Ordering number : EN6504A

SANYO Semiconductors
DATA SHEET

Monolithic Lenear IC

LA6558 — 6-CH Driver for Mini Disk and Compact Disk Applications

Overview

The LA6558 is a 6-channel driver developed for MD and CD players.

Features

- Power amplifier 6-channel built-in
- I_O max 700mA
- Level shift circuit built-in (BTL AMP)
- One mute circuit (output ON/OFF) built-in
- 3.3V power supply built-in (I_O max=300mA)
- 5V power supply built-in (I_O max=5mA)
- Overheat protection circuit (thermal shutdown) built-in

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage	V_{CC} max		14	V
Maximum output current	I_O max		0.7	A
Maximum input voltage	$V_{IN}B$	Each CH for CH1 to CH6	13	V
Mute pin voltage	V_{MUTE}		13	V
Allowable operation	Pd max	Mounted on a board	2.00	W
		Independent IC	1.20	
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

SANYO Semiconductor Co., Ltd.
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage	V_{CC}		6 to 13	V

Electrical Characteristics at S-V_{CC} = P-V_{CC} = 8V, VREF = 1.65V, Ta = 25°C, unless especially specified.

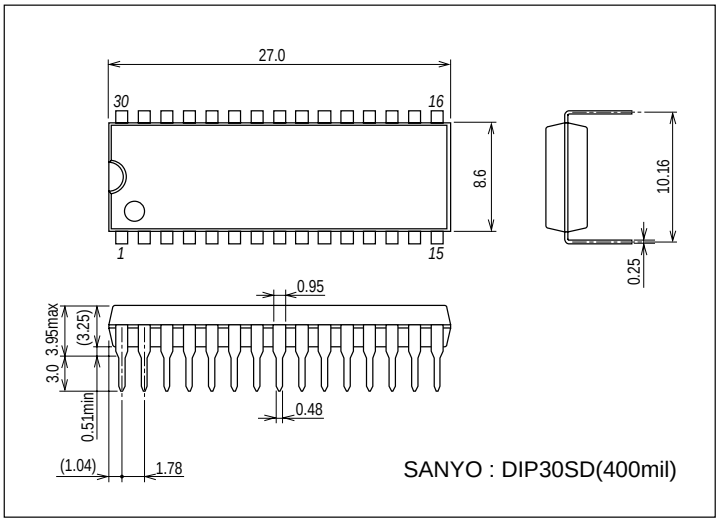
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
All Blocks						
No-load current drain ON	I_{CC}-ON	All AMPs output ON *1		30	50	mA
No-load current drain OFF	I_{CC}-OFF	All AMPs output OFF *1		10	20	mA
VREF input voltage range	V_{REF}-IN		0.5		V_{CC}-1.5	V
BTL AMP Block						
Output offset voltage	V_{OFF}	Voltage difference between output AMPs, each CH	-50		+50	mV
Input voltage range	V_{IN}		0		V_{CC}	V
Output voltage	V_O	Voltage between each V_O+ and V_O- when R_L=8Ω *2	4	4.5		V
Closed-circuit voltage gain	VG	Input/output gain Input resistance 11kΩ		12		dB
Slew rate	SR	Multiply 2 between outputs. *3		1		V/µs
MUTE ON voltage	V_{MUTE}-ON	Each MUTE *4			0.5	V
MUTE OFF voltage	V_{MUTE}-OFF	Each MUTE *4	2			V
Loading Block						
Voltage between outputs F	V_OF	V_{IN}+=2V, V_{IN}-=0V	2.5	2.9	3.3	V
Voltage between outputs R	V_OR	V_{IN}+=0V, V_{IN}-=2V	-3.3	-2.9	-2.5	V
Output voltage range F	V_OMF	V_{IN}+=5V, V_{IN}-=0	5.2	5.7		V
Output voltage range R	V_OMR	V_{IN}+=0V, V_{IN}-=5V		-5.7	-5.2	V
Output offset voltage	V_{OFF}	Voltage difference between outputs when brake is applied.	-50		+50	mV
Input current	I_{IN}	At V_{IN}=3.3V			500	µA
3.3VREG Block						
Output voltage	V_O-REG1	I_O=100mA	3.15	3.3	3.45	V
Line regulation	ΔV-LIN1	V_{CC}=6 to 12V at I_O=100mA	-100		+100	mV
Load regulation	ΔV-LOAD1	I_O=0 to 200mA	-100		+100	mV
5VREG Block						
Output voltage	V_O-REG2	I_O=3mA	4.75	5	5.25	V
Line regulation	ΔV-LIN1	I_O=3mA, V_{CC}=6 to 12V		100		mV
Load regulation	ΔV-LOAD	I_O=1 to 3mA		100		mV
O-RESET Block (Operating for Vref)						
H reset output voltage	V_{OR}H	10kΩ between V_{CC}-RESET	6.5			V
L reset output voltage	V_{OR}L	10kΩ between V_{CC} and RESET			0.5	V
O-RESET threshold voltage	V_{RT}		0.5	0.7	0.9	V
O-RESET hysteresis voltage	V_{hys}		50	100	200	mV

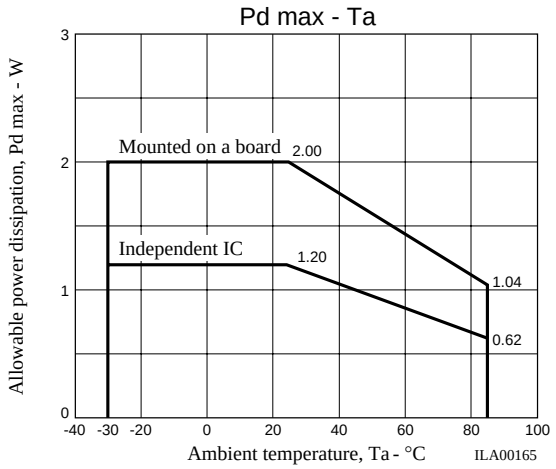
*1. P-V_{CC} and S-V_{CC} total current dissipation under no load.
*2. Voltage difference between both ends of the load(8Ω). Output in the saturated condition.
*3. These values are design guarantee values, and are not tested.
*4. Output is ON with IN-MUTE: [H] and OFF (HI impedance) with IN-MUTE: [L].

Package Dimensions

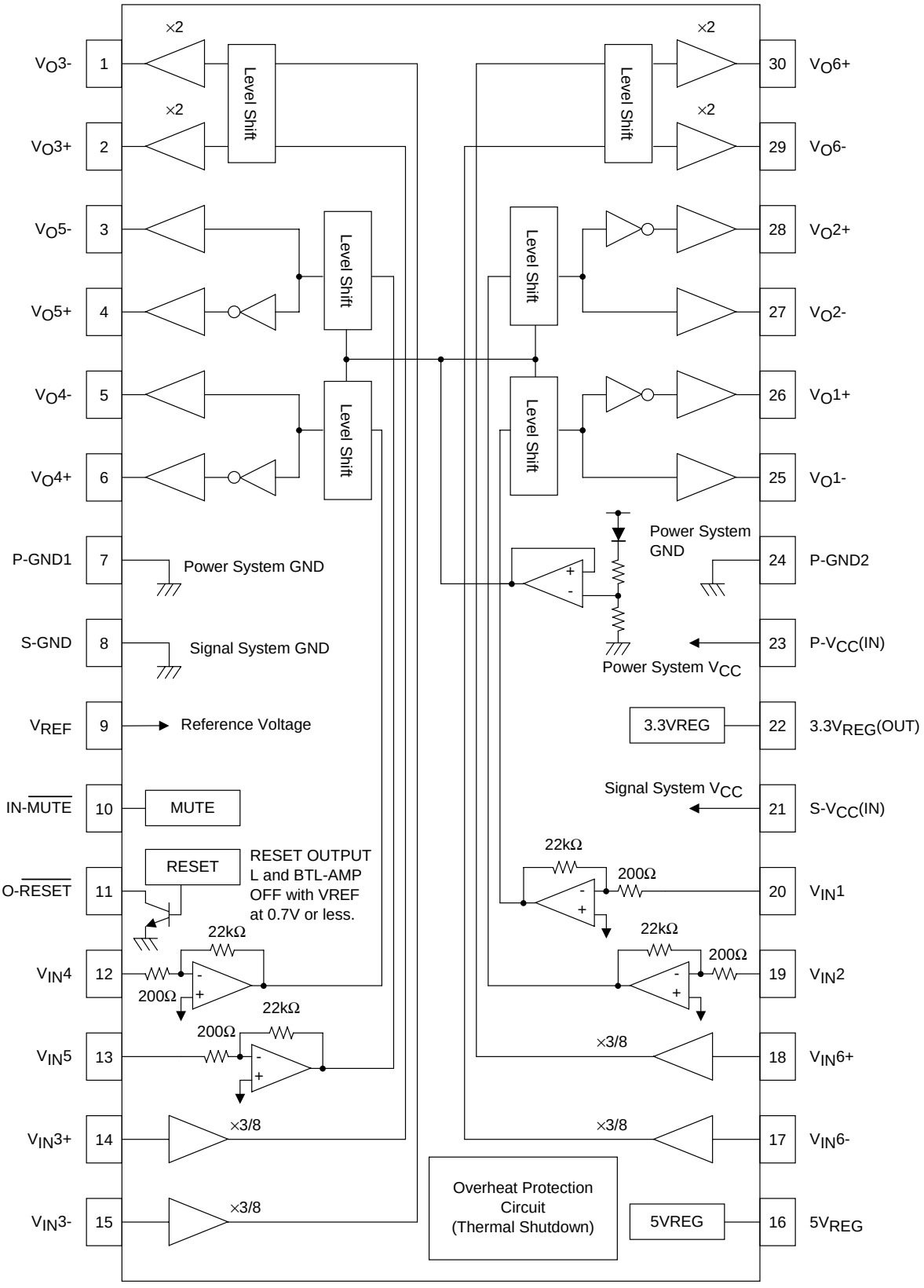
unit : mm (typ)

3196A





Block Diagram



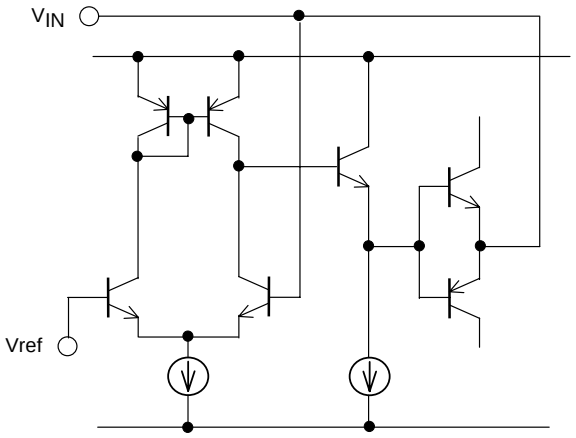
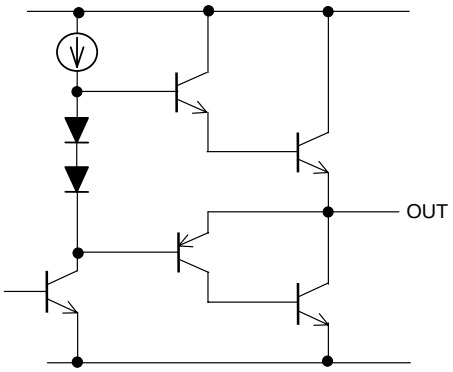
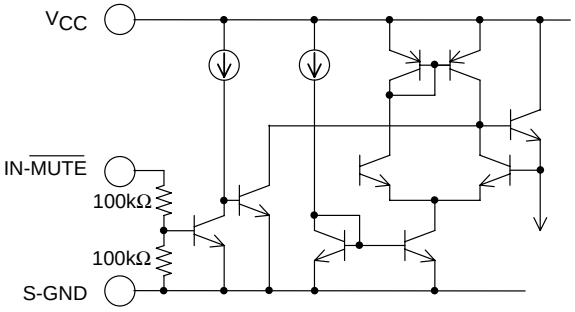
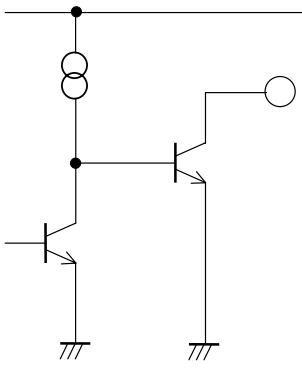
Pin Functions

Pin No.	Pin Name	Description (functions)
1	V_O3-	Output for CH3 (-)
2	V_O3+	Output for CH3 (+)
3	V_O5-	Output for CH5 (-), inverted relative to input
4	V_O5+	Output for CH5 (+), not inverted relative to input
5	V_O4-	Output for CH4 (-), inverted relative to input
6	V_O4+	Output for CH4 (+), not inverted relative to input
7	P-GND1	Power system GND (CH3, 4, 5)
8	S-GND	Signal system GND
9	V_{REF}	Reference voltage input pin
10	IN-$\overline{\text{MUTE}}$	Output ON/OFF for BTL AMP (CH1, 2, 4, and 5) and 3.3 V, 5 V_{REG}. ([H]: Output ON, [L]: Output OFF)
11	O-$\overline{\text{RESET}}$	Reset output (Open collector)
12	$V_{IN}4$	Input for CH4
13	$V_{IN}5$	Input for CH5
14	$V_{IN}3+$	Input for CH3 (+)
15	$V_{IN}3-$	Input for CH3 (-)
16	$5V_{REG}$	5V Power output
17	$V_{IN}6-$	Input for CH6 (-)
18	$V_{IN}6+$	Input for CH6 (+)
19	$V_{IN}2$	Input for CH2
20	$V_{IN}1$	Input for CH1
21	S-V_{CC}	Signal system V_{CC}
22	$3.3V_{REG}$	3.3V Power output
23	P-V_{CC}	Power system power supply
24	P-GND2	Power system GND(CH1, 2, 6)
25	V_O1-	Output for CH1 (-), inverted relative to input
26	V_O1+	Output for CH1 (+), not inverted relative to input
27	V_O2-	Output for CH2 (-), inverted relative to input
28	V_O2+	Output for CH2 (+), not inverted relative to input
29	V_O6-	Output for CH6 (-)
30	V_O6+	Output for CH6 (+)

*1. Connect P-GND and S-GND externally and set both to the lowest potential (sub-straight).

*2. Connect S-V_{CC} and P-V_{CC} externally for use as power supplies.

Pin Description

Pin Name	Pin Name	Pin No	Description	Equivalent Circuit Diagram
Input (BTL AMP)	$V_{IN}1$ $V_{IN}2$ $V_{IN}4$ $V_{IN}5$	20 19 12 13	Each input pin	
Output (BTL AMP)	V_O1+ V_O1- V_O2+ V_O2- V_O4+ V_O4- V_O5+ V_O5-	26 25 28 27 6 5 4 3	Each output	
Mute	IN-$\overline{\text{MUTE}}$	10	Output ON/OFF. IN-$\overline{\text{MUTE}}$: H output ON IN-$\overline{\text{MUTE}}$: L output OFF	
Reset	O-$\overline{\text{RESET}}$	11	Open collector	

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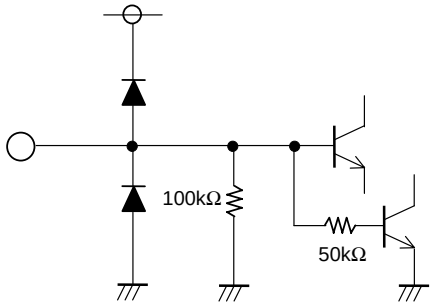
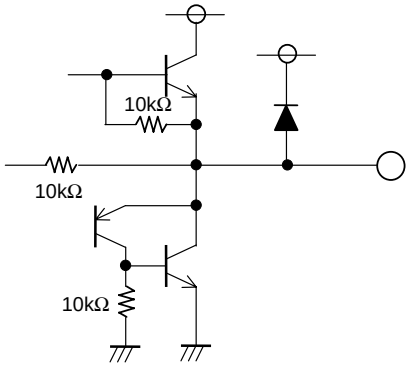
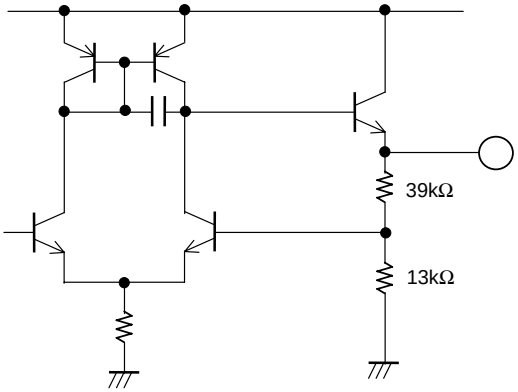
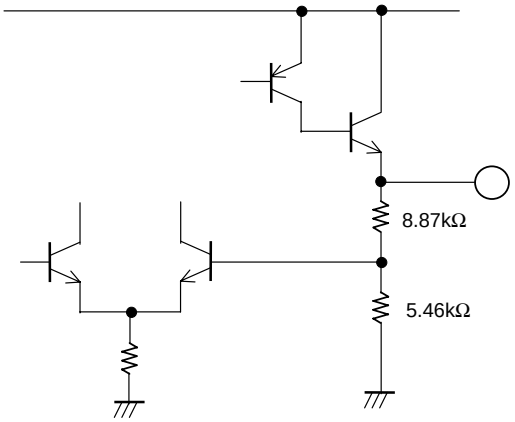
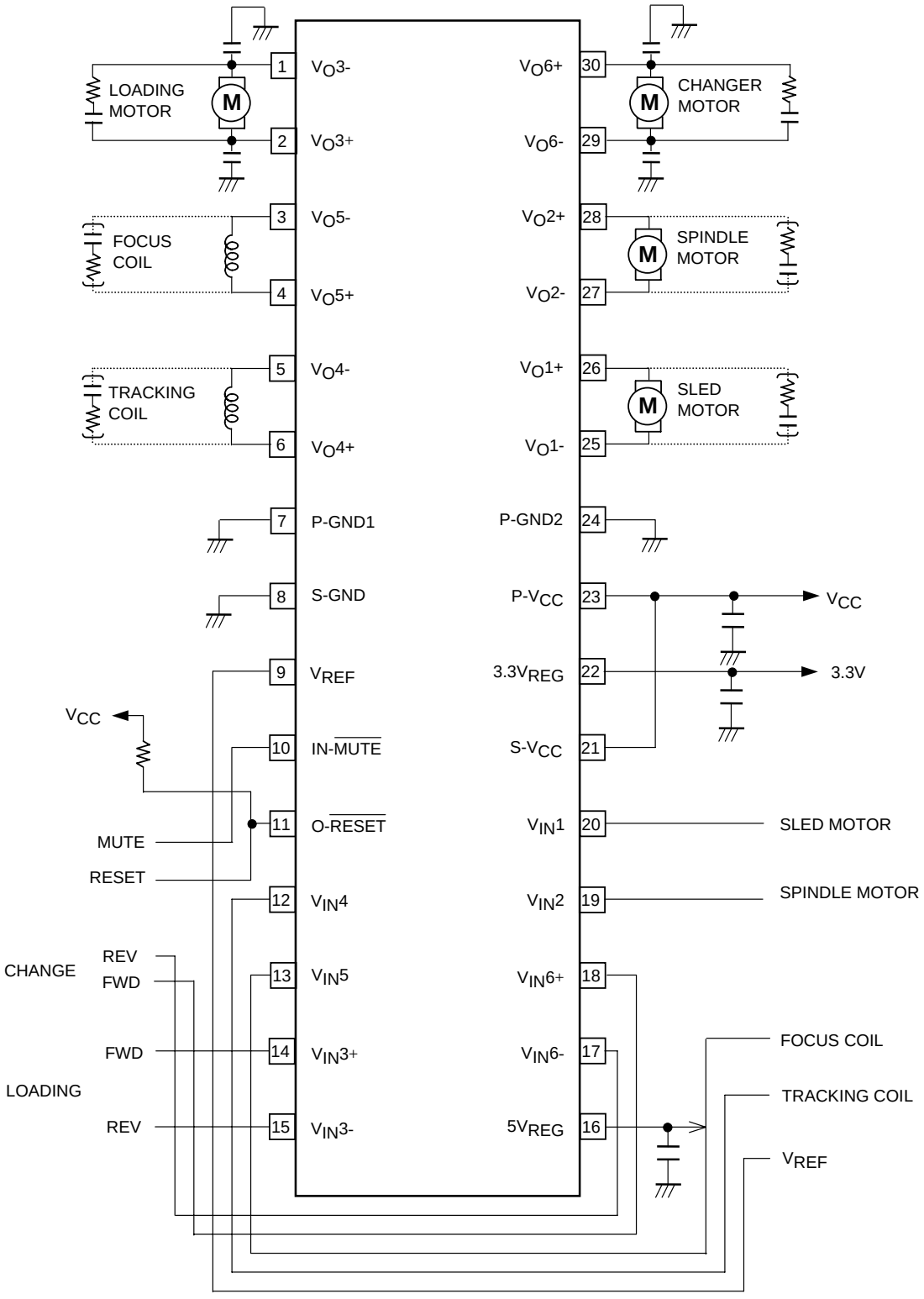
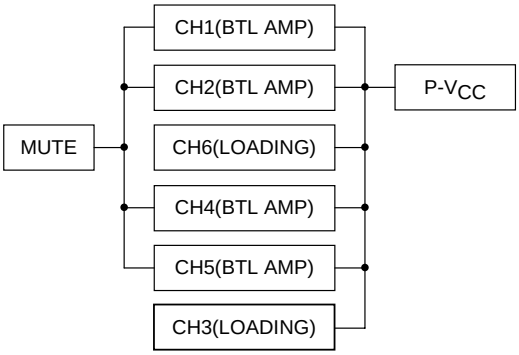
Pin Name	Pin Name	Pin No	Description	Equivalent Circuit Diagram
Input (Loading block)	$V_{IN}3-$ $V_{IN}3+$ $V_{IN}6-$ $V_{IN}6+$	15 14 17 18	Each input pin	
Output (Loading block)	V_O3+ V_O3- V_O6+ V_O6-	2 1 30 29	Each output	
$5V_{REG}$	$5V_{REG}$	16	Output for $5V_{REG}$	
$3.3V_{REG}$	$3.3V_{REG}$	22	Output for $3.3V_{REG}$	

Sample Application Circuit



Note: When connecting a load to CH3 and CH6, set the output capacitor to 0.56μF or more and select the capacitor according to the setting. The capacitor to be used should be less in capacity fluctuation due to temperature.

Relation of MUTE and Power (P-V_{CC})



* Connect S-V_{CC} and P-V_{CC} externally.
* Connect P-GND and S-GND externally.

Various MUTE functions and output, 3.3V REG operation condition

	CH1, 2, 4, 5 (BTL-AMP)	CH3, 6 (LOADING)	$3.3V_{REG}$ $5V_{REG}$
With IN-$\overline{\text{MUTE}}$: L	OFF	-	OFF
With thermal shutdown operating	OFF	OFF	OFF
With VREF lowering (0.7V or less)	OFF	-	-

* (-) indicates no-operation for functions to which MUTE, thermal shutdown, and V_{REF} lowering correspond.
* IN-$\overline{\text{MUTE}}$ operates for BTL-AMP (CH1, 2, 4, and 5) and $3.3V_{REF}$ and 5 V_{REF}.
* V_{REF} lowering is effective for BTL-AMP only.

Operative for ((MUTE operation)) to BTL-AMP(CH1, 2, 4, 5) and $3.3V_{REF}$, $5V_{REF}$

IN-MUTE condition	BTL-AMP (CH1, 2, 4, 5)	$3.3V_{REG}$ $5V_{REG}$
H	ON	
L	OFF	

Operative for ((V_{REF} lowering)) to BTL-AMP

V_{REF} condition	BTL-AMP (CH1, 2, 4, 5)
V_{REF} > 0.7(V)	ON
V_{REF} < 0.7(V)	OFF

LOADING Block

V_{IN}*+ (FWD)	V_{IN}*- (REV)	Loading output
L	L	Brake
	H	Reversed (V_O=-1.5×REV) *1
H	L	Forward (V_O= 1.5×FWD) *1
	H	(V_O=1.5×(VFO-VRE))

* When the brake is applied, each "+" and "-" output voltage becomes $V_{CC}/2$.
*1 FWD: V_{IN}6+, V_{IN}3+, REV: V_{IN}6-, V_{IN}3-.
* L voltage is L<V_F(≈0.6V).
* Gain of loading (CH3, 6) is 3.5dB(TYP).

Reset function

IN-$\overline{\text{MUTE}}$	V_{REF}	O-$\overline{\text{RESET}}$
L	V_{REF} < 0.7V	L
	V_{REF} > 0.7V	L
H	V_{REF} < 0.7V	L
	V_{REF} > 0.7V	H

* O-$\overline{\text{RESET}}$ is an open collector output (NPN).
* O-$\overline{\text{RESET}}$: L indicates that the NPN output is ON while O-$\overline{\text{RESET}}$: H indicates that this output is OFF.

Relation of input and output (BTL-AMP)