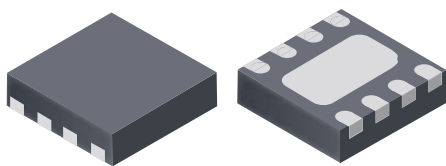


Dual Half Bridge Motor Driver

Features and Benefits

- Low $R_{DS(on)}$ outputs
- Standby mode with zero current drain
- Small 2×2 DFN package
- Crossover Current protection
- Thermal Shutdown protection

Package: 8-contact DFN with Exposed Thermal Pad (suffix EE)



Not to scale

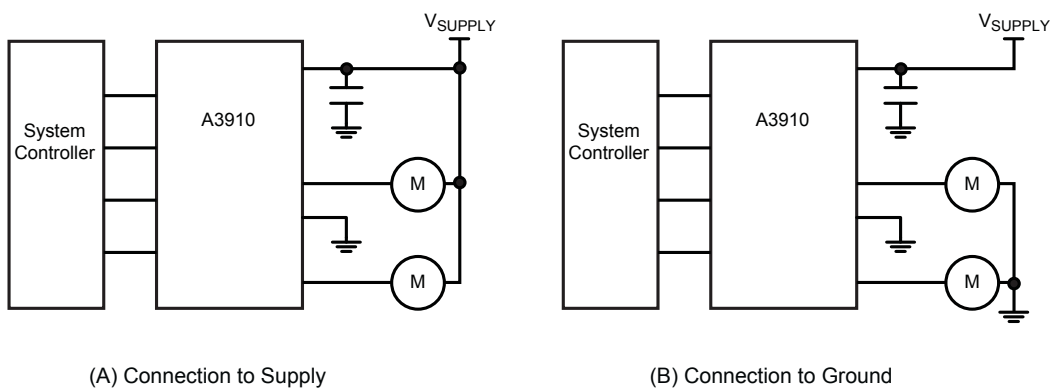
Description

The A3910 is a dual half bridge motor driver, designed for low cost, low voltage battery operated power applications. The outputs are rated for operation up to 500 mA.

Direct control of high- and low-side drivers is implemented to allow either high-side or low-side PWM. The motor can be connected to either supply or GND. Using a MOS switch results in improved braking action for the motor, compared to implementation with simple clamp diode.

The A3910 is supplied in a $2 \text{ mm} \times 2 \text{ mm}$ 8-contact DFN package (EE) with exposed thermal pad. The package is lead (Pb) free, with 100% matte tin leadframe plating.

Typical Application Diagram



Selection Guide

Part Number	Packing*	Package
A3910EEETR-T	3000 pieces per 7-in. reel	8-contact DFN with exposed thermal pad

*Contact Allegro™ for additional packing options.

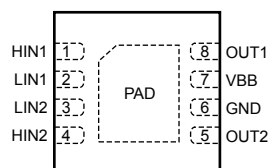
Absolute Maximum Ratings*

Characteristic	Symbol	Notes	Rating	Unit
Supply Voltage	V_{BB}		−0.3 to 5.5	V
Logic Input Voltage Range	V_{IN}		−0.3 to 6	V
Output Current	I_{OUT}		500	mA
Output Voltage	V_{OUT}		−0.3 to $V_{BB} + 1$	V
Operating Ambient Temperature	T_A	E temperature range	−40 to 85	°C
Maximum Junction Temperature	$T_{J(max)}$		150	°C
Storage Temperature	T_{stg}		−55 to 150	°C

Thermal Characteristics may require derating at maximum conditions, see application information

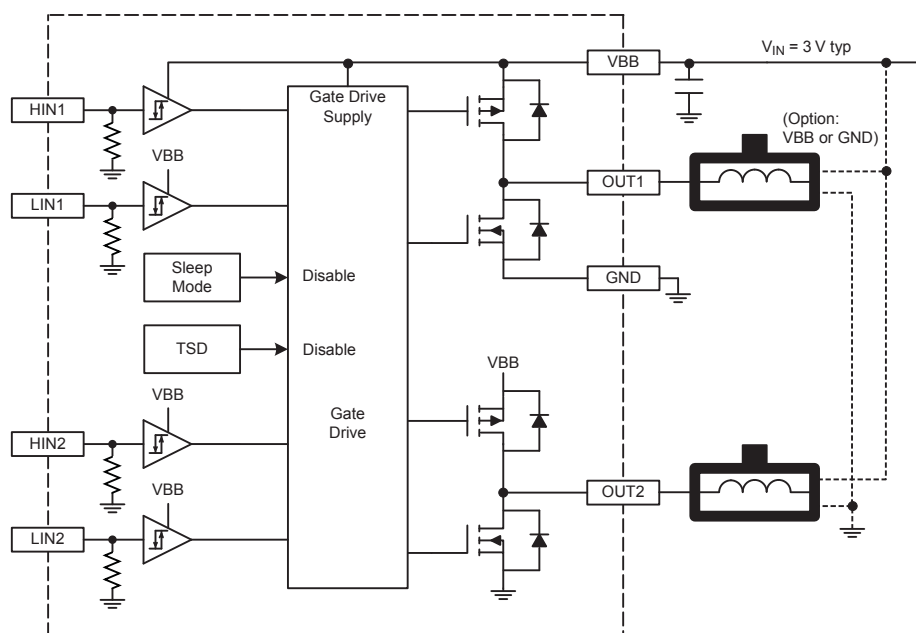
Characteristic	Symbol	Test Conditions*	Value	Unit
Package Thermal Resistance	$R_{\theta JA}$	On 4-layer PCB based on JEDEC standard	49	°C/W
		On 2-layer PCB based with 0.23 in. ² exposed copper each side	92	°C/W

*Additional thermal information available on the Allegro website.

Pin-out Diagram**Terminal List Table**

Number	Name	Function
1	HIN1	Logic input
2	LIN1	Logic input
3	LIN2	Logic input
4	HIN2	Logic input
5	OUT2	Motor terminal
6	GND	Ground
7	VBB	Input Supply
8	OUT1	Motor terminal

Functional Block Diagram



ELECTRICAL CHARACTERISTICS* Valid at $T_A = 25^\circ\text{C}$; unless otherwise specified

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
V _{BB} Supply Range	V _{BB}		2.5	–	5.5	V
V _{BB} Supply Current	I _{BB}	Both bridges, PWM = 50 kHz	–	0.3	1	mA
		Sleep mode (HIN1=HIN2=LIN1=LIN2=0V)	–	<1	1	μA
Output Driver On-Resistance	R _{DS(on)}	Source driver, I = 400 mA, V _{BB} = 3 V	–	1.1	1.4	Ω
		Source driver, I = 400 mA, V _{BB} = 5 V	–	0.8	1	Ω
		Sink driver, I = 400 mA, V _{BB} = 3 V	–	0.5	0.65	Ω
		Sink driver, I = 400 mA, V _{BB} = 5 V	–	0.4	0.52	Ω
Input Logic Low Level	V _{IL}		–	–	0.5	V
Input Logic High Level	V _{IH}		V _{BB} / 2	–	–	V
Input Hysteresis	V _{HYS}		50	150	300	mV
Logic Input Current	I _{IN}	V _{IN} = 3.3 V (Pulldown = 100 kΩ)	–	33	50	μA
Thermal Shutdown Temperature	T _{JTSD}	Temperature increasing	–	165	–	°C
Thermal Shutdown Hysteresis	ΔT _J	Recovery = T _{JTSD} – ΔT _J	–	15	–	°C

*Specified limits are tested at a single temperature and assured over operating temperature range by design and characterization.

Logic Table

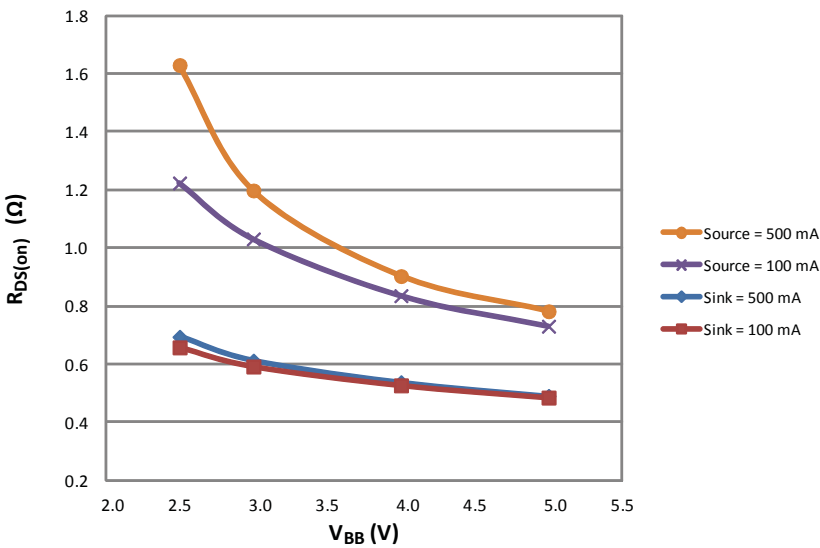
HINx	LINx	OUTx	Function Motor to Supply	Function Motor to GND
0	0	Hi-Z ¹	Coast (Sleep ²)	Coast (Sleep ²)
1	0	High	Brake	Drive
0	1	Low	Drive	Brake
1	1	Hi-Z ¹	Coast	Coast

¹Hi-Z is high impedance.

²Sleep mode activated by all four inputs <100 mV.

Characteristic Performance

Output On-Resistance versus Load Supply Voltage



Output On-Resistance versus Output Current

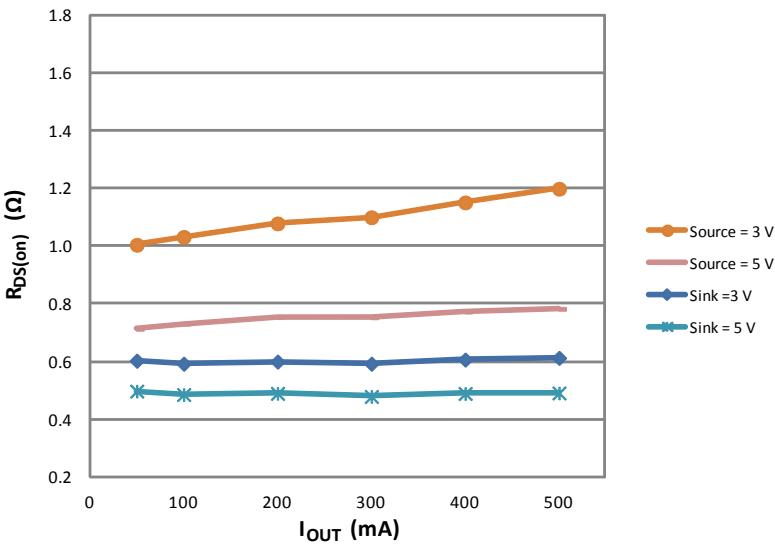


Figure 1: PCB layout reference view. The figure includes three views: a top view, a side view, and a cross-sectional view. The top view shows a square component with dimensions 2.00 ± 0.15 mm by 2.00 ± 0.15 mm. It features a central square pad (A) and four rectangular pads (B) at the corners. The side view shows the component's profile with a height of 0.83 mm. The cross-sectional view shows the component's internal structure, including a seating plane (C) and a central pad (A). Dimensions include 0.08 mm for the central pad, 0.25 ± 0.05 mm for the side pads, and 0.50 mm for the central pad. The bottom view shows a square component with dimensions 1.60 mm by 0.90 mm. It features a central square pad (A) and four rectangular pads (B) at the corners. Dimensions include 0.325 ± 0.050 mm for the side pads, 0.50 mm for the central pad, and 0.90 mm for the side pads. The bottom view also shows a seating plane (C) and a central pad (A).

For reference only (DWG-2857), not for tooling use
(reference JEDEC MO-229UCCD)
Dimensions in millimeters
Exact case and lead configuration at supplier discretion within limits shown

- A** Terminal #1 mark area
- B** Exposed thermal pad (reference only, terminal #1 identifier appearance at supplier discretion)
- C** Reference land pattern layout (reference IPC7351 SON50P200X200X100-9M);
All pads a minimum of 0.20 mm from all adjacent pads; adjust as necessary to meet application process requirements and PCB layout tolerances; when mounting on a multilayer PCB, thermal vias at the exposed thermal pad land can improve thermal dissipation (reference EIA/JEDEC Standard JESD51-5)
- D** Coplanarity includes exposed thermal pad and terminals

Revision History

Revision	Revision Date	Description of Revision
Rev. 1	July 23, 2013	Update Selection Guide

Copyright ©2013, Allegro MicroSystems, LLC

Allegro MicroSystems, LLC reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the performance, reliability, or manufacturability of its products. Before placing an order, the user is cautioned to verify that the information being relied upon is current.

Allegro's products are not to be used in any devices or systems, including but not limited to life support devices or systems, in which a failure of Allegro's product can reasonably be expected to cause bodily harm.

The information included herein is believed to be accurate and reliable. However, Allegro MicroSystems, LLC assumes no responsibility for its use; nor for any infringement of patents or other rights of third parties which may result from its use.

For the latest version of this document, visit our website:

www.allegromicro.com

