Lanner

LEC-2580 Series

Embedded Computing Platform

User Manual

Rev 1.0   Date: August 22nd, 2016

Embedded Computing Platform

Revision History

Revision	Date	Description
0.1	August 3, 2016	Preliminary
1.0	August 22, 2016	Official release

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

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Microsoft Windows and MS-DOS are registered trademarks of Microsoft Corp.

All other product names or trademarks are properties of their respective owners.

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.

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).
- 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.

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

• 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.

Vis

Appareil

Câble de mise à la terre

Point de mise à la terre

À la terre
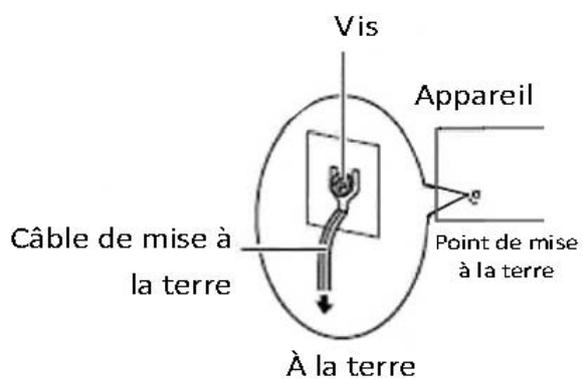
Embedded Computing Platform

Table of Contents

Chapter 1: Introduction

Thank you for choosing LEC-2580. This industrial embedded system is empowered by Intel® Core™ i7-6600U, Core™ i5-6300U and Core™ i3-6100U SoC processors (codenamed Skylake-U). The I/O features include four RS-232/422/485 serial ports, four USB 3.0, two USB 2.0 ports and two HDMI ports. For networking communications, the LEC-2580 offers six 10/100/1000 Mbps Ethernet ports while the LEC-2580P, a variant of the LEC-2580, comes with two 10/100/1000 Mbps Ethernet ports and four PoE ports for even greater flexibility.

Product Features:

- Intel® Core™ i7-6600U/i5-6300U/i3-6100U SoC
- 2 x DDR3L 1333/1600MHz SO-DIMM sockets supporting up to 16GB
- Intel® HD Graphics
- 2x HDMI display output ports
- 6x RJ45 (LEC-2580) or 2x RJ45 & 4x PoE (LEC-2580P)
- 4x USB 3.0 and 2x USB 2.0
- 2x 2.5" HDD/SSD with RAID 0/1
- 4x Serial Ports with RS-232/422/485 signals
- 0°C ~ 60°C Wide Operating Temperature Range
- 2 x mini-PCIe sockets (1 x full-size and 1 x half-size) with PCIe and USB signals
- 1 x mSATA socket for internal storage

Please refer to the following table for detailed specifications

Specifications

Processor	Onboard Intel Skylake-U SoC processor options:
	Intel® Core™ i7-6600U (15W)
	Intel® Core™ i5-6300U (15W)
	Intel® Core™ i3-6100U (15W)
Memory	2x DDR3L 1333/1600MHz SO-DIMM sockets supporting up to 16GB
BIOS	AMI SPI Flash BIOS
Serial	4 x D-Sub9 COM ports with RS-232/422/485 signals
USB	4 x USB 3.0 Type-A ports in dual double-stacked form
	2 x USB 2.0 Type-A ports in double-stacked form
Display	Intel Integrated HD Graphic Engine
	2 x HDMI ports

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|		
Storage		1x mSATA mini socket 1 x dual 2.5" SATA HDD/SSD drive bay
Expansion		1x standard mini-PCI express socket(full size), with SIM card reader 1x half-sized mini-PCI express socket 1x mSATA mini socket
Antenna		2 x SMA antenna holes (sealed by default)
Networking	Ethernet Controller	1x Intel i219 5x Intel i210
	Ethernet Ports	6 x RJ-45 10/100/1000Mbps ports
	PoE	4 x RJ-45 LAN ports with PoE function (available in LEC-2580P only)
LEDs		2 x LED for Power-on status(Green) and Storage access status(Yellow) 2 x LED for 3G & WiFi communication access
Physical Characteristics	Dimensions	164.5 x 143.0 x 30.0, unit: mm
	Mounting	Wall mount, VESA mount
Power	Input	1x 2pin terminal block, support DC +12~+30Vdc input
	Adapter	24V/2.5A, 60W without PoE 24V/5A, 120W with PoE
Reliability Tool	Automatic Reboot Setting	Lanner Watchdog Timer 1~255 level per second or minute
Environment	Operating Temperature	0°C~+60°C
	Non-operating Temperature	-20~70℃
	Humidity	5 to 95% (non-condensing)
	Green	RoHS
Operating System Supported		WES 7 E/P, Win 7 Pro FES, WE 8.1 Industry Pro, Win10 IOT
Standards & Regulations	EMC	CE, FCC Class A

Ordering Information

| LEC-2580-711A	Embedded industrial PC with Intel i7-6600U
LEC-2580-511A	Embedded industrial PC with Intel i5-6300U
LEC-2580-311A	Embedded industrial PC with Intel i3-6100U
LEC-2580P-711A	Embedded industrial PC with Intel i7-6600U w/ 4-ports PoE
LEC-2580P-511A	Embedded industrial PC with Intel i5-6300U w/ 4-ports PoE
LEC-2580P-311A	Embedded industrial PC with Intel i3-6100U w/ 4-ports PoE

# Chapter 2: System Overview

Mechanical Drawing
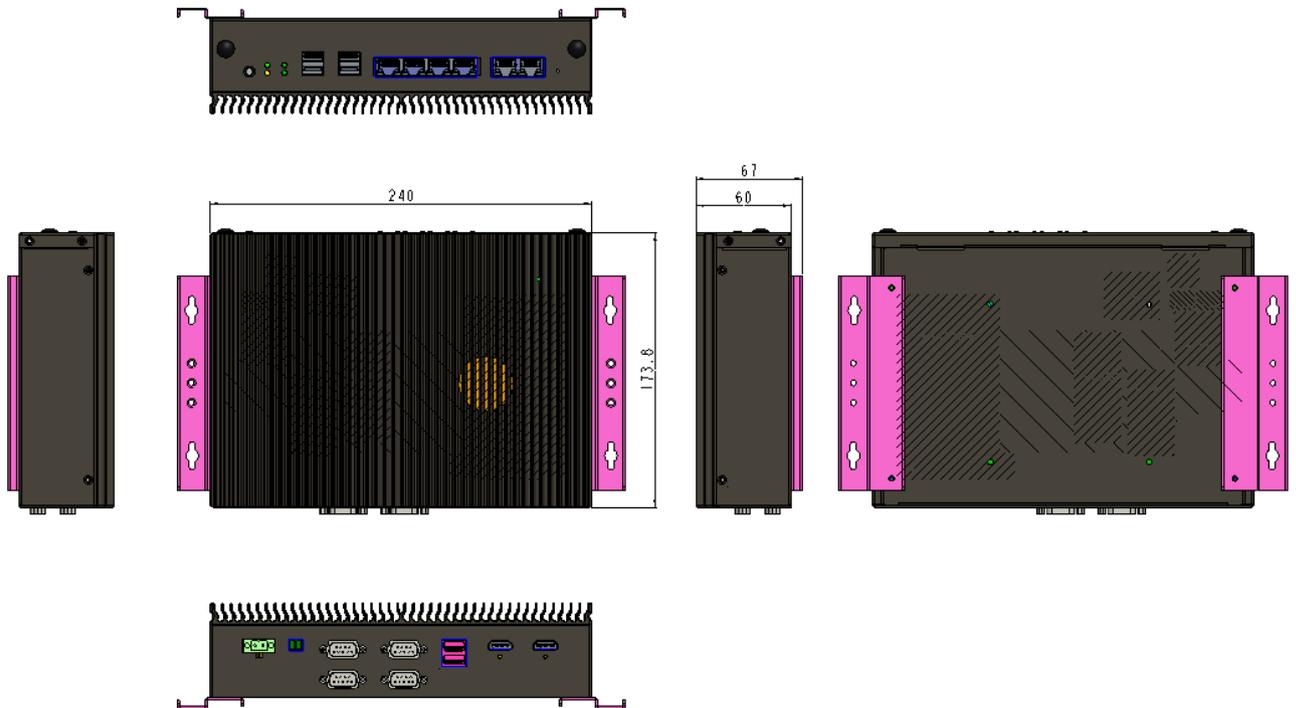
Unit: mm
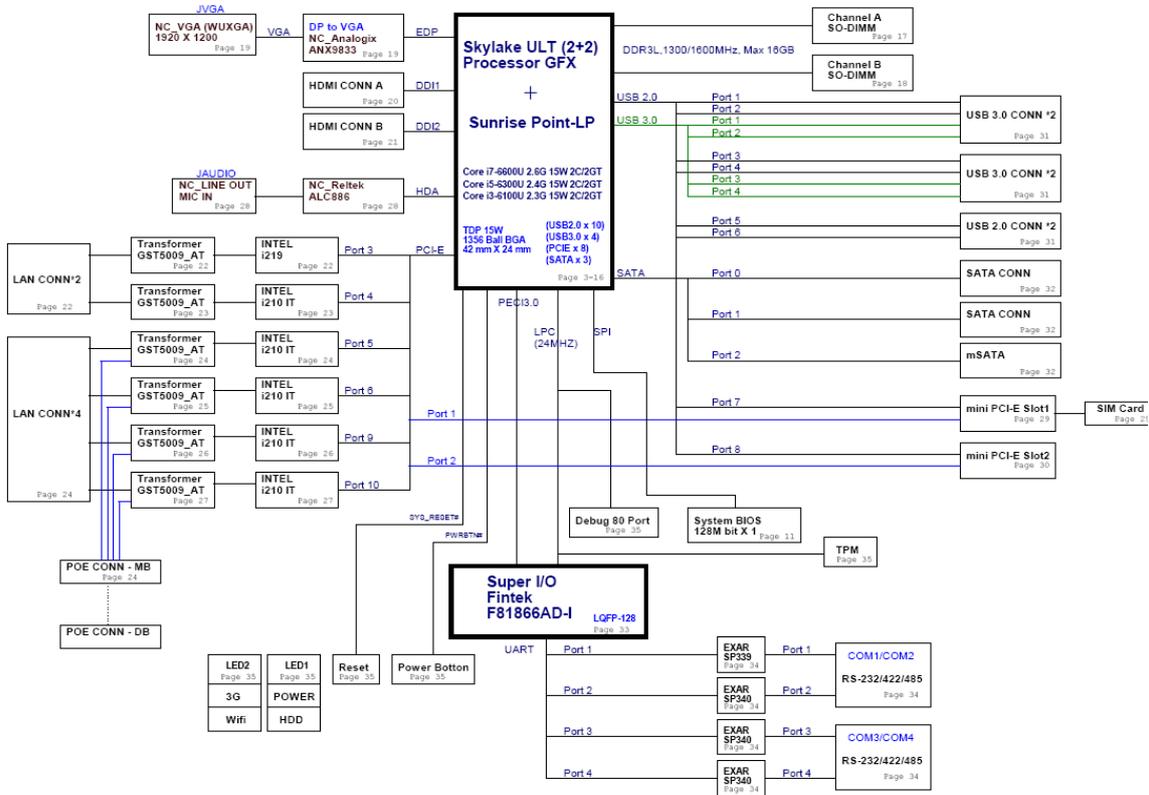
Block Diagram

Front I/Os
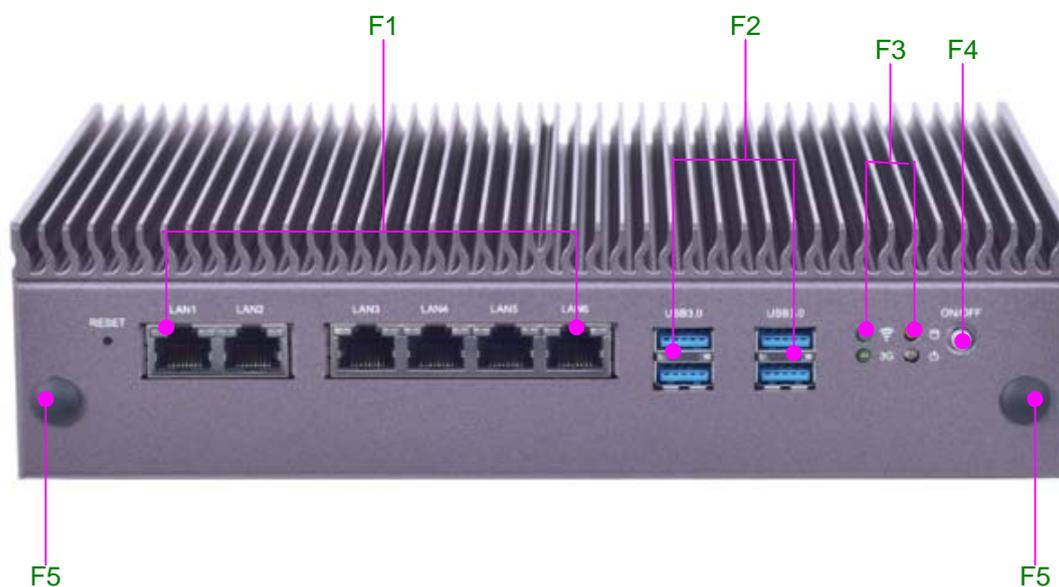
| F1 LAN	6 x 10/100/1000 mbps RJ-45 LAN ports
F2 USB 3.0	4 x USB3.0 Type-A ports in dual double-stacked form
F3 LED	2 x LED for Power-on status(Green) and Storage access status(Yellow) 2 x LED for 3G & WiFi communication access
F4 Reset	1 x Reset button
F5 Antenna	2 x SMA antenna holes (sealed by default)

Rear I/Os
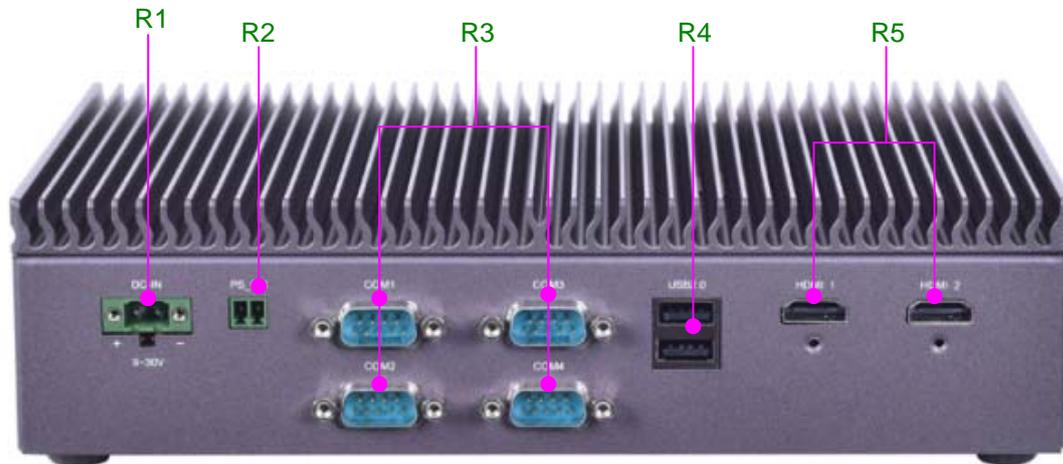
| R1 Power Input	1 x2-pin terminal block, support DC +12~+30Vdc input
R2 Remote Power On/Off	1x 2pin terminal block for remote power on/off
R3 COM	4 x D-sub COM ports with RS-232/422/485 signals
R4 USB	2 x USB 2.0 Type-A ports in double-stacked form
R5 HDMI	2 x HDMI ports

Chapter 3: Board Layout

## Jumpers & Connectors Locations on the Motherboard
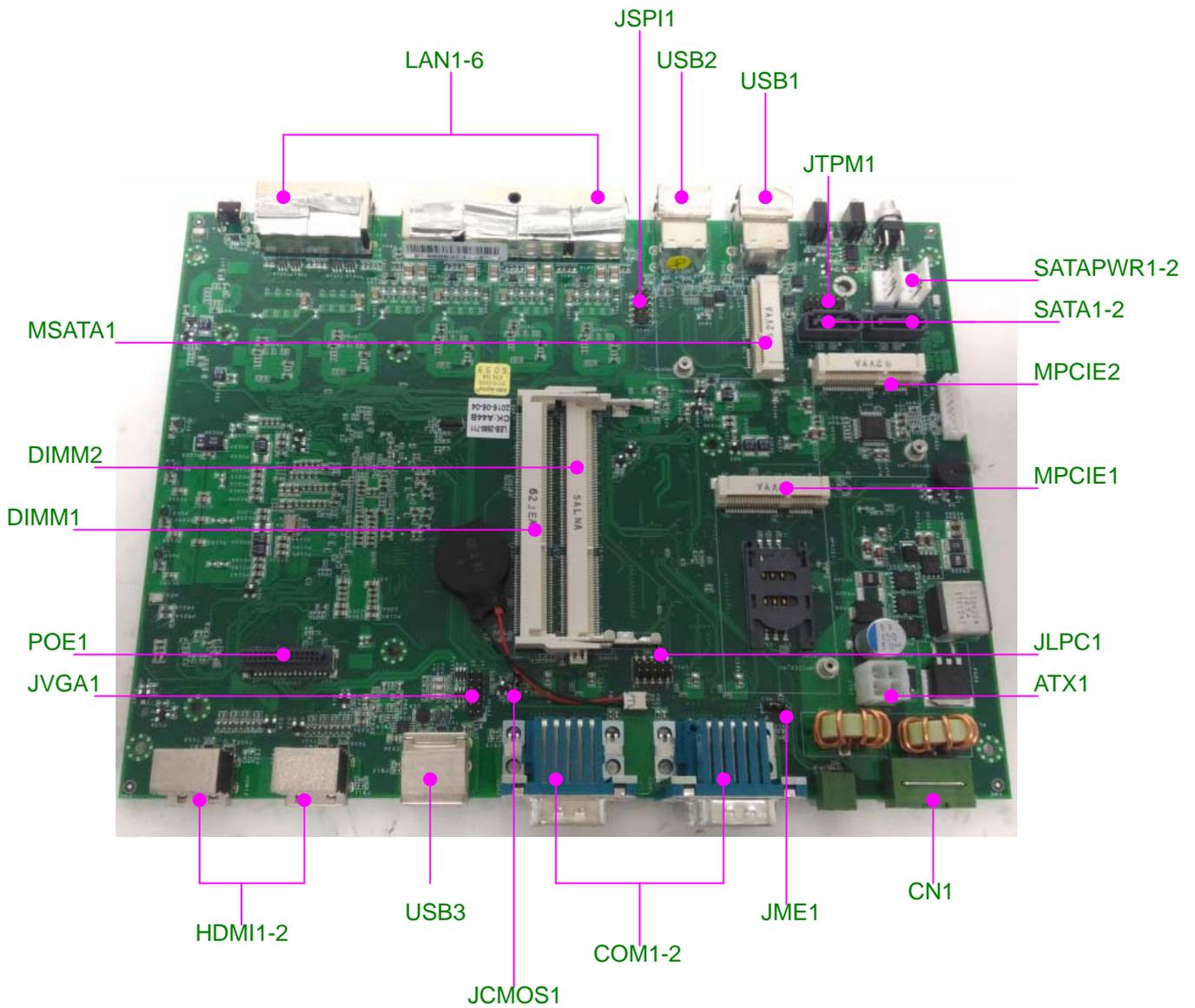
Jumper Settings & Connector Pinout (Motherboard)

HDMI1: High-Definition Multimedia Interface connector
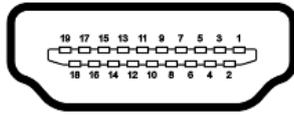
Pin No.	Description	Pin No.	Description
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	N.C	14	N.C
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD		

HDMI2: High-Definition Multimedia Interface connector
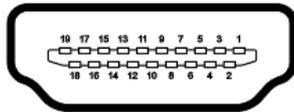
Pin No.	Description	Pin No.	Description
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	N.C	14	N.C
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD		

LAN1-6: LAN Connectors (RJ-45 connectors with LED) at 10/100/1000Mbps for Ethernet connectivity
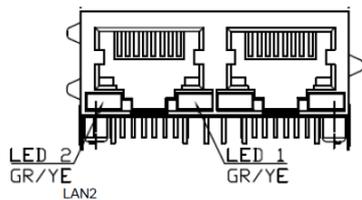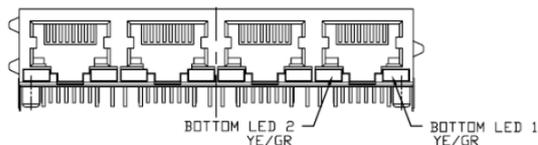
Pin No.	Description	
1	TXD+	MD0+
2	TXD-	MD0-
3	RX+	MD1+
4	T45	MD2+
5	T45	MD2-
6	RX-	MD1-
7	T78	MD3+
8	T78	MD3-
9	10-/100-/1000+	
10	10+/100+/1000-	
11	Active LED+	
12	Active LED-（yellow）	

USB1-2: 4 x USB3.0 Type-A Connectors in dual double-stacked form
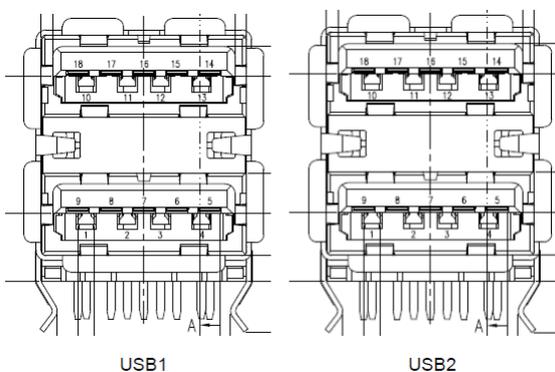
Pin No.	Description	Pin No.	Description
1	USB_VCC1	2	USB1_D-
3	USB1_D+	4	GND
5	USB1_RX-	6	USB1_RX+
7	GND	8	USB1_TX-
9	USB1_TX+	10	USB_VCC1
11	USB1_D-	12	USB1_D+
13	GND	14	USB1_RX-
15	USB1_RX+	16	GND
17	USB1_TX-	18	USB1_TX+

USB3: USB2.0 Type-A Connectors in double-stacked form
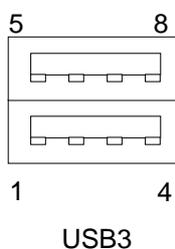
USB3

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

COM1/COM2: 4 x DB-9 COM ports with RS-232/422/485 signals (COM1-4 on the panel)

COM1   COM2
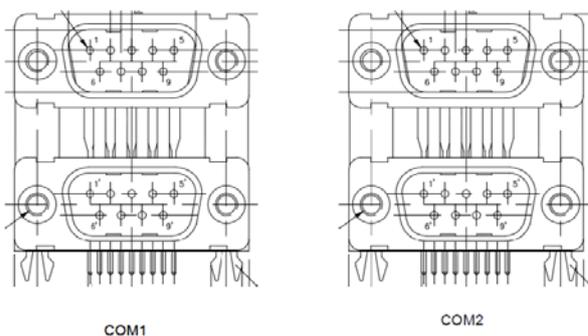
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Pin	Signal	Pin	Signal
1	Data Carrier Detect (DCDA#)	6	Data Set Ready (DSRA#)
2	Receive Data (RXDA)	7	Request To Send (RTSA#)
3	Transmit Data (TXDA)	8	Clear To Send (CTSA#)
4	Data Terminal Ready (DTRA#)	9	Ring Indicator (RIA#)
5	GND		

Pin Assignments for RS-232/422/485

| Pin	RS-232	RS-422	RS-485
1	DCD	TX-	RTX-
2	RXD	TX+	RTX+
3	TXD	RX+	
4	DTR	RX-	
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI		

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MPCIE1: mini-PCIe slot with USB signals and SIM card reader (Full Size) for wireless module

Pin	Description	Pin	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

MPCIE1

MPCIE2: half-sized mini-PCIe slot with PCIe and USB signals for wireless modules

Pin	Description	Pin	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

MPCIE2

MSATA1: mSATA mini slot for storage device (half-sized form)

Pin	Description	Pin	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
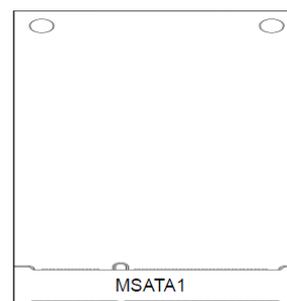
DCIN1: DC Power input through 2-pin 5.0mm Phoenix connector
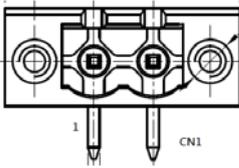
PIN	DESCRIPTION
1	DC_IN (-)
2	DC_IN (12-30V)

JCMOS1: Clear CMOS setting

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

CMOS1

CMOS1

Normal(Def) 1 2 3

Clear CMOS 1 2 3

CMOS1
1
2
3
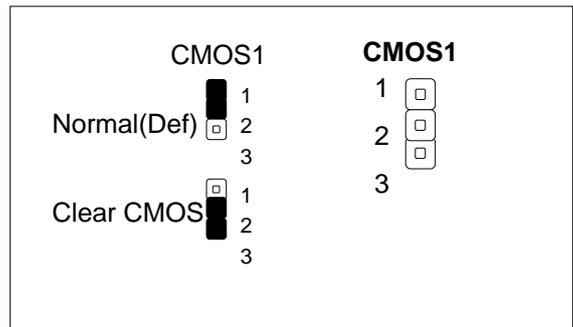
JME1: flash ME (Manageability Engine)

Short Pins	Description
1-2	Normal (Default)
2-3	Flash ME

ME1

ME1

Normal(Def) 1 2 3

Flash ME 1 2 3

ME1
1
2
3
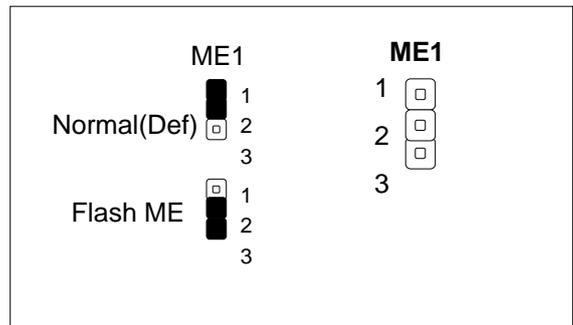
SPI1: SPIROM pin header for debug purpose

2   10

1   9

SPI1
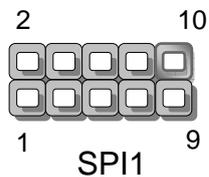
PIN	DESCRIPTION	PIN	DESCRIPTION
1	SPI_HOLD	2	N.C
3	SPI_CS#	4	SPI_VCC
5	SPI_MO	6	N.C
7	N.C	8	SPI_CLK
9	GND	10	SPI_MI

Chapter 4: Hardware Setup

Accessing the Inside of LEC-2580

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 top of the system to prevent damages due to this improper use. Lanner is not liable for damages caused by improper use of the product.

1. Power off LEC-2580 and remove the power cord.

2. Rotate and remove the four rubber pads at the bottom compartment.

2. Lift and open the chassis.

Installing SO-DIMM Memory

The system is designed with two SO-DIMM sockets supporting up to 16GB DDR3L 1333/1600MHz. Please follow the steps below for proper installations.

1. Locate the SO-DIMM sockets on the motherboard.

2. Select the socket for installing the module. Align the memory module's key with the SO-DIMM socket's key.

3. Insert the SO-DIMM module.

4. Press the module down until it is locked by the two clips at each side.

Installing mSATA and Mini-PCIe Module

The system provides one mSATA mini socket and two mini-PCIe sockets (one full-sized and another half-sized) for storage and wireless modules. Please follow the steps below for installations.

1. Locate the mSATA and the mini-PCIe sockets.

2. Select the socket for installing the module. 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.
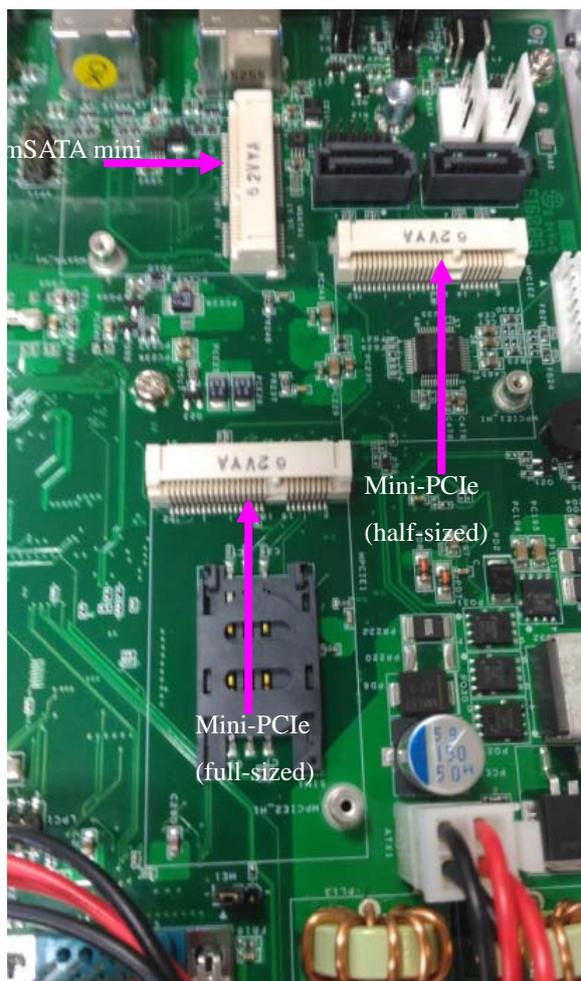
Installing Disk Drives

The system supports 1 x dual 2.5" SATA HDD/SSD drive bay as data storage (SSD is recommended due to heat and vibration concerns). Please follow the steps below for installation.

1. Locate the dual 2.5" SATA HDD/SSD drive bay at the back of the bottom compartment.

2. Place disk drives onto the drive bay and apply two screws on each side of a SATA disk drive.
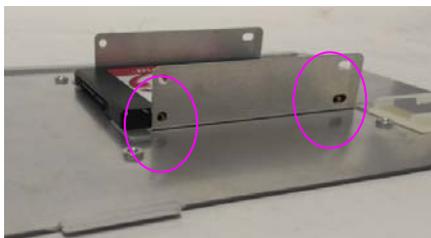
3. Connect the SATA 7-pin signal cable and the SATA 4-pin power cable to their corresponding connectors on the motherboard.

4. Plug the standard 7+15 SATA connector to the SSD.

Appendix 1: 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.

To download sample watchdog code, please refer to our official website at www.lannerinc.com.