ELECTRONIC CIRCUIT

EG2181 Datasheet

High-power MOS transistor, IGBT transistor gate driver chip

 REV 1.0

Version Change record

Version №	Date	Description
V1.0	October 25, 2016	First draft of the EG2181 Datasheet

Contents

EG2181 Datasheet V1.0

1. Features

- High-end suspension bootstrap power supply design, with stand voltage up to 600V
- Adapts to 5V, 3.3 V input voltages
- Maximum frequency support 500KHZ
- Low-side VCC voltage range 3.5 V-20V
- Output current capability IO+/- 2A/2.5 A
- Built-in dead zone control circuit
- Comes with locking function, completely eliminate the upper and lower tube output is turned on at the same time
- HIN input channel active high to control high-side HO output
- LIN input channel is active high to control the low-side LO output
- Fewer peripheral devices
- Quiescent current less than 5ua, ideal for battery applications
- Package form:SOP-8

2. Description

EG2181 is a cost-effective high-power MOS transistor, IGBT transistor Gate Drive dedicated chip, integrated logic signal input processing circuit,dead zone control circuit,latch circuit,level displacement circuit, pulse filter circuit and output drive circuit, dedicated to brushless motor controller drive circuit.

EG2181 high-side operating voltage up to 600V, low-side Vcc supply voltage range is wide 3.5 V ~ 20V, static power consumption is less than 5uA.The chip has a latching function to prevent the output power tube is turned on at the same time,the input channel HIN and LIN built - in a 200k pull-down resistor, when the input floating so that the upper and lower power MOS tube is turned off, the output current capability IO+/ - 2/2.5 A, using SOP8 package.

3. Application Areas

- Mobile power supply high voltage fast charge switching power supply
- Variable frequency pump controller
- 600V step-down switching power supply
- Electric vehicle controller
- Brushless motor driver
- High voltage Class-D power amplifier

4. Pin

4.1. Pin definition

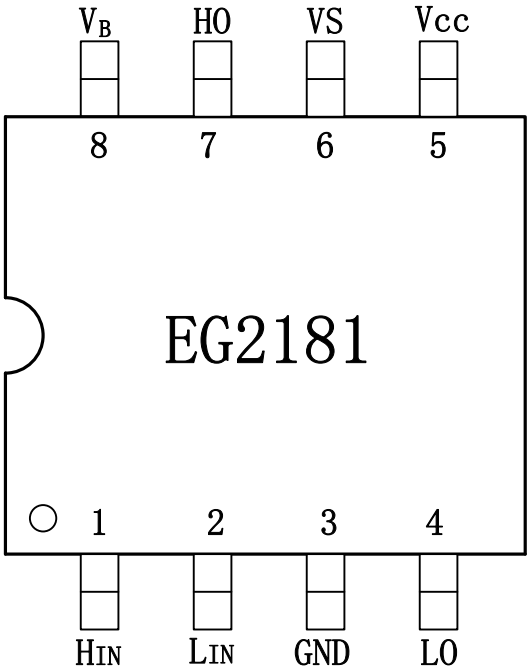

Figure 4-1. EG2181 pin definition

4.2. Pin description

Pin serial №	Pin name	I/O	Description
1	HIN	I	Logic input control signal active high, control the high-side power MOS transistor is turned on and off "0" is the off power MOS transistor "1" is the open power MOS transistor
2	LIN	I	Logic input control signal active high, control the low-side power MOS transistor is turned on and off "0" is the off power MOS transistor "1" is the open power MOS transistor
3	GND	GND	The ground end of the chip.
4	LO	O	The output controls the conduction and shutdown of the low-side MOS transistor
5	Vcc	Power	Chip power input, voltage range 2.8 V-20V,an external high-frequency 0.1 uF bypass capacitor can reduce the high-frequency noise at the input of the chip
6	VS	O	High-end suspended Ground end
7	HO	O	The output controls the on and off of the high-side MOS Power tube
8	VB	Power	High-end suspended power supply

5. Block diagram

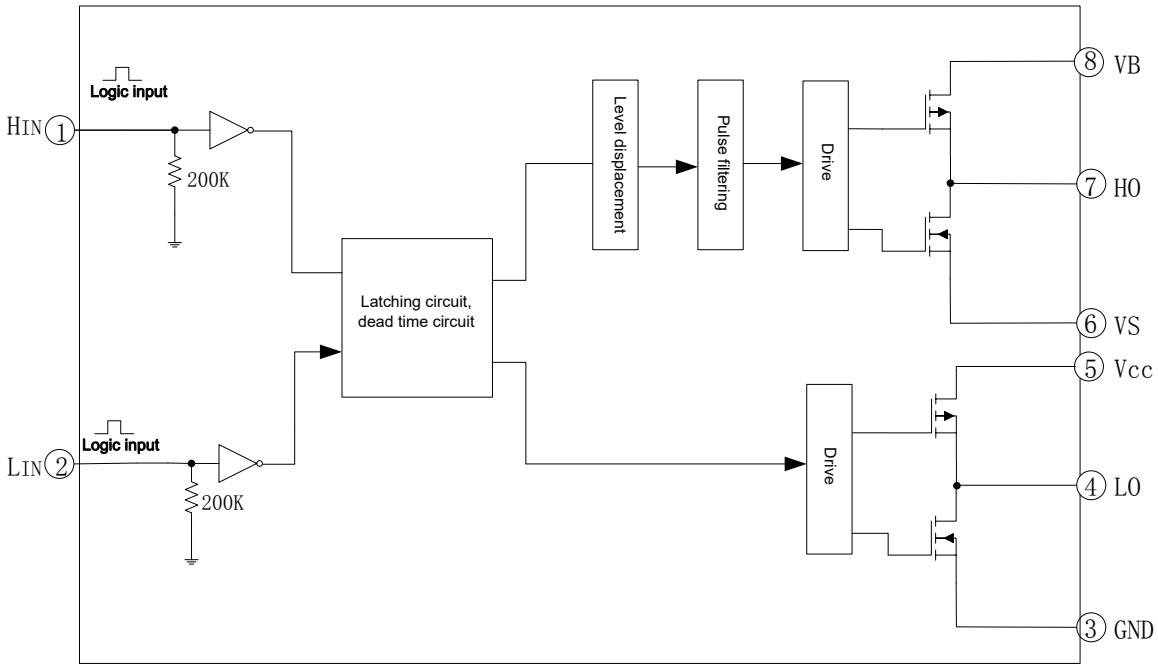

Figure 5-1. EG2181 block diagram

6. Typical application circuit

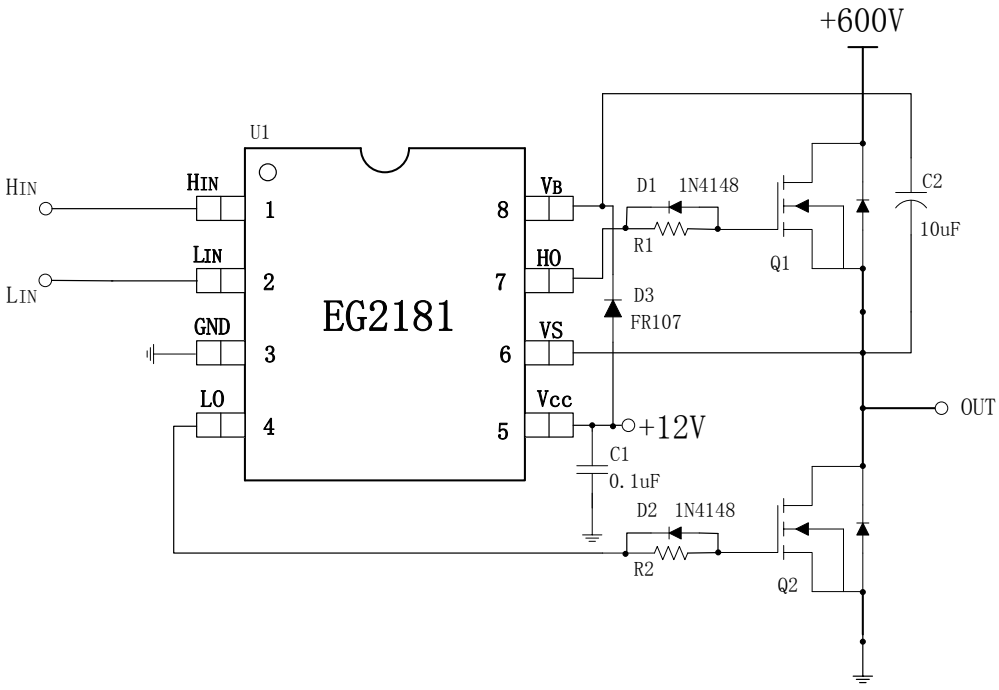

Figure 6-1. EG2181 typical application circuit diagram

7. Electrical characteristics

7.1 Limit parameters

Without further explanation, at TA=25℃ conditions

Symbols	Parameter name	Test conditions	Min.	Max.	Units
VB	High side floating absolute voltage	–	−0.3	600	V
VS	High side floating supply offset voltage	–	VB−20	VB+0.3	V
HO	High side floating supply offset voltage	–	VS−0.3	VB+0.3	V
LO	Low side output voltage	–	−0.3	VCC+0.3	V
VCC	Low side and logic fixed supply voltage	–	−0.3	20	V
HIN	Logic input voltage (HIN)	–	−0.3	VCC+0.3	V
LIN	Logic input voltage (LIN)	–	−0.3	VCC+0.3	V
TA	Ambient temperature	–	-45	125	℃
Tstr	Storage temperature	–	-55	150	℃
TL	Soldering temperature	T=10S	-	300	℃

Note: exceeding the listed limit parameters may cause permanent damage to the chip, operating in extreme conditions for a long time will affect the reliability of the chip.

7.2 Typical parameters

Without further explanation, at TA=25℃, VCC=12V, load capacitance CL=10NF conditions

Parameter name	Symbols	Test conditions	Min.	Typical	Max.	Units
Power supply	Vcc	-	3.5	12	20	V
Quiescent current	Icc	Input floating,VCC=12V	-	-	5	uA
Input logic signal high potential	Vin(H)	All input control signals	2.5	-	-	V
Input logic signal low potential	Vin(L)	All input control signals	-0.3	0	1.0	V
Current at the high level of the input logic signal	Iin(H)	Vin=5V	-	-	20	uA
Input logic signal low current	Iin(L)	Vin=0V	-20	-	-	uA
Low-side output LO switching time characteristics						
On delay	Ton	See Figure 7-1	-	280	400	ns
Off delay	Toff	See Figure 7-1	-	125	300	ns
Rise Time	Tr	See Figure 7-1	-	120	200	ns
Descent time	Tf	See Figure 7-1	-	80	100	ns
High-side output HO switching time characteristics						
On delay	Ton	See Figure 7-2	-	250	400	ns
Off delay	Toff	See Figure 7-2	-	180	400	ns
Rise Time	Tr	See Figure 7-2	-	120	200	ns
Descent time	Tf	See Figure 7-2	-	80	100	ns
Dead time characteristics						
Dead time	DT	See Figure 7-3, No load capacitance CL=0	50	100	300	ns
IO output maximum drive capability						
IO output pull current	IO+	Vo=0V,VIN=VIH PW≤10uS	1.8	2	-	A
IO output sink current	IO-	Vo=12V,VIN=VIL PW≤10uS	2	2.5	-	A

7.3 Switching time characteristics and dead time waveform diagram

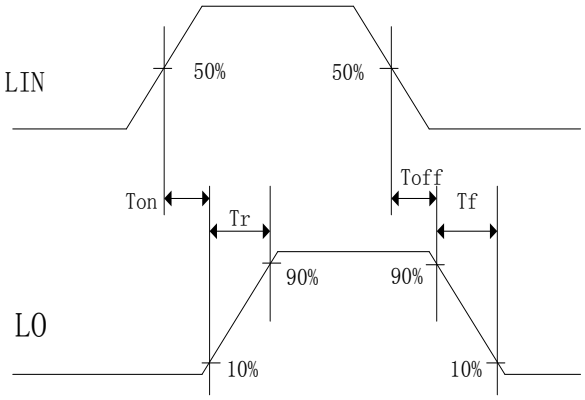

Figure 7-1. Low-side output LO switching time waveform diagram

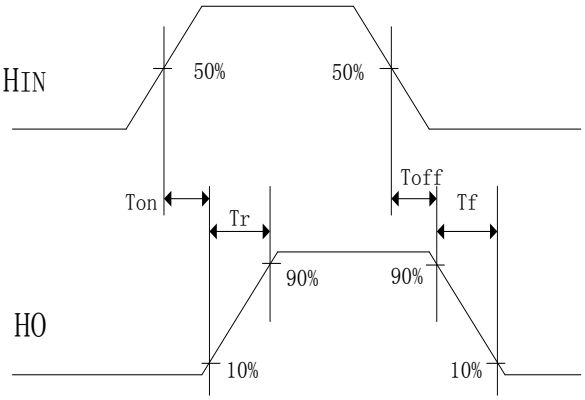

Figure 7-2. High-side output HO switching time waveform diagram

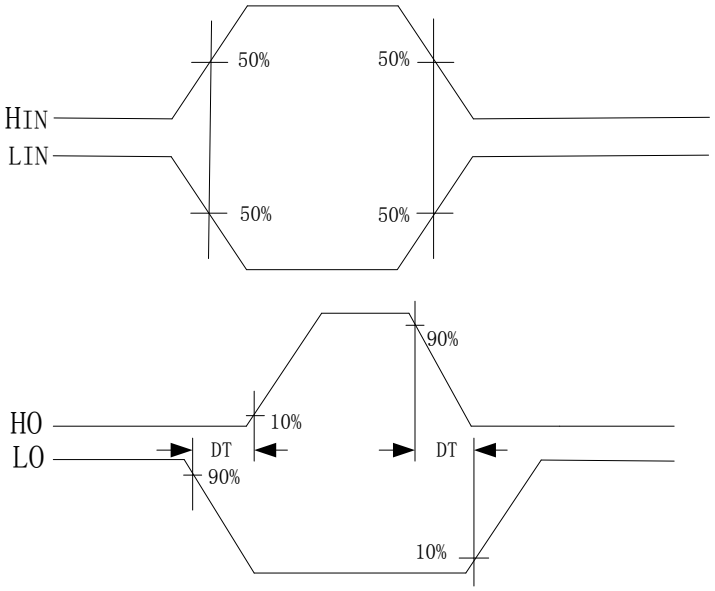

Figure 7-3. Dead time waveform diagram

8. Application design

8. 1 VCC terminal supply voltage

For different MOS transistor, select a different driving voltage,high voltage to open the MOS transistor recommended power supply VCC operating voltage is typically 10V-15V; low voltage to open the MoS transistor recommended power supply VCC operating voltage 3.5 V-10V.

8. 2 Input logic signal requirements and output driver characteristics

The main functions of the EG2181 are logic signal input processing,dead time control, level shifting, floating bootstrap power structure and upper and Lower Bridge totem pole output.Logic signal input high threshold of 2.5 V or more, low threshold of 1.0 V or less, the requirements of the output current of the logic signal is small,you can make the MCU output logic signal is directly connected to the EG2181 input channel.

Up to 1.5 A and the maximum output current up to 1A, the high-end arm channel can withstand a voltage of 600V, the input logic signal and the output control signal between the conduction delay is small,the low-end output opening conduction delay of 280ns, turn-off conduction delay of 125ns, high-end output opening conduction delay of 250ns, turn-off conduction delay of 180ns.The rise time of the low-side output is turned on is 110ns, the fall time of the shutdown is 50nS, the rise time of the high-side output is turned on is 110ns, the fall time of the shutdown is 50ns.

Input signal and output signal logic function diagram shown in Figure 8-2：

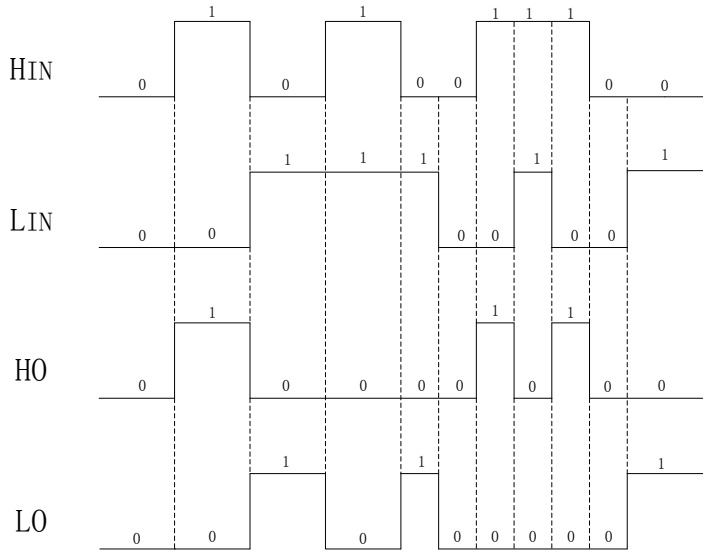

Figure 8-2. Input signal and output signal logic function diagram

Logic truth table for input and output signals：

Input		Output	
Input and output logic			
HIN (pin 4)	LIN (pin 3)	HO (Pin 7)	LO (pin 5)
0	**0**	0	**0**
0	1	0	1
1	0	1	0
1	**1**	**0**	0

From the truth table, when the input logic signal HIN is “1” and LIN is “0”, the driver control output HO is “1” on the tube is turned on, when the input logic signal HIN is“0” and LIN is “1”, the drive control output HO is “0” on the tube is turned off, LO is “1” under the tube is opened; in the input logic signal HIN and LIN at the same time as “0” or at the same time as “1”, the drive control output HO, LO is “0” on the lower power tube

8.3 Bootstrap circuit

EG2181 bootstrap suspension drive power supply structure greatly simplifies the drive power supply design, only one way to complete the power supply voltage VCC high-end N-channel MoS transistor and low-end N-channel MOS transistor driving two power switching devices, to the practical application of great convenience.EG2181 can use an external bootstrap diode as shown in figure 8-3 and a bootstrap capacitor to automatically complete the bootstrap boost function, assuming that the lower tube is turned on, the upper tube is turned off during the C bootstrap capacitor has been charged to a sufficient voltage (Vc=VCC), when the HO output is high on the tube is turned on, the lower tube is turned off, the voltage on the VC bootstrap Capacitor will be equivalent to a voltage source as the internal driver VB and VS, complete the high-end N-channel MOS transistor.

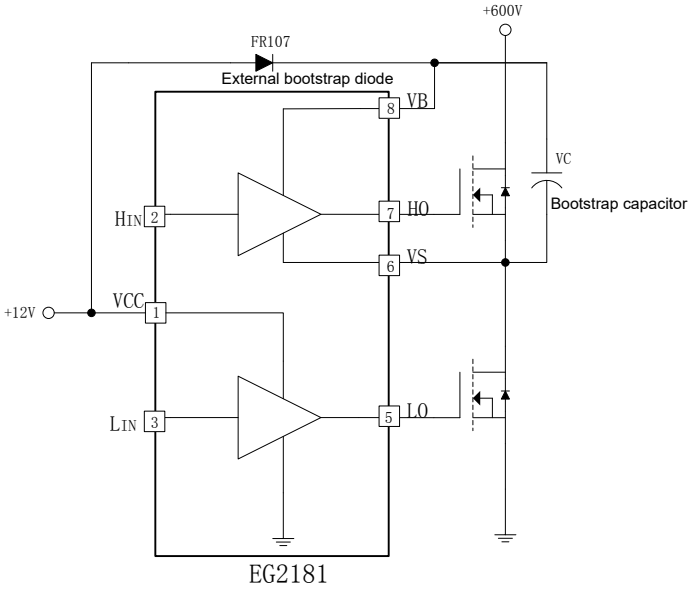

Figure 8-3. EG2181 bootstrap circuit structure

9. Package size

9.1 SO8 package size