Mectric
Motorsport Electronics

uPDM4

The Micro PDM4 is a smart 4 channel power distribution module designed to replace mechanical relays and fuses in aftermarket automotive electrical circuits. Each of the 4 outputs can supply up to 12 amps continuous load current. Higher loads can be driven by grouping outputs together. Each output is triggered by a low side switch input and an optional master ignition switch input.

In applications where installers may need to add a small number of power circuits but don't require the size, cost or complexity of a full scale PDM. The Micro PDM4 is perfect for coupling with new engine harness builds or when adding a wide range of auxiliary circuits to a vehicle.

The uPDM4 is constructed from AEC-Q100 Automotive Grade components, ensuring its reliability in harsh environments.

Overview

- 4x Outputs @ 12A
- 4x Low Side Switch Inputs
- 1x Optional Master Input
- Overcurrent Protection
- Overtemperature Protection
- Short Circuit Protection
- Automotive Grade Device

Applications

- Resistive, Inductive and Capacitive Loads
- EFI relay
- ECU, DBW, Coil, Injector supplies
- Fuel pumps
- Water pumps
- Thermo fans
- Vehicle lighting

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Contents

Operation

Switch Logic

Each output channel (OUTn) is turned ON by pulling its corresponding switch input (SWn) LOW (less than 0.8V).

OUT1 can be turned ON at all times, no other input is required. OUT2, OUT3 & OUT4 can be considered slaves to OUT1. They can only be turned ON when SW1 is also LOW (OUT1 ON). Alternatively, setting the enable input (ENABLE) HIGH (greater than 2V) will allow the switching of OUT2, OUT3, & OUT4 regardless of SW1 or OUT1 states.

This latching operation allows the uPMD4 to be used as the EFI main relay, complete with ECU hold power functionality.

Note: A fault on OUT1 will not affect the state of the other outputs.

Power Outputs

Output channels (OUTn) are smart high side power switches allowing circuit protection without mechanical or parts requiring replacement. OUTn channels are controlled by their corresponding SWn channel. Each output channel is intended to supply up to 12A nominal load current. The outputs are protected against fault conditions including overload, short circuit, and over temp.

In the event of a fault, the output is automatically switched OFF. The output will remain latched off until the corresponding switch input (SWn) is cycled HIGH(OFF) and back to LOW(ON).

Short Circuit Protection

In the event of a short circuit between a OUTn channel and GND, a very high current will flow through the device. This current will exceed the output's over current threshold and the OUTn channel will be switched off. The output will remain off until the its SWn channel is cycled. If the short is no longer present, OUTn will turn back ON.

Overload / Over Temp Protection

Any output channel (OUTn) supplying an excessive current load will cause the output driver to heat up. In the event of excessive IC temperature, OUTn will switch OFF. The output will remain off until its SWn channel is cycled. If the high temperature has recovered, OUTn will turn back ON.

Reverse Battery Protection

In the event of an inverse current, the output channels will turn ON in order to stop the power dissipating via the driver's intrinsic body diode alone. Power dissipation during inverse current is similar to normal operation.

Note: This behavior can allow a path of inverse current in circuits with no other flow control.

High Current Inductive Loads

Some applications with high in-rush currents such as thermo fans may cause an overload condition on initial activation. While the fan may only draw ~10A when running consistently, during power up they can surge to 30A or more. The output will subsequently switch itself OFF. In this case it may be required to drive the load from two OUTn channels in parallel.

Note: SWn inputs will also need to be connected in parallel.

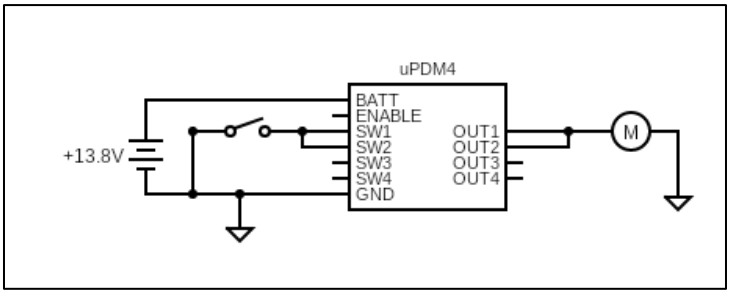
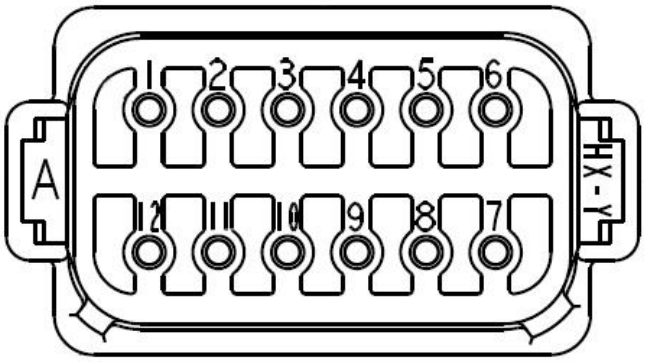


Figure 1 *Parallel outputs driving a single load.*

Connections



Mating Connector: Deutsch DT06-12SA

Pin	Name	Description
1	OUT1	12A load output 1.
2	OUT2	12A load output 2.
3	OUT3	12A load output 3.
4	OUT4	12A load output 4.
5	ENABLE	Enable input, Active HIGH. Internally pulled down. Unlocks outputs 2,3,4 when SW1 is HIGH(OFF).
6	NC	Reserved.
7	NC	Reserved.
8	GND	Chassis ground.
9	SW4	Switch Input. Active LOW. Internally pulled up. Activates Output 4 if SW1 is LOW or Enable is HIGH.
10	SW3	Switch Input. Active LOW. Internally pulled up. Activates Output 3 if SW1 is LOW or Enable is HIGH.
11	SW2	Switch Input. Active LOW. Internally pulled up. Activates Output 2 if SW1 is LOW or Enable is HIGH.
12	SW1	Switch Input. Active LOW. Internally pulled up. Activates Output 1.
M6 Stud	BATT	Battery positive supply.

Truth Table (X = Don't Care)

ENABLE	SW1	SW2/3/4	OUT1	OUT2/3/4
LOW	HIGH	X	OFF	OFF
X	LOW	HIGH	ON	OFF
X	LOW	LOW	ON	ON
HIGH	HIGH	HIGH	OFF	OFF
HIGH	LOW	HIGH	ON	OFF
HIGH	LOW	LOW	ON	ON
HIGH	HIGH	LOW	OFF	ON

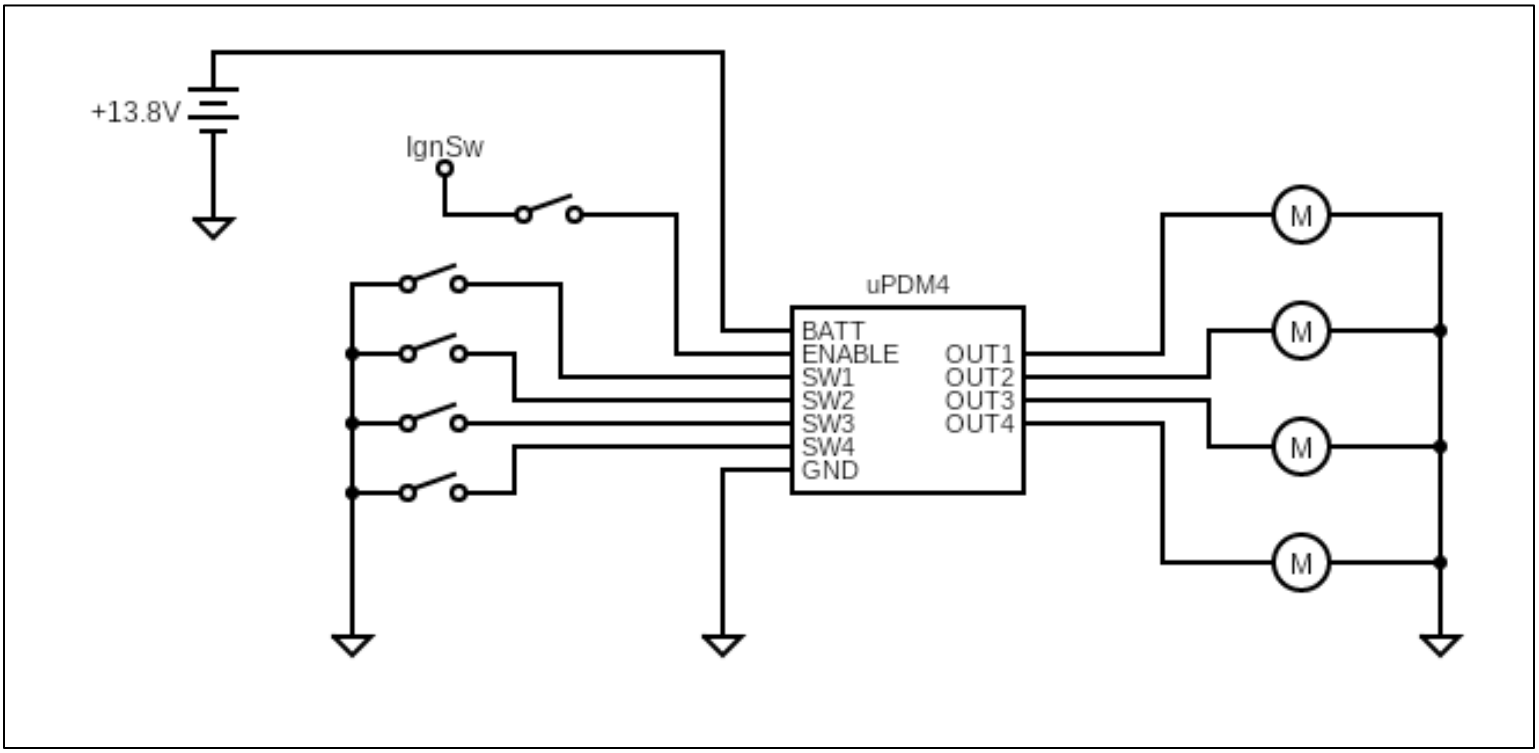


Figure 2 *Basic wiring implementation example - Switches controlling inductive loads.*

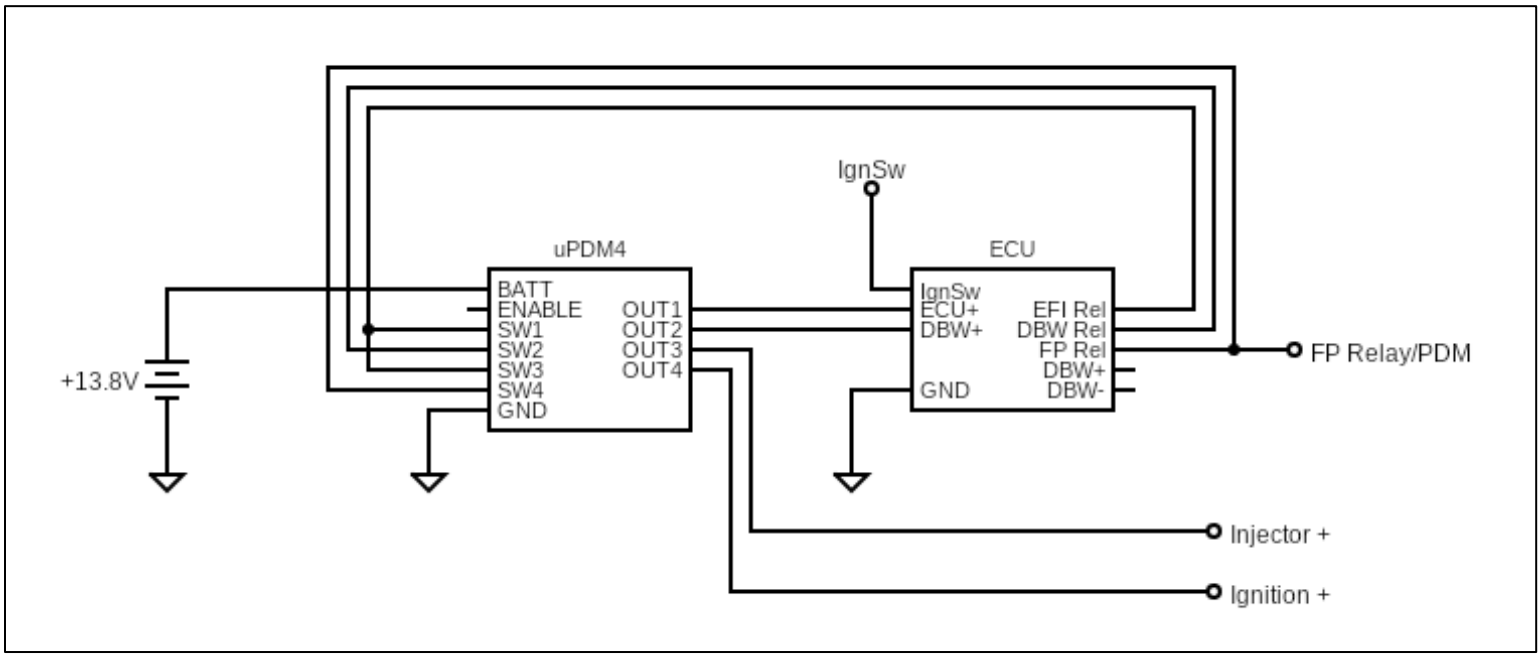
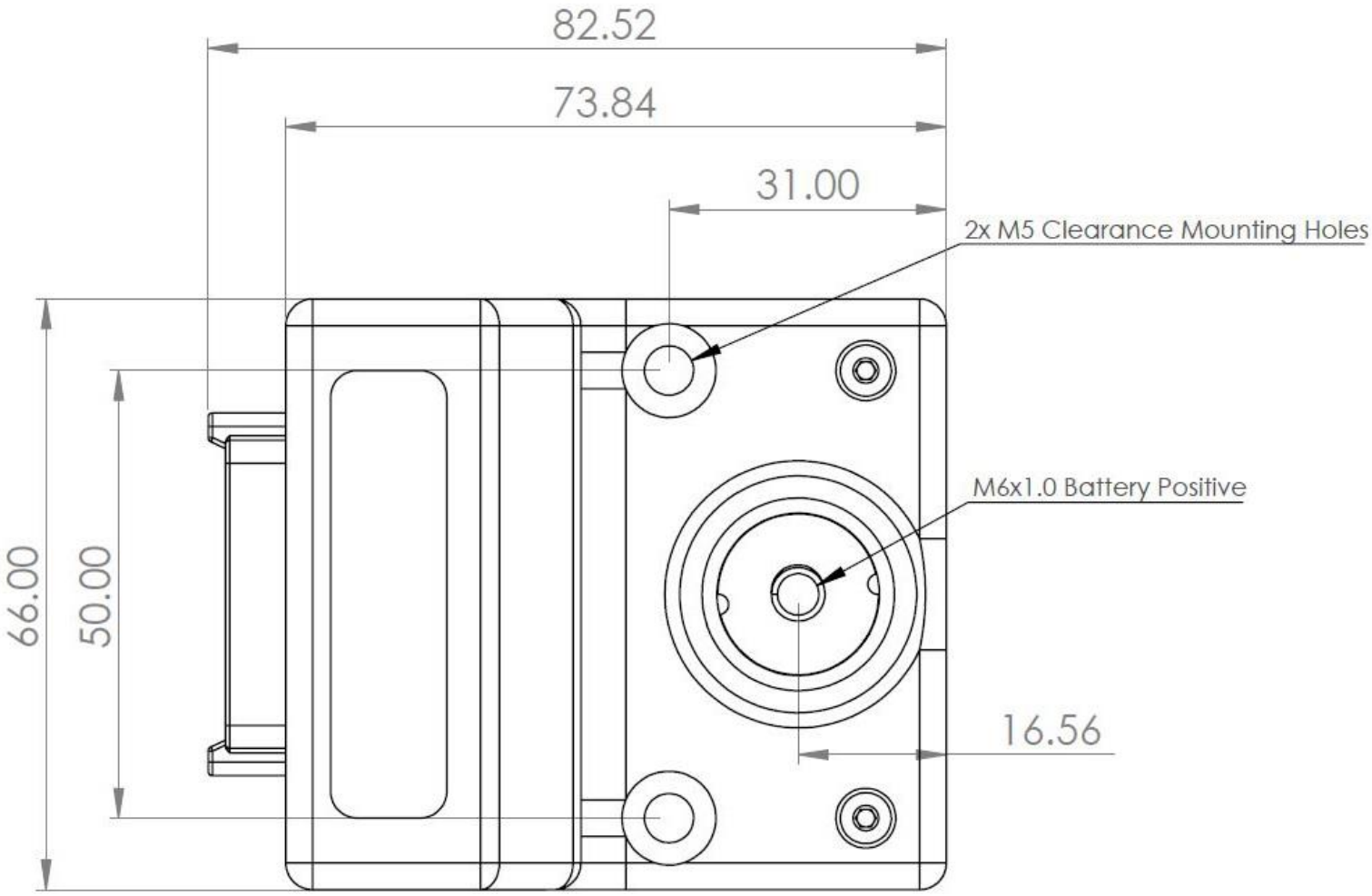


Figure 3 *EFI wiring implementation example: ECU controlled engine harness supplies with hold power and DBW.*

Device Ratings

Parameter	Value
Minimum operating voltage	4.1 V
Minimum operating voltage (cranking)	3.1 V
Maximum operating voltage	28 V
Maximum current draw in OFF state (all channels OFF)	3.2 µA
Input LOW threshold	0.8 V
Input HIGH threshold	2.0 V
Output typical ON-state resistance (T_J = 25 °C)	6.6 mΩ
Output maximum ON-state resistance (T_J = 150 °C)	12 mΩ
Output nominal load current (T_A = 85 °C)	12.5 A
Output minimum overload detection current	81 A
Minimum operating temperature	-40 °C
Maximum operating temperature	125 °C
Minimum component automotive qualification	AEC-Q100 Grade 1

Dimensions


82.52
73.84
31.00
2x M5 Clearance Mounting Holes
M6x1.0 Battery Positive
66.00
50.00
16.56

Document History

09/09/2021 - Initial Release