MotoTron Control Solutions

GCM-0S12-024-0401-F
General Control Module
(Part No. 1751-6338 / 8923-1595)

- **Microprocessor:** Freescale MC9S12DT128, 24MHz
- **Memory:** (MC9S12DT128BMPV) 128K Flash, 8K RAM, 2K EEPROM
- **Operating Voltage:** 8-16VDC
- **Operating Temperature:** -40° to 105° C
- Sealed connectors operable to 10 ft. submerged

- **Inputs:**
  6 Analog
  4 Discrete

- **Outputs:**
  4 1.5A Low Side PWM/Discrete
  1 1.5A Low Side Discrete

- **Datalinks:**
  2 CAN 2.0B Channels

Description

Presenting the GCM-0S12-024-0401-F, the MicroCHI Control Hardware Interface from Woodward's new MotoTron Control Solutions product line. This rugged embedded controllers are capable of operating in harsh automotive, marine, and off-highway applications. Hundreds of successful industrial applications prove the capability of this module. Based on a proven microprocessor, the MicroCHI Control Hardware Interface is capable of delivering complex control strategies. The CAN 2.0B datalink ensures interoperability with other system components.

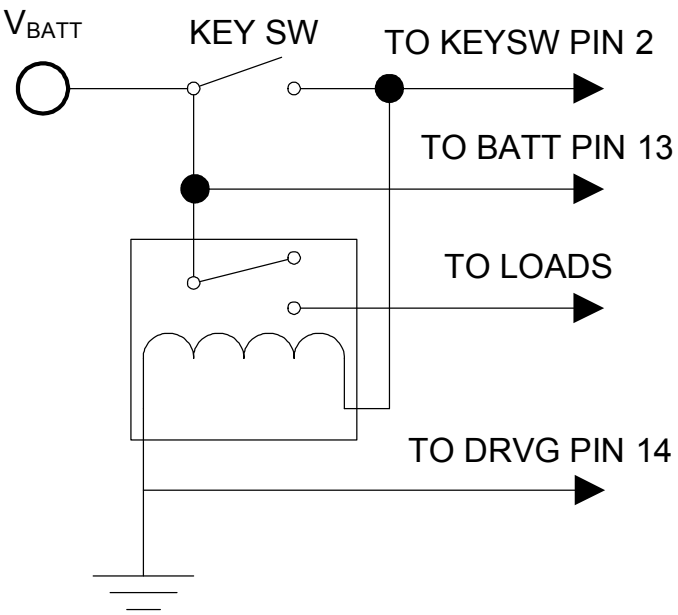
The GCM-0S12-024-0401-F is part of the ControlCore™ family of embedded control systems. MotoTron Control Solutions' ControlCore operating system, MotoHawk® code-generation product, and MotoHawk's suite of development tools enable rapid development of complex control systems.

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

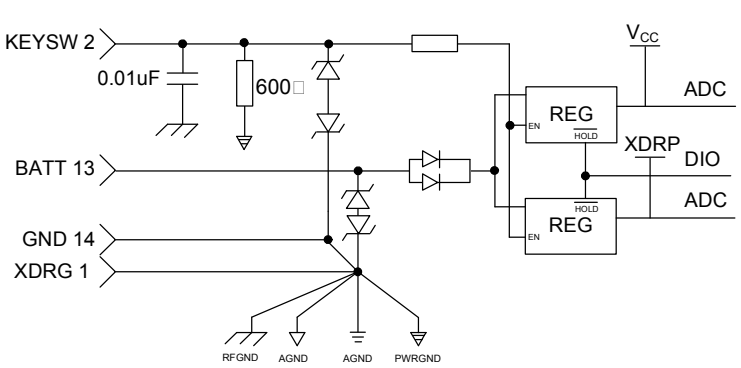
1 Input Signal Conditioning

1.1 KEYSW (2), BATT(13), GND (14), XDRG (1)

KEYSW input wakes the module's voltage regulators.
Input is monitored by the processor

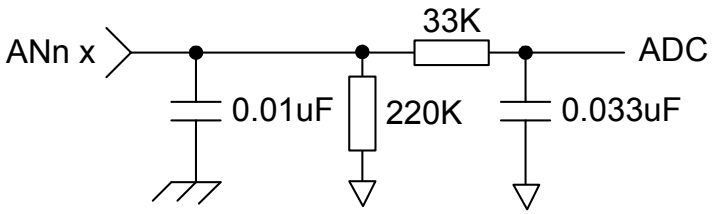


The XDRG is the transducer ground return.



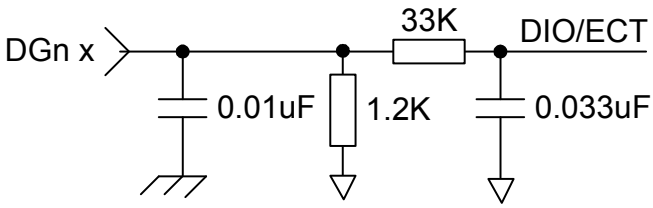
1.2 AN1...AN6 (5)

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



1.3 DG1...DG4 (11, 10, 20, 19)

These are discrete inputs V_{IL} < 4.0V, V_{IH} > 4.5V, τ = 1ms.
Note: These inputs may be switched to 12V.

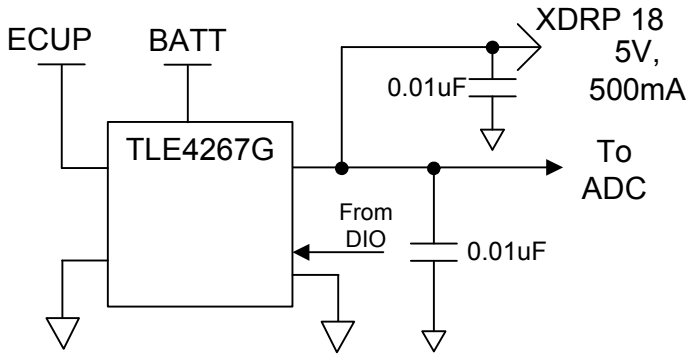


2 Output Signal Conditioning

2.1 XDRP (18)

This pin is the transducer power source, 5V, 500mA. It is monitored by the processor.

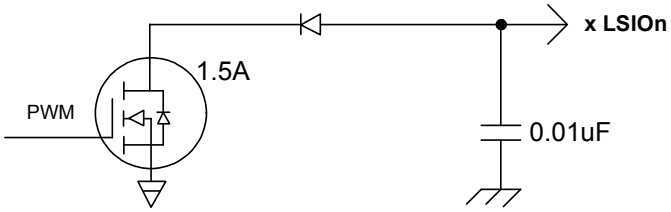
Scaling: 512 counts = 5.00 V dc



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

These outputs are 1.5 A low side drivers.

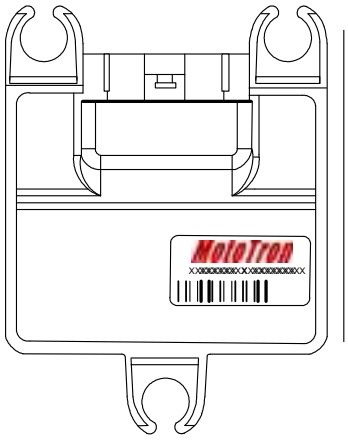
LSO1: discrete output only, no PWM.
LSO5: uses name “ESTOP” in MotoHawk.

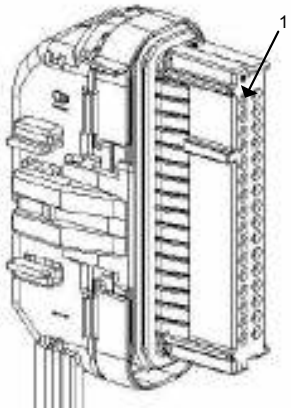


3 Communications

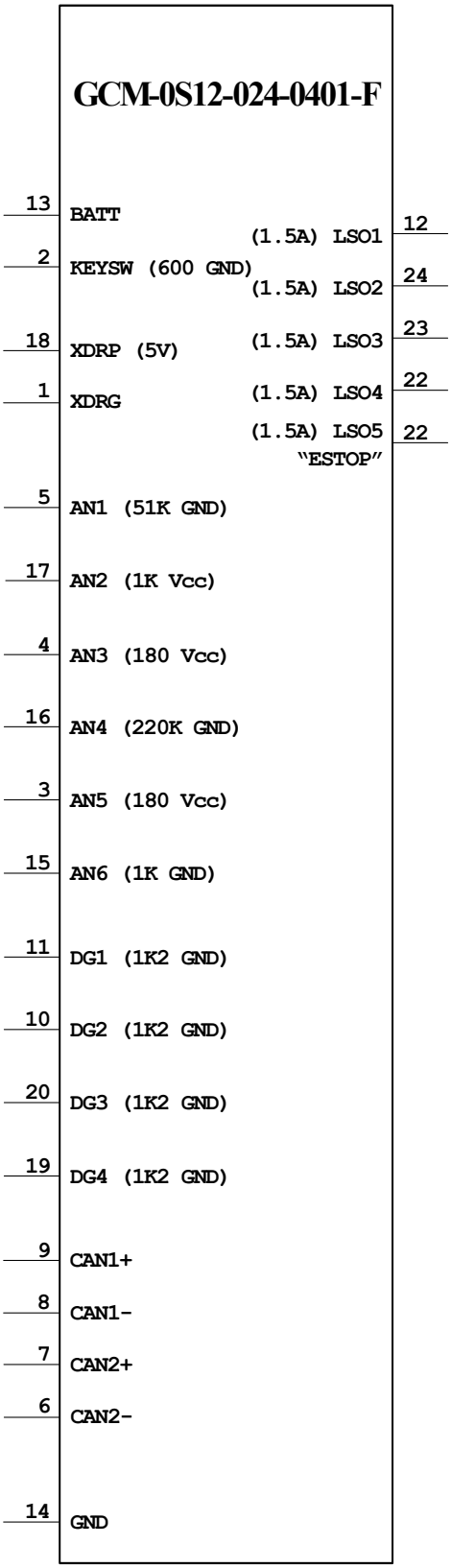
3.1 CAN1+, CAN1-, CAN2+, CAN2- (9, 8, 7, 6)	CAN 2.0B, Standard or Extended ID, up to 1MBd.

4 Connector Definitions





4.1 Block Diagram



4.2 Resource by Connector Pin

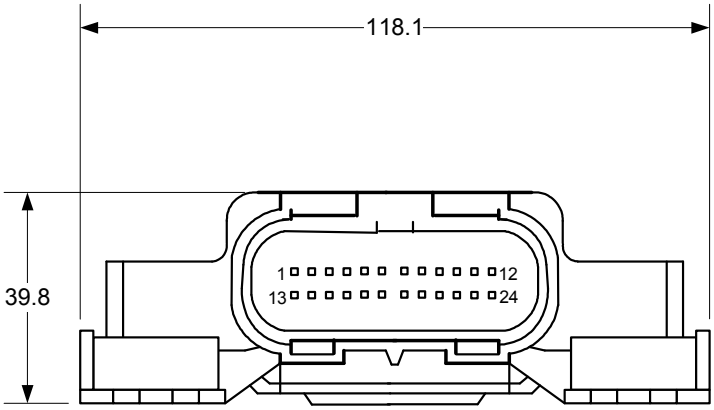
Pin #	ControlCore	Function	Notes	Wire
µCHI	Resource Name	Name		Color
1	XDRG	Transducer Ground	Ground	black/orange
2	KEYSW	Signal to wake module.	600Ω Pull Down	white/black
3	AN5	Analog Input	220K Pull Down	white/brown
4	AN3	Analog Input	220K Pull Down	white/dark blue
5	AN1	Analog Input	220K Pull Down	white/green
6	CAN2-	CAN	Terminating Resistance Required	white
7	CAN2+			green/black
8	CAN1-	CAN	Terminating Resistance Required	green/brown
9	CAN1+			red
10	DG2	Digital Input	1.2K Pull Down	white
11	DG1	Digital Input	1.2K Pull Down	gray/dark blue
12	LSO1	Low Side Driver (Discrete output only)	1.5A Max./ 3K Pull Up	brown
13	BATT	Module Power	Power to Module	purple/white
14	GND	Power Ground	Connect to Battery Ground	black
15	AN6	Analog Input	220K Pull Down	white/light blue
16	AN4	Analog Input	220K Pull Down	white/orange
17	AN2	Analog Input	220K Pull Down	white/yellow
18	XDRP	Transducer Power	5V, 500mA	purple/yellow
19	DG4	Digital Input	1.2K Pull Down	dark blue
20	DG3	Digital Input	1.2K Pull Down	green/blue
21	LSO5 (ESTOP)	Low Side Driver	1.5A Max./ Switch to Ground	brown/white
22	LSO4	Low Side Driver	1.5A Max.	brown/yellow
23	LSO3	Low Side Driver	1.5A Max.	dark brown
24	LSO2	Low Side Driver	1.5A Max.	brown/pink

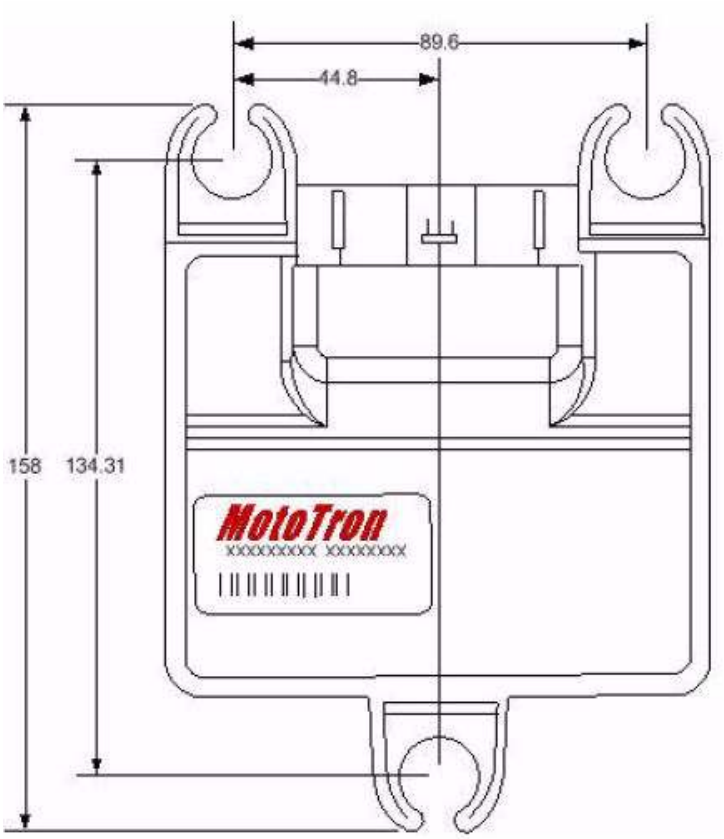
4.3 Resource by Name

ControlCore	Function	Notes		Pin #
Resource Name	Name			µCHI
AN1	Analog Input	220K Pull Down	white/green	5
AN2	Analog Input	220K Pull Down	white/yellow	17
AN3	Analog Input	220K Pull Down	white/dark blue	4
AN4	Analog Input	220K Pull Down	white/orange	16
AN5	Analog Input	220K Pull Down	white/brown	3
AN6	Analog Input	220K Pull Down	white/light blue	15
BATT	Module Power	Power to Module	purple/white	13
CAN1-	CAN	Terminating Resistance Required	green/brown	8
CAN1+	CAN	Terminating Resistance Required	red	9
CAN2-	CAN	Terminating Resistance Required	white	6
CAN2+	CAN	Terminating Resistance Required	green/black	7
DG1	Digital Input	1.2K Pull Down	gray/dark blue	11
DG2	Digital Input	1.2K Pull Down	white	10
DG3	Digital Input	1.2K Pull Down	green/blue	20
DG4	Digital Input	1.2K Pull Down	dark blue	19
GND	System Ground	Connect to Battery Ground	black	14
LSO1	Low Side Driver	1.5A Max.	brown	12
LSO2	Low Side Driver	1.5A Max.	brown/pink	24
LSO3	Low Side Driver	1.5A Max.	dark brown	23
LSO4	Low Side Driver	1.5A Max.	brown/yellow	22
LSO5 (ESTOP)	Low Side Driver	1.5A Max.	brown/white	21
KEYSW	Signal to Wake Module	600? Pull Down	white/black	2
XDRG	Transducer Ground	Ground	black/orange	1
XDRP	Transducer Power	5V, 500mA	purple/yellow	18

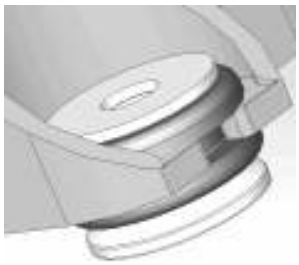
5 Physical Dimensions

All dimensions are in millimeters

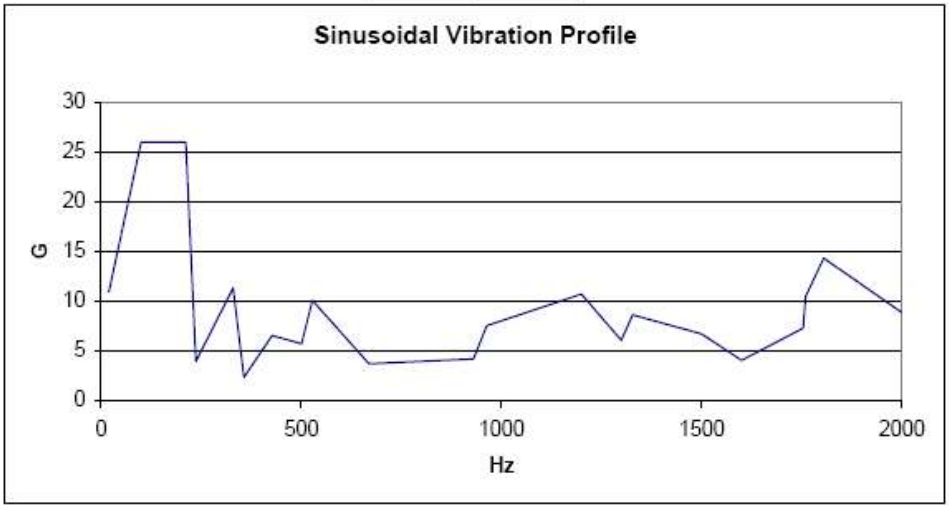




6 ENVIRONMENTAL RATINGS	The MicroCHI is designed to meet automotive industry standard under hood environmental requirements for 12/24 volt systems, and also meets marine industry environmental requirements. Validation tests include extreme operating temperatures (-40° to 105°C), thermal shock, humidity, salt spray, salt fog, immersion, fluid resistance, mechanical shock, vibration, steam pressure wash, and EMC.It is the responsibility of the application engineer to assure that the application does not exceed the demonstrated capabilities of the unit; vibration or thermal. It may be necessary to perform additional tests to validate the unit in the application.
6.1 STORAGE TEMPERATURE:	-50° to +125° C
6.2 OPERATING TEMPERATURE:	-40° to +105° C
6.3 THERMAL SHOCK:	450 cycles, -40° to +125° C
6.4 FLUID RESISTANCE:	4-Stroke Motor Oil, 2-Stroke Motor Oil, Unleaded Gasoline, ASTM Reference Fuel C, Anti-freeze (ref.: J1455)
6.5 HUMIDITY RESISTANCE:	98% humidity at38°C (ref.: J1455)

6.6 SALT FOG RESISTANCE:	500 hours of operation, 5% salt fog, 35°C
6.7 IMMERSION:	Submersible in 8% saltwater solution to 10'
6.8 MECHANICAL SHOCK:	50 g's, 11mS, 1/2 Sine wave, 4 shocks each axis in each direction (+ & -).
6.9 DROP:	Drop tests on concrete from 1 meter, 6 surfaces
6.10 VIBRATION: Engine mountable and designed to high-performance levels, the MicroCHI has been tested according to the schedule shown below. Electrical and mechanical isolation is via a bushing, grommet, and washer, as shown at right.	

HZ	G'S
20	10.96
100	26
153	26
212	26
237	3.93
330	11.31
357	2.34
428	6.53
501	5.7
528	10.08
669	3.7
930	4.18
964	7.53
1200	10.71
1300	6.05
1328	8.62
1500	6.69
1600	4.03
1754	7.28
1760	10.46
1805	14.31
2000	8.85



6.11 ABNORMAL SUPPLY VOLTAGE RESISTANCE:		
Condition	**Supplied Voltage**	**Time**
Reverse Battery	-12 VDC	5 minutes
Double Battery	24 VDC	5 minutes
Minimum Battery	8 VDC	Indefinitely
Low Battery Condition	6.3 VDC	Indefinitely

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For more information, contact:

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