

# VIG-100 USER

**Industrial-grade Wireless IoT Gateway with Arm® Cortex®-A7  
Rugged, Compact, Fanless, -25°C to 70°C Operation**

# Manual

## Record of Revision

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Version	Date	Page	Description	Remark
0.10	09/07/2018	All	Preliminary Release	
1.00	09/17/2018	All	Official Release	
1.10	10/22/2018	P39-47	Update	
1.20	02/03/2020	P18	Update	
1.30	08/24/2020	P42-46	Update	
1.40	09/21/2020	iv, P3, 4, 5, 7, 8, 9	Update	
1.50	09/29/2020	Cover, iv, P1, 2, 3, 4, 5, 6, 7, 8, 9	Update	
1.60	06/21/2023	v, 13, 27	Update	

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# Declaration of Conformity

**FCC** 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 it is not installed and used in accordance with the instruction manual, it 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.

**CE** The products described in this manual comply with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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## Order Information

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Part Number	Description
VIG-120M	VIG-100, Arm® Cortex™-7, 2 M12 LAN, 1 USB, 4 COM, 2 CAN Bus, 8 GPIO
VIG-120	VIG-100, Arm® Cortex™-7, 2 LAN, 1 USB, 4 COM, 2 CAN Bus, 8 GPIO
VIG-110M	VIG-100, Arm® Cortex™-7, 2 M12 LAN, 1 USB, 4 COM, 8 GPIO
VIG-110	VIG-100, Arm® Cortex™-7, 2 LAN, 1 USB, 4 COM, 8 GPIO
VIG-100M	VIG-100, Arm® Cortex™-7, 2 M12 LAN, 1 USB, 2 COM
VIG-100	VIG-100, Arm® Cortex™-7, 2 LAN, 1 USB, 2 COM

## Order Accessories

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Part Number	Description
PWA-12W-US	12W, 12V, 90V AC to 264V AC Power Adapter with 3-pin Terminal Block (US Type)
PWA-12W-EU	12W, 12V, 90V AC to 264V AC Power Adapter with 3-pin Terminal Block (EU Type)
Serial Cable	RJ45 to DB9 Female Serial Cable, 100cm
DIN-RAIL	DIN-RAIL Kit
4G Module	Mini PCIe 4G/GPS Module with Antenna

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# 1

## GENERAL INTRODUCTION

### 1.1 Overview

VIG-100 is a compact and rugged Wireless IoT Gateway, the first arm-based elite in Vecow offering list. Powered by Industrial-grade Arm<sup>®</sup> Cortex<sup>®</sup>-A7 processor, multiple I/O configurations to meet variety of requirements, Optional NB-IoT module (Narrow Band Internet of Thing) for system-ready LPWAN (Low-Power Wide-Area Network) applications, 6V to 40V DC wide range power input, fanless design supporting -25°C to 70°C operating temperature, Vecow VIG-100 stands itself out in this AIoT era.

Based on high-performance and energy-saving Arm<sup>®</sup> Cortex<sup>®</sup>-A7 processor, versatile connectivity including dual Ethernet with rugged M12 connectors, 4 COM RS-232/422/485 for simple networking through connected devices, 1 Mini PCIe for additional USB or SIM expansions, 2 CAN Bus, 1 USB 2.0 for On-The-Go support, 8 GPIO and MicroSD supporting up to 128 GB for configuration backup, Vecow VIG-100 is a great choice for IoT related seamless data acquisition and edge computing embedded applications.

Combing the rugged reliability for seamless operations in harsh industrial environments, 6V to 40V wide range DC power input allowing duties in constrained conditions, Fanless -25°C to 70°C operating temperature, external SIM for WiFi, 4G, LTE, GPRS and UMTS connections keeping stable network and 24/7 operation, dual Ethernet with rugged M12 connectors, compliant with FCC, CE, anti-shock and anti-vibration, Vecow VIG-100 is your trusted enabler in any industrial oriented IoT developments.

VIG-100 is built with wireless connectivity including multiple COM, CAN Bus, SIM, Mini PCIe, Ethernet with rugged M12 connectors ensuring simple networking, a wide DC input range of 6V to 40V, Fanless, -25°C to 70°C operating temperature, compliant with CE, FCC anti-shock and anti-vibration, Vecow VIG-100 Industrial-grade Wireless IoT Gateway is your ideal choice for expanding reach to your IoT projects.

## 1.2 Features

- Industrial grade Arm® Cortex®-A7 696MHz processor
- 6V to 40V wide range DC power input
- -25°C to 70°C Operating Temperature
- Dual Ethernet with rugged M12 Connection
- 4 COM RS-232/422/485, 2 CAN Bus, 1 USB (OTG)
- 8 GPIO, 1 Console, 8 User Programming LED
- External SIM Socket supports WiFi/4G/LTE/GPRS/UMTS
- MicroSD Socket supports up to 128GB

## 1.3 Product Specification

### 1.3.1 Specifications of VIG-120M

System	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex®-A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11
I/O Interface	
Ethernet	2 10/100Mbps Ethernet, M12 connector
Serial	4 software configurable COM RS-232/422/485 (ESD 8KV) : 2 with RJ45 connector, 2 with DB9 connector
CAN Bus	2 CAN Bus 2.0 A/B
USB	1 USB 2.0 supports OTG (External)
GPIO	8 GPIO
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS
Expansion	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)



<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

### 1.3.2 Specifications of VIG-120

<b>System</b>	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex®-A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11
<b>I/O Interface</b>	
Ethernet	2 10/100Mbps Ethernet, RJ45 connector

Serial	4 software configurable COM RS-232/422/485 (ESD 8KV) : 2 with RJ45 connector, 2 with DB9 connector
CAN Bus	2 CAN Bus 2.0 A/B
USB	1 USB 2.0 supports OTG (External)
GPIO	8 GPIO
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS
<b>Expansion</b>	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)
<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

### 1.3.3 Specifications of VIG-110M

<b>System</b>	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex® -A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11
<b>I/O Interface</b>	
Ethernet	2 10/100Mbps Ethernet, M12 connector
Serial	4 software configurable COM RS-232/422/485 (ESD 8KV) : 2 with RJ45 connector, 2 with DB9 connector
USB	1 USB 2.0 supports OTG (External)
GPIO	8 GPIO
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS
<b>Expansion</b>	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)
<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)

Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

### 1.3.4 Specifications of VIG-110

<b>System</b>	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex® -A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11
<b>I/O Interface</b>	
Ethernet	2 10/100Mbps Ethernet, RJ45 connector
Serial	4 software configurable COM RS-232/422/485 (ESD 8KV) : 2 with RJ45 connector, 2 with DB9 connector
USB	1 USB 2.0 supports OTG (External)
GPIO	8 GPIO
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS
<b>Expansion</b>	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)
<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground

<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

### 1.3.5 Specifications of VIG-100M

<b>System</b>	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex®-A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11
<b>I/O Interface</b>	
Ethernet	2 10/100Mbps Ethernet, M12 connector
Serial	2 software configurable COM RS-232/422/485with RJ45 connector (ESD 8KV)
USB	1 USB 2.0 supports OTG (External)
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS

<b>Expansion</b>	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)
<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

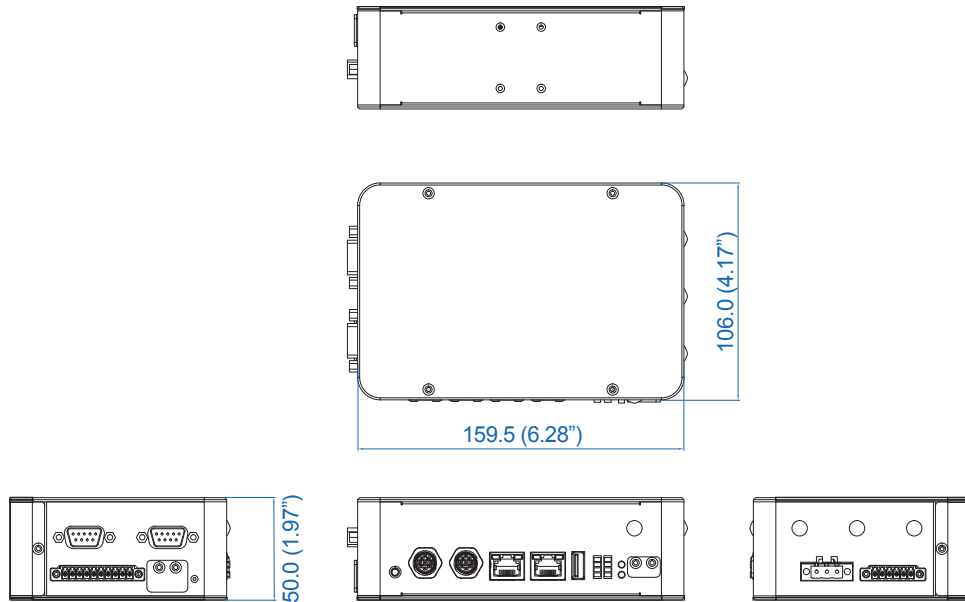
### 1.3.6 Specifications of VIG-100

<b>System</b>	
Processor	NXP i.MX6 UltraLite 696MHz Arm® Cortex®-A7 processor
Memory	1 DDR3L SDRAM, 512MB
Flash	1 NAND Flash, 512MB
EEPROM	1, up to 16KB
OS	Debian Stretch R01-4.9.11

<b>I/O Interface</b>	
Ethernet	2 10/100Mbps Ethernet, RJ45 connector
Serial	2 software configurable COM RS-232/422/485with RJ45 connector (ESD 8KV)
USB	1 USB 2.0 supports OTG (External)
Console	1 independent debug console
Reset Button	2 for H/W Reset and User Programming
LED	10 for System Ready, Power Status and User Programming
Antenna	4 Antenna for WiFi/4G/LTE/GPRS/UMTS
<b>Expansion</b>	
Mini PCIe	1 Full-size for USB/External SIM Card
SIM Card	1 SIM Card Socket (External)
<b>Storage</b>	
MicroSD	1, supports SDHC, up to 128GB (External)
<b>Power</b>	
Power Input	6V to 40V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
<b>Others</b>	
Watchdog Timer	Reset : 0.5 to 128 sec./min. per step
<b>Mechanical</b>	
Dimensions	(W) 106mm x (L) 160mm x (H) 50mm (4.2" x 6.3" x 2.0")
Weight	0.6 kg (1.32 lb)
Mounting	<ul style="list-style-type: none"> <li>• DIN Rail Mount (optional)</li> <li>• Wallmount by mounting bracket</li> </ul>
<b>Environment</b>	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> <li>• IEC 60068-2-27</li> <li>• SSD : 50G @ Wallmount, Half-sine, 11ms</li> </ul>
Vibration	<ul style="list-style-type: none"> <li>• IEC 60068-2-64</li> <li>• SSD : 5Grms, 5Hz to 500Hz, 3 Axis</li> </ul>
EMC	CE, FCC, EN50155, EN50121-3-2

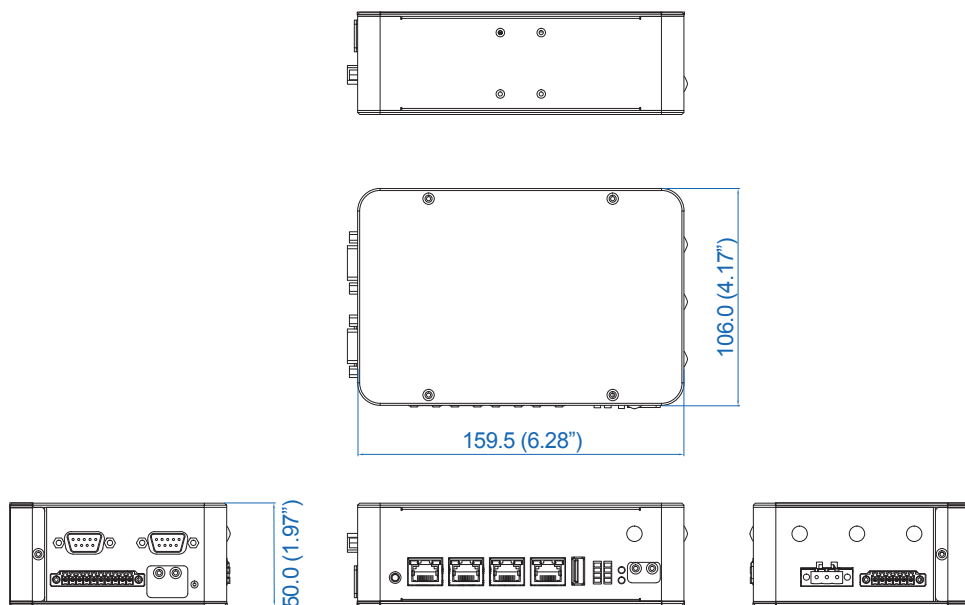
## 1.4 Mechanical Dimension

### 1.4.1 Dimensions of VIG-120M



Unit: mm (inch)

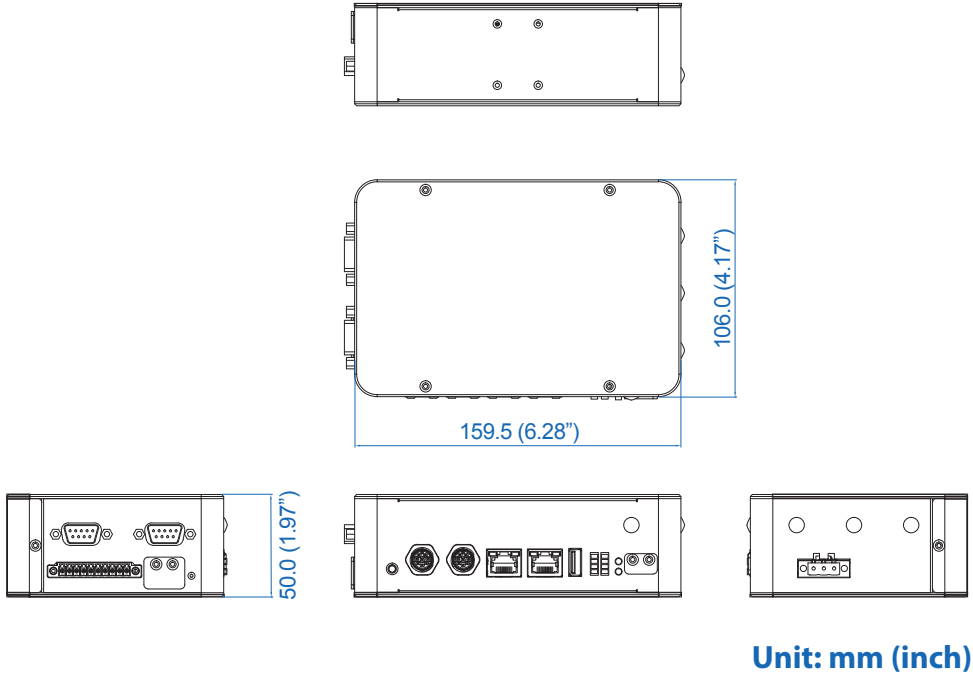
### 1.4.2 Dimensions of VIG-120



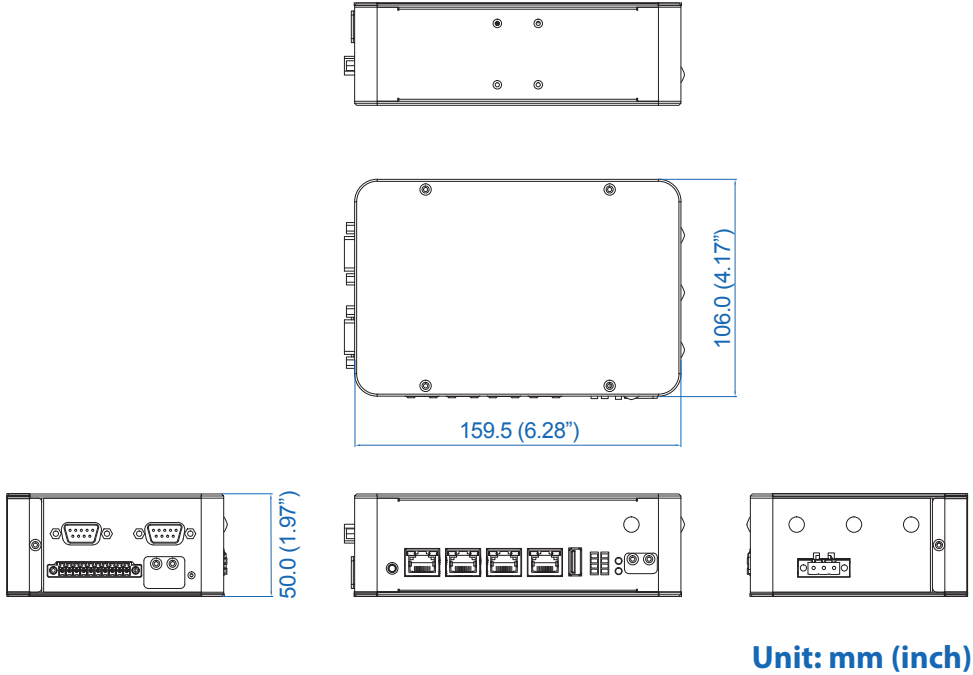
Unit: mm (inch)



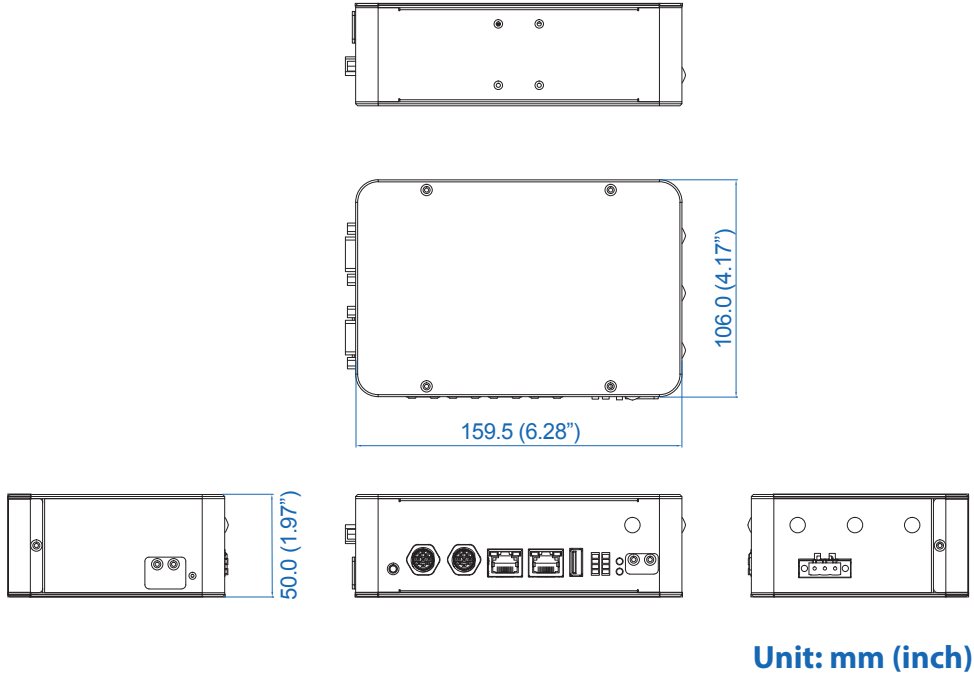
### 1.4.3 Dimensions of VIG-110M



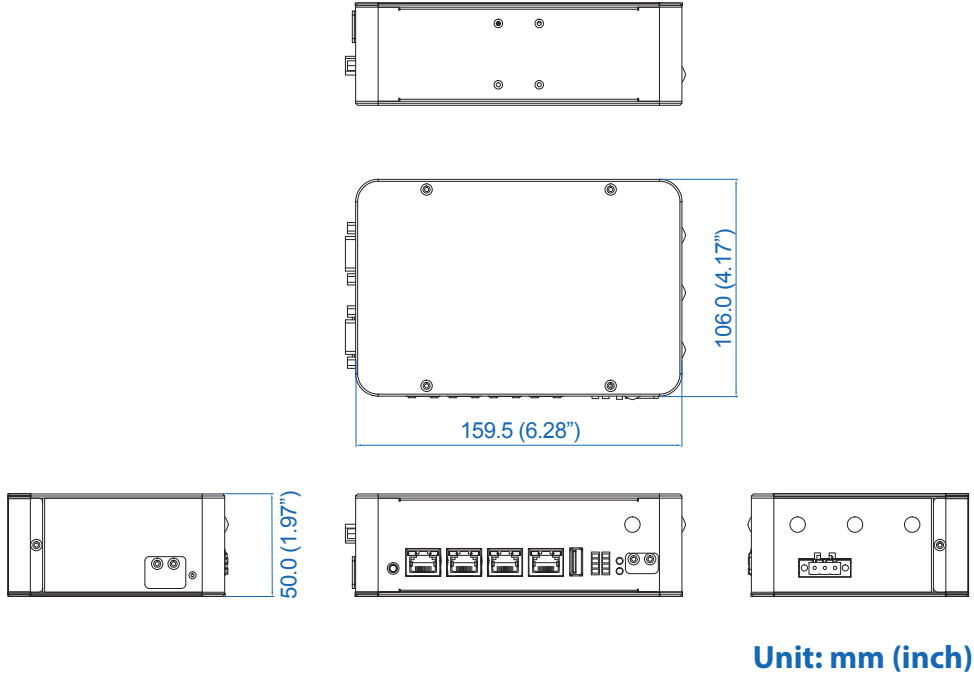
### 1.4.4 Dimensions of VIG-110



### 1.4.5 Dimensions of VIG-100M



### 1.4.6 Dimensions of VIG-100



# 2

## GETTING TO KNOW YOUR VIG-100

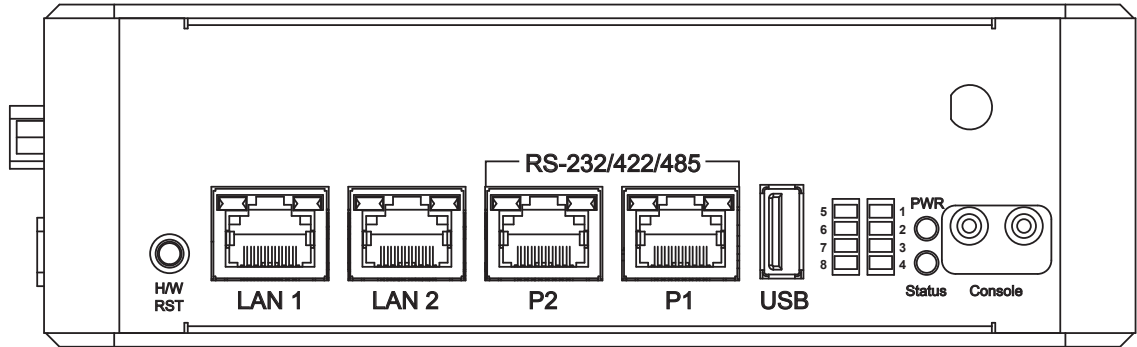
### 2.1 Packing List

Item	Description	Qty
1	VIG-100 Industrial-grade Wireless IoT Gateway (According to the configuration of you order, VIG-100 series may contain MicroSD. Please verify these items if necessary.)	1
2	VIG-100 series accessory box, which contains <ul style="list-style-type: none"><li>• Wall-mounting bracket (PN : 62-01P0071-000)</li><li>• 3-pin pluggable terminal block</li><li>• 10-pin pluggable terminal block</li><li>• 6-pin pluggable terminal block</li></ul>	1 1 1 1

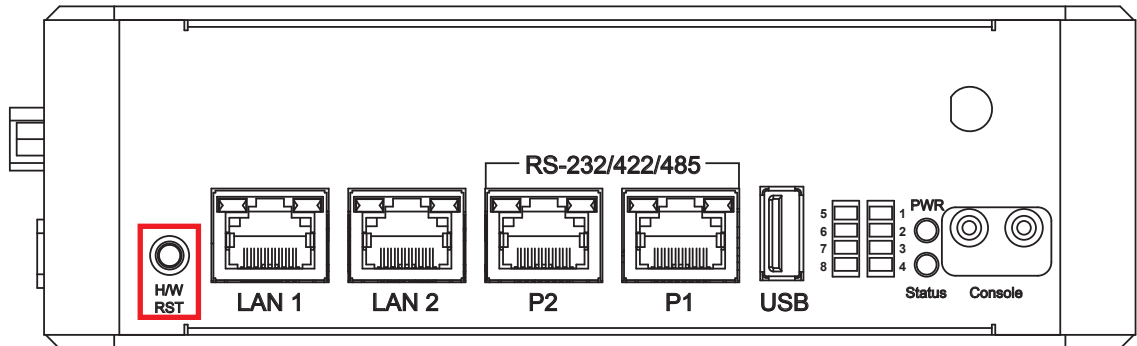
Item	Description	Picture	Use For	P/N	Qty
1	P Head Screw M2.5X6L mm		Mini PCIe Slot	53-2426906-30B	1
2	F Head Screw M3X4L mm		Wall Mount Bracket	53-2470000-218	4
3	P Head Screw M3X6L mm		NB-IOT	53-2426206-80B	1

## 2.2 Front Panel I/O & Functions

In Vecow VIG-100 series, there are 3 sides of the I/O connectors which located on the front, top and bottom panels. Most of the general connections to computer devices, such as USB, COM (RJ-45 Connector), LAN, Console port, Reset button and LED indicators are placed on the front panel.

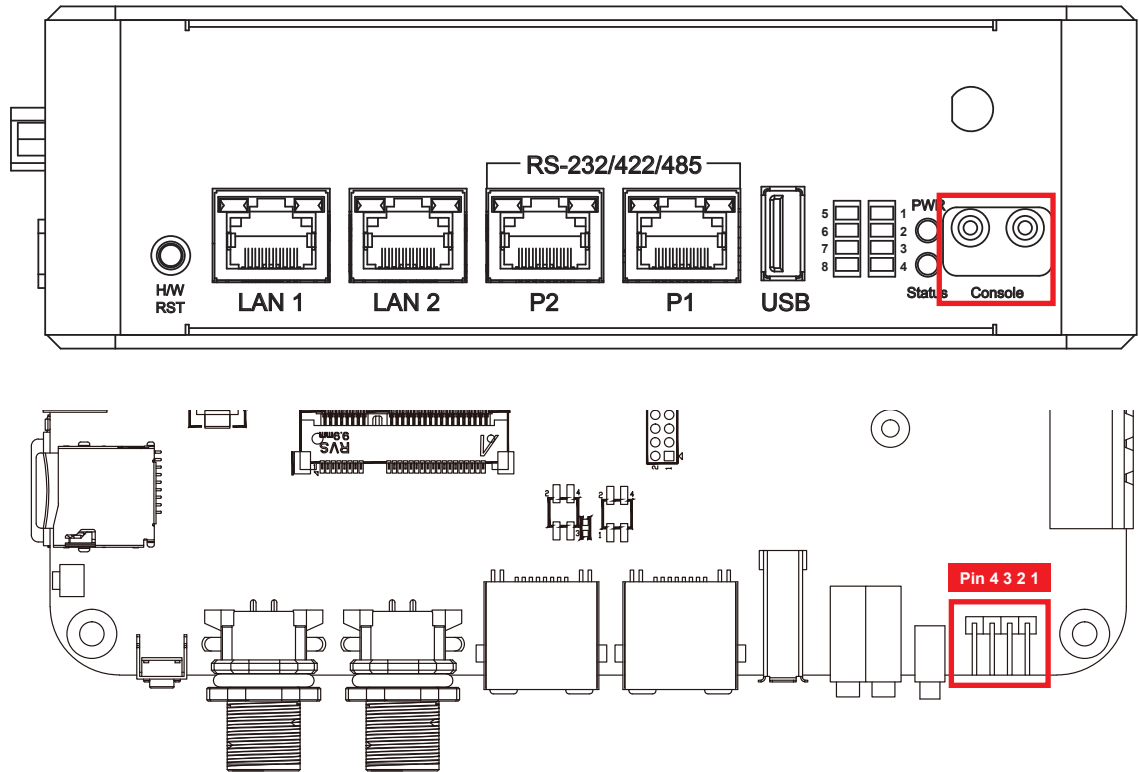


### 2.2.1 H/W Reset Button



To boot up the system, please press H/W Reset button in 2 seconds. To shut down the system, please press the button in 7 seconds. If system error, you can just press the H/W Reset button to restart.

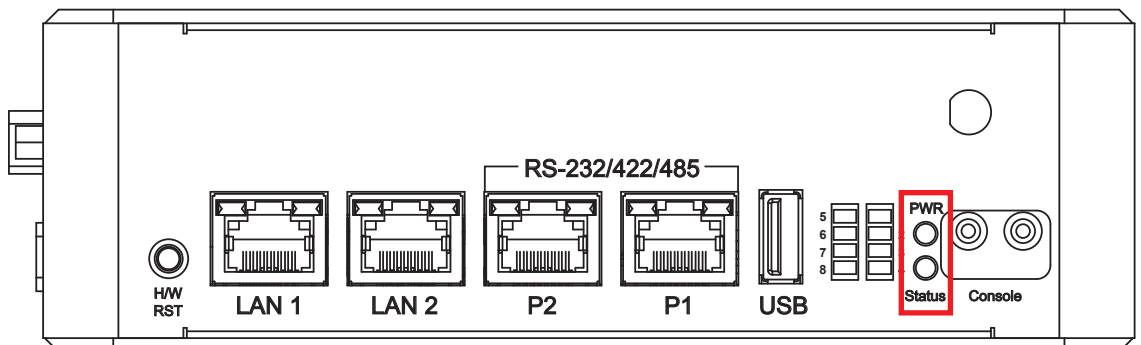
## 2.2.2 Console Port



Console Port Pin Out :

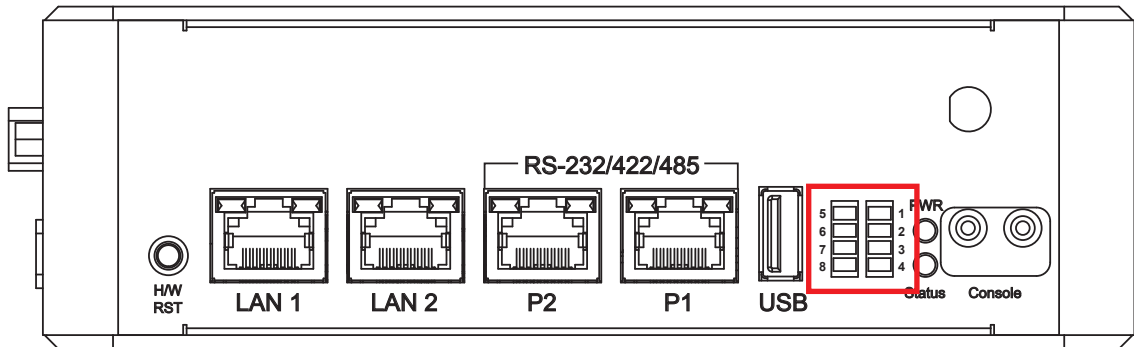
Pin No.	Function	Pin No.	Function
1	+V5	3	USB_DATA+
2	USB_DATA-	4	GND

## 2.2.3 PWR & Status LED Indicators



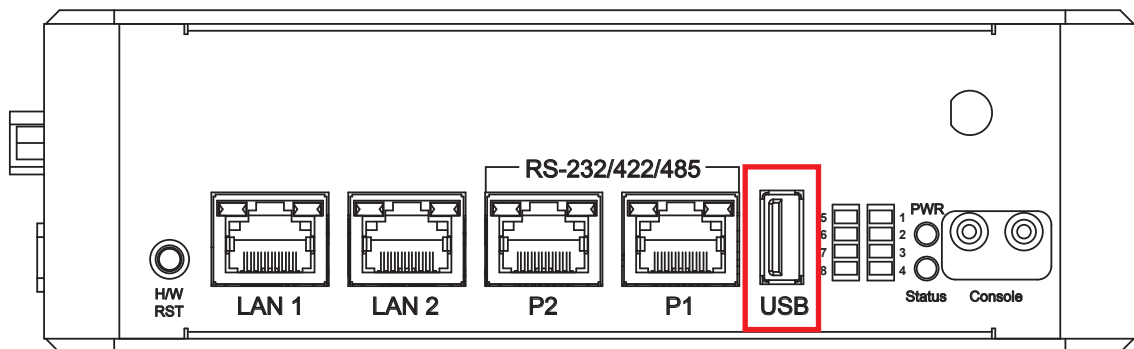
LED Color	System Status
Green (PWR LED)	+V3.3 Power Ready
Yellow (Status LED)	System Running

## 2.2.4 Programmable LED Indicators



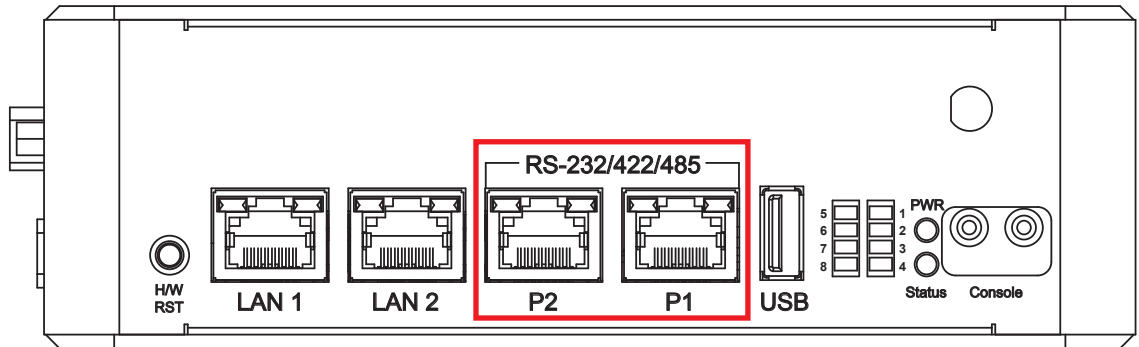
LED No.	LED Status	LED No.	LED Status
1	P3 (COM3) TX Transport Blinking	5	P4 (COM4) TX Transport Blinking
2	CAN 1 TX Transport Blinking	6	CAN 2 TX Transport Blinking
3	Mini PCIe Slot USB Detect LED	7	MicroSD Card Detect LED
4	Programmable LED	8	Programmable LED

## 2.2.5 USB 2.0



This USB interface supports 480 Mbps transfer rate complied with high speed USB specification Rev. 2.0. Also, the USB supports OTG mode and default setting as HOST mode.

## 2.2.6 COM Port (RJ45 connector)



These Serial ports (P1~2) can be configured for RS-232, RS-422, or RS-485.

P1 & P2 Mode Configuration Table:

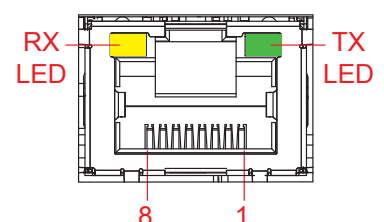
Mode	Mode2	Mode1	Mode0
Loop Back	Low	Low	Low
RS-232	Low	Low	High
RS-422 (5-Wire)	Low	High	High
RS-485	Low	High	Low

P1 & P2 RS-232/RS-422/RS-485 Pin Out:

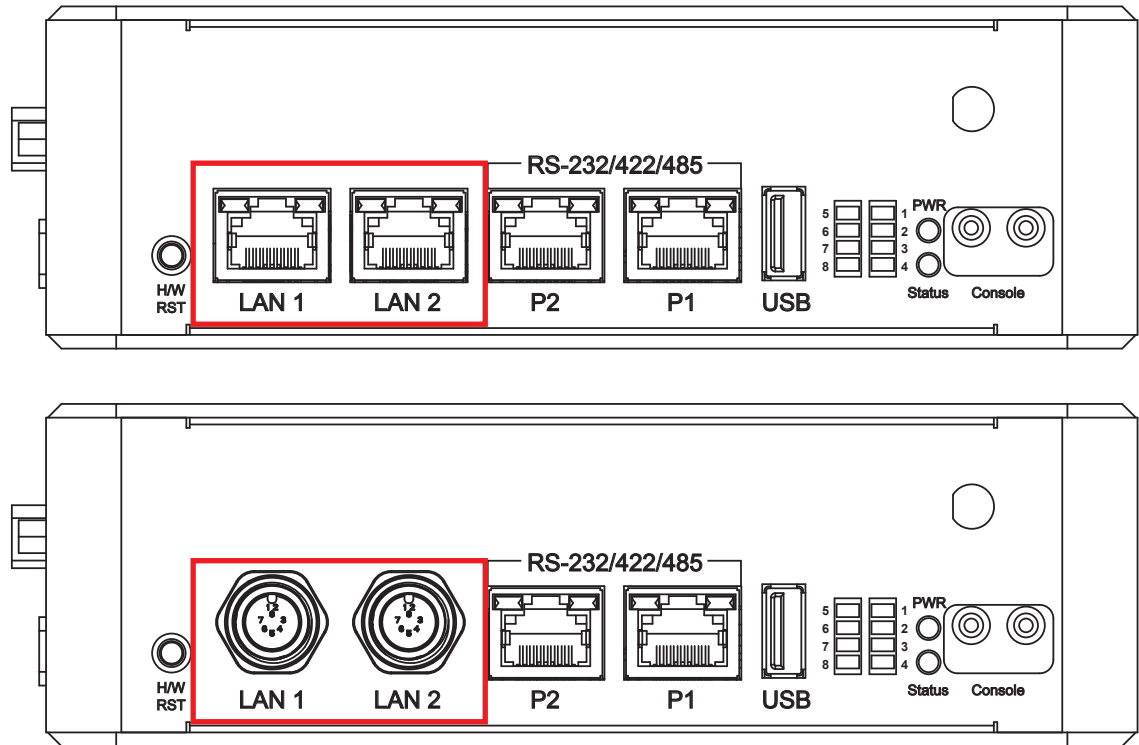
RJ-45 Connector	Pin No.	RS-232	RS-422 (5-wire)	RS-485 (3-wire)
P1/P2	1	Reserved	-----	-----
	2	RTS	-----	-----
	3	GND	GND	GND
	4	TXD	RXD+	-----
	5	RXD	TXD+	DATA+
	6	DCD	TXD-	DATA-
	7	CTS	-----	-----
	8	DTR	RXD-	-----

P1 & P2 LED Table:

RJ-45 Connector	LED Color	LED Status
P1/P2	Yellow	RX Receive Blinking
	Green	TX Transport Blinking



## 2.2.7 10/100 Mbps Ethernet Port



There are two Ethernet ports auto-sensing 10/100 Mbps in RJ45 or M12 connectors on the front side of VIG-100 series.

RJ-45 LAN 1 & 2 Pin Out :

	Pin No.	10/100 Mbps	Pin No.	10/100 Mbps
	1	E_TX+	5	-----
	2	E_TX-	6	E_RX-
	3	E_RX+	7	-----
	4	-----	8	-----

RJ-45 LAN 1 & 2 LED Table:

RJ-45 LED	10Mbps	100Mbps
Right LED Green	Off	Solid Green
Left LED Yellow	Flash Yellow	Flash Yellow

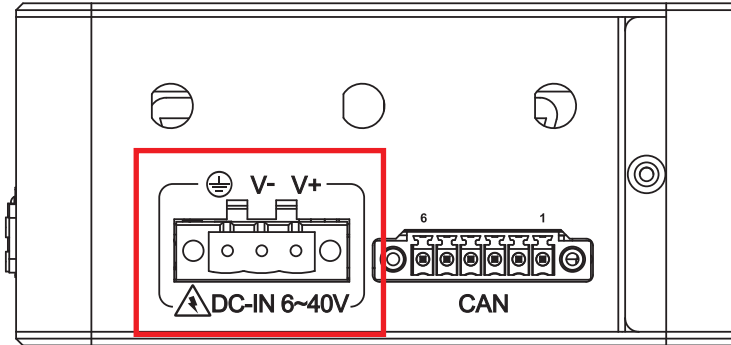
M12 LAN 1 & 2 Pin Out :

	Pin No.	10/100 Mbps	Pin No.	10/100 Mbps
	1	-----	5	E_RX+
	2	-----	6	E_TX+
	3	-----	7	-----
	4	E_TX-	8	E_RX-



## 2.3 Top Panel I/O & Functions

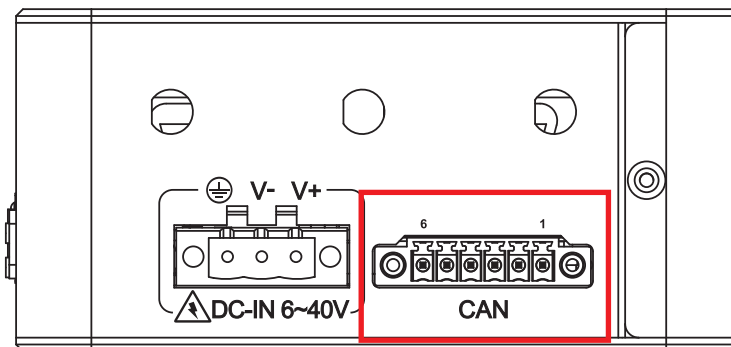
### 2.3.1 Power Terminal Block



VIG-100 supports 6V to 40V DC wide range power input by terminal block on the top side. Besides, onboard LTC4364 supports up to 80V surge protection.

Pin No.	Description	Pin No.	Description
1	V+	3	Chassis Ground
2	V-		

### 2.3.2 CAN Bus Port

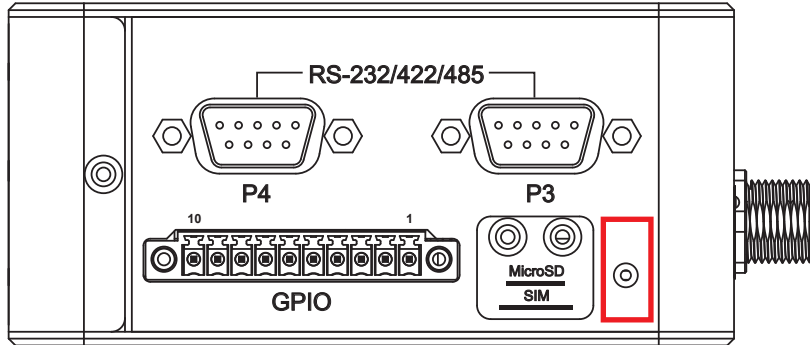


CAN Bus Connector Pin Out:

Pin No.	Description	Pin No.	Description
1	GND	4	GND
2	CANL1	5	CANL2
3	CANH1	6	CANH2

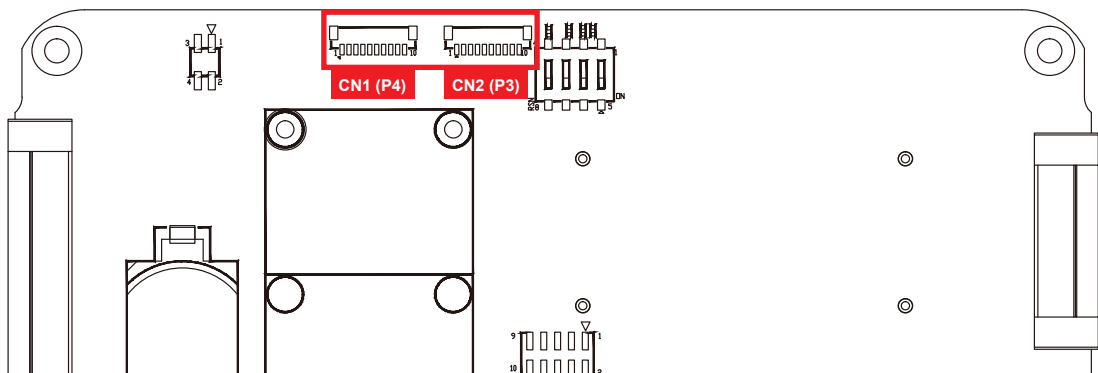
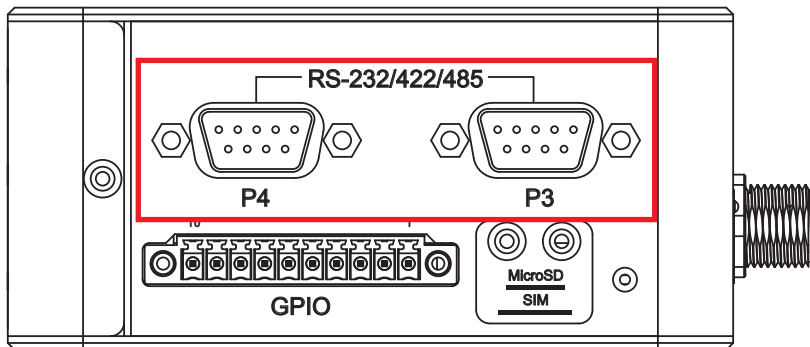
## 2.4 Bottom Panel I/O & Functions

### 2.4.1 Programmable Reset Button

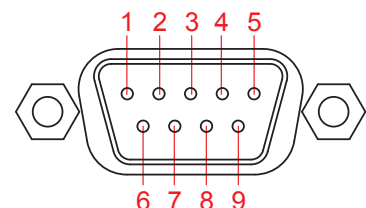


VIG-100 is also equipped with a Programmable Button for users' easy maintenance.

### 2.4.2 COM Port (DB9 connector)



The same as P1~2 on the front panel, Serial port P3~4 can also be configured for RS-232, RS-422, or RS-485 with auto flow control communications.



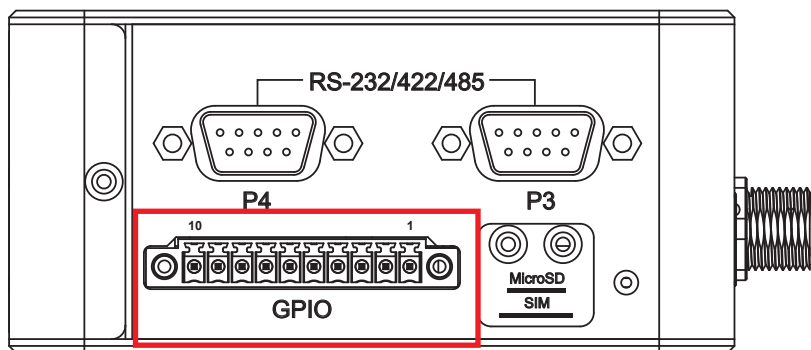
P3 & P4 Mode Configuration Table:

Mode	Mode2	Mode1	Mode0
Loop Back	Low	Low	Low
RS-232	Low	Low	High
RS-422 (5-Wire)	Low	High	High
RS-485	Low	High	Low

P3 & P4 RS-232/RS-422/RS-485 Pin Out:

DB9 Connector	Pin No.	RS-232	RS-422 (5-wire)	RS-485 (3-wire)
P3/P4	1	DCD	TXD-	DATA-
	2	RXD	TXD+	DATA+
	3	TXD	RXD+	-----
	4	DTR	RXD-	-----
	5	GND	GND	GND
	6	-----	-----	-----
	7	RTS	-----	-----
	8	CTS	-----	-----

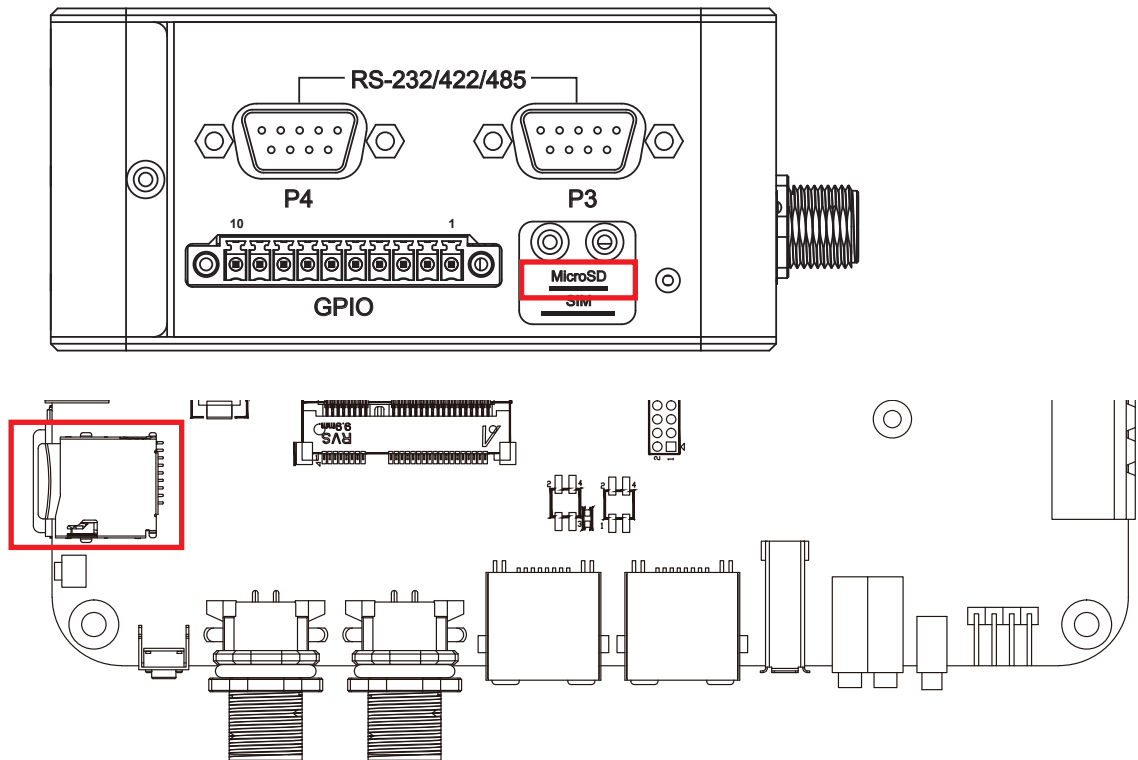
### 2.4.3 GPIO



In VIG-100 series, it is offered with eight programmable I/O within TTL 3.3V tolerance. If the GPIO is logic high, it indicates the accurate signal mapping on SIO GPIO pin and vice versa. (Please refer to [CH2.7](#) for detailed information.)

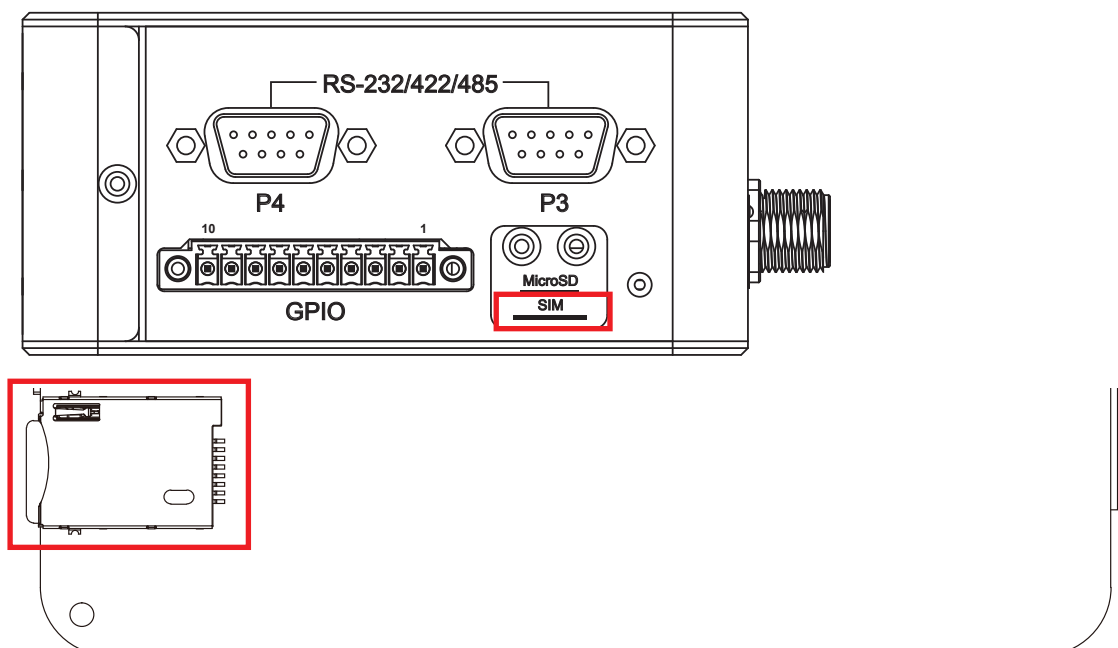
Pin No.	Description	Pin No.	Description
1	+V3.3	6	GPIO5
2	GPIO1	7	GPIO6
3	GPIO2	8	GPIO7
4	GPIO3	9	GPIO8
5	GPIO4	10	GND

## 2.4.4 MicroSD Card



The external MicroSD card provides additional storage expansion. It is located behind the cover-plate on the bottom panel. If you would like to replace or insert the card, you **MUST** ensure the system is powered off, loosen the screws, take out the cover-plate, and then access the slot. (Please refer to [CH3.2](#) for detailed information.)

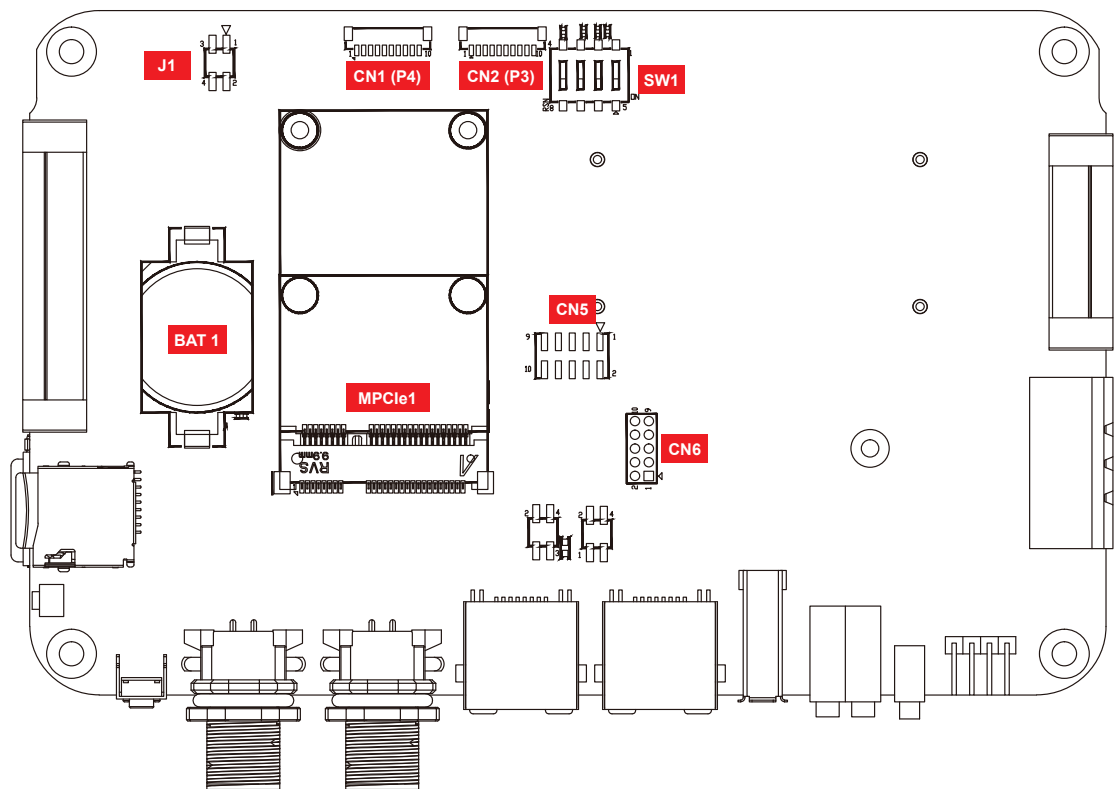
## 2.4.5 SIM Card



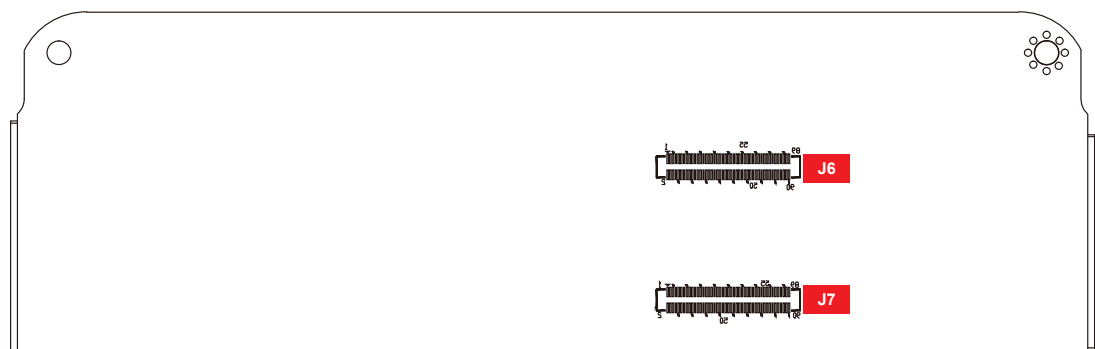
The external SIM card offers wireless communication capability to the system. It's also located behind the cover-plate and under the MicroSD slot. If you would like to replace or insert the card, please take the same actions as treating MicroSD card. (Please refer to [CH3.6](#) for detailed information.)

## 2.5 Main Board Expansion Connectors

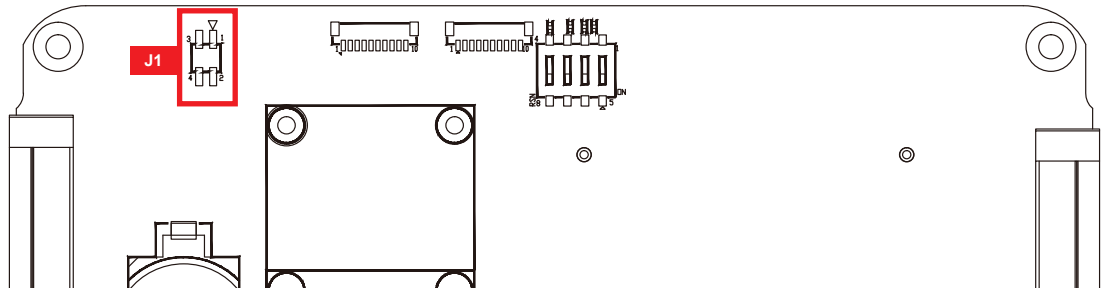
### 2.5.1 Top View of VIG-100 Main Board with Connector Locations



### 2.5.2 Bottom View of VIG-100 Main Board with Connector Locations



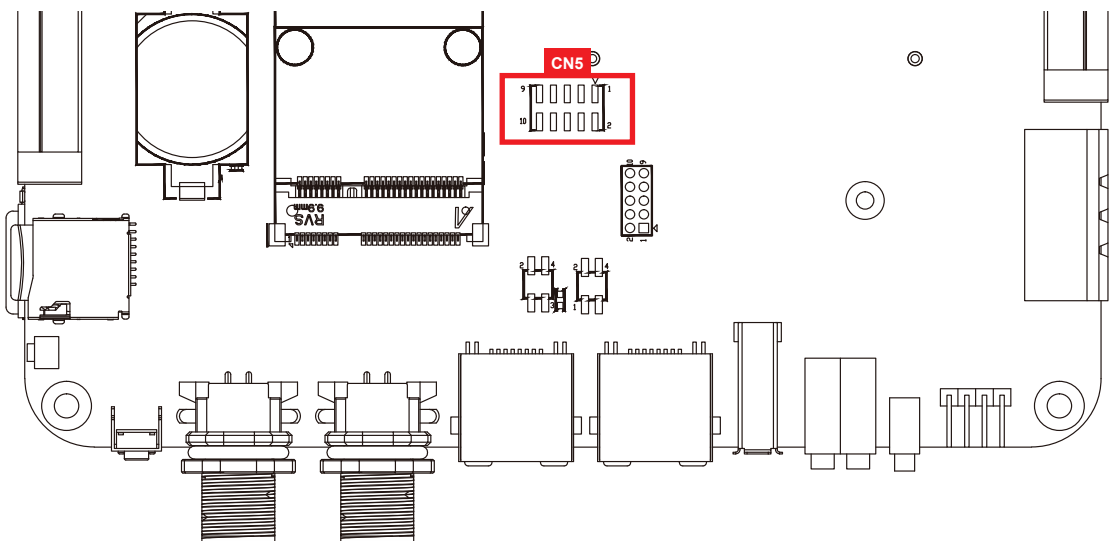
### 2.5.3 J1 : I2C Header



VIG-100 is also equipped with an I2C header.  
I2C Header Pin Out:

	Pin No.	Definition	Pin No.	Definition
J1	1	GND	3	+V3.3
	2	I2C2_SDA	4	I2C2_SCL

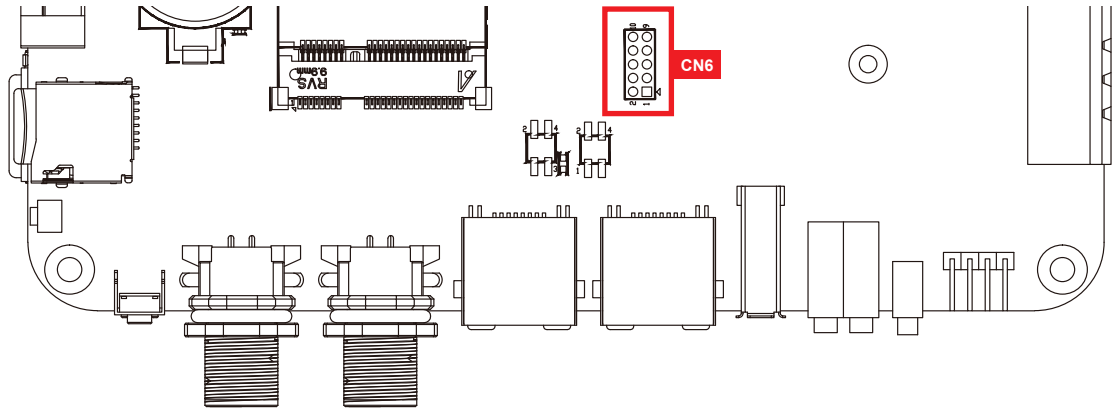
### 2.5.4 CN5 : Audio Header



There are 2 audio headers, Mic-in and Line-out, in VIG-100 series.  
Audio Header Pin Out:

Pin No.	Description	Pin No.	Description
1	MIC-L	2	A_GND
3	MIC-R	4	GND
5	LINEO-R	6	-----
7	-----	8	GND
9	LINEO-L	10	-----

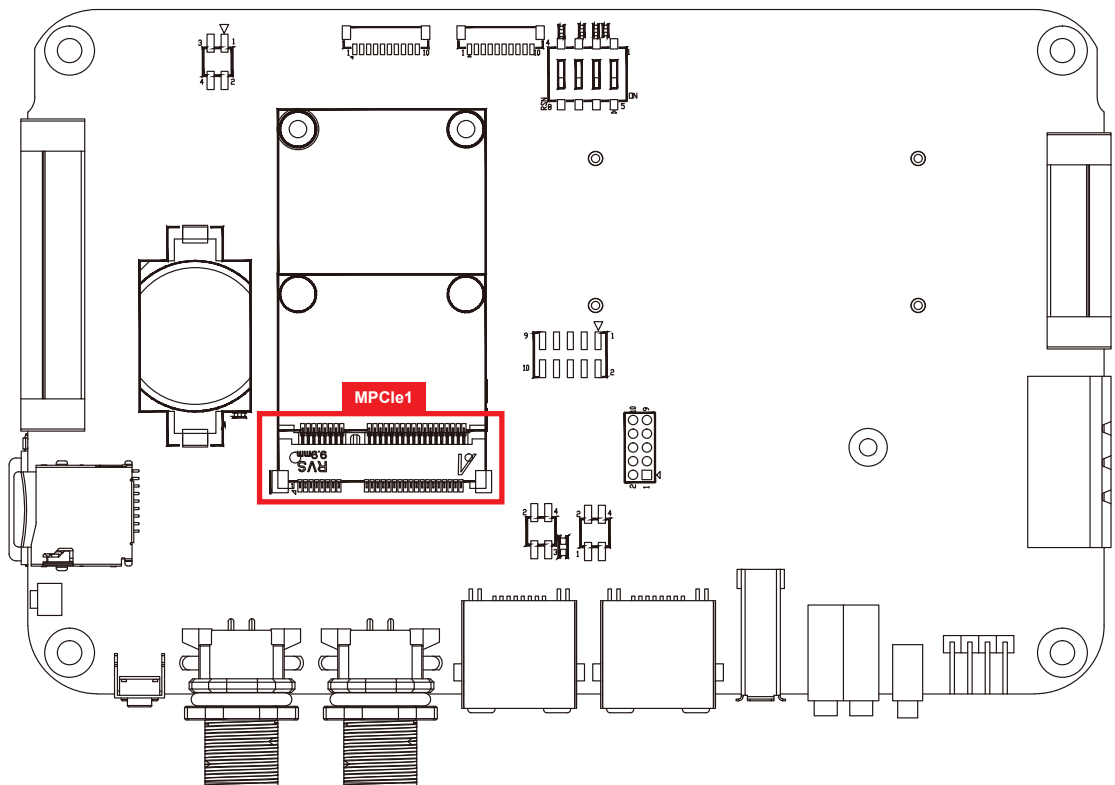
## 2.5.5 CN6 : NB-IoT Module Header



There is a NB-IoT module header in VIG-100.  
NB-IoT Header Pin Out:

Pin No.	Description	Pin No.	Description
1	-----	2	NB-IOT-TX
3	-----	4	NB-IOT-RX
5	-----	6	NB-IOT-RTS
7	GND	8	NB-IOT-CTS
9	GND	10	+V3.3

## 2.5.6 MPCIE1 : Mini PCIe Slot



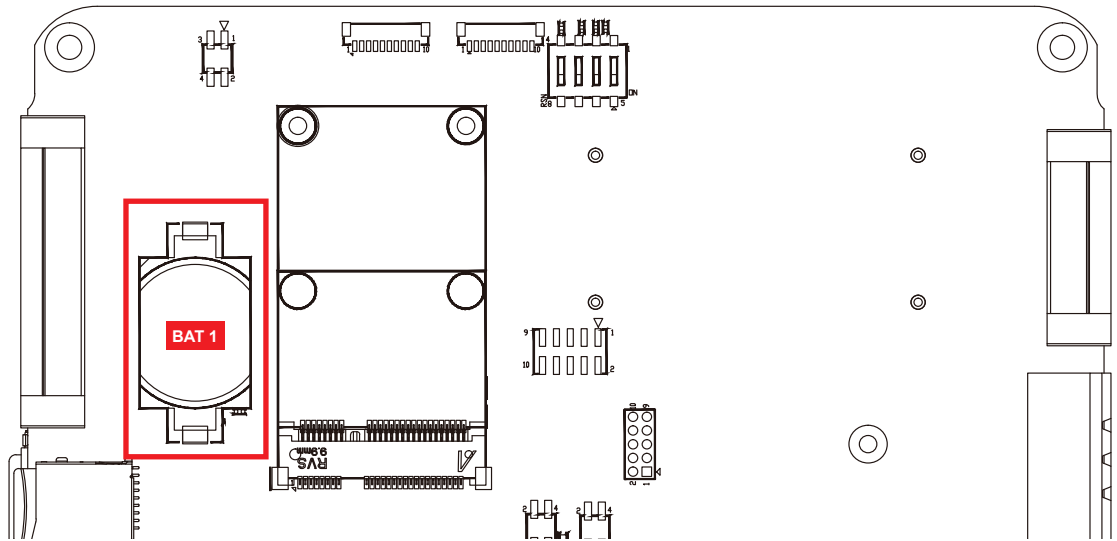
There is a Mini PCIe supported with USB signal in VIG-100.

Mini PCIe Pin Out:

Pin No.	function	Pin No.	function
51	Reserved	52	+V3.3
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	Reserved	44	Reserved
41	+V3.3	42	Reserved
39	+V3.3	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	Reserved	34	GND
31	Reserved	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	Reserved	26	GND
23	Reserved	24	+V3.3
21	GND	22	Reserved
19	Reserved	20	Reserved
17	Reserved	18	GND
Mechanical Key			
15	GND	16	Reserved
13	Reserved	14	Reserved
11	Reserved	12	Reserved
9	GND	10	Reserved
7	Reserved	8	Reserved
5	Reserved	6	1.5V
3	Reserved	4	GND
1	Reserved	2	+V3.3



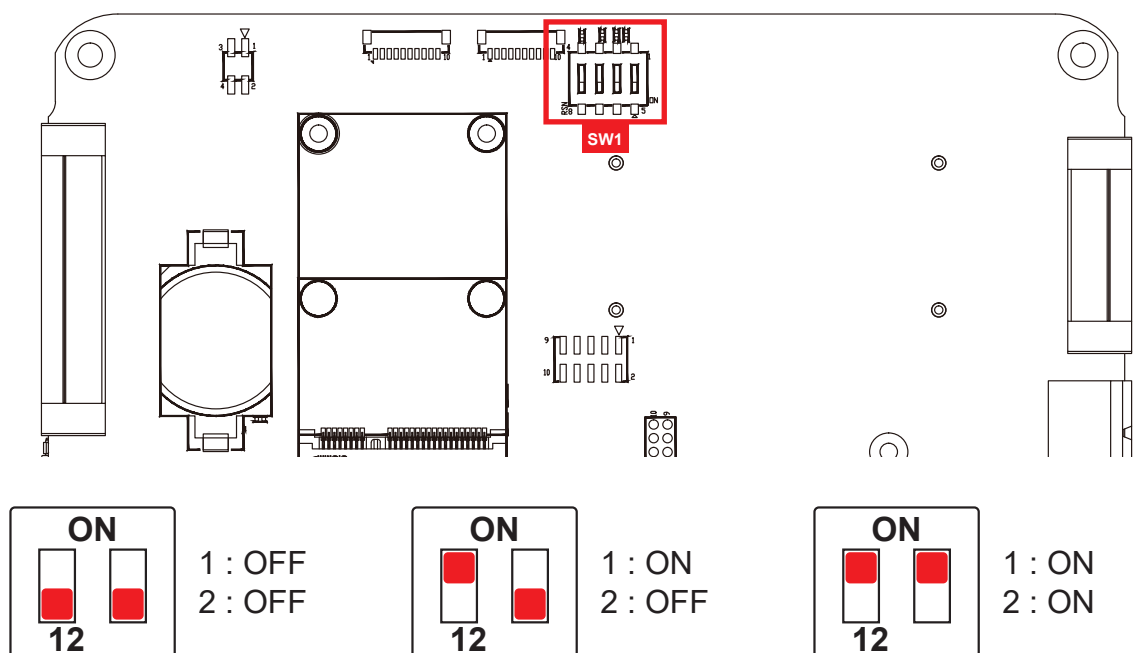
## 2.5.7 BAT1 : RTC Battery



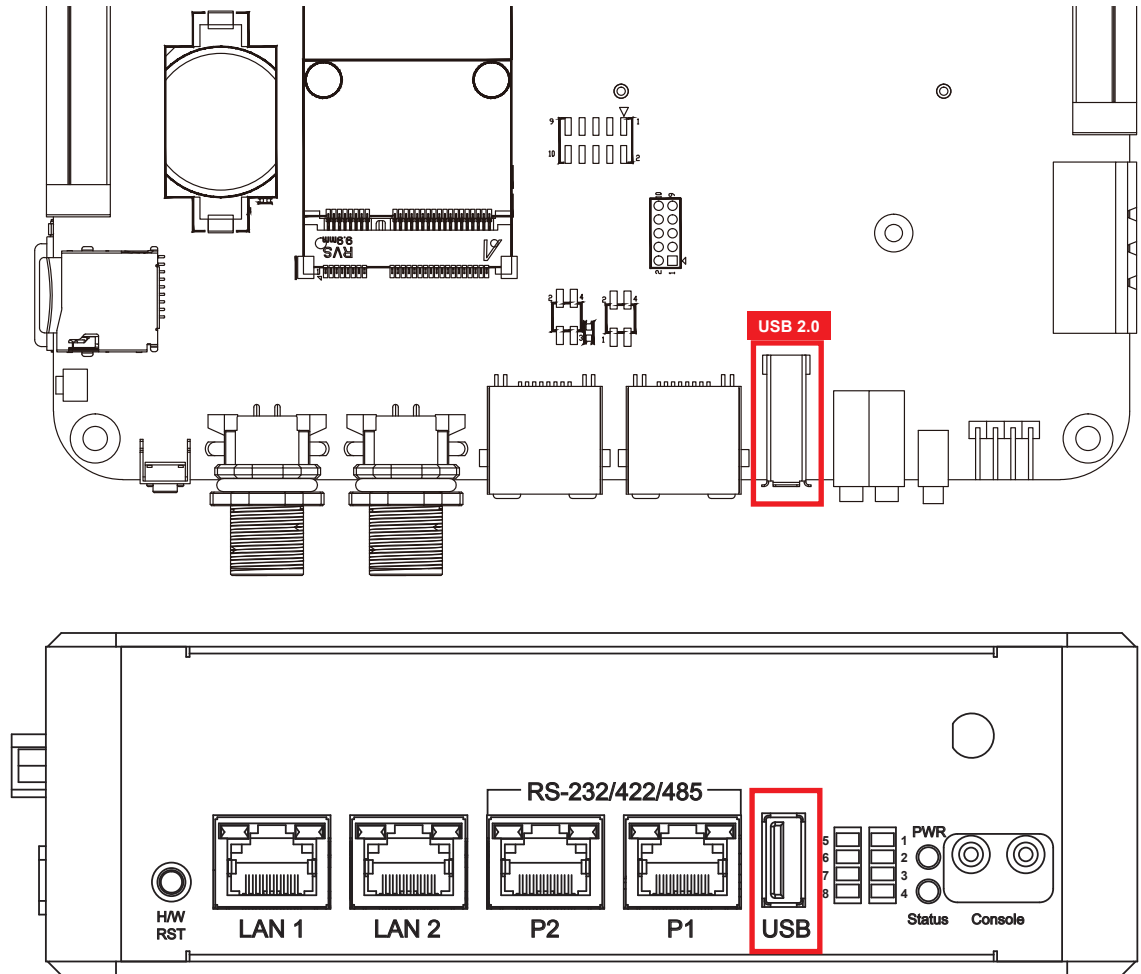
VIG-100 real-time clock is powered by a lithium battery. It is equipped with Panasonic BR2032 190mAh lithium battery. It is recommended that you not replace the lithium battery on your own. If the battery needs to be changed, please contact Vecow RMA service team.

## 2.6 Main Board Jumper & DIP Switch Settings

### 2.6.1 Top View of VIG-100 with Jumper and DIP Switch



## 2.6.2 SW1 : Boot Strap & USB2.0 Right angle +V5 Power(on/off)



There are a SW1 of boot strap mode and USB2.0 power on/off in VIG-100.

Item	Boot strap	USB2.0 (Right angle) 5V Power	Switch Position
1	NAND Mode	USB Power Off	
2	eMMC Mode	USB Power Off	
3	SD Card Mode	USB Power Off	
4	NAND Mode	USB Power ON	
5	eMMC Mode	USB Power ON	
6	SD Card Mode	USB Power ON	

## 2.7 GPIO Pin Assignments Table

Item	SOM Module GPIO Definition	VIG-100 GPIO Definition	Function
1	GPIO 3_0	GPIO1	GPIO Connector
2	GPIO 5_5	GPIO2	
3	GPIO 5_3	GPIO3	
4	GPIO 4_24	GPIO4	
5	GPIO 3_3	GPIO5	
6	GPIO 3_2	GPIO6	
7	GPIO 3_4	GPIO7	
8	GPIO 4_18	GPIO8	
9	GPIO 5_1	Programmable Button	Programmable Reset Button
10	GPIO 3_28	P1_MODE0	P1 Mode
11	GPIO 3_7	P1_MODE1	
12	GPIO 3_27	P1_MODE2	
13	GPIO 3_23	P2_MODE0	P2 Mode
14	GPIO 3_19	P2_MODE1	
15	GPIO 3_17	P2_MODE2	
16	GPIO 3_24	P3_MODE0	P3 Mode
17	GPIO 3_20	P3_MODE1	
18	GPIO 3_6	P3_MODE2	
19	GPIO 3_8	P4_MODE0	P4 Mode
20	GPIO 3_5	P4_MODE1	
21	GPIO 5_10	P4_MODE2	
22	GPIO 1_8	Watch dog	Watch dog
23	GPIO 1_0	USB_OTG	USB2.0 OTG
24	GPIO 5_7	Programmable LED(4)	Programmable LED
25	GPIO 5_8	Programmable LED(8)	
26	GPIO 5_9	MPCIE1 Slot USB Detect LED	
27	I2C1_SDA	I2C1_SDA	Board ID Address 1010 000x
28	I2C1_SCL	I2C1_SCL	
29	I2C2_SDA	I2C2_SDA	I2C RTC Real time clock/Calendar Address 1101 000x
30	I2C2_SCL	I2C2_SCL	

# 3

## SYSTEM SETUP

### 3.1 How to Open Your VIG-100

**Step 1** Loosen screws on top cover marked with "VECOW logo."



**Step 2** Open the Top cover.



## 3.2 Installing MicroSD Card

**Step 1** Unscrew the 2 screws on the MicroSD & SIM card cover.



**Step 2** Push into SD slot.



### 3.3 Installing Mini PCIe Card

**Step 1** Insert the Mini PCIe module into the slot at a 45-degree angle.



**Step 2** Push the Mini PCIe card down and use the provided mounting screw to lock onto motherboard.



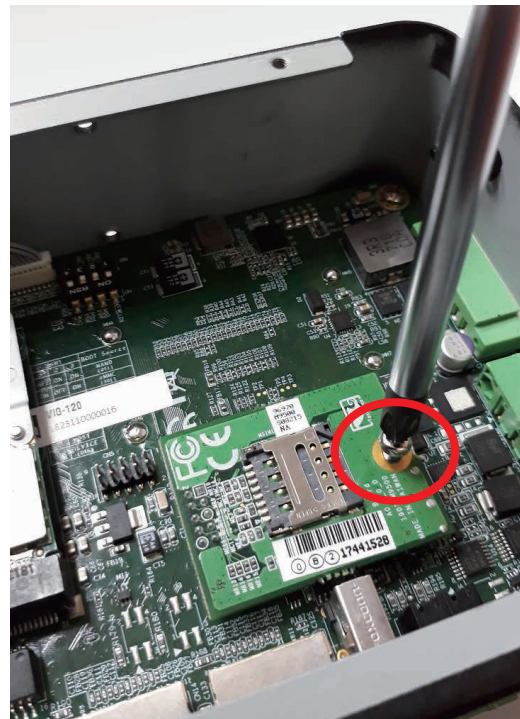
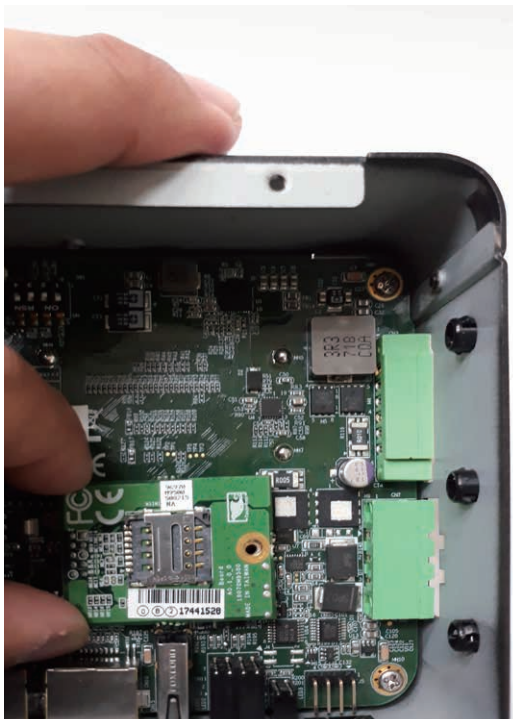
### 3.4 Installing LPWAN NB-IoT Module

**Step 1** Find out NB-IoT Module screw hole.



**Step 2** Align the NB-IoT Module to the screw hole.

**Step 3** Secure with a M3 screw.



### 3.5 Installing Antenna Cable

**Step 1** Check antenna cable and washers.



**Step 2** Remove the hole plugs on VIG-100 top side.



**Step 3** Fasten washer 1, washer 2, and washer 3 on antenna cable connectors.





## 3.6 Installing SIM Card

**Step 1** Unscrew the 2 screws on the MicroSD & SIM card cover.



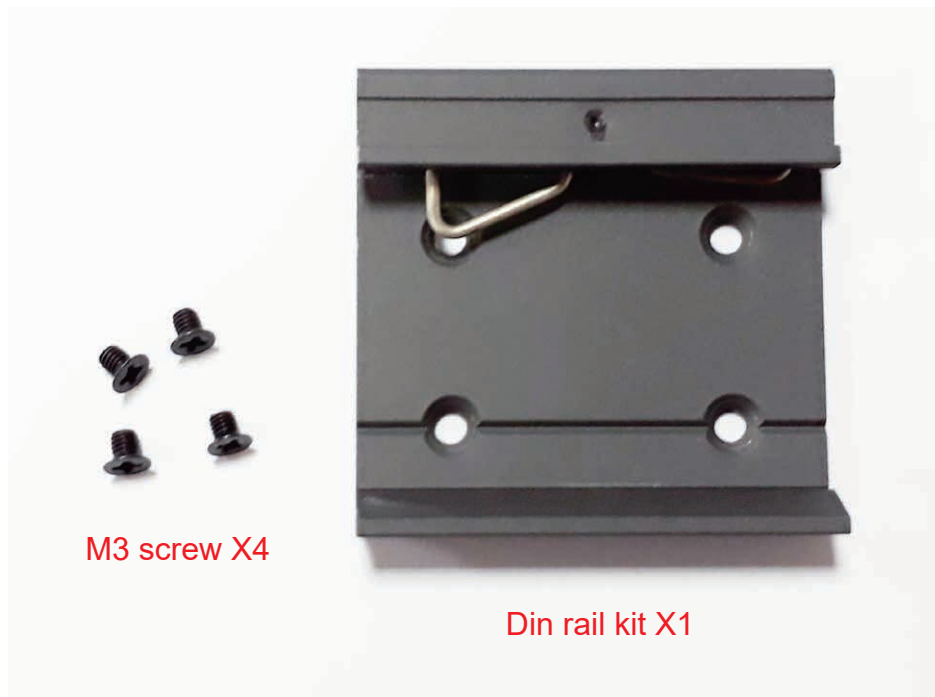
**Step 2** Push into SIM slot.



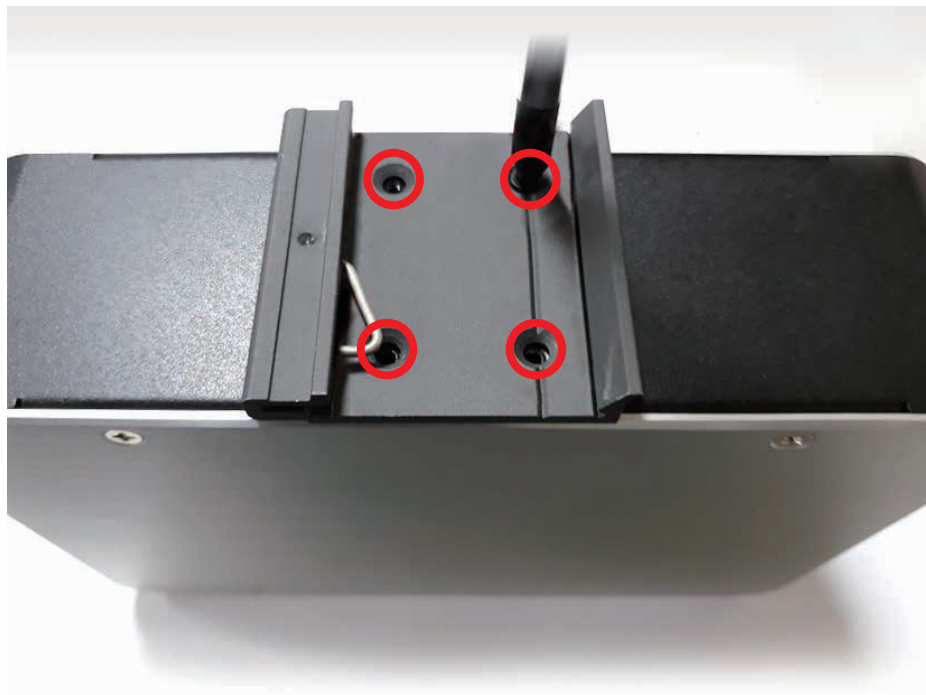
## 3.7 Mounting Your VIG-100

### 3.7.1 DIN-RAIL

**Step 1** DIN rail parts as follows.



**Step 2** Lock the screws.



### 3.7.2 Wall Mount

**Step 1** Wall Mount parts as follows.

Wall Mount screw X3

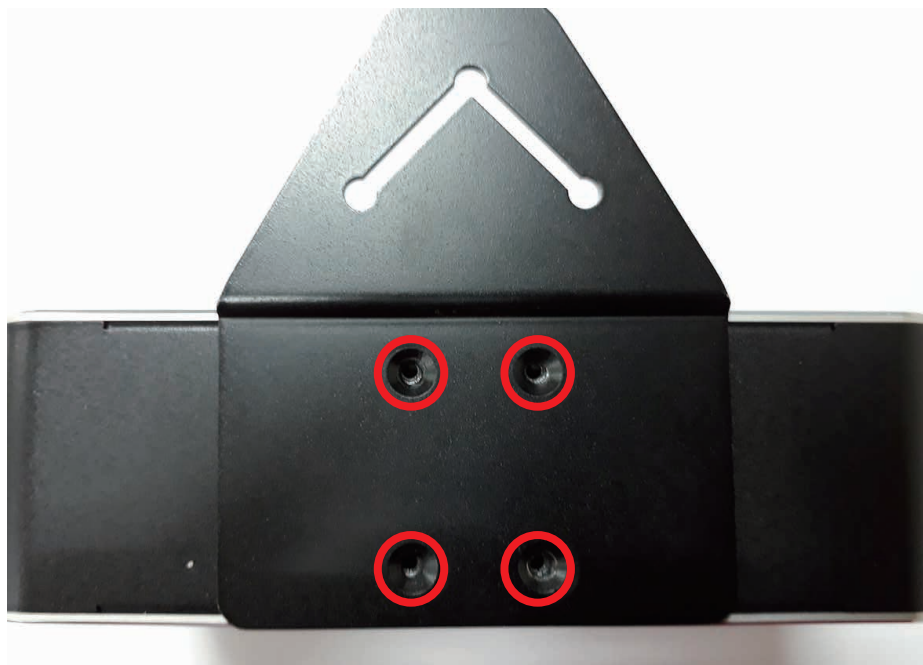


M3 screw X4

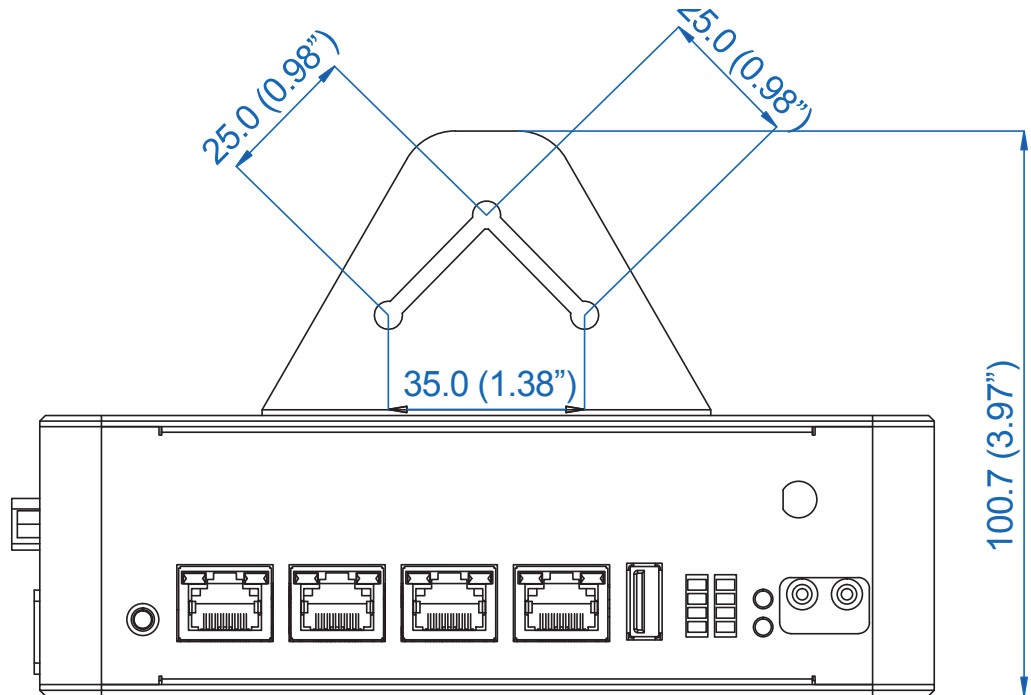


Din rail kit X1

**Step 2** Lock the screws.



**Step 3** Please locate your the screw holes according to the size of the figure below.

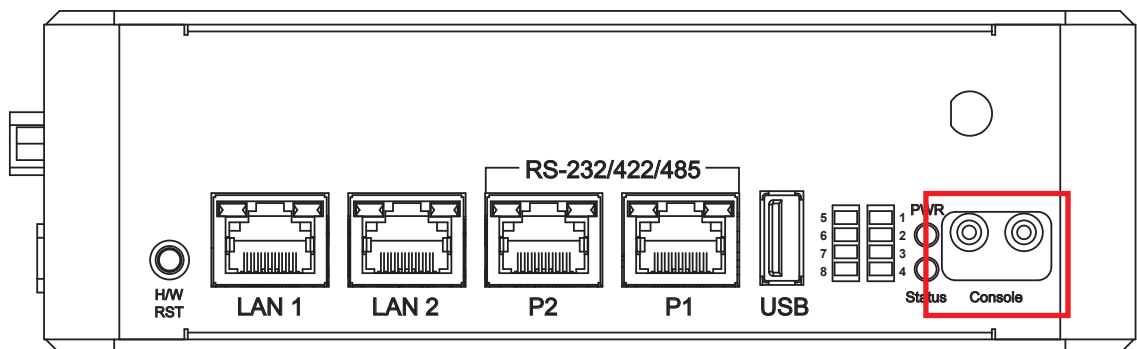


# 4


## SOFTWARE SETUP

### 4.1 Console Port Login

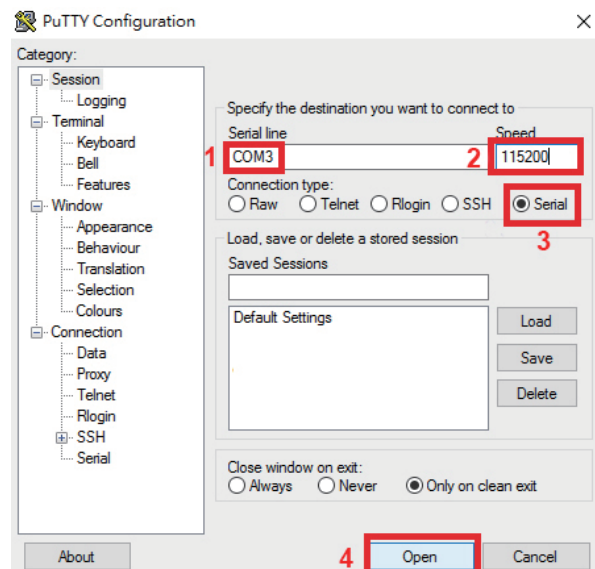
1. Set up a connection between your host computer and VIG-100 console port.



2. Go to “Device Manger,” check “COM & LPT” and you will find “USB SerialPort (COM3)” as Console Port.  
Note : This COM number is not a fixed value and depends on your own device. We take COM3 here for instance.

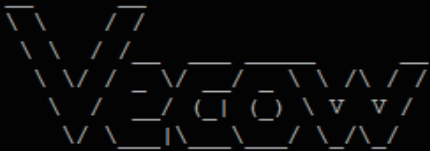
3. Please click “” and choose “Run as Administrator” to bring up the PuTTY Configuration window.

4. Go to Category > Serial, enter the COM (COM3) port you connected your host computer to VIG-100 and enter the following parameters:



5. Make sure VIG-100 Power ON, and then a series of messages may appear. Enter "root" to login.

```
Starting LSB: Advanced IEEE 802.11 management daemon...
Starting LSB: disk temperature monitoring daemon...
Starting /etc/rc.local Compatibility...
[ OK ] Started LSB: Advanced IEEE 802.11 management daemon.
[ OK ] Started LSB: disk temperature monitoring daemon.
[ OK ] Started /etc/rc.local Compatibility.
[ OK ] Started Getty on tty1.
[ OK ] Started Serial Getty on ttymxc0.
[ OK ] Reached target Login Prompts.
[ OK ] Started LSB: Start NTP daemon.
[ OK ] Reached target Multi-User System.
Starting Update UTMP about System Runlevel Changes...
[ OK ] Started Update UTMP about System Runlevel Changes.
```

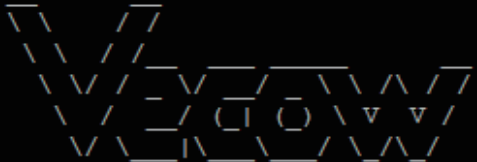


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VIG-100 login: root

6. Please remember to change the default password "root" to avoid unauthorized access.  
Note : Please kindly note that the password is not shown while typing.

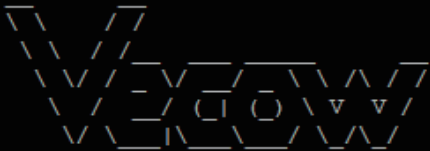
```
Starting LSB: Advanced IEEE 802.11 management daemon...
Starting LSB: disk temperature monitoring daemon...
Starting /etc/rc.local Compatibility...
[ OK ] Started LSB: Advanced IEEE 802.11 management daemon.
[ OK ] Started LSB: disk temperature monitoring daemon.
[ OK ] Started /etc/rc.local Compatibility.
[ OK ] Started Getty on tty1.
[ OK ] Started Serial Getty on ttymxc0.
[ OK ] Reached target Login Prompts.
[ OK ] Started LSB: Start NTP daemon.
[ OK ] Reached target Multi-User System.
Starting Update UTMP about System Runlevel Changes...
[ OK ] Started Update UTMP about System Runlevel Changes.
```



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7. And then “root@VIG-100:~#” will appear. You are ready to begin configuring your system.

```
Starting LSB: Advanced IEEE 802.11 management daemon...
Starting LSB: disk temperature monitoring daemon...
Starting /etc/rc.local Compatibility...
[ OK ] Started LSB: Advanced IEEE 802.11 management daemon.
[ OK ] Started LSB: disk temperature monitoring daemon.
[ OK ] Started /etc/rc.local Compatibility.
[ OK ] Started Getty on tty1.
[ OK ] Started Serial Getty on ttymxc0.
[ OK ] Reached target Login Prompts.
[ OK ] Started LSB: Start NTP daemon.
[ OK ] Reached target Multi-User System.
Starting Update UTMP about System Runlevel Changes...
[ OK ] Started Update UTMP about System Runlevel Changes.
```



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VIG-100 login: root

## 4.2 COM Port

There is some necessary configuration before user start COM Port transmission. For example, to set COM Port 1 as RS232 mode, please follow the steps as below :

### Example 1 : set COM Port 1 to RS232 mode

#### Step 1 Export GPIO 92, 71, 91 pin

```
root@VIG-100:~# echo 92 > /sys/class/gpio/export
root@VIG-100:~# echo 71 > /sys/class/gpio/export
root@VIG-100:~# echo 91 > /sys/class/gpio/export
```

#### Step 2 Set GPIO 92, 71, 91 as output pin

```
root@VIG-100:~# echo out > /sys/class/gpio/gpio92/direction
root@VIG-100:~# echo out > /sys/class/gpio/gpio71/direction
root@VIG-100:~# echo out > /sys/class/gpio/gpio91/direction
```

#### Step 3 Follow the truth table to set COM Port 1 mode pin to "High", "Low", "low" (RS232 mode)

```
root@VIG-100:~# echo 1 > /sys/class/gpio/gpio92/value
root@VIG-100:~# echo 0 > /sys/class/gpio/gpio71/value
root@VIG-100:~# echo 0 > /sys/class/gpio/gpio91/value
```

To enable COM Port 3 and 4, there is an extra COM port enable pin "GPIO 2" needs to config to low state (Enable), please refer to Figure 4-2-1.

Mode	Mode Pin 0	Mode Pin 1	Mode Pin 2	Enable Pin
COM Port 1 (/dev/ttymx2)	GPIO 92	GPIO 71	GPIO 91	N/A
COM Port 2 (/dev/ttymx4)	GPIO 87	GPIO 83	GPIO 81	N/A
COM Port 3 (/dev/ttymx6)	GPIO 88	GPIO 84	GPIO 70	GPIO 2
COM Port 4 (/dev/ttymx7)	GPIO 72	GPIO 69	GPIO 79	

Figure 4-2-1 : COM Port mode GPIO pin mapping and device name

Mode	Mode Pin 0	Mode Pin 1	Mode Pin 2
Loop Back	Low	Low	Low
RS232	High	Low	Low
RS485	Low	High	Low
RS422 (5-wire)	High	High	Low
RS422 (9-wire)	Low	Low	High

Figure 4-2-2 : COM Port mode truth table



## 4.3 I2C interface

There are two different I2C bus on VIG-100 system, I2C-1 is for SOM internal used, I2C-2 is connected to RTC and external I2C Header, if user want to using external I2C header, please avoid the occupied I2C address.

```
root@VIG-100:~/Vig100_test/i2c# i2cdetect -y 0
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50: 50 51 52 53 54 55 56 57  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --

root@VIG-100:~/Vig100_test/i2c# i2cdetect -y 1
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  UU  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50: 50 51  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  UU  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
```

Figure 4-3-1 : I2C device address table

## 4.4 GPIO & LED

VIG-100 has 8 Programmable GPIO and 2 Programmable LED (totally 8 LED, but only 2 programmable), similar to COM port configuration, users need to figure out the pin mapping before program. The following steps are example to set GPIO 1 as output high, and turn on LED 4 :

### Example 1 : Set GPIO 1 as output high

```
root@VIG-100:~# echo 64 > /sys/class/gpio/export
root@VIG-100:~# echo out > /sys/class/gpio/gpio64/direction
root@VIG-100:~# echo 1 > /sys/class/gpio/gpio64/value
```

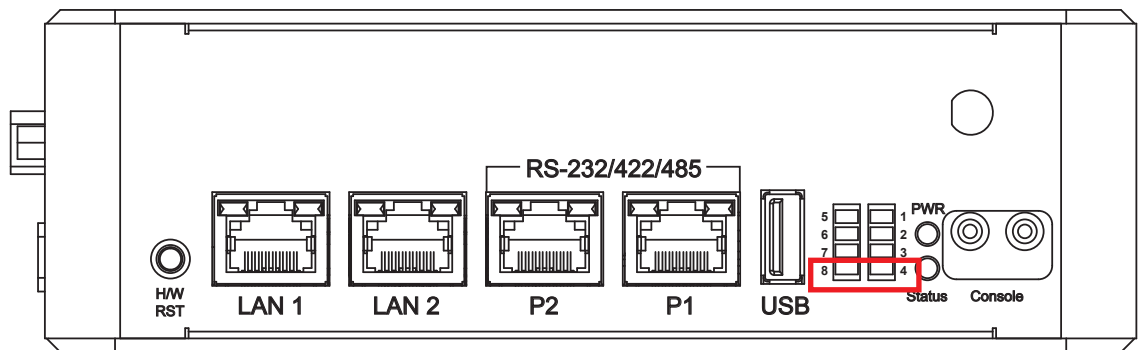
### Example 2 : Turn LED 4

```
root@VIG-100:~# echo 136 > /sys/class/gpio/export
root@VIG-100:~# echo out > /sys/class/gpio/gpio136/direction
root@VIG-100:~# echo 0 > /sys/class/gpio/gpio136/value
```



Mode	SOM GPIO number	Connector pin
GPIO 1	GPIO 64	Pin 2
GPIO 2	GPIO 133	Pin 3
GPIO 3	GPIO 131	Pin 4
GPIO 4	GPIO 120	Pin 5
GPIO 5	GPIO 67	Pin 6
GPIO 6	GPIO 66	Pin 7
GPIO 7	GPIO 68	Pin 8
GPIO 8	GPIO 114	Pin 9

Figure 4-4-1 : Programmable GPIO pin mapping



LED No.	LED Status	LED No.	LED Status
1	P3 (COM3) TX Transport Blinking	5	P4 (COM4) TX Transport Blinking
2	CAN 1 TX Transport Blinking	6	CAN 2 TX Transport Blinking
3	Mini PCIe Slot USB Detect LED	7	MicroSD Card Detect LED
4	Programmable LED	8	Programmable LED

LED No.	SOM GPIO number	LED No.	SOM GPIO number
LED 4	GPIO 136	LED 8	GPIO 135

Figure 4-4-2: Programmable LED pin mapping

## 4.5 Network

VIG-100 supports two 100Mbps Ethernet RJ45/M12 type interface, user can configure their IP by static assign as following :

```
root@VIG-100:~# ifconfig eth0 192.168.2.10 netmask 255.255.255.0
root@VIG-100:~# route add default gw 192.168.2.1
root@VIG-100:~# echo "nameserver 168.95.1.1" > /etc/resolv.conf

root@VIG-100:~# ifconfig eth0
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 192.168.2.10 netmask 255.255.255.0 broadcast 192.168.2.255
    ether f8:dc:7a:0d:7f:48 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Figure 4-5-1: Configure Static IP

Or using DHCP client (e.g. dhclient) to grant IP address automatically :

```
root@VIG-100:~# ifdown eth1
root@VIG-100:~# dhclient eth1 &
[1] 447
root@VIG-100:~# Micrel KS28081 or KS28091 20b4000.ethernet:01: attached PHY driver [Micrel KS28081 o
r KS28091] (miibus:phy_addr=20b4000.ethernet:01, irq=-1)
IPv6: ADDRCONF(NETDEV_UP): eth1: link is not ready
fec 2188000.ethernet eth1: Link is Up - 100Mbps/Full - flow control rx/tx
IPv6: ADDRCONF(NETDEV_CHANGE): eth1: link becomes ready

root@VIG-100:~# ifconfig eth1
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.186 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::fadc:7aff:fe0d:7f49 prefixlen 64 scopeid 0x20<link>
    ether f8:dc:7a:0d:7f:49 txqueuelen 1000 (Ethernet)
    RX packets 497 bytes 44758 (43.7 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 58 bytes 5592 (5.4 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Figure 4-5-2: Configure IP via DHCP client

## 4.6 CANbus

VIG-100 also integrated two CANbus that support CAN 2.0B protocol, the CAN protocol was primarily designed to be used as a vehicle serial data bus meeting the specific requirements of this field. Simply using follow command to establish SocketCAN interface :

### Example 1 : Enable can0 & can1 with 125000 bitrate

```
root@VIG-100:~# ifconfig can0 down
root@VIG-100:~# ifconfig can1 down
root@VIG-100:~# ip link set can1 up type can bitrate 125000
IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
root@VIG-100:~# ip link set can0 up type can bitrate 125000
IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
root@VIG-100:~# ifconfig
can0: flags=193<UP,RUNNING,NOARP> mtu 16
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 10 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 26

can1: flags=193<UP,RUNNING,NOARP> mtu 16
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 10 (UNSPEC)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 27
```

Figure 4-6-1: Configure CANbus

# A

## APPENDIX A : POWER CONSUMPTION

Testing Board	VIG-120
RAM :	512MB (On Board)
USB 2.0-1 :	Transcend USB 3.0 Flash 8GB
LAN 1 :	100Mbps
LAN 2 :	100Mbps
Graphics Output :	USB Console (with Putty)
Test Program :	Software RD provide
Power Source :	Chroma 62006P-100-25

### Power on and boot to Linux Core

Processor	Power Input	Idle status CPU usage less 5%		Run over 90% CPU usage	
		Max Current	Max Consumption	Max Current	Max Consumption
NXP i.MX6 UltraLite 696MHz Arm® Cortex®-A7 processor	06V	0.253A	01.52W	0.287A	01.72W
	09V	0.175A	01.58W	0.211A	01.90W
	12V	0.144A	01.73W	0.170A	02.04W
	24V	0.093A	02.23W	0.093A	02.23W
	36V	0.074A	02.66W	0.084A	03.02W
	40V	0.071A	02.84W	0.079A	03.16W



For further support information, please visit [www.vecow.com](http://www.vecow.com)

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