Ordering number : ENA0599

SANYO Semiconductors
DATA SHEET

LA6560 — Monolithic Linear IC For CD Five-Channel Driver (BTL : Four-Channel, H Bridge : One-Channel)

Overview

The LA6560 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 and not operable for the H bridge of 5VREG)
- 5V regulator built-in (external PNP transistor).
- With VREF changeover function (H : external, L : internal (2.5V) selected)
- Overheat protection circuit (thermal shutdown) built-in.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		14	V
Allowable power dissipation	Pd max	Independent IC	2.0	W
		Mounted on specified board. *	0.8	W
Maximum output current	I_O max	Each output for H bridge, channel 1 to 4.	1	A
Maximum input voltage	$V_{IN}B$		13	V
MUTE pin voltage	VMUTE		13	V
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

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

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		5.6 to 13	V

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Electrical Characteristics at Ta = 25°C, $V_{CC}1 = V_{CC}2 = 8V$, VREF = 2.5V, 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	15	mA
Thermal shutdown temperature	TSD	Design guarantee value	150	175	200	°C
VREF AMP						
VREF-AMP offset voltage	VREF-OFFSET		-10		10	mV
VREF Input voltage range	VREF-IN		1		V_{CC}-1.5	V
VREF-OUT output current	I-VREF-OUT	CH1 input reference voltage	2	5	6.6	mA
BTL AMP Block (CH1 to CH4)						
Output offset voltage	V_{OFF}	Voltage difference between outputs for BTL AMP, each channel. *2	-50		50	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_0+ and V_0- when R_L = 8Ω. *3	5.7	6.2		V
Closed-circuit voltage gain	VG	Input and output gain. Input OP-AMP:BUFFER	3.6	4	4.4	Times
Slew rate	SR	AMP Independent Multiply 2 between outputs.		0.5		V/μs
MUTE ON voltage	VMUTE-ON	Output ON voltage, each MUTE *4	2			V
MUTE OFF voltage	VMUTE-OFF	Output OFF voltage, each MUTE *4			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	*5	300	500		μA
Output offset voltage	V_{OFF}-OP		-10		10	mV
CH1 input changeover voltage 1	VSW-OP1	CH1 input AMP(B), external REF select *6	2			V
CH1 input changeover voltage 2	VSW-OP2	CH1 input AMP(A), internal VREF select *6			0.5	V
Loading Block (CH5, H bridge)						
Output voltage	V_O-LOAD	At forward and reverse rotation, R_L = 8Ω, VCONT=V_{CC} *3	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
Power Supply Block (PNP transistor : 2SB632K-use)						
5V supply voltage	V_{OUT}	I_O = 200mA	4.8	5.0	5.2	V
REG-IN SINK current	REG-IN-SINK	Base current of external PNP *8	5	10		mA
Line regulation	ΔV_OLN	6V ≤ V_{CC} ≤ 12V, I_O = 200mA		10	100	mV
Load regulation	ΔV_OLD	5mA ≤ I_O ≤ 200mA		10	100	mV

Note *1 : Current dissipation that is a sum of $V_{CC}1$ and $V_{CC}2$ at no load.

*2 : Input AMP is a BUFFER AMP.

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

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

*5 : The source of input OP-AMP is a constant current. As the 11kΩ resistance to the next stage is a load, pay due attention when setting the input OP-AMP gain.

*6 : With V_{IN}1-SW : [L], the input AMP selects AMP-A while VREF selects internal VREF (≈ 2.5V).
With V_{IN}1-SW : [H], the input AMP selects AMP-B while VREF selects external VREF (≈ VREF-IN).

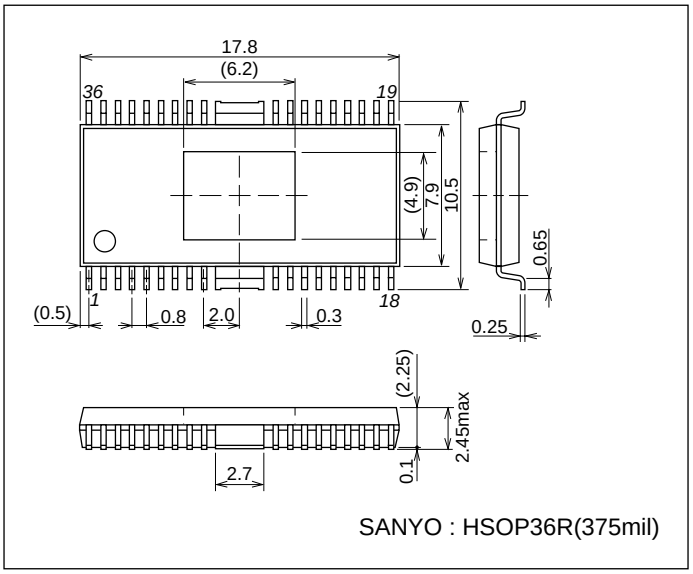
*7 : Short (GND) brake used. SINK side output ON.

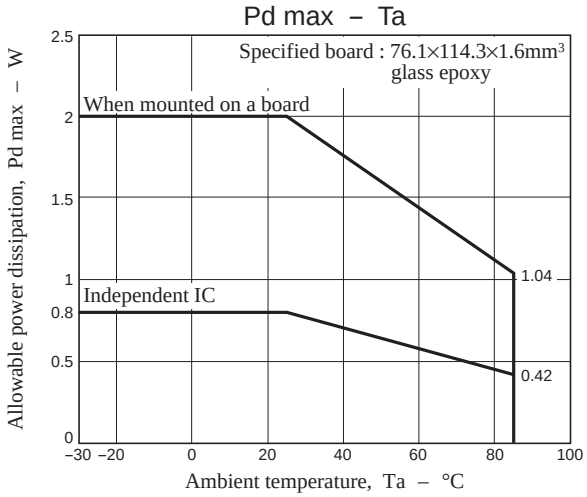
*8 : 5VREG incorporates a drooping protection circuit and operated when the base current is 10mA (TYP).

Package Dimensions

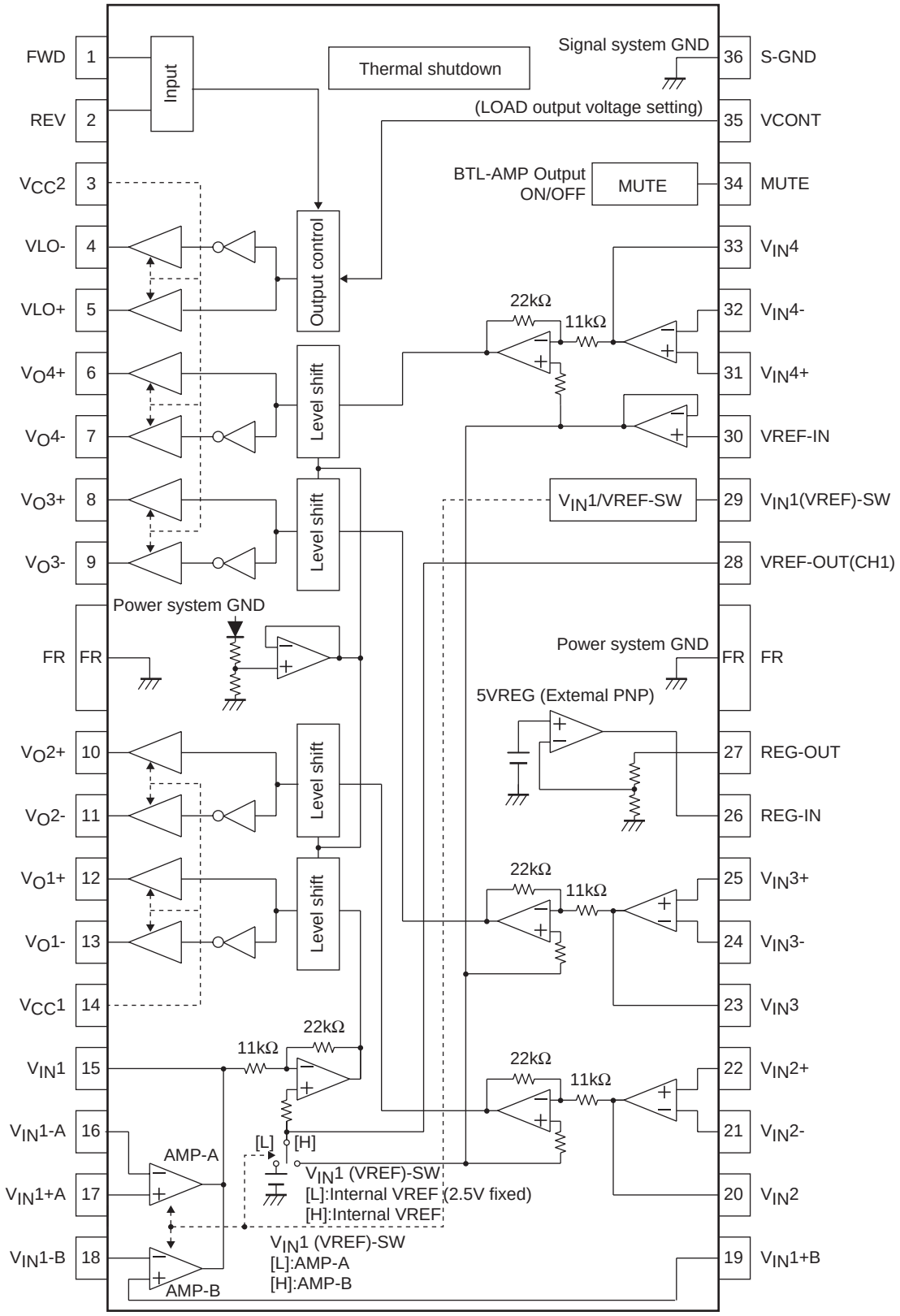
unit : mm (typ)

3251





Block Diagram

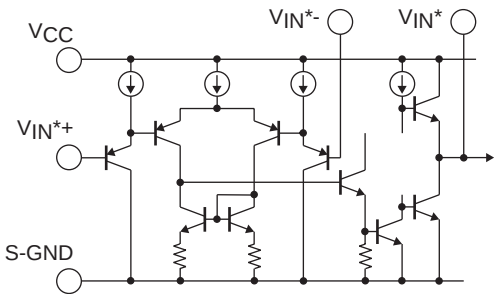
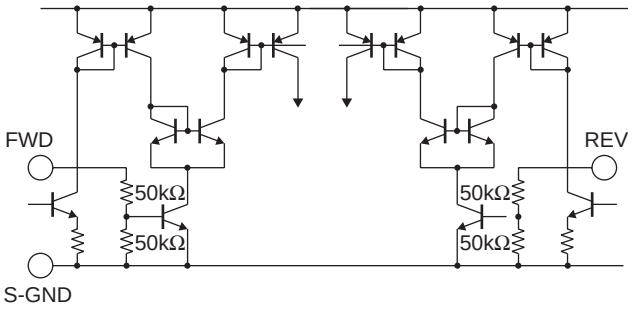
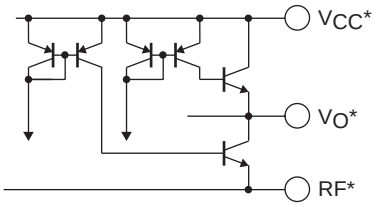
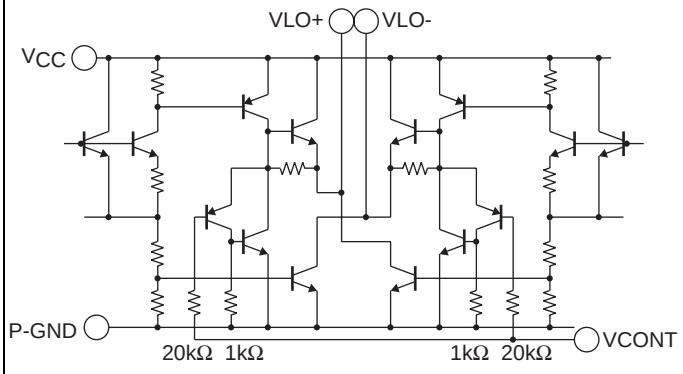
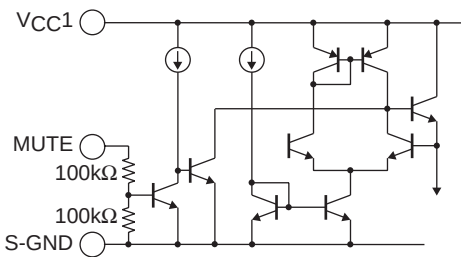


Pin Functions

Pin No.	Symbol	Pin descriptions
1	FWD	Output change pin (FWD) for 5CH (VLO), logic input for loading block.
2	REV	Output change pin (REV) for 5CH (VLO), logic input for loading block.
3	$V_{CC}2$	Power supply for CH3, 4, and 5.
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	$V_{CC}1$	Power supply for CH1, 2 (BTL).
15	$V_{IN}1$	Input pin for channel 1
16	$V_{IN}1$-A	OP-AMP input AMP-A input pin (-)
17	$V_{IN}1$+A	OP-AMP input AMP-A input pin (+)
18	$V_{IN}1$-B	Input AMP-B input pin (-) for channel 1
19	$V_{IN}1$+B	Input AMP-B input pin (+) for channel 1
20	$V_{IN}2$	Input pin for channel 2, input AMP output
21	$V_{IN}2$-	Input pin (-) for channel 2
22	$V_{IN}2$+	Input pin (+) for channel 2
23	$V_{IN}3$	Input pin for channel 3, input AMP output
24	$V_{IN}3$-	Input pin (-) for channel 3
25	$V_{IN}3$+	Input pin (+) for channel 3
26	REG-IN	PNP transistor base connected
27	REG-OUT	5V power output to which the PNP transistor collector connected.
28	VREF-OUT	CH1 reference voltage output. Outputs internal VREF (2.5V : TYP) or external VREF.
29	$V_{IN}1$ (VREF) -SW	Pin for changeover between input AMP-A/internal VREF (TYP2.5V) and input AMP-B/ external VREF.
30	VREF-IN	Reference voltage applied pin
31	$V_{IN}4$+	Input pin (+) for channel 4
32	$V_{IN}4$-	Input pin (-) for channel 4
33	$V_{IN}4$	Input pin for channel 4, input AMP output
34	MUTE	All BTL AMP output ON/OFF
35	VCONT	LOADING output voltage setting
36	S-GND	Signal system GND

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

Pin Description

Pin No.	Symbol	Pin function	Description	Equivalent circuit
17 19 16 18 15 22 21 20 25 24 23 32 31 33	$V_{IN}1+A$ $V_{IN}1+B$ $V_{IN}1-A$ $V_{IN}1-B$ $V_{IN}1$ $V_{IN}2+$ $V_{IN}2-$ $V_{IN}2$ $V_{IN}3+$ $V_{IN}3-$ $V_{IN}3$ $V_{IN}4-$ $V_{IN}4+$ $V_{IN}4$	Input (CH1 to 4)	Input pin (CH1 to 4)	
1 2	FWD REV	Input (H bridge)	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 (BTL-AMP)	Output for channel 1 to 4.	
4 5 35	VLO- VLO+ VCONT	Output (H bridge)	H bridge (LOADING) output and LOADING output setting pin	
34	MUTE	MUTE	BTL AMP output, which turns ON/OFF the output, MUTE : H Output OFF MUTE : L Output OFF	

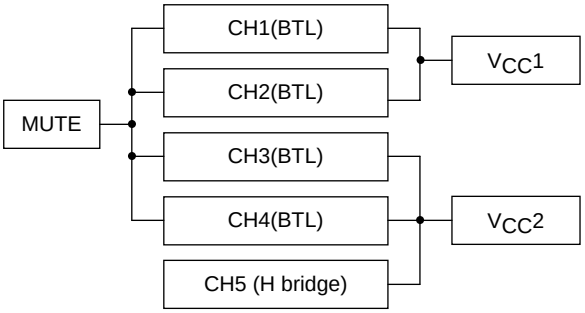
Truth Table (loading (H bridge) section)

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

*1 The output has a high impedance.

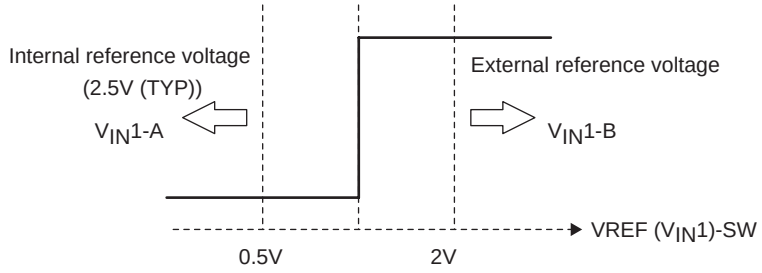
*2 At brake, the SINK side transistor is ON (short brake).
VLO+ and VLO- are approximately on the GND level.

Relation of MUTE and Power (V_{CC}*)



V_{IN}1 (VREF)-SW (CH1 input AMP selection and internal/external VREF selection function)
(Relation between input AMP (CH1 only) and VREF)

V_{IN}1_SW	Input AMP (CH1) state	VREF state
H	V_{IN}1-A (AMP-A)	Internal VREF (2.5V : TYP)
L	V_{IN}1-B (AMP-B)	External VREF



On MUTE

MUTE	BTLAMP output	VREF-OUT
L	OFF	
H	ON	

VREF-OUT operates in an interlock with MUTE.

Sample Application Circuit