

## PDUX4B (12V) Datasheet



The PDUX4B (12V) is a high-performance solid-state power distribution unit with a total of 48 powered output channels and maximum current capacity of 350A.

This includes ten flexible 40A output drivers which may be configured as half-bridge, high side or high side PWM (configurable frequency) outputs, with the ability to soft start electrical loads with closed loop current limitation.

In addition, two 40A capable output drivers, high side and high side PWM (configurable frequency) with the ability to soft start electrical loads and eight 15A capable output drives, high side and high side PWM (configurable frequency) with the ability to soft start electrical loads.

Using digitised, voltage, or linearised values from its 16 analogue inputs and from any of three CAN buses, the PDUX4B is calibrated using a clear graphical interface with full logic simulation and live monitoring capabilities.

The PDUX4B is able to operate in a low-power standby state, drawing <math><2\text{mA}</math>, with configurable activation based on physical or CAN input.

Additionally, the PDUX4B may be used to expand input and output functionality of any Life Racing ECU.

The PDUX4B is available in 12V, 24V and 48V variants as well as an internal IMU option as detailed in the 'Ordering Information' section.

## Features:

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- Schematic based calibration including logic simulation tool.
- Custom CAN across 3 buses including mux frames and retransmission (gateway) features, configured with a graphical display and import/export tool.
- Low power state woken on either a physical input, CAN activity or specific CAN frame
- Configurable evaluation frequency operation of schematic components in circuitry – “Expert Frequency Mode”
- Optional internal IMU (Inertial Measurement Unit) feature offers a six-axis gyro and accelerometer which can be processed internally or transmitted over CAN.

## Outputs:

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- 48 main power outputs:
  - 10 multifunction outputs configurable as either half-bridge, high side, low side, high side PWM (100Hz-20kHz) outputs. (40A continuous, soft-start inrush limiting 60A, hard-start inrush 60A)
  - 10 high side, two of which can be high side PWM (100Hz-20kHz) outputs. (40A continuous, hard-start inrush 60A)
  - 28 high side, eight of which can be high side PWM (100Hz-20kHz) outputs. (15A continuous, hard-start inrush 17.5A)
- Output linking (‘teaming’) to support very high current devices.
- Four additional low side outputs with configurable PWM (10Hz-10kHz).
- All outputs short circuit and thermally protected with multi-stage in-rush control.
- All outputs additionally protected by physical fuses as required by worldwide regulations.
- Combined diagnostic output with reset input.
- 128 scalable CAN (‘soft’) outputs.
- Custom CAN datastream– i.e., customisable channel current, channel state and device information

## Inputs:

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- 16 physical 0-5V inputs, including software selectable 3k Ohm pull-up resistors.
- Four inputs capable of programmable “wake” functionality.
- Comparing and manipulating real numbers (floating point decimal) in schematic using configurable logic blocks.
- Analogue inputs can be linearised, viewed as raw voltage or Boolean values.
- Dedicated wake pin.
- 128 CAN ‘soft’ inputs with configurable scaling.

## Interfaces:

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- 2x 100Mbit/s full duplex Ethernet (Ethernet switch functionality).
- 3x CAN 2.0B – fully flexible.
- Option for one galvanically isolated CAN bus (*CAN3 - custom projects only*).
- RS232C serial interface (*custom projects only*).
- LIN Bus (*custom projects only*).

### Power Supply:

- 6V to 20V input voltage (12V), 6V to 30V input voltage (24V), 6V to 60V (48V).
- Dedicated logic power input.
- Regulated 5V sensor supply output with full circuit protection.

### Sleep State:

- Low power standby state with configurable wake options:
  - Wake by voltage signal (1.6mA).
  - Wake by any CAN activity (CAN-1 only) (2mA).
  - Wake by specific CAN frame or content (two frames required, CAN-1 only) (2mA).
  - Wake by specific CAN frame or content with low latency (one frame required, CAN-1 only) (10mA).

### ECU Slaving:

- Allows a Life Racing ECU to “claim” unused pins across a dedicated CAN bus utilising the following PDU I/O:
  - Outputs 1-10 with additional functionality including full-bridge pairing and configurable PWM frequencies.
  - Low outputs 11-14 with configurable PWM frequencies and internal pull up resistors.
  - All 16 inputs, including eight frequency capable (four optionally bipolar), and all with software selectable 3k Ohm pull-up resistors.

### Physical:

- Two LEAVYSEAL connectors with a total of 113 pins.
- Amphenol SurLok power stud.
- Machined Aluminium enclosure.
- 210x130x57mm (including connectors).
- 1090 grams.
- Operating Temperature -40°C to +85°C.

### Ordering Information:

Description	Part number
PDUX4B 350A (10mm main power stud)	PDU-C02
PDUX4B 200A (8mm main power stud)	PDU-C05
PDUX4B 350A 24V (10mm main power stud)	PDU-E02
PDUX4B 200A 24V (8mm main power stud)	PDU-E05
PDUX4B 350A 48V (10mm main power stud)	PDU-F02
PDUX4B 200A 48V (8mm main power stud)	PDU-F05
PDUX 350A Connector Kit	CON-B10
PDUX 200A Connector Kit	CON-B11
3-axis accelerometer and 3-axis gyroscope	PDU-FEAT-IMU
Two pin wheel speed sensor inputs	PDU-BTC-WS

## Wiring Information:

### Power Stud

*Mating connector (350A): Surlok SLPPCxxBSR*

*Mating connector (200A): Surlok SLPPBxxBSR*

*(xx=size: 35 150A, 50 200A, 70 300A, 85 350A)*

Pin	Gauge	Signal Name	Signal Notes
1	-	+12V Supply	Positive battery supply

### Connector 1

*Mating connector: 1-1534127-1, Hood: 9-1394050-1*

Pin	Gauge	Signal Name	Signal Notes
1	20-12AWG	Power Ground	Negative battery supply
2	20-12AWG	Output 20	High Side 40A
3	20-12AWG	Output 19	High Side 40A
4	20-12AWG	Output 18	High Side 40A
5	20-12AWG	Output 17	High Side 40A
6	20-12AWG	Output 16	High Side 40A
7	20-12AWG	Output 15	High Side 40A
8	20-12AWG	Output 14	High Side 40A
9	20-12AWG	Output 13	High Side 40A
10	20-12AWG	Output 12	High Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup>
11	20-12AWG	Output 11	High Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup>
12	20-12AWG	Output 10	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 9, Low Side, PWM
13	20-12AWG	Output 9	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 10, Low Side, PWM
14	20-12AWG	Output 8	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 7, Low Side, PWM
15	20-12AWG	Output 7	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 8, Low Side, PWM
16	20-12AWG	Output 6	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 5, Low Side, PWM
17	20-12AWG	Output 5	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 6, Low Side, PWM
18	20-12AWG	Output 4	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 3, Low Side, PWM
19	20-12AWG	Output 3	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 4, Low Side, PWM
20	20-12AWG	Output 2	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 1, Low Side, PWM
21	20-12AWG	Output 1	High Side/Low Side/High Side PWM (configurable Hz), Soft start, 40A <sup>(1)</sup> SLAVED: Half Bridge, Full Bridge paired with Output 2, Low Side, PWM

## Connector 2

Mating Connector: 1703998-1, Hood 1703997-1

Pin	Gauge	Signal Name	Signal Notes
1	-	DO NOT CONNECT	LR Internal use only
2	-	DO NOT CONNECT	LR Internal use only
3	-	DO NOT CONNECT	LR Internal use only
4	-	DO NOT CONNECT	LR Internal use only
5	-	DO NOT CONNECT	LR Internal use only
6	-	DO NOT CONNECT	LR Internal use only
7	-	DO NOT CONNECT	LR Internal use only
8	-	DO NOT CONNECT	LR Internal use only
9	24-16AWG	Output 48	High Side 15A
10	24-16AWG	Output 46	High Side 15A
11	24-16AWG	Output 44	High Side 15A
12	24-16AWG	Output 42	High Side 15A
13	24-16AWG	Output 40	High Side 15A
14	24-16AWG	Output 38	High Side 15A
15	24-16AWG	Output 36	High Side 15A
16	24-16AWG	Output 34	High Side 15A
17	24-16AWG	Output 32	High Side 15A
18	24-16AWG	Output 30	High Side 15A
19	24-16AWG	Output 28	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
20	24-16AWG	Output 26	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
21	24-16AWG	Output 24	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
22	24-16AWG	Output 22	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
23	24-16AWG	Low Output 11	Low Side, Low Side PWM (configurable Hz) <sup>(3)</sup> SLAVED: Low Side PWM configurable frequency
24	-	DO NOT CONNECT	LR Internal use only
25	-	DO NOT CONNECT	LR Internal use only
26	-	DO NOT CONNECT	LR Internal use only
27	-	DO NOT CONNECT	LR Internal use only
28	-	DO NOT CONNECT	LR Internal use only
29	-	DO NOT CONNECT	LR Internal use only
30	-	DO NOT CONNECT	LR Internal use only
31	-	DO NOT CONNECT	LR Internal use only
32	24-16AWG	Output 47	High Side 15A
33	24-16AWG	Output 45	High Side 15A
34	24-16AWG	Output 43	High Side 15A
35	24-16AWG	Output 41	High Side 15A
36	24-16AWG	Output 39	High Side 15A
37	24-16AWG	Output 37	High Side 15A
38	24-16AWG	Output 35	High Side 15A
39	24-16AWG	Output 33	High Side 15A
40	24-16AWG	Output 31	High Side 15A

## Connector 2

Continued...

Pin	Gauge	Signal Name	Signal Notes
41	24-16AWG	Output 29	High Side 15A
42	24-16AWG	Output 27	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
43	24-16AWG	Output 25	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
44	24-16AWG	Output 23	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
45	24-16AWG	Output 21	High Side, High Side PWM (configurable Hz), Soft Start, 15A <sup>(2)</sup>
46	24-16AWG	Low Output 12	Low Side, Low Side PWM (configurable Hz) <sup>(3)</sup> SLAVED: Low Side PWM configurable frequency
47	24-16AWG	Input 01	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, -5V to +5V, 3kΩ programmable pullup to 5V, configurable frequency voltage thresholds
48	24-16AWG	Input 03	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, -5V to +5V, 3kΩ programmable pullup to 5V, configurable frequency voltage thresholds
49	24-16AWG	Input 05	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, 3kΩ programmable pullup to 5V Fixed frequency voltage thresholds at 1.25 and 3.75V
50	24-16AWG	Input 07	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, 3kΩ programmable pullup to 5V Fixed frequency voltage thresholds at 1.25 and 3.75V
51	24-16AWG	Input 09	Analogue 0-5V, 3kΩ programmable pullup to 5V
52	24-16AWG	Input 11	Analogue 0-5V, 3kΩ programmable pullup to 5V
53	24-16AWG	Input 13	Analogue 0-5V, 3kΩ programmable pullup to 5V, Wake <sup>(4)</sup>
54	24-16AWG	Input 15	Analogue 0-5V, 3kΩ programmable pullup to 5V, Wake <sup>(4)</sup>
55	24-16AWG	SENSOR GND	Protected sensor ground
56	24-16AWG	5V OUT	Regulated 5V sensor reference supply
57	24-16AWG	LOGIC POWER IN	+12V Battery supply; recommended independent logic supply <0.5A
58	24-16AWG	WARNING AND RESET SW	Warning output for an LED to ground. Short to ground for manual reset.
59	24-16AWG	RS232 RX	RS232 receive
60	24-16AWG	CAN #03 HI	CAN communication port 120Ω software selectable termination
61	24-16AWG	CAN #02 HI	CAN communication port 120Ω software selectable termination ECU Slave – when paired with LR ECU (terminated)
62	24-16AWG	CAN #01 HI	CAN communication port 120Ω software selectable termination
63	24-16AWG	ETHERNET2 RX+	Ethernet communication port 2
64	24-16AWG	ETHERNET2 TX+	Ethernet communication port 2
65	24-16AWG	ETHERNET1 RX+	Ethernet communication port 1
66	24-16AWG	ETHERNET1 TX+	Ethernet communication port 1
67	24-16AWG	Power Ground	Negative battery supply
68	24-16AWG	Low Output 13	Low Side, Low Side PWM (configurable Hz) <sup>(3)</sup> SLAVED: Low Side PWM configurable frequency
69	24-16AWG	Low Output 14	Low Side, Low Side PWM (configurable Hz) <sup>(3)</sup> SLAVED: Low Side PWM configurable frequency
70	24-16AWG	Input 02	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, -5V to +5V, 3kΩ programmable pullup to 5V, configurable frequency voltage thresholds
71	24-16AWG	Input 04	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, -5V to +5V, 3kΩ programmable pullup to 5V, configurable frequency voltage thresholds

## Connector 2

Continued...

Pin	Gauge	Signal Name	Signal Notes
72	24-16AWG	Input 06	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, 3kΩ programmable pullup to 5V Fixed frequency voltage thresholds at 1.25 and 3.75V
73	24-16AWG	Input 08	Analogue 0-5V, 3kΩ programmable pullup to 5V SLAVED: Analogue or frequency; 0-5V, 3kΩ programmable pullup to 5V Fixed frequency voltage thresholds at 1.25 and 3.75V
74	24-16AWG	Input 10	Analogue 0-5V, 3kΩ programmable pullup to 5V
75	24-16AWG	Input 12	Analogue 0-5V, 3kΩ programmable pullup to 5V
76	24-16AWG	Input 14	Analogue 0-5V, 3kΩ programmable pullup to 5V, Wake <sup>(4)</sup>
77	24-16AWG	Input 16	Analogue 0-5V, 3kΩ programmable pullup to 5V, Wake <sup>(4)</sup>
78	24-16AWG	SENSOR GND	Protected sensor ground
79	24-16AWG	Power Ground	Negative battery supply
80	24-16AWG	WAKEUP	Dedicated wake <sup>(4)</sup>
81	24-16AWG	LIN	NOT CURRENTLY IN USE
82	24-16AWG	RS232 TX	RS232 transmit
83	24-16AWG	CAN #03 LO	CAN communication port 120Ω software selectable termination
84	24-16AWG	CAN #02 LO	CAN communication port 120Ω software selectable termination ECU Slave – when paired with LR ECU (terminated)
85	24-16AWG	CAN #01 LO	CAN communication port 120Ω software selectable termination
86	24-16AWG	ETHERNET2 RX-	Ethernet communication port 2
87	24-16AWG	ETHERNET2 TX-	Ethernet communication port 2
88	24-16AWG	ETHERNET1 RX-	Ethernet communication port 1
89	24-16AWG	ETHERNET1 TX-	Ethernet communication port 1
90	24-16AWG	Power Ground	Negative battery supply
91	24-16AWG	Power Ground	Negative battery supply
92	24-16AWG	Output 21D	Duplicate of output 21 with Diode - intended for wiper operation 15A

### Footnotes:

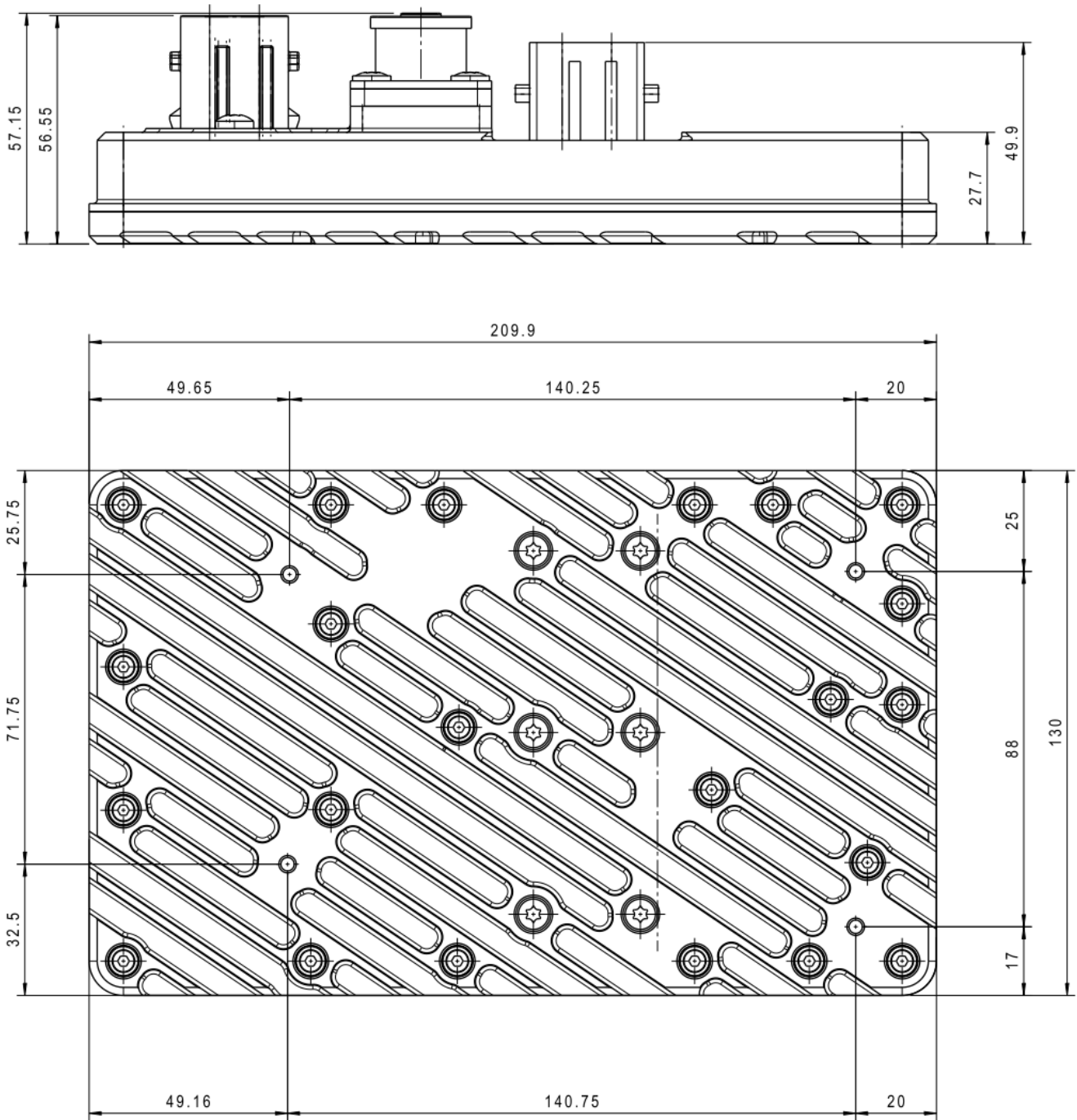
<sup>(1)</sup>Default PWM frequency for Outputs 1-12 is 10kHz.

<sup>(2)</sup>Default PWM frequency for Outputs 21-28 is 10kHz.

<sup>(3)</sup>Default PWM frequency for Low Side Outputs 11-14 is 125Hz.

<sup>(4)</sup>Can be calibrated to bring unit out of sleep mode.

**Dimensions:**



**Warranty and Servicing:**

- One year limited warranty when used within supplied specification.