

POWER DRIVER IC FOR CD PLAYER

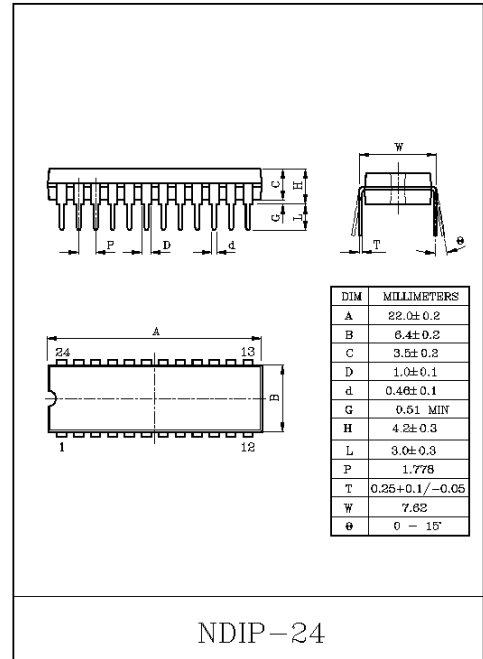
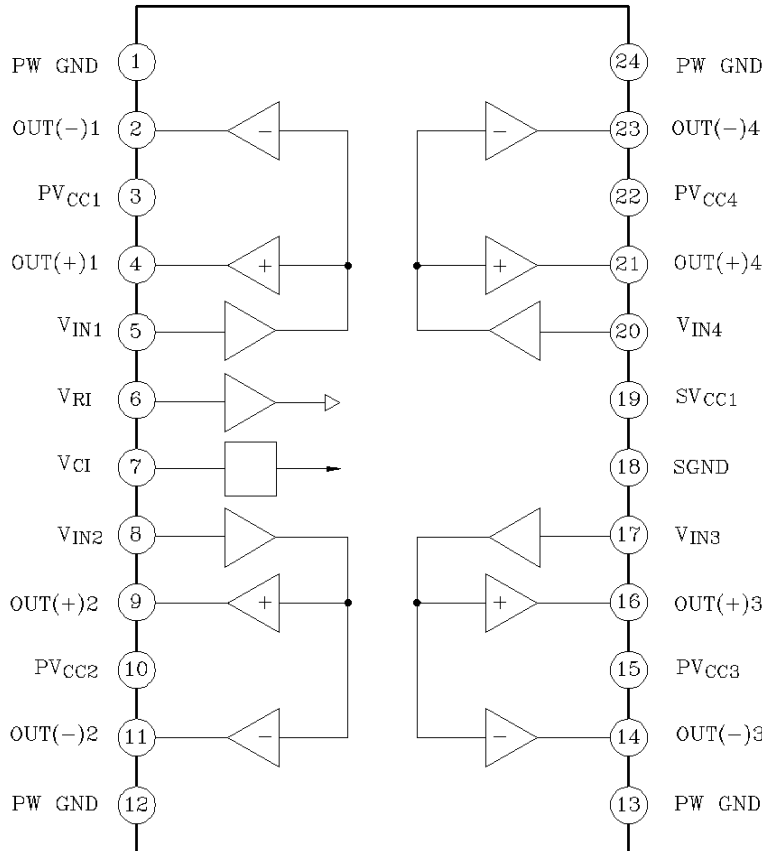
The KIA2092N is a power driver IC developed for CD players.

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.)

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MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	14	V
Power Dissipation	P _D (Note 1)	(2) (Note 2)	W
Operating Temperature	T _{opr}	-30~85	°C
Storage Temperature	T _{stg}	-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

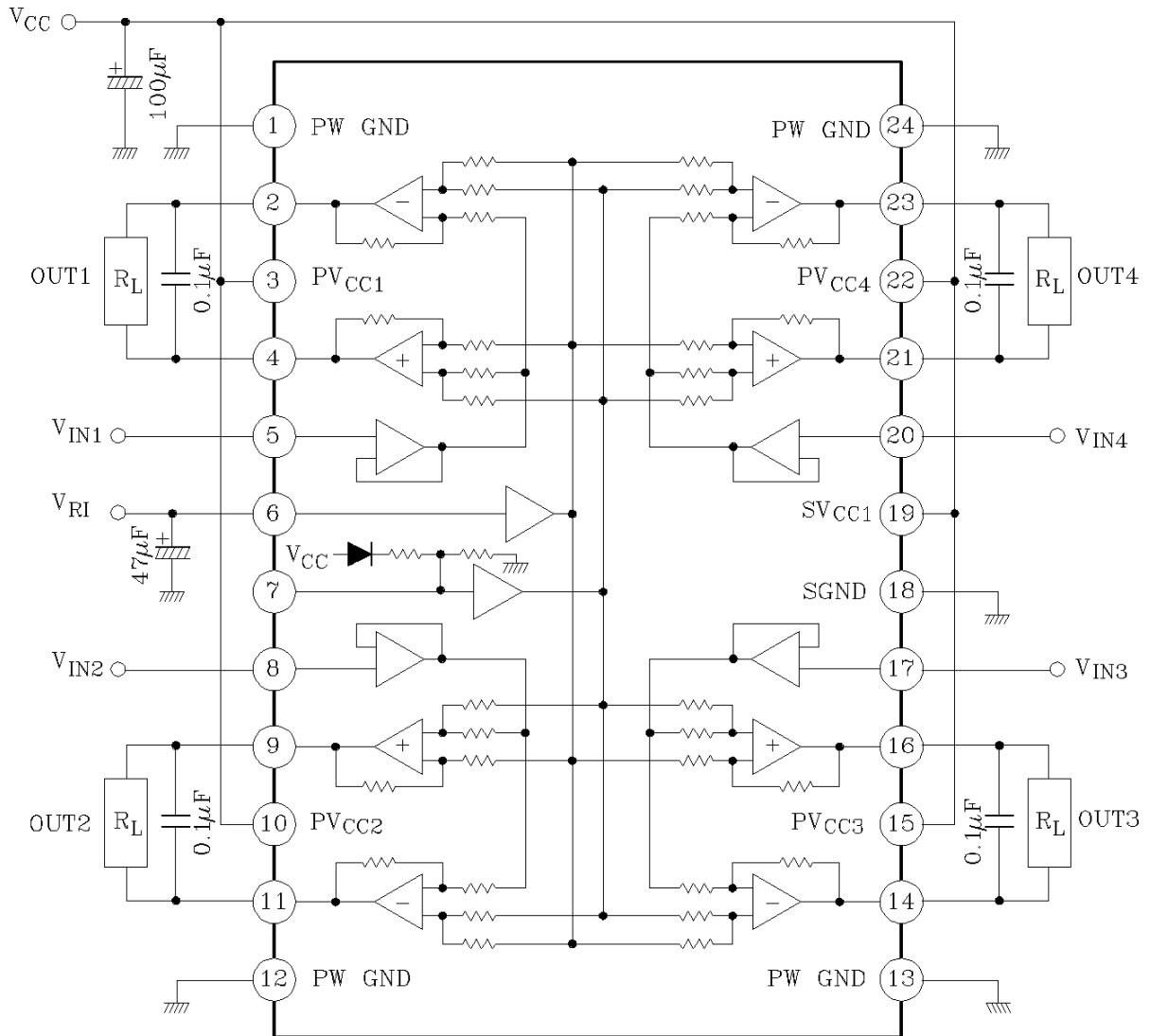
ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{CC}=5V, R_L=5Ω, R_G=620Ω, V_{RI}=2.1V, f=1kHz, Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V _{CC}	-	4.0	-	10.0	V
Quiescent Current	I _{CCQ}	V _{in} =0, R _L =OPEN	20	35	60	mA
Input Offset Current	I _{IN}	V _{IN} =2.1V	-	250	800	nA
V _{RI} Terminal Offset Current	I _{I0}	V _{RI} =2.1V	-	35	120	μA
Output Offset Voltage	V _{O OS1}	V _{CC} =5V, R _G =0Ω	-30	-	30	mV
	V _{O OS2}	V _{CC} =8V, R _G =0Ω	-50	-	50	
	V _{O OS3}	V _{CC} =12V, R _G =0Ω	-100	-	100	
Reference Output Voltage	V _{OUT}	-	-	2.1	-	V
Maximum Output Voltage	V _{OM1}	V _{CC} =5V	4.0	5.0	-	V _{P-P}
	V _{OM2}	V _{CC} =6V	5.0	6.0	-	
Voltage Gain	G _V	V _{in} =100mV _{rms}	14.5	15.5	16.5	dB
Frequency Response	f _c	V _{in} =100mV _{rms}	-	100	-	kHz
Total Harmonic Distortion	THD	V _{in} =100mV _{rms}	-	-50	-	dB
Slew Rate	S.R.	V _{out} =2V _{P-P}	-	1.0	-	V/μS
Cross Talk	C.T.	V _{out} =1V _{rms}	-	-60	-	dB
Ripple Rejection Ratio	R.R.	f _{rip} =100Hz, V _{rip} =100mV _{rms}	-	-60	-	dB
Thermal Shut Down Temperature	T _{TSD}	Chip temperature	-	150	-	°C
V _{RI} -GND Short Protection Voltage	V _{RI OFF}	-	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"> Connected to substrate. ①, ⑫, ⑬, ⑭ pin are connected inside. 		
2	OUT(-) 1	Inverted output for CH1		
3	PV _{CC1}	Supply terminal of output stage for CH1 <ul style="list-style-type: none"> Supply terminal of output stage are not connected to other channel terminal. 		
4	OUT(+) 1	Non-inverted output for CH1		
5	V _{IN1}	Input for CH1 <ul style="list-style-type: none"> Not biased inside 		
6	V _{RI}	Input reference voltage <ul style="list-style-type: none"> Under condition of $V_{RI} \leq 1.8V$, internal bias circuit is shut off. No signal input condition : $V_{RI} = V_{IN}$ 		
7	V _{CI}	Output reference voltage <ul style="list-style-type: none"> $V_{OUT} = V_{CI} = (V_{CC} - V_F) / 2$ 		
8	V _{IN2}	Input for CH2	Same as channel 1	
9	OUT(+) 2	Non-inverted output for CH2		
10	PV _{CC2}	Supply terminal of output stage for CH2		
11	OUT(-) 2	Inverted output for CH2		
12	PW GND	Power GND	Same as channel 1	
13	PW GND	Power GND		
14	OUT(-) 3	Inverted output for CH3		
15	PV _{CC3}	Supply terminal of output stage for CH3		
16	OUT(+) 3	Non-inverted output for CH3	Same as channel 1	
17	V _{IN3}	Input for CH3		
18	S GND	Supply terminal of small signal GND		-
19	S VCC	Small signal GND		-
20	V _{IN4}	Input for CH4	Same as channel 1	
21	OUT(+) 4	Non-inverted output for CH4		
22	PV _{CC4}	Supply terminal of output stage for CH4		
23	OUT(-) 4	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".