

**SANYO**

No. 4187

**LA9215****CD player output amplifier**

## Overview

The LA9215 is an analog output amplifier designed for use in CD players, DAT and other digital audio equipment in combination with a 1-bit D/A converter. It can be used directly with non-stabilized power supplies because it has internal regulator and D/A power supply circuits.

## Functions

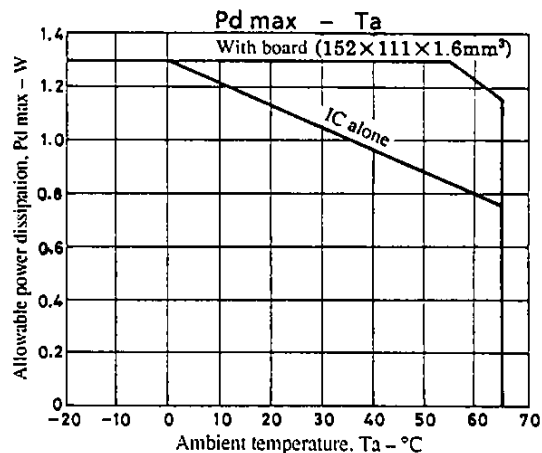
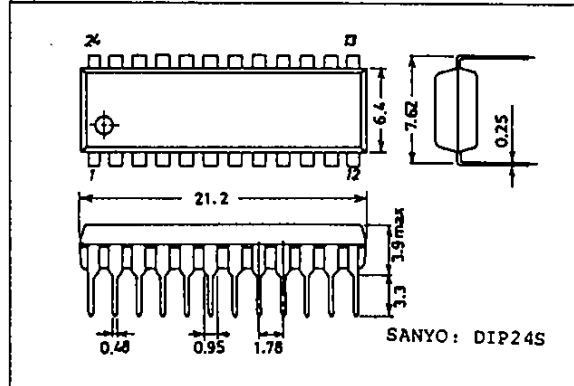
- Amplifier supports 1-bit DACs
- LPF amplifier
- ATT circuit
- Mute circuit
- DAC power supply (5.1V)
- Internal circuit regulator
- Internal power on/off mute circuit

## Features

- Allows compact implementation of CD player output circuits
- Supports 1-bit DACs
- Low harmonic distortion
  - 0.0006% typ (1kHz)
  - 0.0012% typ (10kHz)
- High S/N ratio
  - 108dB typ (JIS-A)
- Can be used directly with non-stabilized power supplies
- Low pop noise at power on/off

## Package Dimensions

unit : mm

**3067 - DIP24S**

## Specifications

### Maximum ratings at Ta=25°C

			unit
Maximum supply voltage	+V <sub>SUP</sub> max	14	V
	-V <sub>SUP</sub> max	-14	V
Allowable power dissipation	Pd max	Ta ≤ 55°C, 152x111x1.6mm <sup>3</sup>	1.3 W
Operating temperature	Topr		-20 to +65 °C
Storage Temperature Range	Tstg		-40 to +150 °C

### Recommended Operating Ranges at Ta=25°C

			unit
Recommended supply voltage	+V <sub>SUP</sub>	9	V
	-V <sub>SUP</sub>	-9	V
Power supply voltage operating range	+V <sub>SUP</sub> op	(not to exceed Pd)	7 to 13 V
	-V <sub>SUP</sub> op	(not to exceed Pd)	-7 to -13 V

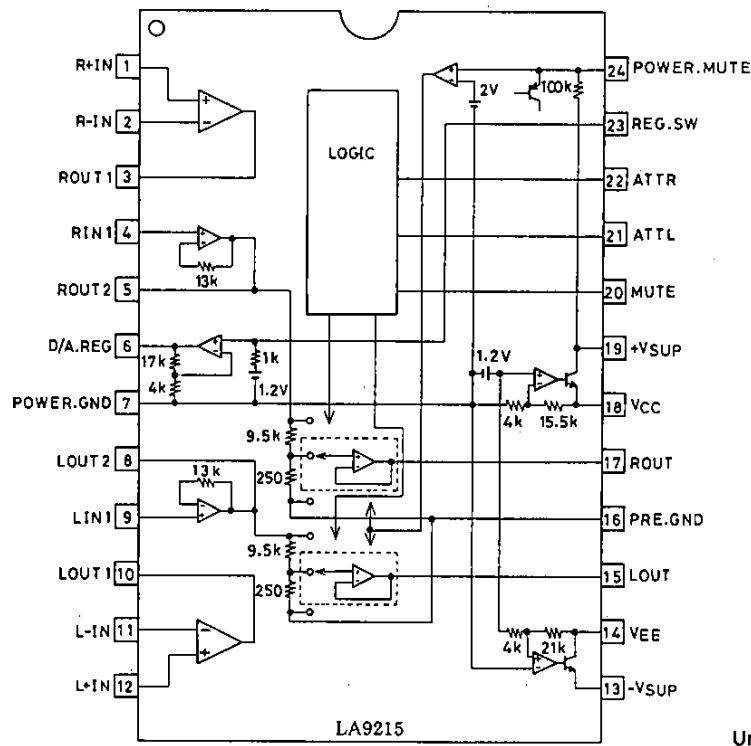
### Operating characteristics at Ta=25°C, ±V<sub>SUP</sub>=±9V, Vi=2Vrms=0dB, fin=1kHz, RL=10kΩ

			min	typ	max	unit
Quiescent current	I <sub>SUP</sub>	No current	27	37	42	mA
	-I <sub>SUP</sub>	No current	-38	-33	-23	mA
ATT ratio	V <sub>ATT</sub>	LPF=20kHz	30.5	32	33.5	dB
Muting ratio	M <sub>f</sub>	LPF=20kHz	65	100		dB
S/N Signal - mode	S/N <sub>S</sub>	JIS, A	86	108		dB
S/N ATT - mode	S/N <sub>ATT</sub>	JIS, A	86	120		dB
S/N MUTE - mode	S/N <sub>MUTE</sub>	JIS, A	86	120		dB
Channel separation	CH <sub>sep</sub>	LPF=20kHz	80	105		dB
THD+N(1kHz)	THD <sub>1K</sub>	LPF=20kHz		0.0006	0.003	%
THD+N(10kHz)	THD <sub>10K</sub>	LPF=20kHz (fin=10kHz)		0.0012	0.004	%
Line output ripple rejection	Lin <sub>RR</sub>	LPF=20kHz, fin=120Hz	73	80		dB
Amplifier output offset voltage	V <sub>OFS</sub>		-15		15	mV
Amplifier output offset voltage difference	V <sub>OFS</sub> D	Signal mode - ATT mode	-10		10	mV
		ATT mode - Mute mode				
		Signal mode - Mute mode				

### [Voltage regulator for D/A]

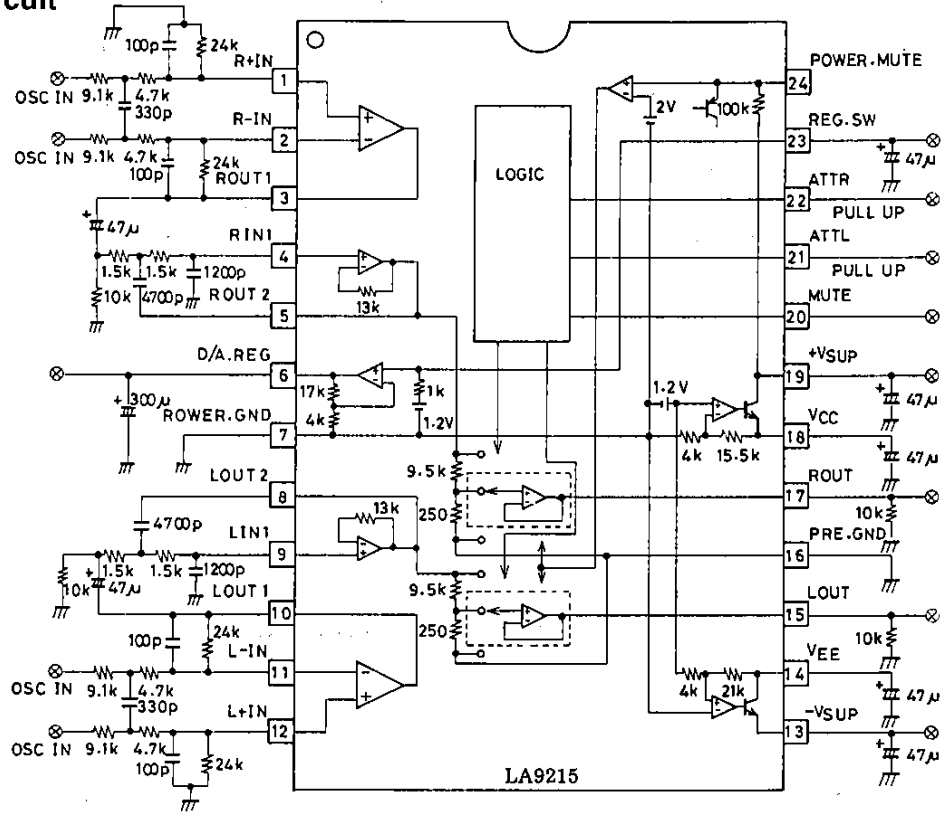
Supply voltage	D/A <sub>V</sub>	No-load	4.8	5.1	5.4	V
Maximum output current	D/A <sub>I</sub>		25			mA
Ripple rejection	D/A <sub>RR</sub>	25mA load (fin=120Hz), LPF=20kHz	60	73		dB
Load regulation	D/A <sub>LR</sub>	25m load		2	100	mV

### Equivalent circuit block diagram and pin assignments



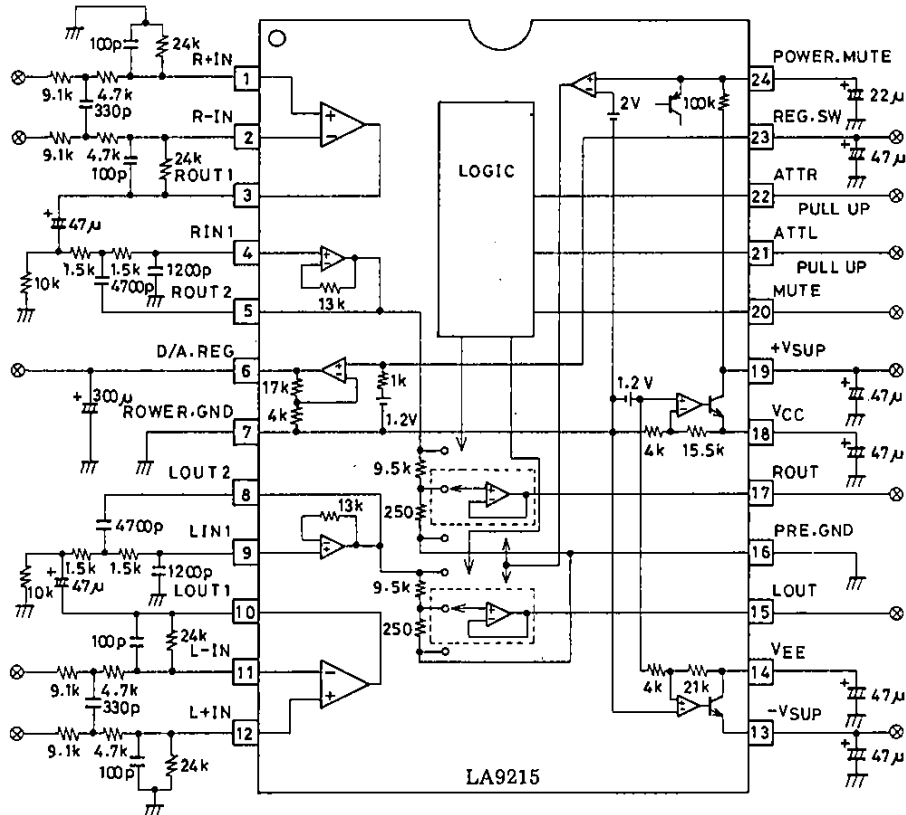
Unit (resistance: Ω)

Test circuit



Sample application circuit

Unit (resistance: Ω, capacitance: F)



## Control mode

L ch ATT 21pin	R ch ATT 22pin	MUTE 20pin	Lch mode	Rch mode
H	H	H	SIGNAL	SIGNAL
L	H	H	ATT	SIGNAL
H	L	H	SIGNAL	ATT
L	L	H	ATT	ATT
H	H	L	MUTE	MUTE
L	H	L	MUTE	MUTE
H	L	L	MUTE	MUTE
L	L	L	MUTE	MUTE

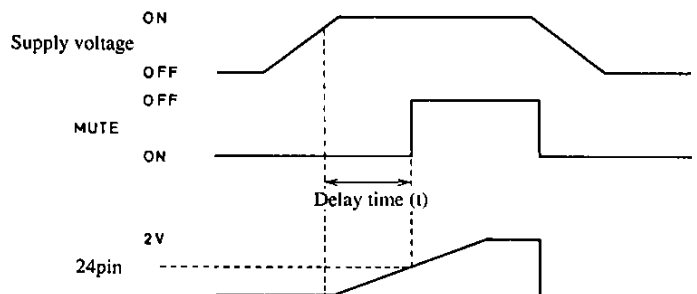
※ Pins 21 and 22 are pulled up, and pin 20 down.

D/A REG.SW 23pin	D/A REG. 6pin
OPEN	5.1V
GND	0V

## Function description

## (1) Power on/off mute

When the supply voltage has not reached the operating voltage level, the system is in the muted state. Adding a capacitor to pin 24 will extend the period of time the mute is in effect after power is turned on.



- In the power on/off mute state, pins 15 and 17 are low active.
- When the power is turned on or off, and +Vsup and -Vsup rise and fall times are significantly different from each other, the power on/off mute function may not operate normally.

## (2) 1-bit DAC amplifier

External resistance and capacitance can be added to configure a 1-bit DAC input amplifier.

- Capacitors will contribute to degraded harmonic distortion, so field dependence should be minimized.
- If the external components for the 1-bit DAC amplifier (differential input) have a large difference, the difference will become an offset, and DC will be cut in the LPF input stage.
- Use with a load short may damage the chip. Never use in a load short condition.

## (3) Low-pass filter (LPF)

External resistance and capacitance can be added to configure an active filter.

- Capacitors will contribute to degraded harmonic distortion, so field dependence should be minimized.
- Use with a load short may damage the chip. Never use in a load short condition.
- The low-pass amplifier has internal resistance, so the output offset will vary with ambient temperature and consumed power.

## (4) Output stage amplifier

Pins 20, 21 and 22 can be controlled to select signal, ATT or mute mode. Power on/off muting can also be used.

- Use with a load short may damage the chip. Never use in a load short condition.

## (5) DAC power supply

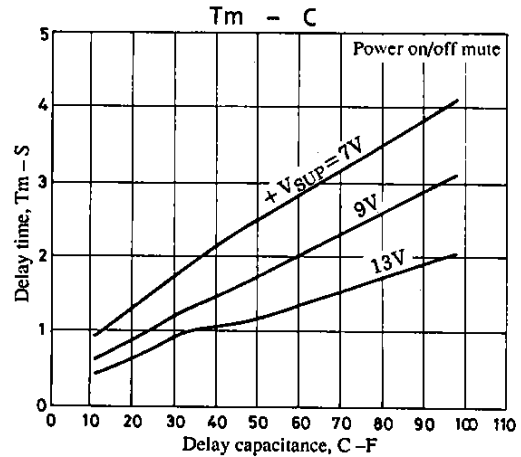
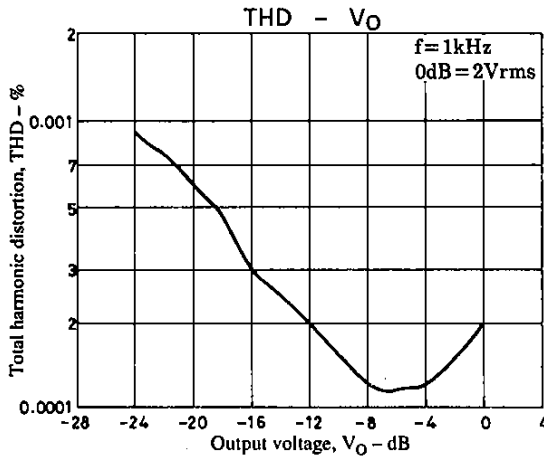
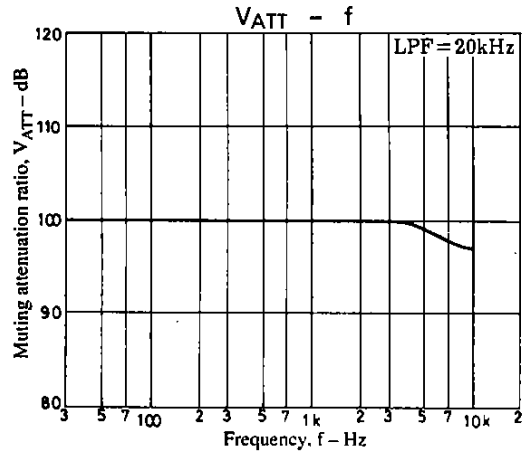
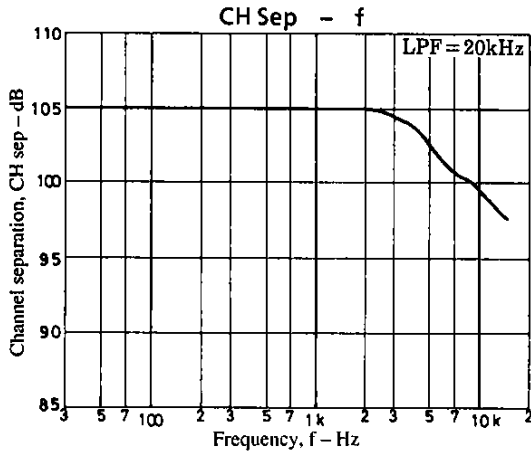
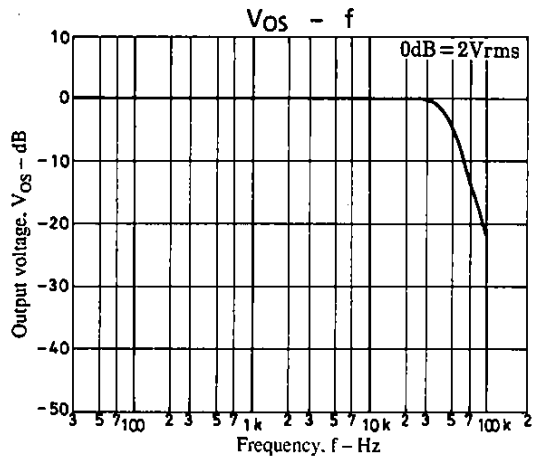
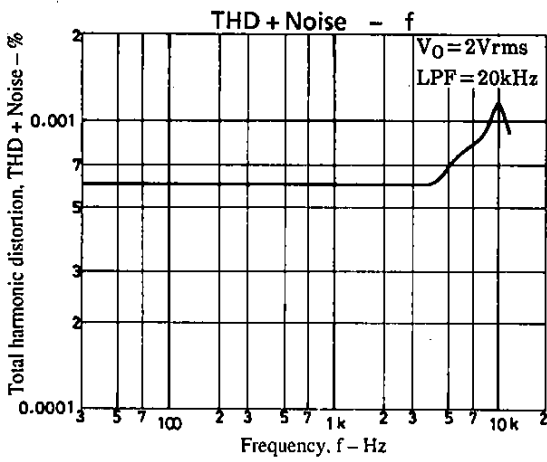
Supplies 5.1V DAC power. Pin 23 can be switched between open and ground to turn the power output on or off.

- Use with a load short may damage the chip. Never use in a load short condition.

## (6) +/- 6V supply

A supply is provided for the internal amplifier.

- Do not use this as an external power supply. Pins 14 and 18 should always have capacitors (about 47uF) inserted between them and ground.
- Use with a load short may damage the chip. Never use in a load short condition.



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