MotoHawk Control Solutions

ECM-0S12-024-0802-C/F

Control Modules

(Part No. 1751-6507, 1751-6428)

- **Microprocessor:** Freescale S9S12
- **Memory:** (MC9S12DT128BMPV) 128K Flash, 8K RAM
- **Operating Voltage:** 8–16 Vdc
- **Operating Temperature:** –40 to +105 °C (in benchmark marine engine application)
- **Sealed Connectors:** Operable to 10 ft (3 m) submerged
- **Inputs:** Up to 9 Analog 1 VR Frequency
- **Outputs:** 3x TTL Level Ignition System 1x 4 A Low Side PWM 1x 3 A Low Side PWM 1x 1.0 A Tachometer Output 1x 5 A H-Bridge PWM
- **Datalinks:** 1 CAN 2.0B Channel

Description

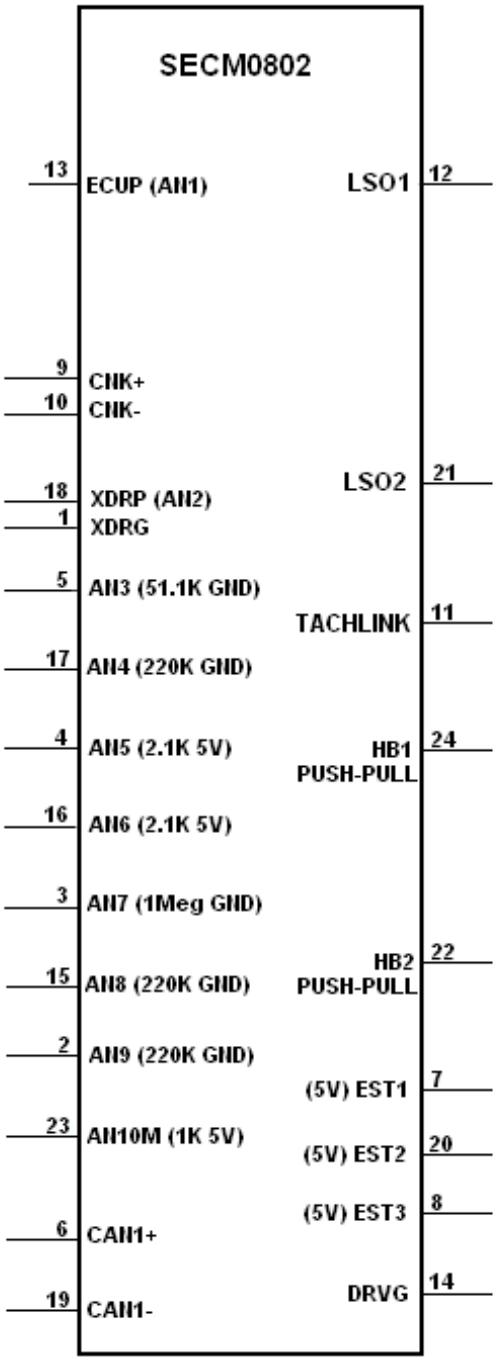
Presenting the ECM-0S12-024-0802-C/F control modules from Woodward's MotoHawk Control Solutions product line. These rugged embedded controllers are capable of operating in harsh automotive, marine, and off-highway applications. Numerous successful industrial and heavy duty truck applications have proven the capability of this module. Based on a proven microprocessor, the ECM-0S12-024-0802-C/F is capable of delivering complex control strategies. The CAN 2.0B datalink ensures interoperability with other system components.

The ECM-0S12-024-0802-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.

NOTICE **MotoHawk does not currently support angle-based events on this module platform; however this capability can be developed to support a production engine control application.**

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.**

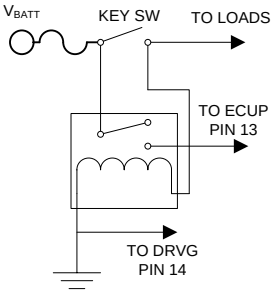
1 Block Diagram



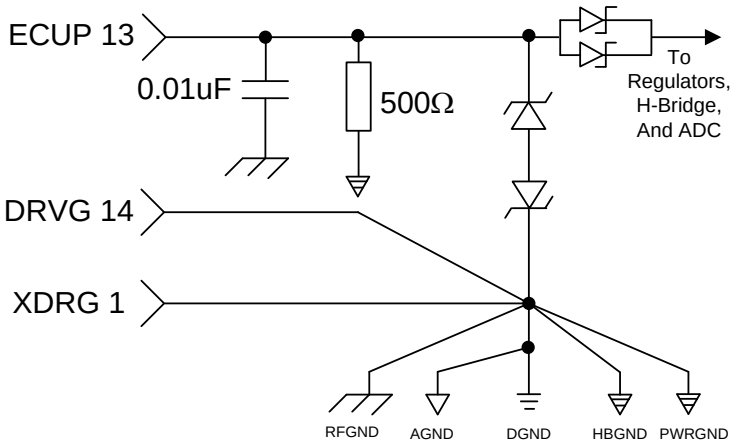
2–Input Signal Conditioning

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

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

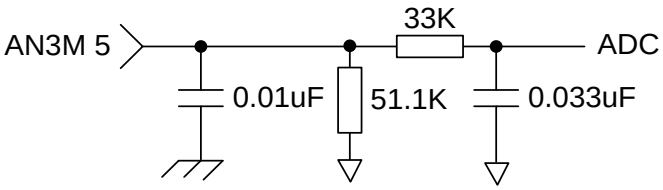


E-Stop switches are placed between the NO contact and pin 13 of the module.
The XDRG is the transducer ground return.



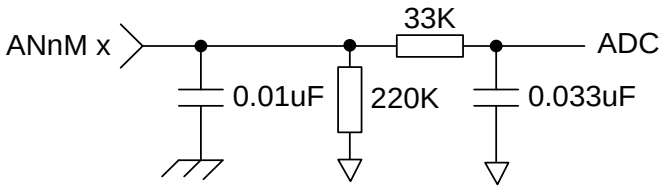
2.2 AN3M (5)

This input is a 10 bit 0–5 A (dc), τ =1 ms.



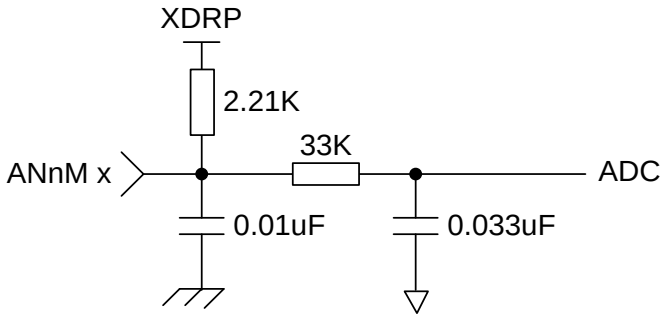
2.3 AN4M, AN8M, AN9M (17, 15, 2)

These inputs are 10 bit 0–5 A (dc), τ = 1 ms.



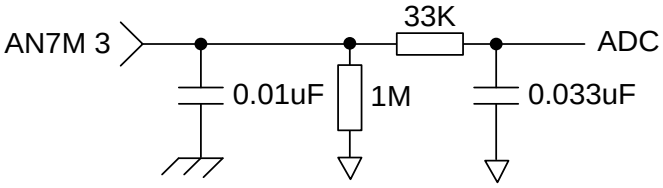
2.4 AN5M, AN6M (4, 16)

These inputs are 10 bit 0–5 A (dc), τ = 1 ms.



2.5 AN7M (3)

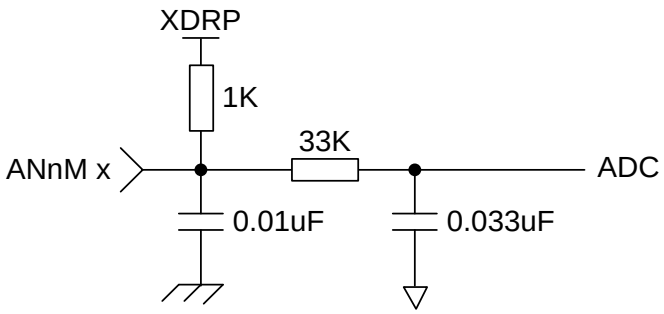
This input is a 10 bit 0–5 A (dc), τ =1 ms.



2–Input Signal Conditioning

2.6 AN10M (23)

This input is a 10 bit 0–5 A (dc), τ =1 ms.

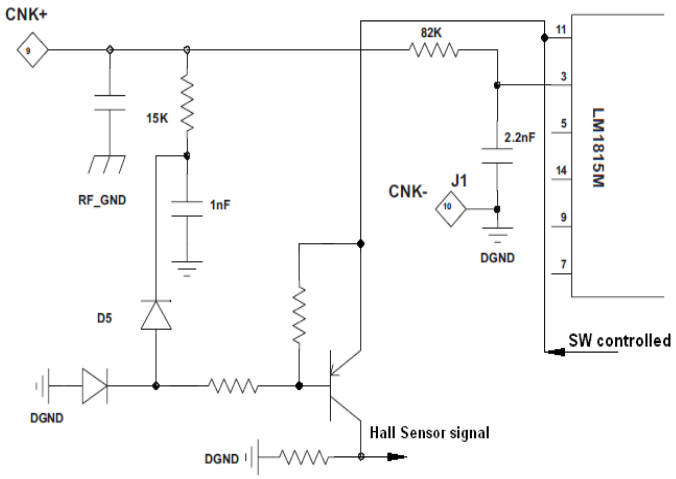


2.7 CNK+/CNK_DG, CNK- (9, 10)

CNK+ and CNK- are variable reluctance sensor inputs. CNK+ can also be used as a Hall Effect sensor input if this mode is selected in software.

For reluctance mode the τ =180 µs.

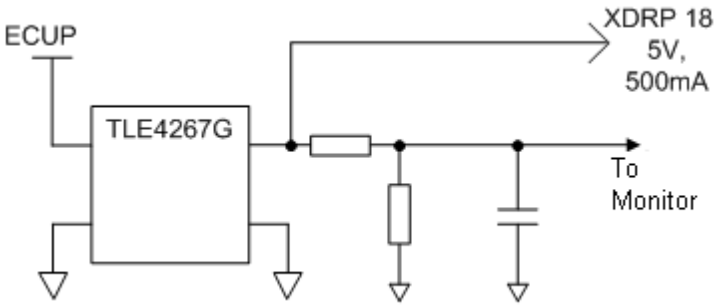
For Hall mode the τ =15 µs.



3–Output Signal Conditioning

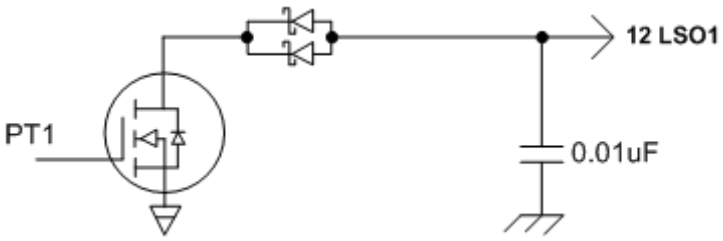
3.1 XDRP (18)

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



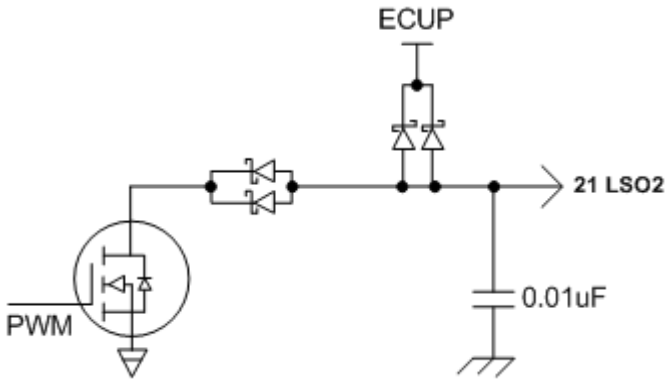
3.2 LSO1 (12)

This output is a high current sink driver continuous 4 A.

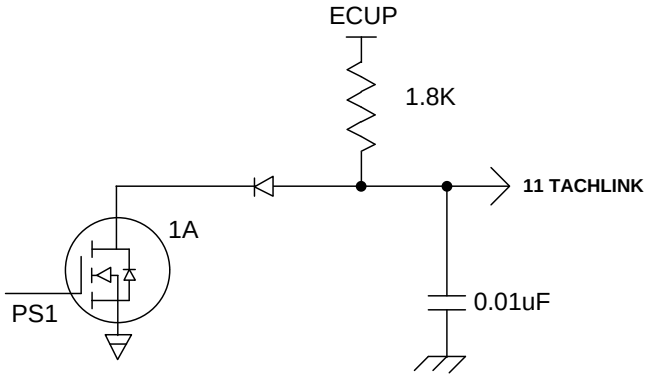


3–Output Signal Conditioning

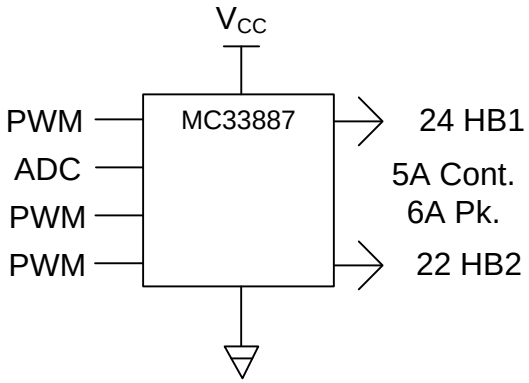
3.3 LSO2 (21)
This output is a high current sink driver. 20 V, 3 A continuous. It includes the freewheeling diodes to ECUP.



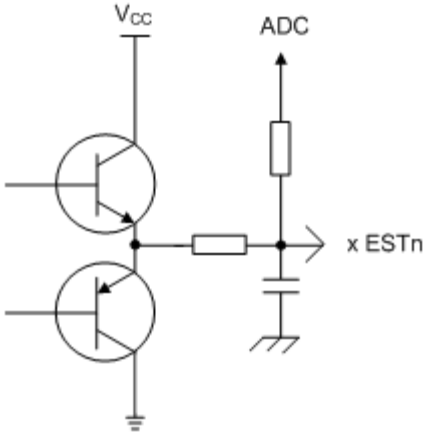
3.3 TACHLINK (11)
This output is capable of sinking 1 A max.



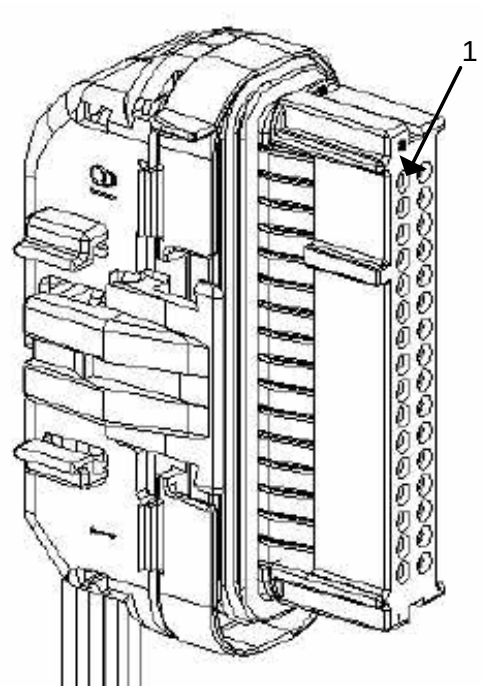
3.4 HB1, HB2, (24, 22)
This is a high current H-bridge output. 5 A cont.@ 25 °C, 6 A pk.

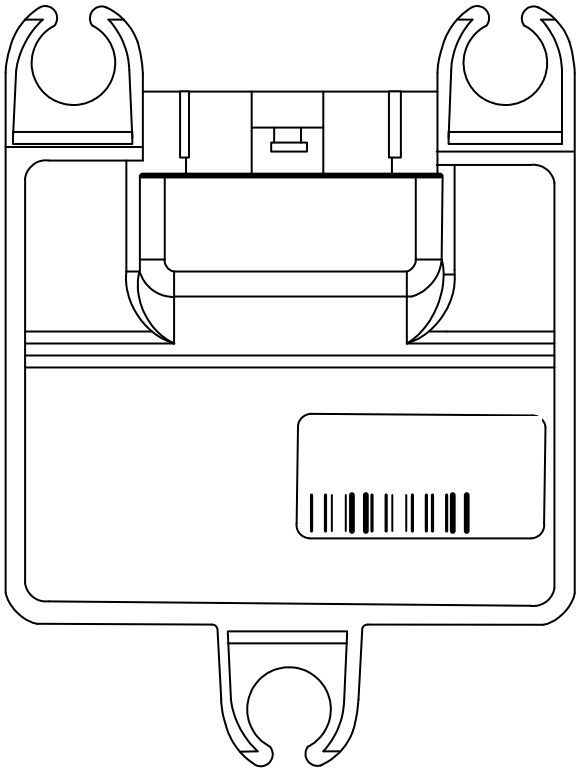


3.5 EST1...EST3, (7, 20, 8)
These outputs are capable of sourcing 0.5 mA and sinking 1 mA.
V_{OL} (max) = 0.5 V at I_{SINK} = 1 mA
V_{OH} (min) = 4.2 V at I_{SOURCE} = 0.5 mA



4–Connector Definitions



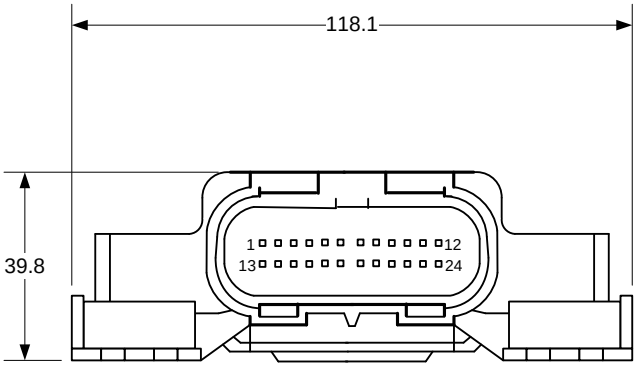


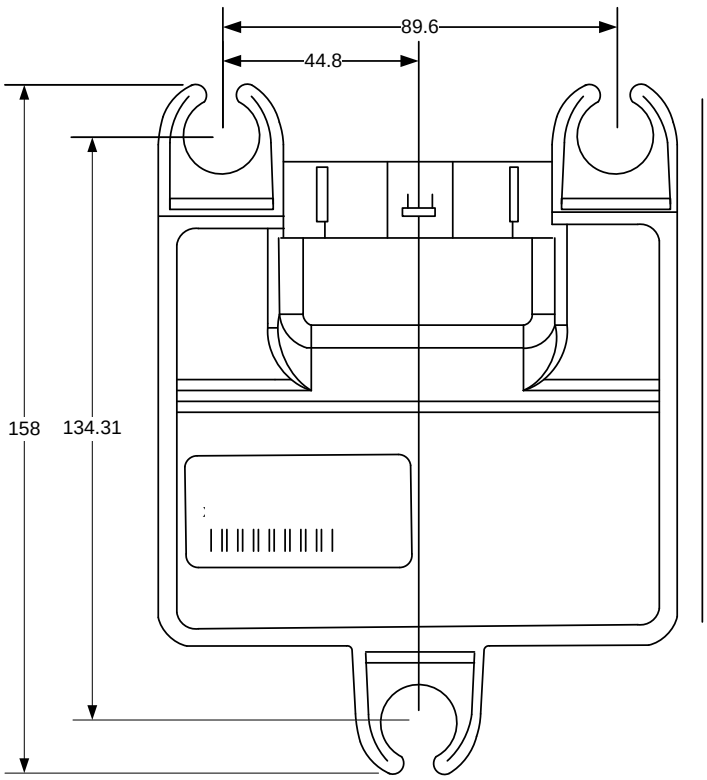
5 Connector Pinouts

Pin # ECM	ControlCore Resource Name	Function Name	Notes
1	XDRG	Transducer Ground	Ground
2	AN9	Analog Input	220K Pull Down
3	AN7	Analog Input	1M Pull Down
4	AN5	Analog Input	2.2K Pull Up
5	AN3	Analog Input	51K Pull Down
6	CAN+	CAN	Terminating Resistance Required
7	EST1	Electronic Spark Timing	Low Current
8	EST3	Electronic Spark Timing	Low Current
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	CAN+	CAN	Terminating Resistance Required
12	LSO1	Low Side Driver	4 A Continuous.
13	ECUP	Module Power	Power to Module (via Key Switch)
14	DRVG	Power Ground	Connect to Battery Ground
15	AN8	Analog Input	220K Pull Down
16	AN6	Analog Input	2.2K Pull Up
17	AN4	Analog Input	220K Pull Down
18	XDRP/AN2	Transducer Power	5 V, 500 mA
19	CAN-	CAN	Terminating Resistance Required
20	EST2	Electronic Spark Timing	Low Current
21	LSO2	Low Side Driver	3 A Continuous.
22	H+	H-Bridge Output	6 A Peak. (see pin description)
23	AN10	Analog Input	1K Pull Up
24	H-	H-Bridge Output	6 A Peak. (see pin description)

6 Physical Dimensions

All dimensions are in millimeters.

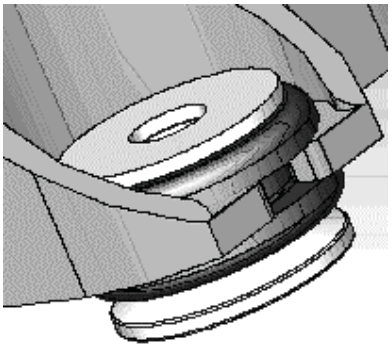




7 Environmental Ratings

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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Distributors & Service

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For more information contact: