EV2274KAH

Datasheet

V2.0

Revision History

Date	Version	Description
2021.9	V 1.0	First Release
2021.11	V 2.0	Model name change, EV2274KAL to EV2274KAH

Contact us:

Web: http://www.ecotron.ai

Email: info@ecotron.ai
support@ecotron.ai

Address: 13115 Barton Rd, STE H
Whittier, CA, 90605
United States

Tel: +1 562-758-3039
+1 562-713-1105

Contents

1. General Information

1.1 Introduction

VCU (Vehicle Control Unit) is the master controller for electric vehicles.
VCU receives the sensors and driver input signals, including pedal inputs, vehicle speed signals, and other inputs, manages the system energy, commands the driver demanded torque to powertrain, coordinates vehicle components, achieves fault diagnosis, and determines the overall vehicle drivability.
VCU plays a critical and supervisory role in the vehicle control network, or CAN bus-based network.

1.1.1 Functionality

EV2274KAH has the following functions:

Table 1 EV2274KAH features

Feature
1 key switch (KEYON)
2 hardwire wakeup (DI_WAKEUP1, DI_WAKEUP2)
4 power supply (BATT)
3 5V outputs: maximum current 100mA
3 CAN Bus ports: CANA support wake up at any frame
16 digital signal inputs: 6 active low, 10 active high
23 analog signal inputs: 17 channels of 0-5V acquisition, 12-bit accuracy; 6 channels of 0-32V acquisition, 12-bit accuracy
6 frequency signal inputs: active low
6 high-side driver outputs: single channel output rated current 1A, maximum current 1.5A. 4 configurable as PWM output
18 low-side driver outputs: single channel output rated current 0.25A, maximum current 1A. 4 configurable as PWM output

1.1.2 Material

The shell of VCU is formed by aluminum die-casting and assembled with silicone rubber. There is no special treatment or plating on the outside of the shell, no sharp burrs and sharp edges. The nominal dimensions of the VCU shell are as follows (excluding the female end of the VCU connector, in mm):

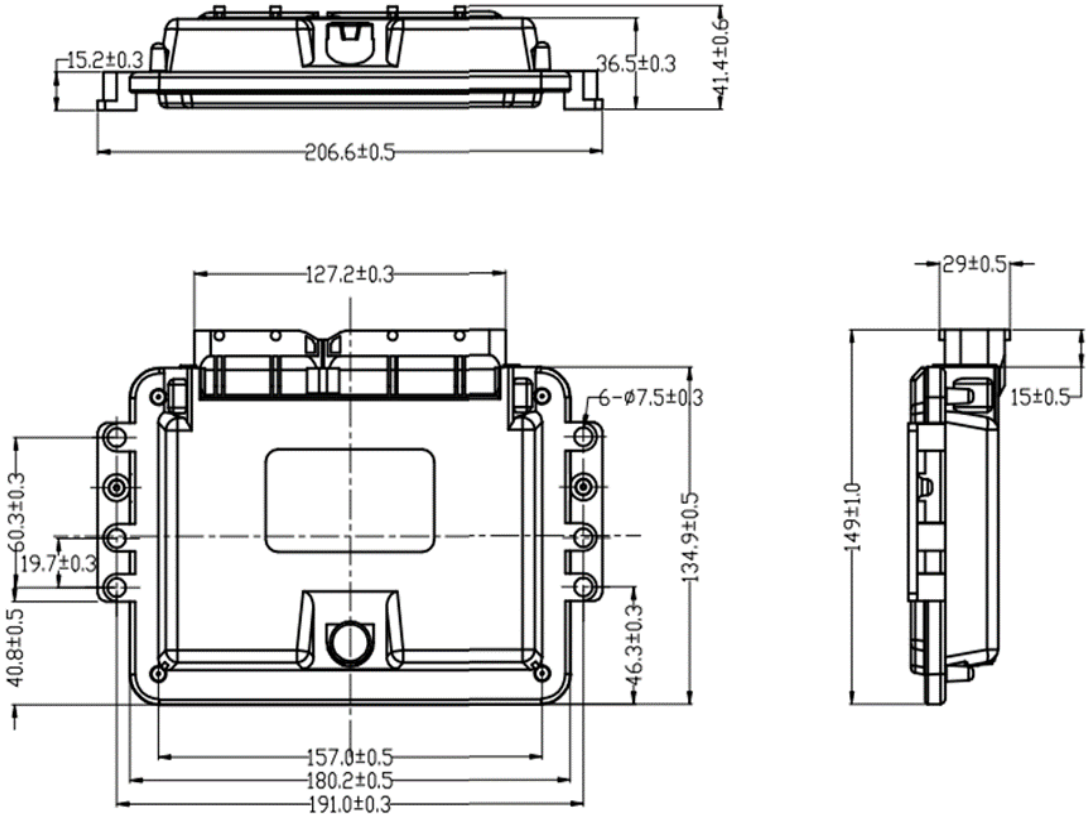


Figure 1 VCU shell size

The appearance of the shell is as follows:

Figure 2 VCU shell appearance

The socket model used for disassembling the shell: Torx T15. The product identification label is affixed to the VCU shell, which contains the product identification code, customer information, date, batch number, serial number, etc.

1.1.3 Harness Connector

VCU uses the world-renowned “TE connectivity” brand connector, which is a qualified product that meets the automotive safety level and has 121 pins. The specific models of the connectors are as follows.

Table 2 Harness connector info

#	Name	Part number	Supplier	URL
1	PCB Pin Seat	1746979-1 (1241434-1)	TE	https://www.te.com/usa-en/product-1746979-1.html (https://www.te.com/usa-en/product-1241434-1.html?q=1241434-1&source=header)
2	81P Connector Header	1473244-1	TE	https://www.te.com/usa-en/product-1473244-1.html
3	40P Connector Header	1473252-1	TE	https://www.te.com/usa-en/product-1473252-1.html?source=header-match
4	Big Socket Contact Crimp	5-968221-1	TE	https://www.te.com/usa-en/product-5-968221-1.html
5	Small Socket Contact Crimp	5-968220-1	TE	https://www.te.com/usa-en/product-5-968220-1.html
6	81P Backshell	1473247-1	TE	https://www.te.com/usa-en/product-1473247-1.html
7	40P Backshell	1473255-1	TE	https://www.te.com/usa-en/product-1473255-1.html
8	81P Retainer Clip	368382-1	TE	https://www.te.com/usa-en/product-368382-1.html
9	40P Retainer Clip	368388-1	TE	https://www.te.com/usa-en/product-368388-1.html

Harness connector is shown below：

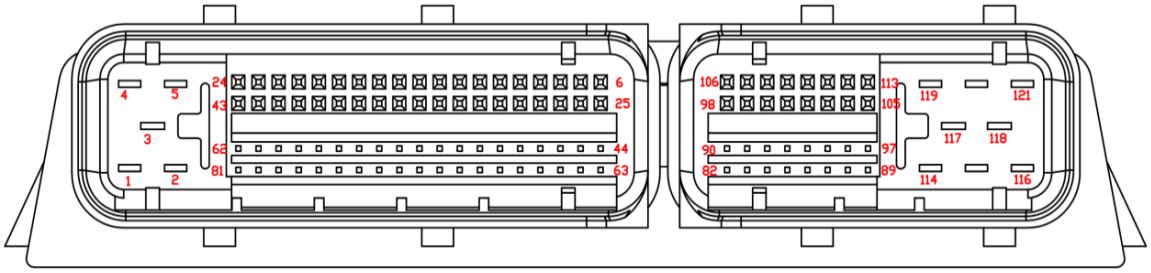


Figure 3 Harness connector and pin distribution diagram

1.1.4 Chip Information

Table 3 Chip info

Feature	Detail
Micro Control Core	32-bit ST SPC574K72E7
Maximum Frequency	160MHZ
Flash	2624KB
RAM	208KB
SPI Serial EEPROM	64KB
Float Point Capability	Yes
Monitor Microprocessor	8-bit NXP S9S08

1.1.5 Power Supply

EV2274KAH requires 4 channels of continuous power supplies (pin1, pin3, pin116, and pin 119), and the VCU is powered on through the key switch (pin59).

Two 5A fuses, one in series with pin1 and pin3, and the other in series with pin116 and pin119 are recommended for EV2274KAH power supply.

2. Interface Description

2.1 Pin Definition

Table 4 pin definition

ID	PIN	Name	Description	Note
Power Supply				
BATT	1 3 116 119	Power Supply	9-32V	Internal collection corresponds to AI28, 12 bit precision, set the voltage divider ratio to (22K+3.48K)/3.48K
GND	2 4 5 120 121	Power Ground		
GND	48 60 70 74 75	Signal Ground		
5V2	51	5V Sensor Supply 2	Single channel maximum current 100mA	
5V3	41	5V Sensor Supply 3		
5V4	49	5V Sensor Supply 4		
Power-on Signal				
KEYON	59	KEYON	Active high wake-up, digital type	
DI_WAKEUP2	81	DC_WAKE		
DI_WAKEUP1	40	AC_WAKE		
Communication				
CAN_SHILD1	58	CANA Shielded Wire		
CAN_SHILD2	77	CANB Shielded Wire		
CANA_H	56	CANA_H		Contains 120 Ohm terminal resistance, supports wake-up at any frame
CANA_L	55	CANA_L		
CANB_H	57	CANB_H		Contains 120 Ohm terminal resistance
CANB_L	76	CANB_L		
CANC_H	54	CANC_H		Contains 120 Ohm terminal resistance
CANC_L	73	CANC_L		
Input Signal				
AI01	15			
AI03	16			

AI05	17	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-5V, Pull-up resistor 51K	
AI07	18			
AI09	71			
AI11	24			
AI12	62			
AI13	13			
AI15	20			
AI16	22			
AI17	79			
AI18	23			
AI02	34	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-5V, Pull-up resistor 5.1K	
AI04	35			
AI06	36	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-5V, Pull-up resistor 61.9R	
AI08	37	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-5V, Pull-up resistor 10K	
AI10	32	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-5V, Pull-up resistor 1K	
AI14	33	Analog Input X (Channel Number)	12-bit precision, Acquisition voltage range 0-32V, Voltage type input	12-bit precision, Voltage divider ratio setting is (22K+3.48K)/3.48K
AI19	61			
AI20	72			
AI21	14			
AI22	12			
AI23	10			
DI05	39	Digital Input X (Channel Number)	Active high Active voltage ≥ 8.5 V	
DI06	80			
DI08	31			
DI10	65			
DI11	46			
DI12	21			
DI13	26			

DI14	44			
DI15	45			
DI16	63			
DI01	42	Digital Input X (Channel Number)	Active low Active voltage ≤ 1.5 V	
DI02	52			
DI03	53			
DI04	38			
DI07	43			
DI09	25			
SPEED1	64	Frequency Signal Input X	Input frequency range 2HZ – 1.5KHZ	Configurable as active low digital input
SPEED5	7			
SPEED4	8			
SPEED2	47			
SPEED3	66			
SPEED6	6			
Output Signal				
LSO02	109	Low-side Driver X (Channel Number)	Single channel output rated current 0.25A maximum current 1A 8 channels total current 2A	LS001, LS002 configurable as PWM outputs
LSO08	89			
LSO03	90			
LSO01	95			
LSO06	96			
LSO05	97			
LSO04	101			
LSO07	110			
LSO14	113	Low-side Driver X (Channel Number)	Single channel output rated current 0.25A maximum current 1A 8 channels total current 2A	
LSO12	103			
LSO09	112			
LSO15	104			
LSO16	105			
LSO10	111			
LSO11	102			
LSO13	88			
LSO17	93	Low-side Driver X (Channel Number)	Single channel output rated current 0.25A maximum current 1A	configurable as PWM outputs
LSO18	92			

HSO01	108	High-side Driver X (Channel Number)	Single channel output rated current 1A maximum current 1.5A	HS001, HS002, HS003, HS004 configurable as PWM outputs
HSO04	99			
HSO02	100			
HSO03	107			
HSO05	106	High-side Driver X (Channel Number)	Single channel output rated current 1A maximum current 1.5A	
HSO06	98			

Note: The high-side/low-side output current data is tested with standard loads and is only for reference. In real life, situations such as inrush current in load may cause misjudgment for fault diagnosis.

2.2 Pin Description

2.2.1 Analog Signal Input

Description

There are 23 channels of analog input. 17 of them are 0~5V resistance inputs and can support resistance sensors, 6 of them are 0-24V voltage input, and one of them is an analog circuit to collect the internal power supply, which is AI28.

Main difference：

- Resistance of pull-up/pull-down resistor
- Pull-up voltage
- Filter time constant

Schematic

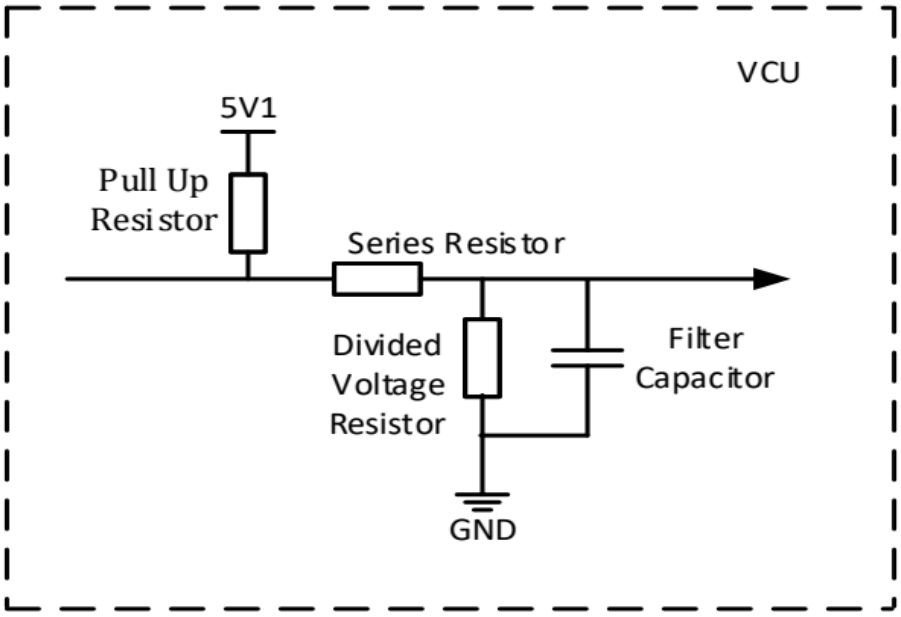


Figure 4 Schematic of analog input channel

Table 5 Analog input channel parameter table

Note：1) "--" = Not installed 2) U_B = BATT voltage 3) AI28 gathers BATT voltage signal 4) AI14 only for hardwire wake-up signal

Pin #	AI	Pull Up Resistor		Serial Resistor	Divided Voltage Resistor	Filter Capacitor	Operation Range		Input Range		Conditions / Remarks
		to U_B (Ohm)	to 5V (Ohm)	(Ohm)	(Ohm)	(F)	V_{low}	V_{high}	Min	Max	
15	AI01	--	51K	22k	--	10n	0 V	5 V	0 V	5V	
34	AI02	--	5.1k	22k	--	10n	0 V	5 V	0 V	5V	

16	AI03	--	51K	22k	--	10n	0 V	5 V	0 V	5V	
35	AI04	--	5.1k	22k	--	10n	0 V	5 V	0 V	5V	
17	AI05	--	51K	22k	--	10n	0 V	5 V	0 V	5V	
36	AI06	--	61.9R	22k	--	10n	0 V	5 V	0 V	5V	
18	AI07	--	51K	22k	--	10n	0 V	5 V	0 V	5 V	
37	AI08	--	10K	22k	--	10n	0 V	5 V	0 V	5 V	
71	AI09	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
32	AI10	--	1K	22k	--	10n	0 V	5 V	0 V	5 V	
24	AI11	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
62	AI12	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
13	AI13	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
33	AI14	--	--	22k	3.48K	10n	0 V	32 V	0 V	32 V	
20	AI15	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
22	AI16	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
79	AI17	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
23	AI18	--	51k	22k	--	10n	0 V	5 V	0 V	5 V	
61	AI19	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	
72	AI20	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	
14	AI21	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	
12	AI22	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	
10	AI23	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	
--	AI28	--	--	22k	3.48K	10n	0 V	32V	0 V	32V	

2.2.2 Digital Signal Input

Description

The digital input channel circuit has the same structure, including EMC capacitors, pull-up/pull-down resistors, voltage divider resistors, and a first-order low-pass filter.

Main difference：

- Resistance of pull-up/pull-down resistor
- Selection of pull up/down resistor
- Filter time constant

Schematic

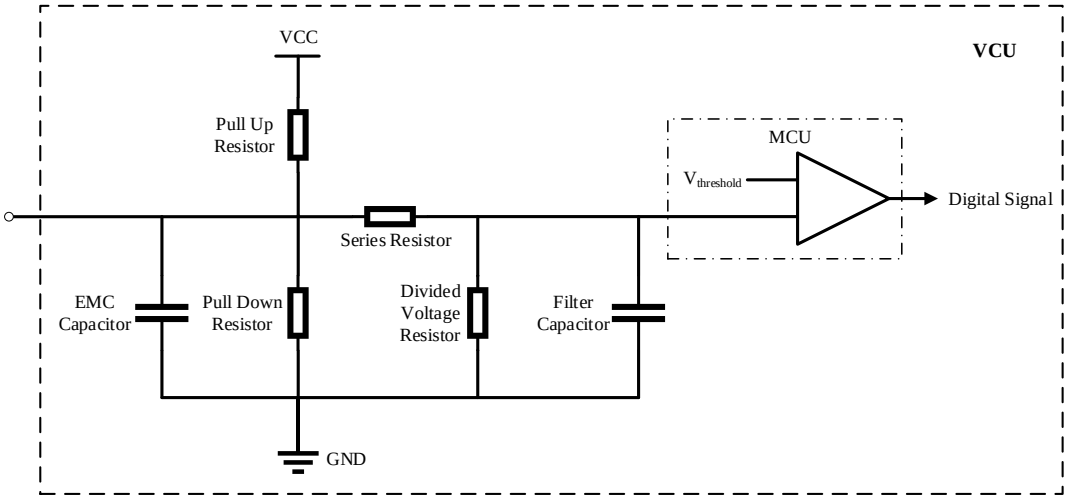


Figure 5 Schematic of Digital Input Channel

Table 6 Digital Input Channel Parameter

Note: 1) "--" = Not installed 2) U_B = BATT voltage 3) KEYON only for key signal, DI_WAKEUP1 only for hardwire wake-up signal

Pin #.	DI	EMC Cap.	Filter Cap.	Pull Up Resistor to U_B	Pull Up Resistor to 5V	Pull Down Resistor	Serial Resistor	Divided Voltage Resistor	Operation Threshold for Input Signal		Input Range		Conditions/ Remarks
		(F)	(F)	(Ohm)	(Ohm)	(Ohm)	(Ohm)	(Ohm)	V_{low}	V_{high}	min	max	
42	DI01	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
52	DI02	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
53	DI03	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
38	DI04	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
39	DI05	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
80	DI06	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
43	DI07	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
31	DI08	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	

25	DI09	--	10n	10k	--	--	100K	68K	4V	9V	0 V	32V	
65	DI10	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
46	DI11	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
21	DI12	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
26	DI13	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
44	DI14	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
45	DI15	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
63	DI16	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	
81	DI_WAKEUP2	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	Wakeup Signal
40	DI_WAKEUP1	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	Wakeup Signal
59	KEYON	--	10n	--	--	--	100K	68K	4V	9V	0 V	32V	Wakeup Signal

2.2.3 Frequency Signal Input

Description

The frequency input channel circuit has the same structure, including EMC capacitors, pull-up/pull-down resistors, voltage divider resistors and a first-order low-pass filter circuit.

Main difference：

- Resistance of pull-up/pull-down resistor
- Pull-up or pull-down
- Filter time constant

Schematic

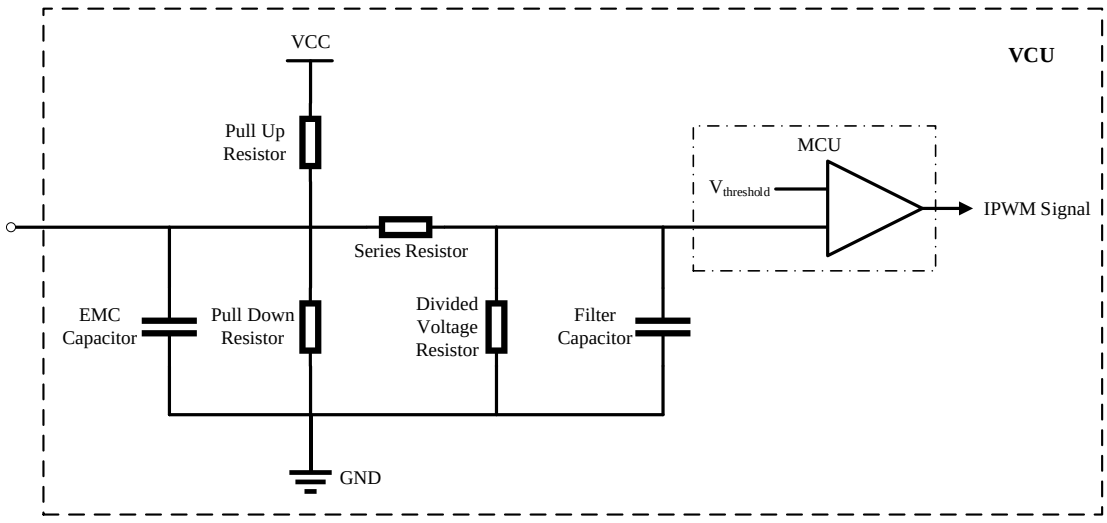


Figure 6 Schematic diagram of digital frequency input channel

Table 7 Frequency signal input channel parameter table

Note：1) "--" = Not installed 2) U_B = BATT voltage

Pin #	Description	EMC Cap.	Filter Cap.	Pull Up Resistor to U_B	Pull Up Resistor to 5V	Pull Down Resistor	Serial Resistor	Divided Voltage Resistor	Operation Threshold for Input Signal		Input Range	
		(F)	(F)	(Ohm)	(Ohm)	(Ohm)	(Ohm)	(Ohm)	V_{low}	V_{high}	min	max
64	SPEED1	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V
47	SPEED2	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V
66	SPEED3	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V
8	SPEED4	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V
7	SPEED5	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V
6	SPEED6	100p	100p	10K	--	--	100K	68K	4V	9V	0 V	32V

Note：the frequency and duty cycle reference values of the frequency signal input channel are shown in the following table (test conditions: BATT = 12V, pulse input amplitude = 10V, pulse input offset = 5V):

Table 8 frequency signal input channel frequency and duty cycle reference value table

Input Frequency	Detection frequency	Input duty cycle	Detection duty cycle	Input duty cycle	Detection duty cycle	Input duty cycle	Detection duty cycle
100Hz	100Hz	10.0%	9.92%	50.0%	49.92%	90.0%	89.92%
1000Hz	1000Hz	10.0%	9.67%	50.0%	49.60%	90.0%	90.32%
2000Hz	2000Hz	10.0%	9.12%	50.0%	49.38%	90.0%	90.32 %

2.2.4 Low-side Driver

Description

The low-side drive can be used as a switch for driving peripheral devices, and all low-side drive channels have a fault diagnosis function.

Main difference：

- Driving current
- With or without freewheeling diode
- With or without PWM function

Schematic

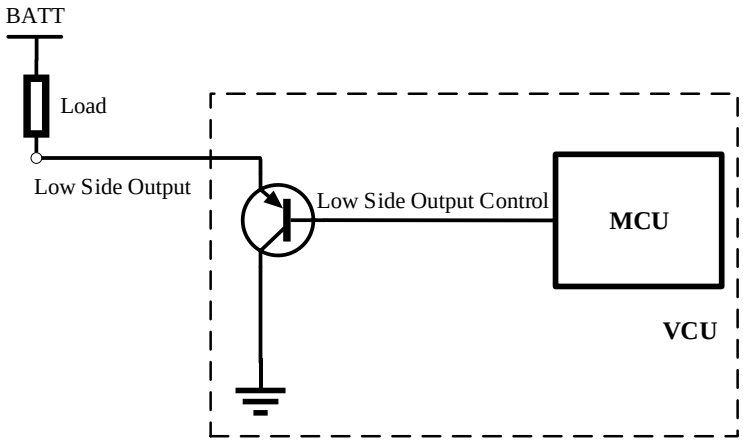


Figure 7 Schematic diagram of low-side drive channel

Table 9 High-side drive channel parameter table

Pin #	Description	EMC Cap.	Output Current	Free Wheeling Diode	Conditions / Remarks
		(F)	Max		
95	LSO01	--	1A	No	OPWM Configurable
96	LSO06	--	1A	No	
110	LSO07	--	1A	No	
89	LSO08	--	1A	No	
109	LSO02	--	1A	No	OPWM Configurable
101	LSO04	--	1A	No	
97	LSO05	--	1A	No	
90	LSO03	--	1A	No	
113	LSO14	--	1A	No	
103	LSO12	--	1A	No	
112	LSO09	--	1A	No	
104	LSO15	--	1A	No	
105	LSO16	--	1A	No	
111	LSO10	--	1A	No	
102	LSO11	--	1A	No	
88	LSO13	--	1A	No	
93	LSO17	--	1A	yes	OPWM Configurabl
92	LSO18	--	1A	yes	OPWM Configurabl

Note：

1. “--” = Not installed
2. The total load of all low-side drive channels should not exceed 2A.

Fault diagnosis of low-side driver

Low-side driver channel	Fault	
	Disable	Enable
LSO01, LSO02, LSO03, LSO04, LSO05, LSO06, LSO07, LSO08, LSO09, LSO010, LSO11, LSO12, LSO13, LSO14, LSO15, LSO16, LSO17, LSO18	•No load •Short to ground	•Short to power supply

Note：

1) Please refer to Chapter 3.8 of "EcoCoder Instruction Manual" for the usage of the fault diagnosis function.

2) The low-side drive channels have short-circuit protection. When it is enabled, if a channel is short-circuited to the ground, it will automatically activate the short-circuit protection function. This function may cause the channel to have a fault code jump phenomenon in this case, which is normal.

3) When LSO01, LSO02, LSO17, LSO18 are configured as OPWM, the frequency and duty cycle reference values are shown in the following table (test conditions: BATT = 12V, load = 24 Ohm, duty cycle is all calculated as negative duty cycle).

Table 10 LSO OPWM frequency and duty cycle reference value table

Set Frequency	Output frequency	Set duty cycle	Output duty cycle	Set duty cycle	Output duty cycle	Set duty cycle	Output duty cycle
100Hz	100Hz	10.0%	10.02%	50.0%	49.7%	90.0%	89.6%
1000Hz	1000Hz	10.0%	10.00%	50.0%	49.9%	90.0%	89.8%
2000Hz	2000Hz	10.0%	9.237%	50.0%	49.4%	90.0%	89.2%

2.2.5 High-side Driver

Description

The high-side drive can be used as a switch for driving peripheral devices, and all high-side drive channels have a fault diagnosis function.

Main difference：

- Driving current
- With or without PWM function
- Current leakage
- With or without freewheeling diode

Schematic

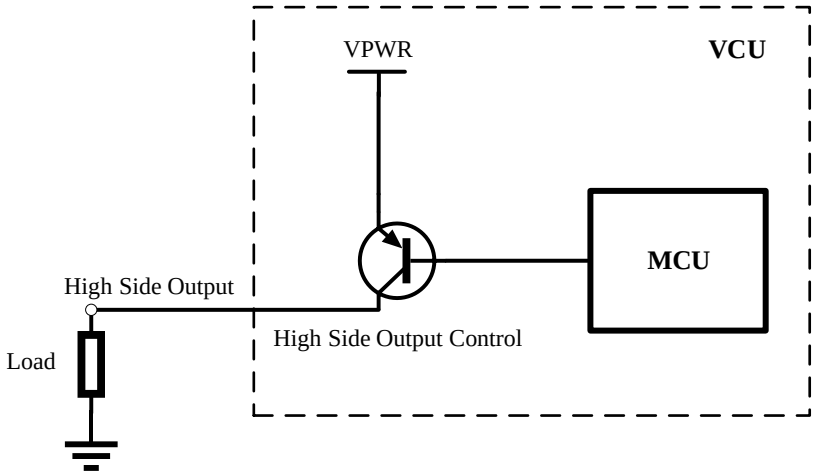


Figure 8 Schematic diagram of high-side drive channel

Table 11 High-side drive channel parameter table

Pin-No	Description	EMC Cap	Output current	Leakage Current	Free Wheeling Diode	Conditions / Remarks
		(F)	Max(A)	Max(uA)		
108	HSO01	100n	1.5	5	No	OPWM Configurable
100	HSO02	100n	1.5	5	No	OPWM Configurable
107	HSO03	100n	1.5	5	No	OPWM Configurable
99	HSO04	100n	1.5	5	No	OPWM Configurable
106	HSO05	100n	1.5	5	Yes	
98	HSO06	100n	1.5	5	yes	

Note：

1. “--” = Not installed
2. The total load of all high-side drive channels does not exceed 5A.

Fault diagnosis of high-side driver

High-side driver channel	Fault	
	Disable	Enable
HSO01, HSO02, HSO03, HSO04, HSO05, HSO06	•Short to power supply	•No load •Short to ground •Short to power supply

Note：

1) Please refer to Chapter 3.8 of "EcoCoder Instruction Manual" for the usage of the fault diagnosis function.

2) When HSO01, HSO02, HSO03, and HSO04 are configured as OPWM, the frequency and duty

cycle reference values are shown in the following table (test conditions: BATT = 12V, load = 24 Ohm, duty cycle is all calculated as positive duty cycle).

Table 12 HSO OPWM frequency and duty cycle reference value table

Set Frequency	Output frequency	Set duty cycle	Output duty cycle	Set duty cycle	Output duty cycle	Set duty cycle	Output duty cycle
100Hz	100Hz	10.0%	10.4%	50.0%	50%	90.0%	90.4%
1000Hz	1000Hz	10.0%	10.8%	50.0%	50.5%	90.0%	91.2%
2000Hz	2000Hz	10.0%	11.1%	50.0%	51.6%	90.0%	91.6%

2.2.6 CAN Bus

Description

CAN interface circuit is used for communication between VCU and other vehicle electronic controllers, and the communication speed can reach 1Mbit/s. CANA supports wake-up at any frame.

Schematic

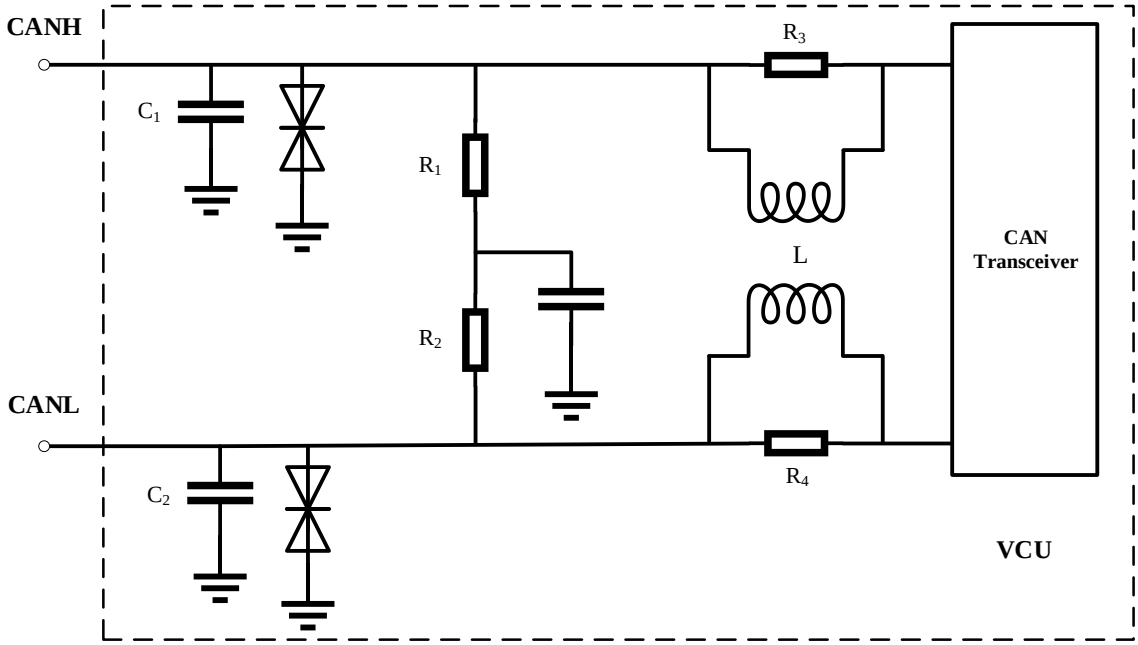


Figure 9 CAN bus schematic

Electrical Characteristics

Table 13 CAN bus parameter table

Pin-No.	Description	EMC Capacitor (F) C1, C2	R1, R2 (Ohm)	Choke L	Conditions / Remarks
56	CANA H	--	60	Yes	Support ISO11898-5, support CAN wake-up at any frame
55	CANA L	--	60		
57	CANB H	47p	60	Yes	Support ISO11898-5
76	CANB L	47p	60		
54	CANC H	47p	60	Yes	Support ISO11898-5
73	CANC L	47p	60		

2.2.7 5V Output

Description

The 5V voltage output channel can provide 5V power supply voltage for external sensors and has the following functions:

- Accurate 5V output for internal IC power supply
- 3 Channels of sensor 5V power supply output
- Invert connection protection, short circuit protection, over-temperature protection

Channel Parameters

Pin-No.	Description	Imax(mA)	Output Voltage
51	5V supply voltage 2	50	5V±2%
41	5V supply voltage 3	50	5V±2%
49	5V supply voltage 4	50	5V±2%

Note: The application layer controls all 5V sensor power supply output channels. Refer to PWR5V2 and PWR5V3 in chapter 3.10.9 of "EcoCoder Instruction Manual" to build and configure application layer model.

3. Technical Performance

3.1 Electrical Characteristics

Item	Design Specifications
Operating Voltage	DC 12 V / 24v (9~32v)
Operating Temperature	-40 °C ~85 °C
Working Humidity	0~95%, No Condensation
Storage Temperature	-40 °C ~85 °C
Quiescent Current	<1mA
Rated Power Consumption	3 W (Not Including Load)
Protection Level	IP67
Weight	≤ 600g
Controller Size	207×150×42mm
Material	Die-Cast Aluminum
Shell	Equipped With Waterproof Breathable Valve, Good Heat Dissipation

3.2 Electrical Performance Standard

Item	Test Standard
Direct Current Supply Voltage	ISO 16750-2
Overvoltage (12V, High Temperature)	ISO 16750-2
Slow Decrease and Increase of Supply Voltage	ISO 16750-2
Superimposed Alternating Voltage	ISO 16750-2
Reversed Voltage	ISO 16750-2
Low Voltage Reset Features	ISO 16750-2
Low Voltage Start Features	ISO 16750-2
Open Circuit Tests – Single Line Interruption	ISO 16750-2
Open Circuit Tests – Multiple Line Interruption	ISO 16750-2
Short Circuit Protection	ISO 16750-2
Withstand Voltage	ISO 16750-2
Insulation Resistance	ISO 16750-2

3.3 Environmental Standards

Item	Test Standard
Waterproof (IP67)	IEC/EN 60529
Dustproof (IP67)	ISO 20653
Salt Spray Leakage Function and Corrosion Test	ISO 16750-4
Mechanical Shock Test	ISO 16750-3
Vibration Test	ISO 16750-3
Drop Test	ISO 16750-3
Temperature Shock	ISO 16750- 4
Electrical Operation at Circulating Ambient Temperature	ISO 16750-4
High and Low Temperature Operation Experiment	ISO 16750-4
High and Low Temperature	ISO 16750-4
Temperature and Humidity Cycle	IEC 60068-2-30
Constant Temperature and Humidity	ISO 16750-4

3.4 EMC Test Standard

Item	Test Standard
Voltage Transient Emissions Test	ISO7637-2
Conducted Emission (CE-V)	CISPR25
Conducted Emission (CE-C)	CISPR25
Radiation Emission (RE-ALSE)	CISPR25
Radiation Immunity Experiment (I/O)-ICC	ISO7637-3
Radiation Immunity Experiment (BCI-Substitution Method)	ISO11452-4
Radiation Immunity Experiment (RI)	ISO11452-2
Low Frequency Magnetic Field Immunity	ISO11452-8
ESD	GMW3097

4. Installation Requirements

It is recommended to install the VCU in the cockpit. If the OEM wants to assemble the VCU in another location, Ecotron's engineers and the OEM's engineers should evaluate the corresponding installation location together.

The precautions for VCU installation are as follows：

1. The VCU and wiring harness installation should be firm and reliable, and there should be no looseness. Avoid supporting the wiring harness by VCU. At the same time, the arrangement of the VCU wiring harness should prevent and protect all wires in the wiring harness from damage due to wear and to overheat.
2. Try to avoid installing in places where dust is easy to gather. A large amount of dust accumulation will affect the reliability of VCU work.
3. VCU should keep away from the location where the temperature of the shell itself may exceed 85°C. At the same time, it is necessary to prevent the surrounding parts from releasing heat to the VCU.
4. Avoid installing the VCU 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 installation position and fixing method of the VCU and avoid installing the VCU at the resonance point of the car body.
6. Avoid installing the VCU 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 VCU power terminal.
7. VCU 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° to -10°, as shown in Figure 10 below. In the vertical direction, the recommended installation angle is -170°~ -10°, as shown in Figure 10 below.

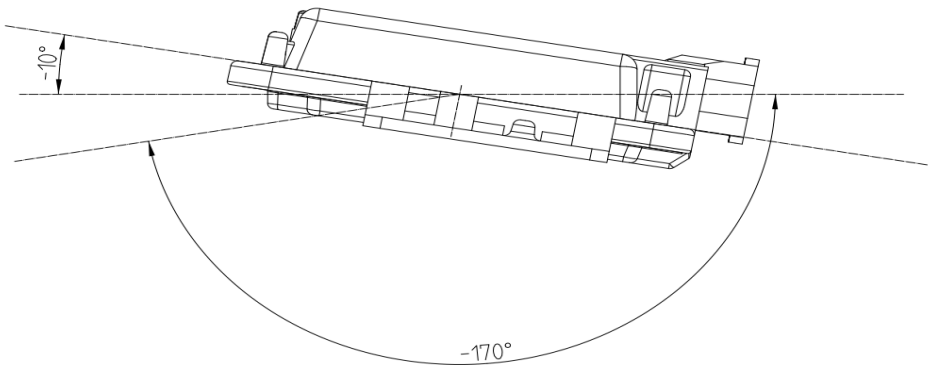
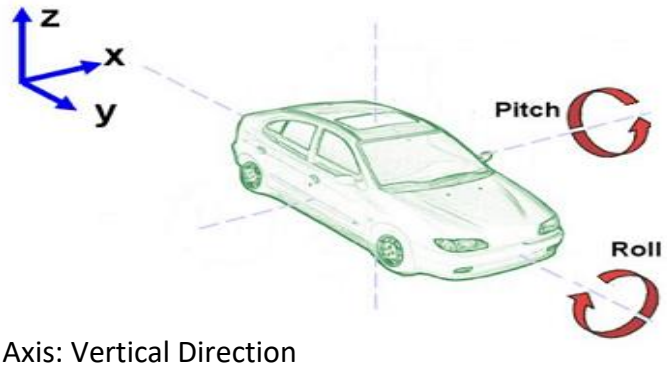


Figure 10 Horizontal Installation Angle



Z Axis: Vertical Direction

X Y Axes: Horizontal Direction

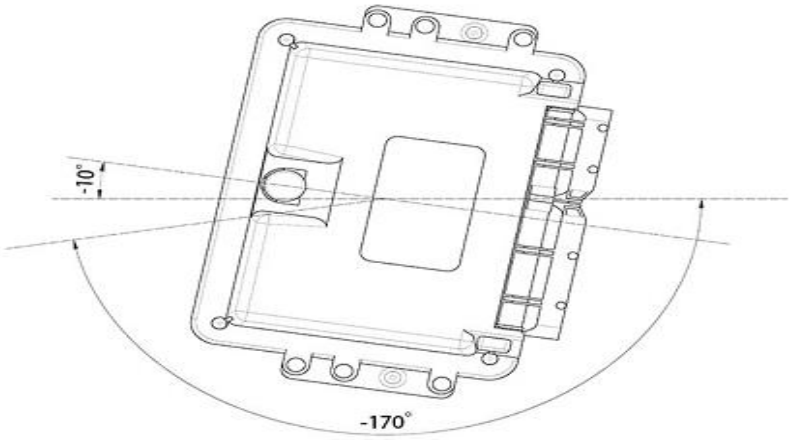


Figure 11 Vertical Installation Angle

Ecotron recommends using the six installation points on the VCU for installation and fixation. It is recommended to use metal materials such as aluminum alloy for the mounting bracket. 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 they can meet the requirements of VCU for vibration, heat dissipation, temperature, EMC, etc. If there is any deviation, it needs to be confirmed with Ecotron.

The VCU system adopts Ground through the vehicle's body. The specific requirement is to directly connect the ground wire in the wiring harness to the vehicle's body and ensure reliable electrical connections.