

### POWER DRIVER IC FOR CD PLAYER

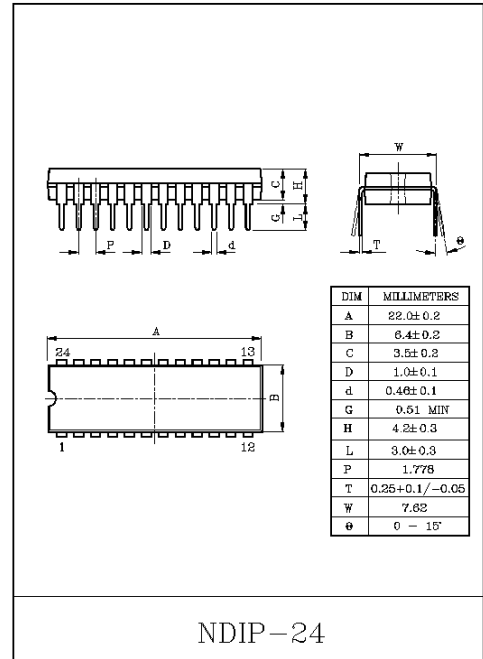
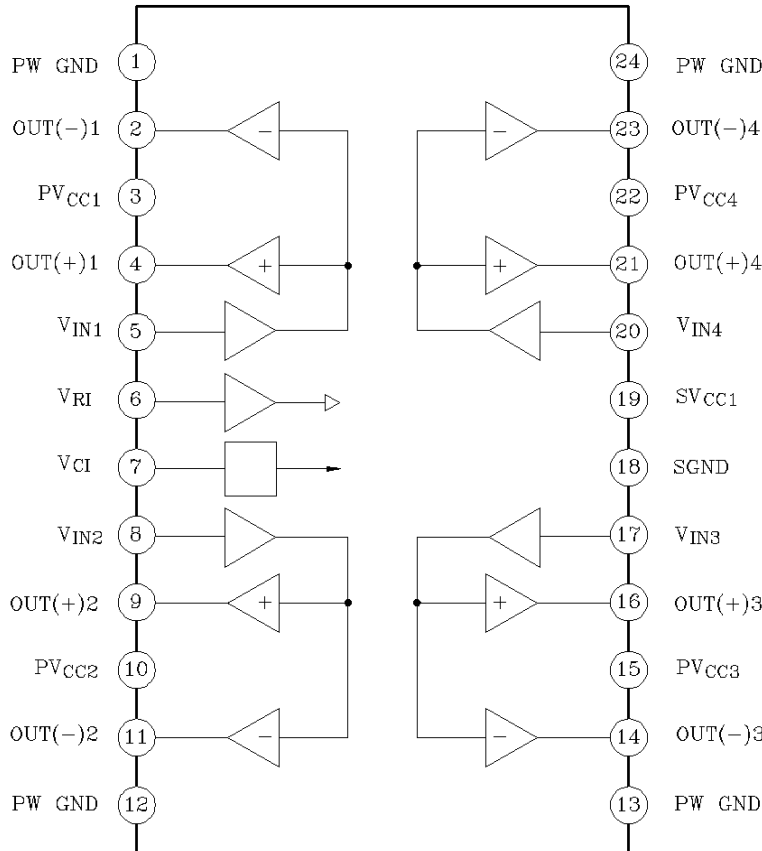
The KIA2092N is a power driver IC developed for CD players.

This IC have built-in 4 channel BTL power amplifiers which drives focus-coil, tracking-coil for 3-beam pick-up head, disc motor and feed motor.

### FEATURES

- 4 channel BTL linear drivers
- Fixed voltage gain :  $G_V=15\text{dB}$  (Typ.)
- High output power
  - :  $V_{OM1}=5V_{P-P}$  (Typ.) @  $V_{CC}=5V$ ,  $R_L=5\Omega$
  - :  $V_{OM2}=6V_{P-P}$  (Typ.) @  $V_{CC}=6V$ ,  $R_L=5\Omega$
- Thermal shutdown circuit.
- Input reference voltage short protection
- Operating Voltage range
  - :  $V_{CC(oper)}=4.0\sim 10.0V$  ( $T_a=25^\circ\text{C}$ )

### BLOCK DIAGRAM



Weight : 1.2g (Typ.)

# KIA2092N

## MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	14	V
Power Dissipation	P <sub>D</sub> (Note 1)	(2) (Note 2)	W
Operating Temperature	T <sub>opr</sub>	-30~85	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

(Note 1) : Mounted on 50mm×50mm×1.6mm size board with copper area 60% over.

(Note 2) : Derated above Ta=25°C, in the proportion of 62.5mW/°C

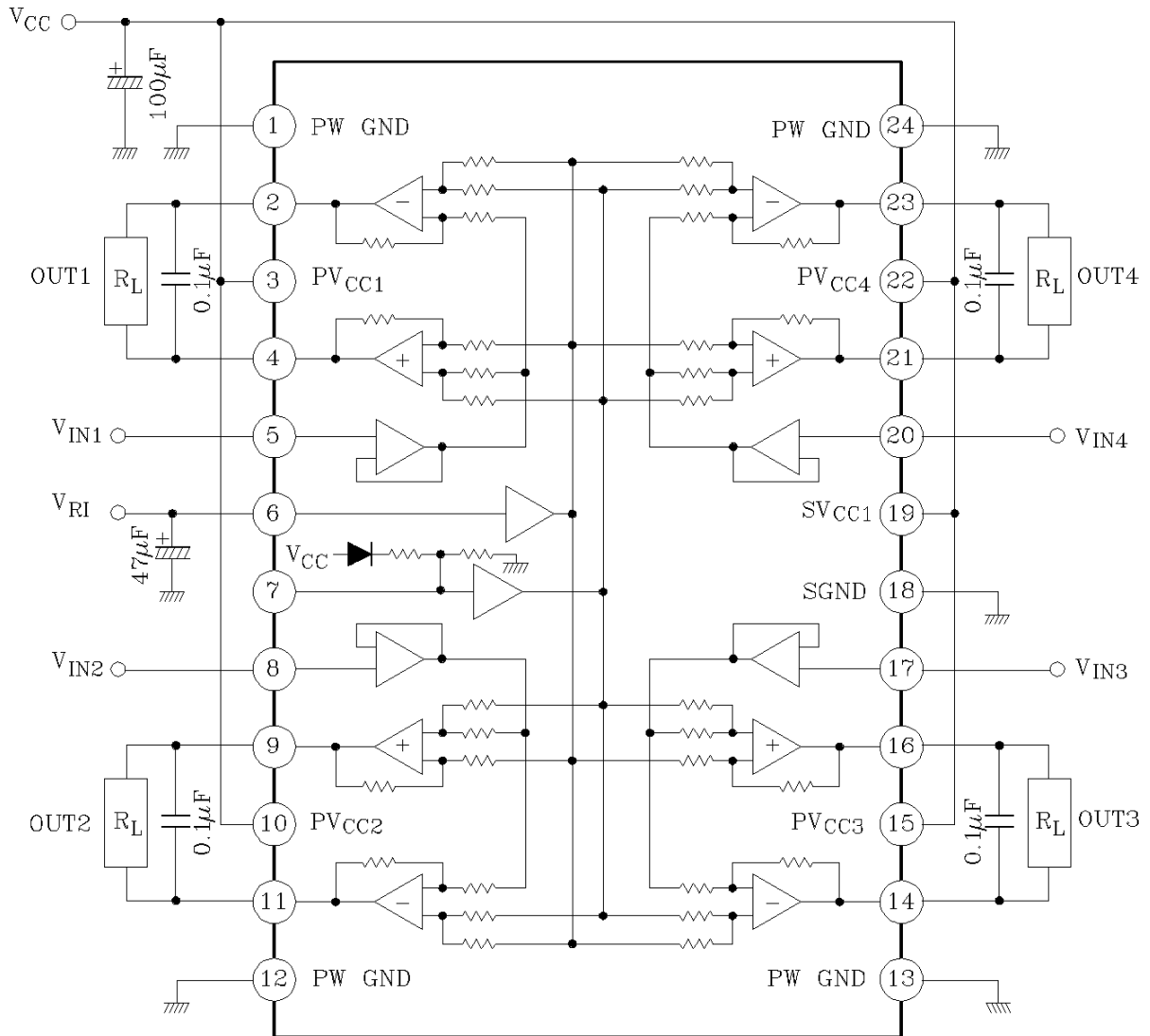
## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V<sub>CC</sub>=5V, R<sub>L</sub>=5Ω, R<sub>G</sub>=620Ω, V<sub>RI</sub>=2.1V, f=1kHz, Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sub>CC</sub>	-	4.0	-	10.0	V
Quiescent Current	I <sub>CCQ</sub>	V <sub>in</sub> =0, R <sub>L</sub> =OPEN	20	35	60	mA
Input Offset Current	I <sub>IN</sub>	V <sub>IN</sub> =2.1V	-	250	800	nA
V <sub>RI</sub> Terminal Offset Current	I <sub>I0</sub>	V <sub>RI</sub> =2.1V	-	35	120	μA
Output Offset Voltage	V <sub>O OS1</sub>	V <sub>CC</sub> =5V, R <sub>G</sub> =0Ω	-30	-	30	mV
	V <sub>O OS2</sub>	V <sub>CC</sub> =8V, R <sub>G</sub> =0Ω	-50	-	50	
	V <sub>O OS3</sub>	V <sub>CC</sub> =12V, R <sub>G</sub> =0Ω	-100	-	100	
Reference Output Voltage	V <sub>OUT</sub>	-	-	2.1	-	V
Maximum Output Voltage	V <sub>OM1</sub>	V <sub>CC</sub> =5V	4.0	5.0	-	V <sub>P-P</sub>
	V <sub>OM2</sub>	V <sub>CC</sub> =6V	5.0	6.0	-	
Voltage Gain	G <sub>V</sub>	V <sub>in</sub> =100mV <sub>rms</sub>	14.5	15.5	16.5	dB
Frequency Response	f <sub>c</sub>	V <sub>in</sub> =100mV <sub>rms</sub>	-	100	-	kHz
Total Harmonic Distortion	THD	V <sub>in</sub> =100mV <sub>rms</sub>	-	-50	-	dB
Slew Rate	S.R.	V <sub>out</sub> =2V <sub>P-P</sub>	-	1.0	-	V/μS
Cross Talk	C.T.	V <sub>out</sub> =1V <sub>rms</sub>	-	-60	-	dB
Ripple Rejection Ratio	R.R.	f <sub>rip</sub> =100Hz, V <sub>rip</sub> =100mV <sub>rms</sub>	-	-60	-	dB
Thermal Shut Down Temperature	T <sub>TSD</sub>	Chip temperature	-	150	-	°C
V <sub>RI</sub> -GND Short Protection Voltage	V <sub>RI OFF</sub>	-	1.4	1.6	1.8	V

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## TEST CIRCUIT



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## TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	PW GND	Power GND <ul style="list-style-type: none"> <li>Connected to substrate.</li> <li>①, ⑫, ⑬, ⑭ pin are connected inside.</li> </ul>	
2	OUT(-) 1	Inverted output for CH1	
3	PV <sub>CC1</sub>	Supply terminal of output stage for CH1 <ul style="list-style-type: none"> <li>Supply terminal of output stage are not connected to other channel terminal.</li> </ul>	
4	OUT(+) <sup>1</sup>	Non-inverted output for CH1	
5	V <sub>IN1</sub>	Input for CH1 <ul style="list-style-type: none"> <li>Not biased inside</li> </ul>	
6	V <sub>RI</sub>	Input reference voltage <ul style="list-style-type: none"> <li>Under condition of <math>V_{RI} \leq 1.8V</math>, internal bias circuit is shut off.</li> <li>No signal input condition : <math>V_{RI} = V_{IN}</math></li> </ul>	
7	V <sub>CI</sub>	Output reference voltage <ul style="list-style-type: none"> <li><math>V_{OUT} = V_{CI} = (V_{CC} - V_F) / 2</math></li> </ul>	
8	V <sub>IN2</sub>	Input for CH2	Same as channel 1
9	OUT(+) <sup>2</sup>	Non-inverted output for CH2	
10	PV <sub>CC2</sub>	Supply terminal of output stage for CH2	
11	OUT(-) <sup>2</sup>	Inverted output for CH2	
12	PW GND	Power GND	Same as channel 1
13	PW GND	Power GND	
14	OUT(-) <sup>3</sup>	Inverted output for CH3	
15	PV <sub>CC3</sub>	Supply terminal of output stage for CH3	
16	OUT(+) <sup>3</sup>	Non-inverted output for CH3	-
17	V <sub>IN3</sub>	Input for CH3	
18	S GND	Supply terminal of small signal GND	
19	S VCC	Small signal GND	
20	V <sub>IN4</sub>	Input for CH4	Same as channel 1
21	OUT(+) <sup>4</sup>	Non-inverted output for CH4	
22	PV <sub>CC4</sub>	Supply terminal of output stage for CH4	
23	OUT(-) <sup>4</sup>	Inverted output for CH4	
24	PW GND	Power GND	

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## PRECAUTION USE

- Input Stage
  - Input stages are consisted of differential circuit of NPN Tr, and have built-in IB compensation circuit.
- Built-in Driver
  - Each channel driver consists of BTL configuration linear amplifier.
  - Voltage gain is fixed :  $G_V=15.5\text{dB}$  (Typ.)
  - Voltage loss for output stage is  $2V_{BE}=V_{CE}(\text{sat})$  for positive cycle,  $V_{CE}(\text{sat})$  for negative cycle, because of no-bootstrap circuit. So, output DC voltage is designed as less than  $1/2 V_{CC}$ .
- $V_{RI}$  Terminal
  - $V_{RI}$  is reference voltage terminal for input signal.
  - If reference voltage from servo IC drop less than 1.8V, protection circuit operates and shut off bias circuit inside. This operation is to prevent load from moving undesirably in case of  $V_{RI}$  drop for accident or some reason.
- $V_{CI}$  Terminal
  - Output DC voltage is determined by circuit of this terminal inside as ;  
$$V_{CI}=V_{OUT(DC)}=(V_{CC}-V_F)/2$$
  - Output signal dynamic range is depend on  $V_{CC}$  On the other hand, input signal dynamic range is determined by  $V_{RI}$  as mentioned and voltage gain is fixed inside. So, maximum output voltage does not increase as  $V_{CC}$  increases.
  - Because of BTL configuration, Ripple Rejection Ratio does not improve not much when capacitor is connected to  $V_{CI}$  terminal to GND.
- GND
  - Large signal GND is for output stage and small signal GND is for stages from input circuit to pro-output stage.
  - These GND pins are not connected inside.
  - The heat of power dissipation is transferred to PCB, through these PW-GND pin, because, ①, ⑫, ⑬, ⑭ pin are connected each other and to substrate of pellet to connected copper foil area as large as possible.
- Oscillation preventive capacitor
  - We recommend to use the capacitor of  $0.1\mu\text{F}$ , between each output terminals. But perform the temperature test to check the oscillation allowance, since the oscillation allowance is varied according to the causes described below.
    - 1) Supply voltage
    - 2) Ambient temperature
    - 3) Load impedance
    - 4) Capacity value of condenser
    - 5) Kind of condenser
    - 6) Layout of printed board
- We recommend to connect Pass-condenser, which is about 10 to  $100\mu\text{F}$  between  $V_{RI}$  terminal and GND.
- $V_{CI}$  terminal is recommend to use "OPEN".