# 2-channel BTL driver for CD players BA5912AFP-Y

The BA5912AFP-Y is a 2-channel BTL driver developed to drive CD player motors and actuators. Perfect for compact applications with the use of the HSOP 25-pin package.

## Applications

CD players, CD-ROM

#### Features

- 1) 2-channel BTL driver.
- Perfect for compact applications with the use of the HSOP 25-pin power package.
- 3) Wide dynamic range.
- 4) External mute pin enables the muting of the output current (independent muting for channels 1 and 2). Muting both channels causes the IC to enter the standby mode.
- 5) Two internal multi-purpose operational amplifiers.
- Power supply is divided into three systems (Pre Vcc, Pow Vcc for channel 1, and Pow Vcc for channel 2)
- 7) Internal standard two operational amplifier.
- 8) Internal thermal shutdown circuit.

## ● Absolute maximum ratings (Ta = 25 °C)

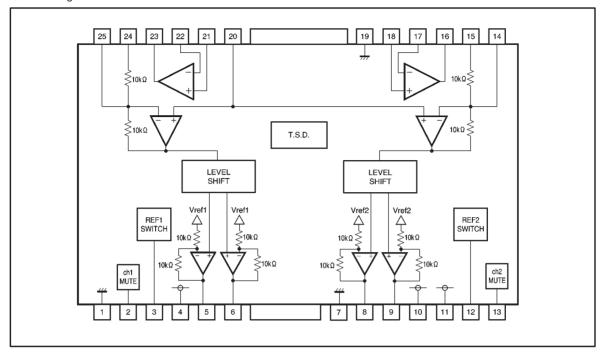
Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	13.5	V
Power dissipation	Pd	1.45*1	W
Operating temperature	Topr	<b>−35~+85</b>	°C
Storage temperature	Tstg	<b>−55∼+150</b>	°C

<sup>\*1</sup> When mounted on a 70mm×70mm×1.6mm glass epoxy board with copper foil coverage of less than 3%. Reduced by 11.6mW for each increase in Ta of 1°C over 25°C.

#### • Recommended operating conditions (Ta = 25 °C)

Parameter	Symbol	Limits	Unit
Power supply voltage	Pre Vcc	4.5~13.2	V
Power-stage power supply voltage	Pow Vcc	4.5∼Pre Vcc	V

## Block diagram

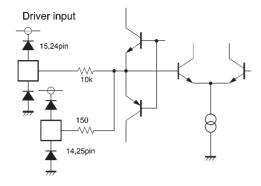


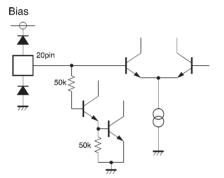
## Pin descriptions

Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	GND	Substrate GND	14	IN2'	Input for channel 2 gain adjustment
2	MUTE1	Channel 1 mute	15	IN2	Channel 2 gain fixed input
3	REF1	Channel 1 Vref switch	16	OP1-OUT	Op-amp 1 output
4	Pow Vcc1	Pow Vcc (channel 1)	17	OP1-IN-	Op-amp 1 negative input
5	OUT1-	Channel 1 negative output	18	OP1-IN+	Op-amp 1 positive input
6	OUT1+	Channel 1 positive output	19	GND	Substrate GND
7	GND	Substrate GND	20	BIAS	Bias input
8	OUT2+	Channel 2 positive output	21	OP2-IN+	Op-amp 2 positive input
9	OUT2-	Channel 2 negative output	22	OP2-IN-	Op-amp 2 negative input
10	Pow Vcc2	Pow Vcc (channel 2)	23	OP2-OUT	Op-amp 2 output
11	Pre Vcc	PreVcc	24	IN1	Channel 1 gain fixed input
12	REF2	Channel 2 Vref switch	25	IN1'	Input for channel 1 gain adjustment
13	MUTE2	Channel 2 mute			

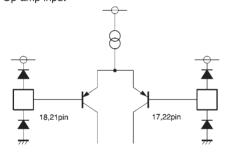
Note: Positive output and negative output are the polarities with respect to the input.

# ●Input / output circuits

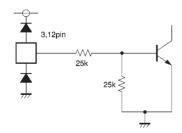


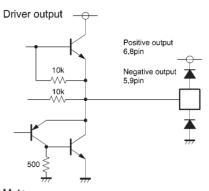


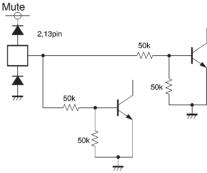
Op-amp input

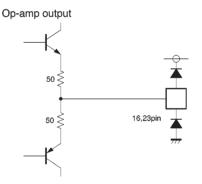


Vref switch









•Electrical characteristics (unless otherwise noted, Ta = 25 °C, Pre Vcc = Pow Vcc = 5V, BIAS = 2.5V, RL = 8 $\Omega$ )

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Circuit current	lcc	_	9.0	14.0	mA	No load, REF1, 2≧2.0V
Circuit current during standby	Iscc	_	0	100	μΑ	No load, REF1, 2≦0.5V
(Driver)						
Output offset voltage	Voo	-50	_	50	mV	
Maximum output amplitude 1	Vом1	3.2	3.5	_	V	REF1, 2≦0.5V
Maximum output amplitude 2	<b>V</b> ом2	3.7	4.0	_	V	Pre Vcc=12V, Pow Vcc=5V REF1, 2>2.0V
Closed-loop voltage gain	Gvc	10.0	11.5	13.0	dB	V <sub>IN</sub> =BIAS±0.5V
Mute on voltage	VMON	GND	_	0.5	V	
Mute off voltage	VMOFF	2.0	_	Vcc	V	
Vref switch voltage 1	Vref1	GND	_	0.5	V	Pre Vcc=Pow Vcc
Vref switch voltage 2	V <sub>ref2</sub>	2.0	_	Vcc	V	Pre Vcc>Pow Vcc+VF
(Operational amplifier)						
Offset voltage	Vofop	<b>-</b> 5	0	5	mV	
Input bias current	Івор	_	_	300	nA	
Output high level voltage	Vонор	4.00	4.36	_	V	
Output low level voltage	Volop	_	0.74	1.1	V	
Output drive current sink	Isink	10	50	_	mA	50 Ω at Vcc
Output drive current source	Isource	10	40	_	mA	50 Ω at GND
Slew rate	SRop	_	1	_	V/μs	100kHz rectangular wave, 4V <sub>P-P</sub> output

### Measurement circuits

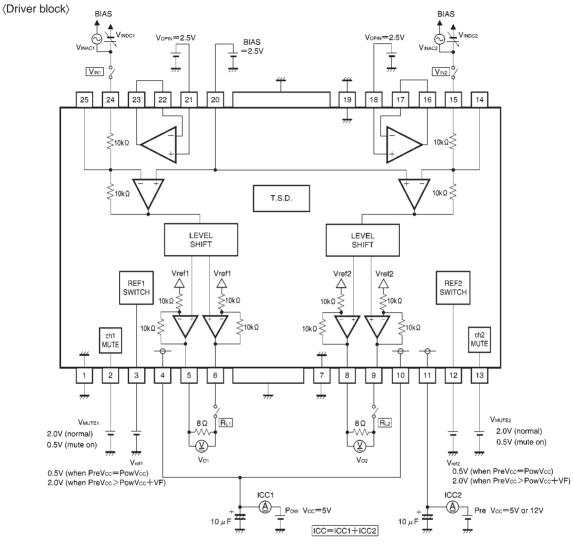


Fig.1

(Operational amplifier block)

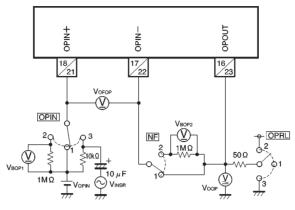


Fig.2

## Application example

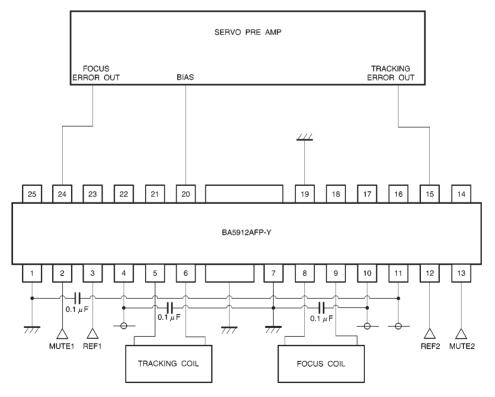


Fig.3

#### Operation notes

- (1) The BA5912AFP-Y contains a thermal shutdown circuit. When the chip temperature reaches 175 °C (Typ.), the output current is muted. If the chip temperature then drops below 150 °C (Typ.), then the mute is released.
- (2) By having the voltage of the mute pins (pins 2 and 13) open or lowered to 0.5V or below, you can independently mute the output current for channels 1 and 2. For normal conditions, have the voltages for the mute pins (pins 2 and 13) pulled up to 2.0V or greater. If the both mute pins (pins 2 and 13) are open or 0.5V or less, then the IC automatically enters the standby mode.
- (3) If the voltage of the bias pin (pin 20) drops below 1.4V (Typ.), outputs are muted. For normal conditions, have the voltage above 2.0V.
- (4) If the power supply voltage drops below 3.5V (Typ.), internal circuits turn off. If the power supply voltage then rises to 4.0V (Typ.), the circuits turn on.
- Electrical characteristic curves

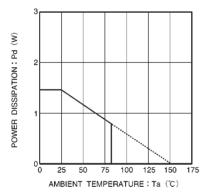


Fig.4 Thermal derating curve

- (5) If the voltage of the thermal shutdown, mute ON, or bias pin drops, or if the power supply voltage drops, the mute is activated; however, in these situations, only the drivers are muted. Also, the output pin voltage becomes the internal bias voltage.
- (6) When Pre  $V_{CC}$  = Pow  $V_{CC}$ , have the Vref switch pin open or at 0.5V or less (internal bias voltage = (Pow  $V_{CC} V_F$ ) / 2). When Pre  $V_{CC} > P_{OW} V_{CC} + V_F$ , have the Vref switch pin pulled up to 2.0V (internal bias voltage =  $P_{OW} V_{CC}$  / 2).
- (7) Connect a bypass capacitor (approx.  $0.1\mu F$ ) between the bases of the power supply pins of this IC.
- (8) Even though the radiation fins are connected to ground within the package, be sure to also connect them to a ground externally as well.

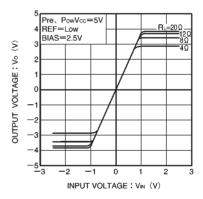


Fig.5 Driver I / O characteristics (When PreVcc=PowVcc, with load regulation)

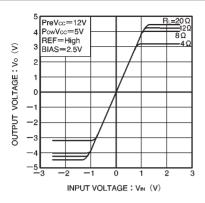


Fig.6 Driver I / O characteristics (When PreVcc≧PowVcc+VF, with load regulation)

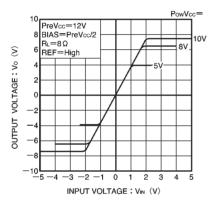
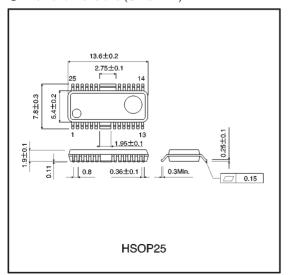


Fig.8 Driver I / O characteristics (With PowVcc regulation)

External dimensions (Units: mm)



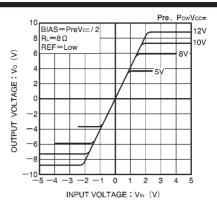


Fig.7 Driver I / O characteristics (With PreVcc and PowVcc regulation)

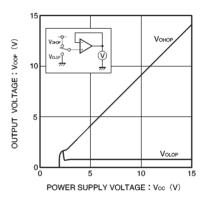


Fig.9 Power supply voltage vs. op-amp output voltage