ELECTRONIC GIANT

EG2131 Chip User Manual

High-power MOS tube, IGBT tube gate driver chip

REV 1.0

Version Change History

Version Numbe	Date Description	
V1.0	EG2131 Datasheet Draft, June 12, 2017	

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EG2131 Chip Datasheet V1.0

1. Features

ÿ High-end floating bootstrap power supply design, with a withstand voltage of up to 300V

ÿ Adapt to 5V, 3.3V input voltage

ÿ Maximum frequency supported: 500KHZ

ÿ Low-side VCC undervoltage shutdown output

ÿ Output current capability IO+/- 1A/1.5A

ÿ Built-in dead zone control circuit

ÿ With built-in locking function, it completely prevents the upper and lower tube outputs from being turned on at the same time

ÿ HIN input channel high level is valid, controls high-end HO output

LIN input channel low level is valid, controls the low-end LO output

ÿ Few peripheral devices

ÿ Quiescent current is less than 5uA, very suitable for battery applications

ÿ Package type: SOP-8

2. Description

EG2131 is a cost-effective high-power MOS tube, IGBT tube gate drive dedicated chip, which integrates logic signal input processing circuit circuit, dead zone control circuit, undervoltage shutdown circuit, locking circuit, level shift circuit, pulse filter circuit and output drive circuit, dedicated to Drive circuit in a brushless motor controller.

The high-end operating voltage of EG2131 can reach 300V, the low-end Vcc power supply voltage range is wide from 11V to 20V, and the static power consumption is less than 5uA. It has a locking function to prevent the output power tubes from being turned on at the same time. The input channel HIN has a built-in 200K pull-down resistor, and LIN has a built-in pull-up 5V High potential, when the input is floating, the upper and lower power MOS tubes are in the off state, the output current capacity IO+/- 1/1.5A, and it uses SOP8 package.

3. Application areas

ÿ Mobile power high-voltage fast-charging switching power supply ÿ Variable frequency water pump controller ÿ 300V step-down switching power supply

ÿ Electric vehicle controller ÿ Brushless motor driver ÿ High voltage Class-D amplifier

4. Pins

4.1 Pin Definition

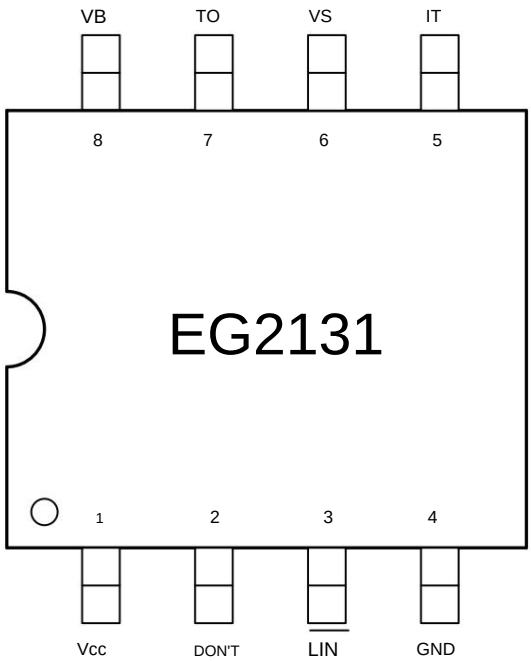


Figure 4-1. EG2131 pin definition

4.2 Pin Description

Pin No.	Pin Name	I/O	describe
1	Vcc	Power	Chip working power input terminal, voltage range 11V-20V, externally connected to a high frequency 0.1uF bypass Capacitors can reduce high-frequency noise at the chip input
2	DON'T	I	The logic input control signal is valid at high level, controlling the on and off of the high-end power MOS tube. "0" turns off the power MOS tube "1" turns on the power MOS tube
3	LIN	I	The logic input control signal is valid at low level, controlling the conduction and cutoff of the low-end power MOS tube. "1" turns off the power MOS tube "0" turns on the power MOS tube
4	GND	GND	The ground terminal of the chip.
5	IT	O	Output controls the conduction and cutoff of the low-end MOS power tube
6	VS	O	High-end floating ground terminal
7	TO	O	Output controls the on and off of the high-side MOS power tube
8	VB	Power	High-end Suspension Power Supply

5.Structural block diagram

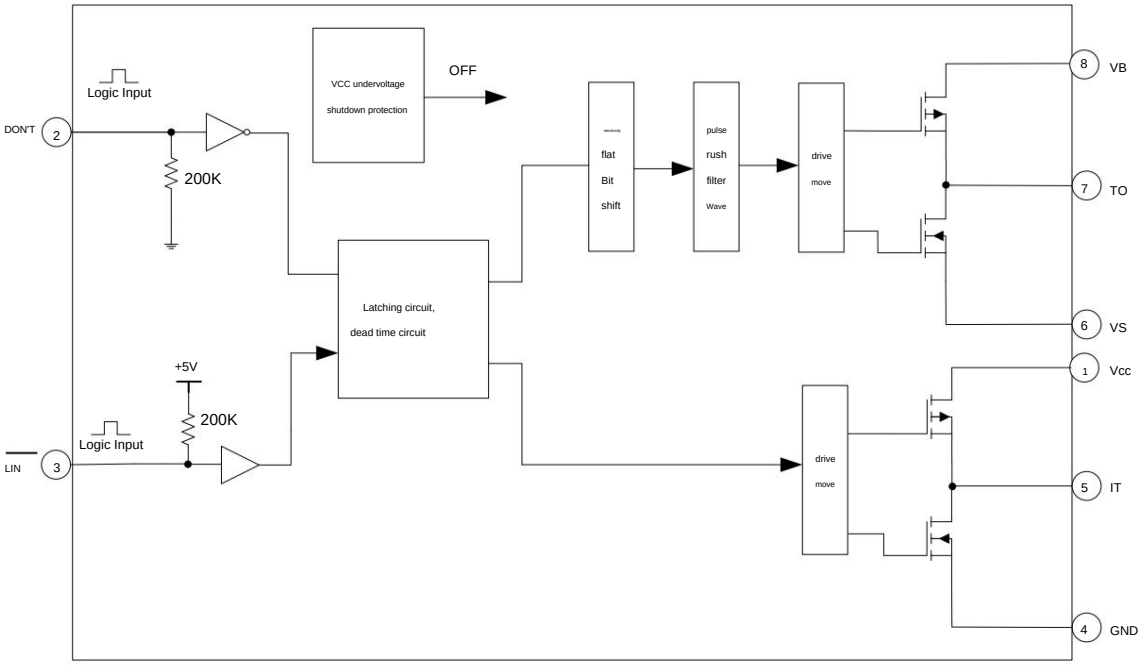


Figure 5-1. EG2131 internal circuit diagram

6. Typical application circuit

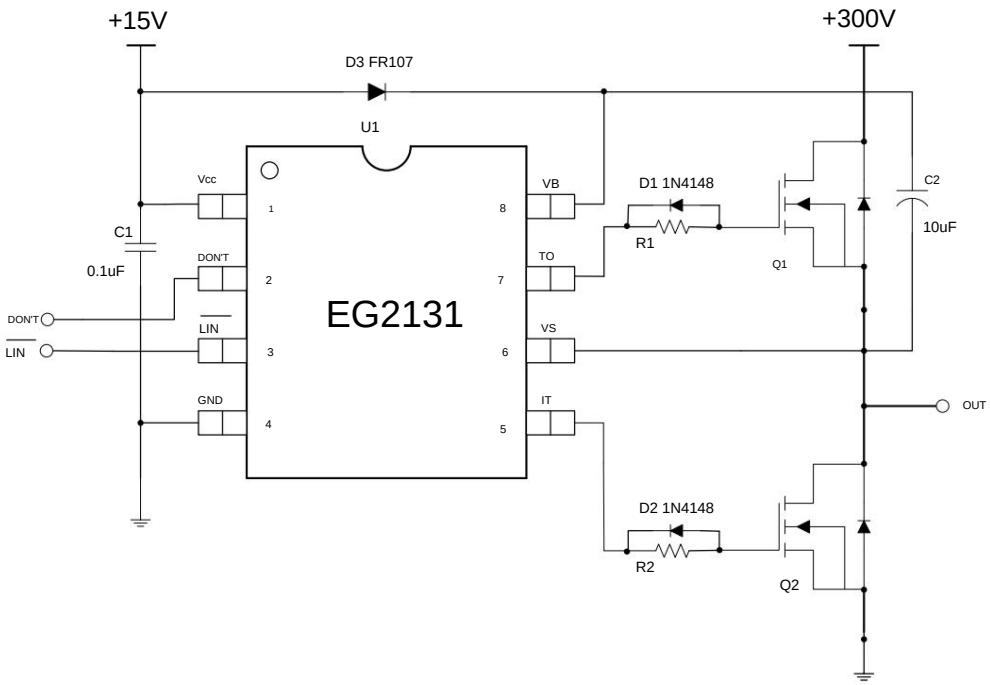


Figure 6-1. EG2131 Typical Application Circuit

7. Electrical characteristics

7.1 Limit parameters

Unless otherwise specified, at TA=25ÿ

Symbol Parameter Name Bootstrap High-End VB Power Supply		Test conditions Min.	Max.	Units	
VB			-0.3	300	In
VS	High-end suspended ground terminal		VB-25	VB+0.3	In
TO	High-end output		VS-0.3	VB+0.3	In
IT	Low-end output		-0.3	VCC+0.3	In
VCC	power supply		-0.3	25	In
HIN	High channel logic signal input level		-0.3	VCC+0.3	In
LIN	Low channel logic signal input level		-0.3	6	In
FACING	Ambient temperature		-45	125	ÿ
Tstr	Storage temperature		-55	150	ÿ
TL	Soldering temperature	T=10S		300	ÿ

Note: Exceeding the listed extreme parameters may cause permanent damage to the chip. Long-term operation under extreme conditions will affect the reliability of the chip.

7.2 Typical Parameters

Unless otherwise specified, at TA=25ÿ, Vcc=15V, load capacitance CL=10nF

Parameter Name	symbol	Test Conditions	Min.	Typ.	Max.	Unit
Power	Vcc		11	15	20	In
Quiescent current	Icc	input is floating, Vcc=12V	-		30	uA
Input logic signal high potential	Vin (H)	All input control signals	2.5			In
Input logic signal low potential	Vin (L)	All input control signals	-0.3		0	1.0 In
Input logic signal high level current	Iin(H)	Vin=5V			20	uA
Input logic signal low level current	Iin(L)	Vin=0V	-20			a
VCC power supply undervoltage shutdown feature						
Vcc turn-on voltage	Vcc(on)		9.6	10.3	11	In
Vcc shutdown voltage	Vccÿoffÿ		8.6	9.3	10	In
Low-side output LO switching time characteristics						
On Delay	Ton	See Figure 7-1		410	500	nS
Off Delay	Toff	See Figure 7-1		150	300	nS
Rise time	Tr	See Figure 7-1		180	300	nS
Fall time	Tf	See Figure 7-1		70	150	nS
High-side output HO switching time characteristics						
On Delay	Ton	See Figure 7-2		400	500	nS
Off Delay	Toff	See Figure 7-2		150	400	nS
Rise time	Tr	See Figure 7-2		180	300	nS
Fall time	Tf	See Figure 7-2		70	150	nS
Dead time characteristics						
Dead time	DT	See Figure 7-3. No load capacitance CL=0	150	250	350	nS
IO output maximum driving capability						
IO output source current	IO+	Vo=0V,Vin=VIH PWÿ10uS	0.7	1		A
IO output sink current	IO-	Vo=12V,VIN=VIL PWÿ10uS	1	1.5		A

7.3 Switching Time Characteristics and Dead Time Waveform

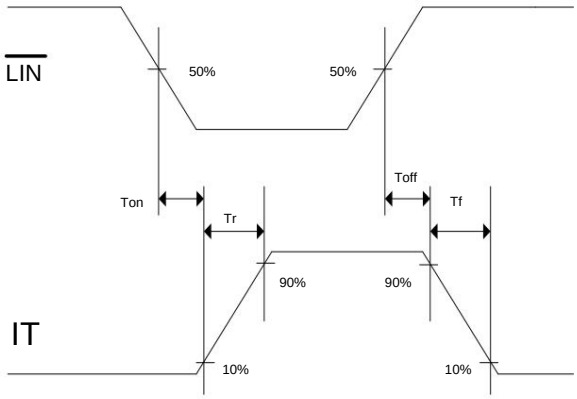
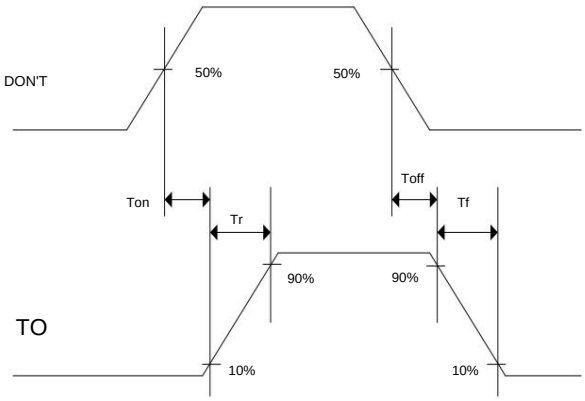


Figure 7-1. Low-side output LO switching time waveform



7-2. High-side output HO switching time waveform

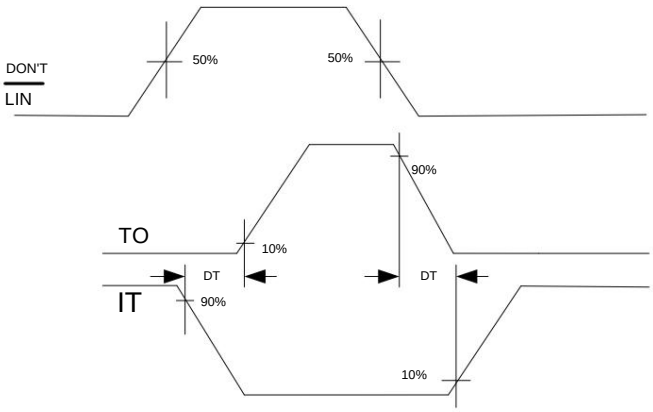


Figure 7-3. Dead time waveform

8. Application Design

8.1 Vcc terminal power supply voltage

Considering that there is enough driving voltage to drive the N-channel power MOS tube, the recommended power supply Vcc working voltage is typically 11V-20V; EG2131

The chip ground shares the same ground as the MCU ground.

8.2 Input Logic Signal Requirements and Output Driver Characteristics

The main functions of EG2131 include logic signal input processing, dead time control, level conversion function, floating bootstrap power supply structure and upper and lower bridges.

Totem pole output. The high level threshold of the logic signal input terminal is above 2.5V and the low level threshold is below 1.0V. The output of the logic signal is required to be

The current is small, so the MCU output logic signal can be directly connected to the input channel of EG2131.

The maximum input current of the high-side upper bridge arm and low-side lower bridge arm output drivers can reach 1.5A and the maximum output current can reach 1A.

It can withstand a voltage of 300V, and the conduction delay between the input logic signal and the output control signal is small. The low-end output turn-on conduction delay is 410nS.

The turn-off conduction delay is 140nS, the high-side output turn-on conduction delay is 400nS, and the turn-off conduction delay is 150nS.

The rise time of high-side output on is 180nS, and the fall time of off is 100nS. The rise time of high-side output on is 180nS, and the fall time of off is 100nS.

The logic function diagram of input and output signals is shown in Figure 8-1:

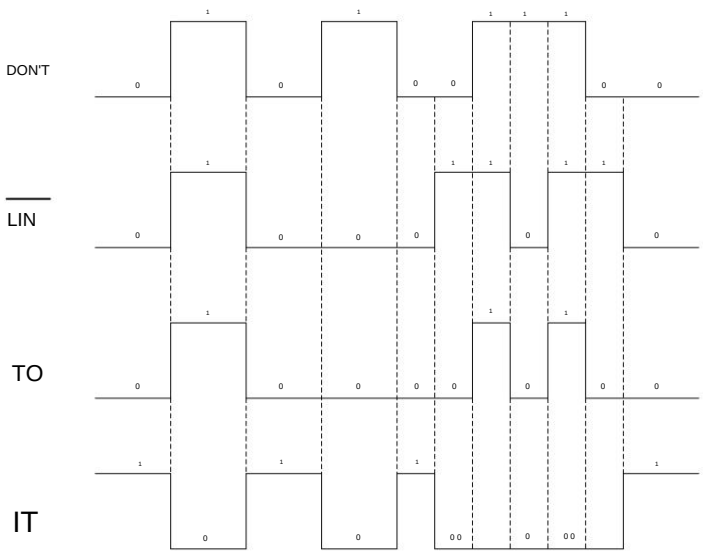


Figure 8-1. Input and output signal logic function diagram

Input signal and output signal logic truth table:

enter		Output	
Input and output logic			
HIN (pin 4)	LINÿÿÿÿÿÿÿCategory3 ÿ HOÿCategory7ÿ		LO (Pin 5)
0	**0**	0	**1**
0	1	0	0
1	0	0	0
1	**1**	**1**	0

From the truth table, we can see that when the input logic signals HIN and LINÿÿÿÿÿÿÿ are both “0” and “1” at different times, the driver control output

When HO and LO are both “0”, the upper and lower power tubes are turned off at the same time; when the input logic signals HIN and LINÿÿÿÿÿÿÿ are both “0”, the driver controls the output HO

When LO is “0”, the upper tube is turned off, and when LO is “1”, the lower tube is turned on. When the input logic signals HIN and LINÿÿÿÿÿÿÿ are both “1”, the driver control output HO is

"1" turns on the upper tube, LO is "0" turns off the lower tube; the internal logic processor prevents the upper and lower power tubes of the controller from being turned on at the same time, and has mutual

Locking function.

8.3 Bootstrap Circuit

EG2131 adopts bootstrap suspension drive power supply structure, which greatly simplifies the drive power supply design. Only one power supply voltage VCC is needed to complete the high-end

The EG2131 can drive two power switching devices, N-channel MOS tube and low-end N-channel MOS tube, which brings great convenience to practical applications.

Use an external bootstrap diode as shown in Figure 8-2 and a bootstrap capacitor to automatically complete the bootstrap boost function. Assume that during the period when the lower tube is turned on and the upper tube is turned off

The bootstrap capacitor C has been charged to a sufficient voltage (Vc=VCC). When HO outputs a high level, the upper tube is turned on and the lower tube is turned off. The voltage on the bootstrap capacitor VC is

The voltage is equivalent to a voltage source as the power supply of the internal drivers VB and VS, completing the driving of the high-end N-channel MOS tube.

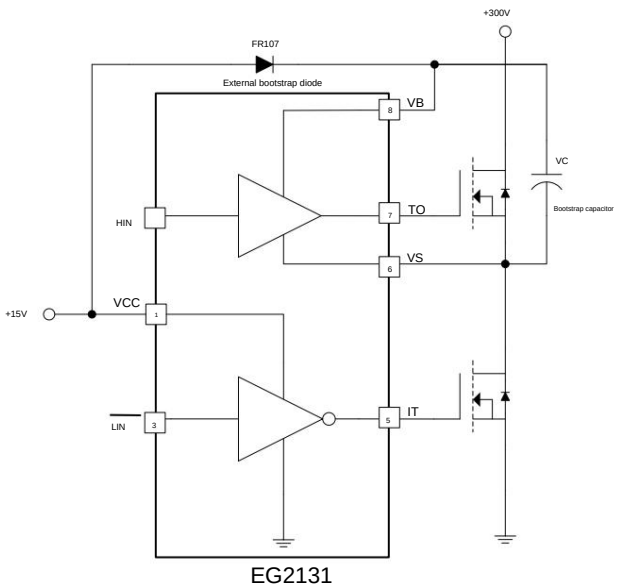


Figure 8-2. EG2131 bootstrap circuit structure

9. Package size

9.1 SO8 Package Dimensions