



# LA6541

## 4-channel Bridge Driver for Compact Discs

### Overview

The LA6541 is a 4-channel bridge (BTL) driver with a 5 V power supply (uses an external PNP transistor) developed for compact discs.

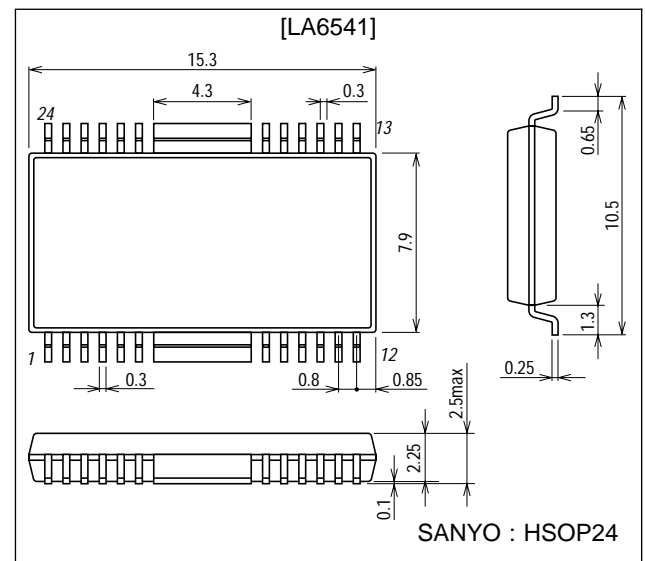
### Functions and Features

- 4-channel bridge (BTL) power amplifier.
- $I_O \text{ max.} = 700 \text{ mA}$ .
- With mute circuit  
(Affects all amplifier outputs, Amp 1 to Amp 8).  
(When the mute voltage is low, the outputs turn off;  
when the mute voltage is high, the outputs turn on).
- 5.0 V regulator built in (Uses external PNP transistor).
- Reset circuit built in (The reset output delay time can be adjusted through an external capacitor).

### Package Dimensions

unit : mm

#### 3227-HSOP24



### Specifications

#### Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		14	V
Maximum input voltage	$V_{INB}$		13	V
Mute pin voltage	$V_{Mute}$		13	V
Allowable power dissipation	$P_d \text{ max}$	When using standard board $114.3 \times 76.1 \times 1.5 \text{ mm}$ (material: glass epoxy)	2.3	W
Operating temperature	$T_{opr}$		$-20$ to $+75$	$^\circ\text{C}$
Storage temperature	$T_{stg}$		$-55$ to $+150$	$^\circ\text{C}$

#### Operating Conditions at $T_a = 25^\circ\text{C}$

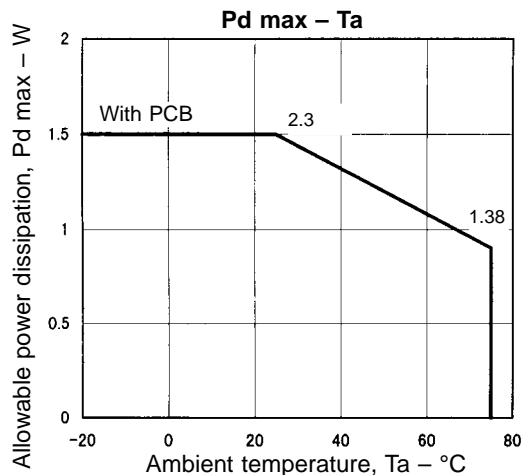
Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	$V_{CC}$		5.6 to 13	V
Reset output source current	$I_{ORH}$		0 to 200	$\mu\text{A}$
Reset output sink current	$I_{ORL}$		0 to 2	mA

**Electrical Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8.0\text{ V}$ ,  $V_{REF} = 2.5\text{ V}$** 

Parameter	Symbol	Conditions	min	typ	max	Unit
No-load current drain	$I_{CC1}$	When all amplifier outputs are on (Mute high)		20	40	mA
	$I_{CC2}$	When all amplifier outputs are off (Mute low)		15	35	mA
Output offset voltage	$V_{OF1}$	Amplifier 1 to 2 ( $V_{O1}$ to $V_{O2}$ ), Amplifier 3 to 4 ( $V_{O3}$ to $V_{O4}$ )	-50		+50	mV
	$V_{OF2}$	Amplifier 5 to 6 ( $V_{O5}$ to $V_{O6}$ ), Amplifier 7 to 8 ( $V_{O7}$ to $V_{O8}$ )	-50		+50	mV
Buffer amplifier input voltage range	$V_{BIN}$		1.5		$V_{CC}-1.5$	V
Input voltage range	$V_{IN}$		1.0		$V_{CC}-1.5$	V
Output source voltage	$V_{O1}$	Note 1, when $R_L = 8.0\ \Omega$	5.0	5.6		V
Output sink voltage	$V_{O2}$	Note 2, when $R_L = 8.0\ \Omega$		1.8	2.4	V
Closed-circuit voltage gain	$V_G$	Between bridge amplifiers		9		dB
Slew rate	SR			0.15		V/ $\mu\text{s}$
Mute on voltage	$V_{Mute}$	Note 3		1.2		V
[Power Supply] (with 2SB632K connected externally)						
Output voltage	$V_{OUT1}$	$I_O = 200\text{ mA}$	4.75	5.0	5.25	V
Line regulation	$\Delta V_{OLN1}$	$5.6\text{ V} \leq V_{IN1} \leq 12\text{ V}$		20	100	mV
Load regulation	$\Delta V_{OLD1}$	$5\text{ mA} \leq I_O \leq 200\text{ mA}$		50	150	mV
[Reset]						
High reset output voltage	$V_{ORH}$	$I_{ORH} = 200\ \mu\text{A}$ , Cd pin open	4.73	4.98	5.23	V
Low reset output voltage	$V_{ORL}$	$I_{SRL} = 2\text{ mA}$ , Cd is shorted to GND		100	200	mV
Reset threshold voltage	$V_{RT}$	Note 4		4.3		V
Reset hysteresis voltage	$V_{hys}$	Note 5	40	100	200	mV
Reset output delay time	$t_d$	Cd = $0.1\ \mu\text{F}$		10		ms

Notes:

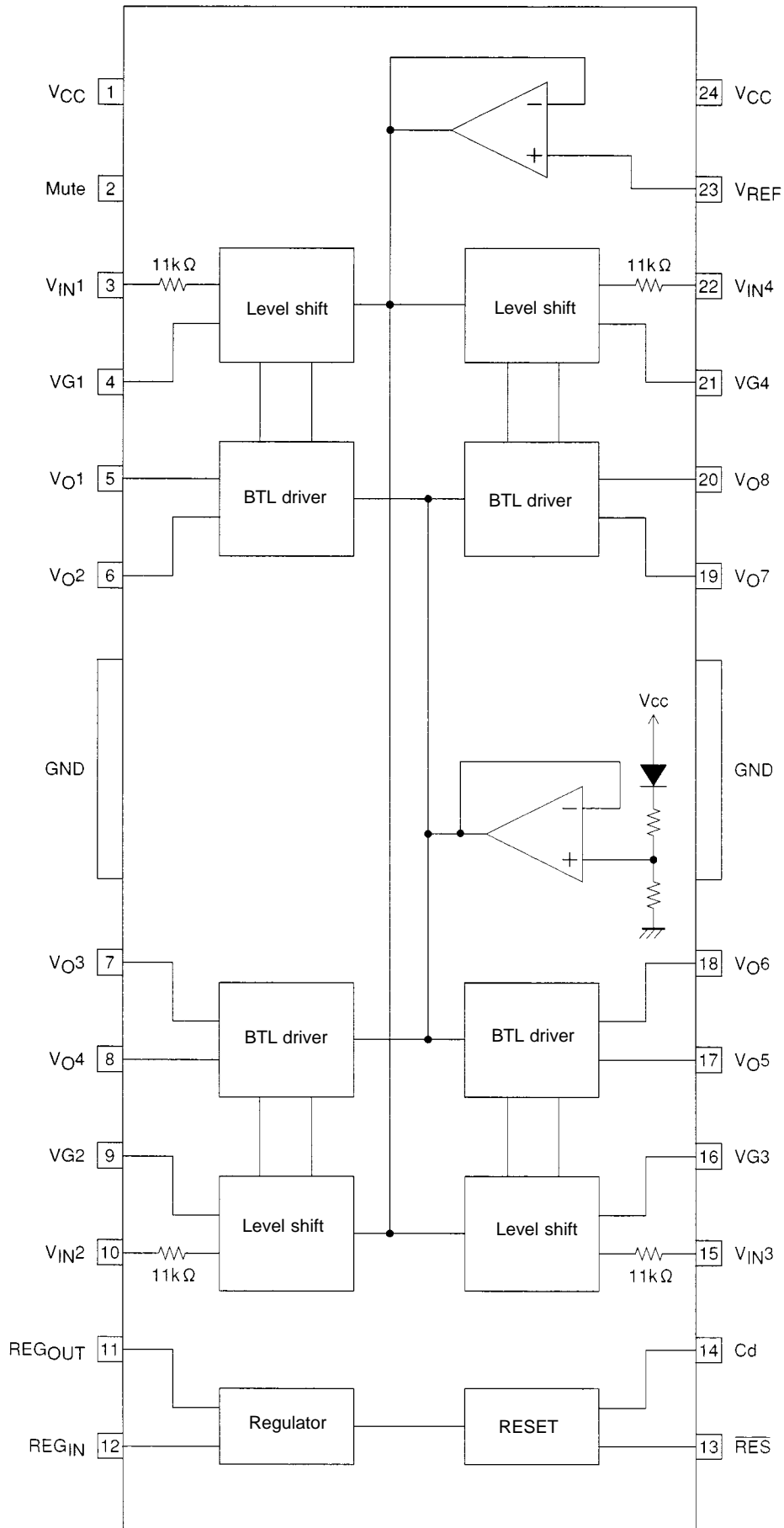
- Source voltage to ground when an  $8\ \Omega$  load is connected between bridge amplifier outputs.
- Sink voltage to ground when an  $8\ \Omega$  load is connected between bridge amplifier outputs.
- When the mute signal is high, all amplifier outputs turn on, and when low, all amplifier outputs turn off. When the mute signal is low, amplifier output is undefined.
- 5 V supply voltage when the reset output goes low.
- Potential difference from the 5 V supply voltage when the reset output goes low and when it goes high.

**Truth Table**

Input	MUTE	CH1		CH2		CH3		CH4	
		$V_{O1}$ (Amp1)	$V_{O2}$ (Amp2)	$V_{O3}$ (Amp3)	$V_{O4}$ (Amp4)	$V_{O5}$ (Amp5)	$V_{O6}$ (Amp6)	$V_{O7}$ (Amp7)	$V_{O8}$ (Amp8)
H	H	H	L	L	H	H	L	L	H
	L	—	—	—	—	—	—	—	—
L	H	L	H	H	L	L	H	H	L
	L	—	—	—	—	—	—	—	—

\* The “—” symbol means “amplifier output is OFF.”

# Block Diagram

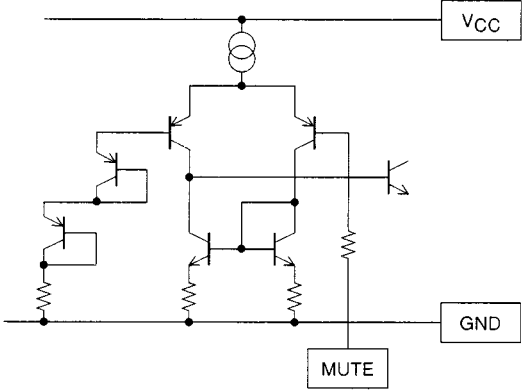
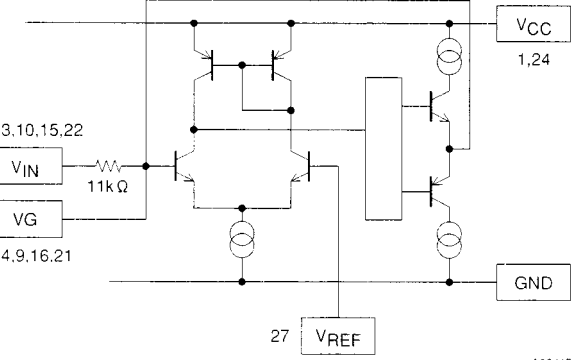
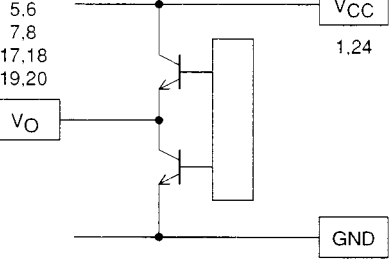


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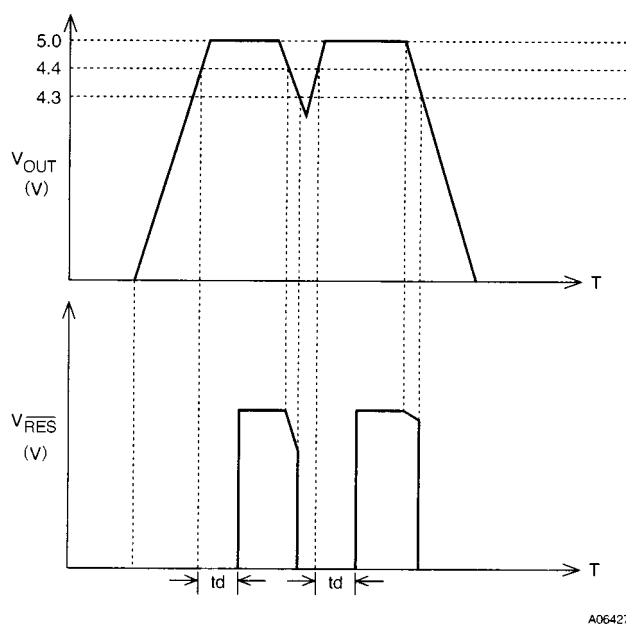
Note: Use a delay capacitor ( $C_d$ ) whose capacitance does not change much according to the temperature.

## Pin Functions

Pin No.	Pin Name	Equivalent Circuit	Description
1	V <sub>CC</sub>		Power supply (shorted with pin 24)
2	Mute	 <p>A06419</p>	ON/OFF control for all BTL AMP outputs
3 4 9 10 15 16 21 22	V <sub>IN1</sub> V <sub>G1</sub> V <sub>G2</sub> V <sub>IN2</sub> V <sub>IN3</sub> V <sub>G3</sub> V <sub>G4</sub> V <sub>IN4</sub>	 <p>A06417</p>	BTL AMP 1 input BTL AMP 1 input (for gain control) BTL AMP 2 input (for gain control) BTL AMP 2 input BTL AMP 3 input BTL AMP 3 input (for gain control) BTL AMP 4 input (for gain control) BTL AMP 4 input
5 6 7 8 17 18 19 20	V <sub>O1</sub> V <sub>O2</sub> V <sub>O3</sub> V <sub>O4</sub> V <sub>O5</sub> V <sub>O6</sub> V <sub>O7</sub> V <sub>O8</sub>	 <p>A06418</p>	BTL AMP 1 output (non-inverting side) BTL AMP 1 output (inverting side) BTL AMP 2 output (inverting side) BTL AMP 2 output (non-inverting side) BTL AMP 3 output (non-inverting side) BTL AMP 3 output (inverting side) BTL AMP 4 output (inverting side) BTL AMP 4 output (non-inverting side)
11	REG <sub>OUT</sub>		Connection for collector of external transistor (PNP); 5 V supply output
12	REG <sub>IN</sub>		Connection for base of external transistor (PNP)
13	RES		Reset output
14	Cd		Reset output delay time setting (with capacitor)
23	V <sub>REF</sub>		Reference voltage input for level shift circuit
24	V <sub>CC</sub>		Power supply (shorted with pin 1)

Note: GND (minimum electrical potential) should be connected to the center frame of the pin.

## Reset Operation



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