

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

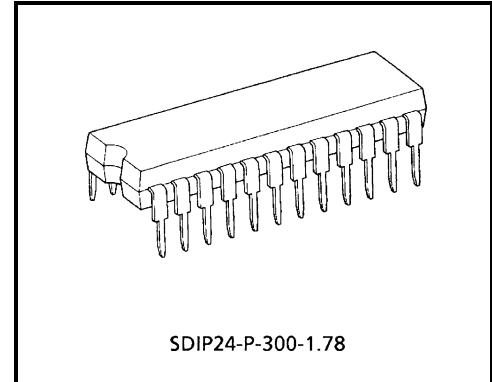
TA2092AN

Power Driver IC for CD Player

The TA2092AN 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.

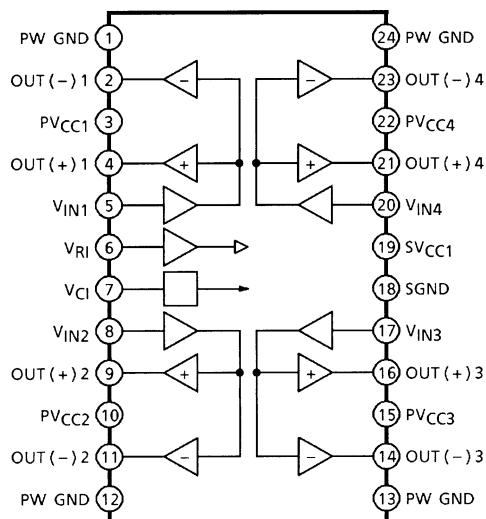
Features

- 4 channel BTL linear drivers
- Fixed voltage gain: $G_V = 15.5\text{dB}$ (typ.)
- High output power
- Thermal shutdown circuit
- Input reference voltage short protection
- Operating voltage range: $V_{CC}(\text{opr}) = 4.5\text{~}10.0\text{ V}$ ($T_a = 25^\circ\text{C}$)



Weight: 1.2 g (typ.)

Block Diagram



Terminal Explanation

Terminal No.	Symbol	Function	Equivalent Circuit
1	PW GND	Power GND • Connected to substrate. • pin 1, 12, 13, 24 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 $V_{RI} \leq 1.1$ V, 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	
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	
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	
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	
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	

Maximum Ratings (Ta = 25°C)

Characteristics	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

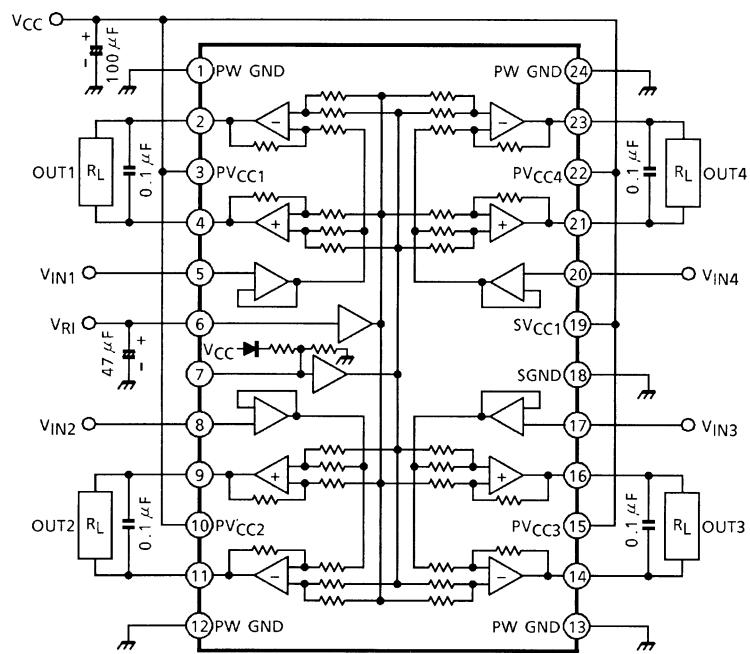
Note 1: Mounted on 50 mm × 50 mm × 1.6 mm size board with copper area 60 % over.

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

Electrical Characteristics (unless otherwise specified, V_{CC} = 8 V, R_L = 5 Ω, f = 1 kHz, V_{BIAS} = 1.65 V, R_g = 3.3 kΩ, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Operating voltage	V _{CC}	—	—	4.5	8.0	10.0	V
Quiescent current	I _{CCQ}	—	V _{IN} = 0, R _L = OPEN	30	50	70	mA
Input offset current	I _{IN}	—	V _{IN} = 1.65 V	—	0	200	nA
V _{RI} terminal offset current	I ₁₀	—	V _{RI} = 1.65 V	—	30	60	μA
Output offset voltage	V _{OS}	—	R _g = 3.3 kΩ	-68	—	68	mV
Reference output voltage	V _{OUT}	—	—	—	3.6	—	V
Maximum output voltage	V _{OM}	—	—	7	8	—	V _{p-p}
Voltage gain	G _V	—	V _{IN} = 100 mV	14.5	15.5	16.5	dB
Frequency response	f _c	—	V _{in} = 100 mVrms	—	100	—	kHz
Total harmonic distortion	THD	—	V _{in} = 100 mVrms	—	-50	—	dB
Slew rate	S.R.	—	V _{out} = 2 V _{p-p}	—	1.0	—	V/μs
Cross talk	C.T.	—	V _{out} = 1 Vrms	—	-60	—	dB
Ripple rejection ratio	R.R.	—	f _{rip} = 100 Hz, V _{rip} = 100 mVrms	—	-60	—	dB
Thermal shut down temperature	T _{TSD}	—	Chip temperature	—	150	—	°C
V _{RI} ~GND short protection voltage	V _{RI} OFF	—	—	0.9	1.1	1.3	V

Test Circuit



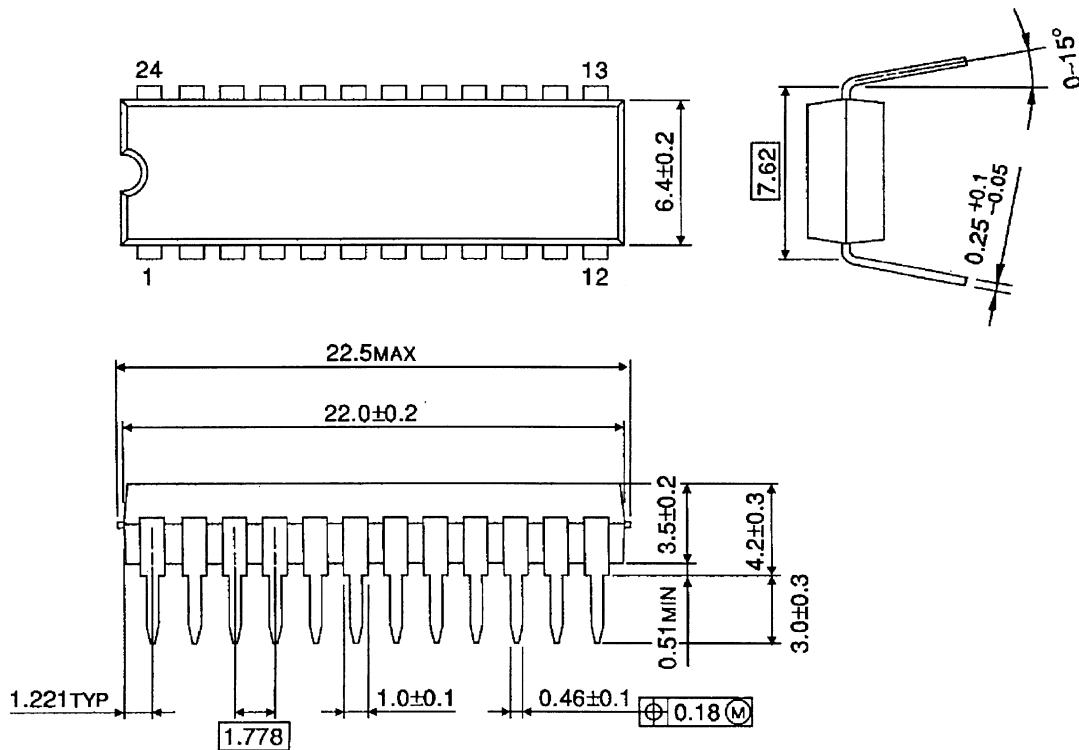
Precaution Use

- Input stage
 - Input stages are consisted of differential circuit of PNP Tr, and have built-in base current compensation circuit.
- Built-in driver
 - Each channel driver consists of BTL configuration linear amplifier. Voltage gain is fixed: $GV = 15.5\text{dB}$ (typ.)
 - Voltage loss for output stage is $2 VBE = VCE(\text{sat})$ for positive cycle, $VCE(\text{sat})$ for negative cycle, because of no-bootstrap circuit. So, output DC voltage is designed as less than $1/2 VCC$.
- VRI terminal
 - VRI is reference voltage terminal for input signal. If reference voltage from servo IC drop less than 1.1 V, protection circuit operates and shut off bias circuit inside. This operation is to prevent load from moving undesirably in case of VRI drop for accident or some reason.
- VCI terminal
 - Output DC voltage is determined by circuit of this terminal inside as;
$$VCI = VOUT(DC) = (VCC - VF) / 2$$
 - Output signal dynamic range is depend on VCC. On the other hand, input signal dynamic range is determined by VRI as mentioned and voltage gain is fixed inside. So, maximum output voltage does not increase as VCC increases.
 - Because of BTL configuration, Ripple Rejection Ratio does not improve not much when capacitor is connected to VCI 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, 24 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 47 to $100 \mu\text{F}$ between VRI terminal and GND.
 - VCI terminal is recommend to use "OPEN".

Package Dimensions

SDIP24-P-300-1.78

Unit : mm



Weight: 1.2 g (typ.)

RESTRICTIONS ON PRODUCT USE

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