

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA2092N

POWER DRIVER IC FOR CD PLAYER

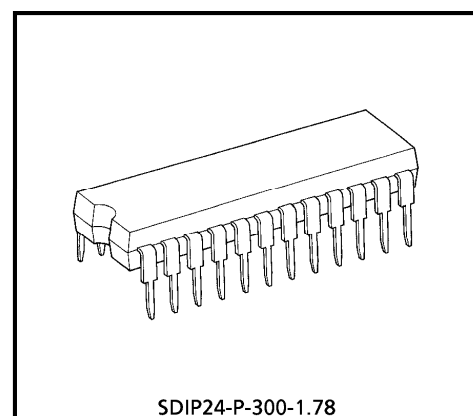
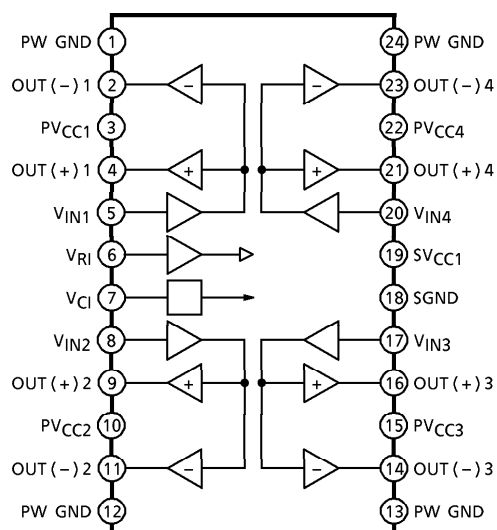
The TA2092N is a power driver IC developed for CD players.

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
 - : $V_{CC}(\text{opr}) = 4.0 \sim 10.0V$ ($T_a = 25^\circ\text{C}$)

BLOCK DIAGRAM



Weight : 1.2g (Typ.)

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TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	PW GND	Power GND ● Connected to substrate. ● ①, ⑫, ⑬, ⑭pin 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	VIN1	Input for CH1 ● Not biased inside	
6	VRI	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	VCI	Output reference voltage ● $V_{OUT} = V_{CI} = (V_{CC} - V_F) / 2$	
8	VIN2	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	VIN3	Input for CH3	
18	S GND	Supply terminal of small signal GND	
19	S VCC	Small signal GND	
20	VIN4	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 (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.

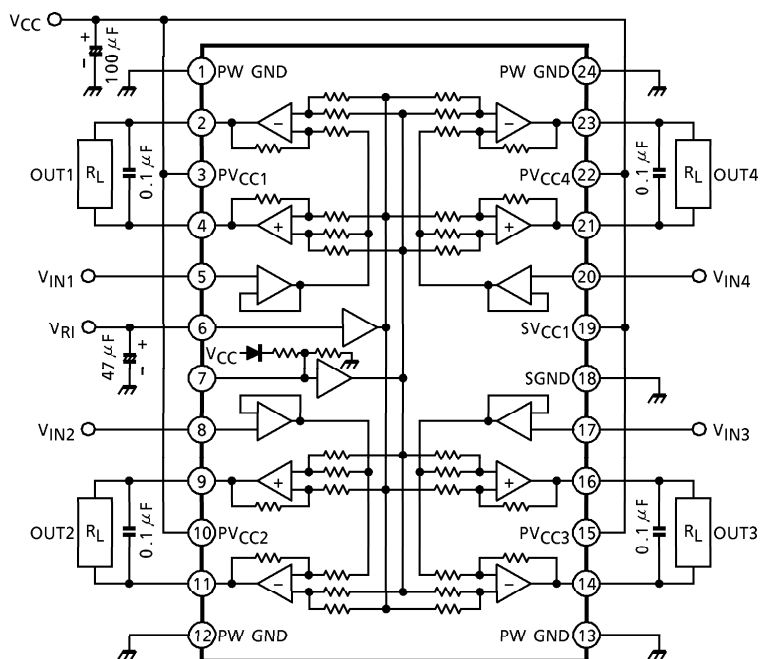
(Note 2) : Derated above Ta = 25°C, in the proportion of 62.5mW/°C.

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 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 = 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

TEST CIRCUIT

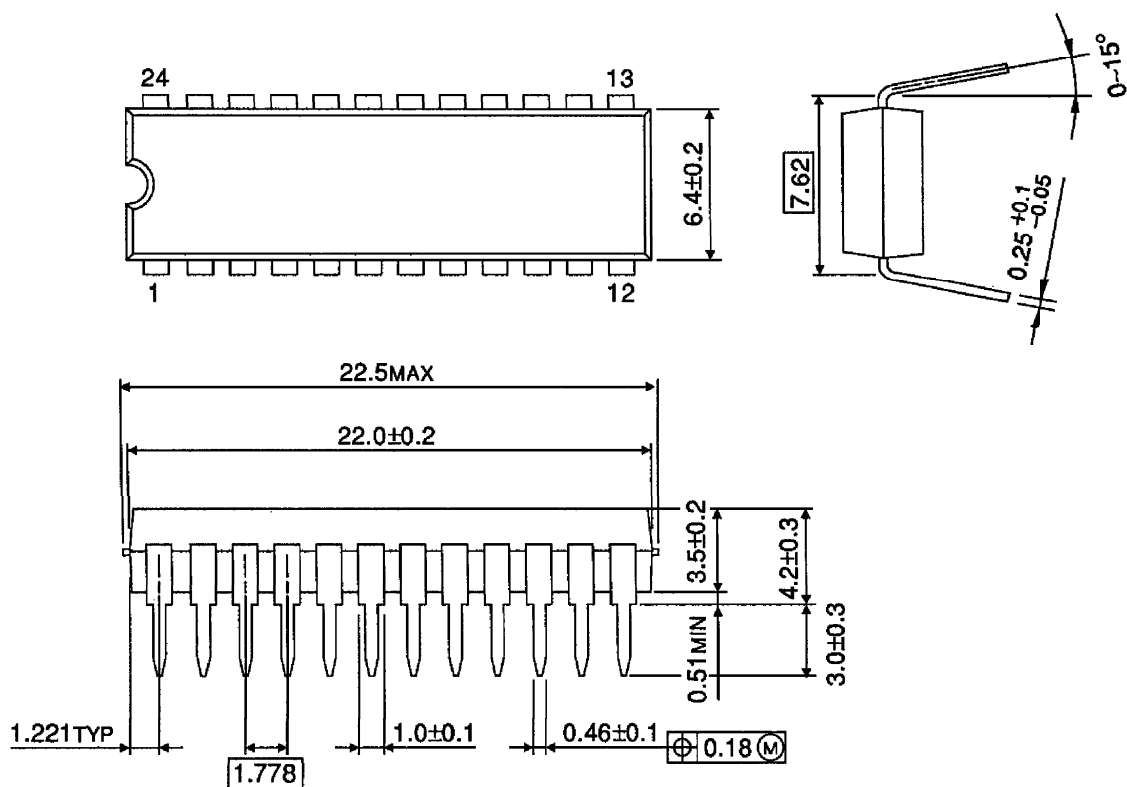


PRECAUTION USE

- 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.)