

TA2092N

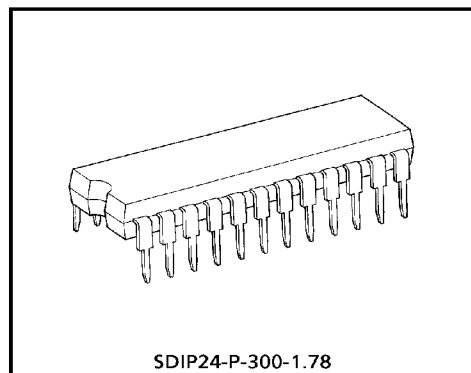
POWER DRIVER IC FOR CD PLAYER

The TA2092N 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

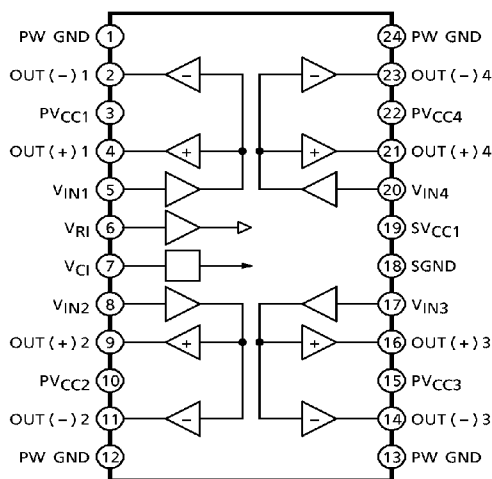
- 4 channel BTL linear drivers
- Fixed voltage gain : $G_V = 15\text{dB}$ (Typ.)
- High output power
 - : $V_{OM1} = 5V_{p-p}$ (Typ.) @ $V_{CC} = 5V, R_L = 5\Omega$
 - : $V_{OM2} = 6V_{p-p}$ (Typ.) @ $V_{CC} = 6V, R_L = 5\Omega$
- Thermal shutdown circuit
- Input reference voltage short protection
-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



SDIP24-P-300-1.78

Weight : 1.2g (Typ.)

BLOCK DIAGRAM



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TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	PW GND	Power GND ● Connected to substrate. ● ①, ⑫, ⑬, ⑭ pin are connected inside.	
2	OUT (-) 1	Inverted output for CH1	
3	PVCC1	Supply terminal of output stage for CH1 ● 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 ● Not biased inside	
6	V _{RI}	Input reference voltage ● 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 ● $V_{OUT} = V_{CI} = (V_{CC} - V_F) / 2$	
8	V _{IN2}	Input for CH2	Same as channel 1
9	OUT (+) 2	Non-inverted output for CH2	
10	PVCC2	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	PVCC3	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	PVCC4	Supply terminal of output stage for CH4	
23	OUT (-) 4	Inverted output for CH4	
24	PW GND	Power GND	

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MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

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	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55~150	$^\circ\text{C}$

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

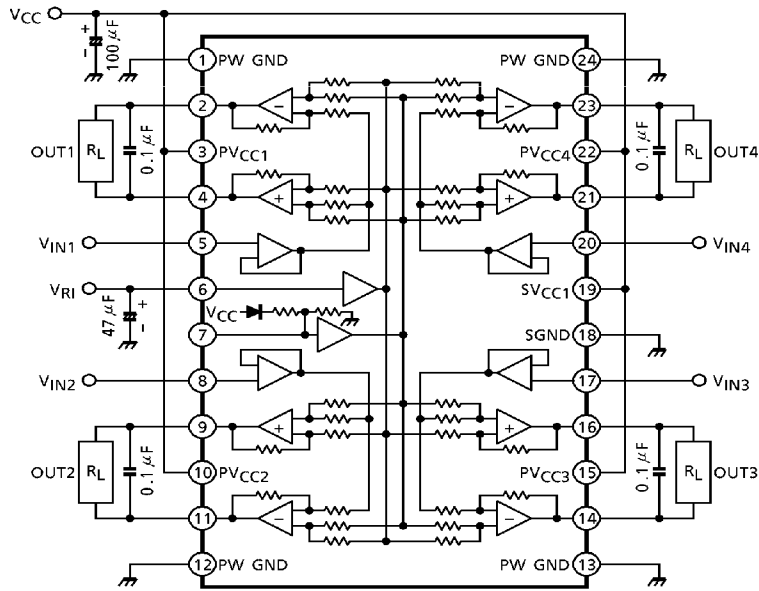
(Note 2) : Derated above $T_a = 25^\circ\text{C}$, in the proportion of 62.5mW/ $^\circ\text{C}$.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $V_{CC} = 5\text{V}$, $R_L = 5\Omega$, $R_g = 620\Omega$, $V_{RI} = 2.1\text{V}$, $f = 1\text{kHz}$, $T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V_{CC}	—	—	4.0	—	10.0	V
Quiescent Current	I_{CCQ}	—	$V_{in} = 0$, $R_L = \text{OPEN}$	20	35	60	mA
Input Offset Current	I_{IN}	—	$V_{IN} = 2.1\text{V}$	—	250	800	nA
V_{RI} Terminal Offset Current	I_{I0}	—	$V_{RI} = 2.1\text{V}$	—	35	120	μA
Output Offset Voltage	V_O OS1	—	$V_{CC} = 5\text{V}$, $R_g = 0\Omega$	-30	—	30	mV
	V_O OS2	—	$V_{CC} = 8\text{V}$, $R_g = 0\Omega$	-50	—	50	
	V_O OS3	—	$V_{CC} = 12\text{V}$, $R_g = 0\Omega$	-100	—	100	
Reference Output Voltage	V_{OUT}	—	—	—	2.1	—	V
Maximum Output Voltage	V_{OM1}	—	$V_{CC} = 5\text{V}$	4.0	5.0	—	V_{p-p}
	V_{OM2}	—	$V_{CC} = 6\text{V}$	5.0	6.0	—	
Voltage Gain	G_V	—	$V_{in} = 100\text{mV}_{rms}$	14.5	15.5	16.5	dB
Frequency Response	f_c	—	$V_{in} = 100\text{mV}_{rms}$	—	100	—	kHz
Total Harmonic Distortion	THD	—	$V_{in} = 100\text{mV}_{rms}$	—	-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.	—	$f_{rip} = 100\text{Hz}$, $V_{rip} = 100\text{mV}_{rms}$	—	-60	—	dB
Thermal Shut Down Temperature	T_{TSD}	—	Chip temperature	—	150	—	$^\circ\text{C}$
$V_{RI} \sim \text{GND}$ Short Protection Voltage	$V_{RI OFF}$	—	—	1.4	1.6	1.8	V

TEST CIRCUIT

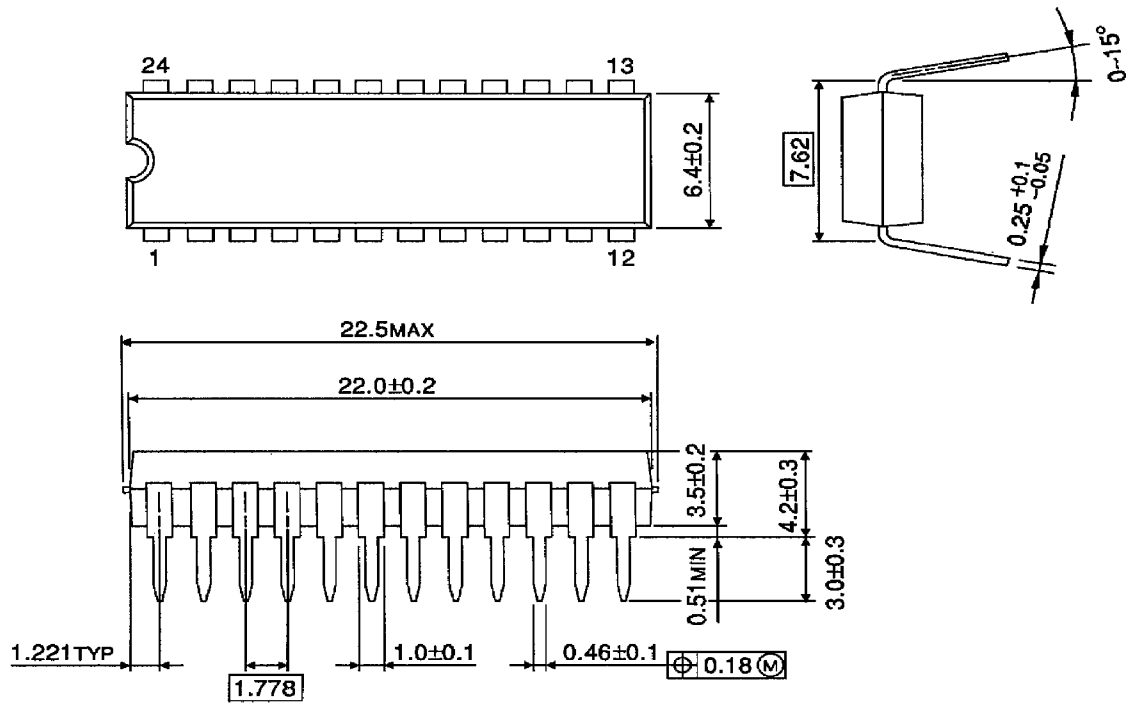


PRECAUTION USE

- 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 $1/2V_{CC}$.
- 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 undesireably 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 ;
$$V_{CI} = V_{OUT}(\text{DC}) = (V_{CC} - V_F) / 2$$
 - 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 pre-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".

OUTLINE DRAWING
SDIP24-P-300-1.78

Unit : mm



Weight : 1.2g (Typ.)