

PRODUCT BRIEF

Mono Class D Audio Subsystem with Earpiece Driver, Ground Referenced Headphone Amplifiers, Speaker Protection and No Clip with Clip Control

General Description

The LM49151 is a fully integrated audio subsystem designed for portable handheld applications such as cellular phones. The LM49151 combines a 1.25W mono E²S class D amplifier, 125mW Class AB earpiece driver, 42mW/channel stereo ground referenced headphone drivers, volume control, input mixer/multiplexer, and speaker protection into a single device.

The LM49151 class D speaker amplifier features National's unique Automatic Level Control (ALC) that provides both a I²C programmable no-clip feature with Clip Controls and speaker protection. The E²S (Enhanced Emission Suppression) class D amplifier features a patented, ultra low EMI PWM architecture that significantly reduces RF emissions while preserving audio quality and efficiency while delivering 1.25W into an 8Ω load with <1% THD+N with a 5V supply. The 42mW/channel headphone drivers feature National's ground referenced architecture that creates a ground-referenced output from a single supply, eliminating the need for bulky and expensive DC-blocking capacitors, saving space and minimizing system cost.

The LM49151 features separate volume controls for the loud-speaker and headphone inputs. Mode selection, shutdown control, and volume are controlled through an I²C compatible interface. The LM49151's superior click and pop suppression eliminates audible transients on power-up/down and during shutdown.

Notice: This document is not a full datasheet. For more information regarding this product or to order samples please contact your local National Semiconductor sales office or visit <http://www.national.com/support/dir.html>

Key Specifications

- Output power at $V_{DD} = 3.3V$
THD+N ≤ 1%
 - LS Mode, $R_L = 8\Omega$ 520mW (typ)
 - HP Mode, $R_L = 32\Omega$ 40mW (typ)
- Output power at $V_{DD} = 5V$
THD+N ≤ 1%
 - LS Mode, $R_L = 8\Omega$ 1.25W (typ)
 - HP Mode, $R_L = 32\Omega$ 42mW (typ)
- Output Offset
 - LS Mode 15 6mV (typ)
 - HP Mode 15 2mV (typ)

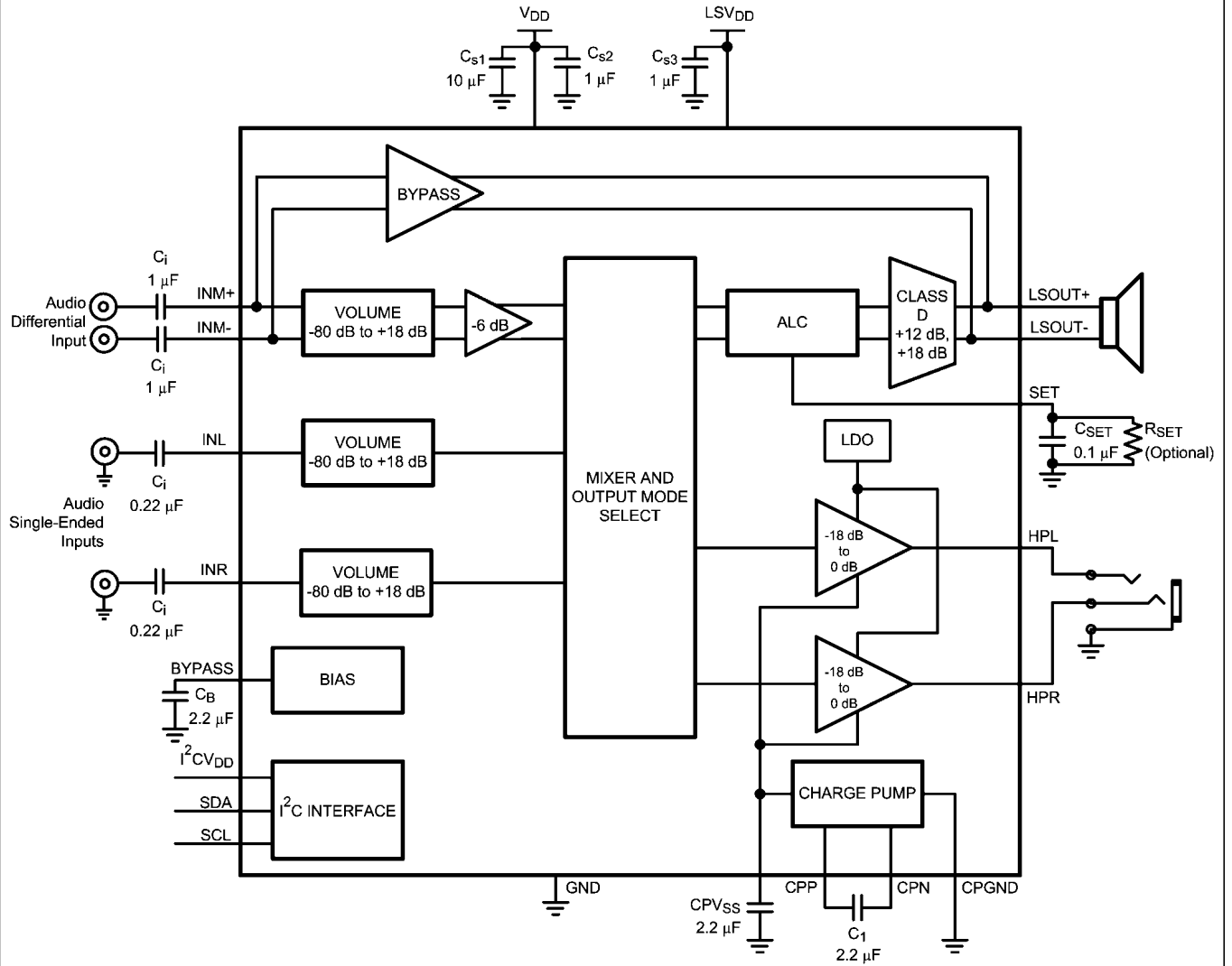
Features

- E²S class D amplifier
- Ground referenced outputs — eliminates output coupling capacitors
- I²C programmable No Clip Function with Clip Control
- Voltage limiter speaker protection
- I²C volume and mode Control
- Ear Piece Amplifier
- Advanced click-and-pop suppression
- Low supply current
- Micro-power shutdown
- 20-bump micro SMD package

Applications

- Mobile Phones
- PDAs
- Notebook PCs
- Portable Electronics Devices
- MP3 Players

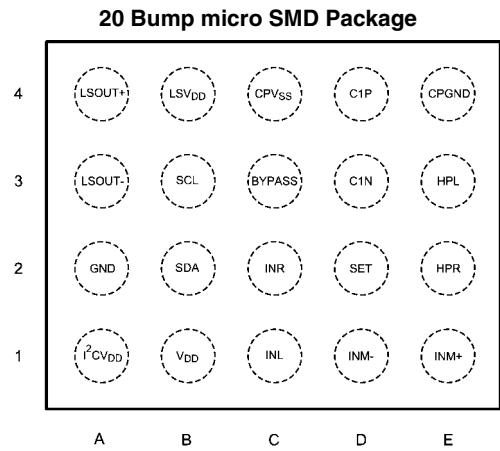
Typical Application



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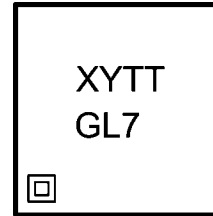
FIGURE 1. Typical Audio Amplifier Application Circuit

Connection Diagrams



Top View
Order Number LM49151TL
 (See NS Package Number TLA20GDA)

Top Markings



30092515
Top View
XY - Date Code
TT - Die Traceability
G- Boomer
L7 - LM49151TL

Ordering Information

Order Number	Package	Package DWG #	Transport Media	MSL Level	Green Status
LM49151TL	20 Bump micro SMD	TLA20GDA	250 units on tape and reel	1	RoHS and no sB/Br
LM49151TLX	20 Bump micro SMD	TLA20GDA	3000 units on tape and reel	1	RoHS and no sB/Br

Bump Descriptions

Bump	Name	Description
A1	I ² C _{V_{DD}}	I ² C Power Supply
A2	GND	Ground
A3	LSOUT-	Inverting Loudspeaker Output
A4	LSOUT+	Non-Inverting Loudspeaker Output
B1	V _{DD}	Analog Power Supply
B2	SDA	I ² C Data Input
B3	SCL	I ² C Clock Input
B4	LSV _{DD}	Loudspeaker Power Supply
C1	INL	Left Channel Input
C2	INR	Right Channel Input
C3	BYPASS	Mid-Rail Supply Bypass
C4	CPV _{SS}	Charge Pump Output
D1	INM-	Mono Channel Inverting Input
D2	SET	ALC Timing Control
D3	CPN	Charge Pump Flying Capacitor - Negative Terminal
D4	CPP	Charge Pump Flying Capacitor - Positive Terminal
E1	INM+	Mono Channel Non-Inverting Input
E2	HPR	Right Channel Headphone Amplifier Output
E3	HPL	Left Channel Headphone Amplifier Output
E4	CPGND	Charge Pump Ground

Notes

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Data Converters	www.national.com/adc	Samples	www.national.com/samples
Interface	www.national.com/interface	Eval Boards	www.national.com/evalboards
LVDS	www.national.com/lvds	Packaging	www.national.com/packaging
Power Management	www.national.com/power	Green Compliance	www.national.com/quality/green
Switching Regulators	www.national.com/switchers	Distributors	www.national.com/contacts
LDOs	www.national.com/lido	Quality and Reliability	www.national.com/quality
LED Lighting	www.national.com/led	Feedback/Support	www.national.com/feedback
Voltage References	www.national.com/vref	Design Made Easy	www.national.com/easy
PowerWise® Solutions	www.national.com/powerwise	Applications & Markets	www.national.com/solutions
Serial Digital Interface (SDI)	www.national.com/sdi	Mil/Aero	www.national.com/milaero
Temperature Sensors	www.national.com/tempensors	SolarMagic™	www.national.com/solarmagic
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