

## User Manual

# Edge AI Box

AIX-8000

Qualcomm Dragonwing  
QCS8550



# Revision History

Revision	Description	Date
0.1	Preliminary Release	2025-12-22

# Copyright Notice

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# Declaration of Conformity

## FCC Class A



### Note

This equipment has been tested and found to comply with the limits for a Class A digital device 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 such cases users will be required to correct the interference at their own expense.



### Warning

*Any modifications to this device that are not approved by the relevant standards authority may void the authority granted to the user by the FCC to operate this equipment.*

## Packing List

Before installing the AIX-8000 Edge AI Box, check that the following materials have been included in the shipment:

- AIX-8000 Unit x1
- Accessories
  - T6 Screw Driver x1
  - Screw Pack
  - Wi-Fi/Bluetooth Antenna x2 (Applicable when Wi-Fi/Bluetooth module is configured)
  - Cellular Antenna x4 (Applicable when cellular module is configured)
  - 60W Power Adapter x1 (Optional)
  - Power Cord x1 (Optional)
  - DIN Rail Kit (Optional)
  - VESA Mount Kit (Optional)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

## Technical Support and Assistance

Visit the Sysgration website at <http://www.sysgration.com> to obtain the latest product information.

For technical support or additional assistance, contact your distributor, sales representative, or Sysgration's customer service center. Please have the following information ready before calling:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

# Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all AC outlets before cleaning. Use only a damp cloth for cleaning; do not use liquid or spray detergents.
4. For pluggable equipment, ensure the power outlet socket is located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a stable surface during installation. Dropping or allowing the equipment to fall may cause damage.
7. The openings of the enclosure are for air convection. Protect the equipment from overheating by not covering the openings.
8. Verify that the voltage is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas and avoid placing anything over it.
10. Note all cautions and warnings on the equipment.
11. If the equipment will not be used for an extended period, disconnect it from the power source to prevent damage from transient overvoltage.
12. Never pour liquid into any opening, as this may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should only be opened by qualified service personnel.
14. Have the equipment checked by authorized service personnel if any of the following occur:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - The equipment has been exposed to moisture.
  - The equipment is malfunctioning or does not operate according to the user manual.
  - The equipment has been dropped or damaged.
  - The equipment shows obvious signs of breakage.

15. Do not store the equipment in environments where temperatures fluctuate below  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) or above  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ), as this may cause damage. Store the equipment in a controlled environment.



**Warning**

Because of the risk of electric shock, do not remove the equipment cover during operation or when connected to a power outlet.



**Caution!**

To avoid short circuits and otherwise damaging the device, do not allow fluids to come in contact with the device. If fluids are accidentally spilled on the equipment, remove the affected unit from service as soon as possible and contact service personnel to verify that personal safety is not compromised.

# Content

<b>Revision History</b> .....	<b>1</b>
<b>Copyright Notice</b> .....	<b>1</b>
<b>Declaration of Conformity</b> .....	<b>1</b>
<b>Packing List</b> .....	<b>2</b>
<b>Technical Support and Assistance</b> .....	<b>2</b>
<b>Safety Instructions</b> .....	<b>3</b>
<b>1. General Information</b> .....	<b>6</b>
1.1. Introduction.....	6
1.2. Specifications .....	6
1.3. System Block Diagram.....	8
1.4. Dimensions .....	9
1.4.1. Front View .....	9
1.4.2. Rear View .....	9
1.4.3. Top View.....	10
1.4.4. Side View .....	10
<b>2. Interface Introduction</b> .....	<b>11</b>
2.1. External Interface.....	11
2.1.1. Front I/O Interface .....	11
2.1.2. Rear Interface.....	12
2.2. Internal Interface .....	13
2.2.1. Bottom Slot.....	13
2.2.2. Front I/O Slot .....	14
2.3. Pin Definitions.....	14
2.3.1. USB 3.0 Connectors .....	14
2.3.2. Front I/O Slot .....	15
2.3.3. Digital IN/OUT and Analog IN.....	16
2.3.4. Controller Area Network (CAN) Bus .....	16
2.3.5. Serial Port .....	16
2.3.6. 9~36 V DC Connector .....	17
2.3.7. M.2 Connector.....	17
<b>Appendix A Compatible Module List</b> .....	<b>18</b>

# 1. General Information

## 1.1. Introduction

Sysgration specializes in the design of automotive and industrial electronic products, delivering high-performance and highly reliable embedded solutions.

The AIX-8000 is a fanless, high-performance edge AI inference system built on the SMARC architecture and powered by the Qualcomm Dragonwing QCS8550 platform. It accelerates deep learning workloads for object detection, recognition, and classification, making it ideal for industrial applications such as medical image processing, logistics automation, autonomous vehicles, smart retail, and AI-based network video recorders (NVR).

This compact fanless system offers extensive industrial I/O and advanced visual inferencing capabilities, featuring dual HDMI displays, dual GbE ports, two USB 3.0 ports, two COM ports, two CAN bus interfaces, two M.2 Key B slots, one M.2 Key E slot, a microSD card slot, and a NanoSIM socket to support wireless connectivity options including Wi-Fi, 3G/4G LTE, 5G, and 5G RedCap. Sysgration's AI Box solution enables powerful edge AI performance with exceptional efficiency and convenience while maintaining minimal power consumption.

## 1.2. Specifications

System	
CPU	Qualcomm® Dragonwing™ QCS8550
GPU	Qualcomm® Adreno™ 740
AI	48 INT8 TOPs
RAM	16GB LPDDR5x
Storage	128GB UFS
OS	Android 13, Yocto Linux

## Interfaces

Button	1x power with LED, 1x reset
HDMI	2x HDMI 4K@30fps
USB	2x USB 3.0 Type-A
Ethernet	2x 10/100/1000Mbps Ethernet
Serial Port	2x COM RS-232/422/485
CAN Bus	2x CAN FD and 2.0B
LED Indicator	4x Programmable LEDs
Digital I/O	4
Analog Input	2
Audio	N/A

## Extension Slots

M.2	1x M.2 2242/52/80 Key B socket 1x M.2 2280 Key B Socket 1x M.2 2230 Key E Socket
SD Card Slot	1x MicroSD Card Slot
SIM Slot	1x NanoSIM Slot

## Wireless Connectivity

Wi-Fi/Bluetooth	M.2 Wi-Fi 7/Bluetooth Combo Module (optional) IEEE 802.11be/ax/ac/a/b/g/n, Bluetooth v5.4
Cellular	M.2 5G module (optional)

## Power Supply

DC Input	9V ~ 36V, 3-pole Terminal Block
AC Input	60W power adapter (optional)

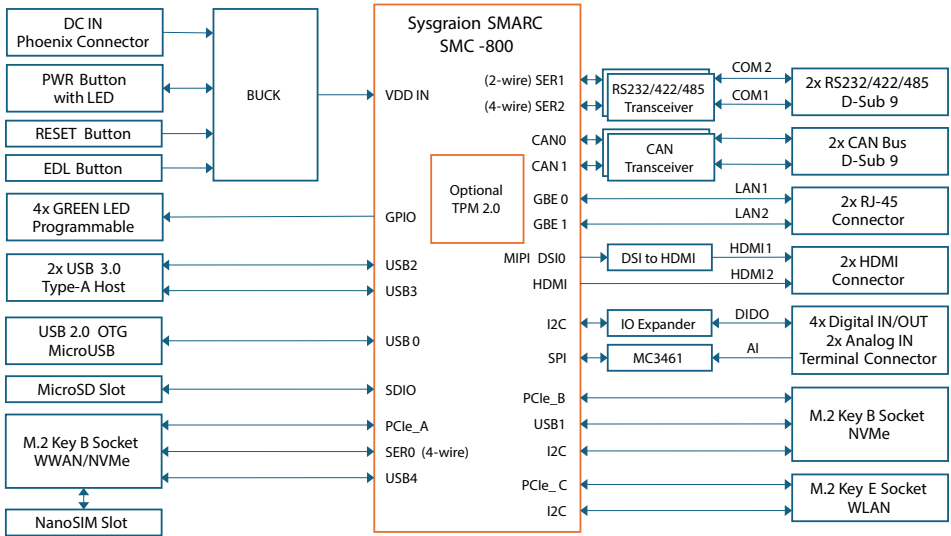
## Mechanical

Dimensions (W x D x H)	163mm x 106mm x 58.5mm
Weight	1.725 KG
Mounting	Wall mount, VESA DIN rail (optional)
Antenna Connector	6x SMA connector (optional)

## Environmental

Operating Temperature	-20°C to 60°C
Operating Humidity	5%~90% @40°C (non-condensing)
Storage Temperature	-40°C to +85°C
Regularity	CE & FCC class B

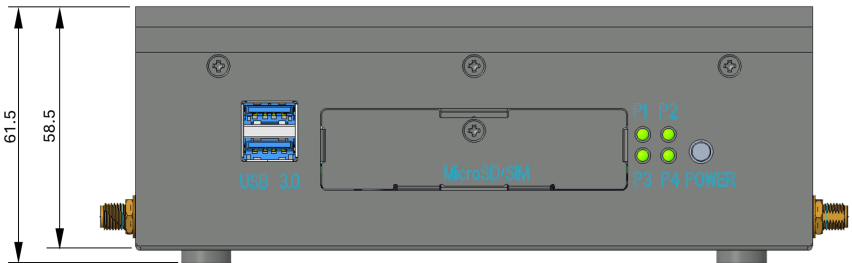
# 1.3. System Block Diagram



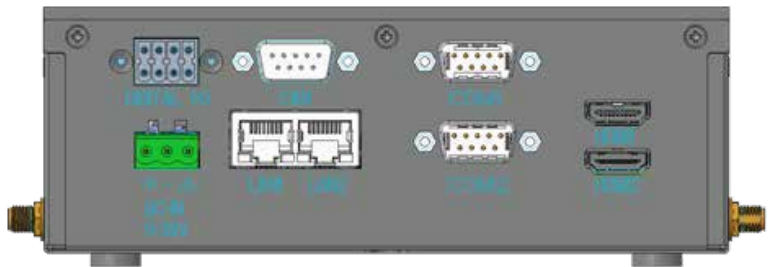
## 1.4. Dimensions

### 1.4.1. Front View

All dimensions shown in millimeters (mm).

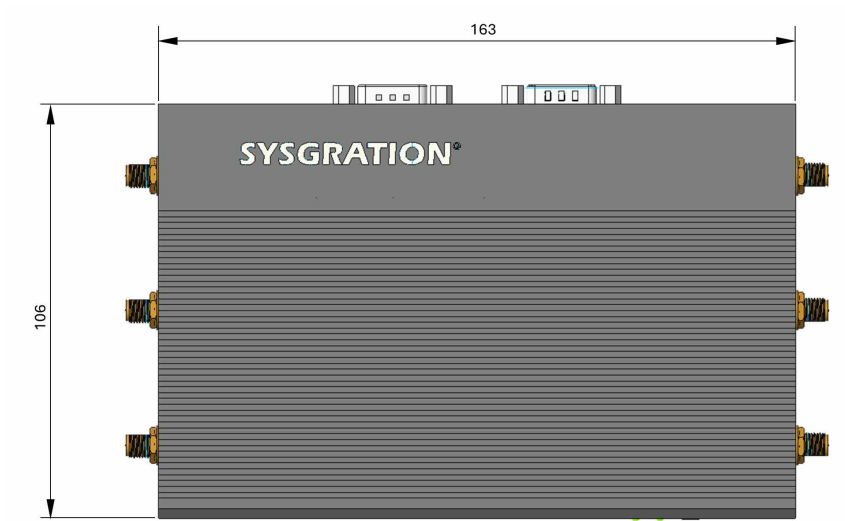


### 1.4.2. Rear View

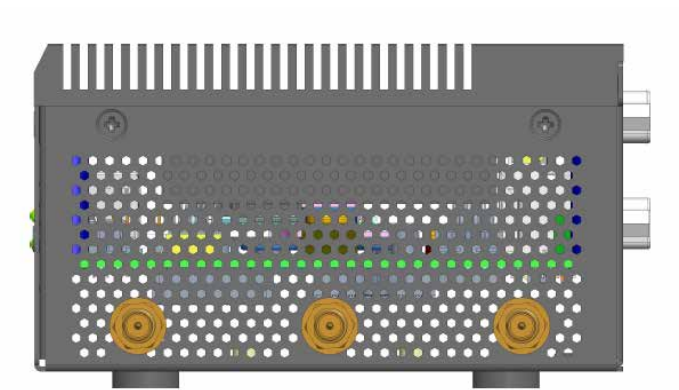


### 1.4.3. Top View

All dimensions shown in millimeters (mm).



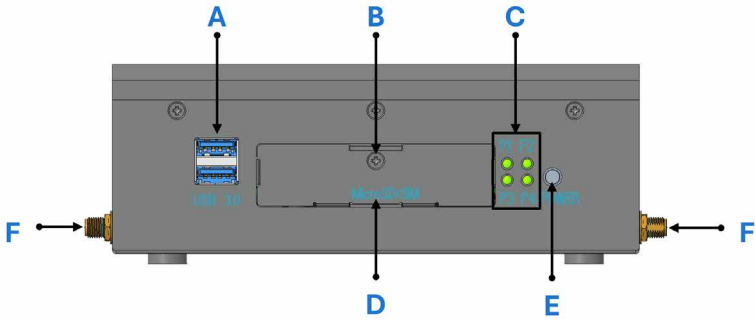
### 1.4.4. Side View



## 2. Interface Introduction

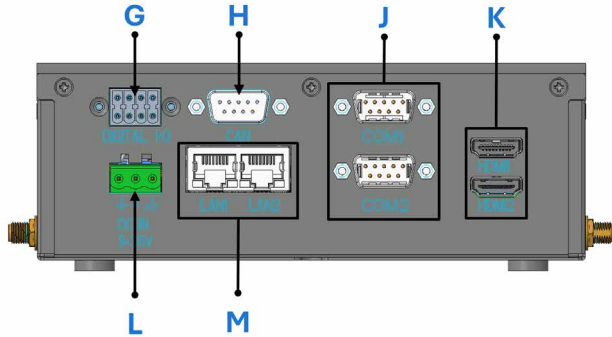
### 2.1. External Interface

#### 2.1.1. Front I/O Interface



Item	Name	Description
A	USB 3.0 Type-A	See <b>Section 2.3.1 USB 3.0 Connectors</b>
B	T6 Screw	Security Lock of Front Slot
C	LED Indicators	4x Software programmable GREEN lights
D	Front I/O Door	The front I/O door secures MicroSD/SIM cards, RESET button and EDL button and EDL connector to prevent the removal and unexpected activation. See <b>Section 2.3.2. Front I/O Door</b>
E	Power Key with LED	The power button is a non-latched push button with a green LED power indicator. Press to power on/ power off the system. The button LED lights up when the system is turned on.
F	SMA Connector	Optional SMA connectors depending on the SKU, such as Wi-Fi/BT or cellular module.

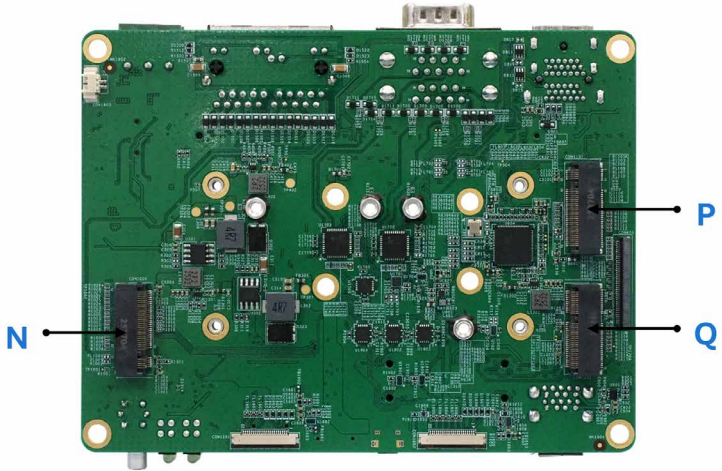
## 2.1.2. Rear Interface



Item	Name	Description
G	Digital/ Analog	4x Digital I/O and 2x Analog Input (8-Pin Terminal connector) See <b>Section 2.3.3. Digital IN/OUT and Analog IN</b>
H	CAN Bus	2x CAN FD & CAN 2.0B (backward compatible with 2.0A) See <b>Section 2.3.4. Controller Area Network (CAN) Bus</b>
J	Serial Port	2x COM port (DB-9 connector) RS-232/422/485 (Software Programmable) See <b>Section 2.3.5. Serial Port</b>
K	HDMI	2x HDMI 2.0 output, up to 4K@30Hz
L	DC IN	9~36V DC 3-Pole Terminal Block See Section 2.3.6. 9~36 V DC Connector
M	GbE Port	2x RJ-45, support 10/100/1000 Mbps Ethernet

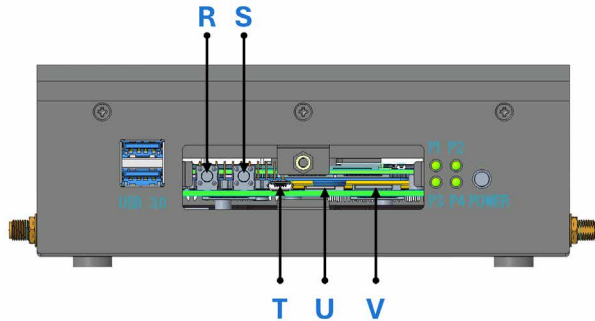
## 2.2. Internal Interface

### 2.2.1. Bottom Slot



Item	Name	Description
N	M.2 NVMe Slot (Reserved)	CON1001, M.2 Key B for NVMe SSD only See <b>Section 2.3.8. M.2 Connector</b>
P	M.2 WWAN Slot (Reserved)	CON1101, M.2 Key B for Cellular Module See <b>Section 2.3.8. M.2 Connector</b>
Q	M.2 WLAN Slot (Reserved)	CON1201, M.2 Key E for Wi-Fi/Bluetooth Module See <b>Section 2.3.8. M.2 Connector</b>

## 2.2.2. Front I/O Slot



Item	Name	Description
R	RESET Key	The RESET button executes a hard reset on the system.
S	EDL Key	Press this button to force the system into recovery mode.
T	USB 2.0 OTG Connector	USB 2.0 OTG (Micro USB) See <b>Section 2.3.2. Front I/O Slot</b>
U	USIM Slot	NanoSIM card See <b>Section 2.3.2. Front I/O Slot</b>
V	MicroSD Card Slot	Compliant with SD/SDHC/SDXC, with storage capacity up to 1TB.

## 2.3. Pin Definitions

### 2.3.1. USB 3.0 Connectors

The USB 3.0 ports support a USB Type-A connection, compatible with SuperSpeed, Hi-Speed, Full-speed and Low-speed USB devices suitable for USB peripherals including USB cameras.

Pin	Signal
1	VBUS
2	D-
3	D+
4	GND
5	StdA_SSRX-
6	StdA_SSRX+
7	GND_DRAIN
8	StdA_SSTX-
9	StdA_SSTX+

### 2.3.2. Front I/O Slot

The I/O connectors accessible from the front side panel of the Edge AI Box are described below.

#### USIM Slot

The Edge AI Box is equipped with a USIM slot connected to the M.2 connector for use with a user-provided NanoSIM card and compatible M.2 4G/LTE or 5G module to provide cellular communication. Install or remove a NanoSIM card module via the front door.

#### MicroSD Card Slot

MicroSD Card slot supports MicroSD form factor compliant with SD/SDHC/SDXC standards, with storage capacity up to 1TB.

#### RESET Key

The RESET button executes a hard reset on the system.

#### EDL Key

Press this button to force the system into EDL mode.

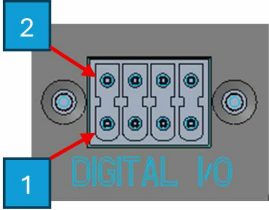
#### USB 2.0 OTG Connector

The Edge AI Box supports a USB 2.0 OTG Micro USB Type-B connection for system recovery.

Pin	Signal	Description
1	V+	+5 V power
2	D-	Data -
3	D+	Data +
4	ID	Host/Slave detect (USB OTG ID)
5	GND	Ground

### 2.3.3. Digital IN/OUT and Analog IN

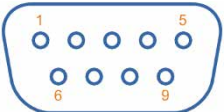
Pin	Signal
1	Digital IN/OUT #0
2	Digital IN/OUT #1
3	Digital IN/OUT #2
4	Digital IN/OUT #3
5	GND
6	Analog IN #0
7	Analog IN #1
8	GND



### 2.3.4. Controller Area Network (CAN) Bus

The Controller Area Network (CAN) enables communication among devices.

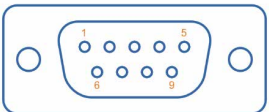
Pin	Signal	Description
1	GND	Ground
2	CAN0_L	CAN 0 channel L bus line
3	CAN1_H	CAN 1 channel H bus line
4	X	Don't care
5	CAN1_L	CAN 1 channel L bus line
6	GND	Ground
7	CAN0_H	CAN 0 channel H bus line
8	X	Don't care
9	VBATT(5V)	5V



### 2.3.5. Serial Port

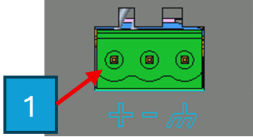
Single COM port supports RS-232/422/485, configured by the software.

Pin	RS-232	RS-422	RS-485
1	DCD	TXD-	Data B (-)
2	RXD	TXD+	Data A (+)
3	TXD	RXD+	GND
4	DTR	RXD-	N/C
5	GND	GND	N/C
6	DSR	N/C	N/C
7	RTS	N/C	N/C
8	CTS	N/C	N/C
9	RI	N/C	N/C



### 2.3.6. 9~36 V DC Connector

The Edge AI Box supports a DC 3-pole terminal block that can be connected 9-36V DC external power input.

Pin	Signal	
1	9~36V DC	
2	GND	
3	GND	

### 2.3.7. M.2 Connector

To ensure the module is properly driven and operates reliably under high-temperature conditions, please select models listed in the compatibility list. Non-compatible models cannot be guaranteed to function correctly.

For the list of compatible modules, please refer to Appendix A Compatible Module List.

Form Factor	CON1001	CON1101	CON1201
M.2 2230	Not Supported	Not Supported	Key E WLAN Module
M.2 3042	Not Supported	Key B WWAN Module Key B+M NVMe SSD	Not Supported
M.2 3052	Not Supported	Key B WWAN Module	Not Supported
M.2 2280	Key B+M NVMe SSD	Key B+M NVMe SSD	Not Supported

# Appendix A Compatible Module List

No.	Type	Supplier	Model	M.2	Description
1	WWAN	Semtech	EM9291	3052	B Key, 5G NR Sub-6, Wide Temp.
2	WWAN	Semtech	EM7590	3042	B Key, 4G LTE Cat-13, Wide Temp.
3	WWAN	Telit	FN920C04	3042	B Key, 5G Red Cap, Wide Temp.
4	NVMe SSD	InnoDisk	3TE8	2280	B+M Key, 512GB, Wide Temp. w/ Heatsink
5	NVMe SSD	InnoDisk	3TE8	2280	B+M Key, 1TB, Wide Temp. w/ Heatsink
6	NVMe SSD	InnoDisk	3TE8	2280	B+M Key, 2TB, Wide Temp. w/ Heatsink
7	SD Card	InnoDisk	3TE4	MicroSD	64GB, ET
8	SD Card	InnoDisk	3TE4	MicroSD	128GB, ET
9	SD Card	InnoDisk	3TE4	MicroSD	256GB, ET
10	SD Card	InnoDisk	3TE4	MicroSD	512GB, ET

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