Engine Control Unit
(ECU)
Technical Spec

ECOTRONS LLC

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Note: If you are not sure about any specific details, please contact us at info@ecotrons.com.

Product：　　Engine Control Unit

Part#：　　EH2T1CDTCD

Comment：　　All the data in the document are tests under normal conditions

Index	Page	Revision	Date	Note
1	----	**First Edition**	7.9.2014	V1.0
2	----	**Second Edition**	8.15.2014	V1.1
3	----	**Third Edition**	2.18.2017	V1.2

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1 Overview

The core part of Ecotrons ECU is **FreeScal**e's 16 bit or 32 bit microprocessor that is specifically designed for powertrain controls. ECU also includes some Application Specific Integrated Circuits, or ASIC chips, from world famous automotive semiconductor manufacturers, like **Infineon**, and **International Rectifier** etc. Most importantly, Ecotrons' ECU contains the state-of-art engine control software which combines both efficiency and flexibility of the modern engine control technology.

Ecotrons has a few small engine ECUs; all small sizes and light weight. One is like the below picture, potted with the epoxy for weather proof.



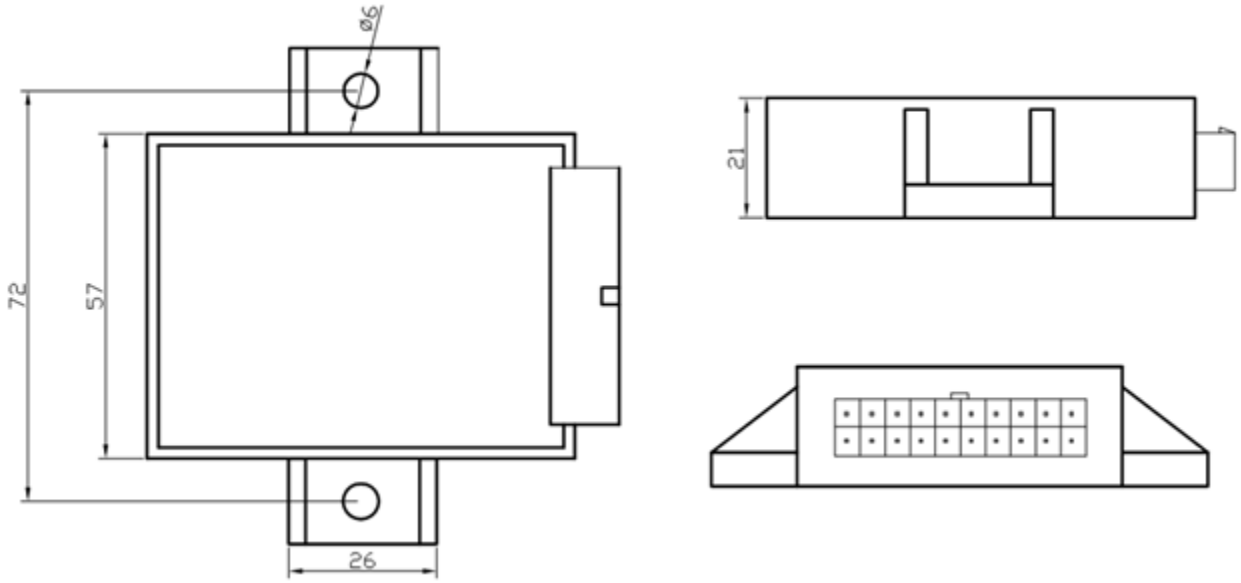
2 Characteristic and principle

2.1 Characteristics

- The 20-pin ECU with a lightweight plastic shell is sealed by pouring sealant.

And there are mounting holes on the shell.

- The size of ECU series.



2.2 Working Principle

ECU judges the working state of the engine through the sensor measuring data acquisition and calculation. ECU performs Optimization and control tasks according to the existing and stored calibration data.

3 Technical Parameters

Voltage	9~16V DC
Current	≤60mA
Storage Temperature	-40~125℃
Working Temperature	-40~125℃
The Weight	**≤120g**

4 Installations

4.1 Installation location

In order to ensure a high reliability, ECU installation should abide by the

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following principles:

- Mounting position of ECU should have adequate ventilation.
- Avoid the heat transmission to the ECU.
- Away from the ignition system, the EMI is serious.
- It should be installed firmly.
- Avoid the dirty, wet, and splash water.
- Don't let the ECU to prop up the wiring harness.
- Wiring harness should avoid wear and heat.

4.2 Temperature Adaptability

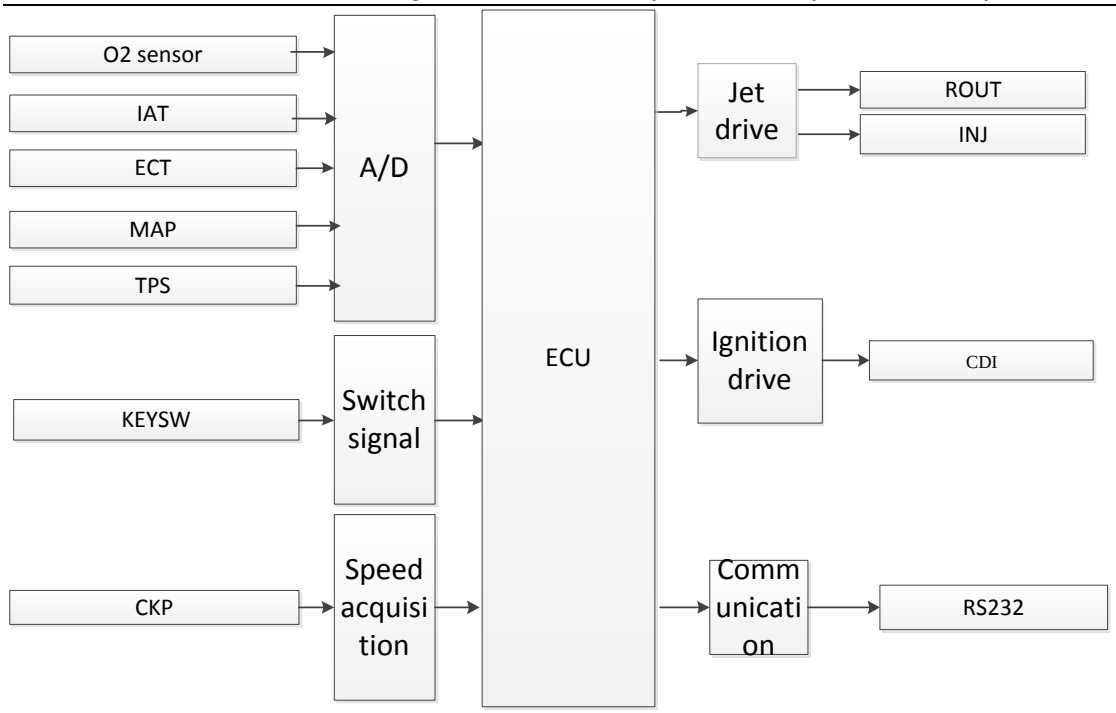
The temperature of location must under the limit (125 ^{o}C) at any time.

4.3 Waterproof Requirements

- The water cannot gather near the ECU connector. It may cause a short.
- All the possibility of contact with water should be ruled out.

5 Instructions

5.1System Function



Abbreviation:

IAT: Intake Air Temperature Sensor

ECT: Engine (Coolant) Temperature or Cylinder Head Temperature Sensor

MAP: Manifold Absolute Pressure Sensor

BARO: Barometric Pressure Sensor

TPS: Throttle Position Sensor

KEYSW: Key Switch or Ignition Switch input

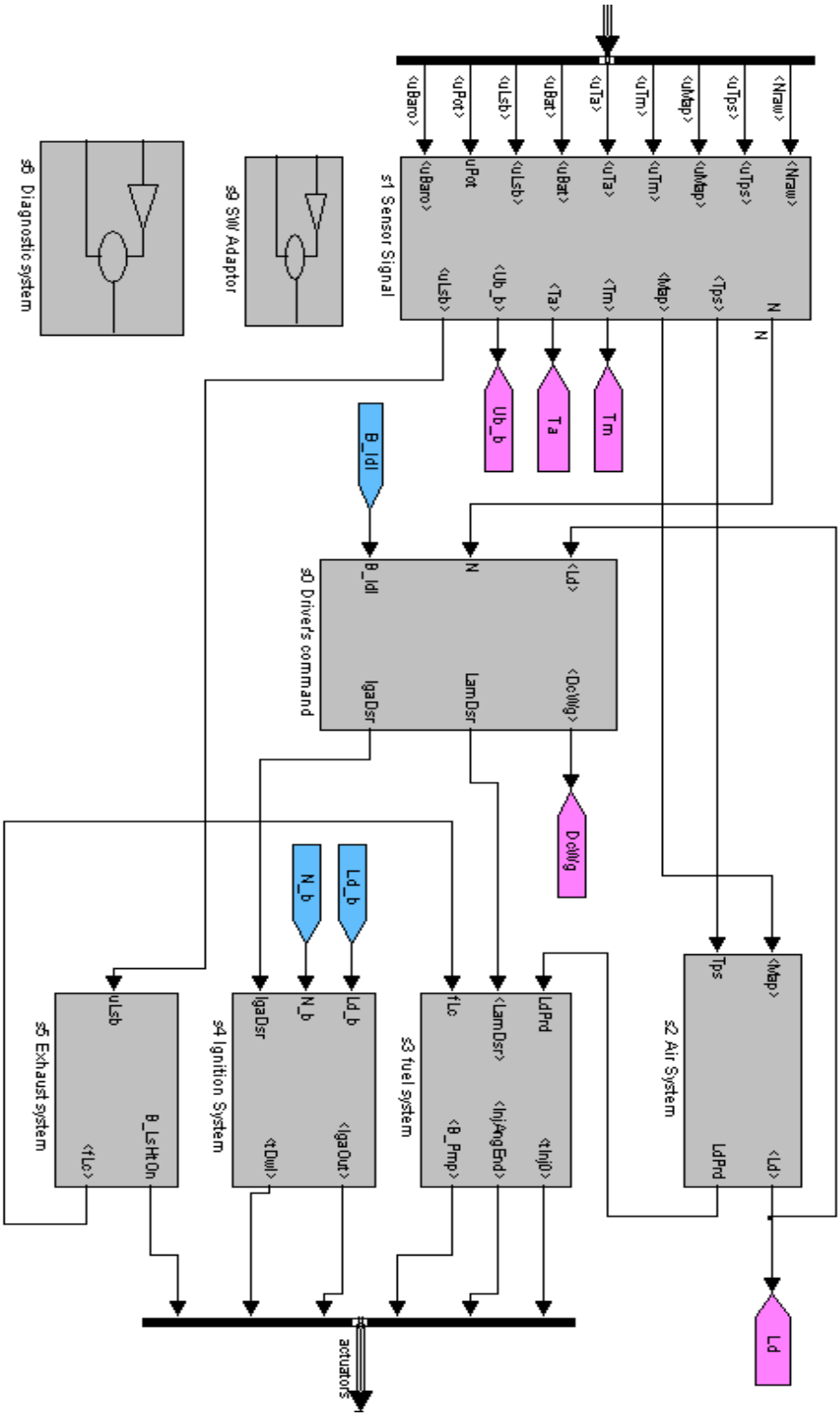
CKP: Crank Position Sensor

ROUT: Relay control Output

INJ: Injector control output

CDI: Capacitor Discharge Ignition Controls

Control Strategy Block Diagram:



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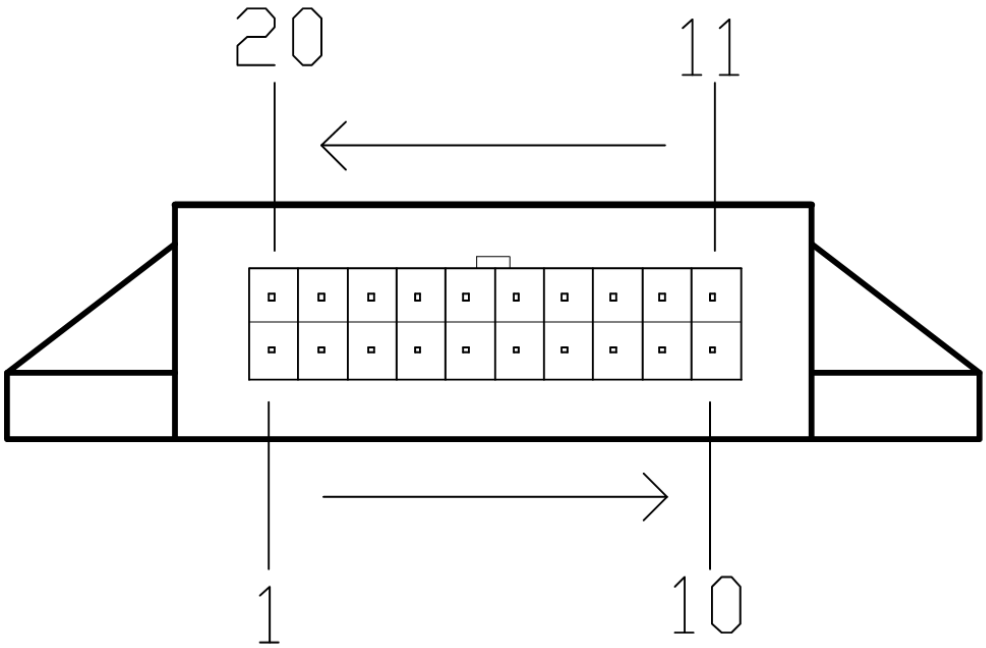
Control Strategy Block Diagram (as above)

Major control strategies:

- Charge detection and prediction.
- Fuel injection controls.
- Ignition system controls.
- Fuel pump controls.
- EVAP emission controls.
- Transient fuel compensations.
- Decel-fuel-cut-off.
- Altitude compensations.
- Temperature compensations (winter, summer, etc.).
- Engine protections.
- Diagnostics and serial communications.

5.2 ECU Pin Definition and Description

ECU Port Definition：



N.O.	Define	Instructions	The input/out type	Voltage range
1	CKP	The crank position sensor input	input	-150~150V
2	MIL-LAMP	Malfunction Indicator Lamp driver output	output	0~16V
3	MAP	Manifold air pressure sensor input	input	0~5V
4	IAT	Intake air temperature sensor input	input	0~5V
5	RXD	serial port communication sender	output	-15~+15V
6	TXD	serial port communication receiver	input	-15~+15V
7	ROUT	fuel pump relay driver output	output	0~16V
8	CDI_CTL	CDI control output	output	0~4V
9	INJ1	Fuel injector # 1 driver output	output	0~16V
10	GND-P	Power ground	output	0
11	O2HOUT1	Oxygen sensor heater driver output	output	0~16V
12	KEYSW	Key switch	input	0~16V
13	+12V	Battery terminal positive	input	9~16V
14	GND-P	Power ground	output	0
15	VCC	5v sensor power supply	output	5V
16	ECT	The engine temperature sensor	input	0~5V
17	TPS	Throttle position sensor	input	0~5V
18	O2IN	Oxygen sensor input	input	0~1V
19	SWITCH	Switch input	input	0~5V
20	GND-A	Sensor ground	output	0

5.3 ECU Function Module

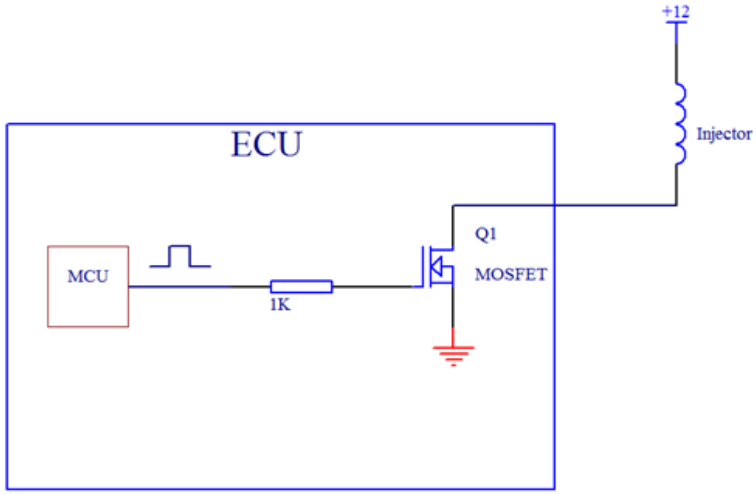
5.3.1 Analog signal acquisition channel

AD conversion channel can convert analog signals from sensor to digital signals. The ECU can get signals from the sensors, like the air temperature sensor, engine temperature sensor, air pressure sensor, throttle position sensor and oxygen sensor signal.

5.3.2 CKP signal acquisition

The CKP signal is extracted from the engine ignition trigger sensor, the voltage of original signal is high, so it must be converted into a 0~5V digital pulse voltage, can be processed to identify ECU, then ECU can get the information of engine speed and piston position . The voltage of signal from trigger sensor must be higher than 2V.

5.3.3 Fuel injector drive



Fuel injector drive circuit

MCU can control the MOSFET to be ON or OFF, and then the injector will be ON or OFF. So the ECU can control the injector to inject the accurately fuel. For gasoline engine, the stoic AFR (air/fuel ratio) is 14.7.

5.3.4 Ignition control

The 2T1C ECU can give a 4V pulse signal to control a CDI system. The CDI must be appropriative, which cannot adjust the ignition timing by CDI self.

Note: the 2T1C ECU cannot driver an ignition coil directly.

5.4 Matters Needing Attention

- In the installation, the ECU should be installed at the end to reduce the damage of the electrostatic.
- The power supply should be disconnected before the ECU is installed.
- For the first time to use the ECU, in order to get the right TPS information, please operate as following:
  - ✧ Close the throttle , in the idle position;
  - ✧ Key on, waiting for more than 5 seconds;
  - ✧ Open the throttle fully, waiting for more than 5 seconds;
  - ✧ Close the key switch, waiting for more than 5 seconds.
- Try to avoid ECU suffered more than 16V voltages.
- ECU should be stored in a dry, dust-free environment, not exposed to any liquid waste.

6 Malfunction Indicator and Elimination

The fault phenomenon	Cause analysis	Elimination method
Malfunction Indicator Lamp shining	Parts are bad	According to the software read failure
After open the key switch, oil pump does not work	1. The ECU is not powered on. 2. The relay is damaged. 3. The ECU has been damaged.	1. Check the red power cord and fuse 2. Replace the relay 3. Replace the ECU

7 Appendixes: Mechanical CAD Size(mm)

