

8V to 36V 3 Phases P/N Gate Driver

General Description

The EHB0610 is a P/N gate driver IC designed for three phases brushless DC motor applications. It has two inputs for both high side and low side, and two outputs per channel with internal dead time to prevent shoot through. The recommended input voltage range of EHB0610 is 8V to 36V.

The EHB0610 is available in SOP-16 package.

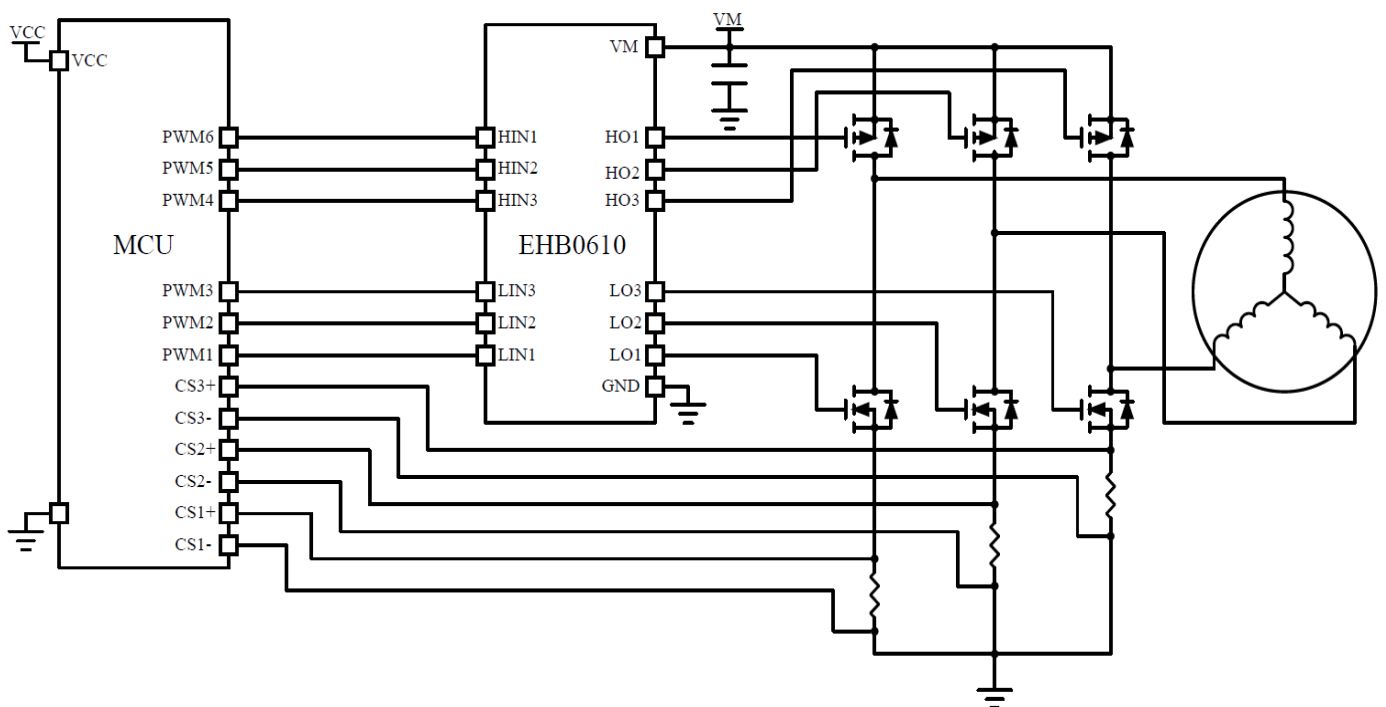
Features

- 8V to 36V Input Voltage Range
- Output 5V V_{GS} for both PMOS and NMOS
- Independent inputs for high side and low side
- Logic Shoot Through Prevention
- Under Voltage Lock Out Protection
- SOP-16 package

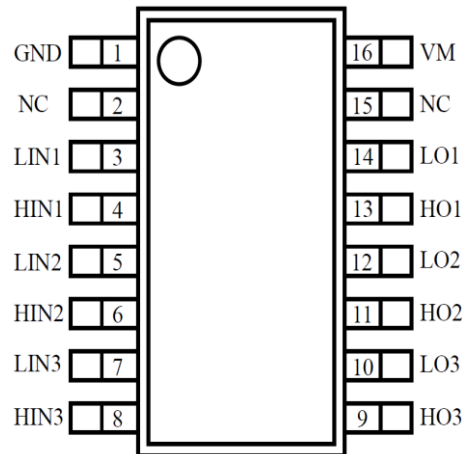
Applications

- 3 phases BLDC motors
- Fan application
- Water pump application

Typical Application



Package Configuration



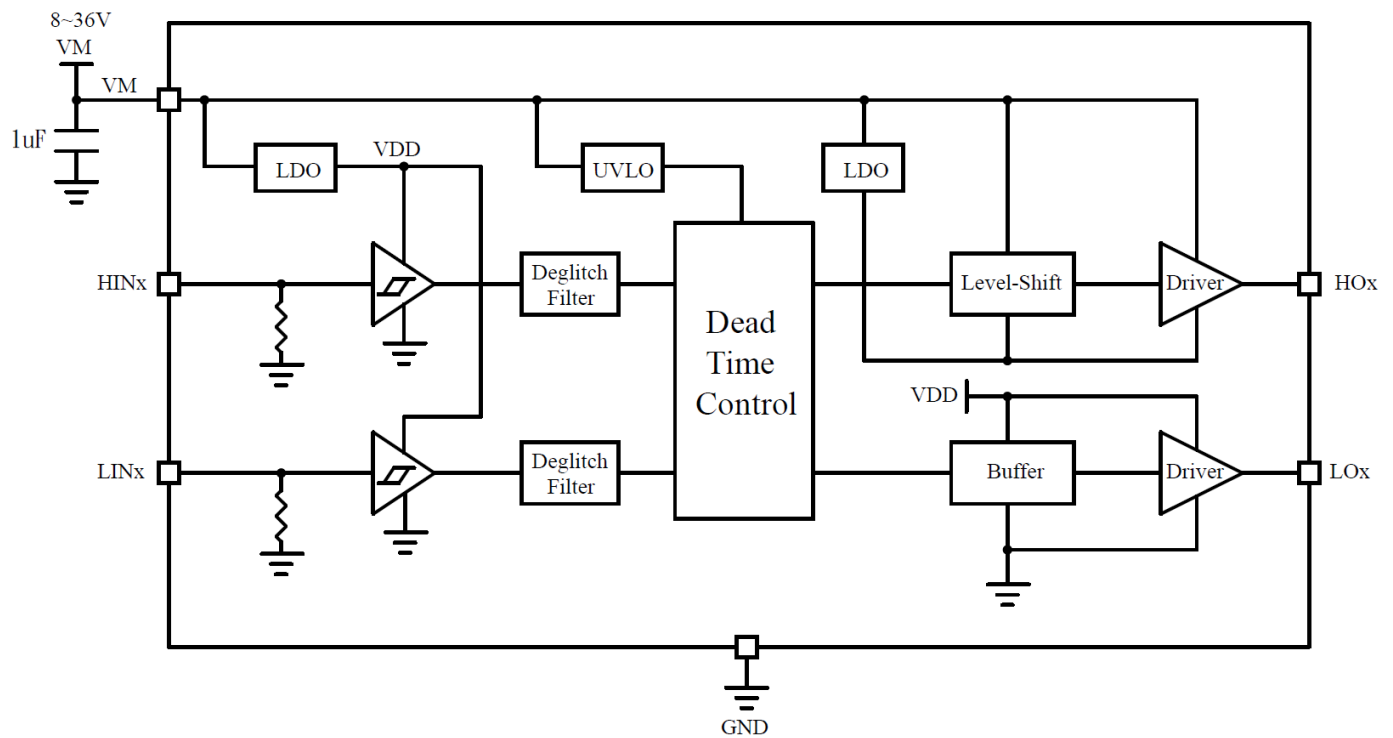
Order, Marking and Packing Information

Package	Product ID.	Marking	Packing
SOP-16	EHB0610-SO16NBR Green, Rating: -40 to 105°C	ESMT EHB0610 Tracking Code PIN1 MARK	Tape & Reel 2.5K pcs

Pin Function

Pin #	Name	Description
1	GND	Ground
2	NC	NC
3	LIN1	Phase 1 low side PWM input pin. Internal pulldown.
4	HIN1	Phase 1 high side PWM input pin. Internal pulldown.
5	LIN2	Phase 2 low side PWM input pin. Internal pulldown.
6	HIN2	Phase 2 high side PWM input pin. Internal pulldown.
7	LIN3	Phase 3 low side PWM input pin. Internal pulldown.
8	HIN3	Phase 3 high side PWM input pin. Internal pulldown.
9	HO3	Phase 3 high-side gate drive output pin. Connect to P-CH MOSFET.
10	LO3	Phase 3 low-side gate drive output pin. Connect to N-CH MOSFET.
11	HO2	Phase 2 high-side gate drive output pin. Connect to P-CH MOSFET.
12	LO2	Phase 2 low-side gate drive output pin. Connect to N-CH MOSFET.
13	HO1	Phase 1 high-side gate drive output pin. Connect to P-CH MOSFET.
14	LO1	Phase 1 low-side gate drive output pin. Connect to N-CH MOSFET.
15	NC	NC
16	VM	Input supply voltage. Bypass to ground with a ceramic capacitor.

Function Block Diagram



In general, the recommended bypass capacitor value is 1μF for VM.

Absolute Maximum Ratings (Note 1,2)

VM	40V
Junction Temperature	150°C
Storage Temperature Range	-60°C to 150°C
High Side Output Voltage	VM-6V to VM+1V
Low Side Output Voltage	-1V to 6V
Logic Input Voltage	-1V to 6V
Lead Temperature (Soldering, 10 sec.)	260°C
ESD Rating: Human Body Model	2KV

Recommended Operating Conditions

Input Voltage Range (VM)	8V to 36V
Logic Input Voltage Range (HIN1, HIN2, HIN3, LIN1,LIN2,LIN3)	0V to 5V
Junction Temperature Range	-40°C to 125°C
Operation Temperature Range	-40°C to 105°C

Electrical Characteristic

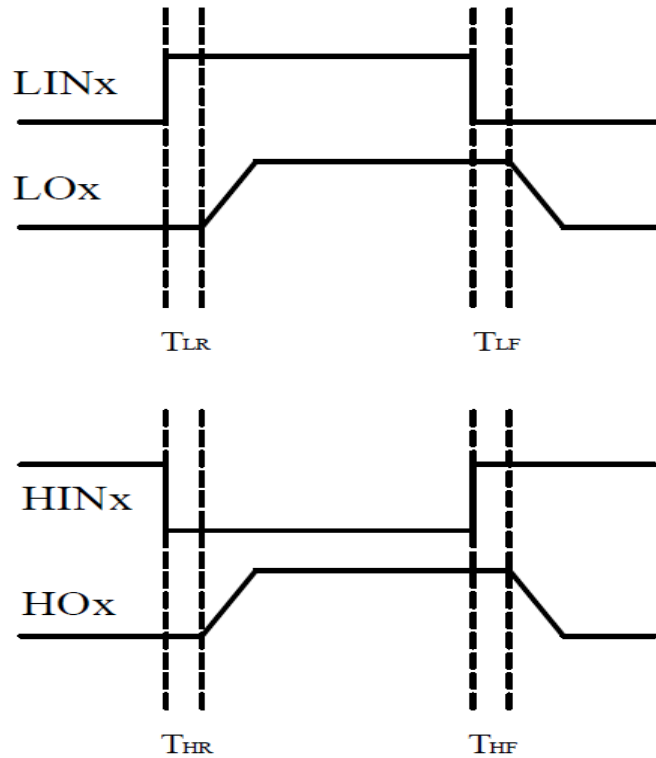
VM=24V, TA = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	Unit
POWER SUPPLIE						
I _{STANDBY}	Standby current	HINx=0, LINx=0		50	100	μA
I _{VM}	Operation current	HINx=0, LINx=1		220	400	μA
		HINx=1, LINx=0		270	400	μA
Control Logic						
V _{IH}	Input logic 'high' threshold				2.4	V
V _{IL}	Input logic 'low' threshold		0.6			V
Resistance						
R _{PD}	Input pull-down resistance			200		kΩ
R _{OH}	Output resistance	HINx=0, HOx=VM-0.2V		3		Ω
R _{OL}	Output resistance	LINx=0, LOx=0.2V		2		Ω
Drive current						
I _{H_ON}	High side source current	HINx=1, HOx=VM		100		mA
I _{H_OFF}	High side sink current	HINx=0, HOx=VM-5V		100		mA
I _{L_ON}	Low side source current	LINx=1, LOx=0		100		mA
I _{L_OFF}	Low side sink current	LINx=0, LOx=5V		100		mA
Timing						
T _{LR}	Low side rising output rise			52		ns
T _{LF}	Low side falling output fall			36		ns
T _{HR}	High side rising output rise			75		ns
T _{HF}	High side falling output fall			50		ns
PROTECTIONS						
T _D	Internal dead time			150		ns
UVLO	Under voltage lock out		1.3	1.8	2.2	V

Note 1: Absolute Maximum ratings indicate limits beyond which damage may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.

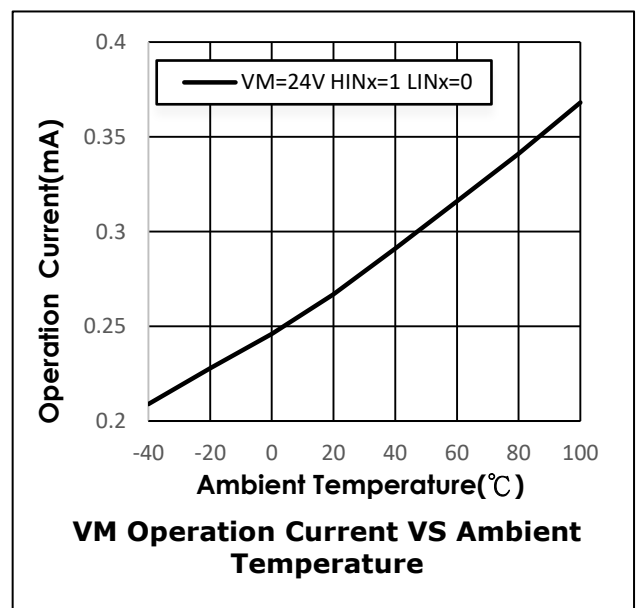
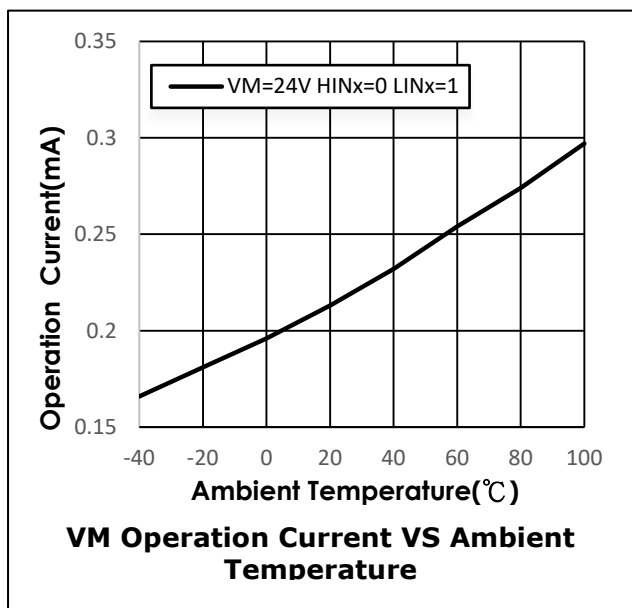
Note 2: All voltages are with respect to the potential at the ground pin.

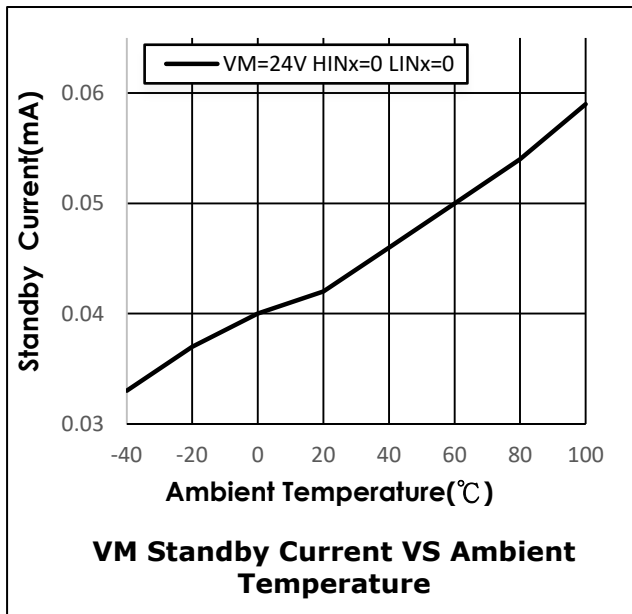
Timing Diagram



Typical Characteristics

Plots generated using characterization data.





Application Information

Overview

The EHB0610 is a three-phase BLDC motor pre-driver that drives three external P-channel MOSFET and N-channel MOSFET half bridges, with 100mA source and 100mA sink current capability. It operates over a wide input voltage range of 8V to 36V.

Shoot Through Prevention Function

The EHB0610 has shoot through prevention circuitry monitoring the high and low side control inputs. It can be designed to prevent outputs of high and low side from turning on at the same time, as shown below Figure 1 and Figure 2.

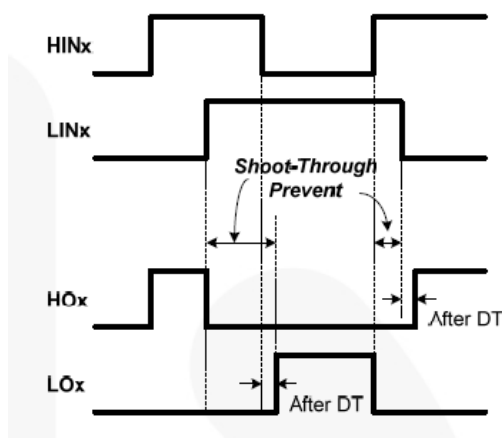


Figure 1

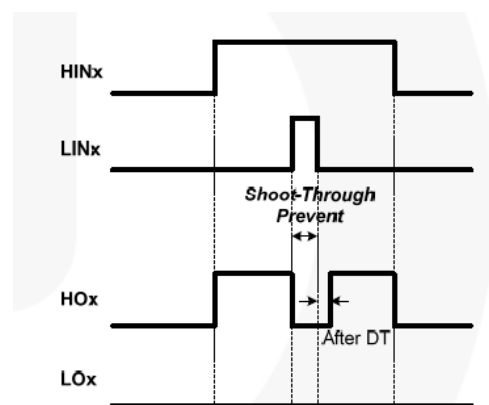
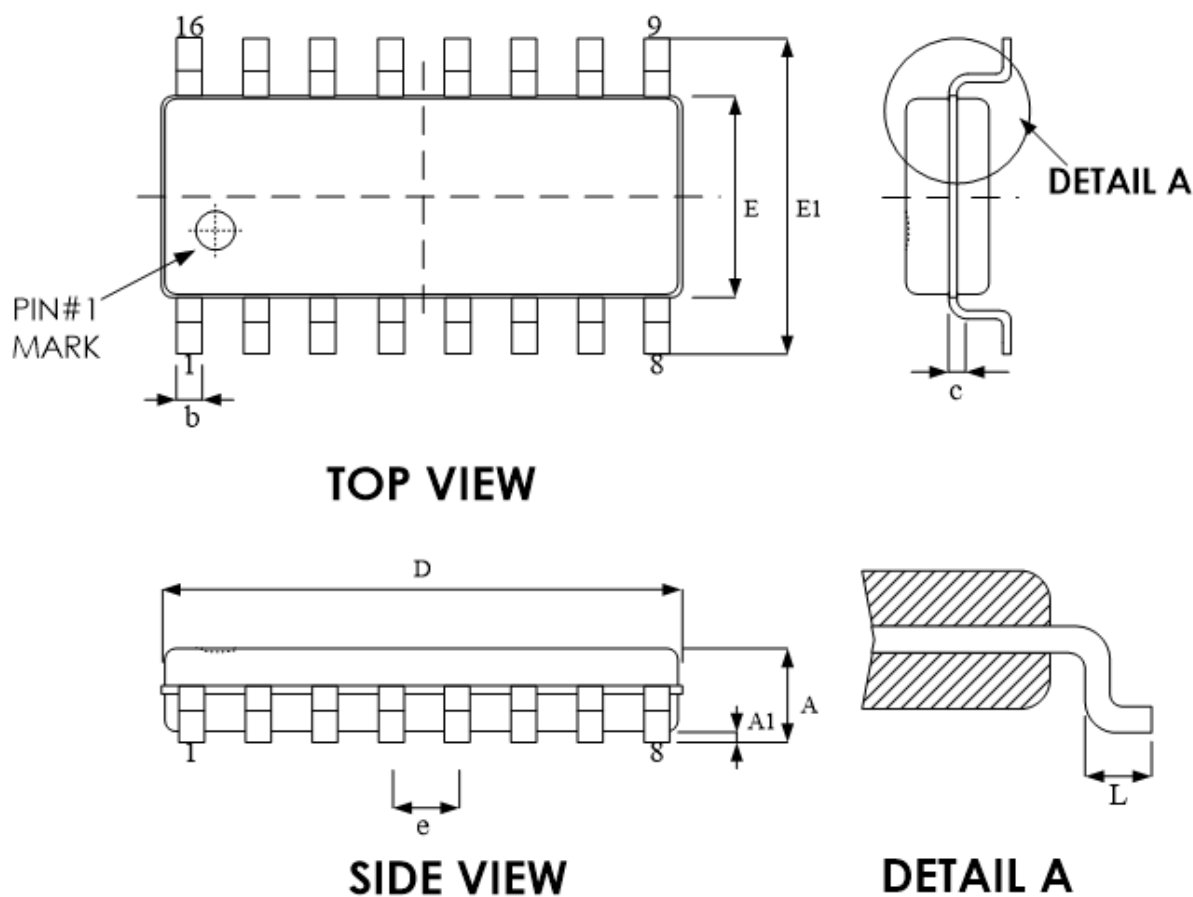


Figure 2

Package Outline Drawing

SOP-16



Symbol	Dimension in mm	
	Min	Max
A	-	1.75
A1	0.10	0.225
b	0.39	0.47
c	0.20	0.24
D	9.80	10.00
E1	5.80	6.20
E	3.80	4.00
e	1.27 BSC	
L	0.50	0.80

Revision History

Revision	Date	Description
1.0	2024.8.05	Original

Important Notice

All rights reserved.

No part of this document may be reproduced or duplicated in any form or by any means without the prior permission of ESMT.

The contents contained in this document are believed to be accurate at the time of publication. ESMT assumes no responsibility for any error in this document, and reserves the right to change the products or specification in this document without notice.

The information contained herein is presented only as a guide or examples for the application of our products. No responsibility is assumed by ESMT for any infringement of patents, copyrights, or other intellectual property rights of third parties which may result from its use. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of ESMT or others.

Any semiconductor devices may have inherently a certain rate of failure. To minimize risks associated with customer's application, adequate design and operating safeguards against injury, damage, or loss from such failure, should be provided by the customer when making application designs.

ESMT's products are not authorized for use in critical applications such as, but not limited to, life support devices or system, where failure or abnormal operation may directly affect human lives or cause physical injury or property damage. If products described here are to be used for such kinds of application, purchaser must do its own quality assurance testing appropriate to such applications.