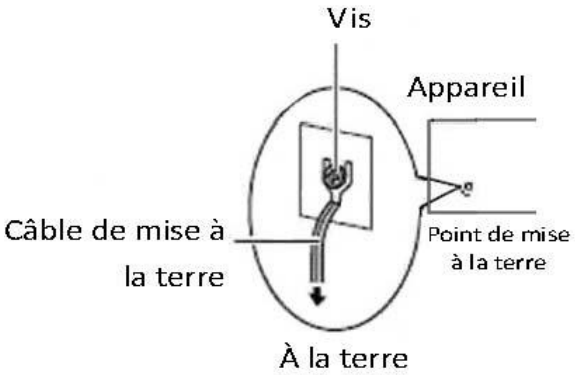


Table of Contents

Revision History 2
Chapter 1: Introduction 9
System Specification 10
Ordering Information 12
Accessories 12
Package Contents 12
Chapter 2: System Overview 13
Mechanical Drawing (LEC-2281) 13
Mechanical Drawing (LEC-2284) 14
Block Diagram (LEC-2281) 15
Block Diagram (LEC-2284) 16
Front I/Os (LEC-2281) 17
Rear I/Os (LEC-2281) 18
Front I/Os (LEC-2284) 19
Rear I/Os (LEC-2284) 20
Chapter 3: Board Layout 21
Jumpers and Connectors on the Motherboard 21
Jumpers and Connectors on the Add-on Board 22
Jumpers and Connectors on the Add-on Board 23
Jumpers and Connectors List 25
Jumper Setting and Connector Pin-out 26
Chapter 4: Hardware Setup 39
Accessing the Inside of the System 39
Installing the System Memory 40
Installing a mSATA or Mini-PCIe module 41
Installing a Disk Drive for LEC-2281 41
Installing a Disk Drive for LEC-2284 43
Connecting Power 44
Appendix1: Programming Watchdog Timer 45

Chapter 1: Introduction

Thank you for choosing LEC-2281/LEC-2284. This fanless embedded Box PC utilizes Intel Haswell platform, with ordering options of Celeron 2000E, i3-4102E, i5-4400E, or i7-4700EQ. The system supports DDR3L memory up to 16GB. Regarding peripheral connections, LEC-2281/LEC-2284 supports multiple I/O features including 2 LAN ports (one with iAMT/Teaming), 6 USB ports, 2 x mini-PCIe slots and two SATA 2.5" storage bays supporting RAID 0 & 1. The rich I/O functionality makes LEC-2281/LEC-2284 an instant embedded platform for various applications. Their major difference lies in physical size. For compact applications, LEC-2281 is the ideal choice. For larger system with externally accessible disk drives, LEC-2284 is the primary option.

Here is the summary of the key features:

- On board Intel Haswell Family CPU: Celeron 2000E/ i3-4102E/ i5-4400E/ i7-4700EQ
- Intel QM87 Chipset
- Fanless System
- 2x DDR3L SO-DIMM support up to 16GB
- 2x 10/100/1000Mbps Ethernet ports (one support iAMT or Teaming)
- 2x USB3.0, 6x USB 2.0 (2x USB2.0 used onboard 2x5 pin header)
- 2x mini-PCIe sockets (one with SIM card reader)
- Storage:
  - LEC-2281 Series: 2 x SATA 2.5" HDD/SSD drive bays
  - LEC-2284 Series: 2x SATA 2.5" HDD/SSD externally accessible drive bays
- 2x SATA 2.5"storage bay support RAID 0 &1 and 1 x mSATA socket
- Support 9~30V wide range power input
- External Expansion:
  - LEC-2281 series: 1x PCIe expansion slot; standard with x16 riser card, with 1x PCI expansion slot (included in package)
  - LEC-2284 series: 2x PCIe expansion slot; standard with x8 riser card, with 2x PCI expansion slot (included in package)

Please refer to the following chart for a detailed description of the system's specifications.

System Specification

Processor Options		Onboard Haswell processor: Intel® Core™ i7-4700EQ (47W) Intel® Core™ i5-4400E (37W) Intel® Core™ i3-4102E (25W) Intel® Celeron® Processor 2000E (37W)
Chipset		Intel® QM87
BIOS		AMI SPI 128Mbit Flash BIOS
System Memory		2x DDR3L SO-DIMM socket supports capacity up to 16GB (8GB for each socket) @1333/1600MHz
USB		4 x USB 2.0 ports in double-stacked type-A connector 2x USB 3.0 ports in double-stacked type-A connector 1 x USB2.0 onboard pin header
OS Support		Windows Embedded Standard 7, Windows 7 FES, Windows Embedded 8.1 Industry Pro,Windows 10 IoT Enterprise 2016, Linux Kernel 3.x
Storage		1 x mSATA socket 2 x 2.5” SATA HDD/SSD drive bays (Externally accessible for LEC-2284)
		Supports RAID 0/1
Networking	LAN	2x RJ-45 of 10/100/1000Mbps Ethernet ports (one with iAMT or Teaming)
	Controller	1x Intel i217LM & 1x Intel i210AT
Serial Interface	Serial Standard	2 x DB9 COM ports (with RS232/422/485)
Display	Graphics Controller	Intel integrated HD graphic engine 4600 Intel® HD Graphics (Intel® Celeron® Processor 2000E)
	Dual Display Function	Independent, clone, and extended mode
	Output	1 x VGA port 1 x HDMI port 1 x DVI-D connector
Super I/O		1x LPC Super I/O Fintek F81866AD-I supporting

		Watchdog Timer, Hardware monitor,1x Temperature monitor for internal system
Audio		Realtek ALC886-GR Mic-in, Line-out
Expansion		Internal: 2x mini-PCIe slots (one with SIM card Reader) External: LEC-2281: 1x PCIe expansion slot; standard with x16 riser card Option: 1x PCI expansion slot (included in package) LEC-2284: 2x PCIe expansion slot; standard with x8 riser card Option: 2x PCI expansion slot (included in package)
Antenna		2 x SMA antenna inputs
TPM		TPM Pin header onboard
LED Indicator		2x LED for Power-on status(Green) and Storage access status(Yellow)
Physical Characteristics	Housing	Made by Aluminum & SGCC
	Thermal	Fanless design
	Dimensions	277 x 110 x 195 mm (10.9” x 4.33” x 7.68”)
	Mounting Options	Wallmount, VESA, Rackmoount
	Weight	4.2 kg
Environment	Operating Temperature	-10°C to +50°C
	Non-operating Temperature	-20°C to +70°C
	Ambient Humidity	5 to 95% (non-condensing)
	Vibration	IEC 60068-2-64, 0.5Grms, Random 5 ~500 Hz, 40 Mins/Axis
Power	Input Voltage	1x 2-pin terminal block for +9V~+30V DC input
	Power Consumption	Idle: 25.42W Full Load: 36.22W
	Power Button	1x Power-on button(Red-Stand by, Green-Operating)
	Reset	1x Reset Switch
Certifications	EMC	CE/FCC Class A

	Green product	RoHS
Reliability	Automatic Reboot Trigger	Watchdog Timer 1~255 level time interval system reset, software programmable

Ordering Information

LEC-2281-711A	Fanless Industrial PC with Intel® Core™ i7-4700EQ
LEC-2281-511A	Fanless Industrial PC with Intel® Core™ i5-4400E
LEC-2281-311A	Fanless Industrial PC with Intel® Core™ i3-4102E
LEC-2281-C11A	Fanless Industrial PC with Intel® Celeron® Processor 2000E

LEC-2284-711A	Fanless Industrial PC with Intel® Core™ i7-4700EQ
LEC-2284-511A	Fanless Industrial PC with Intel® Core™ i5-4400E
LEC-2284-311A	Fanless Industrial PC with Intel® Core™ i3-4102E
LEC-2284-C11A	Fanless Industrial PC with Intel® Celeron® Processor 2000E

Accessories

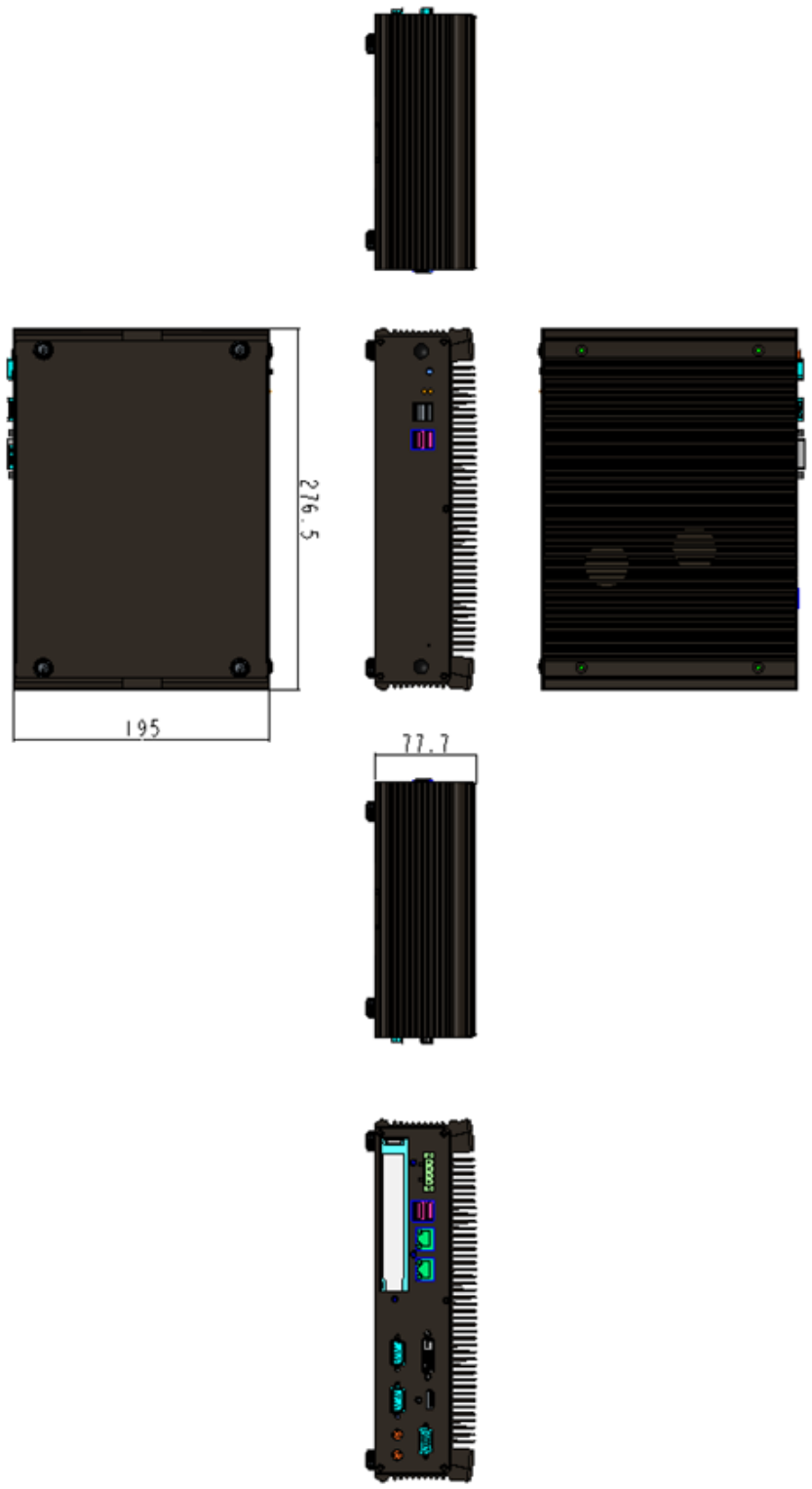
LEK-IOA2	2xCOM, Mic-in; Line-out
LEK-IOA12	2x LAN & 16GPIO(support 8DI 8DO)
LEK-IOA13	2x PoE, 16GPIO (support 8DI 8DO)
LEK-EA6	1x PCIe x16 slot
LEK-EA7	2x PCIex8 slot
LEK-PB5	1x PCI slot
LEK-PB6	2x PCI slot

Package Contents

080W1N0002001	SATA SSD/HDD Cable with Power
098W000004000	Metal Brkt Black Wallmount-4

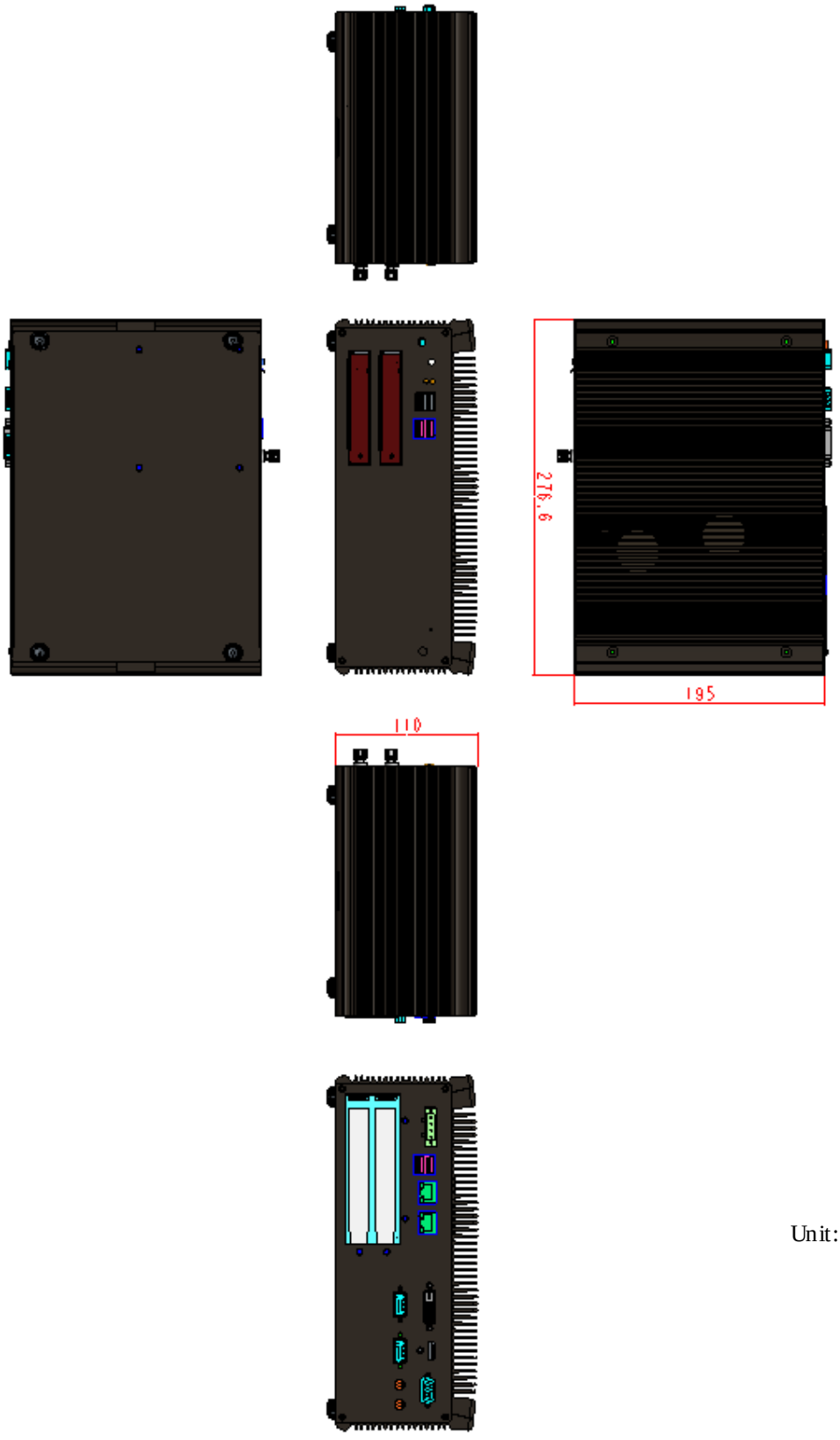
Chapter 2: System Overview

Mechanical Drawing (LEC-2281)



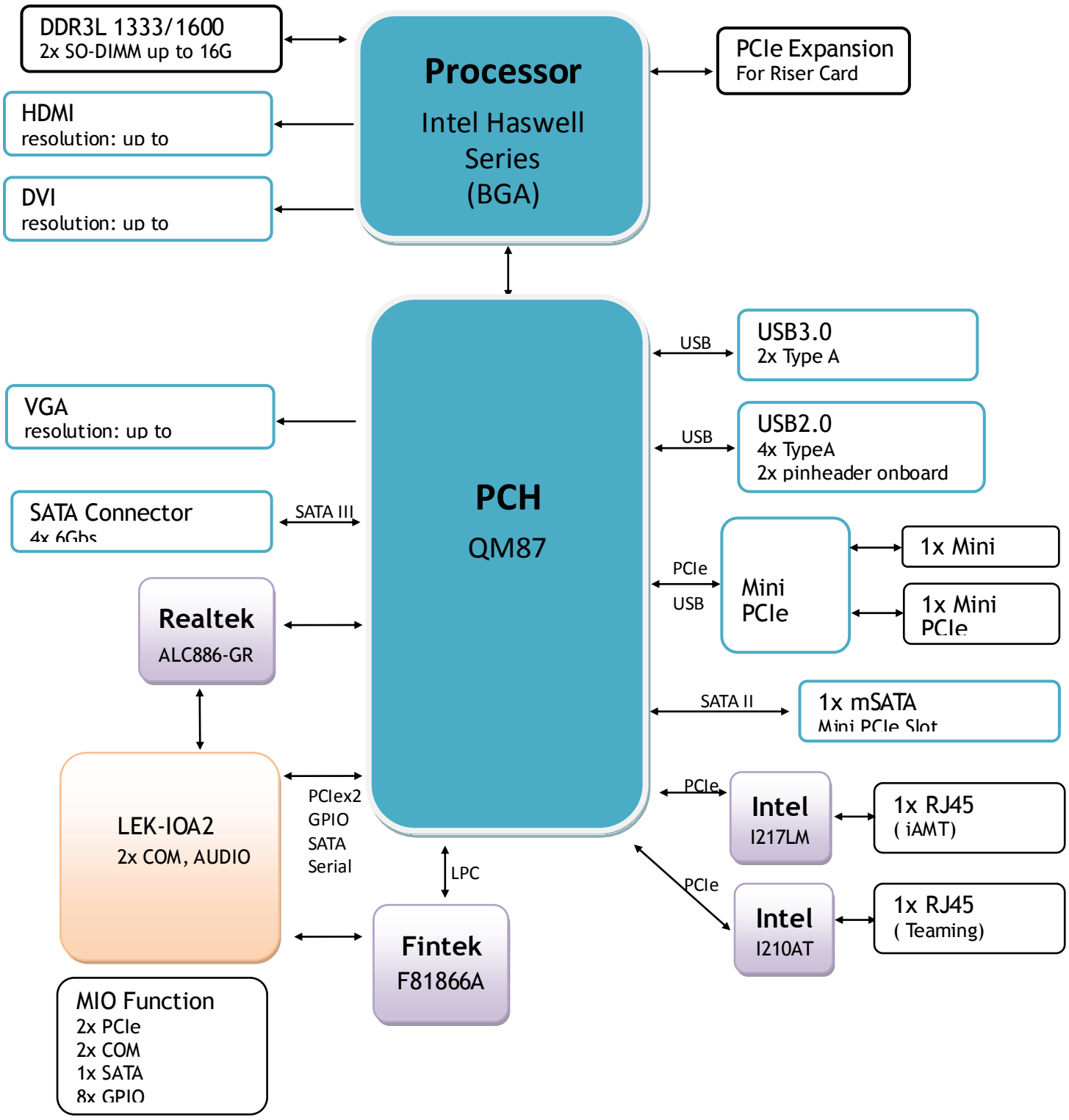
Unit: mm

Mechanical Drawing (LEC-2284)

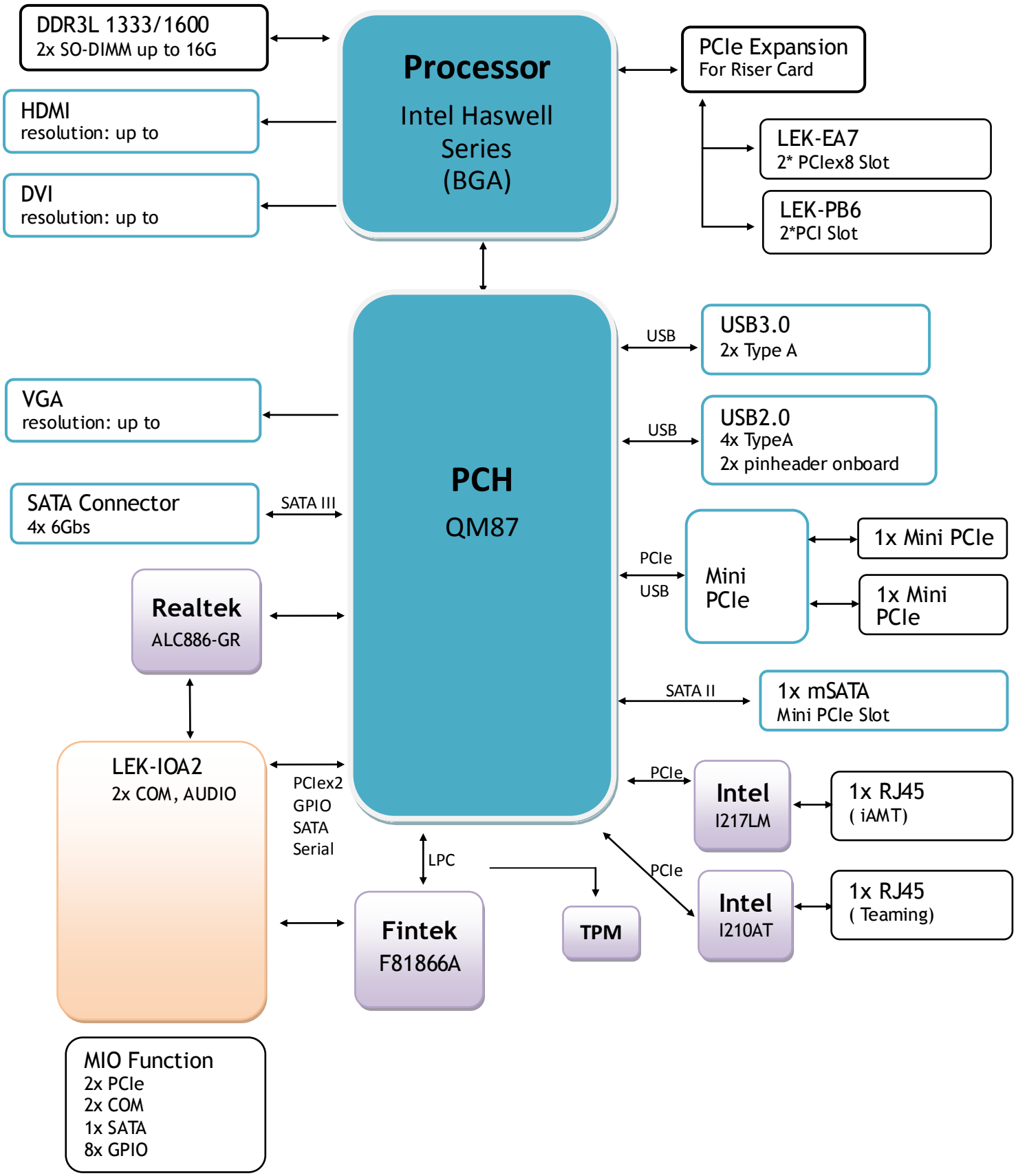


Unit: mm

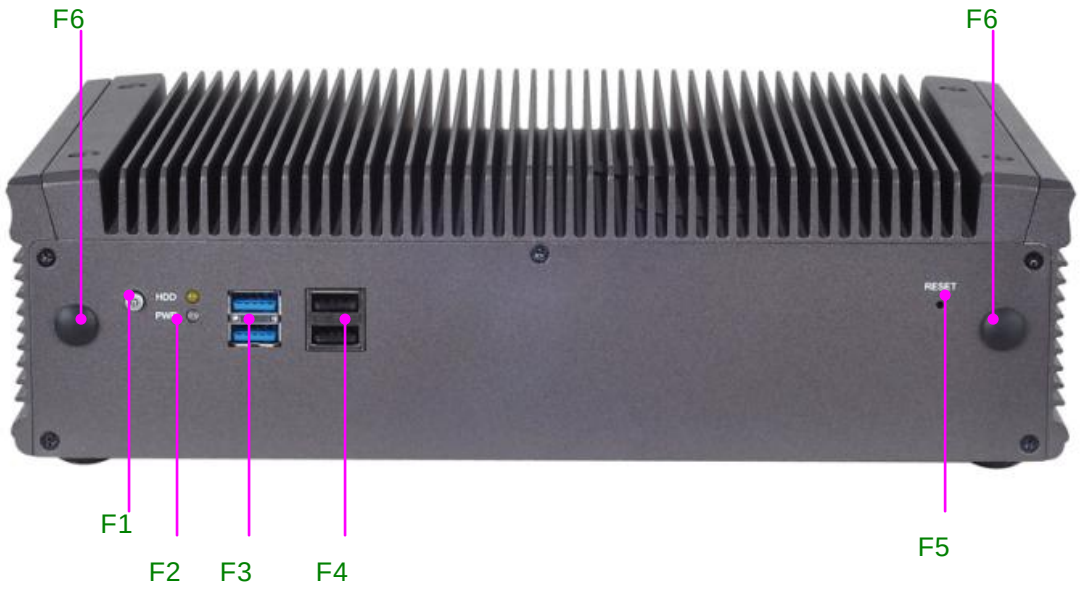
Block Diagram (LEC-2281)



Block Diagram (LEC-2284)

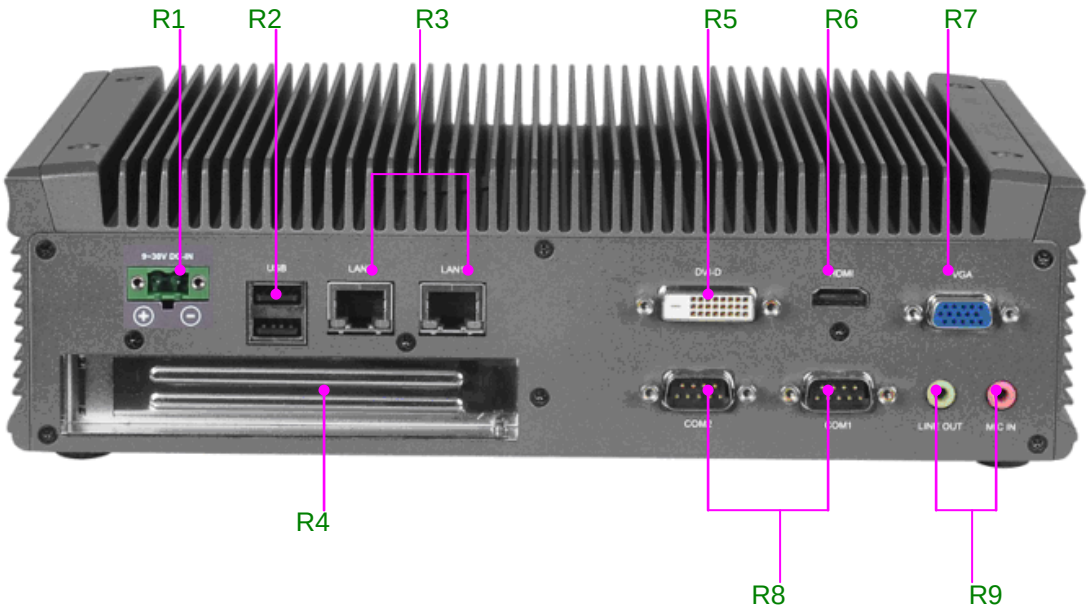


Front I/Os (LEC-2281)



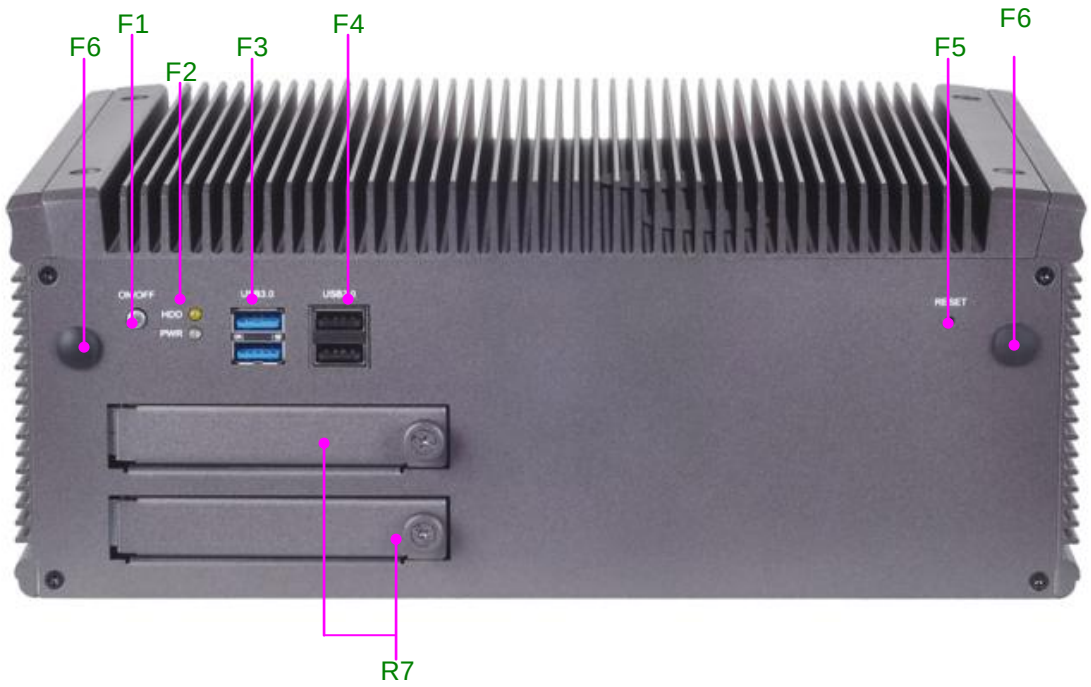
F1 Power Button	1 x Power button, Red-Stand by, Green-Operating
F2 LED Indicator	2x LED for Power-on status(Green) and Storage access status(Yellow)
F3 USB 3.0	2 x USB 3.0 Type-A connectors in double-stacked form
F4 USB 2.0	2 x USB 2.0 Type-A connectors in double-stacked form
F5 Reset	1 x Reset switch
F6 Antenna	2 x SMA Antenna holes

Rear I/Os (LEC-2281)



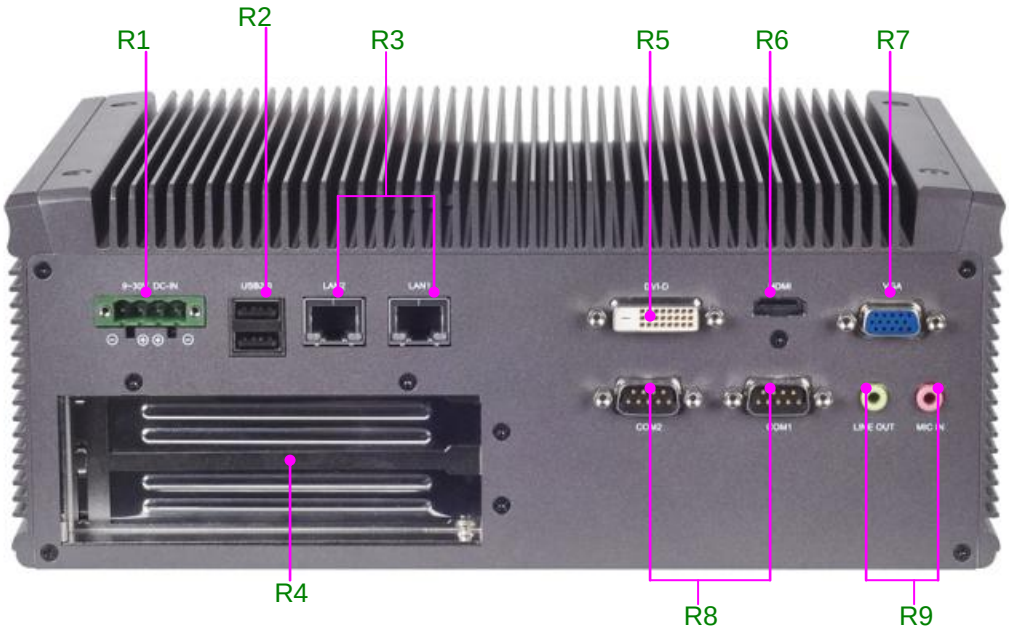
R1 Power Input	2-pin power input DC +9~+30VDC
R2 USB	2 x USB2.0 type A connectors
R3 LAN	2x 10/100/1000Mbps LAN ports
R4 Expansion	1x PCIe expansion slot; standard with x16 riser card Option: 1x PCI expansion slot (included in package)
R5 DVI-D	1 x DVI-D display connector
R6 HDMI	1 x HDMI port
R7 VGA	1 x VGA display port
R8 COM	2 x DB9 COM ports with RS-232/422/485 signals
R9 Audio	Mic-in, Line-out

Front I/Os (LEC-2284)



F1 Power Button	1 x Power button, Red-Stand by, Green-Operating
F2 LED Indicator	2x LED for Power-on status(Green) and Storage access status(Yellow)
F3 USB 3.0	2 x USB 3.0 Type-A connectors in double-stacked form
F4 USB 2.0	2 x USB 2.0 Type-A connectors in double-stacked form
F5 Reset	1 x Reset switch
F6 Antenna	2 x SMA Antenna holes
F7 HDD/SSD trays	2 x Externally accessible SATA 2.5” HDD/SSD drive trays

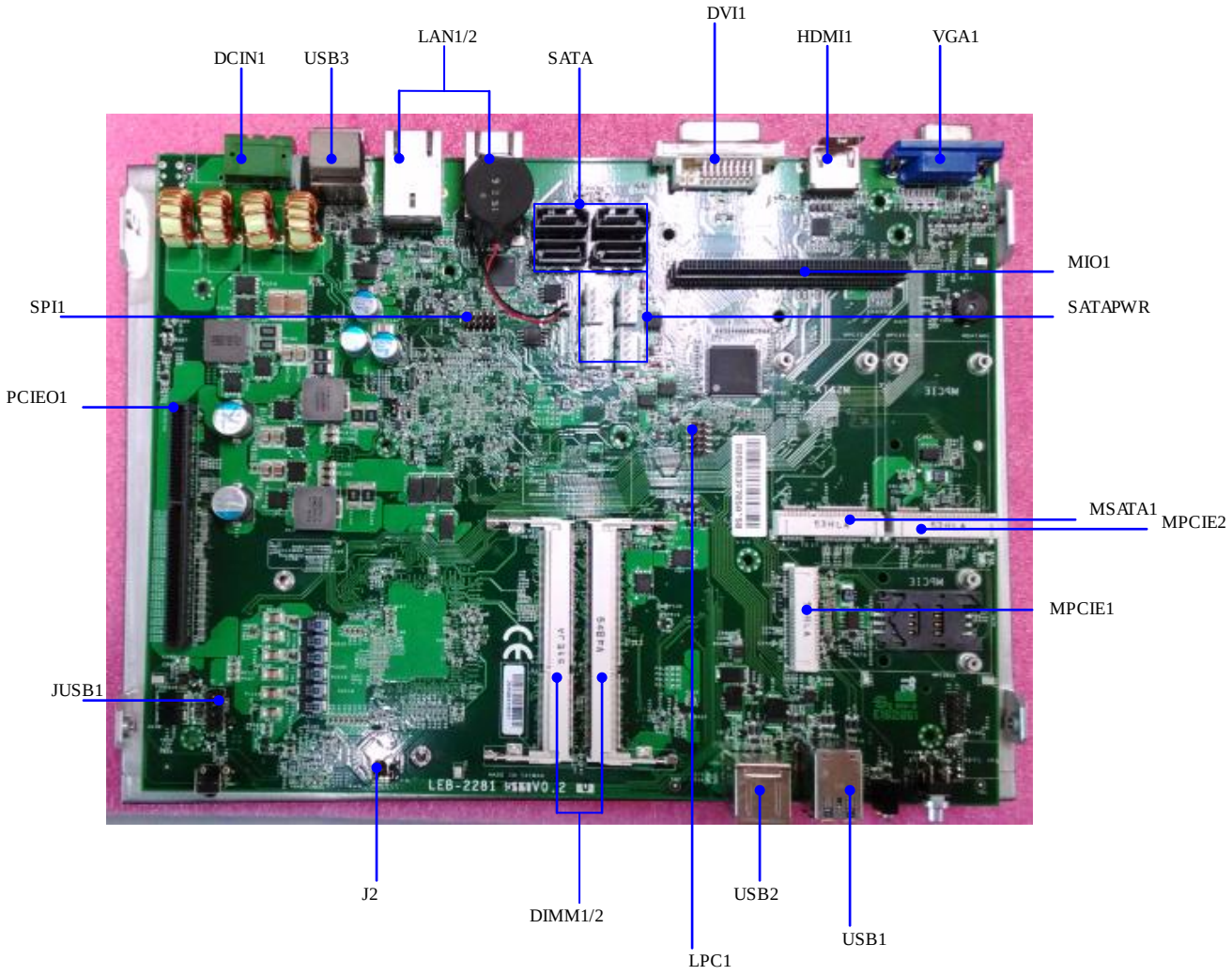
Rear I/Os (LEC-2284)



R1 Power Input	2-pin power input DC +9~+30VDC
R2 USB	2 x USB2.0 type A connectors
R3 LAN	2x 10/100/1000Mbps LAN ports
R4 Expansion	2x PCIe expansion slot; standard with x8 riser card Option: 2x PCI expansion slot (included in package)
R5 DVI-D	1 x DVI-D display connector
R6 HDMI	1 x HDMI port
R7 VGA	1 x VGA display port
R8 COM	2 x DB9 COM ports with RS-232/422/485 signals
R9 Audio	Mic-in, Line-out

Chapter 3: Board Layout

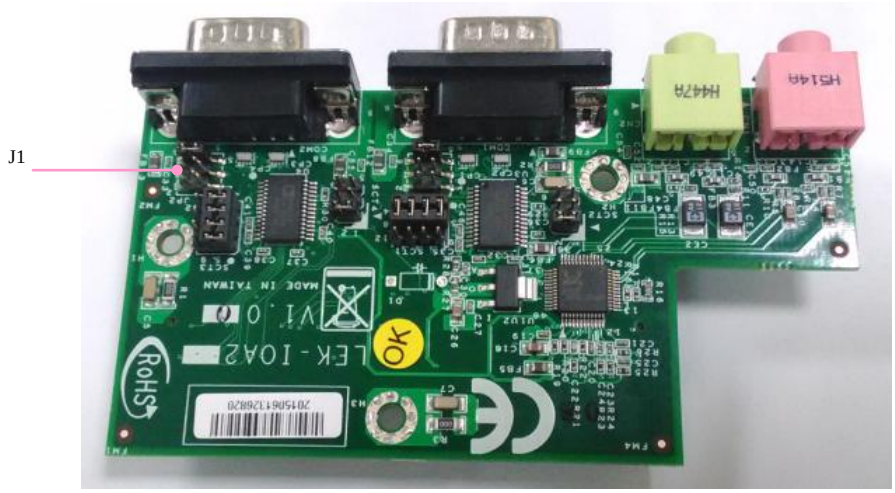
Jumpers and Connectors on the Motherboard



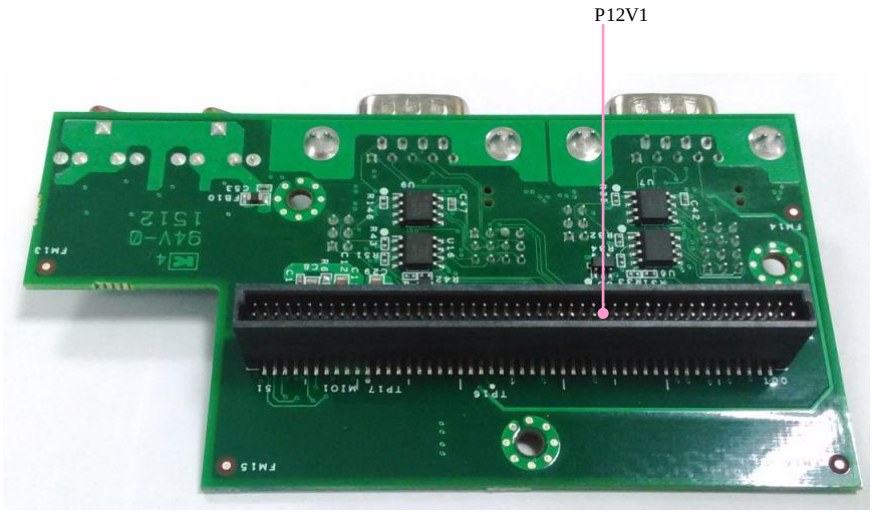
Jumpers and Connectors on the Add-on Board

LEK-IOA2

Top Side

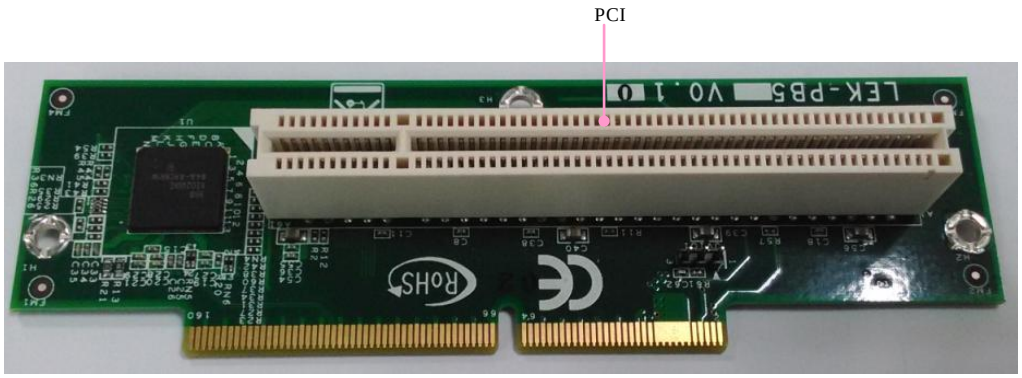


Rear Side

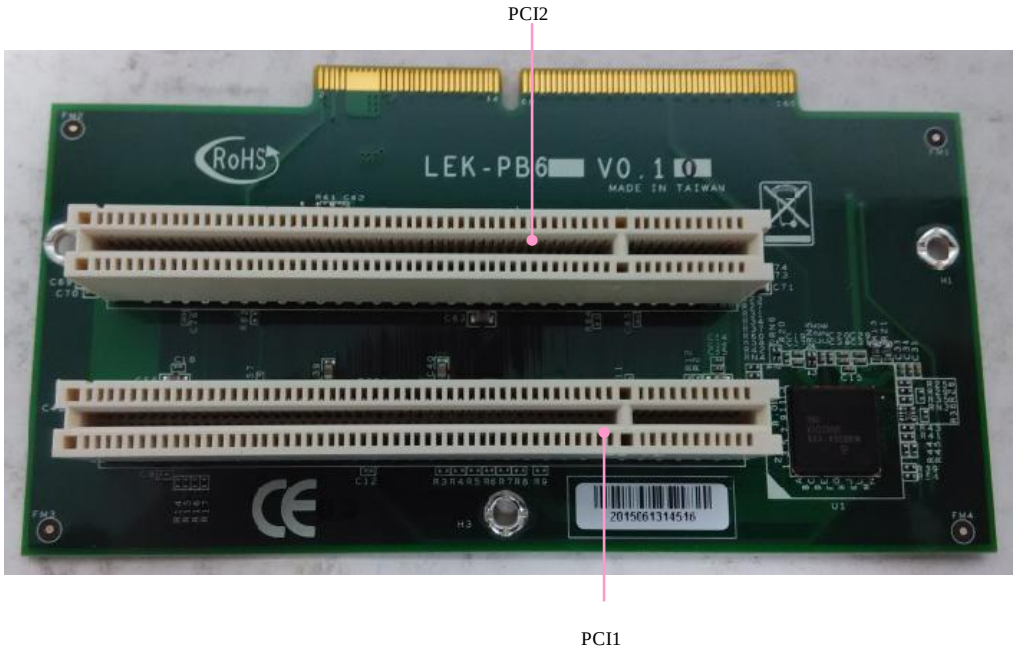


Jumpers and Connectors on the Add-on Board

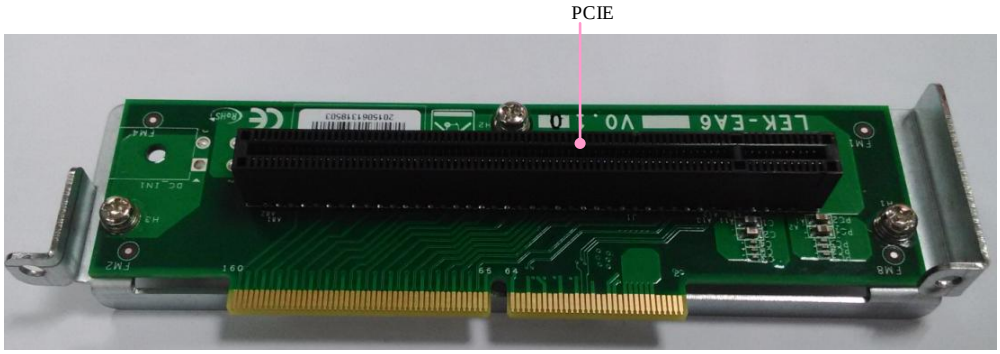
LEK-PB5



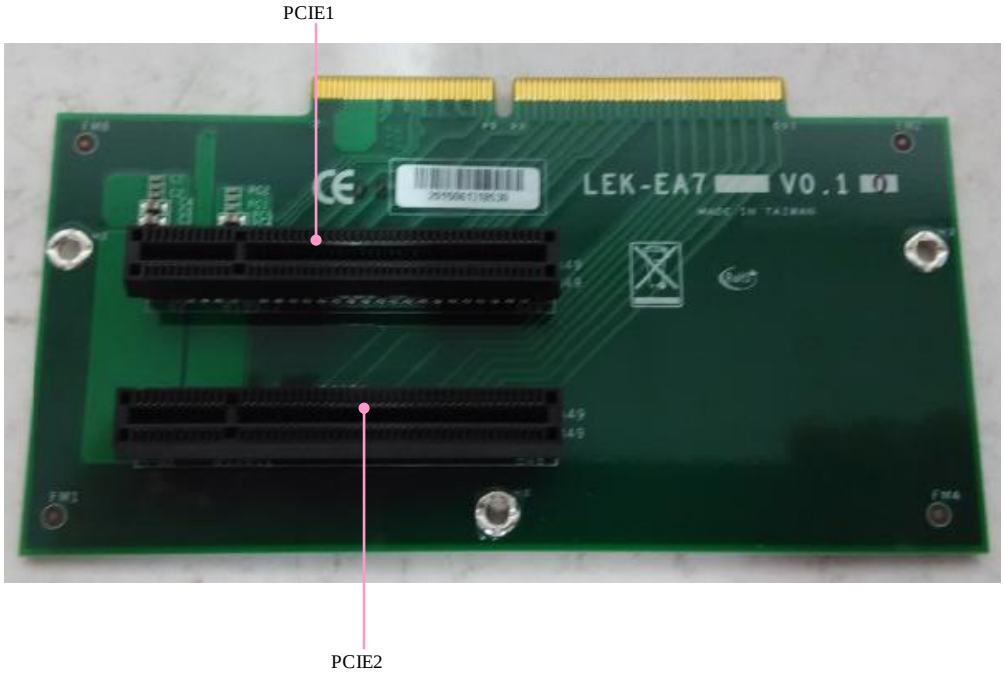
LEK-PB6



LEK-EA6



LEK-EA7

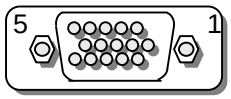


Jumpers and Connectors List

Labels	Descriptions	Remarks
VGA1	VGA display interface	
DVI1	DVI-D digital visual interface	
HDMI1	High definition multimedia interface	
LAN1/2	2 x RJ-45 LAN connectors	
USB1	USB 3.0 double stacked ports	
USB2/3	USB 2.0 double stacked ports	
JUSB1	Internal USB pin header	
MPCIE1	Mini-PCIe socket with SIM card reader	
MPCIE2	Mini-PCIe socket	
MSATA1	mSATA socket	
MIO1	Multiple I/O interface for add-on cards	
PCIEO1	PCIe multiple I/O interface for riser card	
DCIN1	2-pin DC power input 9-30V	
CMOS1	Clear CMOS jumper	
SPI1	SPI for debug use	
LPC1	Low-pin-count for debug use	
J2	PCIe configuration jumper	

Jumper Setting and Connector Pin-out

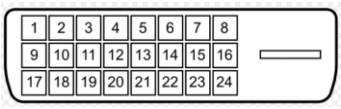
VGA Connector (VGA1): DB-15 VGA display connector



VGA1

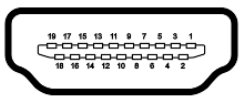
Pin No.	Description	Pin No.	Description
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	N.C	14	N.C
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD		

Digital Visual Interface Port (DVI1): a DVI-D display connector



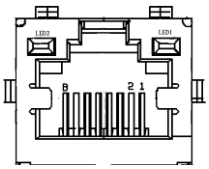
Pin No.	Description	Pin No.	Description	Pin No.	Description
1	DATA2-	9	DATA1-	17	DATA0-
2	DATA2+	10	DATA1+	18	DATA0+
3	GND	11	GND	19	GND
4	DATA4-	12	DATA3-	20	DATA5-
5	DATA4+	13	DATA3+	21	DATA5+
6	DDC_CLK	14	VCC	22	GND
7	DDC_DAT	15	GND	23	CLK+
8	N.C	16	HP_DET	24	CLK-

HDMI (High Definition Multimedia Interface) Ports (HDMI1): HDMI display port



Pin No.	Description	Pin No.	Description	Pin No.	Description
1	CRT-R	6	GND	11	N.C
2	CRT-G	7	GND	12	V_SDAT
3	CRT-B	8	GND	13	HSYNC
4	N.C	9	VCC	14	VSYNC
5	GND	10	GND	15	V_SCLK

Ethernet (LAN1/2): 2 x RJ-45 LAN connectors

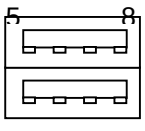


Pin No.	Description	
1	TXD+	MD0+
2	TXD-	MD0-
3	RXD+	MD1+
4	T45	MD2+
5	T45	MD2-
6	RXD-	MD1-
7	T78	MD3+
8	T78	MD3-
9	10-/100-/1000+	
10	10+/100+/1000-	
11	NC	
12	NC	
13	Active LED-（yellow）	
14	Active LED+	

USB 3.0 Connectors (USB1): USB3.0 ports in double-stacked form

PIN NO	9	8	7	6	5
DESCRIPTION	USB1_TX+	USB1_TX-	GND	USB1_RX+	USB1_RX-
PIN NO	1	2	3	4	
DESCRIPTION	USB_VCC1	USB1_D-	USB1_D+	GND	

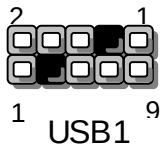
USB 2.0 Connectors (USB2/3): USB 2.0 ports in double stacked form



USBB2/3

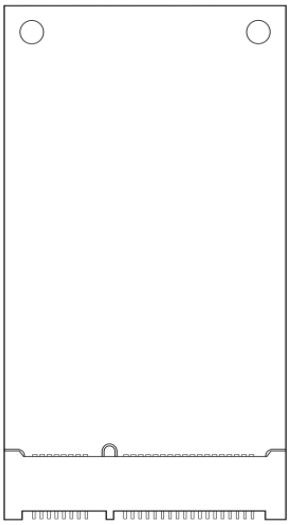
PIN NO.	DESCRIPTION
1	USB_VCC1
2	-USB
3	+USB
4	GND
0	USB_VCC2
6	-USB
7	+USB
8	GND

Internal USB Pin Header (JUSB1)



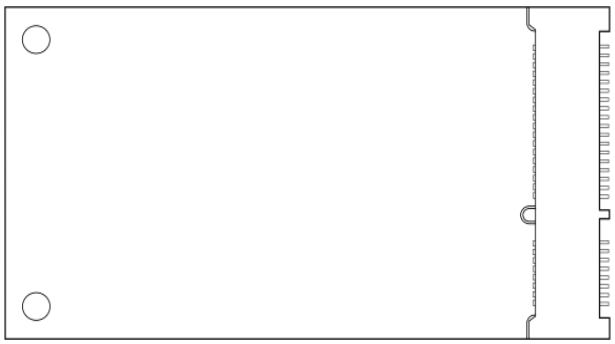
PIN NO.	DESCRIPTION	PIN NO	DESCRIPTION
1	USB_VCC	2	GND
3	KEY	4	+USB
5	-USB	6	-USB
7	+USB	8	KEY
9	GND	10	USB_VCC

Mini-PCIe Expansion (MPCIE1): mini-PCIe expansion socket with SIM Card reader



Pin NO	DESCRIPTION	Pin NO	DESCRIPTION
1	WAKE#	2	+3.3V
3	RSVD	4	GND
5	RSVD	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET
15	GND	16	UIM_VPP
KEY			
17	RSVD	18	GND
19	RSVD	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3V
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D+
37	GND	38	USB_D-
39	+3.3V	40	GND
41	+3.3V	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	RSVD	46	LED_WPAN#
47	RSVD	48	+1.5V
49	RSVD	50	GND
51	RSVD	52	+3.3V

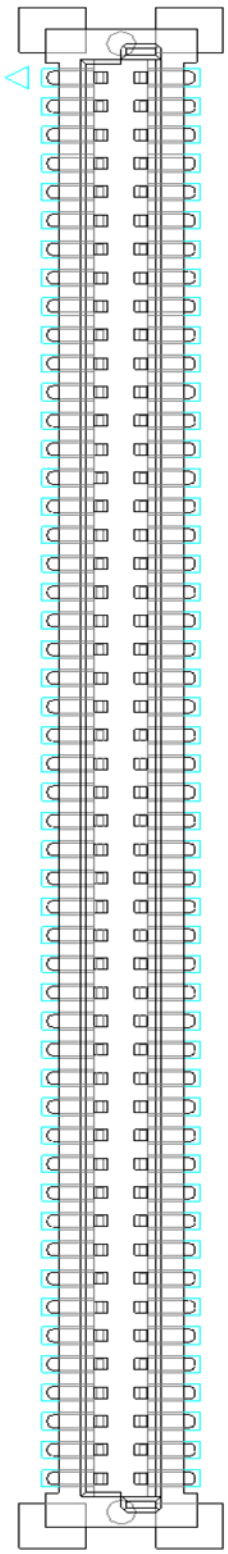
mSATA (MSATA1): mSATA socket for storage



Pin NO	DESCRIPTION	Pin NO	DESCRIPTION
1	N.C	2	+3.3V
3	N.C	4	GND
5	N.C	6	N.C
7	N.C	8	N.C
9	GND	10	N.C
11	N.C	12	N.C
13	N.C	14	N.C
15	GND	16	N.C
KEY			
17	N.C	18	GND
19	N.C	20	N.C
21	GND	22	N.C
23	SATA_RXp	24	+3.3V
25	SATA_RXn	26	GND
27	GND	28	N.C
29	GND	30	N.C
31	SATA_TXn	32	N.C
33	SATA_TXp	34	GND
35	GND	36	N.C
37	GND	38	N.C
39	+3.3V	40	GND
41	+3.3V	42	N.C
43	GND	44	N.C
45	N.C	46	N.C
47	N.C	48	N.C
49	N.C	50	GND
51	N.C	52	+3.3V

Multiple I/O Interface (MIO1): MIO connector for connecting add-on card

Pin NO	PiN Description
1	GND
2	SATA_TXN
3	SATA_TXP
4	GND
5	SATA_RXN
6	STAT_RXP
7	GND
8	VCC3
9	VCC3
10	VCC3
11	GND
12	PCIE_RXN1
13	PCIE_RXP1
14	PCIE_TXN1
15	PCIE_TXP1
16	PCIE_CKN1
17	PCIE_CKP1
18	NC
19	PLTRST#
20	WAKE_N
21	DC_IN
22	VCC12
23	VCC5SB
24	VCC5SB
25	VCC5
26	VCC5
27	VCC5
28	GND
29	DO_0
30	DO_1
31	DO_2
32	DO_3
33	GND
34	COM3_DCD#

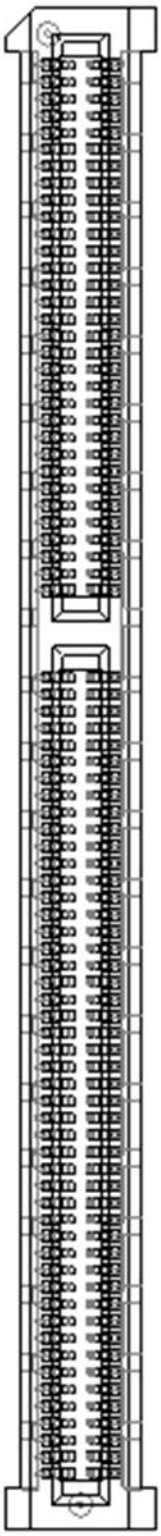


Pin NO	PiN Description
51	HDA_BCLK
52	HDA_SYNC
53	HDA_RST#
54	HDA_SDIN
55	HDA_SOUT
56	HDA_SPK
57	VCC3SB
58	VCC3SB
59	VCC3SB
60	VCC3SB
61	VCC3SB
62	PCIE_RXN2
63	PCIE_RXP2
64	PCIE_TXN2
65	PCIE_TXP2
66	PCIE_CKN2
67	PCIE_CKP2
68	NC
69	SMB_CLK
70	SMB_DAT
71	NC
72	NC
73	USB_N1
74	USB_P1
75	GND
76	USB_N2
77	USB_P2
78	GND
79	DI_0
80	DI_1
81	DI_2
82	DI_3
83	GND
84	COM1_DCD#

35	COM3_RI#	85	COM1_RI#
36	COM3_CTS#	86	COM1_CTS#
37	COM3_DTR#	87	COM1_DTR#
38	COM3_RTS#	88	COM1_RTS#
39	COM3_DSR#	89	COM1_DSR#
40	COM3_SOUT	90	COM1_SOUT
41	COM3_SIN	91	COM1_SIN
42	GND	92	GND
43	COM4_DCD#	93	COM2_DCD#
44	COM4_RI#	94	COM2_RI#
45	COM4_CTS#	95	COM2_CTS#
46	COM4_DTR#	96	COM2_DTR#
47	COM4_RTS#	97	COM2_RTS#
48	COM4_DSR#	98	COM2_DSR#
49	COM4_SOUT	99	COM2_SOUT
50	COM4_SIN	100	COM2_SIN

PCIe Expansion Socket (PCIEO1): PCIe interface connector for riser card

Pin NO	Description
1	VCC3SB
3	VCC3SB
5	NC
7	VCC3P3
9	VCC3P3
11	VCC3P3
13	VCC3P3
15	VCC3P3
17	VCC3P3
19	NC
21	GND
23	NC
25	+12
27	+12
29	+12
31	+12
33	NC
35	PLTRST#
37	PCIE_WAKE#
39	GND
41	PCIE_RXN2
43	PCIE_RXP2
45	GND
47	PCIE_RXP1
49	PCIE_RXN1
51	GND
53	PCIE_CKP1
55	PCIE_CKN1
57	GND
59	PEGA_CLKN
61	PEGA_CLKP
63	GND
KEY	
65	GND
67	PEG_RXN15
69	PEG_RXP15
71	GND
73	PEG_RXN14
75	PEG_RXP14
77	GND
79	PEG_RXN13
81	PEG_RXP13
83	GND
85	PEG_RXN12
87	PEG_RXP12



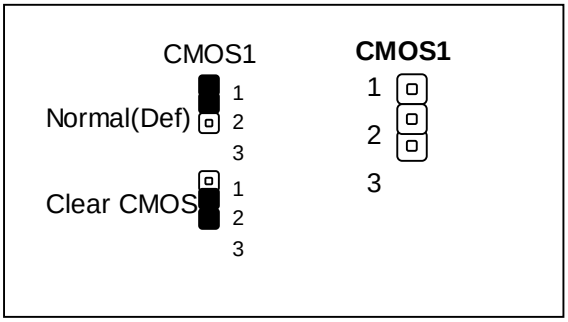
Pin NO	Description
2	VCC5SB
4	VCC5SB
6	NC
8	V1P5
10	NC
12	VCC5
14	VCC5
16	VCC5
18	VCC5
20	VCC5
22	VCC5
24	NC
26	GND
28	GND
30	CLKRQ1
32	CLKRQ2
34	GND
36	SMB_CLK
38	SMB_DAT
40	GND
42	PCIE_CKN2
44	PCIE_CKP2
46	GND
48	PCIE_TXN2
50	PCIE_TXP2
52	GND
54	PCIE_TXN1
56	PCIE_TXP1
58	GND
60	PEGB_CLKN
62	PEGB_CLKP
64	GND
KEY	
66	GND
68	PEG_TXN15
70	PEG_TXP15
72	GND
74	PEG_TXN14
76	PEG_TXP14
78	GND
80	PEG_TXN13
82	PEG_TXP13
84	GND
86	PEG_TXN12
88	PEG_TXP12

89	GND	90	GND
91	PEG_RXN11	92	PEG_TXN11
93	PEG_RXP11	94	PEG_TXP11
95	GND	96	GND
97	PEG_RXN10	98	PEG_TXN10
99	PEG_RXP10	100	PEG_TXP10
101	GND	102	GND
103	PEG_RXN9	104	PEG_TXN9
105	PEG_RXP9	106	PEG_TXP9
107	GND	108	GND
109	PEG_RXN8	110	PEG_TXN8
111	PEG_RXP8	112	PEG_TXP8
113	GND	114	GND
115	PEG_RXN7	116	PEG_TXN7
117	PEG_RXP7	118	PEG_TXP7
119	GND	120	GND
121	PEG_RXN6	122	PEG_TXN6
123	PEG_RXP6	124	PEG_TXP6
125	GND	126	GND
127	PEG_RXN5	128	PEG_TXN5
129	PEG_RXP5	130	PEG_TXP5
131	GND	132	GND
133	PEG_RXN4	134	PEG_TXN4
135	PEG_RXP4	136	PEG_TXP4
137	GND	138	GND
139	PEG_RXN3	140	PEG_TXN3
141	PEG_RXP3	142	PEG_TXP3
143	GND	144	GND
145	PEG_RXN2	146	PEG_TXN2
147	PEG_RXP2	148	PEG_TXP2
149	GND	150	GND
151	PEG_RXN1	152	PEG_TXN1
153	PEG_RXP1	154	PEG_TXP1
155	GND	156	GND
157	PEG_RXN0	158	PEG_TXN0
159	PEG_RXP0	160	PEG_TXP0

DC Power input (DCIN1): 2-pin Phoenix connector for power input (9 to 30V)

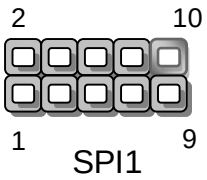
PIN NO.	DESCRIPTION
1	DC_IN (GND)
2	DC_IN (9~30V)

CMOS1:Clear CMOS jumper



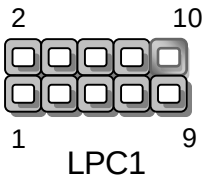
Description	Short pin
Normal (Default)	1-2
Clear CMOS	2-3

SPI Interface(SPI1): SPI pin header for debug use



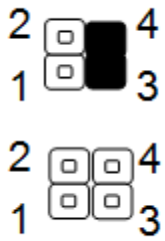
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	SPI_HOLD	2	N.C
3	SPI_CS#	4	SPI_VCC
5	SPI_MO	6	N.C
7	N.C	8	SPI_CLK
9	GND	10	SPI_MI

LPC Interface (LPC1):LPC (low-pin-count) for debug use only



PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LPC_CLK	2	LAD1
3	PLTRST	4	LAD0
5	LFRAME#	6	3.3V
7	LAD3	8	GND
9	LAD2	10	GND

PCI Express configuration (J2): this jumper allows switching between PCIe x8 and PCIe x16.



Pin 1-2	Pin 3-4	Description	Default	Supported Riser Card
Short	Short	1 x8, 2 x4 PCIe		None
Open	Short	2 x8 PCIe	LEC-2284	LEK-PB5/LEK-PB6/LEK-EA7
Short	Open	Reserved		None
Open	Open	1 x16 PCIe	LEC-2281	LEK-EA6

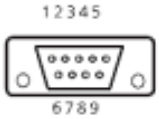
Open: w/o Jumper

Short: w/ Jumper cap

PCIe jumper configuration for compatible expansion cards:

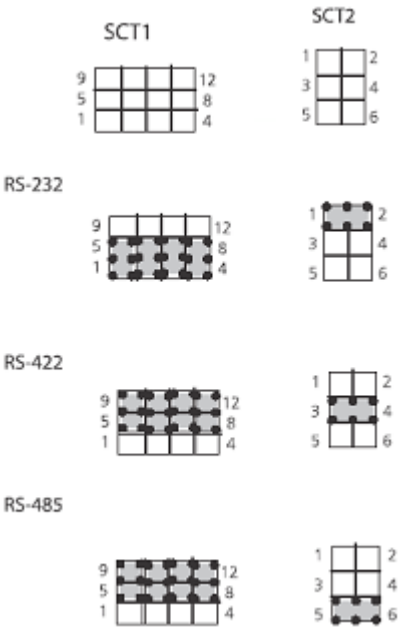
- LEK-PB5:1x PCI for LEC-2281
- LEK-PB6:2x PCI for LEC-2284
- LEK-EA6:1x PCIe x16 for LEC-2281
- LEK-EA7:2x PCIe X8 for LEC-2284

Serial Ports (COM1-2): 2 x D-sub9 RS-232/422/485 serial ports



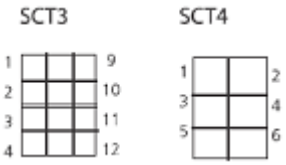
PIN NO.	DESCRIPTION		
	RS-232	RS-422	RS-485
1	DCD	TXD-	DATA-
2	RXD	TXD+	DATA+
3	TXD	RXD+	
4	DTR	RXD-	
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI		

COM Protocol Setting (SCT1/SCT2): jumpers select for COM1 protocol setting. The diagram is for instruction purpose about the pins to short.



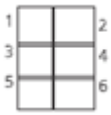
Switch / Protocol	SCT1	SCT2
RS-232 (Default)	1-5 2-6 3-7 4-8	1-2
RS-422	5-9 6-10 7-11 8-12	3-4
RS-485	5-9 6-10 7-11 8-12	5-6

COM Protocol Setting (SCT3/SCT4): jumpers select for COM2 protocol setting. The diagram is for instruction purpose about the pins to short.



Switch / Protocol	SCT1	SCT2
RS-232 (Default)	1-5 2-6 3-7 4-8	1-2
RS-422	5-9 6-10 7-11 8-12	3-4
RS-485	5-9 6-10 7-11 8-12	5-6

COM1-2 Pin9 Setting (JP1/JP2): the JP1/2 jumper setting is designed to configure the Pin9 (Ring Indicator) functionality for COM1/COM2.



JP1		JP2	
Pin	Signal	Pin	Signal
1-2	VCC5	1-2	VCC5
3-4	VCC12	3-4	VCC12
5-6	SPI_RI	5-6	SPI_RI

Chapter 4: Hardware Setup

Preparing the Hardware Installation

To access some components and perform certain service procedures, you must perform the following procedures first.

WARNING:

- To reduce the risk of personal injury, electric shock, or damage to the equipment, please remove all power sources.
- Please wear ESD protected gloves before conducting the following steps.
- Do NOT pile items on the system.

Accessing the Inside of the System

1. Power off the system and remove the power cord.
2. Remove the 4 rubber pads of the bottom compartment, as shown in the image below.

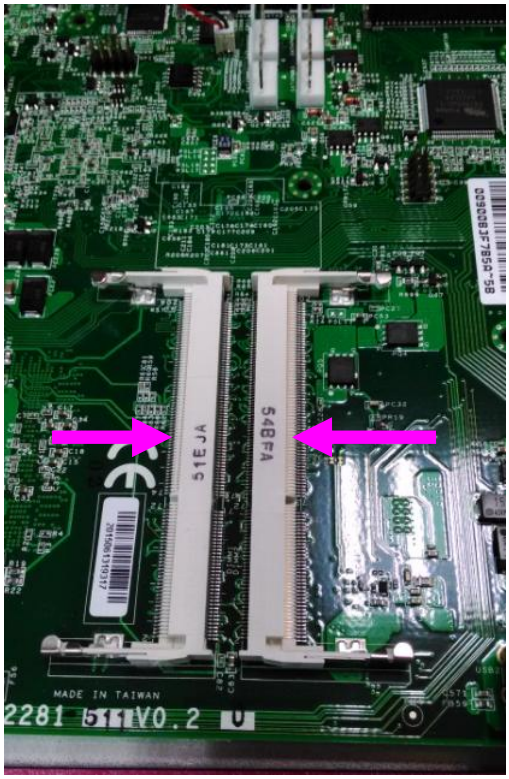
Notes: the image is for reference ONLY.

3. Lift the top compartment to access the motherboard

Installing the System Memory

The motherboard supports DDR3L memory that features data transfer rates of 1333/1600 MHz to meet the bandwidth requirements of current operating system and Internet applications. It comes with two DDR3L Small Outline Dual In-line Memory Module (SO-DIMM) socket.

1. Align the memory module's key with the SO-DIMM socket's key.
2. Insert the SO-DIMM.



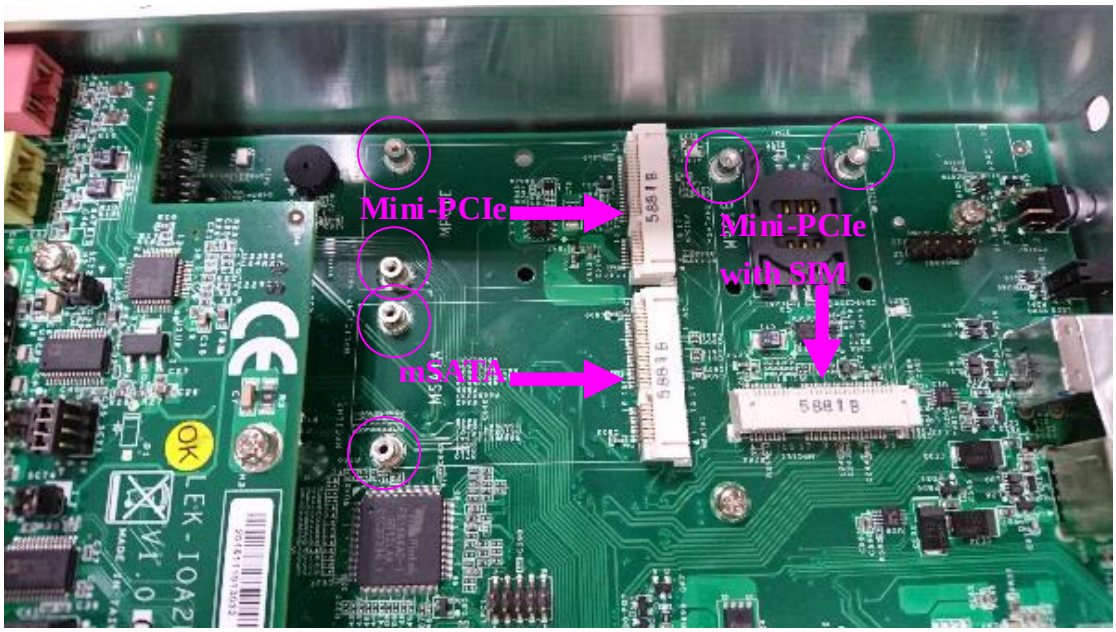
Note:

1. SO-DIMMs installed should meet the required speed which is 1333/1600 MHz. Do not install SODIMM supporting different frequencies.
2. Each SO-DIMM socket on this motherboard supports up to 8GB.

Installing a mSATA or Mini-PCIe module

The system provides a mSATA socket and two mini-PCIe slots for expansions. Please follow the steps below for installations.

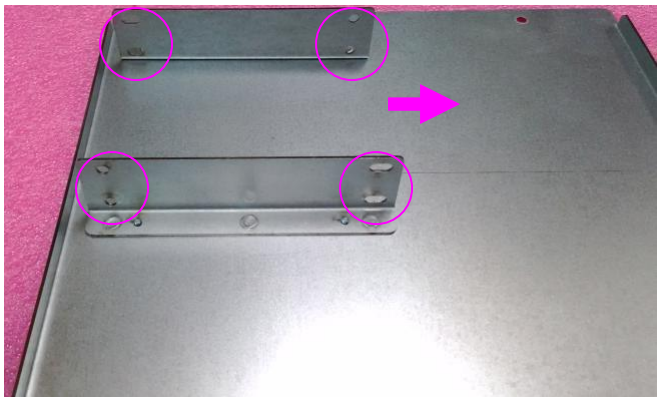
1. Locate the mSATA or the mini-PCIe socket.
2. Align the mechanical notches between the module and the socket.
3. Insert the module into the socket.
4. Secure the installed module with two screws.



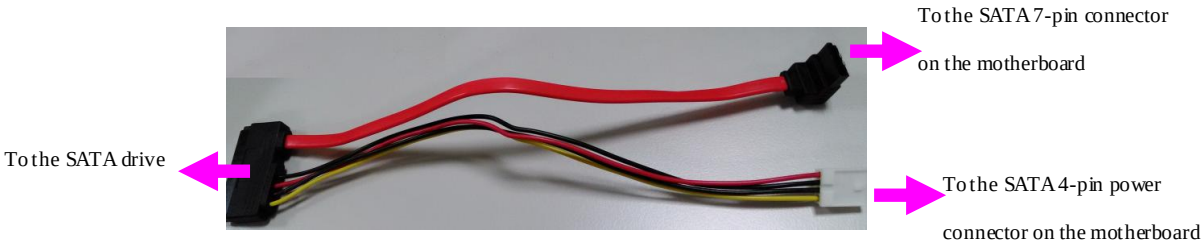
Installing a Disk Drive for LEC-2281

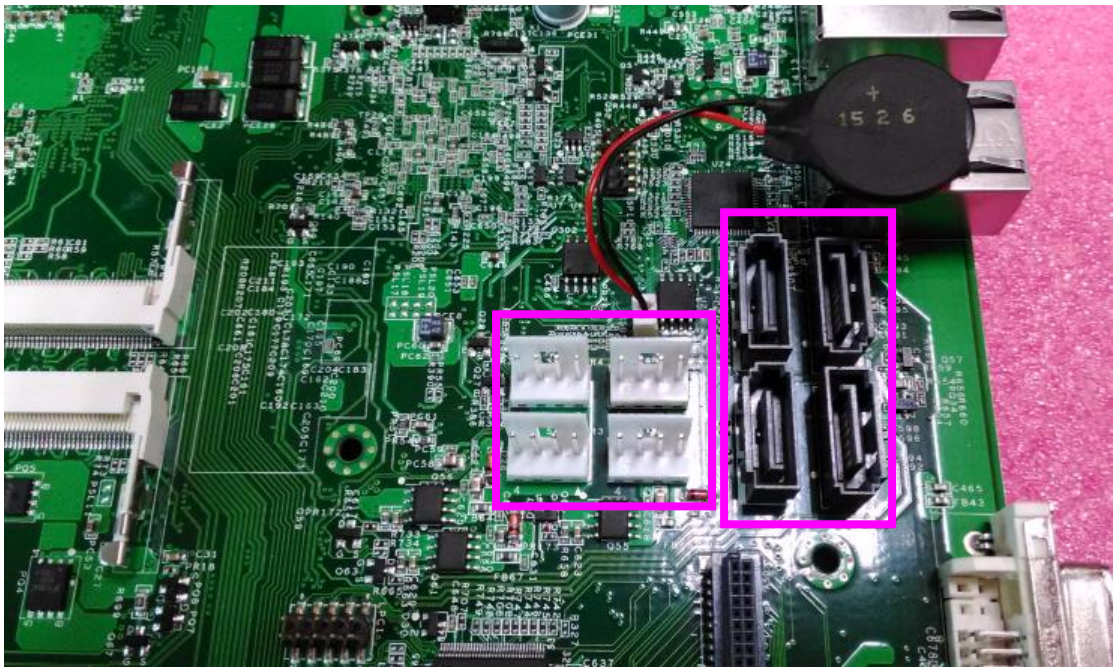
The system can accommodate two 2.5” SATA disk drives. Please follow the steps below.

1. Locate the SATA drive tray on the inner side of the bottom compartment. **You have to remove the 4 rubber pads on the bottom of the system.**
2. Apply 4 screws for each disk drive. There are 8 screw holes in total. When placing a SATA disk drive, make sure the SATA connector face the direction as shown in the arrow of direction below.



3. Prepare the supplied SATA cable.





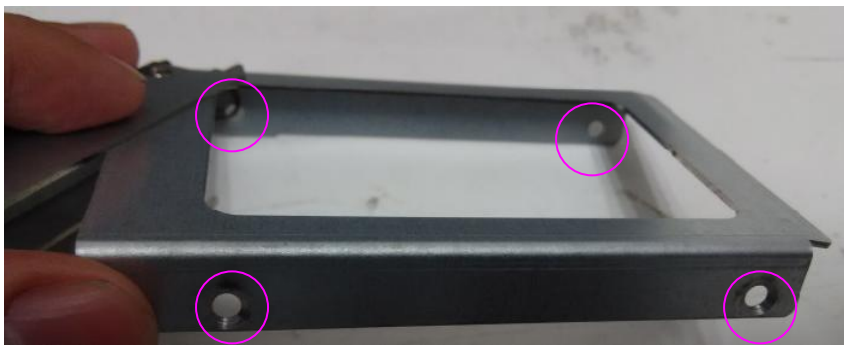
Installing a Disk Drive for LEC-2284

The system provides two 2.5” SATA disk drives that are externally accessible. Please follow the steps below for disk installation.

1. Unscrew the captive screw at the door of the drive bay.

2. Hold onto the captive screw and gently pull it outwards.

3. When the tray is removed from the drive bay, install a SATA 2.5” HDD/SSD into the tray and apply 4 screws to fix it.



Connecting Power

Connect the system to a compliant DC power source. The power source comes from the AC/DC Adapter through a Phoenix contact. This power socket is purposely designed to guard against fault in power contact so that the reverse of the electrical polarity will not damage the system.

Appendix1: Programming Watchdog Timer

A watchdog timer is a piece of hardware that can be used to automatically detect system anomalies and reset the processor in case there are any problems. Generally speaking, a watchdog timer is based on a counter that counts down from an initial value to zero. The software selects the counter's initial value and periodically restarts it. Should the counter reach zero before the software restarts it, the software is presumed to be malfunctioning and the processor's reset signal is asserted. Thus, the processor will be restarted as if a human operator had cycled the power.

For sample watchdog code, see *WD* folder under Driver and Utility on the *Driver and Manual CD.*