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	V_{DD}	9	V
Predriver supply voltage	VG (pin2)	12	V
Driver output current	I_O (ch1, ch3) I_O (ch2, ch4)	500 300*1	mA
Power dissipation	Pd	850*2	mW
Operating temperature	Topr	−30～+85	℃
Storage temperature	Tstg	−55～+150	℃

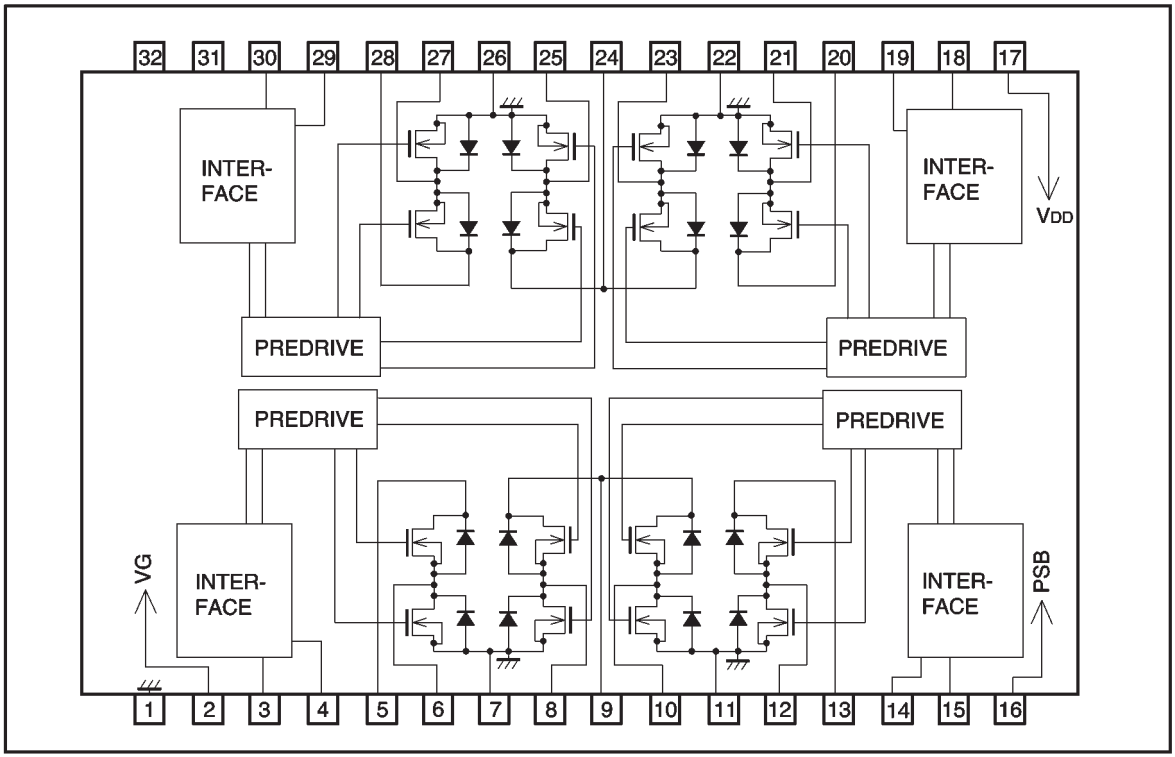
*1 500 msec.

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

●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	V_{DD}	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	℃
Pulse input frequency	f_{IN}	−	176.4	200	kHz

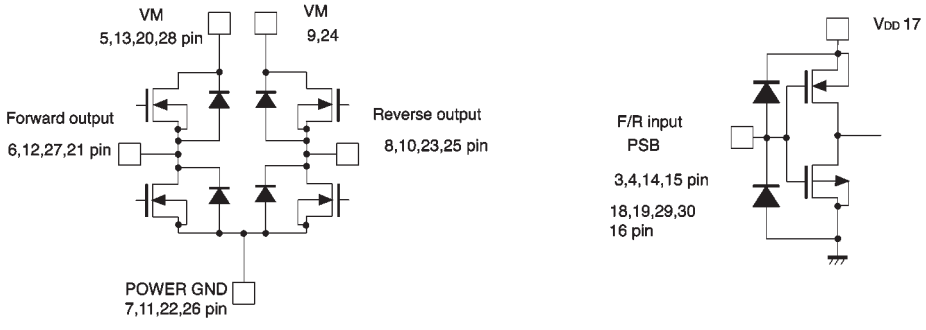
●Block diagram



●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, Ta = 25°C, V_M = 2.5V, V_{DD} = 3V, V_G = 10V, f_{IN} = 176kHz, RL = 8Ω − 47μH)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈H-bridge supply current〉						
No input	I_{ST}	—	—	1	μA	V_{DD}=OFF, VM=5V
〈Control supply current〉						
No input	I_{DD1}	—	—	1	μA	
Operating	I_{DD2}	—	6	70	μA	IDD1 and four channels driven simultaneously
〈Predriver supply voltage〉						
No input	I_{G1}	—	—	1	μA	
Operating	I_{G2}	—	1.5	2.2	mA	IG1 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

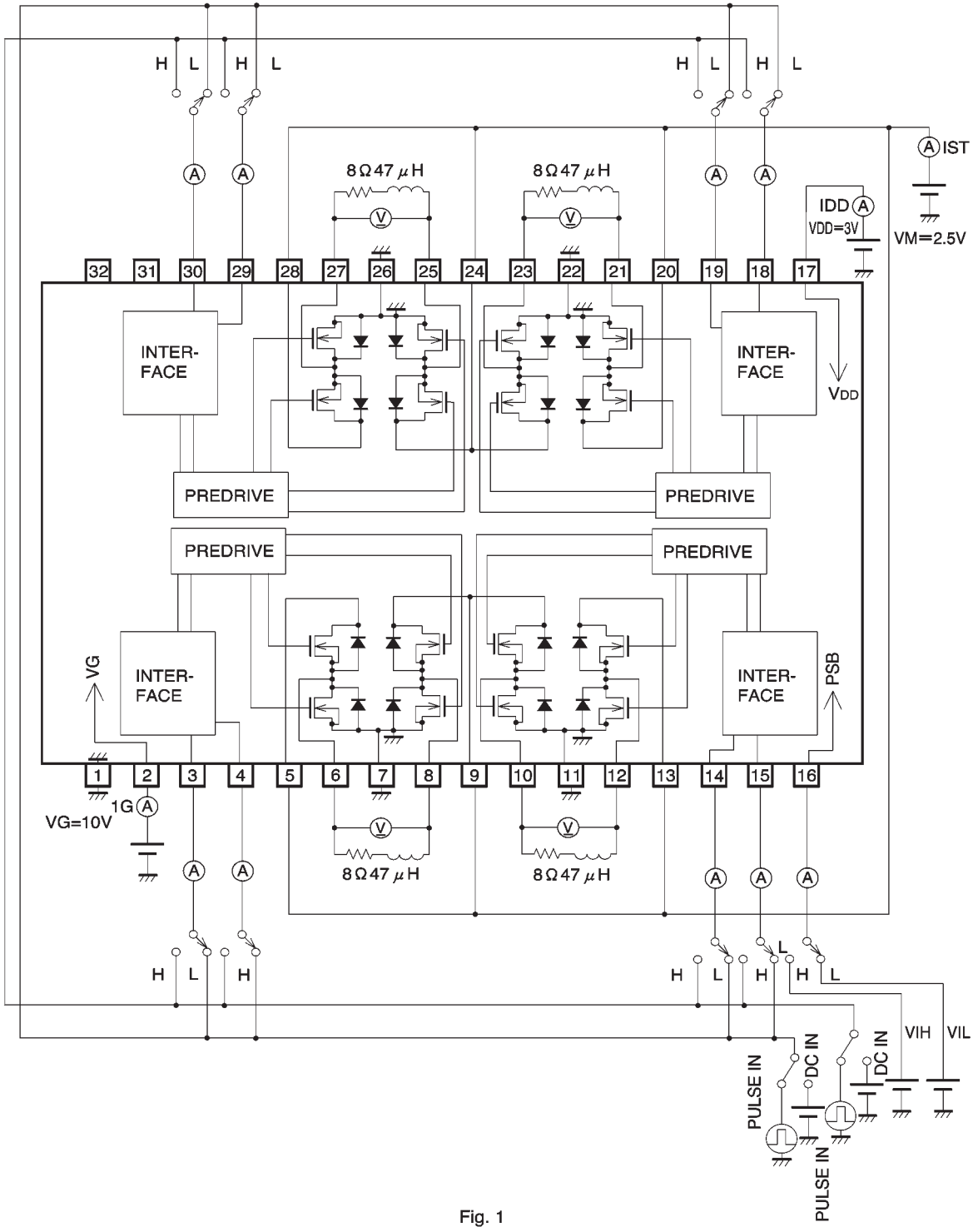


Fig. 1

●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

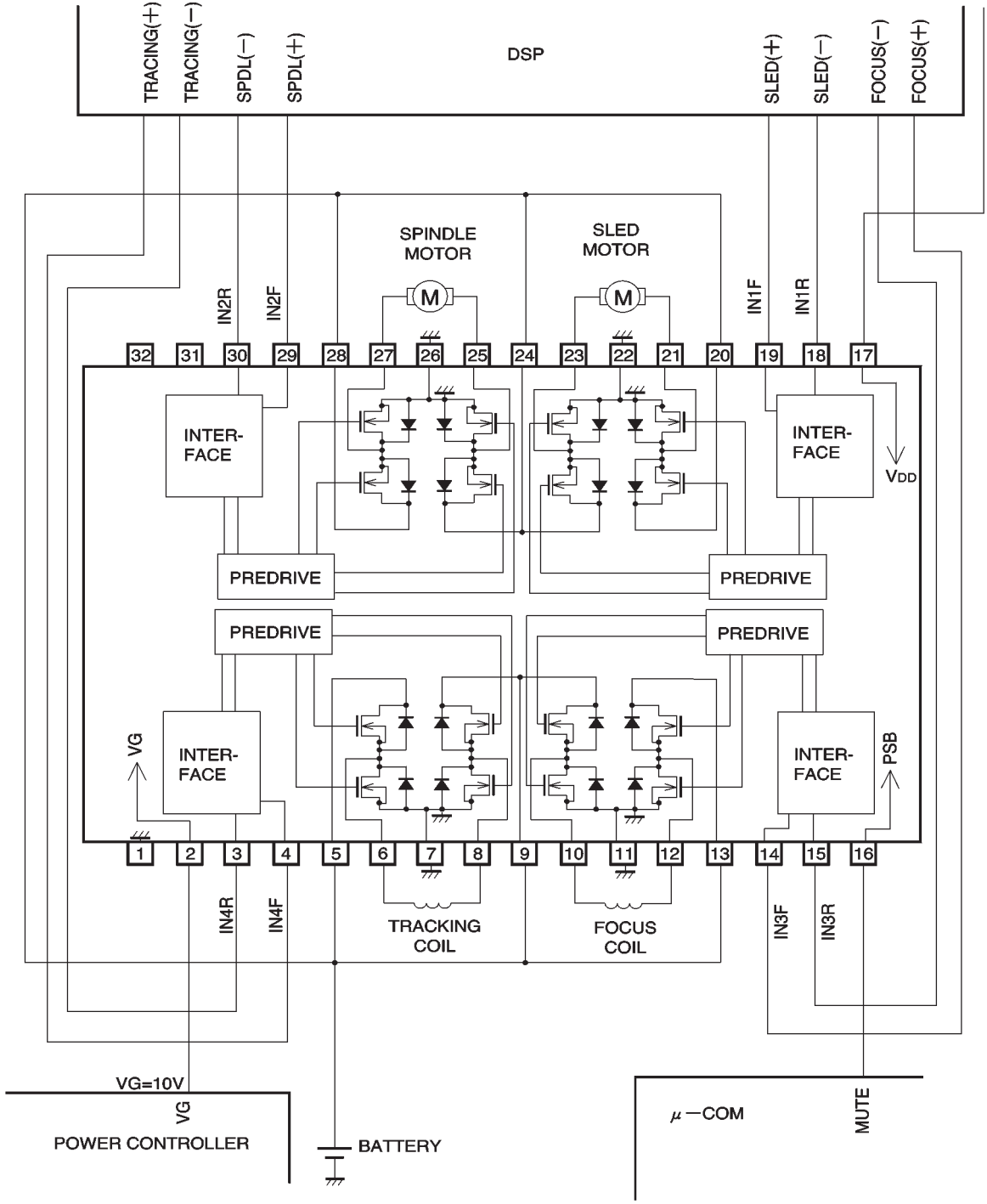


Fig. 2

●Operation notes

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

V_{DD} : control block (INTERFACE)
VG : pre drive block
VM : H-bridge block

As starting VG and VM 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

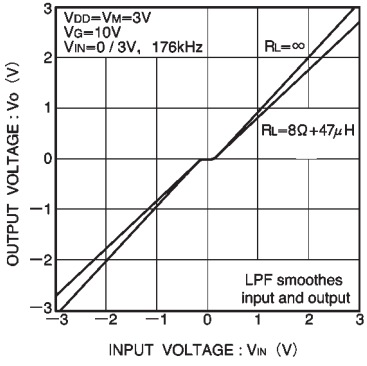


Fig. 3 I / O characteristics (CH1, CH3)

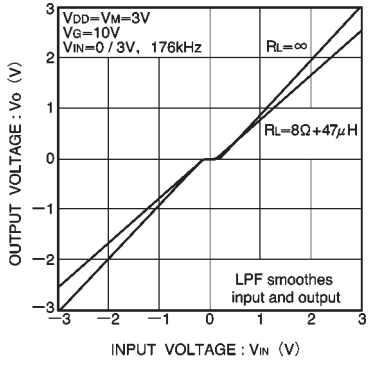


Fig. 4 I / O characteristics (CH2, CH4)

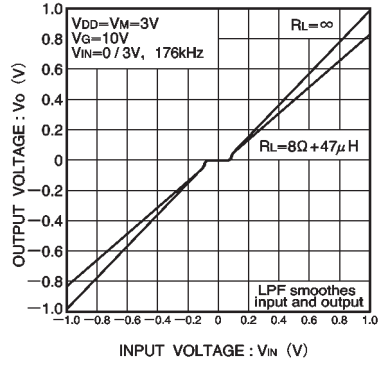


Fig. 5 I / O characteristics during ultralow input (CH1, CH3)

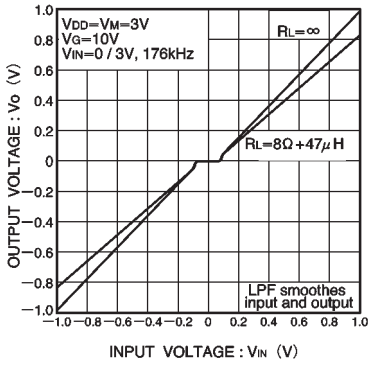


Fig. 6 I / O characteristics during ultralow input (CH2, CH4)

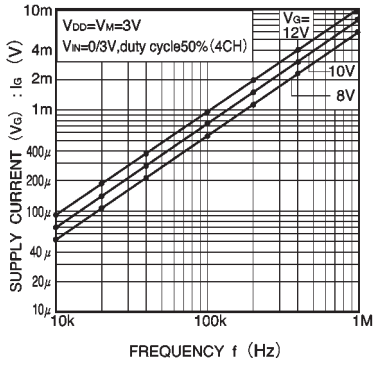
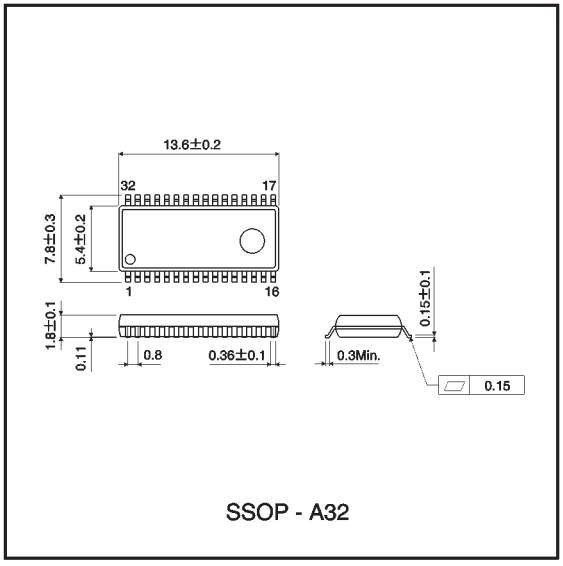


Fig. 7 Input frequency vs. VG pin supply current

●External dimensions (Units: mm)



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