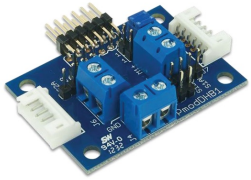
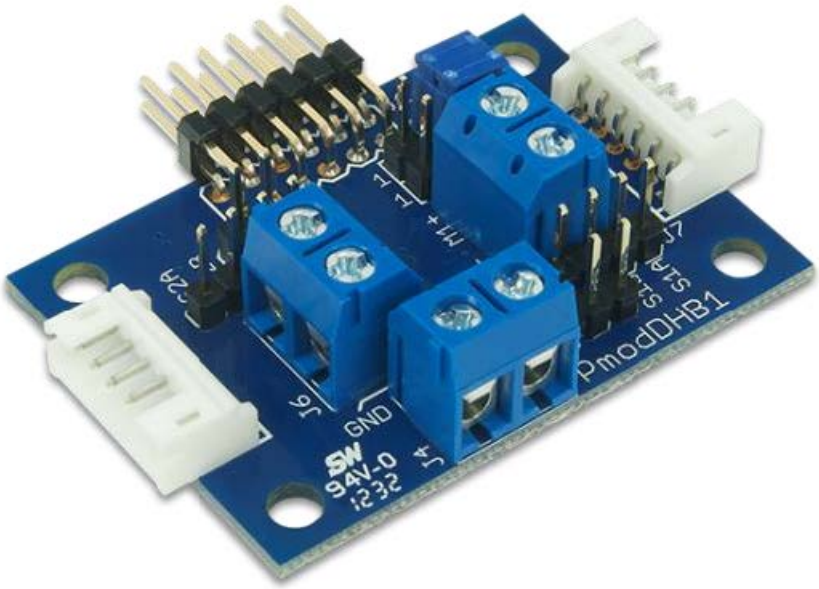


DIGILENT PmodDHB1 Dual H-Bridge Owner's Manual

Contents

DIGILENT PmodDHB1 Dual H-Bridge



Product Information

The Digilent PmodDHB1 is a dual H-Bridge motor driver that is designed to drive two DC motors, a bipolar stepper motor, and other devices with inductive loads. It features two quadrature encoder channels for motor feedback and twJST 6-pin ports for connection to Digilent boards. The PmodDHB1 follows the Digilent Pmod Interface Specification Type 5.

Product Usage Instructions

To interface with the PmodDHB1, it communicates with the host board using the GPIO protocol. Users can control the motor speed by driving the enable (EN) pins with a PWM signal and setting a logic level low or high voltage on the direction (DIR) pins.

Truth Table: The EN and DIR pins have different combinations and results, as shown in the truth table below:

DIR1	EN1	Result
0	0	Stop
0	1/PWM	Forward
1	0	Stop
1	1/PWM	Reverse

Note that it is recommended to drive the EN pin to a low voltage state before changing the voltage state on the DIR pin to avoid short-circuiting the FETs.

Pinout Description: The PmodDHB1 has several pin headers for different connections.

The pinout description tables are as follows:
Header J1:

Pin	Signal	Description
1	EN1	Motor 1 Enable
2	DIR1	Motor 1 Direction
3	S1A	Motor 1 Sensor A Feedback
4	S1B	Motor 1 Sensor B Feedback
5	GND	Power Supply Ground
6	VCC	Power Supply (3.3V/5V)

Header J4 – Motor Voltage:

Pin	Signal	Description
1	VM	Motor Power
2	GND	Power Supply Ground

Header J5 – M1 Power:

Pin	Signal	Description
1	M1+	Motor 1 Positive Supply
2	M1-	Motor 1 Negative Supply

Header J6 – M2 Power:

Pin	Signal	Description
1	M2+	Motor 2 Positive Supply
2	M2-	Motor 2 Negative Supply

Header J7 – M1 Feedback:

Pin	Signal	Description
1	SA1-IN	Sensor A From Motor 1
2	SB1-IN	Sensor B From Motor 1
3	GND	Power Supply Ground
4	VCC	Power Supply (3.3V)

Header J2 – M1 JST 6-Pin Motor Connector Header J3 – M2 JST 6-Pin Motor Connector Header J8 – M2 Feedback:

Pin	Signal	Description
1	SA2-IN	Sensor A From Motor 2
2	SB2-IN	Sensor B From Motor 2
3	GND	Power Supply Ground
4	VCC	Power Supply (3.3V)

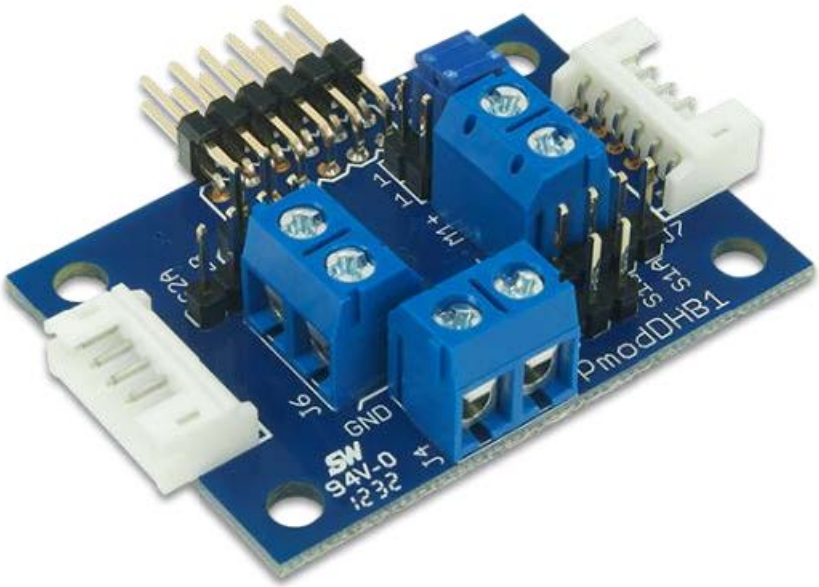
Header J9 – Fault:

Pin	Signal	Description
1	NFAULT	Overcurrent Condition
2	GND	Power Supply Ground

Header J10 – Sleep:

Pin	Signal	Description
1	Sleep	Sleep Mode Control
2	GND	Power Supply Ground

Overview
The Digilent PmodDHB1 is a dual H-Bridge motor driver that is capable of driving two DC motors, a bipolar stepper motor, and other devices with inductive loads.



The PmodDHB1.

Features include:

- Dual H-Bridge capable of 1.5A RMS
- Two quadrature encoder channels for motor feedback
- Two JST 6-pin ports for connection to Digilent motor/gearbox
- Over-current protection
- Recommended 10.8 V max motor voltage
- Logic input voltage range of 2.5 V to 5 V
- Small PCB size for flexible designs 1.3“ × 1.8” (3.3 cm × 4.6 cm)
- Follows Digilent Pmod Interface Specification Type 5

Functional Description

The PmodDHB1 utilizes TI’s DRV8833 to drive a variety of systems. With the two built in H-Bridges and pull down resistors on the inputs, users may run two DC motors or a single bipolar stepper motor in fast decay mode.
The DRV8833 chip provides over-current protection on the motor drive circuits. Each internal drive FET is independently monitored for an over-current condition and will be shut down internally to protect the chip. When an over-current condition is sensed the chip will shut down the FET with the fault and then set the NFAULT pin low signaling a fault condition on the chip. The remaining FETs will continue to operate as normal. When the fault condition is over, the chip will self-reset and return the NFAULT logic level to logic high.

Interfacing with the Pmod

The PmodDHB1 communicates with the host board via the GPIO protocol. By driving the enable (EN) pins with a PWM signal and a logic level low or high voltage signal on the direction (DIR) pins, users are able to run DC motors at various speeds.

A truth table listing out the various possible combinations and results of the EN and DIR pins is provided below:

DIR1	**EN1**	**Result**
0	0	Stop
0	1/PWM	Forward
1	0	Stop
1	1/PWM	Reverse

DIR2	**EN2**	**Result**
0	0	Stop
0	1/PWM	Forward
1	0	Stop
1	1/PWM	Reverse

Table 1. Truth table list.

Note that like all H-Bridges, it is recommended that the EN pin is driven to a low voltage state before changing the voltage state on the DIR pin to ensure that the FETs are not short-circuited.
Two sensor feedback pins for both motors are provided so users can capture the signals coming from any Hall Effect Sensors in quadrature.

Pinout Description Tables

Header J1

Pin	Signal	Description
1	EN1	Motor 1 Enable
2	DIR1	Motor 1 Direction
3	S1A	Motor 1 Sensor A Feedback
4	S1B	Motor 1 Sensor B Feedback
5	GND	Power Supply Ground
6	VCC	Power Supply (3.3V/5V)

Pin	Signal	Description
7	EN2	Motor 2 Enable
8	DIR2	Motor 2 Direction
9	S2A	Motor 2 Sensor A Feedback
10	S2B	Motor 2 Sensor B Feedback
11	GND	Power Supply Ground
12	VCC	Power Supply (3.3V/5V)

Header J4 – Motor Voltage			
Pin	Signal	Description	
1	VM	Motor Power	
2	GND	Power Supply Ground	
Header J5 – M1 Power			
Pin	Signal	Description	
1	M1+	Motor 1 Positive Supply	
2	M1-	Motor 1 Negative Supply	
Header J6- M2 Power			
Pin	Signal	Description	
1	M2+	Motor 2 Positive Supply	
2	M2-	Motor 2 Negative Supply	
Header J7- M1 Feedback			
Pin	Signal	Description	
1	SA1-IN	Sensor A From Motor 1	
2	SB1-IN	Sensor B From Motor 1	
3	GND	Power Supply Ground	
4	VCC	Power Supply (3.3V)	

Header J2- M1 JST 6-Pin Motor Connector

Header J8- M2 Feedback			
Pin	Signal	Description	
1	SA2-IN	Sensor A From Motor 2	
2	SB2-IN	Sensor B From Motor 2	
3	GND	Power Supply Ground	
4	VCC	Power Supply (3.3V)	
Header J9- Fault			
Pin	Signal	Description	
1	NFAULT	Overcurrent Condition	
2	GND	Power Supply Ground	
Header J10- Sleep			
Pin	Signal	Description	
1	NSLEEP	Puts device into sleep state	
2	GND	Power Supply Ground	

Any external power applied to the PmodDHB1 must be within 2.7V and 10.8V; however, it is recommended that Pmod is operated at 3.3V.

Physical Dimensions
The pins on the pin header are spaced 100 mil apart. The PCB is 1.3 inches long on the sides parallel to the pins on the pin header and 2.3 inches long on the sides perpendicular to the pin header.

Documents / Resources

	DIGILENT PmodDHB1 Dual H-Bridge [pdf] Owner's Manual PmodDHB1 Dual H-Bridge, PmodDHB1, Dual H-Bridge, H-Bridge

References

- Digilent â€“ Start Smart, Build Brilliant.