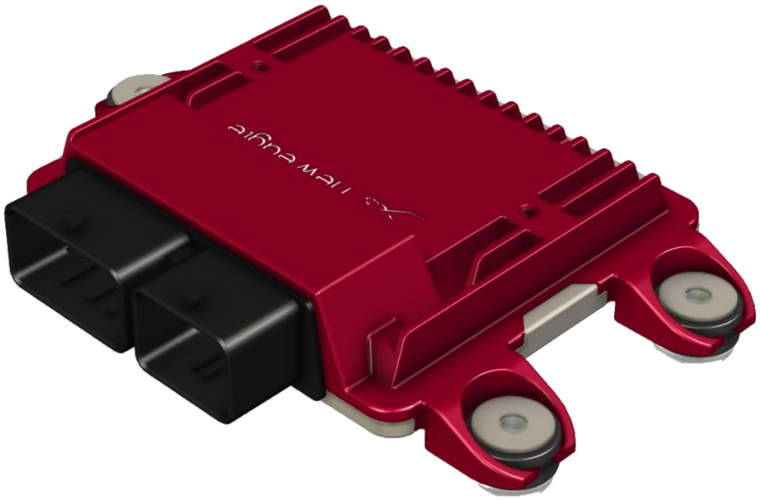
RCM80-2203

Raptor Control Module
P/N: RCM-5743R-080-2203



The RCM80-2203 is a general-purpose control module with 4 CAN buses, 1 LIN bus, and configurable discrete inputs and outputs including analog inputs, digital inputs, RTD inputs, a wake input, high-side driver outputs, low-side driver outputs, analog outputs, and an TTL output.

The RCM80-2203 is one of the Raptor™ rugged production controllers that use a software development process based upon MATLAB/Simulink and Raptor-Dev which significantly speeds up algorithm development by using automatic integration and code generation. In addition, developers can quickly test application software using simulation and automated testing.

For more details, visit https://neweagle.net/raptor/
Or contact our Sales Team at sales@neweagle.net

- **Programming**
  - MATLAB Simulink with Raptor
  - Raptor-Dev_2022a_1.0*
- **Processor**
  - NXP SPC5743R
  - 200 MHz
- **Memory**
  - 2MB App Flash
  - 16KB EEPROM
  - 128KB Internal RAM
- **38 Inputs**
  - 21 Analog Inputs
  - 11 Digital/Frequency Inputs
  - 1 Wake Input
  - 5 RTD Inputs (2-Wire)
- **17 Outputs**
  - 11 Low Side Drivers (PWM)
  - 3 High Side Drivers (PWM)
  - 1 TTL Output
  - 2 Analog Outputs
- **8-32 V Operating Voltage**
- **Communication**
  - 4 CAN 2.0B (Wake CAN4)
  - 1 LIN (Master/Slave + Wake)
- **Environmental**
  - -40°C to 105°C Operating Temp
  - IP69 Intent
- **Compiler**
  - S32 Design Studio for Power Architecture v2.1 (Free download from NXP)
- **Aluminum Construction**
- **Weight**
  - 0.8lb (0.4kg)

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Table of Contents

1. Controller Overview

Hardware	
Microprocessor	NXP MPC5743R
Clock Speed	200 MHz
Environmental	IP6k7
Operating Temp	-40°C to 105°C

Memory Segments	
Memory Segment	Size
FLASH (ALL)	2048 KB
application_reset_vector	8 B
application_descriptor_info	8 KB
application_flash	3576 KB
EEPROM	16 KB
INTERNAL RAM	224 KB

Communication Channels		
Channel	Functions	Options
CAN1	CAN	125k 250k 500k 1000k
CAN2	CAN	125k 250k 500k 1000k
CAN3	CAN	125k 250k 500k 1000k
CAN4	CAN Wake on CAN	125k 250k 500k 1000k
LIN	LIN MASTER LIN SLAVE Wake On LIN	1200 2400 4800 9600 10400 19200

Note: CAN1 Default Baud is 500k

Inputs			
Resource	Functions	Input Measurable Range	Pull-Up/Down
WAKE_INPUT1	digital_in analog_in	0V to BATT	
DG1	freq_in digital_in input_capture	0V to BATT	1k PU Selectable
DG2	freq_in digital_in input_capture	0V to BATT	
DG3	freq_in digital_in input_capture	0V to BATT	1k PU Selectable
DG4	freq_in digital_in input_capture	0V to BATT	
DG5	freq_in digital_in input_capture	0V to BATT	1k PU Selectable
DG6	freq_in digital_in input_capture	0V to BATT	
DG7	freq_in digital_in input_capture	0V to BATT	2.2k PU
DG8	freq_in digital_in input_capture	0V to BATT	2.2k PU
DG9	freq_in digital_in input_capture	0V to BATT	2.2k PU
DG10	freq_in digital_in input_capture	0V to BATT	2.2k PU
DG11	freq_in digital_in input_capture	0V to BATT	2.2k PU
AN1	analog_in	0 - 5 V	51k PD
AN2	analog_in	0 - 5 V	51k PD
AN3	analog_in	0 - 5 V	51k PD
AN4	analog_in	0 - 5 V	2.2k PU
AN5	analog_in	0 - 5 V	2.2k PU
AN6	analog_in	0 - 5 V	2.2k PU
AN7	analog_in	0 - 5 V	2.2k PU
AN8	analog_in	0 - 5 V	220k PD

Inputs

Resource	Functions	Input Measurable Range	Pull-Up/Down
AN9	analog_in	0 - 5 V	220k PD
AN10	analog_in	0 - 5 V	220k PD
AN11	analog_in	0 - 5 V	220k PD
AN12	analog_in	0 - 5 V	10k PD
AN13	analog_in	0 - 5 V	10k PD
AN14	analog_in	0 - 5 V	10k PD
AN15	analog_in	0 - 5 V	33k PD
AN16	analog_in	0 - 5 V	51k PD
AN17	analog_in	0 - 5 V	4.7k PD
AN18	analog_in	0 - 5 V	4.7k PD
AN19	analog_in	0 - 5 V	4.7k PD
AN20	analog_in	0 - 5 V	4.7k PD
AN21	analog_in	0 - 5 V	4.7k PD
TS1	temp_measurement	-200°C to 800°C	-
TS2	temp_measurement	-200°C to 800°C	-
TS3	temp_measurement	-200°C to 800°C	-
TS4	temp_measurement	-200°C to 800°C	-
TS5	temp_measurement	-200°C to 800°C	-

Outputs

Resource	Functions	Driver Types
TTL1	pwm_out digital_out	TTL
AO1	analog_output	Analog Output
AO2	analog_output	Analog Output
HSO1	pwm_out digital_out output_status internal_measurement	High Side Current Feedback
HSO2	pwm_out digital_out output_status internal_measurement	High Side Current Feedback
HSO3	pwm_out digital_out output_status internal_measurement	High Side Current Feedback
LSO1	pwm_out digital_out output_status internal_measurement	Low Side Current Feedback

Outputs		
Resource	Functions	Driver Types
LSO2	pwm_out digital_out output_status internal_measurement	Low Side Current Feedback
LSO3	pwm_out digital_out output_status internal_measurement	Low Side Current Feedback
LSO4	pwm_out digital_out output_status	Low Side
LSO5	pwm_out digital_out output_status	Low Side
LSO6	pwm_out digital_out output_status	Low Side
LSO7	pwm_out digital_out output_status	Low Side
LSO8	pwm_out digital_out output_status	Low Side
LSO9	pwm_out digital_out output_status	Low Side
LSO10	pwm_out digital_out	Low Side
LSO11	pwm_out digital_out	Low Side

Internal Measurements		
Resource	Units	Note
SENSOR_POWER	V	5V Sensor Power Voltage
BATT	V	Battery Voltage
MPRD_FEEDBACK	V	Voltage on MPRD Pin
DRVP_FEEDBACK	V	Voltage on DRVP Pin
HSO1_CURRENT	mA	HSO1 CURRENT FEEDBACK
HSO2_CURRENT	mA	HSO2 CURRENT FEEDBACK
HSO3_CURRENT	mA	HSO3 CURRENT FEEDBACK
LSO1_CURRENT	mA	LSO1 CURRENT FEEDBACK
LSO2_CURRENT	mA	LSO2 CURRENT FEEDBACK
LSO3_CURRENT	mA	LSO3 CURRENT FEEDBACK
WAKE_INPUT1	V	Voltage on WAKE_INPUT1
INT_TEMP	C	Internal Temperature

2. Block Diagram

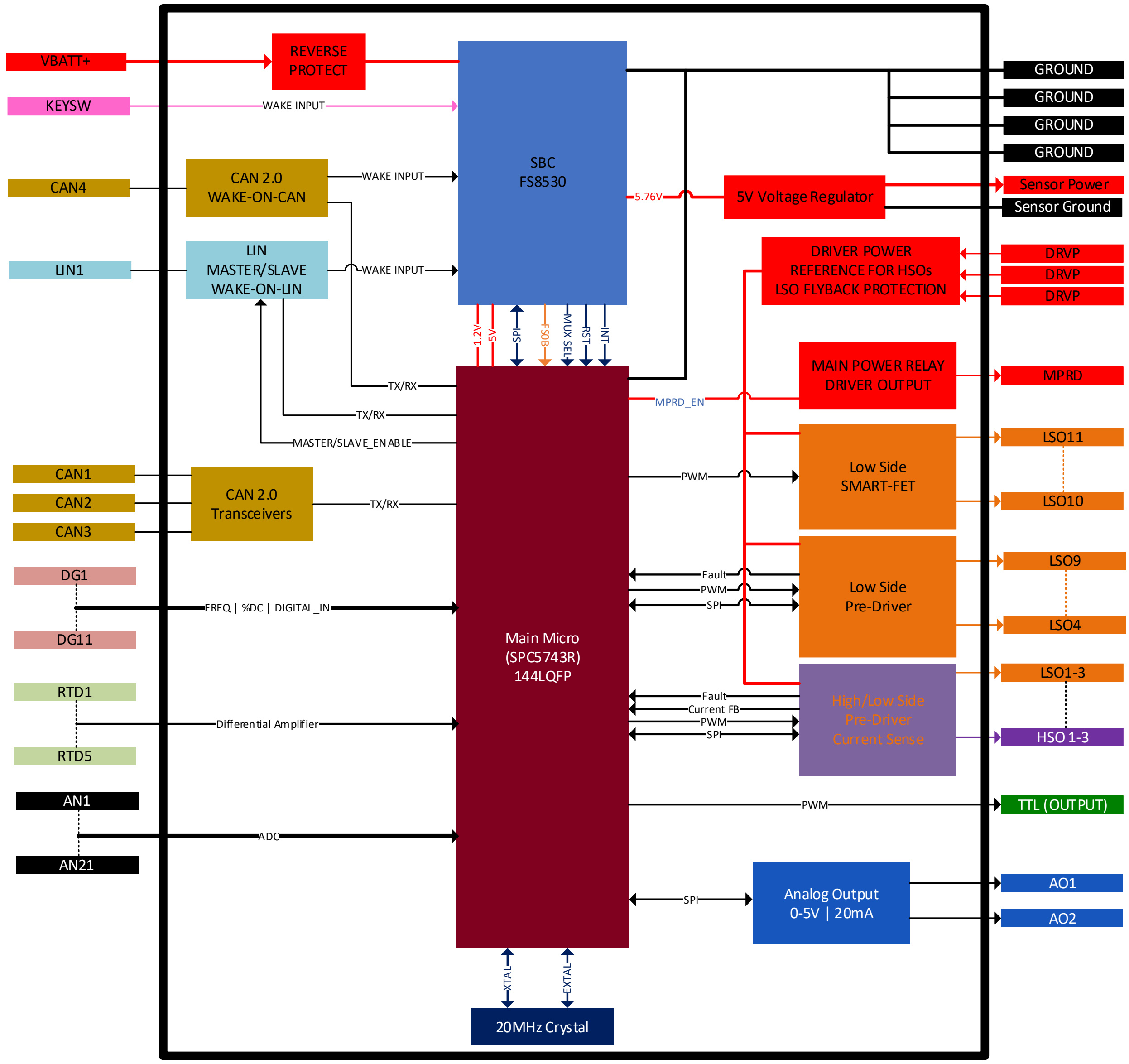


Figure 1: RCM-5743R-080-2203 Block Diagram

3. Communication

The RCM80-2203 contains a total of 1 LIN bus and 4 CAN 2.0 buses.
There is no internal termination of the CAN Buses (able to be populated per customer production volume approval).

4. Power

The logical battery input should be permanently connected to battery voltage. This battery input is needed to power the microprocessors when awake. It should be fused independently of the entire system to ensure that there is not excess current on the logic power traces.

Note: The RCM is protected against reverse polarity supply voltage of up to 32V for up to 5 minutes.

Note: Jump Start with battery voltage of 36V is permitted up to 5 minutes at ambient temperature 23°C +/-5°C (see note in Section 4.1).

Note: The BATT+ and Wake_Input1 inputs have reverse battery protection.

4.1 Max Ratings

	Min	Nom	Max	Units
Input Voltage: Normal Operation	8	13.8/27.6	32	V
Jump Start (Up to 5 min) *			48	V
Reverse Battery Protection (Up to 5 min)			-32	V
Current Draw: Off-State Current			0.5	mA
Overvoltage Protection			36	V

***Note**: The RCM will turn off if exposed to voltage over 38V but will not be damaged.

4.2 Power Inputs (BATT, DRVG_A and DRVG_B)

Connect the power source positive to the BATT+ input (8V-32V) through an appropriately sized fuse and the power source common to DVRG1 and DVRG2.

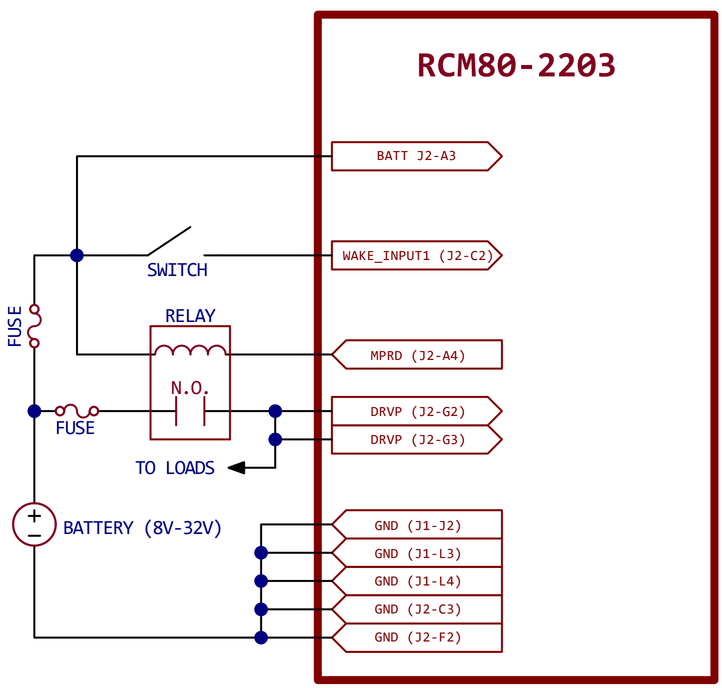


Figure 2: Input Power Wiring Diagram

Note: Avoid using long wires and run the power leads directly from the power source to the control. Do not power other devices with leads common to the control's power inputs.

4.3 Internal Battery Measurement (Analog)

Within the software, the BATT input is available as an internal measurement through the "internal measurement" block.

Software Resource	ADC Range	Theoretical Range
BATT	0-4096	0-42V

4.4 Wake Input (Pin Name: WAKE_INPUT1)

4.4.1.1 Wake from Key Switch (KEYSW)

The controller monitors the voltage on the key switch (Wake_Input1) pin to determine when it should power up. When the voltage level on the key switch pin exceeds 8V, the controller "wakes up" and begin executing the application software. At this point, the WAKE_INPUT1 input acts simply as an analog input. When WAKE_INPUT1 voltage goes low, the typical application will commence a shutdown sequence (e.g., to complete application routines and/or store non-volatile memory); however, this decision is application-specific, and the programmer can customize the shutdown logic in the software. When the controller is shutdown from the application, the controller returns to the low-power ("sleep") state. WAKE_INPUT1 is the only wake source. Table 1 shows the power states of the RCM.

BATT (8-32V always ON)	Wake_Input1	DRVP	Micro	Comments
ON, <500uA	OFF	OFF	OFF	Micro off, <500uA current on V_BATT
ON	ON	OFF	ON	When WAKE_INPUT1 goes high (>8V), power supplies turn ON, then micro turns ON. WAKE_INPUT1 is a sense line and should be <10mA.
ON	ON	ON	ON	Micro actuates DRVP, RCM operates normal
ON	ON	OFF	ON	E.g. Case: Micro detects an overcurrent and turns OFF DRVP, but continue to operate and send diagnostics
ON	ON	ON	ON	E.g. Case: Micro detects overcurrent case resolved and turns ON DRVP
ON	OFF	ON	ON	Micro senses WAKE_INPUT1 status and begins shutdown process
ON	OFF	OFF	ON	E.g. Case: Micro turns OFF DRVP
ON, <500uA	OFF	OFF	OFF	Micro shuts down and everything is OFF.

Table 1: Power States

Note: WAKE_INPUT1 is protected from negative voltage transients and reverse battery connection.
Note: The BATT+ supply must be from a fused source as shown in Figure 2.

4.4.1.2 Wake from CAN and LIN

The controller can wake on CAN 4. The RCM can also wake via LIN.

4.5 Driver Power & Main Power Relay Driver (Pin Name: DRVP & MPRD)

Driver power (DRVP) shall be the power source for outputs that source power (such as the H-Bridge and high side drivers); the power path shall be through the module then through the DRVP pin and then out of the module through the output (e.g., H-Bridge+/-). Driver power shall also provide the internal flyback path for all output recirculation diodes.

It is the intent that an external main power relay (driven by the main power relay driver (MPRD)) is used to source power to DRVP. Further, it is the intent that driver power is the power source for all actuators that use low-side outputs. The main power relay architecture is recommended for use with low-side outputs as it provides protection from reverse battery events. In the case of a reversed battery connection, an improper setup (without the main power relay) risks unintended low-side output actuation due to a reverse battery conduction path through the body diode of the MOSFETs. The main power relay architecture eliminates this risk. The MPRD drive has a reverse battery diode and thus cannot not actuate in a reversed battery connection; therefore, all actuators sourcing power from the main power relay will be isolated and not actuated. The driver power INPUT pins supply power for loads driven by the HSO outputs and a flyback path through a diode for LSO outputs when driving inductive devices.

Notes:

- DRVP shall be externally protected via an appropriately selected fuse or circuit breaker. The current and voltage rating for the fuse is dependent on the external system, and cannot be defined by this document.

4.6 Internal Temperature Monitor

The RCM80-2203 microcontroller contains an internal temperature monitor that can be used by the application. This monitor is a critical parameter for the application thermal study which is a requirement for application approval and warranty coverage.

Important: A logged maximum temperature exceeding 130 °C may result in warranty claim denial.

4.7 Internal Temperature Measurement (Analog)

Within the software, the internal temperature monitor is available as an internal measurement through the “internal measurement” block.

Software Resource	ADC Range	Theoretical Range
INT_TEMP	0-4096	-40 to 130°C

4.8 Sensor Power Outputs

The RCM80-2203 control provides an external Sensor power source of up to +5 VDC. This power output is protected against over-voltage, over-temperature, short circuits, and reverse power. The sensor Power output pins are connected internally.

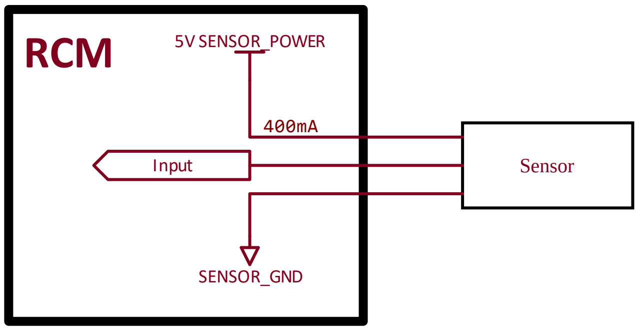


Figure 3: Sensor Output Power Wiring Diagram

4.8.1.1 Sensor Output Specifications

Output	Voltage	Current Limit
SENSOR POWER	5 V ± 2.5 %	200 mA

4.8.1.2 Internal Sensor Power Measurement (Analog)

Resource	ADC	Theoretical Range
SENSOR POWER	0-4096	0-10V

5. Inputs

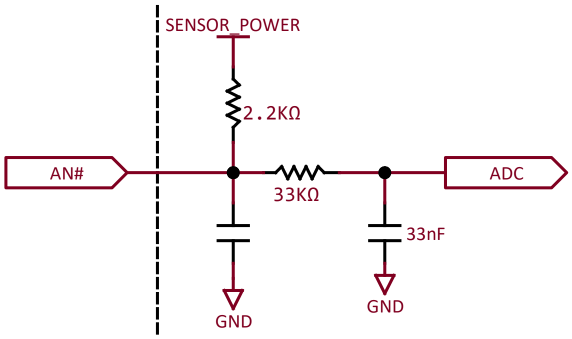
5.1 Analog Inputs (AN1-AN21)

All analog inputs have the following characteristics:

Analog Input Specifications				
	Min	Nom	Max	Units
Input Voltage Measurement Range	0		5	V
Overvoltage Input Tolerance			VBATT	V
ADC Resolution		12		bits
ADC Range	0		4096	
Cutoff Frequency		482		Hz

5.1.1 Analog Inputs – Pull-Up (AN4—AN7)

The analog inputs are configured (in hardware) with a 2.2kΩ pull-up resistor (Figure 4). All the analog inputs have a single-pole filter with a 1 ms time constant. The Analog inputs are protected for shorts up to 32 V.



Function	Ω
AN4*	2.2k PU
AN5*	2.2k PU
AN6*	2.2k PU
AN7*	2.2k PU

Figure 4: Analog Input (with PU) Circuit Diagram

5.1.1 Analog Inputs – Pull-Down (AN1,2,3,8—21)

The analog inputs are configured (in hardware) with a pull-down resistor (Figure 4). All the analog inputs have a single-pole filter with a 1 ms time constant. The Analog inputs are protected for shorts up to 32V.

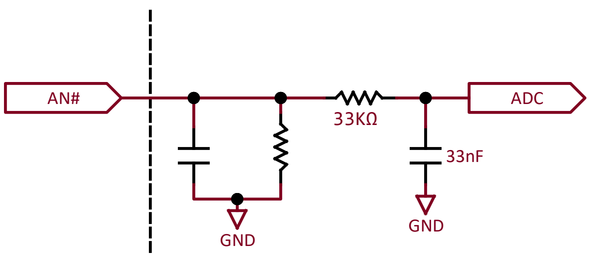


Figure 5: Analog Input (with PD) Circuit Diagram

Function	PD Ω
AN1*	51k PD
AN2*	51k PD
AN3*	51k PD
AN8*	220k PD
AN9*	220k PD
AN10	220k PD
AN11	220k PD
AN12	10k PD
AN13	10k PD
AN14	10k PD
AN15	33k PD
AN16	51k PD
AN17	4.7k PD
AN18	4.7k PD
AN19	4.7k PD
AN20	4.7k PD
AN21	4.7k PD

***Note: AN1-AN9 can be hardware configured with a PU or PD Resistor upon application & production review & approval.**

5.2 Digital/Frequency Inputs (DG1-DG11)

These inputs on the RCM80-2203 can be used to as Digital Capture inputs to sense motor position of a brushless DC motor. The inputs utilize a 1kΩ PU resistor except for DG7-DG11 which utilize a 2.2kΩ PU.

5.2.1 Digital Inputs (DG1—DG6)

The input capture specification is recognized as a software specification as the limitation is within the TPU of the MCU.

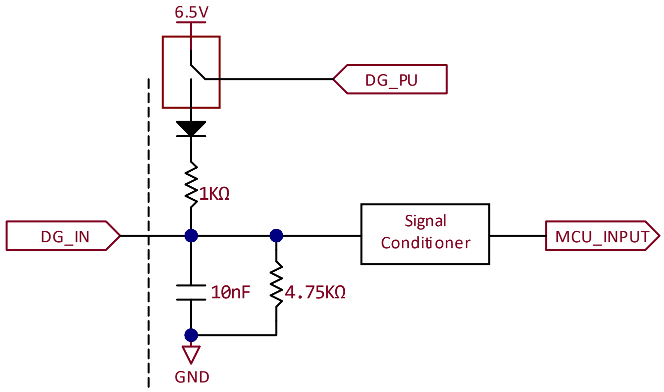


Figure 6: Digital Input Circuit with Software Selectable 1k PU resistor

Function	Notes
DG1	Software selectable 1k pull up Exclusive pair via "DG_PU"
DG2	
DG3	Software selectable 1k pull up Exclusive pair via "DG_PU"
DG4	
DG5	Software selectable 1k pull up Exclusive pair via "DG_PU"
DG6	

Note:

- **For DG1- DG6, the Software selectable PU is exclusive between each DG Pair. For example, if the DG1 PU is selected, DG2 will automatically also be pulled-up. This is a hardware limitation.**
- **Input frequency limitation may be approximately 3 Hz anything lower must use the software "input capture" feature**

5.2.1.1 Digital Frequency Input 1-6 Specifications

Parameter	Specification
Input Voltage Thresholds at 25 deg C	ViL = 1.77V ViH = 1.05V
Pull-Up	1 kΩ ± 1 % pull-up to internal 5V
Operating Frequency	3Hz to 10kHz

5.2.2 Digital Inputs (DG7—DG11)

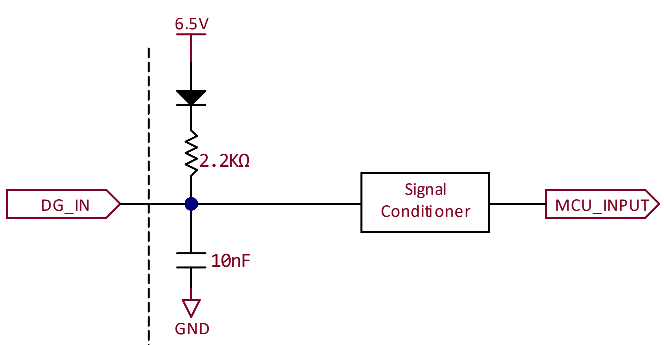


Figure 7: Digital Input Circuit with 2.2k PU resistor

5.2.2.1 *Digital Frequency Input 7-11 Specifications*

Parameter	Specification
Input Voltage Thresholds at 25 deg C	ViL = 2.1V ViH = 2.85V
Pull-Up	2.2 kΩ ± 1 % pull-up to internal 6.5V through series diode.
Operating Frequency	3Hz to 10kHz

Note:

- **Input frequency limitation may be approximately 3 Hz anything lower must use the software "input capture" feature**

5.2.3 WAKE_INPUT1

There is a user-selectable digital input in the software for monitoring the logic-level status of the WAKE_INPUT1.

5.3 Temperature Sense Inputs (TS1-TS5)

The RCM80-2203 has 5 RTD Inputs which work with Resistance Temperature Detectors (RTDs). They utilize 2-wire connections to improve measurement accuracy and reduce lead wire resistances. The circuit is optimized for 200Ohm RTDs.

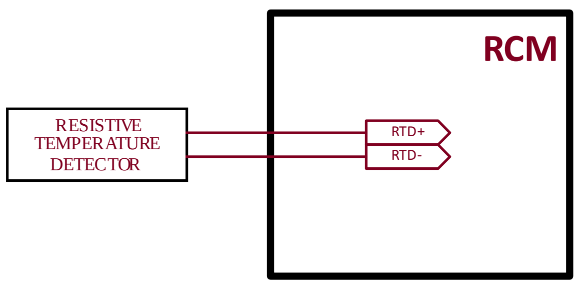


Figure 8: RTD Wiring Diagram

	Min	Nom	Max	Units
MAX VOLTAGE ON INPUT PINS			5	V
Measurable Temp Range	-200		850	C
Resolution		12		bits
ADC	0		4096	
A_v Gain		20		

6. Outputs

6.1 Low-Side Outputs (LSO1-LSO11)

The RCM80-2203 control has 11 low-side outputs (LSO's) that can be used as Boolean outputs for driving relays, or as PWM outputs to drive solenoids. All outputs have internal fly back clamping. All LSOs are protected against short circuits to battery and ground.
Output Status measurements are available for Short-to-Battery, Short-to-Ground, and Open Load. For LSO1-9 only. LSO10 and LSO11 do not have any feedback diagnostics.
Current feedback is also measurable for LSO1-LSO3 in the internal_measurement block.

6.1.1.1 LSO Characteristics and Capabilities

Function	Drive Capability	Max Current	Diode Type	Other
LSO1	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB
LSO2	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB
LSO3	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB
LSO4	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO5	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO6	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO7	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO8	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO9	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO10	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	
LSO11	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	

Max Ratings	Min	Nom	Max	Units
Frequency	100*	-	20000	Hz

*For frequencies less than 100Hz, custom timer logic will need to be added to your application logic.

6.1.1 LSO1-LSO11 Circuit Diagram

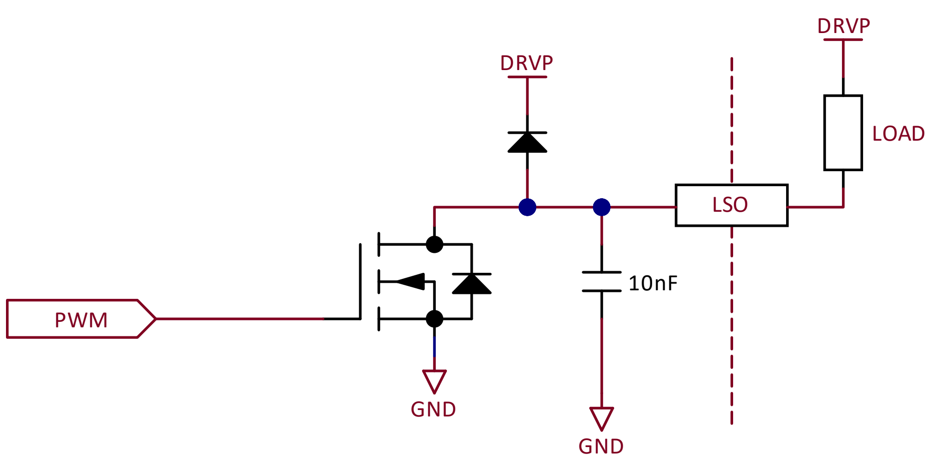


Figure 9: Low Side Output Circuit Diagram

6.2 High-Side Outputs (HSO1-HSO3)

The RCM80-2203 control has 3 high-side outputs (HSO's) that can be used as Boolean outputs for driving relays, or as PWM outputs to drive solenoids. All outputs have internal fly back clamping. All HSOs are protected against shorts to battery and ground.
Output Status measurements are available for Short-to-Battery, Short-to-Ground, and Open Load. Current feedback is also measurable for HSO1-HSO3 in the internal_measurement block.

6.2.1.1 HSO Characteristics and Capabilities

Function	Drive Capability	Max Current	Diode Type	Other
HSO1	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB
HSO2	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB
HSO3	Digital or PWM	3A Cont. | 6A Max	Internal Flyback	Current FB

Max Ratings	Min	Nom	Max	Units
Frequency	100		20000	Hz

6.2.1 HSO1-HSO3 Circuit

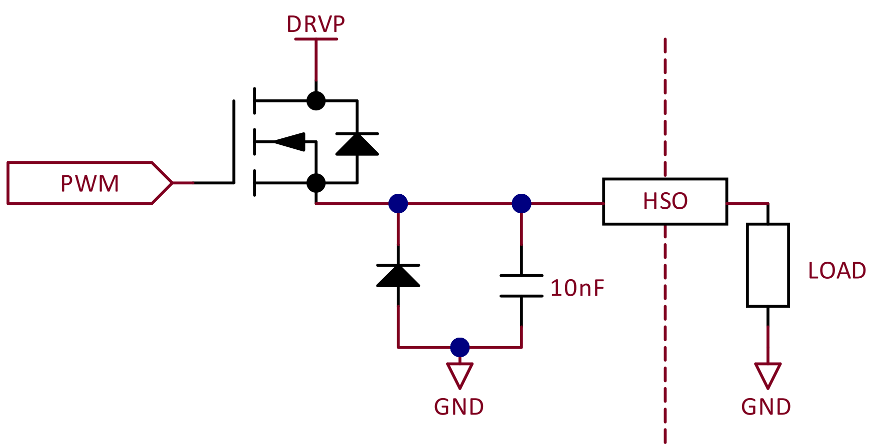


Figure 10: High Side Output Circuit Diagram

6.3 Half-Bridge Configuration

The RCM80-2203 outputs HSO1-HSO3 and LSO1-LSO3 can be configured to operate as Half-Bridges. This is done by making the following splice connections in the harness:

LSO1	>	HSO1
LSO2	>	HSO2
LSO3	>	HSO3

Note: It is important to make sure your commutation logic for driving Half-Bridges does not cause shorts across the HSO/LSO.

6.4 TTL Output (TTL1)

The RCM80-2203 has 1 TTL push/pull logic-level outputs. When in an off state, the TTL output is driven low. Diagnostics are provided via analog feedback during a software-initiated high impedance condition during the off state. Diagnostic pull-up is a 33k to 5.6–6.2 V.

6.4.1 TTL Driver Characteristics and Capabilities

Function	Drive Capability	Max Current
TTL1	Boolean PWM (250Hz*-10kHz) 0.75V to 4.5V (at 5 mA)	5 mA

***Note: For frequencies under 250Hz, custom timing logic can be implemented into the Raptor .slx model to toggle the output at slower frequencies.**

6.5 Analog Output (AO1-AO2)

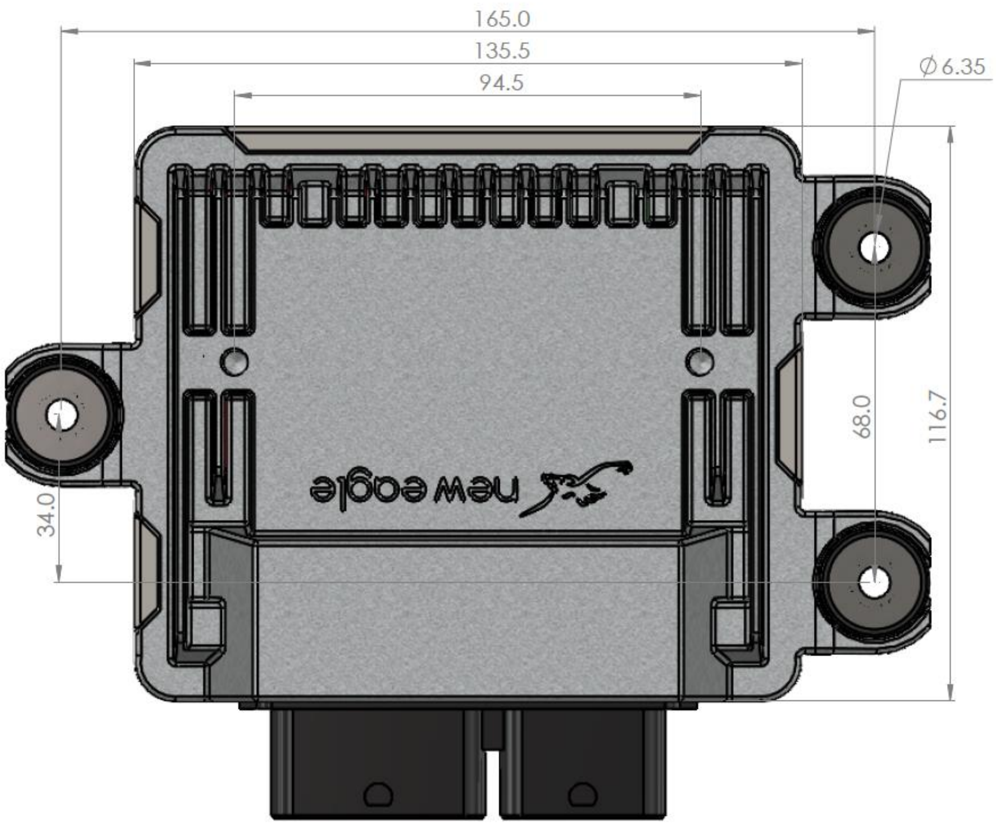
The RCM80-2203 has 1 low-power, 12-bit voltage output. It has an internal accuracy of +/- 3% of full-scale and can source or sink up to 20mA. The output is protected against short to Battery and short to Ground connections.

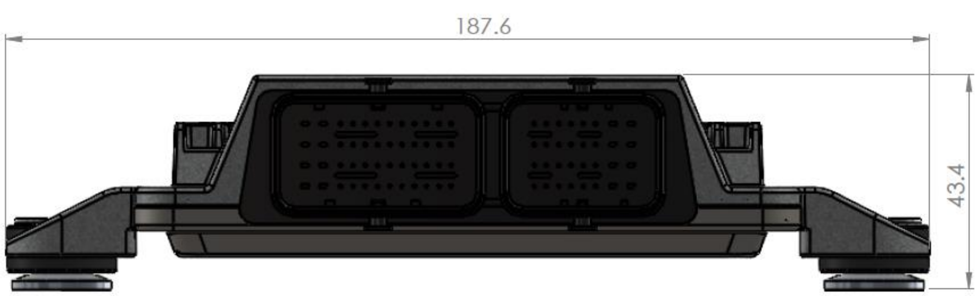
6.5.1 Analog Output Characteristics and Capabilities

Function	Drive Capability	Max Current
AO1	Analog Output 0 to 5V	20 mA
AO2	Analog Output 0 to 5V	20 mA

7. Dimensions (mm)

Note: The RCM80 chassis <u>must</u> be connected to the System Chassis Ground via one (1) of the two (2) provided Grounding Strap locations on the top of the Enclosure using an M6-1.0 x 8 mm BHCS screw.

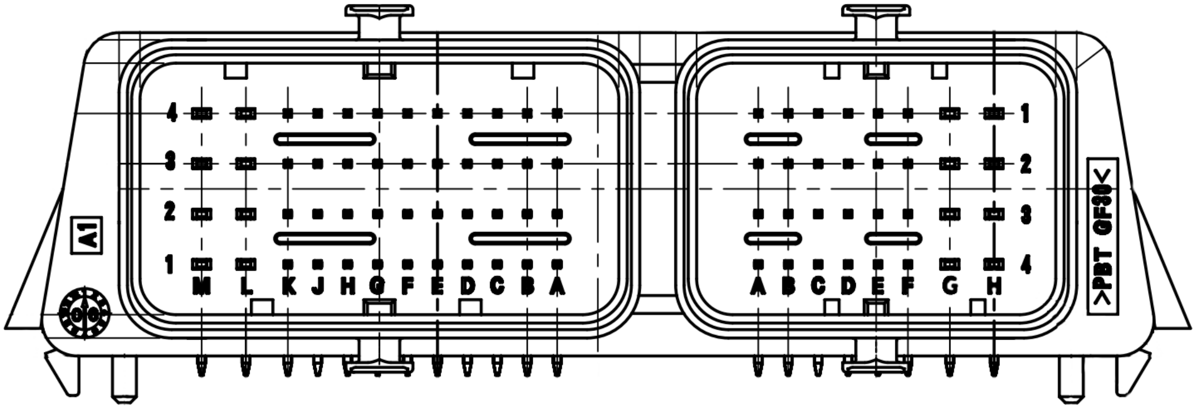




8. Connections and Pinout (Pending)

The RCM80-2203 has a 48-pin connector, as follows: Molex 643201319 (Brown Keying)

As well as a 32-pin connector, as follows: Molex 643193211 (Black Keying)



CONNECTOR J1 CONNECTOR J2

Connector J1 (Brown Key): 643201319			
Pin #	Pin Name	Pin #	Pin Name
J1-A1	AN8	J1-G1	DG11
J1-A2	AN7	J1-G2	AN3
J1-A3	AN6	J1-G3	RTD1-
J1-A4	AN4	J1-G4	RTD1+
J1-B1	AN9	J1-H1	DG10
J1-B2	AO2	J1-H2	TTL1
J1-B3	AO1	J1-H3	DG5
J1-B4	AN5	J1-H4	DG6
J1-C1	AN21	J1-J1	LSO6
J1-C2	SENSOR POWER	J1-J2	GND
J1-C3	RTD5-	J1-J3	DG3
J1-C4	RTD5+	J1-J4	DG4
J1-D1	AN20	J1-K1	LSO8
J1-D2	SENSOR GROUND	J1-K2	DG9
J1-D3	RTD4-	J1-K3	DG1
J1-D4	RTD4+	J1-K4	DG2
J1-E1	AN19	J1-L1	LSO4
J1-E2	AN1	J1-L2	LSO10
J1-E3	RTD3-	J1-L3	GND
J1-E4	RTD3+	J1-L4	GND
J1-F1	AN18	J1-M1	LSO11
J1-F2	AN2	J1-M2	LSO5
J1-F3	RTD2-	J1-M3	LSO9
J1-F4	RTD2+	J1-M4	LSO7

Note: Pins A1-K4 typically utilize 20AWG Wire (Recommended PN: WM20 TLX series)

Note: Pins L1-M4 typically utilize 18AWG Wire (Recommended PN: WM18 TLX series)

Connector J2 (Black Key): 643193211			
Pin #	Pin Name	Pin #	Pin Name
J2-A1	DG7	J2-E1	CAN1-
J2-A2	AN13	J2-E2	CAN2+
J2-A3	BATT	J2-E3	CAN4-
J2-A4	MPRD	J2-E4	CAN4+
J2-B1	DG8	J2-F1	CAN1+
J2-B2	AN16	J2-F2	GND
J2-B3	AN11	J2-F3	CAN3-
J2-B4	AN10	J2-F4	CAN3+
J2-C1	AN15	J2-G1	LSO1
J2-C2	WAKE_INPUT1	J2-G2	DRVP
J2-C3	GND	J2-G3	DRVP
J2-C4	AN12	J2-G4	HSO3
J2-D1	CAN2-	J2-H1	HSO1
J2-D2	AN17	J2-H2	LSO2
J2-D3	AN14	J2-H3	HSO2
J2-D4	LIN1	J2-H4	LSO3

***Note: Green Cells on Connector J2 Above Indicate Required for Minimum Programming**
*****Note: Must have All GND pins connected if driving Loads**
Note: Pins A1-F4 typically utilize 20AWG Wire (Recommended PN: WM20 TXL series)
Note: Pins G1-H4 typically utilize 18AWG Wire (Recommended PN: WM18 TXL series)

9. Recovery Procedure

1. Power **OFF** the module completely (keep Wake_Input1 connected and switched "**ON**").
2. Open the **Raptor-Cal** application.
3. Select **CAN 1** and set the baud rate to **500K**.
4. Click on **Flash**. The window will say "No Modules Found".
5. Click on **Recover**. Select **RCM-5743R-080** in the drop-down, select "Go"
6. Power the Module on and then **Exit ("X")** out of the pop-up window within the displayed timeframe of the Broadcast Recovery message being sent.
7. Raptor-Cal will detect an Unidentified UDS Module.
   If you do not see your module, double check that it is powered, the key-switch is ON, and that your CAN-to-USB device is connected properly.
8. **Double-click** the detected Module and **Select/Flash** the desired RPG.
9. Success! Your module has been recovered and will be flashed with the selected .RPG file.
   If this step fails, the software package may be to blame. Try a different .RPG file or try using a project with raptor_create_project('Project_Name') to confirm you can still flash a "blank" model.

10. Related Products

Part	New Eagle Store Part Number
CONNECTOR KIT – RCM80	CON-KIT-RCM80
HARNESS – RCM80 PIGTAIL 12 FT	HARN-RCM80-003
HARNESS – RCM80-2203 Minimum Programming*	*TBD
BREAKOUT BOX – RCM80	ASM-BBOX-RCM80

11. Environmental Ratings

Condition	Notes
This RCM is designed for automotive, under hood and marine industry environmental requirements. Validation tests include extreme operating temperatures, thermal shock, humidity, salt spray, salt fog, immersion, fluid resistance, mechanical shock, and vibration. EMC Tests include ISO7637-2 pulses, BCI, Radiated and Conducted Emissions, Battery Voltages, Short to Battery/Short to Ground, and ESD. The customer must contact New Eagle and provide the intended environmental conditions in the application for verification of performance capability.	
Storage Temperature	–40 °C to +105 °C
Operating Temperature	–40 °C to +105 °C
Thermal Shock	SAE J1455, section 4.1.3.2 –40 °C to +125 °C, 500 Cycles
Fluid Resistance	Two-stroke motor oil, four-stroke motor oil, unleaded gasoline, ASTM Reference 'C' fuel
Humidity Resistance	SAE J1455; section 4.3.3.2 90% Humidity at 85°C for 1000 Hours
Salt Fog Resistance	SAE J1455; section 4.3.3.2 500 Hours, 5% Salt Fog @ 35°C
Immersion	SAE J1455; section 4.3.3.2 4.34 psi test (simulated 3m / 10ft), salt water, 20 min
Mechanical Shock	MIL-STD 810H, Method 516.8, Procedure I 50 G's, 11 ms, half-sine wave, 4 shocks per direction.
Drop Test	SAE J1455 6 drops on concrete from 1m, no hidden damage
Vibration	MIL-STD-810H Method 514.8
ISO7637-2 Pulses	Pulse1, 1B, 2A, 2B, 3A, 3B, and Waveforms A1, and A2
ISO16750-2 Pulse	Section 4.6.4 Test A: Pulse 5B De-Centralized Load Dump Section 4.6.4 Test B: Pulse 5B Centralized Load Dump
BCI	ISO 11452-4
Radiated Immunity	ISO 11452-2
Radiated and Conducted Emissions	CISPR25
Battery Voltages	8-32V Steady State, 5.5V minimum operating voltage, 36V Max Overvoltage
Reverse Battery	-32V for up to 5 Minutes
Short to Battery/Short to Ground	All pins can tolerate short to battery and short to ground connections
ESD	Up to 4kV Handling, up to 15kV Operating

12. Production Warranty Approval Process

New Eagle does not warranty prototype or development ECUs based on the information supplied in this datasheet. Production applications using this hardware require application review by New Eagle Engineering prior before production warranty coverage can be granted. Typically, this review is performed as part of the Production Supply Agreement and involves a review of the application's operating mode, environmental conditions, and I/O usage details to assure that the application is utilizing the hardware within its design specifications. Involving New Eagle's Application Engineering team early can help to expedite the approval process.