EG2104 Datasheet

MOS driver chip with
SD function

 REV 1.0

Version Change record

Version number	Date	Description
V1.0	November 21, 2017	First draft of the EG2104 DataSheet

Contents

EG2104 Datasheet V1.0

1. Features

- High-end suspension bootstrap power supply design, withstand voltage up to 600V
- Adapts to 5V, 3.3 V input voltages
- Maximum frequency support 500KHZ
- Low-side VCC voltage range 2.8V-20V
- Output current capability IO+/- 1A/1.5A
- Built-in dead zone control circuit
- SDinput channel active low, turn off HO,LO outputs
- Less peripheral devices
- Quiescent current less than 1uA, ideal for battery applications
- Package form:SOP-8

2. Description

The EG2104 is a cost-effective MOS transistor with SD function, IGBT transistor Gate Drive dedicated chip. Internal integration of logic signal input processing circuit,dead zone control circuit,level shift circuit,pulse filter circuit and output drive circuit.Dedicated to brushless motor controller,power supply DC-DC drive circuit.

EG2104 high-side operating voltage up to 600V, low-side Vcc supply voltage range is wide 2.8 V ~ 20V, static power consumption is less than 1uA.The chip input channel in built - in a 200k pull-down resistor,SD built-in a 200k pull-down resistor, when the input floating so that the upper and lower power MOS transistor is turned off, the output current capability IO+/ - 1/1.5 A, using SOP8 package.

3. Application Areas

- Mobile power supply high voltage fast charge switching power supply
- Variable frequency pump controller
- DC-DC power supply
- Wireless charging driver
- Brushless motor driver
- High voltage Class-D power amplifier

4. Pin

4.1 Pin definition

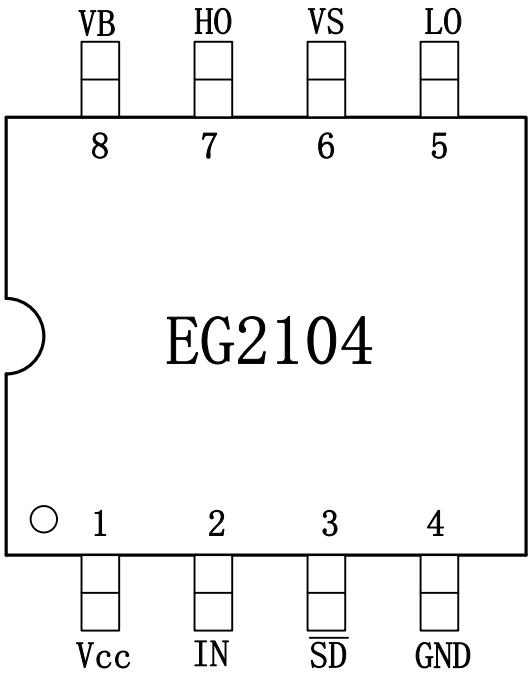

Figure 4-1. EG2104 pin definition

4.2 Pin description

Pin serial №	Pin name	I/O	Description
1	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.
2	IN	I	Logic input control signal to control the output MOS transistor is turned on and off. "0" corresponds to LO High,HO low. "1" corresponds to HO high,LO low.
3	$\overline{SD}$	I	Logic input control signal is active low, forcing the LO,HO output low. "1 " allows LO and HO to be controlled with the IN input. "0" forces the LO and HO outputs low.
4	GND	GND	The ground end of the chip.
5	LO	O	The output controls the turn-on and turn-off of the low-side MOS transistor.
6	VS	O	High-end suspended Ground end.
7	HO	O	The output controls the on and off of the high-side MOS transistor.
8	VB	Power	High-end suspension power supply.

5. Block diagram

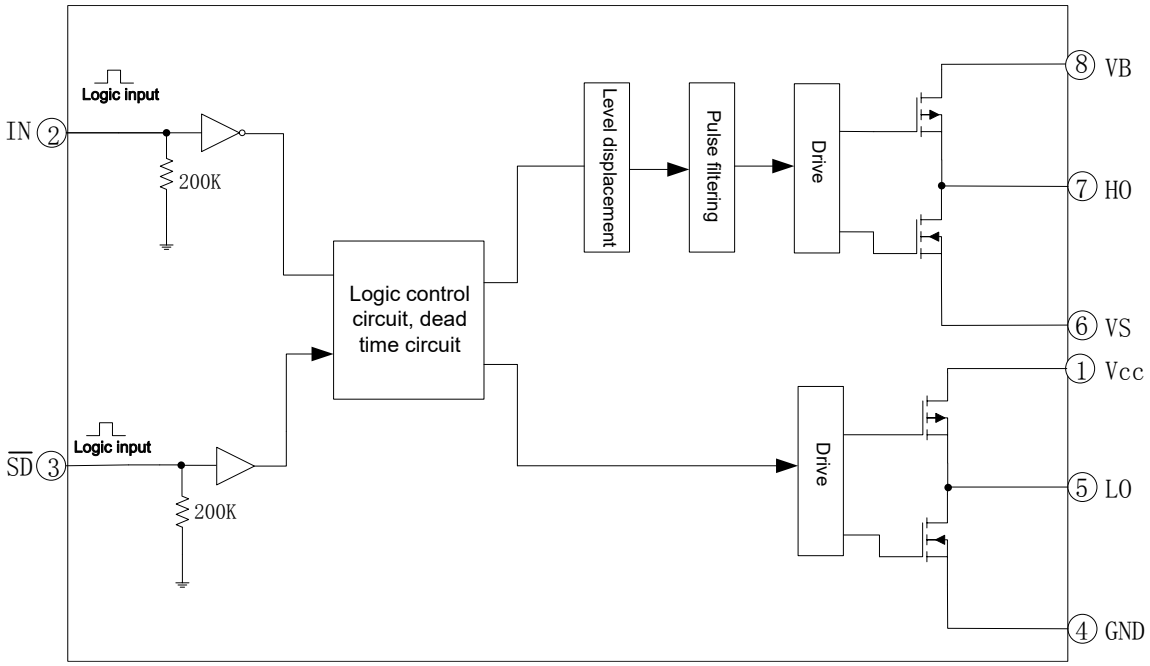

Figure 5-1. EG2104 internal circuit diagram

6. Typical application circuit

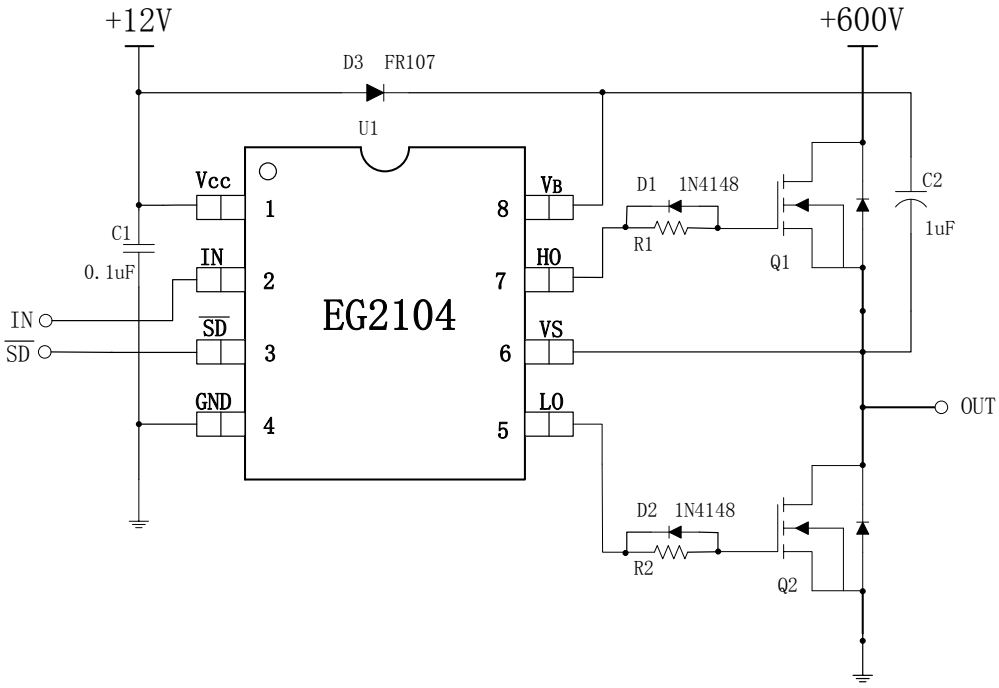

Figure 6-1. EG2104 typical application circuit diagram

7. Electrical characteristics

7.1 Limit parameters

No additional instructions, in T_A=25℃ under conditions

Symbols	Parameter name	Test conditions	Min.	Max.	Units
High side floating absolute voltage	VB	-	-0.3	600	V
High side floating supply offset voltage	VS	-	VB-20	VB+0.3	V
High side floating supply offset voltage	HO	-	VS-0.3	VB+0.3	V
Low side output voltage	LO	-	-0.3	VCC+0.3	V
Low side and logic fixed supply voltage	VCC	-	-0.3	20	V
Logic input voltage (HIN & LIN)	IN	-	-0.3	VCC+0.3	V
Low channel logic signal input level	$\overline{SD}$	-	-0.3	6	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

No additional instructions,in T_A=25℃，Vcc=12V，Load capacitance C_L=10nF condition

Parameter name	Symbols	Test conditions	Min.	Typical	Max.	Units
Power supply	Vcc	-	2.8	12	20	V
Quiescent current	Icc	Input dangling, Vcc=12V	-	-	1	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	-	-	30	uA
Input logic signal low current	Iin(L)	Vin=0V	-10	-	-	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	0.8	1	-	A
IO output sink current	IO-	Vo=12V,VIN=VIL PW≤10uS	1.2	1.5	-	A

7.3 Switching time characteristics and dead time waveform diagram

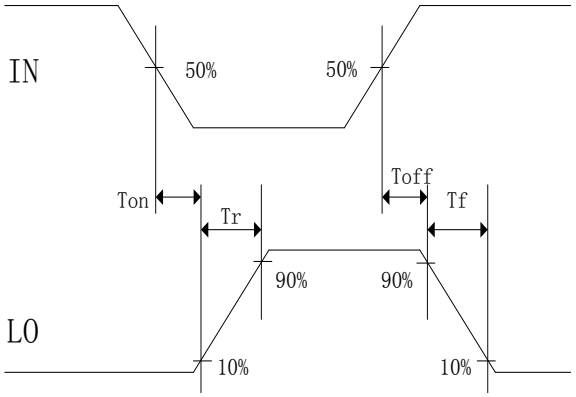

Figure 7-1. Low-side output LO switching time waveform diagram

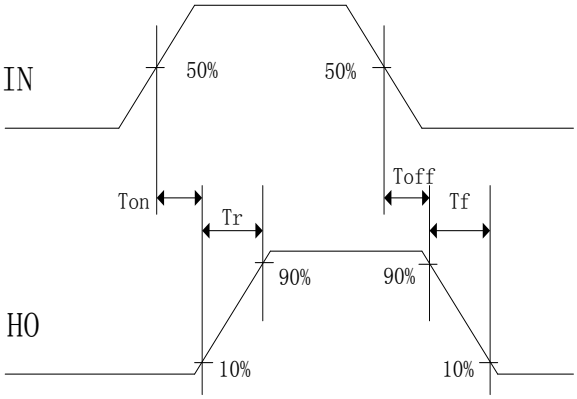

Figure 7-2. High-side output HO switching time waveform diagram

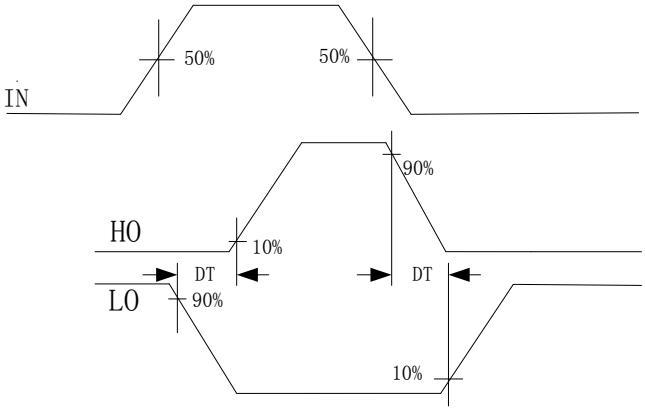

Figure 7-3. Dead time waveform diagram

8. Application design

8.1 Vcc Terminal supply voltage

For different MOS transistors, select a different drive voltage, chip supply voltage range of 2.8 V-20V.

8.2 Input logic signal requirements and output driver characteristics

The main functions of the EG2104 are logic signal input processing,dead time control, level translation function, 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 EG2104 input channel.

High-end upper arm and low-end lower arm output driver maximum poured up to 1.5 A and the maximum output current of up to 1A, high-end upper arm channel can withstand 600V voltage, input logic signal and output control signal conduction delay between the small, 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 low-side output is turned on with a rise time of 110ns and a fall time of 50ns for shutdown, and the high-side output is turned on with a rise time of 110ns and a fall time of 50ns for shutdown.

Input signal and output signal logic function diagram shown in Figure 8-1：

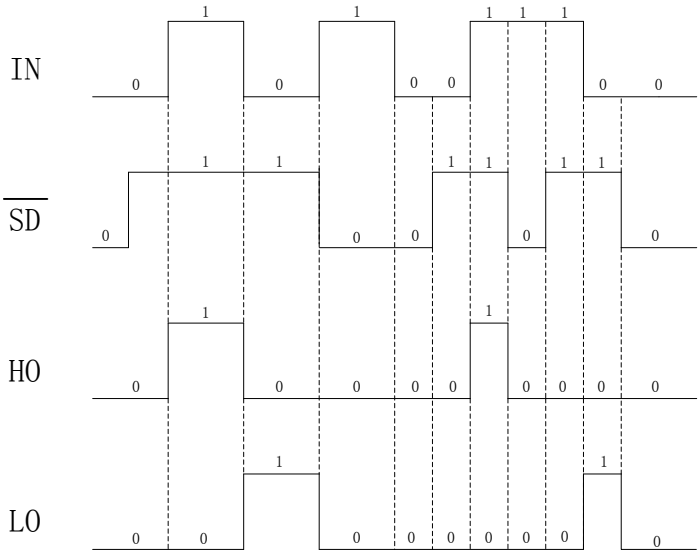

Figure 8-1. Input signal and output signal logic function diagram

Logic truth table for input and output signals：

Input		Output	
Input and output logic			
IN（Pin2）	$\overline{SD}$ (Pin 3）	HO (Pin 7)	LO (Pin 5)
0	0	0	0
1	0	0	0
0	1	0	1
1	1	1	0

From the truth table, when the input logic signal SD is "0“, regardless of IN is”1“or”0“case, the driver control output HO, LO at the same time”0", the upper and lower power tube is turned off at the same time.When the input logic signal SD is“1”, IN is“0”, HO output is“0”, LO output is“1”; when the input logic signal SD is“1”, IN is“1”, HO output is“1”, LO output is“0.”

8.3 Bootstrap circuit

EG2104 using 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.The EG2104 can automatically complete the bootstrap boost function using an external bootstrap diode (figure 8-2) and a bootstrap capacitor.Assuming that the lower tube is opened, the upper tube is turned off during the VC bootstrap capacitor has been charged to a sufficient voltage (Vc=VCC), when the HO output is high on the tube is opened, the lower tube is turned off, the voltage on the VC bootstrap Capacitor will be equivalent to a voltage source as an internal driver VB and VS power supply,

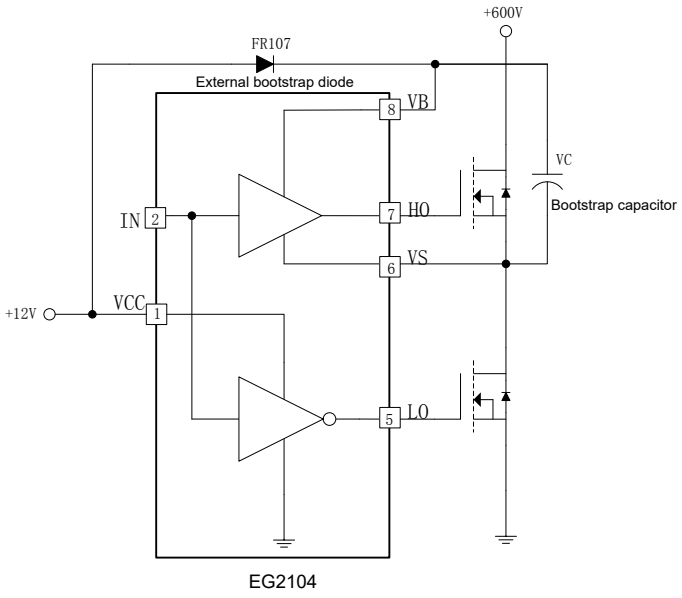

Figure 8-2. EG2104 bootstrap circuit structure

9. Package size

9.1 SO8 Package size