



SANYO Semiconductors

DATA SHEET

LA6559

Monolithic Linear IC

For CD

5-Channel Driver

(BTL : Four-Channel, H Bridge : One-Channel)

Overview

The LA6559 is a 5-channel driver (BTL : 4-channel, H bridge : 1-channel) for CD players.

Functions

- Power amplifier 5-channel built-in. (Bridge-connection (BTL) : 4-channel, H bridge : 1-channel)
- I_O max 1A
- Level shift circuit built-in (except H bridge).
- Mute circuit (output ON/OFF) built-in.
(Operable with BTL AMP with MUTE1 : CH1 and MUTE2 : CH2 to 4 and not operable for the H bridge of 3.3VREG)
- 3.3V regulator built-in (external PNP transistor).
- With a function to set the loading output voltage
- Overheat protection circuit (thermal shutdown) built-in.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		14	V
Allowable power dissipation	P_d max	Independent IC	0.8	W
		Mounted on a standard board. *	2	W
Maximum output current	I_O max	Each output for H bridge, channel 1 to 4.	1	A
Maximum input voltage	V_{INB}		13	V
MUTE pin voltage	V_{MUTE}		13	V
Operating temperature	T_{opr}		-30 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Standard board size : 76.1×114.3×1.6mm³, glass epoxy.

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}	Same for V_{CC} -VREG	5.6 to 13	V

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LA6559

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC1} = V_{CC2} = 8\text{V}$, $V_{REF} = 1.65\text{V}$, unless especially specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
ALL Blocks						
No-load current drain ON	I_{CC-ON}	BTL-AMP output ON, LOADING block OFF *1		30	50	mA
No-load current drain OFF	I_{CC-OFF}	All outputs OFF *1		10	20	mA
VREF input voltage range	VREF-IN		1		$V_{CC}-1.5$	V
Thermal shutdown temperature	TSD	*2	150	175	200	$^\circ\text{C}$
BTL AMP Block (CH1 to CH4)						
Output offset voltage	V_{OFF}	Voltage difference between outputs for BTL AMP, each channel. *3	-60		60	mV
Input voltage range	V_{IN}	Input voltage range for input for OP-AMP.	0		$V_{CC}-1.5$	mA
Output voltage	V_O	Each voltage between V_{O+} and V_{O-} when $R_L = 8\Omega$. *4	5.7	6.5		V
Closed-circuit voltage gain	VG	Input and output gain. *3	5.4	6	6.6	Times
Slew rate	SR	AMP Independent Multiply 2 between outputs. *2		0.5		$\text{V}/\mu\text{s}$
MUTE ON voltage	VMUTE-ON	Each MUTE *5	2			V
MUTE OFF voltage	VMUTE-OFF	Each MUTE *5			0.5	V
Input AMP Block (CH1 to 4)						
Input voltage range	V_{IN-OP}		0		$V_{CC}-1.5$	V
Output current (SINK)	SINK-OP		2			mA
Output current (SOURCE)	SOURCE-OP	*6	300	500		μA
Output offset voltage	V_{OFF-OP}		-10		10	mV
Loading Block (CH5, H bridge)						
Output voltage	V_{O-LOAD}	Forward, reverse, $R_L = 8\Omega$, $V_{CONT}=8\text{V}$ *4	5.7	6.5		V
Break output saturation voltage	$V_{CE-BREAK}$	Output voltage at braking *7			0.3	V
Input low level	V_{IN-L}				1	V
Input high level	V_{IN-H}		2			V
Output set voltage	VCONT	$I_O = 200\text{mA}$ (Between outputs), $V_{CONT} = 3\text{V}$	2.9	3.15	3.4	V
Power Supply Block (PNP transistor : 2SB632K-use)						
3.3V supply voltage	V_{OUT}	$I_O = 200\text{mA}$	3.15	3.3	3.45	V
REG-IN SINK current	REG-IN-SINK	Base current of external PNP *8		10		mA
Line regulation	ΔV_{OLN}	$6\text{V} \leq V_{CC} \leq 12\text{V}$		20	150	mV
Load regulation	ΔV_{OLD}	$5\text{mA} \leq I_O \leq 200\text{mA}$		50	200	mV

Note *1 : Current dissipation that is a sum of V_{CC1} and V_{CC2} and $S-V_{CC}$ at no load.

*2 : Design guarantee value

*3 : Input AMP is a BUFFER AMP.

*4 : Voltage difference between both ends of load (8Ω). Output saturated.

*5 : Output ON with MUTE : [H] and OFF with MUTE : [L] (HI impedance).

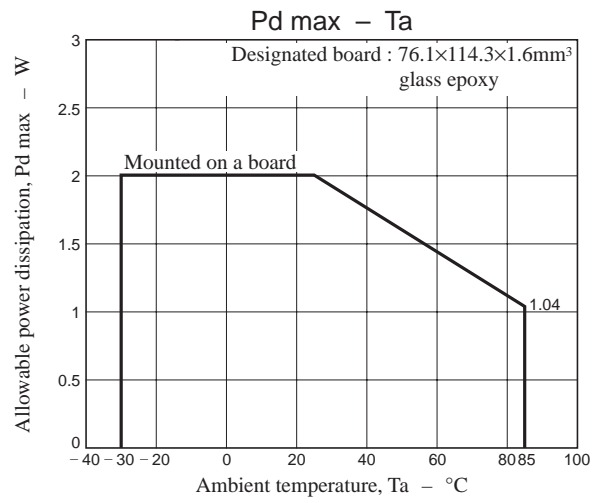
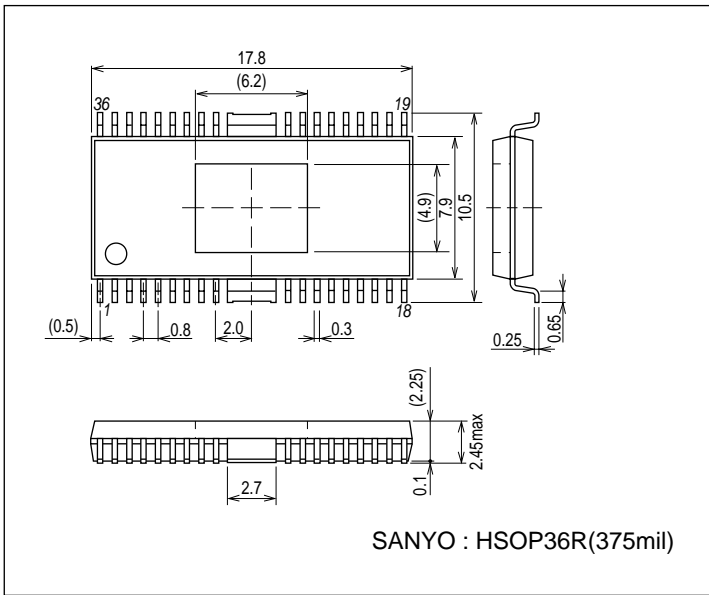
*6 : The source of input OP-AMP is a constant current. As the $11\text{k}\Omega$ resistance to the next stage is a load, pay due attention when setting the input OP-AMP gain.

*7 : Short (GND) brake used. SINK side output ON.

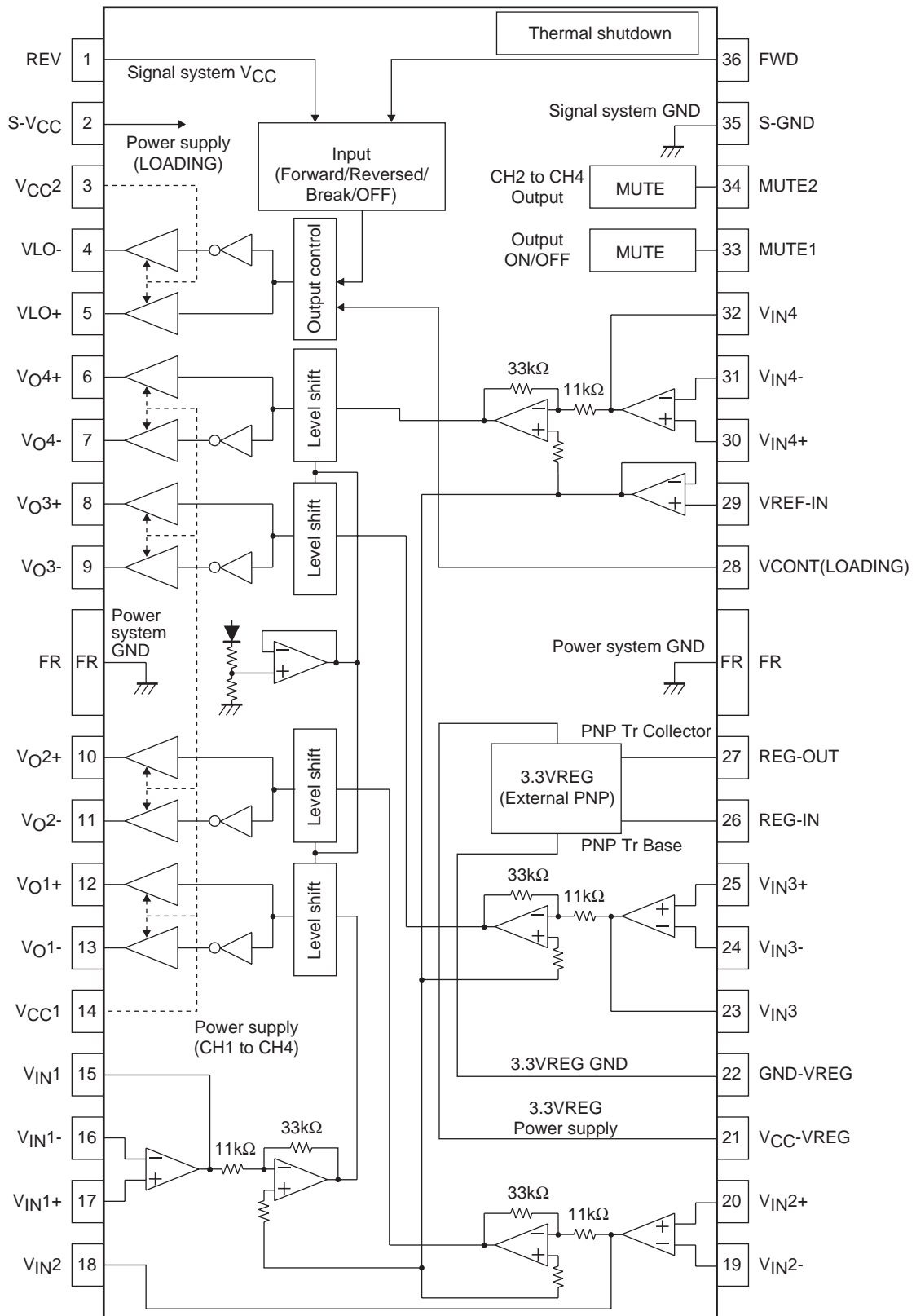
*8 : 3.3VREG incorporates a drooping protection circuit and operated when the base current is 10mA (TYP).

Package Dimensions

unit : mm (typ)
3251



Block Diagram



LA6559

Pin Functions

Pin No.	Symbol	Pin descriptions
1	REV	5CH (VLO) Output change pin (REV), logic input for loading block.
2	S-V _{CC}	Signal system power supply (BTL-AMP : CH1 to 4)
3	V _{CC2}	Power supply for loading block
4	VLO-	Loading output (-)
5	VLO+	Loading output (+)
6	V _{O4+}	Output pin (+) for channel 4
7	V _{O4-}	Output pin (-) for channel 4
8	V _{O3+}	Output pin (+) for channel 3
9	V _{O3-}	Output pin (-) for channel 3
10	V _{O2+}	Output pin (+) for channel 2
11	V _{O2-}	Output pin (-) for channel 2
12	V _{O1+}	Output pin (+) for channel 1
13	V _{O1-}	Output pin (-) for channel 1
14	V _{CC1}	CH1 to CH4 (BTL-AMP) output stage power supply
15	V _{IN1}	Input pin for channel 1
16	V _{IN1-}	OP-AMP input AMP-A input pin (-)
17	V _{IN1+}	OP-AMP input AMP-A input pin (+)
18	V _{IN2}	Input pin for channel 2, input AMP output
19	V _{IN2-}	Input pin (-) for channel 2
20	V _{IN2+}	Input pin (+) for channel 2
21	V _{CC-VREG}	3.3VREG power supply
22	GND-VREG	3.3VREG GND
23	V _{IN3}	Input pin for channel 3, input AMP output
24	V _{IN3-}	Input pin (-) for channel 3
25	V _{IN3+}	Input pin (+) for channel 3
26	REG-IN	PNP transistor base connected
27	REG-OUT	3.3V power output to which the PNP transistor collector connected.
28	VCONT (LOADING)	Output voltage set pin for loading block
29	VREF-IN	Reference voltage applied pin
30	V _{IN4+}	Input pin (+) for channel 4
31	V _{IN4-}	Input pin (-) for channel 4
32	V _{IN4}	Input pin for channel 4, input AMP output
33	MUTE1	Output ON/OFF, channel 1 (BTL AMP)
34	MUTE2	Output ON/OFF, channel 2 to 4 (BTL AMP)
35	S-GND	Signal system GND
36	FWD	Output change pin (FWD) for loading output (VLO+ -), logic input for loading block.

Note 1 : Center frame (FR) becomes GND for the power system (P-GND). Set this to the minimum potential together with S-GND.

Note 2 : Short-circuit each of V_{CC1}, V_{CC2}, V_{CC-VREG}, and S-V_{CC} power pins externally.

Pin Description

Pin No.	Symbol	Pin function	Description	Equivalent circuit
17 16 15 20 19 18 25 24 23 30 31 32	V_{IN1+} V_{IN1-} V_{IN1} V_{IN2+} V_{IN2-} V_{IN2} V_{IN3+} V_{IN3-} V_{IN3} V_{IN4+} V_{IN4-} V_{IN4}	Input (CH1 to 4)	Input pin (CH1 to 4)	
36 1	FWD REV	Input (LOADING)	Logic input pin. By combining H and L of this pin, any one of four modes (forward/ reversed/brake/idling) can be selected.	
12 13 10 11 8 9 6 7	V_{O1+} V_{O1-} V_{O2+} V_{O2-} V_{O3+} V_{O3-} V_{O4+} V_{O4-}	Output (CH1 to 4)	Output for channel 1 to 4.	
33 34	MUTE1 MUTE2	MUTE	BTL AMP output. Output ON/OFF for CH1 to CH4. MUTE : H Output OFF MUTE : L Output OFF	
5 4 28	VLO- VLO+ VCONT	Output (LOADING)	Output voltage set pin for loading block	

Truth Table (loading (H bridge) section)

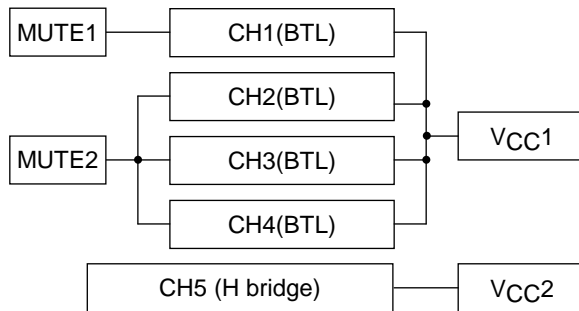
FWD	REV	Loading output
L	L	OFF *1
	H	Forward
H	L	Reversed
	H	(Short) brake *2

*1 The output has a high impedance.

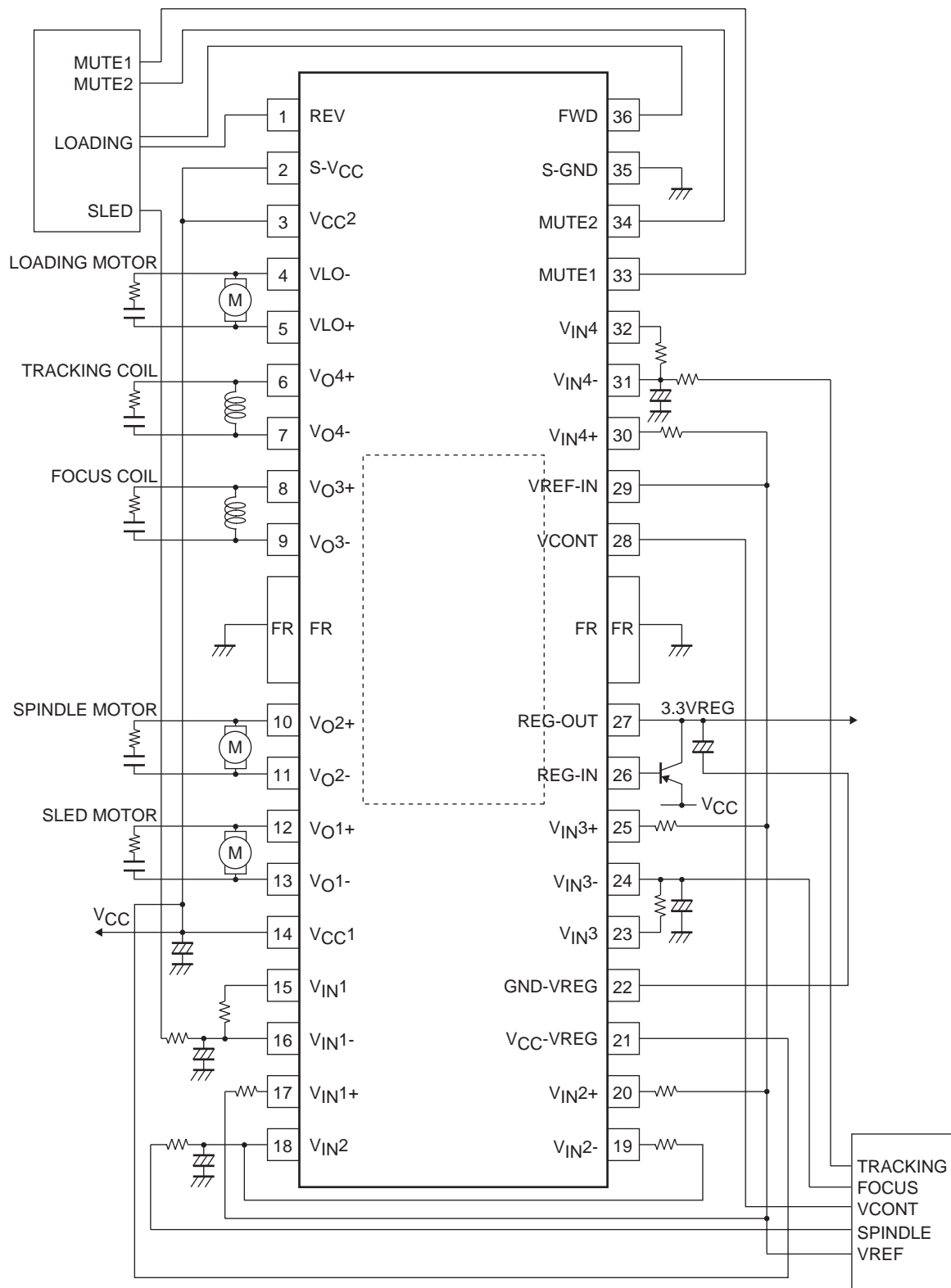
*2 At brake, the SINK side transistor is ON (short brake).

VLO+ and VLO- are approximately on the GND level.

Relation of MUTE and Power (VCC*)



Sample Application Circuit



Note : Add CR between outputs or to a circuit to GND when oscillation occurs in the output (Example : R = 2.2Ω, C = 0.1μF). Apply 4.5V or more to the external PNPT_r emitter pin.

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