



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

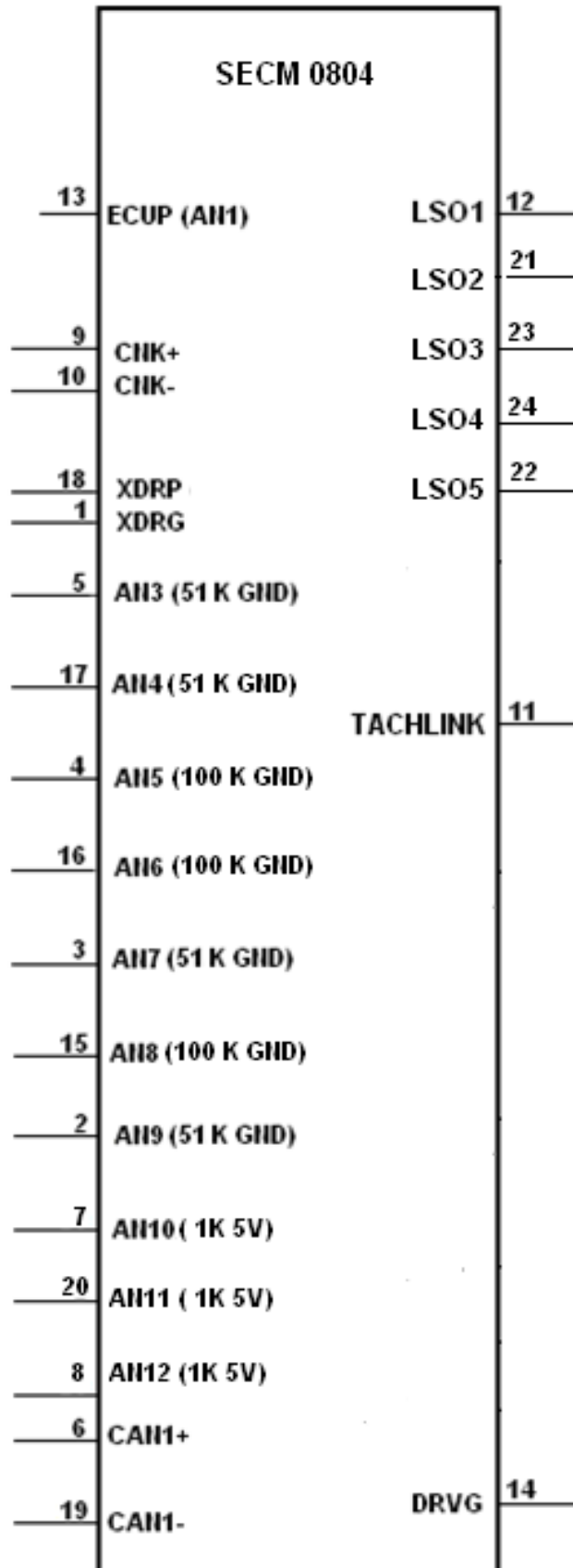
Presenting the ECM-0S12-024-0804-C/F engine control modules from Woodward's MotoHawk Control Solutions product line. These rugged embedded controllers are capable of operating in harsh automotive, marine, and off-highway applications. Numerous successful industrial and heavy duty truck applications have 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.

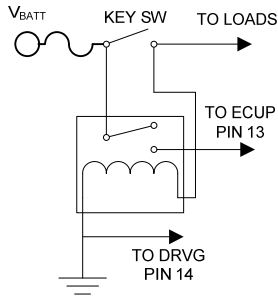
1 Block Diagram



2-Input Signal Conditioning

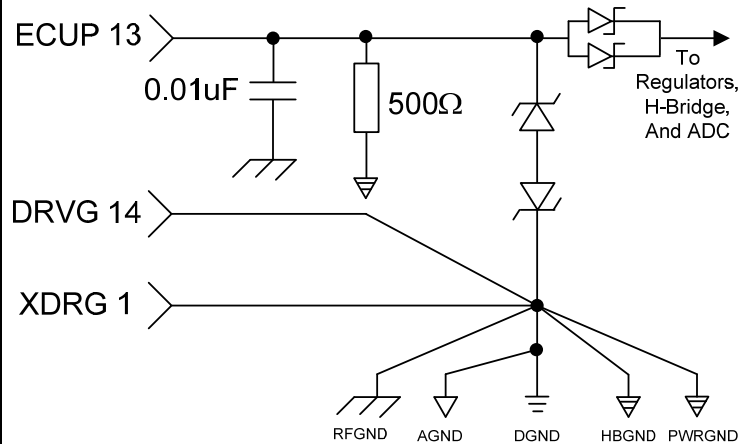
2.1 ECUP/AN1M (13), DRVG (14), XDRG (1)

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



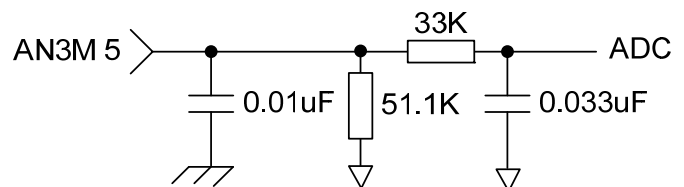
E-Stop switches are placed between the NO contact and pin 13 of the module.

The XDRG is the transducer ground return.



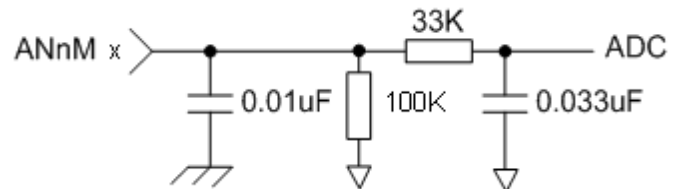
2.2 AN3M, AN4M, AN7M, AN9M (5, 17, 3, 2)

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



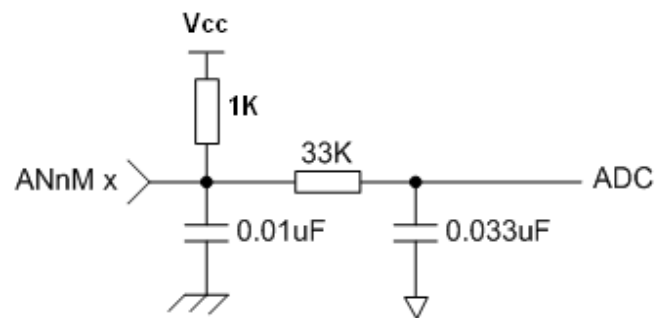
2.3 AN5M, AN6M, AN8M (4, 16, 15)

These inputs are 10 bit 0–5 V ADC, $\tau = 1$ ms.



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

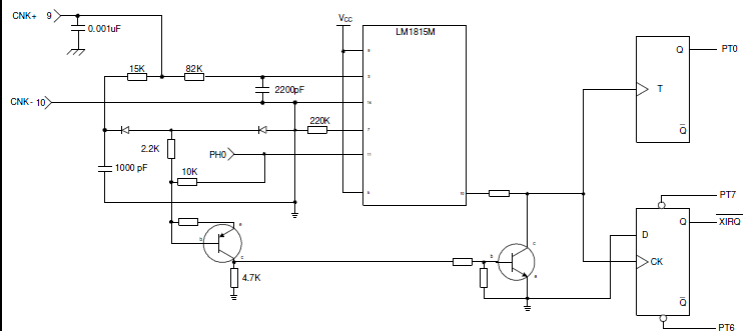
These inputs are 10 bit 0–5 V ADC, $\tau = 1$ ms.



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.

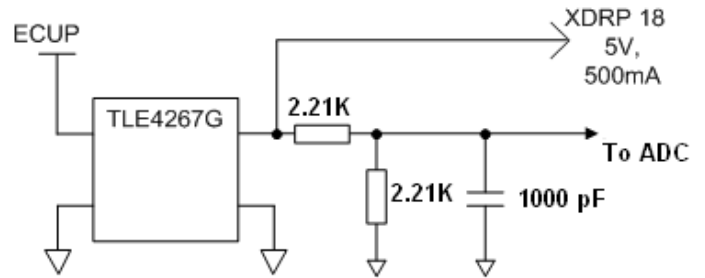
Only one should be wired in a time.



3-Output Signal Conditioning

3.1 XDRP (18)

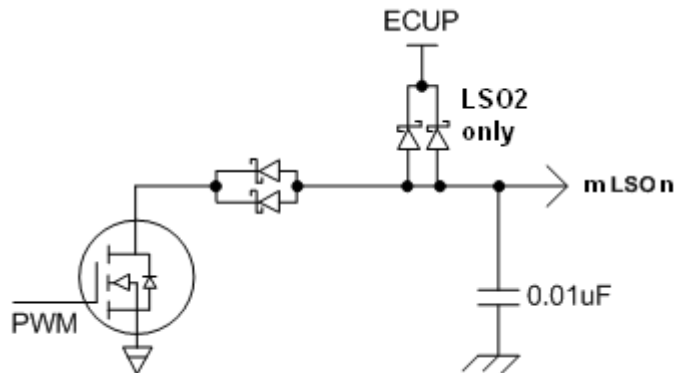
This pin is the transducer power source. It is monitored by the processor



3.2 LSO1, ..., LSO5 (12, 21, 23, 24, 22)

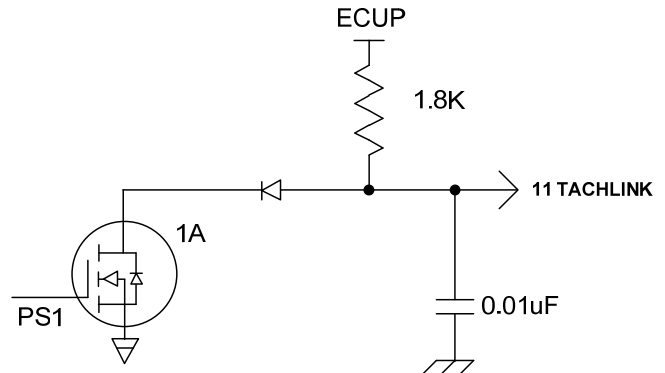
These outputs are high current sink drivers capable of 3 A max (4 A for LSO1). This max current rating is an average or continuous current.

Only LSO2 includes a freewheeling diode to ECUP.

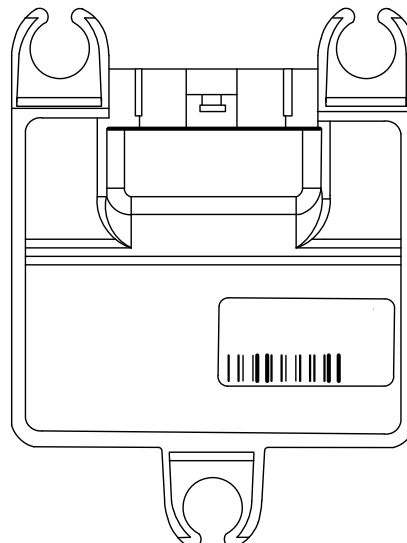
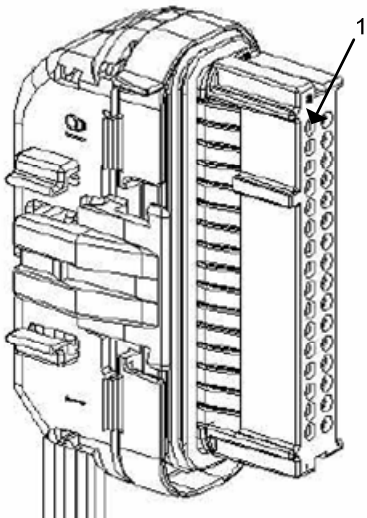


3.3 TACHLINK (11)

This output is capable of sinking 1 A max.

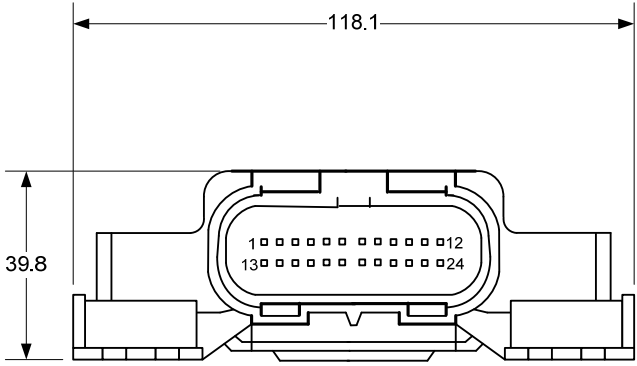
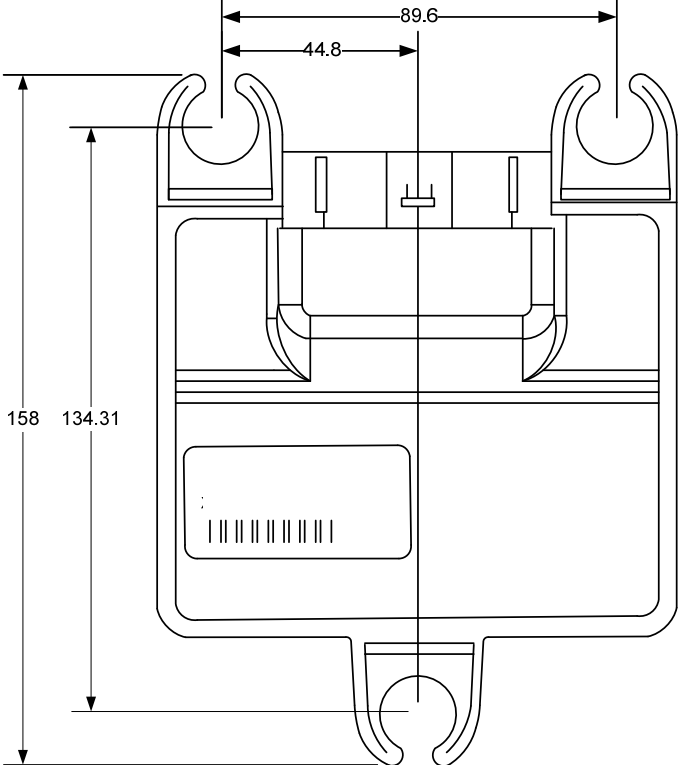


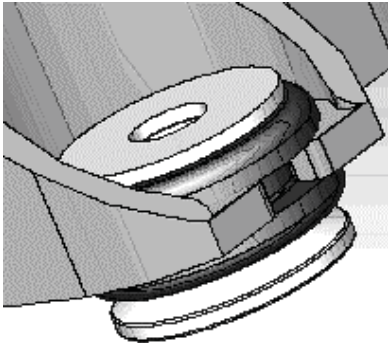
4-Connector Definitions



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 |
|--|---|
| <p>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.</p> | |
| 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. |
| <p>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.</p> <p>IMPORTANT For prior verification of performance capability, contact Woodward and provide the vibration profile of the intended application.</p> |  |



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