



<b>Document No.</b>		<b>Revision Date</b>	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
<b>Document Name</b>	EAORA07 Datasheet	<b>Contact</b>	info@ecotron.ai	




# EAORA07 Datasheet

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	


## Contact us

Web: [www.ecotron.ai](http://www.ecotron.ai)  
Email: [info@ecotron.ai](mailto:info@ecotron.ai)  
[support@ecotron.ai](mailto:support@ecotron.ai)  
Address: 13115 Barton Road, Ste H,  
Whittier, CA, 90605, USA  
Telephone: +1 562-758-3039  
Fax: +1 562-352-0552

<b>Document No.</b>		<b>Revision Date</b>	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
<b>Document Name</b>	EAORA07 Datasheet	<b>Contact</b>	info@ecotron.ai	

## Contents

<b>1.</b>	<b>SUMMARY .....</b>	<b>4</b>
<b>2.</b>	<b>INTERFACE .....</b>	<b>5</b>
<b>3.</b>	<b>MECHANICAL.....</b>	<b>6</b>
3.1	DIMENSIONS .....	6
<b>4.</b>	<b>HARDWARE.....</b>	<b>7</b>
4.1	SPECIFICATIONS .....	7
4.2	SYSTEM MAIN CHIP .....	8
<b>5.</b>	<b>SOC BASIC SOFTWARE .....</b>	<b>11</b>
<b>6.</b>	<b>DEMO APPLICATION .....</b>	<b>13</b>
<b>7.</b>	<b>DEVELOPMENT TOOL.....</b>	<b>14</b>
7.1	ECOCODER-AI .....	14
7.2	ECOCODER.....	15
7.3	ECOCAL .....	17
7.4	ECOFASH.....	18
<b>8.</b>	<b>INSTALLATION REQUIREMENTS.....</b>	<b>19</b>


Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

## 1. Summary

The EAORA07 product is an intelligent computing platform developed by Ecotron Corporation for automatic driving systems. Based on the dual-Orin integrated solution for driving and parking, it is mainly targeting L3-L4 level driving and parking All-in-one solutions. It integrates two NVIDIA ORIN chips and one Infineon's TC397 chip, combined with high-precision maps, localization, and navigation, it can achieve L3 functions of Highway Pilot HWP, Traffic Jam Pilot TJP, Navigate on Pilot NOP, and L4 functions of Home-Zone Parkin HPA, and Automated Valet Parking AVP.




Figure 1 Controller Appearance

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

## 2. Interface

Interface type	Number	Function	Chip	Connector
Camera interface	12	GMSL2/ FPDLINK3	SOC	3 * FAKRA
100M Automotive Ethernet	4	100BASE-T1	Switch	2* 6 cavity connector
Gigabit Automotive Ethernet	8	1000BASE-T1	Switch	
Gigabit Standard Ethernet	1	100BASE-T/1000BASE-T	Switch	1 * aviation plug
HDMI	2		SOC	
USB	2	2 channels USBHost support USB2.0、US3.0、USB3.1	SOC	
M.2 KEY M	1	Extended storage	SOC	Internal
GPS+IMU	1		SOC	
CANFD	4		SOC	121 PIN-CMC
RS232	8	2 channels for Debug	SOC	
PPS_IN	2	Support 5V-16V	SOC	
PPS_OUT	4	PPS is 5V high voltage pulse signal	SOC	
CAN	1		GNSS	
RS232	1		GNSS	
CANFD	8	2 channels support specific frame wake up	MCU	
LIN	2		MCU	
USS	12		MCU	
KEYON	4	2 channels for SOC, 2 channels for MCU	MCU	
Digital Input	4	Default settings: 2 channels active-high, 2 channels active-low	MCU	
Analog Input	4		MCU	
Low-side output	4	4 channels @ 250mA	MCU	
High-side output	4	4 channels @ 1A	MCU	
5V Sensor power	2	Maximum current 100mA	MCU	
Power Positive	6			
Power Ground	7			
Signal Ground	2			

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

### 3. Mechanical

#### 3.1 Dimensions

There is no special treatment or plating on the surface of the controller's housing, no sharp burrs, or sharp edges.

Dimensions: 428mm \* 266mm \* 60.5mm.

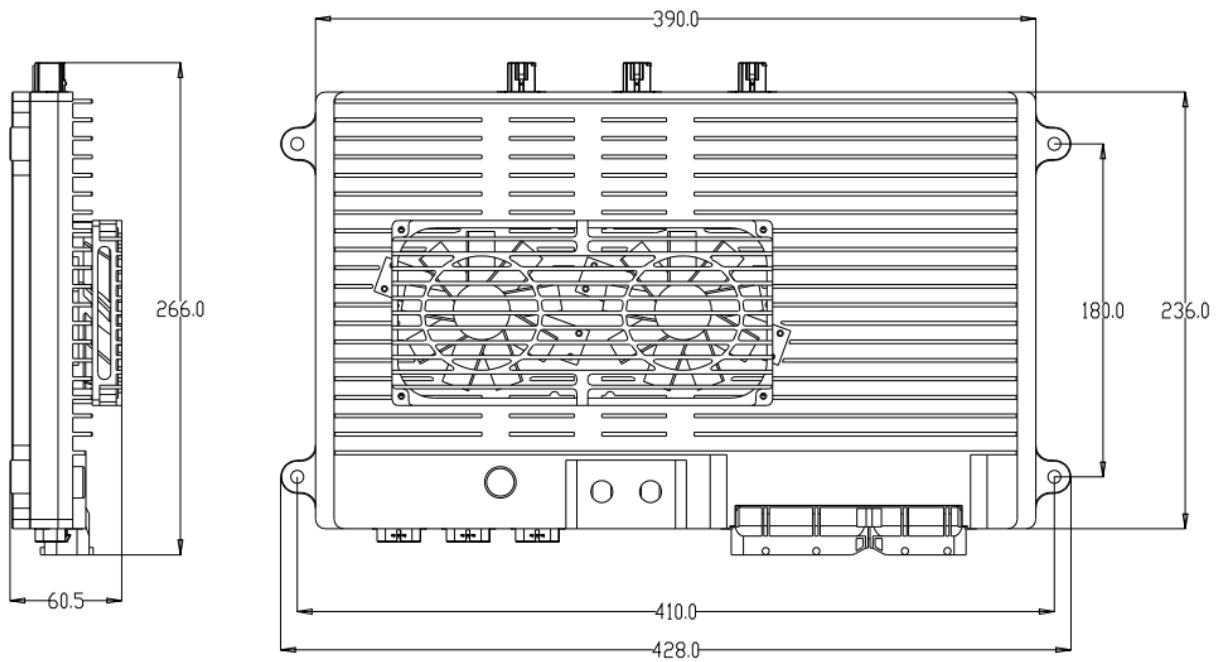



Figure 2 Controller Dimension Diagram


Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

## 4. Hardware

The hardware circuit of the computing platform is designed according to the application requirements of the autonomous driving system. The electrical parameters meet Automotive-grade requirements and have a variety of data transmission interfaces that can meet the requirements of multi-sensor fusion for autonomous driving systems. The main chip contains a variety of high-performance computing units to adapt to the computation-intensive characteristics of autonomous driving, including sequential and parallel computing.

### 4.1 Specifications

Item	Parameter
AI Computation Power	400+ TOPS
Operating voltage	DC 9-36V
Operation memory	32GB * 2
Storage memory	64GB * 2, support extra SSD
Operating temperature	-25 to 70 °C
Operating humidity	0 - 95%, no condensation
Storage temperature	-40 to 85 °C
Dimensions	428mm*266mm*60.5mm
Waterproof	IP6X
Cooling	Air Cooling

<b>Document No.</b>		<b>Revision Date</b>	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
<b>Document Name</b>	EAORA07 Datasheet	<b>Contact</b>	info@ecotron.ai	

## 4.2 System Main Chip

The main chip of EAORA07 is NVIDIA Jetson Orin which is designed specifically for embedded autonomous driving control systems. The computing performance of different internal processors is listed below.

AI performance: 200 INT8 Sparse TOPs

CPU: 8 core Cortex A78 ARM 64-bit CPU, 2 clusters (4x 256KB L2 + 2MB L3) + 4MB L4


Deep Learning Accelerator (DLA): 2x NVDLA 2.0 Engines (48 TOPs each)

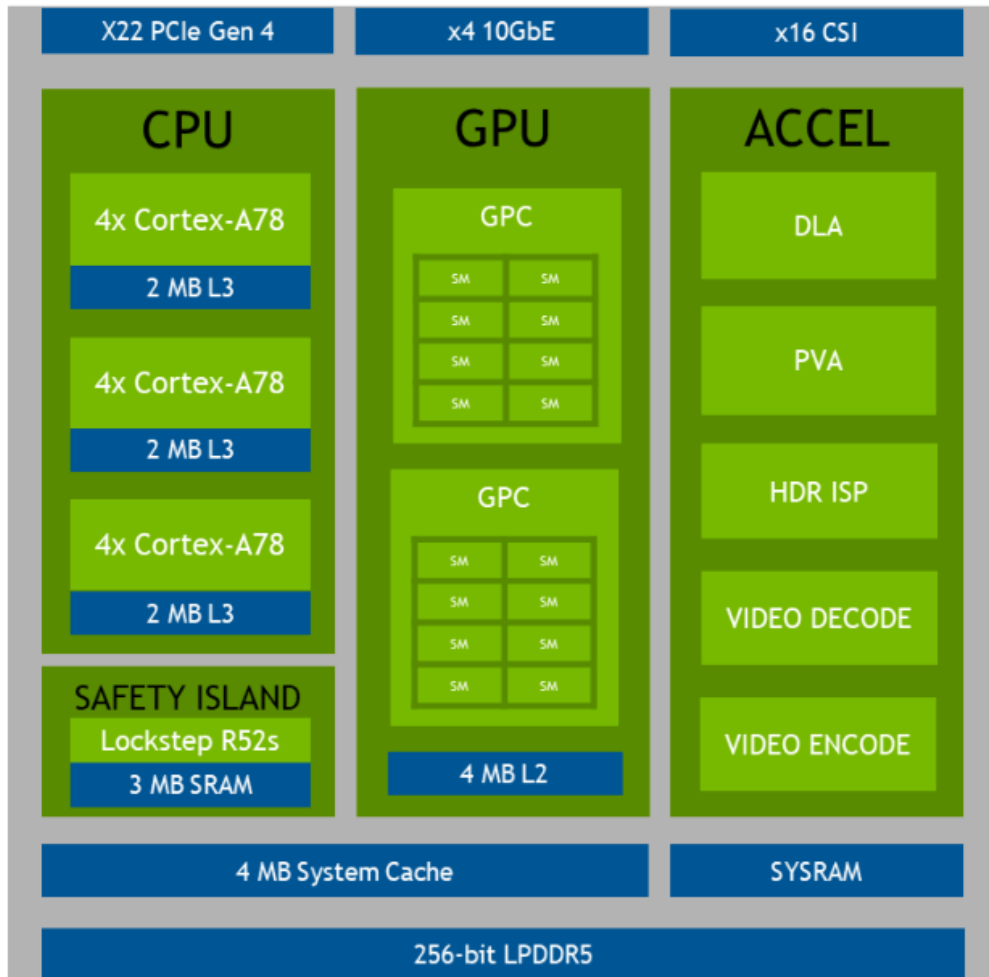
GPU: NVIDIA Ampere Architecture with 2048 NVIDIA<sup>®</sup> CUDA<sup>®</sup> cores and 64 Tensor Cores.  
(108 Sparse INT8 TOPs)

Vision accelerator: 1x PVA v2

Image Signal Processor (ISP): 1.85 Giga Pixels/s

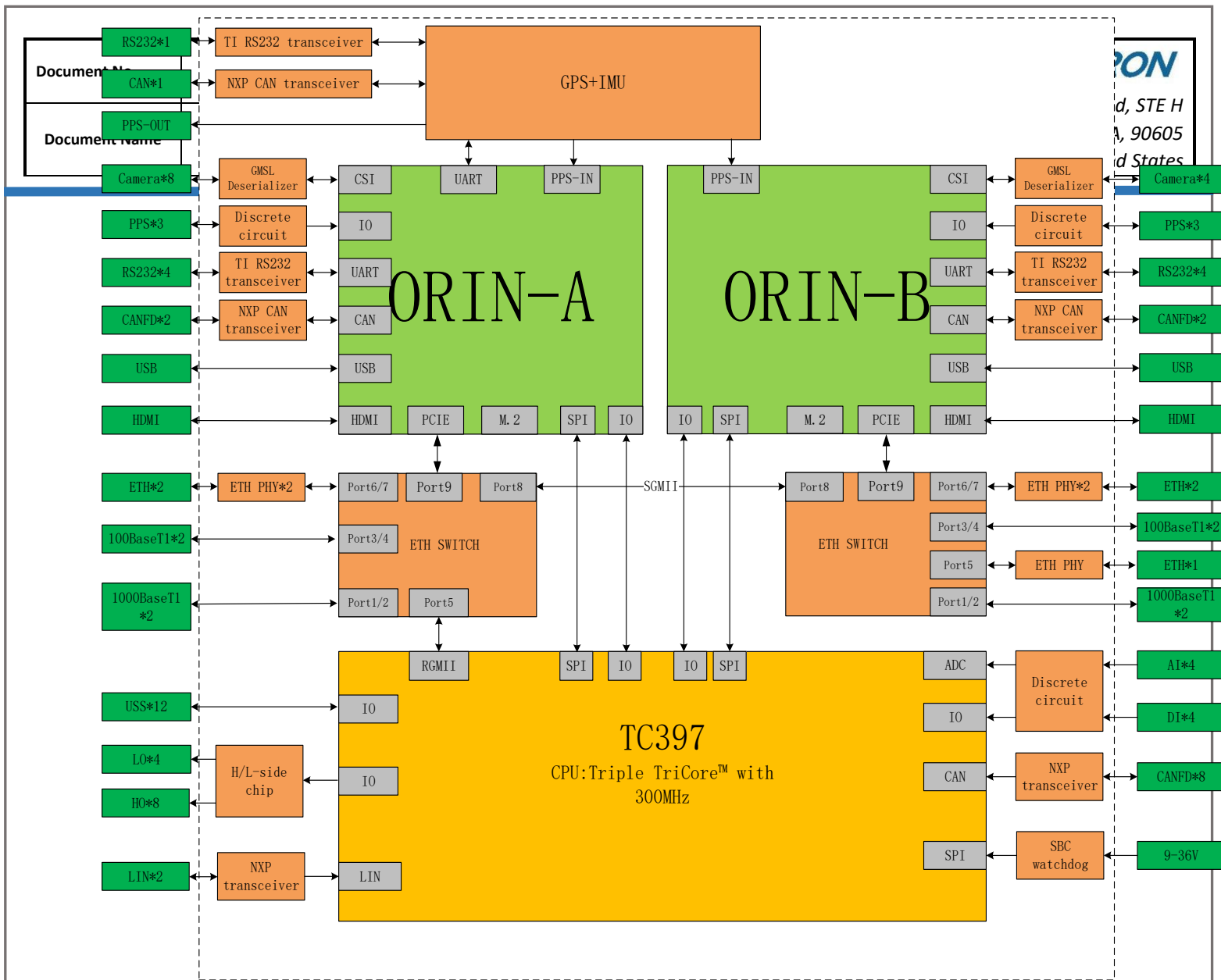


Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	




The microcontroller used in EAORA07 is Infineon TC397 which has a TriCore™ architecture, working at 300MHz and has an ECC (Error Correction Code) protected RAM with a capacity of up to 2.9MB + 16MB, designed based on ISO26262, supporting up to ASIL-D. By working with a system basic chip (SBC), it can achieve the hardware core safety architecture. The resources of the chip are as follows:

Feature	Detail
Micro Control Core	32-bit Infineon TC397XP
Maximum Frequency	300MHz



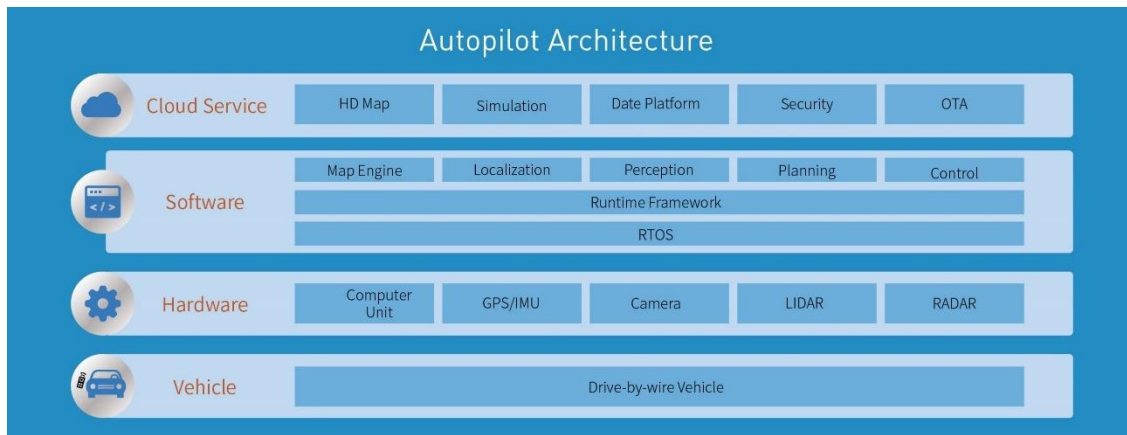
Flash	16M
SRAM	2.9MB
EEPROM	129K
Float Point Capability	Yes
SBC	TLF35584

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	


## 5. Soc Basic Software

The SOC software system of the computing platform is customized for the autonomous driving system. A typical framework of an autonomous driving system is shown below. The SoC software system of EAORA07 consists of RTOS and Runtime Framework. RTOS is a Linux operating system. Runtime Framework is ROS (Robot Operating System) Melodic.

Linux is a bridge connecting the hardware and the users, providing functions such as Process Management, Memory Management, File System, Network, Security, User Interface, and Device Drivers. Users can enter commands through the user interface of the operating system. The operating system interprets the commands, drives the hardware devices, and implements user requirements. ROS provides some standard operating system services, such as Hardware Abstraction, Low-Level Device Control, Inter-Process Messaging, and Message Packet Management. ROS is built on a graph architecture, various nodes can publish, subscribe and aggregate all kinds of information, e.g. sensing, control, status, planning.

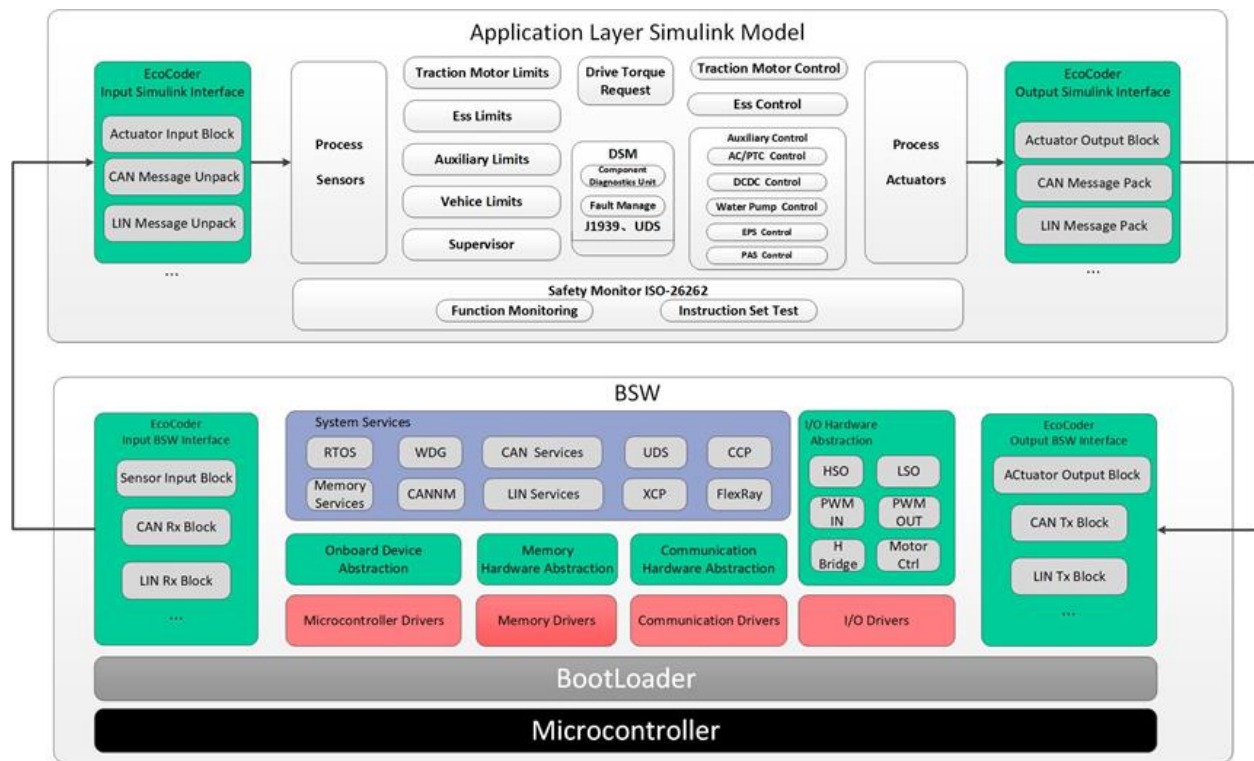



The software architecture of the MCU inside EAORA07 is designed according to AUTOSAR, which is divided into Application Software Layer and Basic Software Layer. Basic Software Layer consists of a microcontroller abstraction layer, an ECU abstraction layer, a service layer, and a complex driver. Application software and basic software are connected and integrated through EcoCoder. EcoCoder encapsulates the low-level software interfaces into the Simulink library via

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

s-functions. Application developers can use Simulink to build the model and generate executable program files for TC397 via Simulink by just one click.

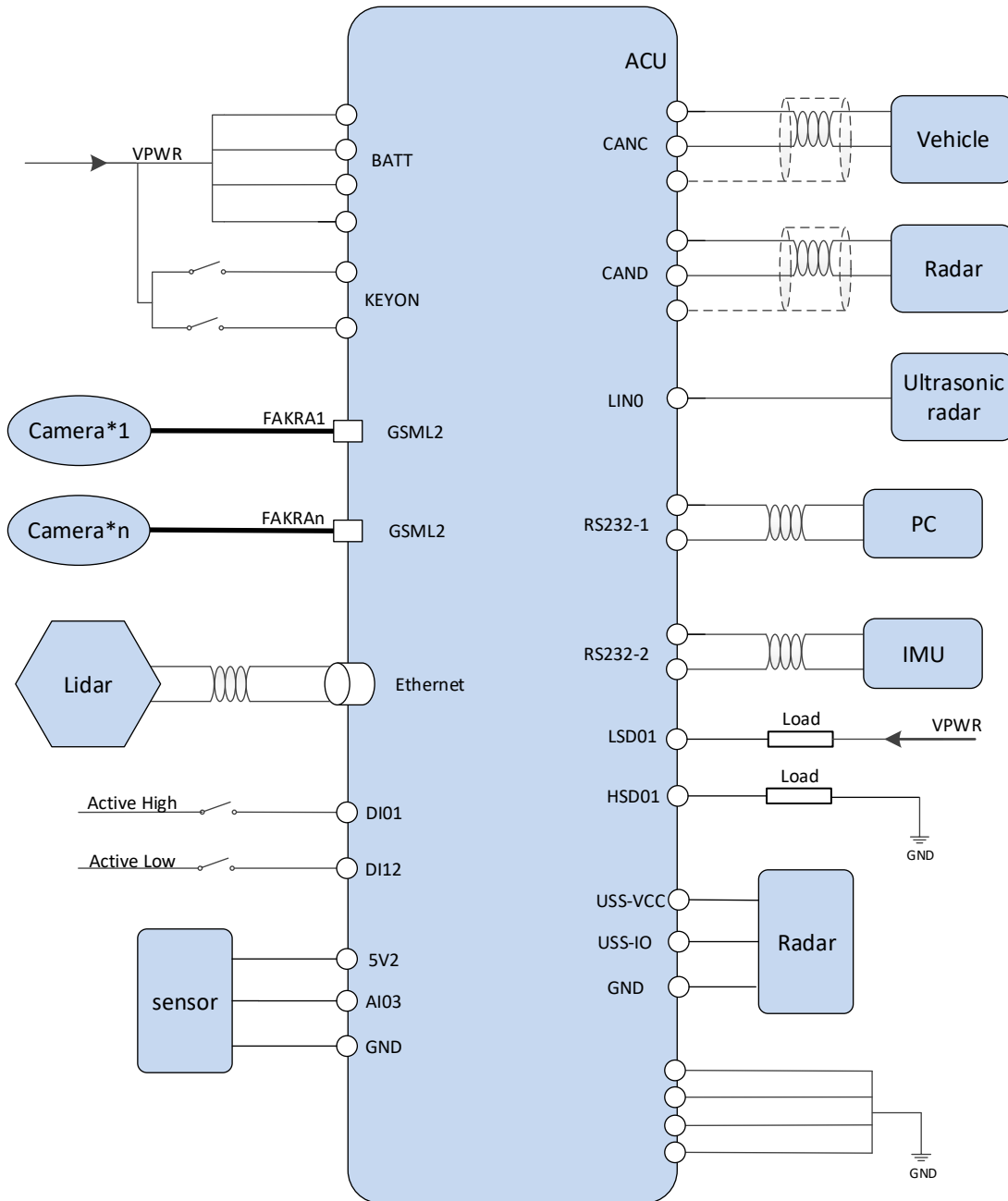
The basic software interfaces that EcoCoder encapsulates can read digital and analog input signals, control high and low side outputs, support .dbc file interpretation, implement CCP and UDS protocols, and define the measurement, calibration and NVM variables. MCU application development is implemented with the calibration software EcoCAL and the flashing software EcoFlash.




Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

## 6. Demo Application

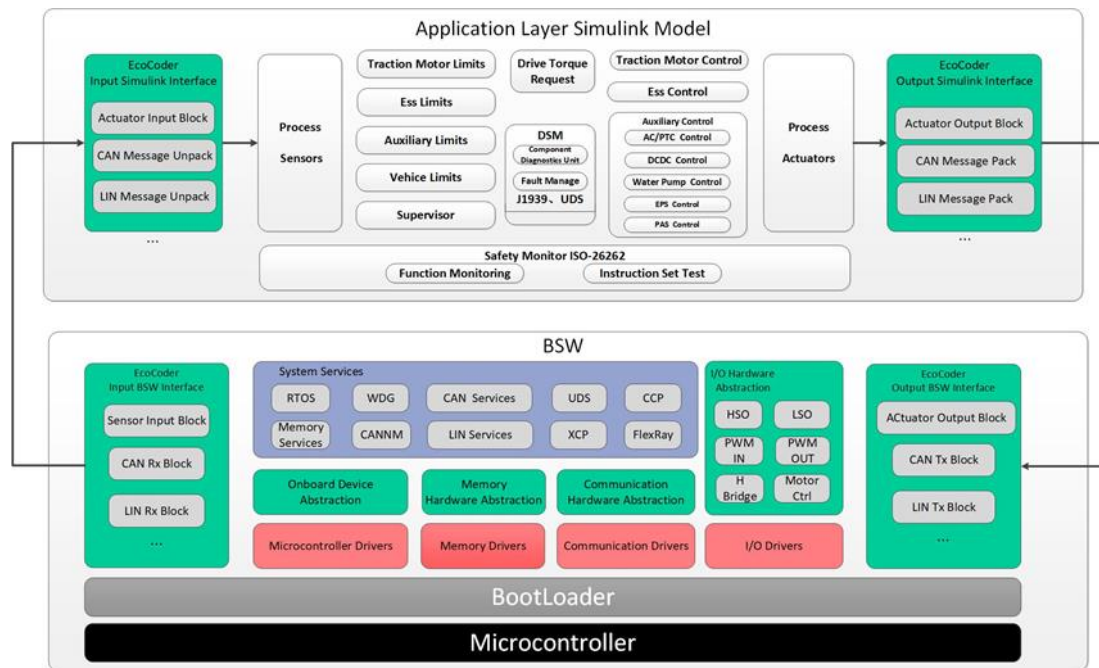
A demo for an autonomous driving hardware platform is shown below, which consists of EAORA07 and sensors.



Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	


## 7. Development Tool

The software architecture of the MCU in this dual-Orin computing platform is designed with reference to the AUTOSAR architecture standard and is divided into an application software layer and a basic software layer. Among them, the basic software layer is divided into microcontroller abstraction layer, ECU abstraction layer, service layer and complex driver. Application layer software and basic software are connected and integrated through EcoCoder. EcoCoder uses the s-function in Simulink to encapsulate the lower-level interface into the Simulink module library. Application developers can use Simulink to build application layer models and generate executable program files adapted to TC397 through Simulink with just one click.

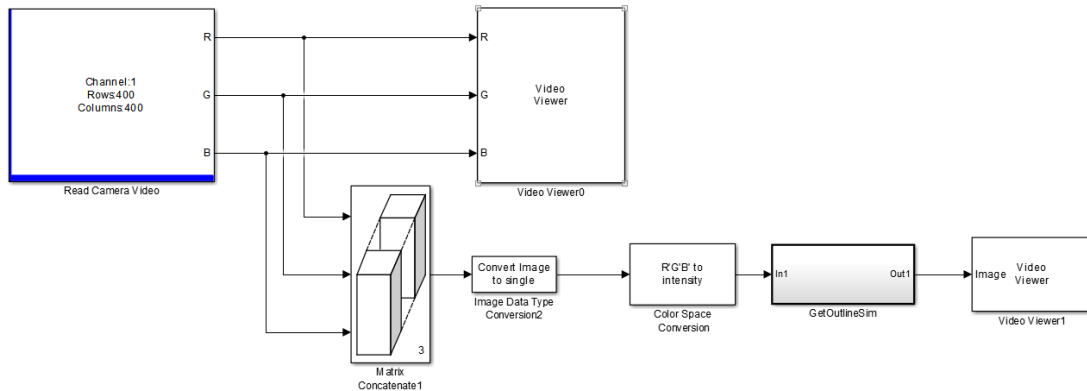


### 7.1 EcoCoder-AI

EcoCoder-AI is a powerful automatic code generation library based on Matlab / Simulink that links directly to the target controller. EcoCoder-AI integrates code generation, compilation and one-click generation of executable files. In addition, the control model based on Simulink can

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

be directly converted into an ROS-based executable program suitable for the target controller and downloaded to the target controller. For details, please refer to EcoCoder-AI Manual.




## 7.2 EcoCoder

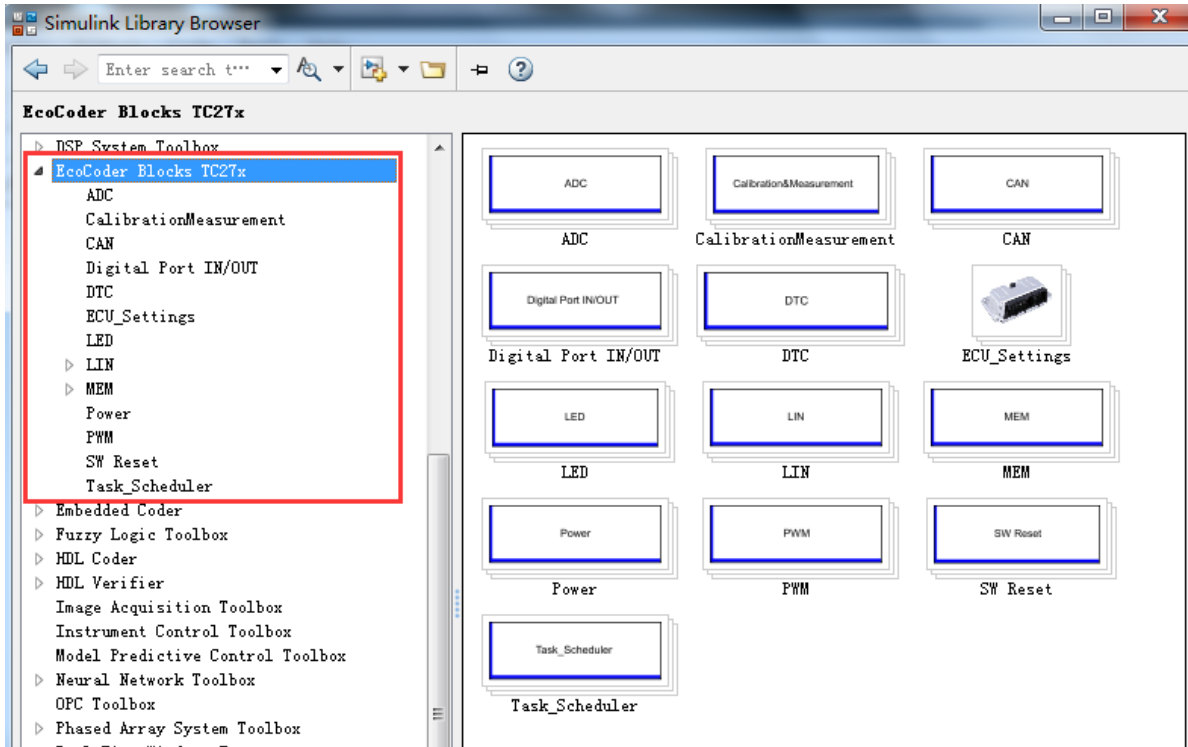
EcoCoder is an application development tool for the control system, which makes it easier for users to develop embedded application software in the Simulink environment. It expands the resources of Simulink and Real-Time Workshop embedded encoders to generate the necessary code module and automatically configures and optimizes code generation. By encapsulating the low-level software library to s-functions, EcoCoder allows developers to use low-level software interfaces by model-based-design method and configure basic parameters. It can generate executable files and data description files with one click and provide .a2l file address update tool.

### Features:

- Users develop embedded application software in the Simulink environment.
- Application developers can focus on control strategy development without knowing all the information about hardware.
- By encapsulating the low-level software library to s-functions, EcoCoder enables developers to use the low-level software interfaces and configure parameters using the model-based-design method.


Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

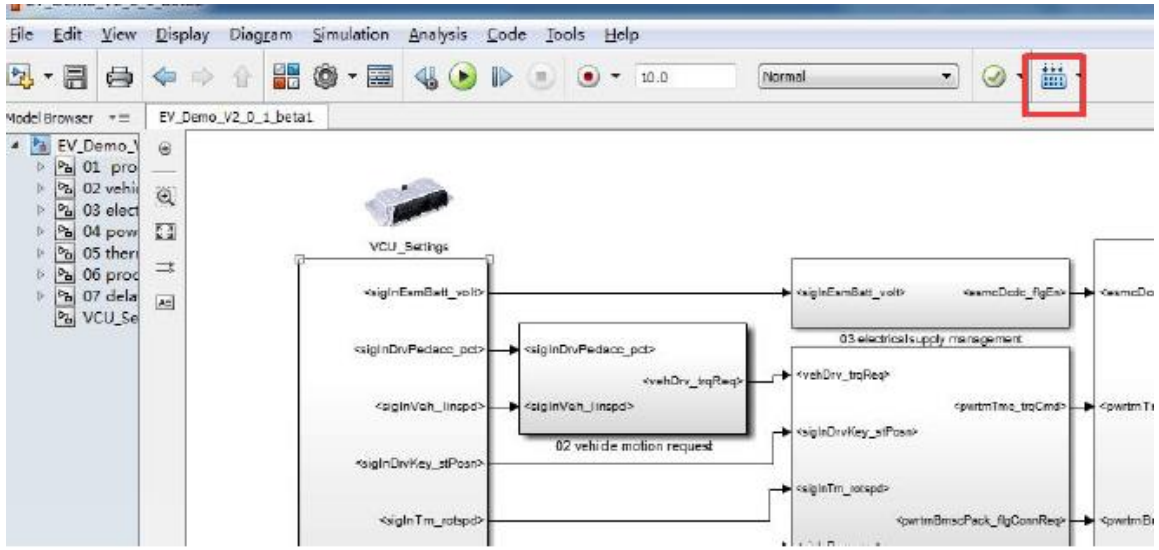
- Executable file and data description file can be generated by one click, and an .a2l file address update tool is provided. During the generation, the code generated by the model is integrated with the low-level software automatically in the background, then makefile is used to call the compiler to generate executables.



After compilation of the model, use the shortcut “Ctrl + B” or click the button shown below, the flash-able file will be generated.




Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

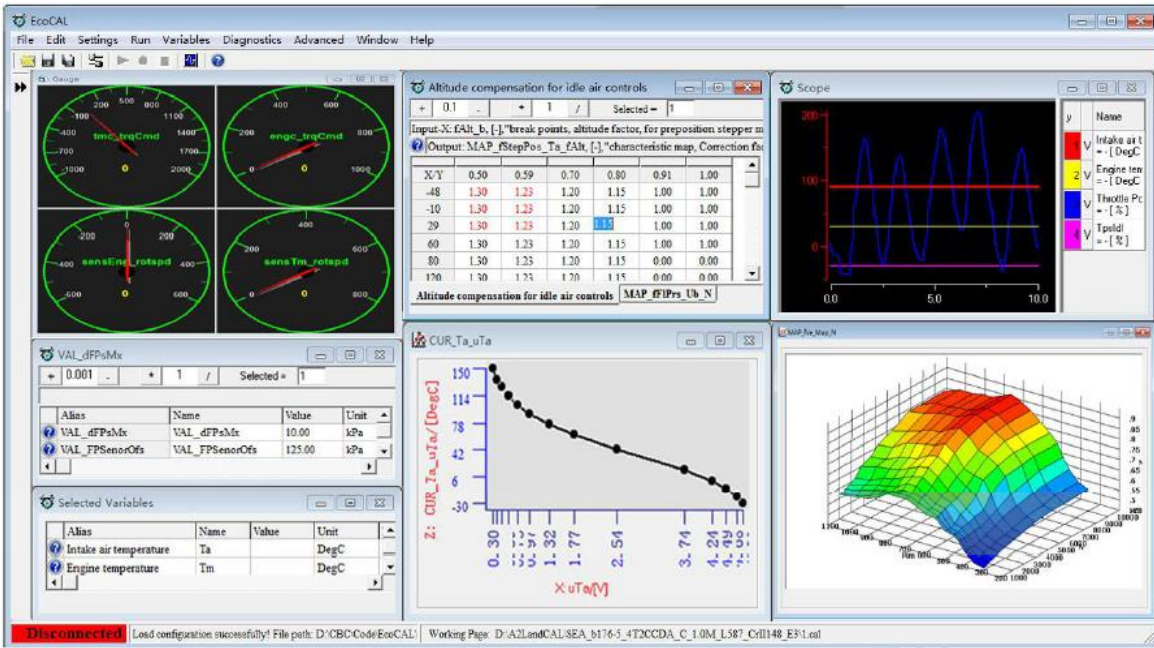


Developers can use EcoCoder to develop application software for MCU in EAORA04. Please refer to EcoCoder User Manual.

### 7.3 EcoCAL

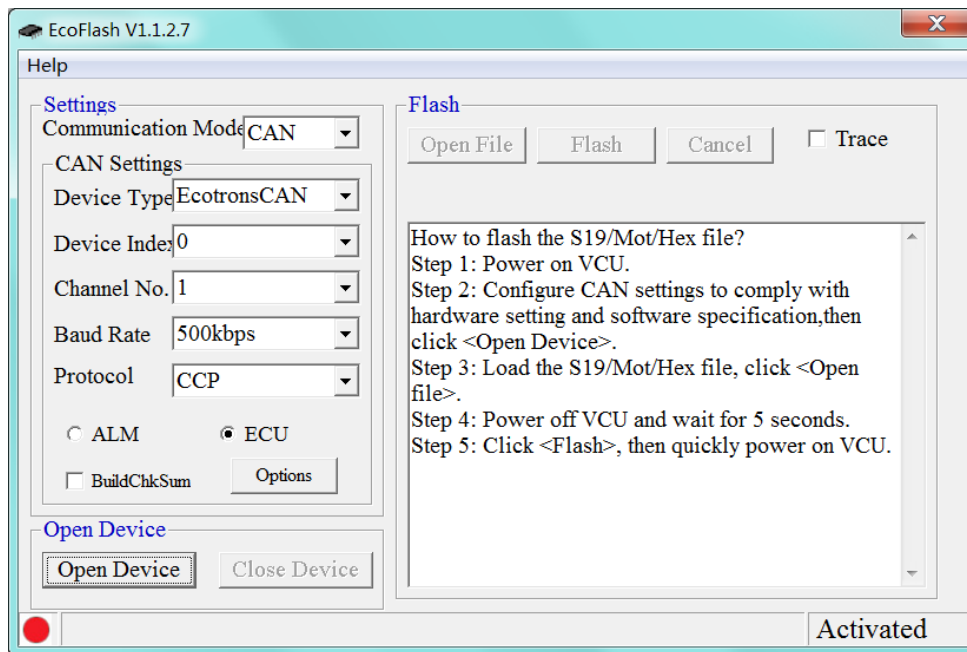
EcoCAL is a PC-side calibration software based on the CCP protocol. By loading .a2l and .hex files, to achieve real-time observation and online calibration. It can assist control strategy development engineers to debug and calibrate application software. Please refer to EcoCAL User Manual for more details.


Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	



## 7.4 EcoFlash

EcoFlash is PC-side software working with BootLoader to flash target program files. It uses CAN communication protocol CCP/UDS, and support.s19, .mot and .hex files.



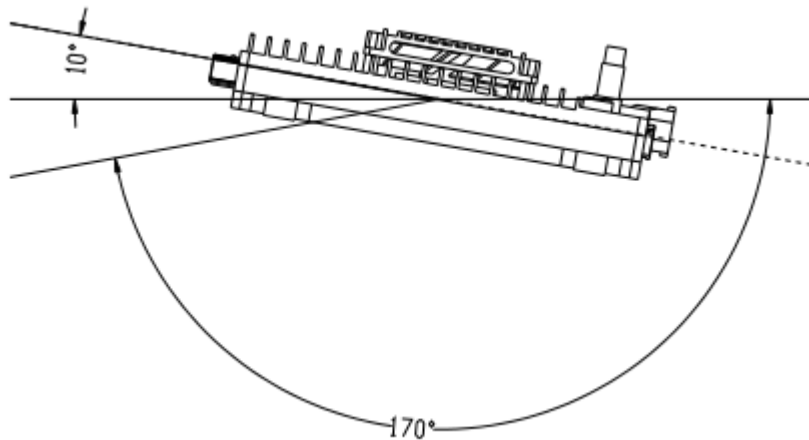
Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

## 8. Installation Requirements


It is recommended to install the ADCU in the cockpit. If the OEM wants to assemble the ADCU in another location, the corresponding installation location should be evaluated by Ecotron's engineers and the OEM's engineers.

The precautions for ADCU installation are as follows :

1. The installation of ADCU and wiring harness should be firm and reliable, and there should be no looseness. Avoid supporting the wiring harness by ADCU. At the same time, the arrangement of ADCU wiring harness should prevent and protect all wires in the wiring harness from damage due to wear and overheating.
2. Try to avoid installing in places where dust is easy to gather, a large amount of dust accumulation will affect the reliability of ADCU work.
3. ADCU should keep away from the location where the temperature of the shell itself may exceed  $-15\sim 70^{\circ}\text{C}$ . At the same time, it is necessary to prevent the surrounding parts from releasing heat to the ADCU.

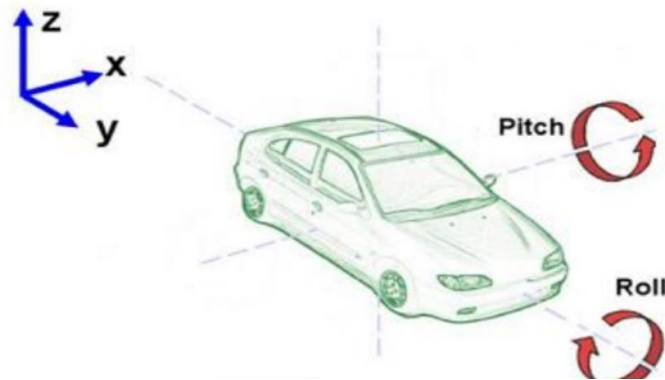


4. Avoid installing the ADCU in locations where oil, moisture, and water droplets are likely to splash on it.
5. Avoid the possibility of additional mechanical shock and external impact due to the

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	


installation position and fixing method of the ADCU and avoid installing the ADCU at the resonance point of the car body.

6. Avoid installing the ADCU where it may come into contact with the battery or other parts that are prone to seepage of acid and alkaline solutions, and near the ADCU power terminal.
7. Avoid installing the ADCU where it may come into contact with the positive terminal of Battery and the ignition power terminal.
8. ADCU should be installed in the horizontal and vertical position according to the connector downwards and maintain a certain angle to prevent water from entering the connector. In the horizontal direction, the recommended installation angle is  $-170^{\circ}$  to  $-10^{\circ}$ , as shown in Figure below. In the vertical direction, the recommended installation angle is  $-170^{\circ}$ ~ $-10^{\circ}$ , as shown in Figure below.



Z Axis: Vertical Direction

X Y Axes: Horizontal Direction

Document No.		Revision Date	February 2023	 13115 Barton Rd, STE H Whittier, CA, 90605 United States
Document Name	EAORA07 Datasheet	Contact	info@ecotron.ai	

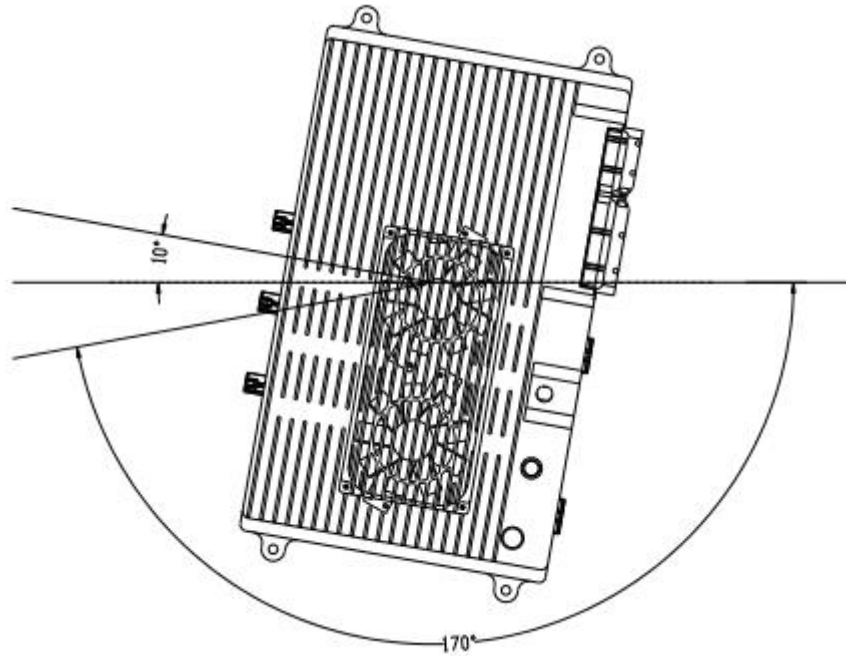


Figure: Vertical Installation Angle

Ecotron recommends using the 4 installation points on the ADCU for installation and fixation. It is recommended to use metal materials such as aluminum alloy for the mounting bracket, and the housing should have a reliable electrical connection with the vehicle body through the bracket. If other materials are used, the customer must ensure that it can meet the requirements of ADCU for vibration, heat dissipation, temperature, EMC, etc. If there is any deviation, it needs to be confirmed with Ecotron.

9. High-speed signal lines such as harness installation, network cables, video cables, etc. should keep away from areas of high voltage, radiation interference such as motors, battery packs, DCDCs as far as possible.