

# 4-channel BTL driver for CD players

## BA5941FP

The BA5941FP contains a 4-channel BTL driver for CD player motors and actuators. Perfect for compact applications with the use of the HSOP 28-pin package.

### ●Applications

CD players, CD-ROM

### ●Features

- 1) 4-channel BTL driver.
- 2) Perfect for compact applications with the use of the HSOP 28-pin power package.
- 3) Wide dynamic range (4.8V (Typ.) when  $V_{CC} = 8V$  and  $R_L = 8\Omega$ ).
- 4) Internal thermal shutdown circuit.
- 5) Gain is adjustable with externally connected resistor.
- 6) Internal multi-purpose operational amplifier.
- 7) External mute pin enables the muting of the output current.

### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{CC}$	18	V
Power dissipation	$P_d$	1.7 *1	W
Operating temperature	$T_{opr}$	-35~+85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55~+150	$^\circ\text{C}$

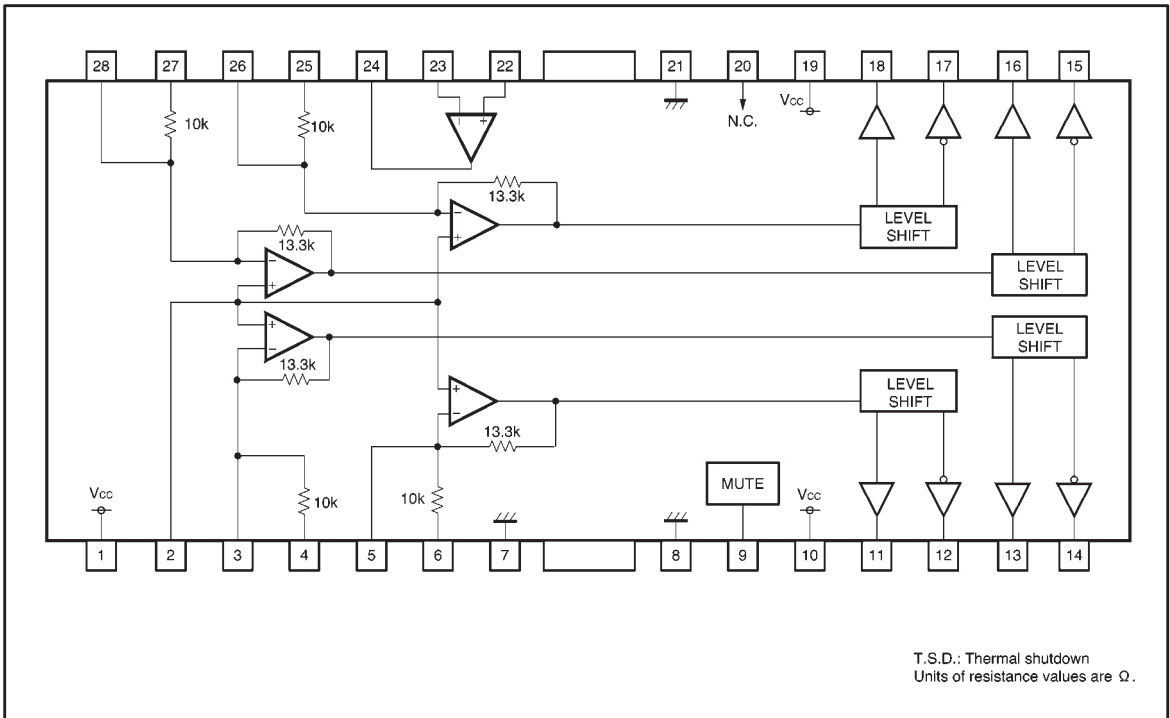
\*1 When mounted on a 70mm × 70mm × 1.6mm glass epoxy board.  
Reduced by 13.6mW for each increase in  $T_a$  of  $1^\circ\text{C}$  over  $25^\circ\text{C}$ .

### ●Recommended operating conditions ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{CC}$	4.5~13.2	V



● Block diagram



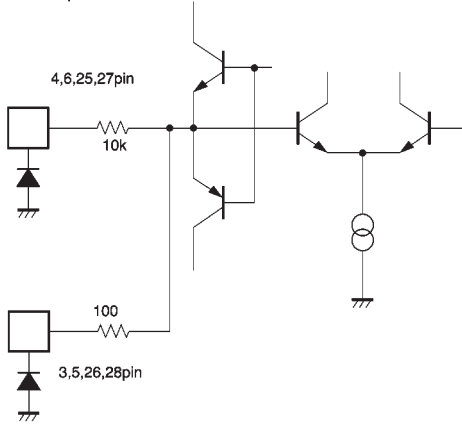
● Pin descriptions

Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	V <sub>CC</sub>	V <sub>CC</sub>	15	VO4 (+)	Driver channel 4 positive output
2	BIAS IN	Bias amplifier input	16	VO4 (-)	Driver channel 4 negative output
3	VIN1'	Input for driver channel 1 gain adjustment	17	VO3 (+)	Driver channel 3 positive output
4	VIN1	Driver channel 1 input	18	VO3 (-)	Driver channel 3 negative output
5	VIN2'	Input for driver channel 2 gain adjustment	19	V <sub>CC</sub>	V <sub>CC</sub>
6	VIN2	Driver channel 2 input	20	N.C.	—
7	GND	GND	21	GND	GND
8	GND	GND	22	OP IN (+)	Op-amp positive input
9	MUTE	Mute control	23	OP IN (-)	Op-amp negative input
10	V <sub>CC</sub>	V <sub>CC</sub>	24	OP OUT	Op-amp output
11	VO2 (-)	Driver channel 2 negative output	25	VIN3	Driver channel 3 input
12	VO2 (+)	Driver channel 2 positive output	26	VIN3'	Input for driver channel 3 gain adjustment
13	VO1 (-)	Driver channel 1 negative output	27	VIN4	Driver channel 4 input
14	VO1 (+)	Driver channel 1 positive output	28	VIN4'	Input for driver channel 4 gain adjustment

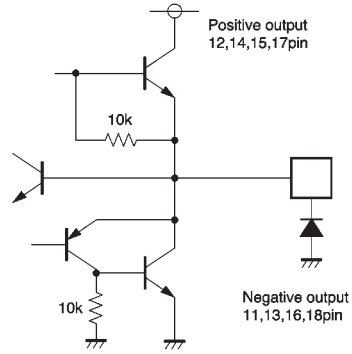
Note: Positive output and negative output are the polarities with respect to the input. If the input pin is high, the negative output pin is low and the positive output pin is high.

## ● Input/output circuits

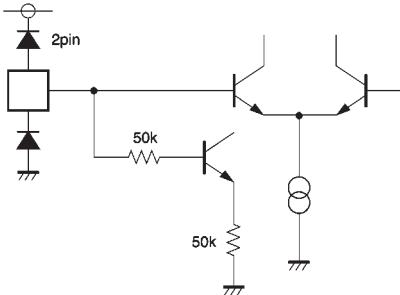
### Driver input



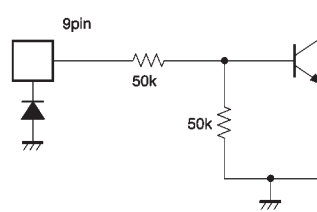
### Driver output



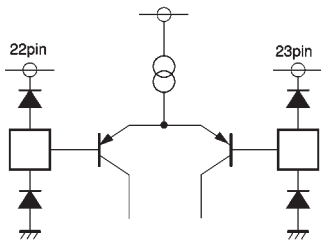
### Bias



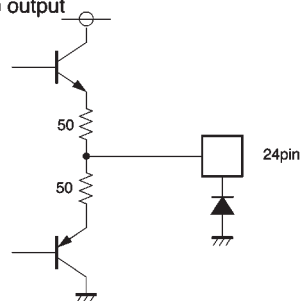
### Mute



### Op-amp input



### Op-amp output



● Electrical characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8\text{V}$ ,  $\text{BIAS} = 2.5\text{V}$ ,  $R_L = 8\Omega$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current	$I_{CC}$	—	8.2	12.0	mA	No load
Output offset voltage	$V_{OO}$	−50	—	50	mV	
Maximum output amplitude	VOM	4.0	4.8	—	V	
Closed-loop voltage gain	$G_{VC}$	7.3	8.3	9.3	dB	$V_{IN} = \pm 0.5\text{V}$
Mute on voltage	VMON	—	—	0.5	V	
Mute off voltage	VMOFF	2.0	—	—	V	
〈Operational amplifier〉						
Offset voltage	VOFOP	−6	0	6	mV	
Input bias current	VBOP	—	—	300	nA	
Output high level voltage	VOHOP	6.5	7.3	—	V	
Output low level voltage	VOLOP	—	0.7	1.1	V	
Output drive current sink	ISI	10	40	—	mA	$50\Omega$ at $V_{CC}$
Output drive current source	ISO	10	40	—	mA	$50\Omega$ at GND
Slew rate	SROP	—	1	—	$\text{V} / \mu\text{s}$	100kHz rectangular wave, $2V_{PP}$ output

©Not designed for radiation resistance.

● Measurement circuits

⟨Driver block⟩

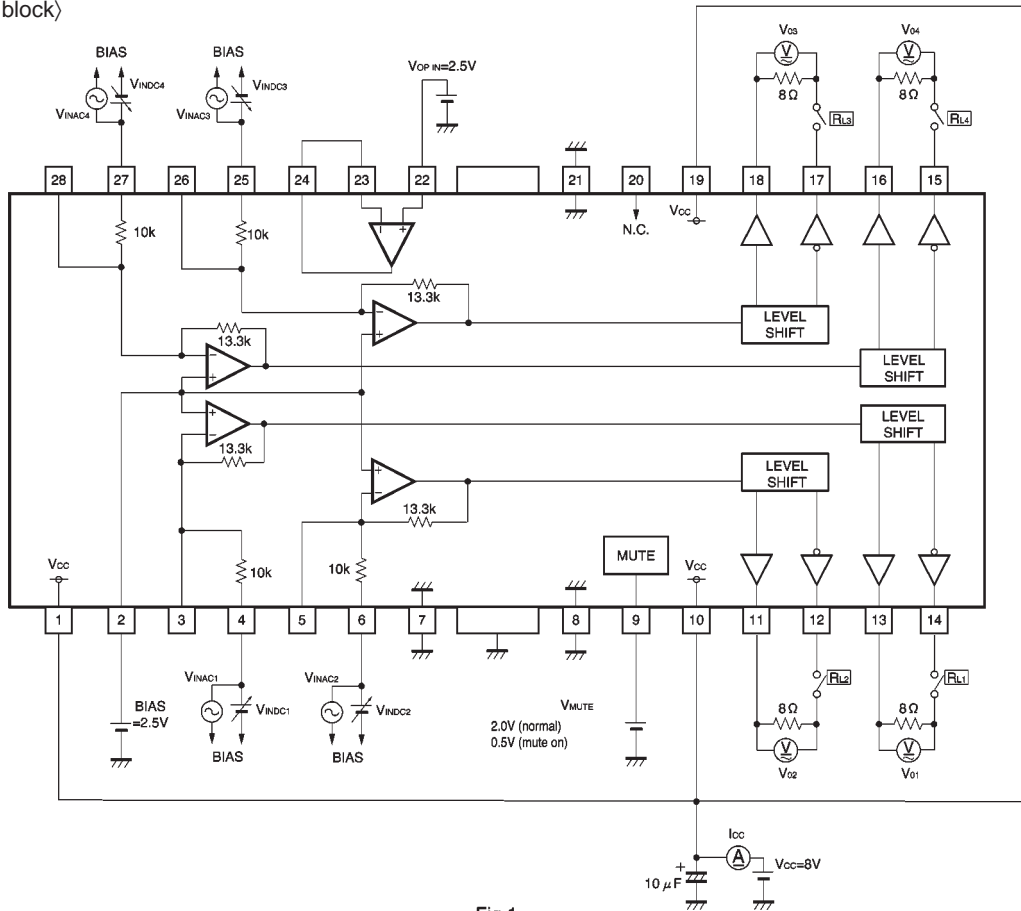


Fig.1

⟨Operational amplifier block⟩

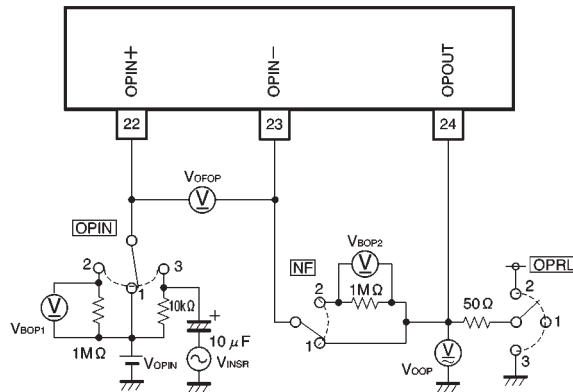


Fig.2

● Application example

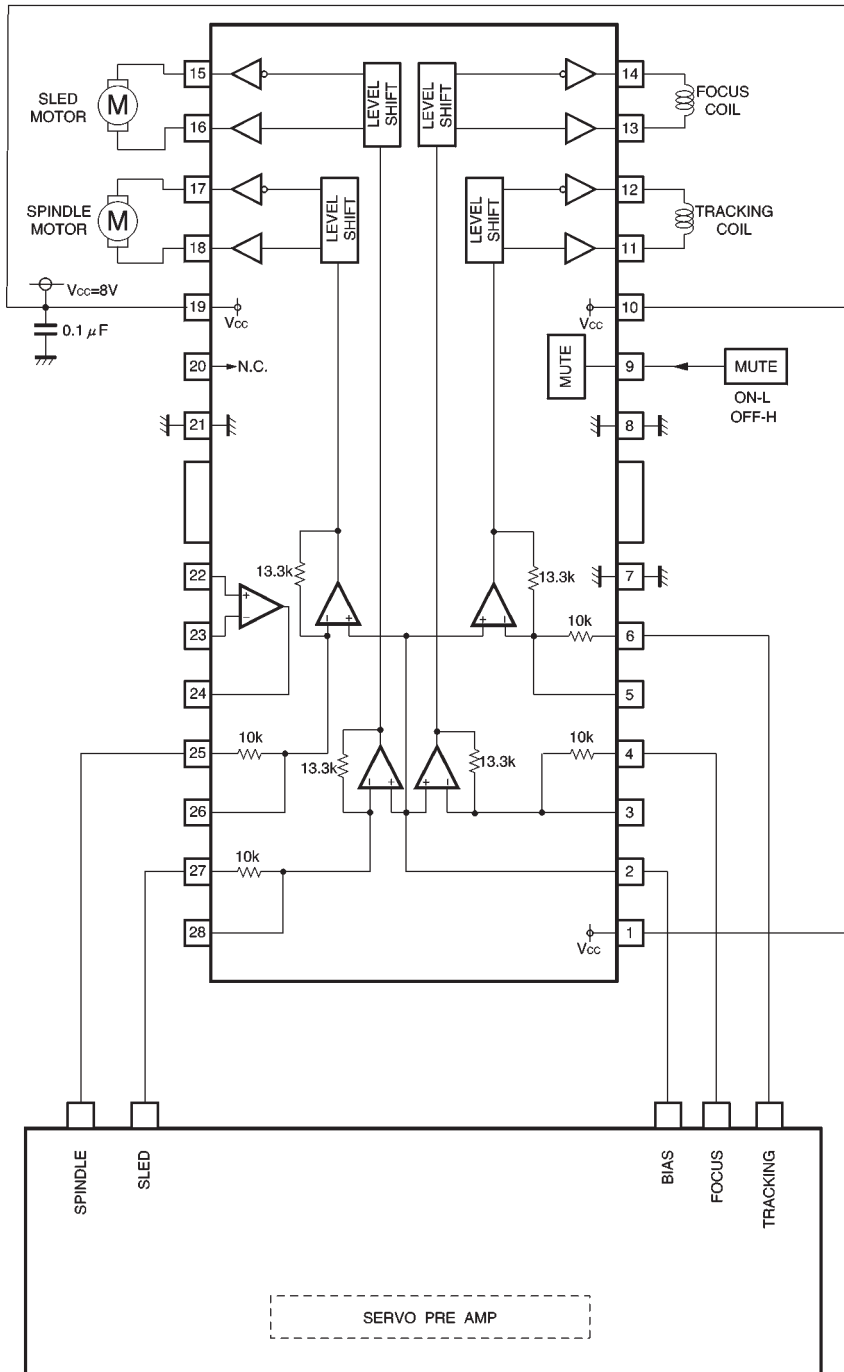


Fig.3

● Operation notes

(1) The BA5941FP contains a thermal shutdown circuit.

When the chip temperature reaches 175°C (Typ.), the output current is muted.

(2) By having the mute pin (pin 9) voltage open or lowered to 0.5V or below, the output currents can be muted. For normal conditions, have the voltage at pin 9 pull-up to 2V.

(3) If the voltage of the bias pin (pin 2) drops below 1.4V (Typ.), outputs are muted.

For normal conditions, have the voltage above 1.8V.

(4) If the voltage of the thermal shutdown, mute ON, or bias pin drops, the mute is activated; however, in these situations, only the drivers are muted.

Also, the output pin voltage becomes the internal bias voltage (approx.  $V_{CC} - VF/2$ ).

(5) Connect a bypass capacitor (approx. 0.1μF) between the bases of the power supply pins of this IC.

(6) Even though the radiation fins are connected to ground within the package, be sure to also connect them to a ground externally as well.

● Electrical characteristic curves

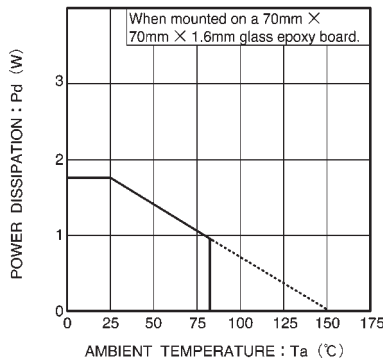


Fig.4 Thermal derating curve

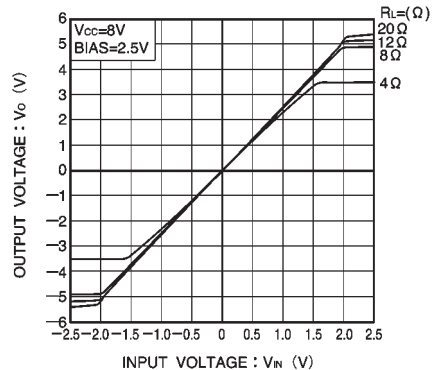


Fig.5 Driver I / O characteristics (during load regulation)

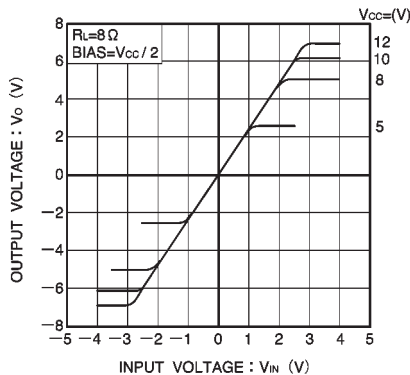


Fig.6 Driver I / O characteristics (during VCC regulation)

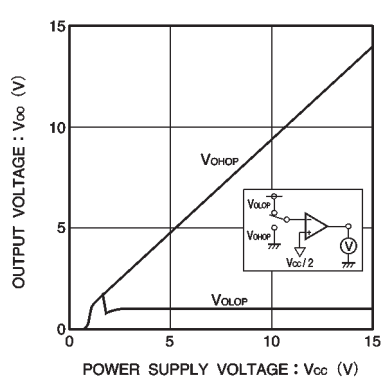


Fig.7 Op-amp output voltage vs. power supply voltage

● External dimensions (Units: mm)

