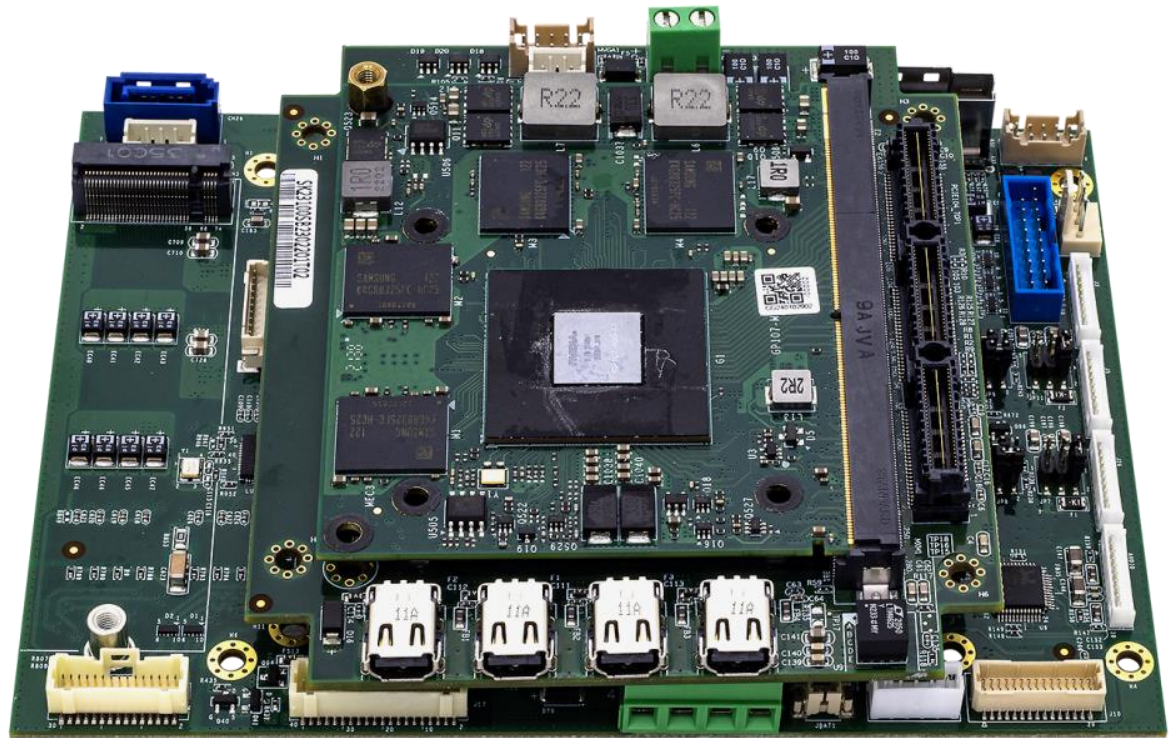




# PCIe/104-RH

PCIe/104 Processing Unit Intel 13th Raptor Lake (H)



**User's Manual**  
Revision Date: Mar. 13. 2024

# 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

## Revision History

Revision	Date (yyyy/mm/dd)	Changes
V1.0	2024.03.13	Initial Release
V2.0	2024.05.07	Add Cable kit
V3.0	2024.09.05	Update the Block diagram PCBA V2版 更新 JP31:固定2-3 PCIE, J15:usb2.0 (應該是J27), J3:SPI (應移除改 J4:LPC), SAS1:SLIM SAS8 placement 更新

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## Chapter 1 : Product Introduction

### 1.1 Specifications

#### System

COM Express CPU Options (Type 6)	Intel® Core™ i7-13800HRE 45W Raptor Lake 13th Gen, 14C, Freq. 2.5 /5.0 GHz, 24MB cache
COM Express Compatibility	COM Express® Type 6
Memory type	Based on CPU module
Chipset	Based on CPU module

#### Expansion

MiniPCIe Expansion	2x Full-size Mini PCIe
M.2 Expansion	1x 2280 M-key support PCIe x4
PCIe/104 Expansion	Type 2, 4x PCIe x1 、 2x PCIe x4
SlimSAS	1x SlimSAS 8i connector

#### Display

Display Port	2x Display Port outputs from CPU module
LVDS	1x dual channel 18/24bit LVDS from CPU module

#### Ethernet

Gigabit Ethernet	1x Intel® I226-LM GbE LAN (10/100/1000Mbit /2.5G) Ethernet ports 1x GbE LAN from CPU module
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#### Storage

SATA	1x SATA III
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#### Internal I/O

USB	1x 20Pin (2x USB 3.0) 1x 10Pin (2x USB2.0)
COM Port	2x 10Pin (2x RS232/422/485)
Audio	1x 10Pin (1x Line-out,1x MIC-IN)
SATA Power	1x SATA Power
LPC	1x 10Pin

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DIO	1x DI/DO (4 in / 4 out)
CPU FAN	1x CPU FAN
Front Panel	2x 5Pin (Power Button, Reset, SSD LED)
Battery	1x Battery Header

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## Power System

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Input Power_SYS	9V~36V DC-IN (4P Terminal Block)
Power Management	ACPI3.0
RTC Battery	3V CR2032

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## Mechanical and Environmental

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Dimension	146mm x 110mm
Operation Temperature	-40 to 85°C (Exclude the MXM GPU card)
Storage Temperature	-40 to 85°C
Relative Humidity	10% to 90%, non-condensing

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## Standard Compliance

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Standard Compliance	CE / FCC
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## OS

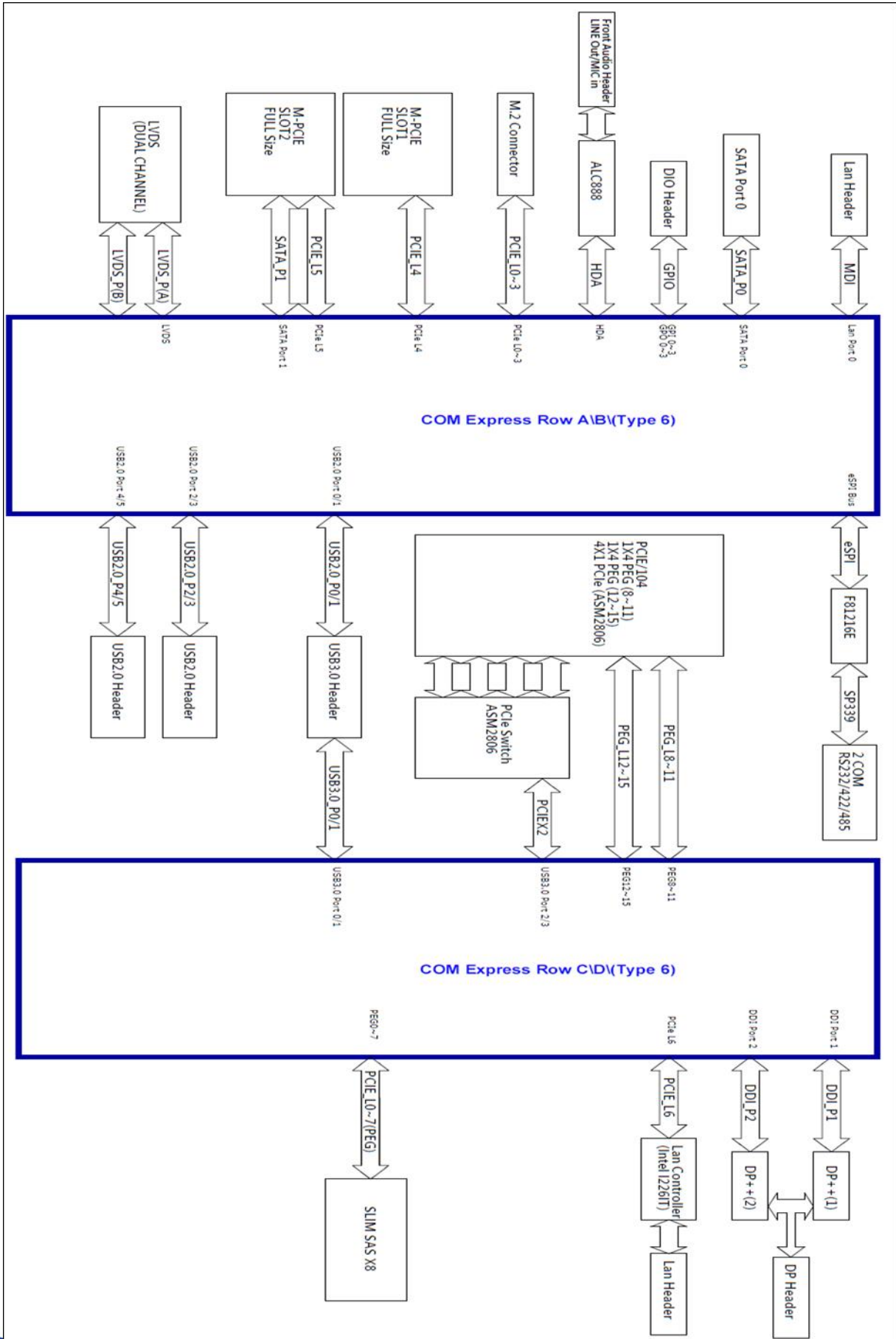
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OS Support	Windows®10 64bit, Linux(Support by request)
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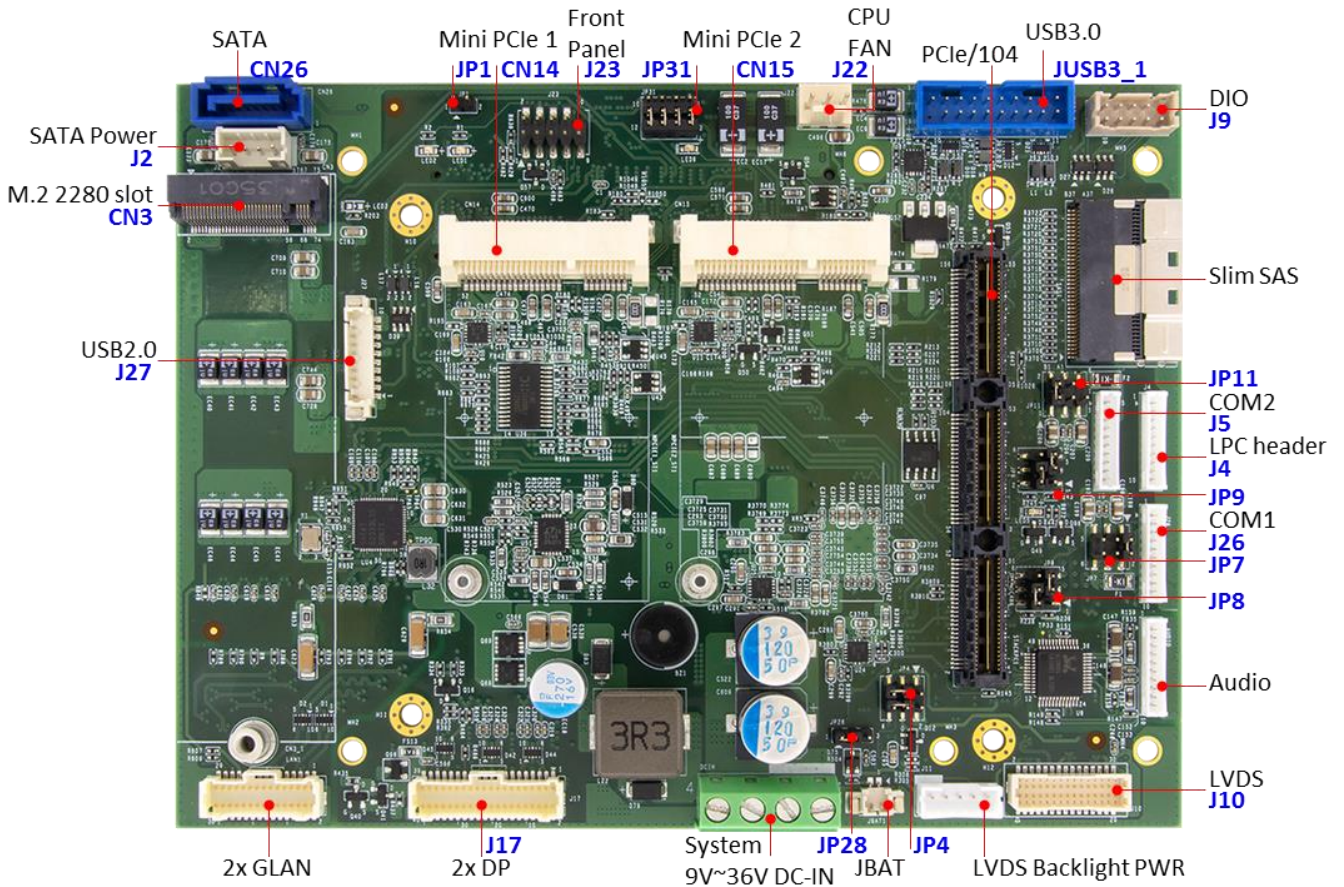
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\*All specifications and photos are subject to change without notice.

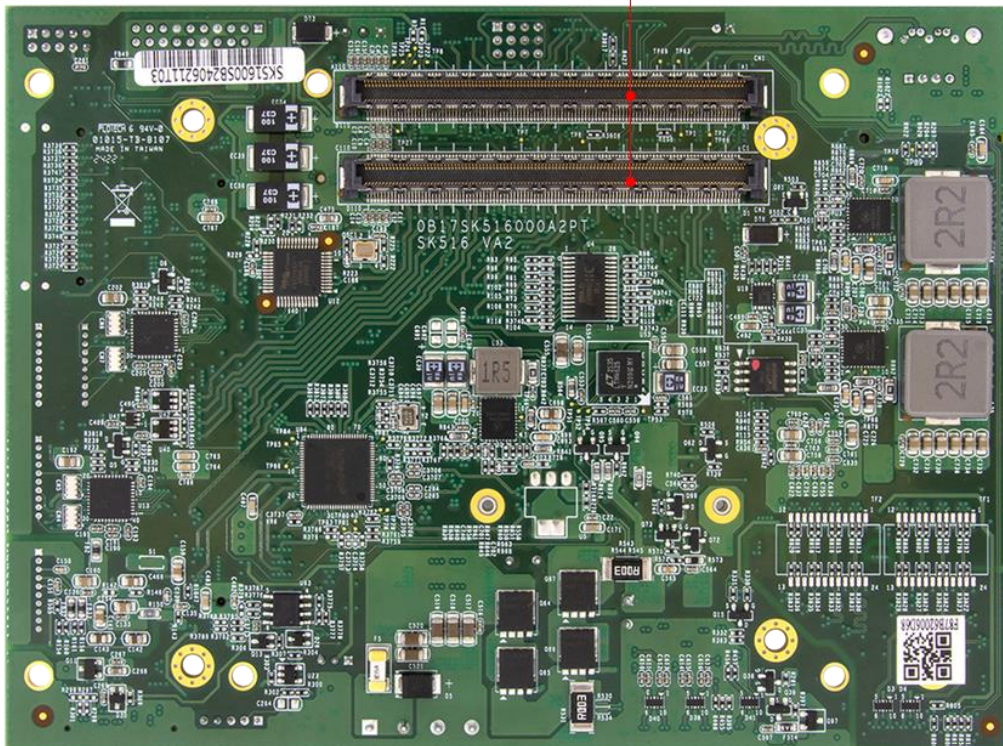
## 1.2 Board Diagram



## 1.3 Connector & Pin Header

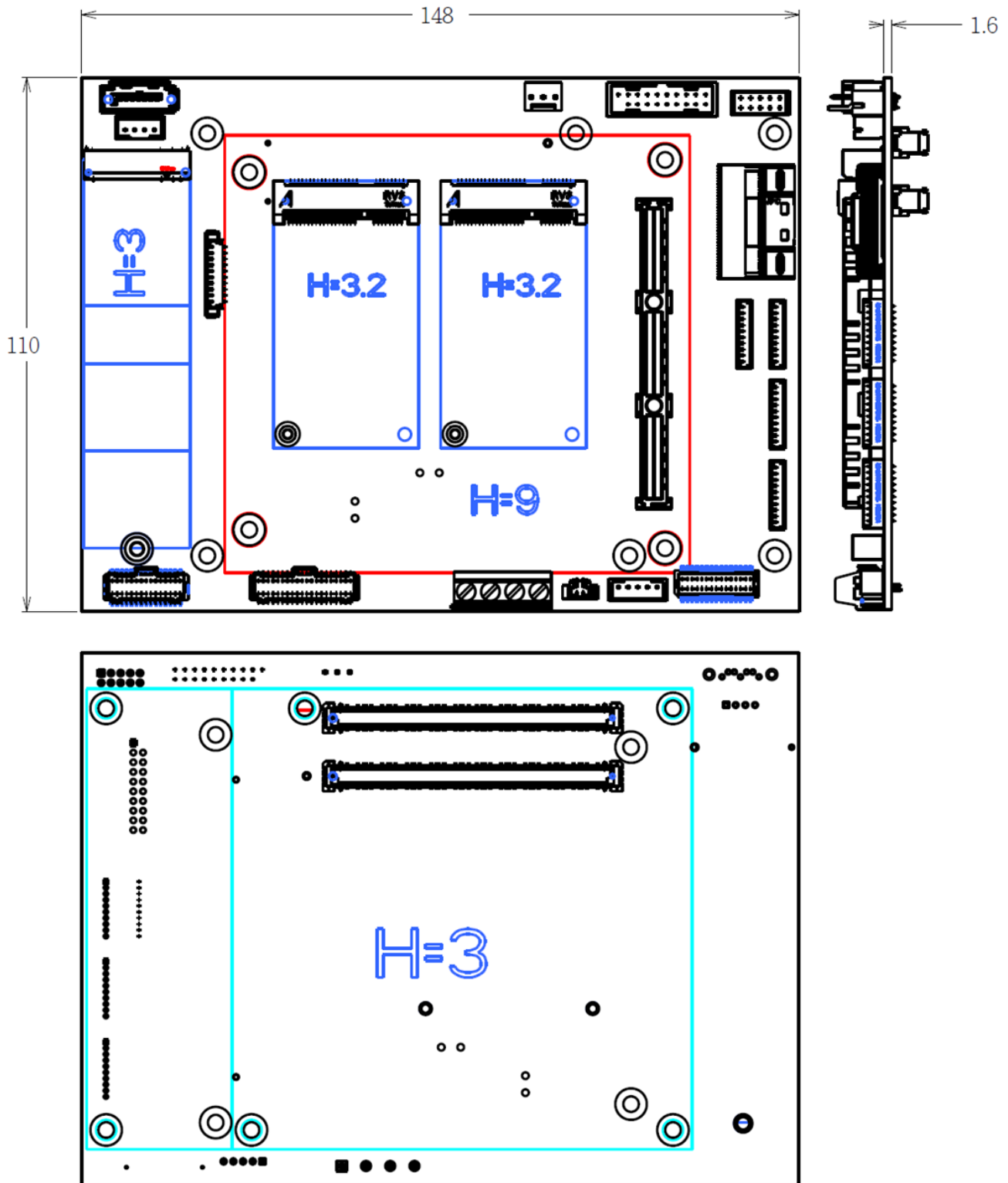


COM Express Type 6





## 1.4 Dimension

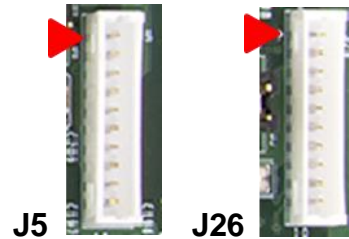


## Chapter 2 : Jumpers and Connectors

### 2.1 Connector & Pin Definitions

#### J26/J5: COM1/COM2

	RS232	RS422	RS485
Pin1	DCD	TX-	DATA-
Pin2	RXD	TX+	DATA+
Pin3	TXD	RX+	NC
Pin4	DTR	RX-	NC
Pin5	GND	GND	GND
Pin6	DSR#	NC	NC
Pin7	RTS#	NC	NC
Pin8	CTS#	NC	NC
Pin9	RI#	NC	NC



#### JP8: COM1 Mode select

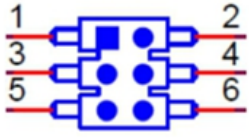
MODE [1,0]	JP8	JP8	Function
00	3-5	4-6	Loopback
01	3-5	2-4	RS-232
10	1-3	4-6	RS-485 Half Duplex
11	1-3	2-4	RS-485/422 Full Duplex

#### JP9: COM2 Mode select

MODE [1,0]	JP8	JP8	Function
00	3-5	4-6	Loopback
01	3-5	2-4	RS-232
10	1-3	4-6	RS-485 Half Duplex
11	1-3	2-4	RS-485/422 Full Duplex

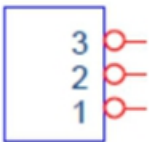
#### JP7/JP11: COM1/COM2 Pin select

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



#### J22: CPU FAN Connector

Pin	Function
1	GND
2	CPUFANOUT
3	+12V



#### JBAT1



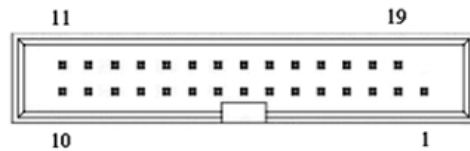
## AUDIO

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		

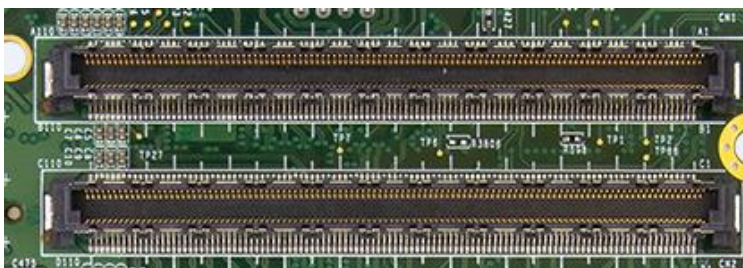


## J23: Front Panel

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



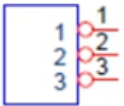
## CN1, CN2: COM Express Connector



Support COM Express Basic Size Type 6 Module

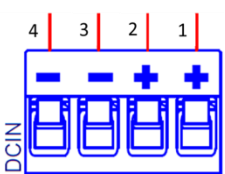
### JP28: Clear CMOS

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

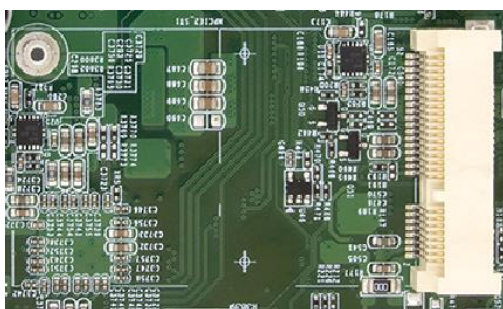


### DC-IN: System DC-IN

Pin	Definition
1	9V~36V
2	9V~36V
3	GND
4	GND




### CN15: M\_PcLe 2 (Mini PCIe Slot)



### JP31: Mini PCIe 1 function select

None	PCle x1
(1-2) Closed	(2-3) Closed




### CN14: M\_PcLe 1 (Mini PCIe Slot)



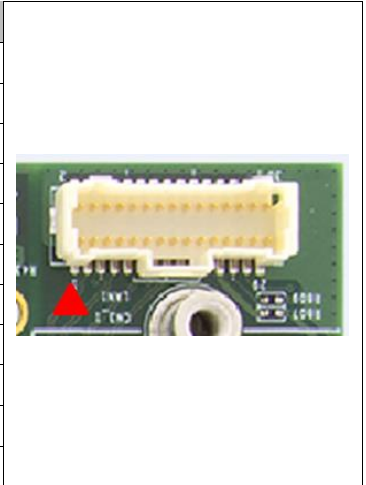
### J27: USB2.0 (USB2/USB3)

Pin	Function	Pin	Function
1	5V_USB2	6	5V_USB3
2	USB2_DN2	7	USB2_DN3
3	USB2_DP2	8	USB2_DP3
4	GND	9	GND
5	GND	10	GND



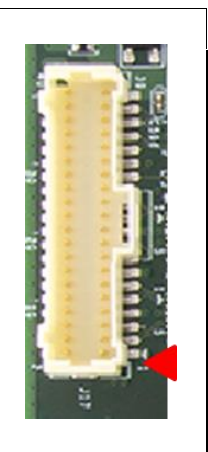
## LAN1 : LAN1/LAN2

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-		



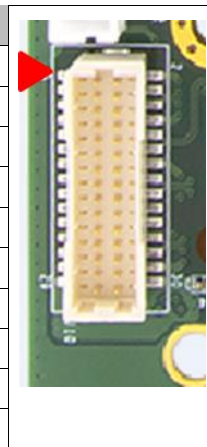
## J17: DDI1/2\_DP1/2

Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	GND	11	DP1_TN1	21	DP1_TP3	31	DP1_AUXP_CLK
2	GND	12	DP2_TN1	22	DP2_TP3	32	DP2_AUXP_CLK
3	DP1_TP0	13	GND	23	DP1_TN3	33	DP1_AUXN_DAT
4	DP2_TP0	14	GND	24	DP2_TN3	34	DP2_AUXN_DAT
5	DP1_TN0	15	DP1_TP2	25	GND	35	GND
6	DP2_TN0	16	DP2_TP2	26	GND	36	GND
7	GND	17	DP1_TN2	27	DP1_AUX_SEL	37	DP1_DET
8	GND	18	DP2_TN2	28	DP2_AUX_SEL	38	DP2_DET
9	DP1_TP1	19	GND	29	GND	39	DP1_PWR
10	DP2_TP1	20	GND	30	GND	40	DP2_PWR



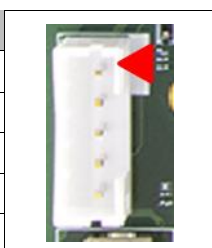
## J10: LVDS

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



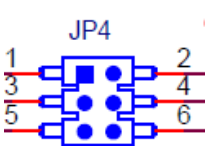
## J11: LVDS Backlight

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



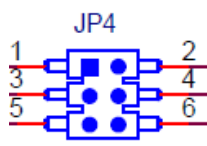
## JP4: LVDS Backlight Power select

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




## JP4: LVDS Signal Power select

Pin	Function
(2-4) Closed	5V
(4-6) Closed	3.3V(Default)




## J9: DIO

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

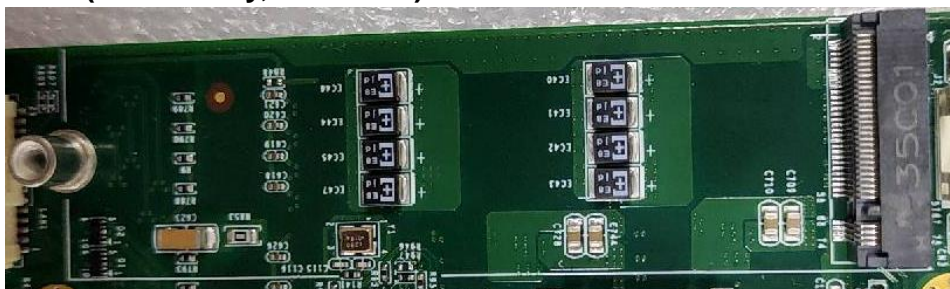


## J4: LPC Header

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




## CN3: M.2 (2280 M-key, PCIe x4)




## CN26: SATA3

Pin	Function
1	GND
2	SATA_TX0P
3	SATA_TX0N
4	GND
5	SATA_RX0N
6	SATA_RX0P
7	GND

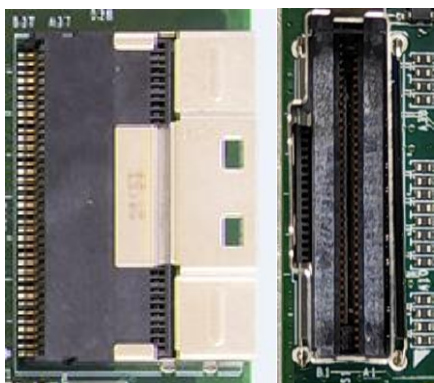


## J2: SATA Power

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

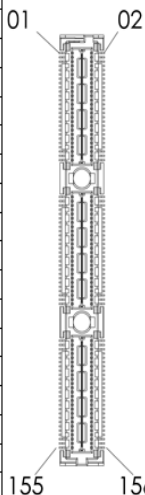


## SAS1: SlimSAS 8i



## STACKPC1:

PIN	DEFINITION	PIN	DEFINITION	PIN	DEFINITION	PIN	DEFINITION	PIN	DEFINITION	PIN	DEFINITION
1	USB_HUB_OC#	2	Stack_RST#	53	STK0	54	STK1	105	STK2	106	STK_LPC
3	3V3	4	3V3	55	TYPE_DET#	56	GND	107	GND	108	GND
5	USB_HUB_DIN_P	6	USB_HUB_DIN1_P	57	N/A	58	PCIE_TX4P	109	N/A	110	PCIE_RX4P
7	USB_HUB_DIN_M	8	USB_HUB_DIN1_M	59	N/A	60	PCIE_TX4N	111	N/A	112	PCIE_RX4N
9	GND	10	GND	61	GND	62	GND	113	GND	114	GND
11	PEx1_TX_DP	12	PEx0_TX_DP	63	N/A	64	PCIE_TX5P	115	N/A	116	PCIE_RX5P
13	PEx1_TX_DN	14	PEx0_TX_DN	65	N/A	66	PCIE_TX5N	117	N/A	118	PCIE_RX5N
15	GND	16	GND	67	GND	68	GND	119	GND	120	GND
17	PEx2_TX_DP	18	PEx3_TX_DP	69	N/A	70	PCIE_TX6P	121	N/A	122	PCIE_RX6P
19	PEx2_TX_DN	20	PEx3_TX_DN	71	N/A	72	PCIE_TX6N	123	N/A	124	PCIE_RX6N
21	GND	22	GND	73	GND	74	GND	125	GND	126	GND
23	PEx1_RX_DP	24	PEx0_RX_DP	75	N/A	76	PCIE_TX7P	127	N/A	128	PCIE_RX7P
25	PEx1_RX_DN	26	PEx0_RX_DN	77	N/A	78	PCIE_TX7N	129	N/A	130	PCIE_RX7N
27	GND	28	GND	79	GND	80	GND	131	GND	132	GND
29	PEx2_RX_DP	30	PEx3_RX_DP	81	N/A	82	N/A	133	N/A	134	N/A
31	PEx2_RX_DN	32	PEx3_RX_DN	83	N/A	84	N/A	135	N/A	136	N/A
33	GND	34	GND	85	GND	86	GND	137	GND	138	GND
35	CK_PeX_100M_SLT1	36	CK_PeX_100M_SLT0	87	USB_HUB_DIN4_P	88	USB_HUB_DIN3_P	139	N/A	140	N/A
37	CK_PeX_100M_SLT1	38	CK_PeX_100M_SLT0	89	USB_HUB_DIN4_M	90	USB_HUB_DIN3_M	141	N/A	142	N/A
39	+5V_SB	40	+5V_SB	91	GND	92	GND	143	GND	144	GND
41	CK_PeX_100M_SLT2	42	CK_PeX_100M_SLT3	93	USB_HUB_DIN6_P	94	USB_HUB_DIN5_P	145	LPC_AD0	146	LPC_DRQ#
43	CK_PeX_100M_SLT2	44	CK_PeX_100M_SLT3	95	USB_HUB_DIN6_M	96	USB_HUB_DIN5_M	147	LPC_AD1	148	LPC_SERIRQ
45	N/A	46	PWRGOOD	97	GND	98	GND	149	GND	150	GND
47	SMB_DAT	48	CK_PeX_100M_SLT4	99	N/A	100	N/A	151	LPC_AD2	152	LPC_FRAME
49	SMB_CLK	50	CK_PeX_100M_SLT4	101	N/A	102	N/A	153	LPC_AD3	154	N/A
51	SMB_ALERT	52	PSON	103	GND	104	GND	155	GND	156	GND



## Chapter 3 : Cable Kit

Model	Function	Description	P/N	Illustration	Q'TY
PCIe/104 Cable Kit list (SK516) 0ZCSK516000 00000	2x LAN	PCBA MT321-R Mini PCIe 2 x LAN board FOR RJ45 Adapte測試階	0L22MT321-R0P1PF		1
	Board to Board LAN cable	Board to Board LAN cable, Molex 501189-3010 Pitch: 1.0mm, UL1571#28, L:300mm, LEAD FREE	0ZAKRCA258500000		1
	2x USB3.0	USB 3.0 (AF+EAR SCREW) x2 PORT TO 20P FEMALE 180°, U3 28/28/26+DA, L=300mm(不含頭), RoHS	0C50400T1070C80L		1
	COM	Cable D-SUB 9P (附2pcs六角螺絲) to Molex1.25-10P 10P P:1.25mm L:200mm 180D LEAD FREE	0C5020010008230L		2
	SATA Power Cable	SATA POWER CABLE, A2001H-4P 1x4P P:2.0mm to SATACHS-15P-F 1x15P, L:200mm 180D LEAD FREE	0C5020014070300L		1
	2x Display Port	Cable DP Port(F)帶鎖耳(快異點外模KYD-144) x2+ A1003H-2*20P, P=1.0mm, L=300mm,RoHS	0C50400YBW20100L		1
	2 pcs for USB3.0 cable	Screw cross circle Plating Ni White M3 L:12mm ø5.4 Lead Free	0F0100501200000L		2
	Cooper Stud for PCIe/104 card	Copper stud (六角銅柱) CU M3x15.2 L:5mm Lead Free [家泰螺絲]	0F0203301500000L		4
	Screw for COMe module	Screw cross circle Plating Ni White M2.5 L:6mm ø4.3 Lead Free [家泰螺絲PMS 2.5x6]	0F0140400600000L		5
	Hex Nut for PCIe/104 copper stud	HEX NUT 六角螺帽 NI White M3 T=2.3mm Lead Free [家泰螺絲 NUT 3x5.5]	0F000X500000000L		4
	Cooper stud for COMe module	Copper stud (六角銅柱) CU M2.5x8 L:5mm, RoHS [家泰螺絲]	0F024E400800000L		5
	Hex Nut for COMe module cooper stud	HEX NUT 六角螺帽 NI White M2.5 T=2mm, RoHS [家泰螺絲]	0F004X500000000L		5
	Bag for Cooper stud & Hex Nut & screw	3號夾鍊袋 100x70x0.04mm	0P010000000100L		1
	Box for cable kit	Gift Box 禮盒, 三層B楞 配件盒 無印刷, 210x155x45mm, RoHS [譜嘉]	0P0300000001040L		1
Bag for cable kit	8號夾鍊袋 240x170x0.04mm Lead Free	0P010000000800L		1	

### Option Cable:

USB2.0	CABLE USB 2.0 TYPE A x2 FEMALE to Molex 51021-1000 P=1.25 1x10 180D L=100mm	0C50200YBW1611EL		1
each 2 pcs for USB3.0 & USB2.0 cable	Screw cross circle Plating Ni White M3 L:12mm ø5.4 Lead Free	0F0100501200000L		2