

4-channel PWM driver for CD and MD players

BH6510FS

The BH6510FS is a 4-channel PWM driver for CD and MD player motors and actuators. The power MOSFET in the output stage assures low power consumption for applications.

●Applications

CD and MD players

●Features

- 1) Internal 4-channel power MOS H-bridge.
- 2) Adaptable for PWM input.
- 3) Low ON resistance.
- 4) Low power consumption.
- 5) 32-pin SSOP-A package.
Compact package.

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
H-bridge supply voltage	VM	9	V
Control circuit supply voltage	VDD	9	V
Predriver supply voltage	VG (pin2)	12	V
Driver output current	Io (ch1, ch3) Io (ch2, ch4)	500 300*1	mA
Power dissipation	Pd	850*2	mW
Operating temperature	Topr	-30~+85	°C
Storage temperature	Tstg	-55~+150	°C

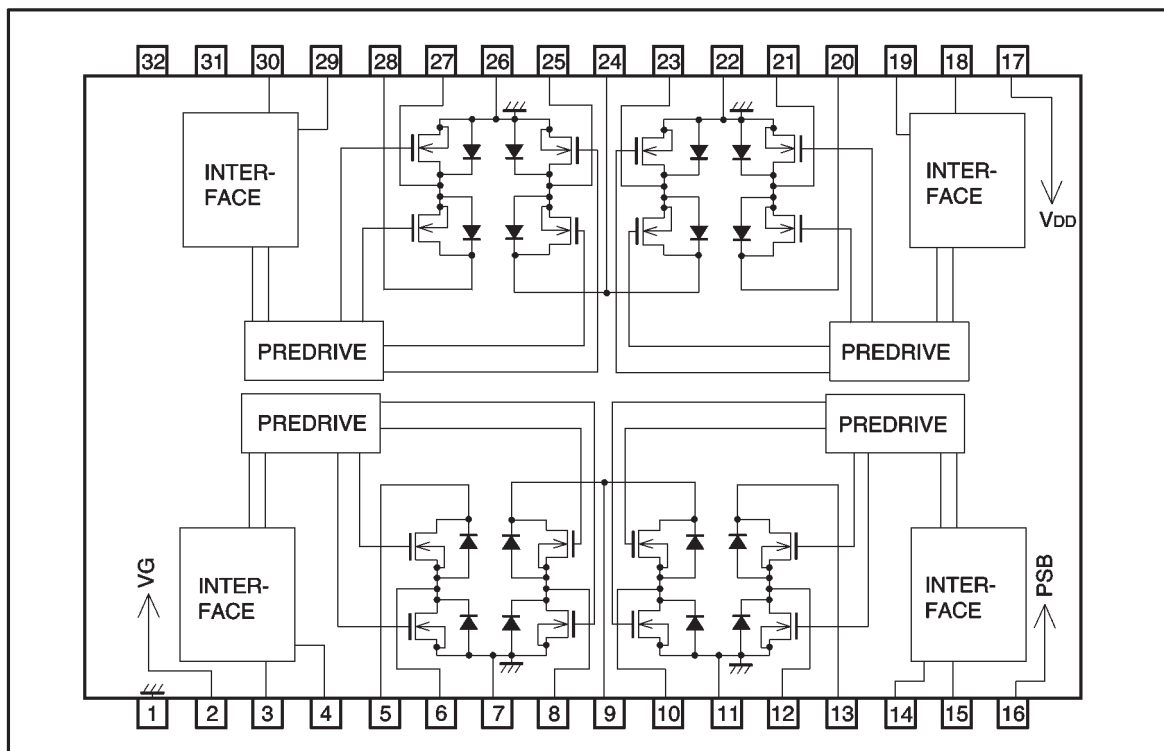
*1 500 msec.

*2 Reduced by 6.8 mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
H-bridge supply voltage	VM	1.6	5.0	5.5	V
Control circuit supply voltage	VDD	2.7	3.0	5.5	V
Predriver supply voltage	VG (pin2)	VM+3.0	10	11.5	V
Ambient temperature	Ta	-35	25	85	°C
Pulse input frequency	fIN	—	176.4	200	kHz

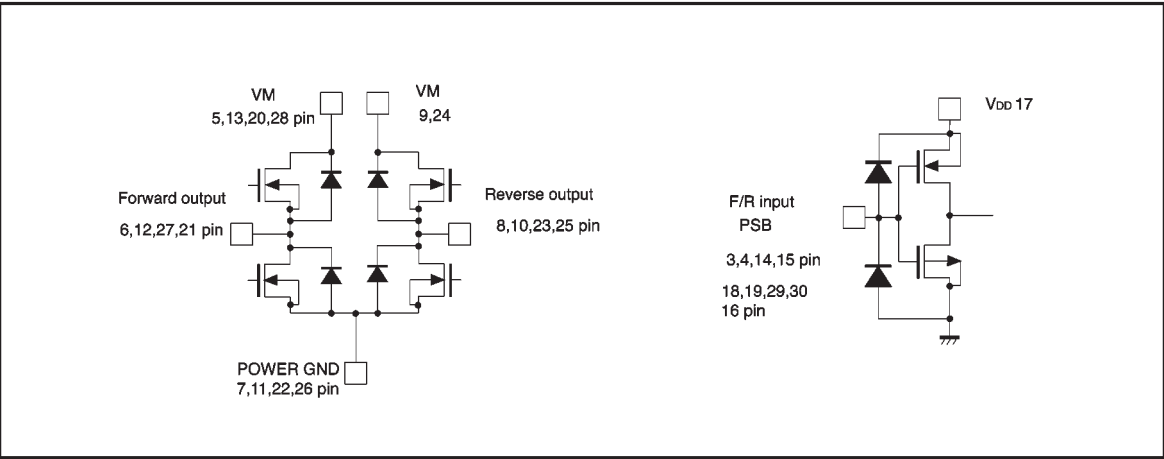
● Block diagram



● Pin descriptions

Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	GND	Predrive ground	17	N.C.	—
2	VG	Gate voltage supply	18	N.C.	—
3	IN4R	Channel 4 reverse input	19	IN2R	Channel 2 reverse input
4	IN4F	Channel 4 forward input	20	IN2F	Channel 2 forward input
5	VM4	Power supply	21	VM2	Power supply
6	OUT4F	Channel 4 forward output	22	OUT2F	Channel 2 forward output
7	PGND4	Power ground	23	PGND2	Power ground
8	OUT4R	Channel 4 reverse output	24	OUT2R	Channel 2 reverse output
9	VM34	Power supply	25	VM12	Power supply
10	OUT3R	Channel 3 reverse output	26	OUT1R	Channel 1 reverse output
11	PGND3	Power ground	27	PGND1	Power ground
12	OUT3F	Channel 3 forward output	28	OUT1F	Channel 1 forward output
13	VM3	Power supply	29	VM1	Power supply
14	IN3F	Channel 3 forward input	30	IN1F	Channel 1 forward input
15	IN3R	Channel 3 reverse input	31	IN1R	Channel 1 reverse input
16	PSB	Power cut	32	V _{DD}	Predrive power supply

● Pin equivalent circuit



● Electrical characteristics (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_M = 2.5\text{V}$, $V_{DD} = 3\text{V}$, $V_G = 10\text{V}$, $f_{IN} = 176\text{kHz}$, $R_L = 8\Omega - 47\mu\text{H}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈H-bridge supply current〉						
No input	I_{ST}	—	—	1	μA	$V_{DD}=\text{OFF}$, $V_M=5\text{V}$
〈Control supply current〉						
No input	I_{DD1}	—	—	1	μA	
Operating	I_{DD2}	—	6	70	μA	I_{DD1} and four channels driven simultaneously
〈Predriver supply voltage〉						
No input	I_{G1}	—	—	1	μA	
Operating	I_{G2}	—	1.5	2.2	mA	I_{G1} and four channels driven simultaneously
〈Logic input characteristics〉						
Input high level voltage	V_{IH}	$V_{DD}-0.6$	—	—	V	
Input low level voltage	V_{IL}	—	—	0.6	V	
Input high level current	I_{IH}	—	—	1	μA	
Input low level current	I_{IL}	-1	—	—	μA	
Output ON resistance	$R_{ON1, 3}$	—	0.8	1.2	Ω	Sum of top and bottom ON resistance
	$R_{ON2, 4}$	—	1.2	2.0		
Output delay time	t_{RISE}	—	0.2	1	μs	
	t_{FALL}	—	0.2	1	μs	

©Not designed for radiation resistance.

● Measurement circuit

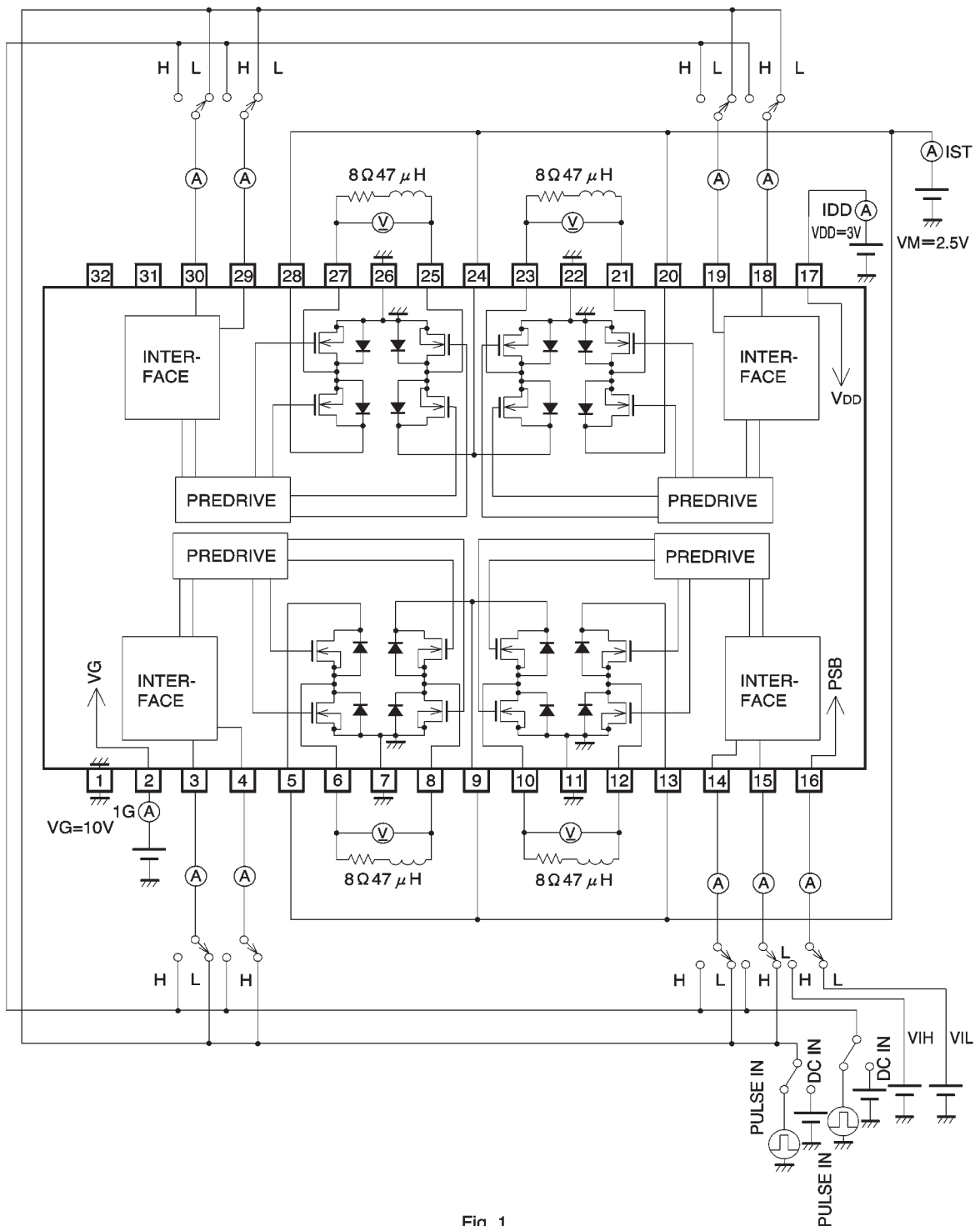


Fig. 1

●Circuit operation

○PWM driver

The output stage is an H-bridge driver with four N-type FET circuits. Output PWM duty is changed according to input PWM duty. This pulse drives the load (direct PWM).

Driver truth table

PSB*	IN1~4F	IN1~4R	OUT1~4F	OUT1~4R
H	L	L	L	L
H	L	H	L	H
H	H	L	H	L
H	H	H	L	L
L	X	X	High-Z	High-Z

* Output turns off (high impedance) when PSB = LOW (power OFF), regardless of input.

●Application example

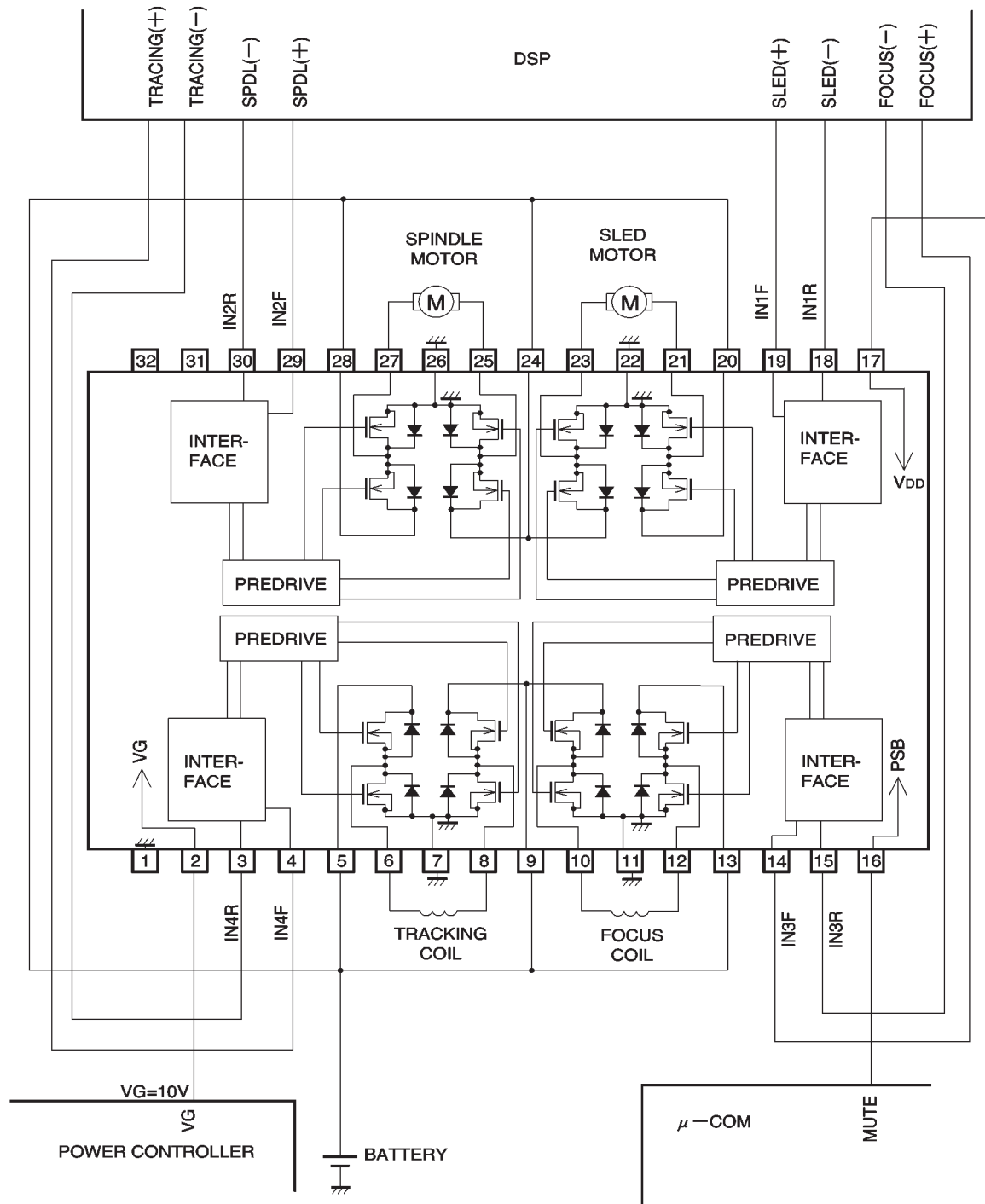


Fig. 2

● Operation notes

This IC uses three power supplies : V_{DD} , V_G and V_M . Below are the blocks to which each power supply connects.

V_{DD} : control block (INTERFACE)

V_G : pre drive block

V_M : H-bridge block

As starting V_G and V_M when V_{DD} is open could cause the top and bottom output MOS to turn on simultaneously before the previous stage logic stabilizes, be sure to design so that V_{DD} starts up first.

● Electrical characteristic curves

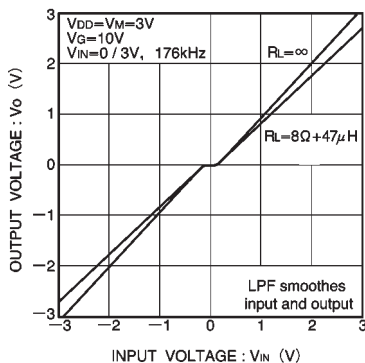


Fig. 3 I/O characteristics (CH1, CH3)

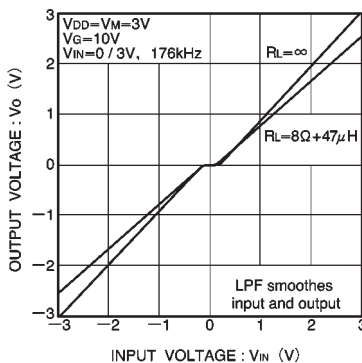


Fig. 4 I/O characteristics (CH2, CH4)

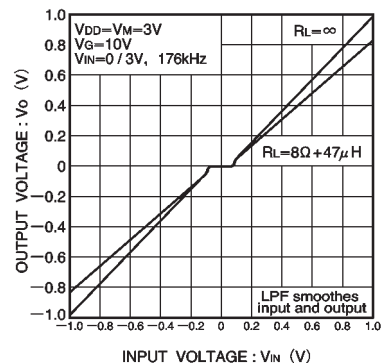


Fig. 5 I/O characteristics during ultralow input (CH1, CH3)

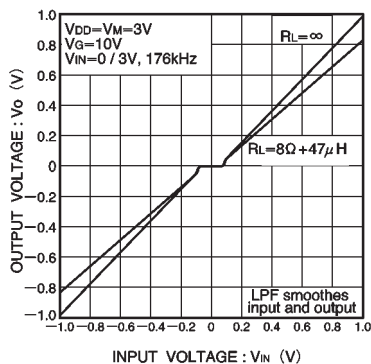


Fig. 6 I/O characteristics during ultralow input (CH2, CH4)

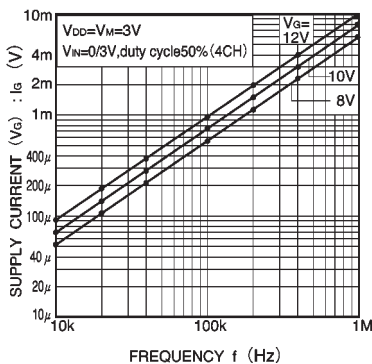


Fig. 7 Input frequency vs. V_G pin supply current

●External dimensions (Units: mm)

