MotoHawk Control Solutions

ECM-0S12-024-0804-C/F

Engine Control Modules

(Part No. 1751-6534, 1751-6432)

- **Microprocessor**: Freescale S9S12
- **Memory**: (MC9S12DT128BMPV) 128K Flash, 8K RAM
- **Operating Voltage**: 8–16 Vdc
- **Operating Temperature**: –40 to +105 °C
- Sealed connectors operable to 10 ft (3 m) submerged
- **Inputs:**
  Up to 10 Analog
  1 VR Frequency
- **Outputs:**
  4x 3 A Low Side PWM
  1x 4 A Low Side PWM
  1x 1 A Tachometer
- **Datalinks:**
  1 CAN 2.0B Channel

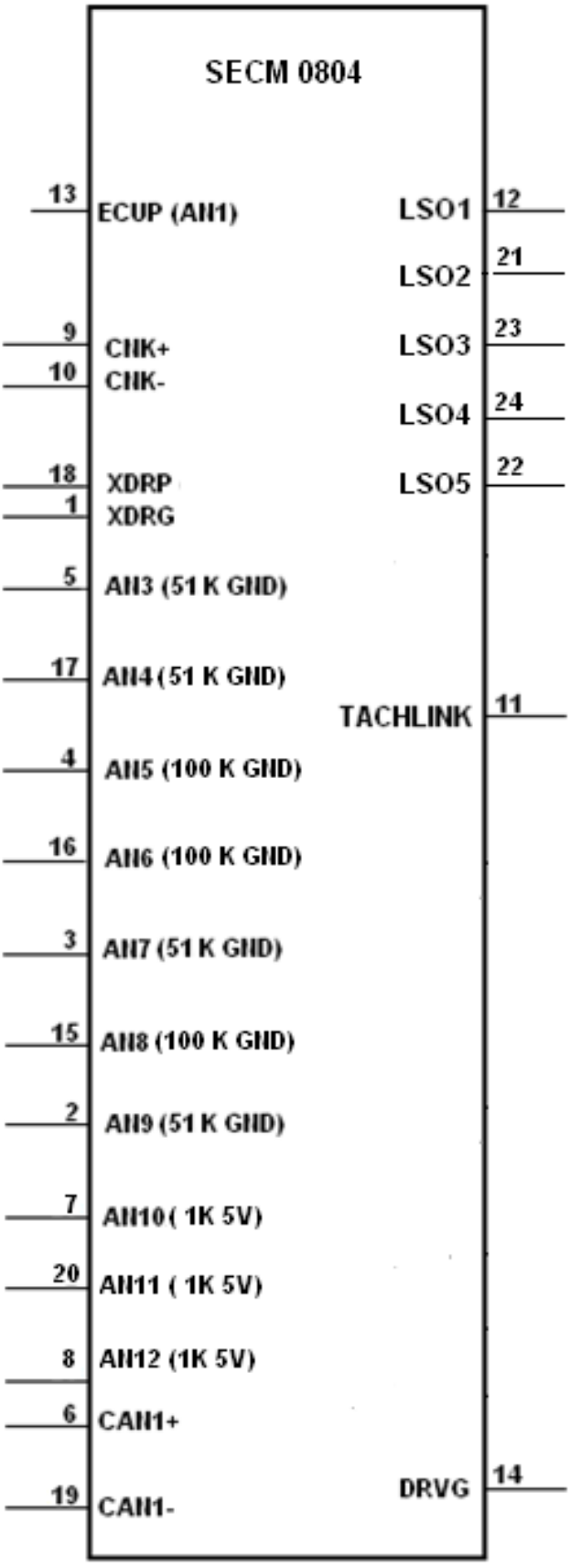
Description

Presenting the ECM-0S12-024-0804-C/F engine control modules from Woodward's MotoHawk Control Solutions product line. These rugged embedded controllers are capable of operating in harsh automotive, marine, and off-highway applications. Numerous successful industrial and heavy duty truck applications have proven the capability of this module. Based on a proven microprocessor, the ECM-0S12-024-0804-C/F is capable of delivering complex control strategies. The CAN 2.0B datalink ensures interoperability with other system components.

The ECM-0S12-024-0804-C/F modules are part of the ControlCore® family of embedded control systems. MotoHawk Control Solutions' ControlCore operating system, MotoHawk® code-generation product, and MotoHawk's suite of development tools enable rapid development of complex control systems.

IMPORTANT **Woodward does not warranty these ECMs based on information supplied in this datasheet, but only with an express and specific production supply agreement based on customer's operating mode. Information in this datasheet is subject to change without prior notice. Please contact MotoHawk Control Solutions sales for more information.**

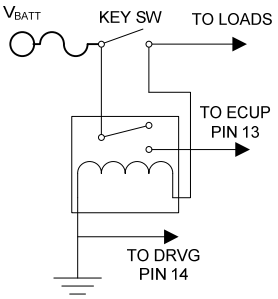
1 Block Diagram



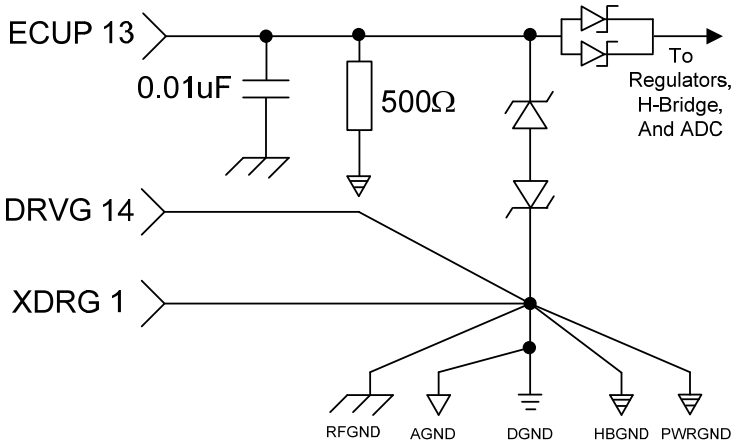
2–Input Signal Conditioning

2.1 ECUP/AN1M (13), DRVG (14), XDRG (1)

Power (Key) switch input ECUP supplies module power. Input is monitored by the processor.

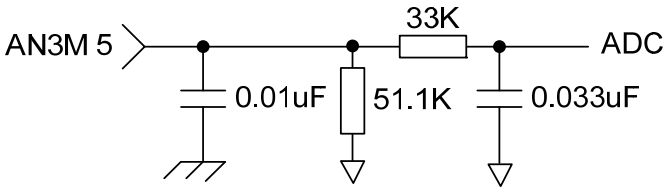


E-Stop switches are placed between the NO contact and pin 13 of the module.
The XDRG is the transducer ground return.



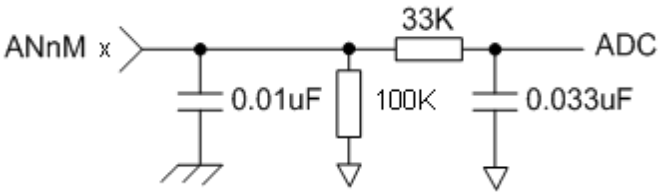
2.2 AN3M, AN4M, AN7M, AN9M (5, 17, 3, 2)

This input is a 10 bit 0–5 V ADC, τ =1 ms.



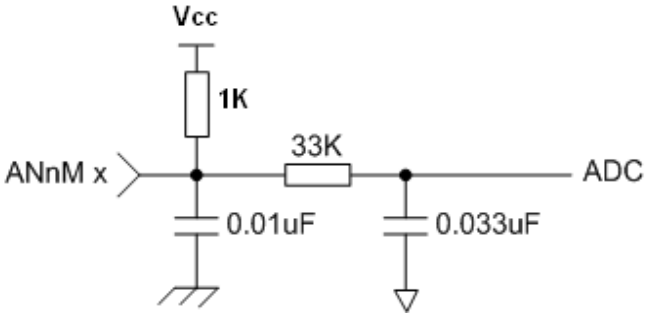
2.3 AN5M, AN6M, AN8M (4, 16, 15)

These inputs are 10 bit 0–5 V ADC, τ = 1 ms.



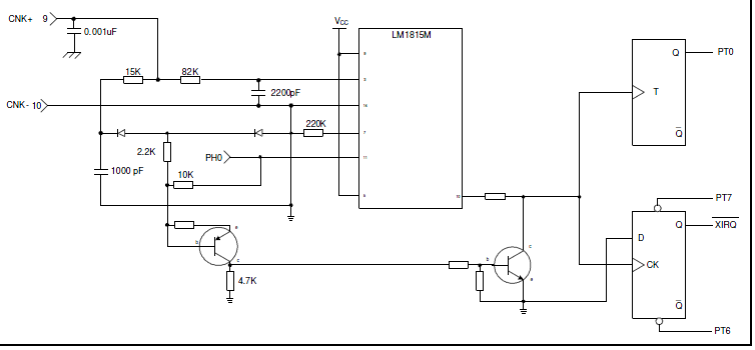
2.4 AN10M, AN11M, AN12M (7, 20, 8)

These inputs are 10 bit 0–5 V ADC, τ = 1 ms.



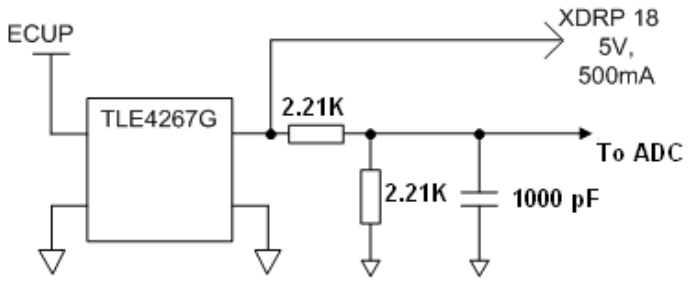
2.5 CNK+/CNK_DG, CNK– (9, 10)

CNK+ and CNK– are variable reluctance sensor inputs.
CNK_DG is a switch input for Hall Effect sensor.
Only one should be wired in a time.



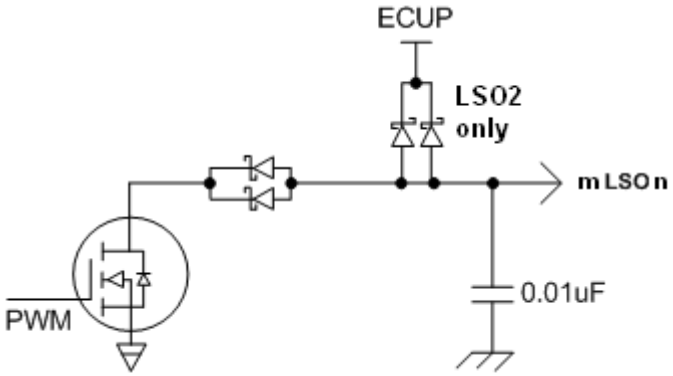
3–Output Signal Conditioning

3.1 XDRP (18)
This pin is the transducer power source. It is monitored by the processor

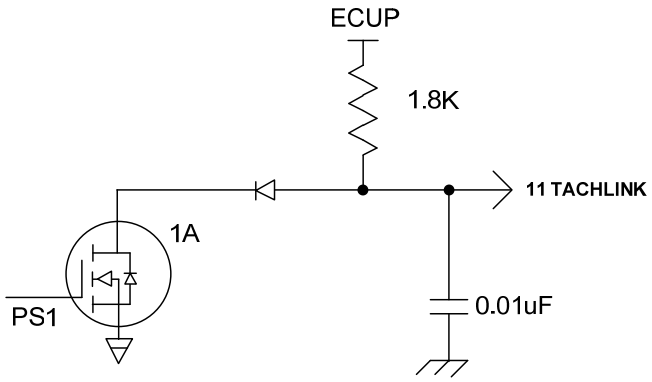


3.2 LSO1,…, LSO5 (12, 21, 23, 24, 22)
These outputs are high current sink drivers capable of 3 A max (4 A for LSO1). This max current rating is an average or continuous current.

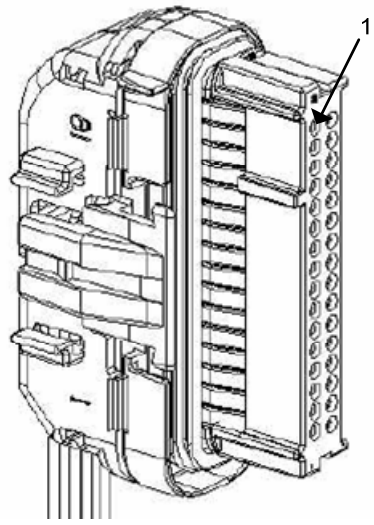
Only LSO2 includes a freewheeling diode to ECUP.

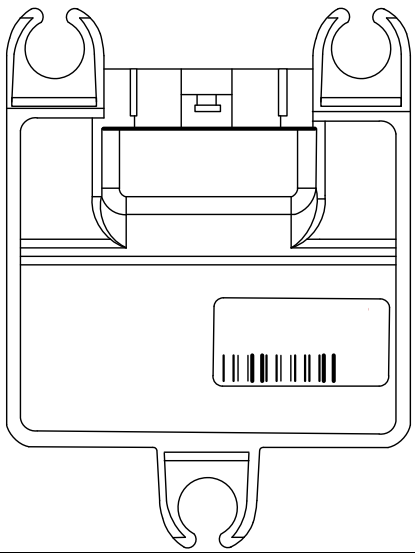


3.3 TACHLINK (11)
This output is capable of sinking 1 A max.



4–Connector Definitions



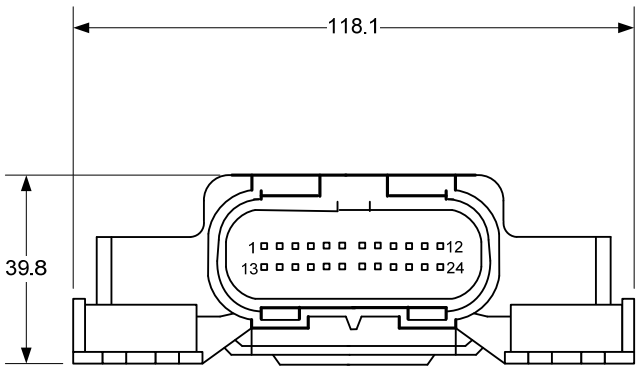


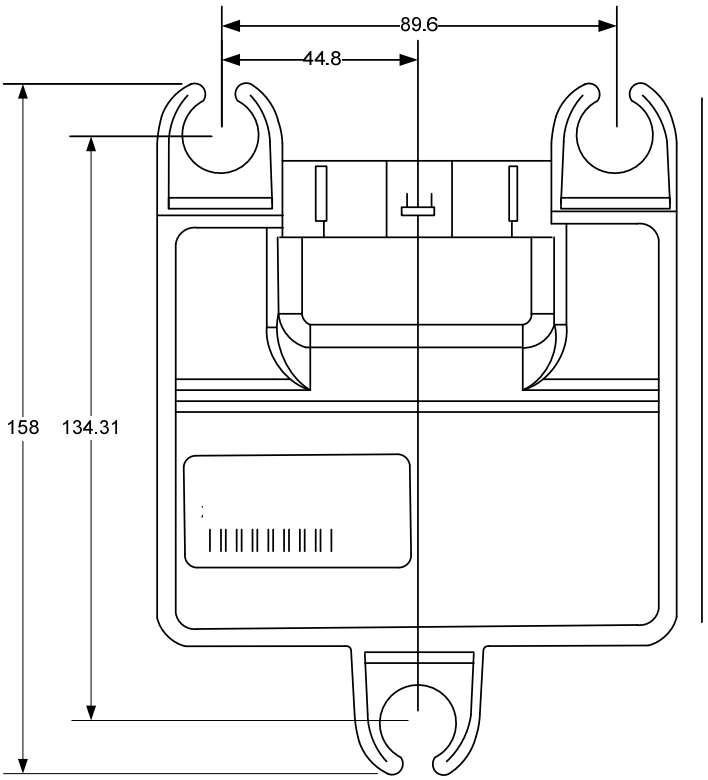
5 Connector Pinouts

Pin # ECM	ControlCore Resource Name	Function Name	Notes
1	XDRG	Transducer Ground	Ground
2	AN9	Analog Input	51K Pull Down
3	AN7	Analog Input	51K Pull Down
4	AN5	Analog Input	100K Pull Down
5	AN3	Analog Input	51K Pull Down
6	CAN+	CAN	Terminating Resistance Required
7	AN10	Analog Input	1K Pull Up
8	AN12	Analog Input	1K Pull Up
9	CNK+/ CNK_DG	Crank Position HI/ Hall Effect Crank Sensor	Variable Reluctance Sensor Compatible with NSC LM1815 or Hall Effect sensor
10	CNK–	Crank Position LO	Variable Reluctance Sensor Only
11	TACHLINK	Serial Communication	Tachometer/EZ-Link
12	LSO1	Low Side Driver	4 A Max
13	ECUP/AN1	Module Power	Power to Module (via Key Switch)
14	DRVG	Power Ground	Connect to Battery Ground
15	AN8	Analog Input	100K Pull Down
16	AN6	Analog Input	100K Pull Down
17	AN4	Analog Input	51K Pull Down
18	XDRP/AN2	Transducer Power	5 V, 500 mA
19	CAN–	CAN	Terminating Resistance Required
20	AN11	Analog Input	1K Pull Up
21	LSO2	Low Side Driver	3 A Max
22	LSO5	Low Side Driver	3 A Max
23	LSO3	Low Side Driver	3 A Max
24	LSO4	Low Side Driver	3 A Max

6 Physical Dimensions

All dimensions are in millimeters.

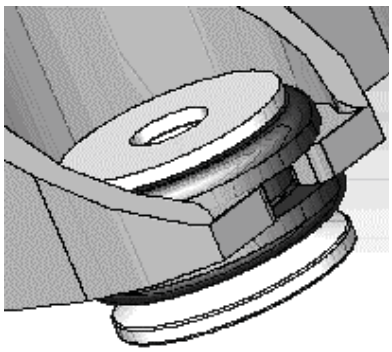




7 Environmental Ratings

Notes

The ECM is designed for under-hood automotive and marine industry environmental requirements. Validation tests include extreme operating temperatures, thermal shock, humidity, salt spray, salt fog, immersion, fluid resistance, mechanical shock, vibration, and EMC. The customer must contact Woodward and provide the intended environmental conditions in the application for verification of performance capability.

Storage Temperature	–40 to +125 °C
Operating Temperature	–40 to +85 °C (105 °C applications possible)
Thermal Shock	–40 to +105 °C
Fluid Resistance	Two-stroke motor oil, four-stroke motor oil, unleaded gasoline, ASTM Reference 'C' fuel
Humidity Resistance	85% humidity at 85 °C for 1000 hours.
Mechanical Shock	26 G's, 11 ms, half sine wave.
Drop Test	Drop test on concrete from 1 meter.
Vibration This ECM family has been successfully deployed with on-engine mounting for small displacement engine applications with extreme vibrations. Electrical and mechanical isolation is achieved via Woodward mounting hardware (consisting of grommet, bushing, and washer) shown to the right. ***IMPORTANT*** **For prior verification of performance capability, contact Woodward and provide the vibration profile of the intended application.**	

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For more information contact:

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