FD2203S

250V Half-bridge Gate Driver

Overview

FD2203S is a Half-bridge Gate Driver designed for driving high-voltage, high-speed N-type power MOSFET, and workable at 250V circuit.

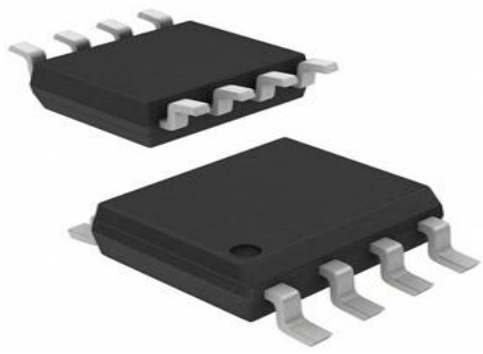
FD2203S has built-in under-voltage (UVLO) protection to prevent the power tube at low voltage to work, and also for improving efficiency.

FD2203S has also built-in input signal filtering to prevent input noise. It can also prevent the short-circuit turning on of MOSFETs, and thus protect effectively the power devices

Features

- Suspension absolute voltage :+250V
- Output current: +1.6A/-2.3A
- Input logic compatible: 3.3V/5V
- VCC/VBS Undervoltage protection (UVLO)
- High side output is in phase with the high side input
- Low side output is out of phase with the low side input
- Cross-conduction prevention
- Built-in 250ns dead time zone
- Channel matching for high and low side

Package



SOIC-8

Application

Motor drive

DC-DC converter

1. Absolute maximum rating (Unless otherwise noted, all pins refer to COM as a reference point)

Parameter		Symbol	Range	Unit
High-side float absolute voltage		V_B	-0.3～275	V
High-side floating offset voltage		V_S	V_B-25～V_B+0.3	V
High-side output voltage		V_{HO}	V_S-0.3～V_B+0.3	V
Low-side supply voltage		V_{CC}	-0.3～25	V
Low side output voltage		V_{LO}	-0.3～V_{CC}+0.3	V
Logic input voltage（HIN, LIN*）		V_{IN}	-0.3～V_{CC}+0.3	V
Offset voltage slew rate range		dV_S/dt	≤50	V/ns
Power dissipation @T_A≤25°C	SOIC-8	P_D	≤0.625	W
Thermal resistance, junction to the ambient	SOIC-8	R_{thJA}	≤200	°C/W
Junction temperature range		T_j	≤150	°C
Storage temperature range		T_{stg}	-55～150	°C

Note:

1：Do not exceed P_D under any circumstances

2: Voltage exceeding absolute maximum ratings may damage the chip.

2. Recommended working conditions (All voltages are referenced to COM)

Parameter	Symbol	Min	Max	Uint
High-side float absolute voltage	V_B	V_S+8	V_S+20	V
High-side floating offset voltage	V_S	-2	250	V
High-side output voltage	V_{HO}	V_S	V_B	V
Low-side supply voltage	V_{CC}	8	20	V
Low side output voltage	V_{LO}	0	V_{CC}	V
Logic input voltage（HIN, LIN*）	V_{IN}	0	V_{CC}	V
Environment temperature	T_A	-40	125	°C

Note:

1. When V_S is (COM-2V) to 250V, HO works normally. When V_S is (COM-2V) to (COM-V_{BS}), the HO logic state is maintained.
2. When V_s is （COM-50V） and transient negative voltage is 50ns, HO can work as usual.
3. The reliability of the chip could be affected if it operates with long-term in the recommended working conditions.

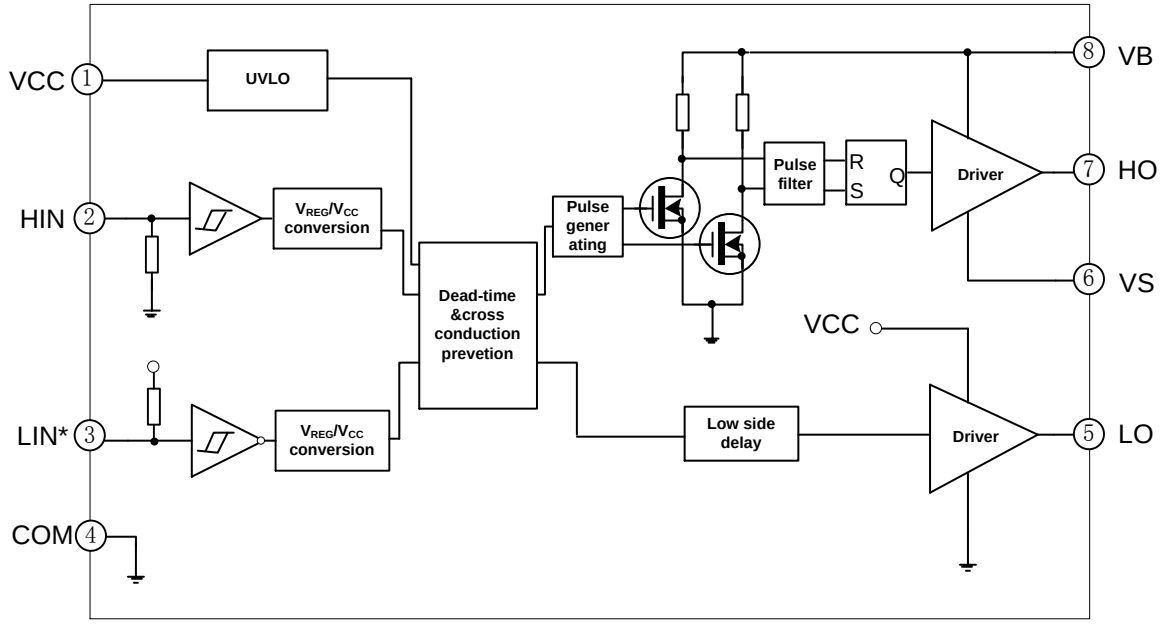
3. Static electrical parameters (T_A =25°C，V_{CC}=V_{BS}=15V，V_S=COM, Unless otherwise specified,)

Parameter	Symbol	Conditions	Min	Typical	Max	Unit
High level threshold input voltage	V_{IH}		2.4	--	--	V
Low level threshold input voltage	V_{IL}		--	--	0.8	V
V_{CC} undervoltage protection trip voltage	V_{CCUV+}		6.3	6.9	7.5	V
V_{CC} undervoltage protection reset voltage	V_{CCUV-}		5.9	6.5	7.1	V
V_{CC} Undervoltage protection hysteresis voltage	V_{CCUVH}		0.2	0.4	--	V
V_{BS} Undervoltage protection trip voltage	V_{BSUV+}		6.3	6.9	7.5	V
V_{BS} Undervoltage protection reset voltage	V_{BSUV-}		5.9	6.5	7.1	V
V_{BS} Undervoltage protection hysteresis voltage	V_{BSUVH}		0.2	0.4	--	V
Leakage current of suspended power supply	I_{LK}	V_B=V_S=250V	--	1.0	10.0	μA
V_{BS} Static current	I_{QBS}	V_{IN}=0V 或 5V	--	140	250	μA
V_{BS} operate current	I_{PBS}	f_{HIN}=20kHz	--	140	250	μA
V_{CC} Static current	I_{QCC}	V_{IN} =0V 或 5V	--	460	700	uA
V_{CC} operate current	I_{PCC}	f_{IN}=20kHz	--	460	700	μA
LIN* High-level input bias current	I_{LIN+}	V_{LIN*}=0V	--	20	40	μA
LIN* Low-level input bias current	I_{LIN-}	V_{LIN*}=5V	--	--	2	μA
HIN High-level input bias current	I_{HIN+}	V_{HIN}=5V	--	20	40	μA
HIN Low-level input bias current	I_{HIN-}	V_{HIN}=0V	--	--	2	μA
High-level output voltage	V_{OH}	I_O=20mA	--	0.09	0.16	V
Low-level output voltage	V_{OL}	I_O=20mA	--	0.03	0.06	V
High-level output short-circuit pulse current	I_{OH}	V_O=0V，PWD≤10μs	1.1	1.6	--	A
Low-level output short-circuit pulse current	I_{OL}	V_O=15V，PWD≤10μs	1.6	2.3	--	A
V_S static negative voltage	V_{SN}		--	-6.0	--	V

4. Transient electrical parameters (T_A =25°C ,V_{CC}=V_{BS}=15V ,C_L=1000pF ,V_S=COM, unless otherwise specified)

Parameter	Symbol	Condition for texting	Min	Typical	Max	Unit
Output rising edge transmission time	t_{on}	C_L=1000pF	--	350	520	ns
Output falling edge transmission time	t_{off}	C_L=1000pF	--	100	150	ns
Output rising time	t_r	C_L=1000pF	--	12	--	ns
Output falling time	t_f	C_L=1000pF	--	8	--	ns
Dead-time	DT		--	250	370	ns
High-low side delay match	MT		--	--	50	ns

5. Circuit diagram



6. Chip pin configuration

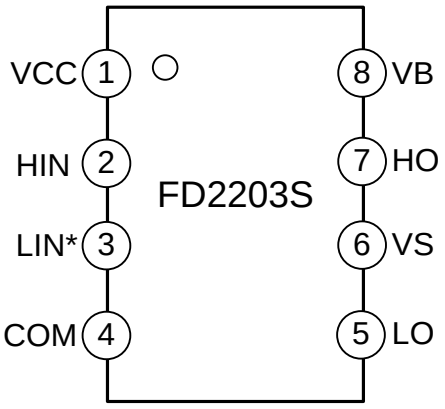
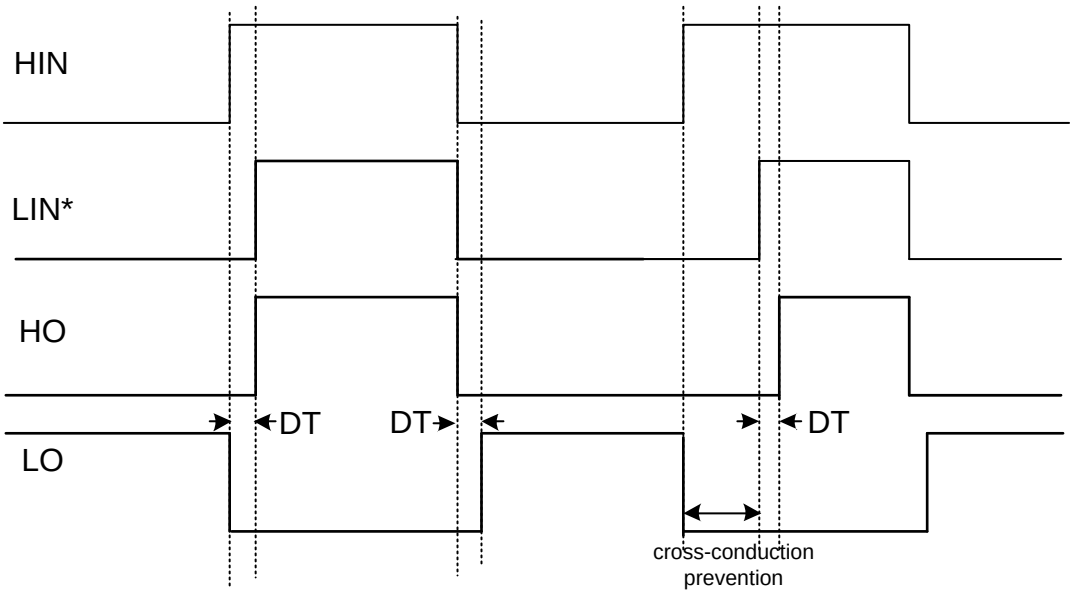


Figure 6-1 Package pin diagram

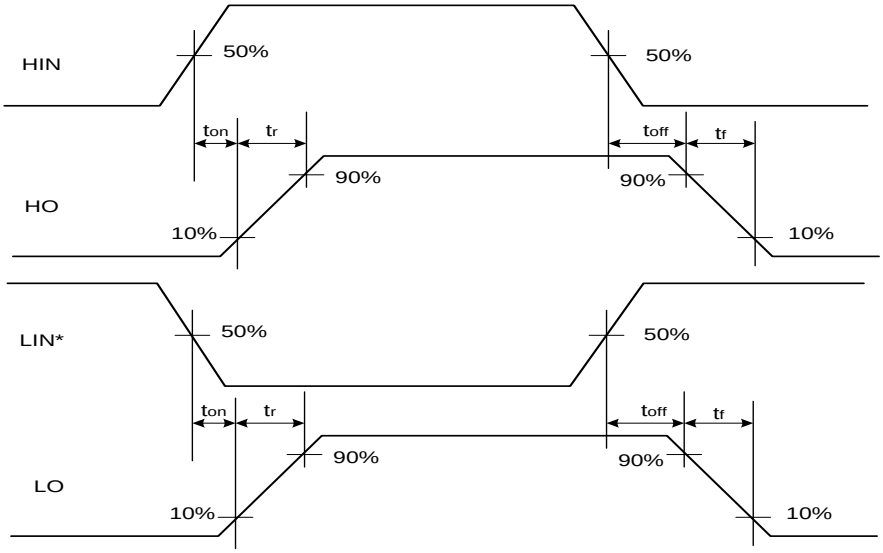
Table 6-1 Package pin

Pin no.	Pin name	Pin description
1	VCC	Low-side supply voltage
2	HIN	High-side input
3	LIN*	Low-side input
4	COM	Ground
5	LO	Low-side output
6	VS	High-side floating offset voltage
7	HO	High-side output
8	VB	High-side float absolute voltage

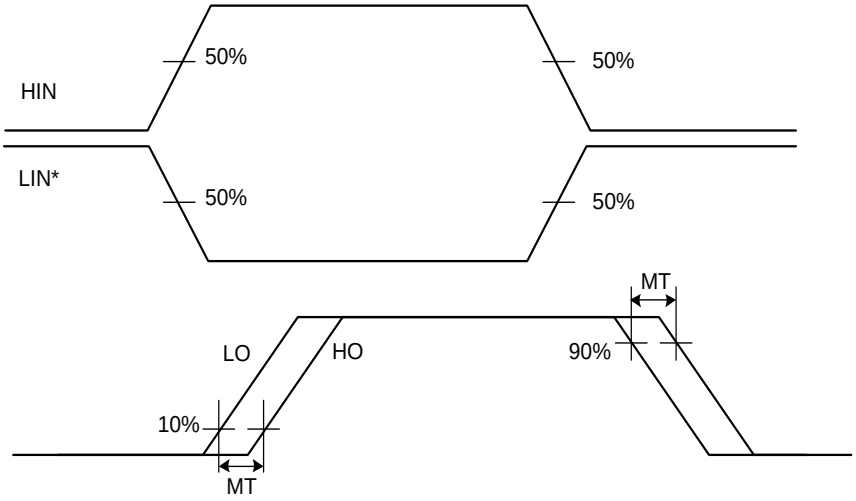
7. Logic timing diagram



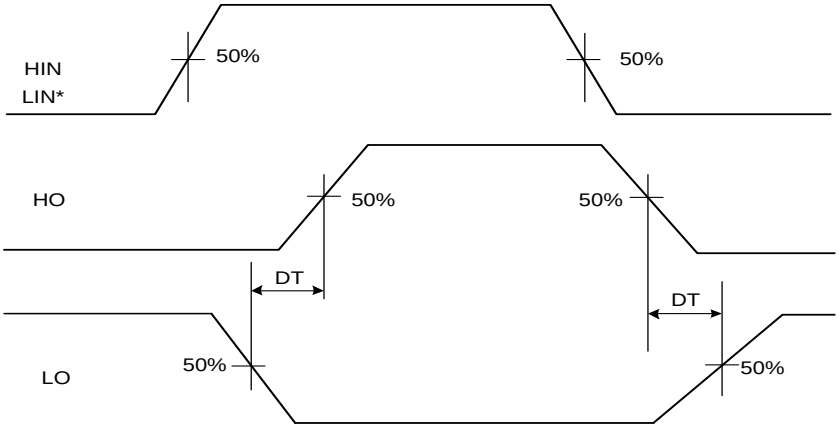
8. Switching time test standards



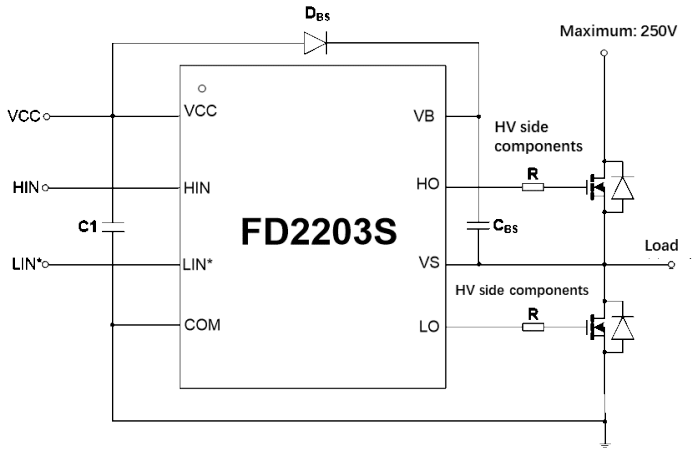
9. Transmission time matching test standards



10. Dead time test standards



11. Typical application circuit



C1： Power filter capacitor, according to the circuit can choose 1 μ F ~ 100 μ F, as close to the chip pin as possible.

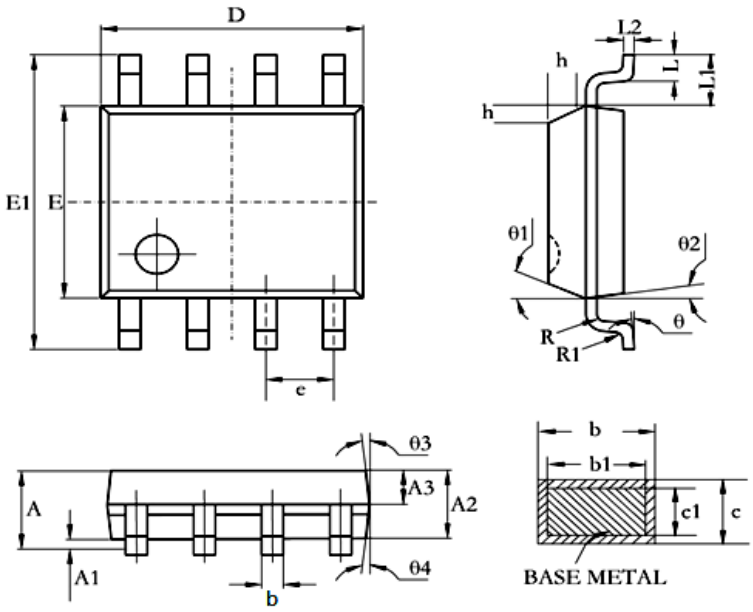
R： Gate drive resistor, and the resistance depends on the device being driven.

Dbs：Bootstrap diodes. It should be selected for high reverse breakdown voltage Schottky diodes.

Cbs：Bootstrap capacitors. Ceramic capacitors or tantalum capacitors should be selected, according to the circuit can choose 1 μ F ~ 50 μ F. The capacitor should be as close as possible to the chip pin.

Note: The above circuits and parameters are for reference only. The actual application circuit should be designed with the measured results in setting the parameters.

12. Package size (SOIC-8)



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	1.36	1.55	1.75	0.053	0.061	0.069
A1	0.10	0.15	0.25	0.004	0.006	0.010
A2	1.25	1.40	1.65	0.049	0.055	0.065
A3	0.50	0.60	0.70	0.020	0.024	0.028
b	0.38	-	0.51	0.015	-	0.020
b1	0.37	0.42	0.47	0.015	0.017	0.019
c	0.17	-	0.25	0.007	-	0.010
c1	0.17	0.20	0.23	0.007	0.008	0.009
D	4.80	4.90	5.00	0.189	0.193	0.197
E1	5.80	6.00	6.20	0.228	0.236	0.244
E	3.80	3.90	4.00	0.150	0.154	0.157
e	1.27BSC					
L	0.45	0.60	0.80	0.018	0.024	0.031
L1	1.04REF					
L2	0.25BSC					
R	0.07	-	-	0.003	-	-
R1	0.07	-	-	0.003	-	-
h	0.30	0.40	0.50	0.012	0.016	0.020
θ	0 °	-	8 °	0 °	-	8 °
θ1	15 °	17 °	19 °	15 °	17 °	19 °
θ2	11 °	13 °	15 °	11 °	13 °	15 °
θ3	15 °	17 °	19 °	15 °	17 °	19 °
θ4	11 °	13 °	15 °	11 °	13 °	15 °

Product number	Package	Marking	Packing	Quantity
FD2203S	SOP8	FD2203S	Tape & Reel	3000

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