1.25 Watt Fully Differential Audio Power Amplifier With Internal Feedback Resistors

Features

- Fully differential amplifier
- Improved PSRR at 217Hz(VDD>3.0V) 86dB (typ)
- Power output at 5.0V & 1% THD 1.25W (typ)
- Power output at 3.6V & 1% THD 0.6W (typ)
- Ultra low shutdown current 0.01μA (typ)
- Improved pop & click circuitry eliminates noises during turn-on and turn-off transitions
- Thermal overload protection circuitry
- No output coupling capacitors, bootstrap capacitors required
- Unity-gain stable
- External gain configuration capability
- Available in space-saving package: 9-bump micro SMD and 8-pin MSOP8

General description

The BL6211 is a fully differential audio power amplifier designed for portable communication device applications. It is capable of delivering 1.25 watt of continuous average power to an 8Ω BTL load with less than 1% distortion (THD+N) from a 5V battery voltage. It operates from 2.2 to 5.5V.

Features like 86dB PSRR at 217Hz, improved RF-rectification immunity, the space-saving 8-pin MSOP8 and 9-bump micro SMD package, the advanced pop & click circuitry, a minimal count of external components and low-power shutdown mode make BL6211 ideal for wireless handsets.

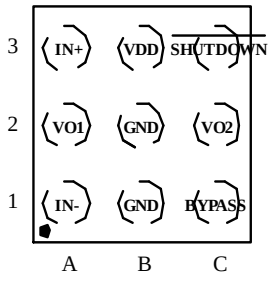
The BL6211 is unity-gain stable, and the gain can be configured by external input resistors and internal feedback resistors.

Applications

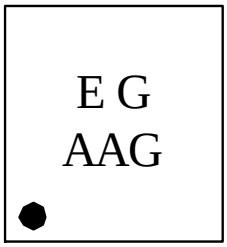
- Wireless handsets
- Portable audio devices
- PDAs, Handheld computers

Pin Diagram (Top View)

9 Bump micro SMD Package
(Top View)

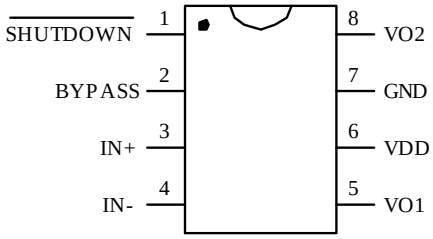


9 Bump micro SMD Marking

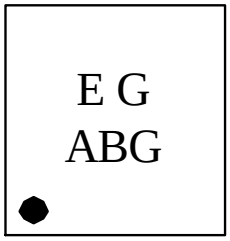


E - Die Run Traceability
G - Date Code
AAG - BL6211ITLX ROHS

Mini Small Outline (MSOP8) Package
(Top View)



MSOP8 Marking



E - Die Run Traceability
G - Date Code
ABG - BL6211MM ROHS

Figure 1 Pin Diagram of BL6211

Pin Definitions and Functions

Table 1. Pin Definitions and Functions

MSOP8	9-Bump micro SMD	Symbol	Type	Functions
1	C3	SHUTDOWN	I	Shutdown Pin, active low.
2	C1	BYPASS	I	Common mode voltage. Connect a bypass capacitor to GND for common mode voltage filtering. The bypass capacitor is optional.
3	A3	IN+	I	Positive differential input.
4	A1	IN-	I	Negative differential input.

MSOP8	9-Bump micro SMD	Symbol	Type	Functions
5	A2	VO1	O	Positive differential output.
6	B3	VDD	I	Power supply
7	B1,B2	GND	I	Ground.
8	C2	VO2	O	Negative differential output.

Operation conditions and Electrical characteristics

Operation Conditions

Table 2. Operation Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V_{DD}	2.2		5.5	V
Operating Temperature Range	T_A	-40		85	℃

ctrical Characteristics

Table 3. V_{DD}=5V (The following specifications apply for 8Ω load，A_V=1V/V，T_A=25℃, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent Power Supply Current	I_{DD}	VIN=0V, no load		2.5	5	mA
		VIN=0V, R_L=8Ω		4	8	
Shutdown Current	I_{SD}	$V_{SHUTDOWN}$=GND		0.01	1	μA
Output Power	P_O	THD=1%(max); f=1kHz		1.25		W
Total Harmonic Distortion + Noise	THD+N	P_O=0.6Wrms; f=1kHz		0.02		%
Power Supply Rejection Ratio	PSRR	Vripple=200mV sine p-p				dB
		f=217Hz (note1)		-88		
		f=1kHz (note1)		-83		
		f=217Hz (Note2)		-83		
		F=1KHz (Note2)		-83		

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Common Mode Rejection Ratio	CMRR	f=217Hz V_{CM}=200mV_{PP}		-78		dB
Output Offset	V_{OS}	VIN=0V		2	8	mV
Shutdown Voltage Input High	V_{SDIH}		1.5			V
Shutdown Voltage Input Low	V_{SDIL}				0.5	V
Closed Loop Gain	A_V		$\frac{36k\Omega}{Ri}$	$\frac{40k\Omega}{Ri}$	$\frac{44k\Omega}{Ri}$	V/V

Note1: Unterminated input

Note2: 10Ω terminated input

Table 4. V_{DD}=3.6V (The following specifications apply for 8Ω load，A_V=1V/V，T_A=25℃，unless otherwise specified.)

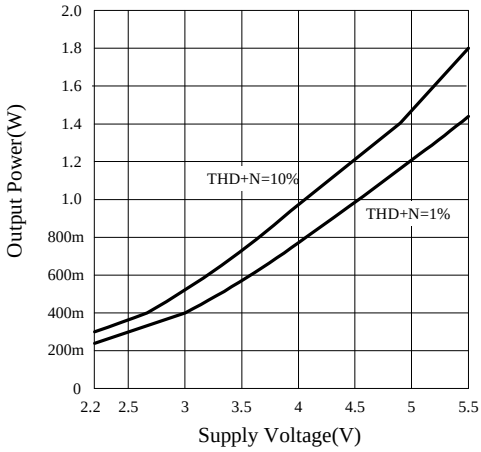
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent Power Supply Current	I_{DD}	VIN=0V, no load		2	4.5	mA
		VIN=0V, R_L=8Ω		3.5	7.5	
Shutdown Current	I_{SD}	$V_{SHUTDOWN}$=GND		0.01	1	μA
Output Power	P_O	THD=1%(max); f=1kHz		0.6		W
Total Harmonic Distortion + Noise	THD+N	P_O=0.4Wrms; f=1kHz		0.02		%
Power Supply Rejection Ratio	PSRR	Vripple=200mV sine p-p				dB
		f=217Hz (note1)		-86		
		f=1kHz (note1)		-83		
		f=217Hz (Note2)		-83		
		F=1KHz (Note2)		-83		
Common Mode Rejection Ratio	CMRR	f=217Hz V_{CM}=200mV_{PP}		-76		dB
Output Offset	V_{OS}	VIN=0V		2	8	mV
Shutdown Voltage Input High	V_{SDIH}		1.5			V
Shutdown Voltage Input Low	V_{SDIL}				0.5	V
Closed Loop Gain	Gain		$\frac{36k\Omega}{Ri}$	$\frac{40k\Omega}{Ri}$	$\frac{44k\Omega}{Ri}$	V/V

Note1: Unterminated input

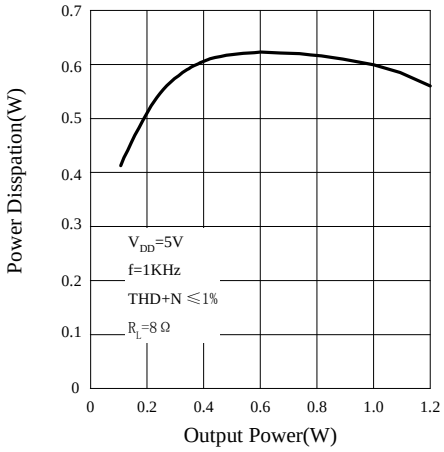
Note2: 10Ω terminated input

Typical characteristics

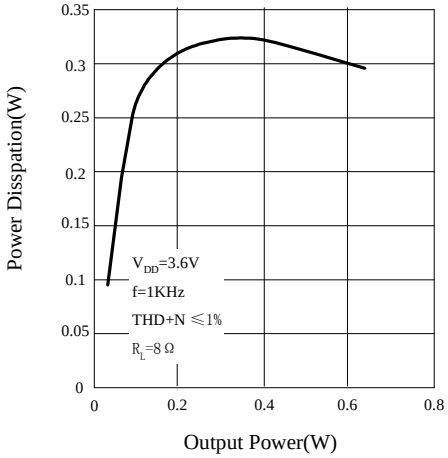
Output Power vs Supply Voltage
R_L=8Ω



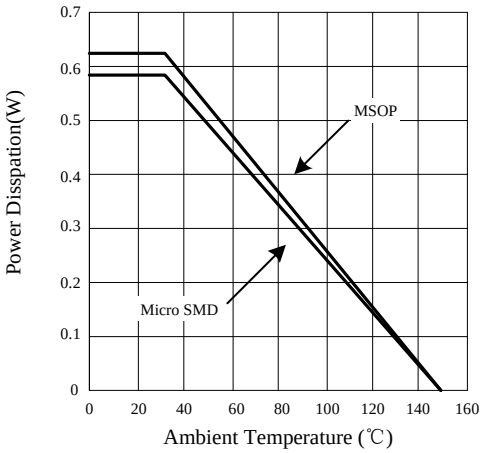
Power Dissipation vs Output Power



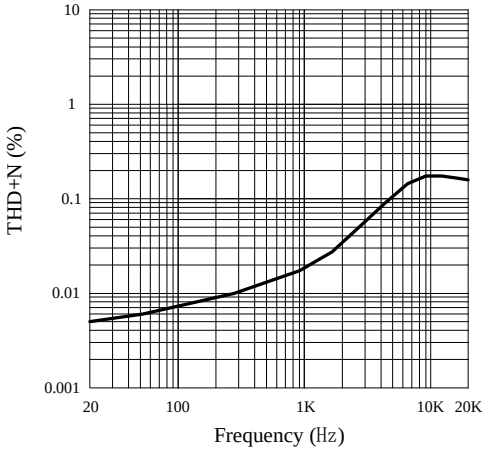
Power Dissipation vs Output Power



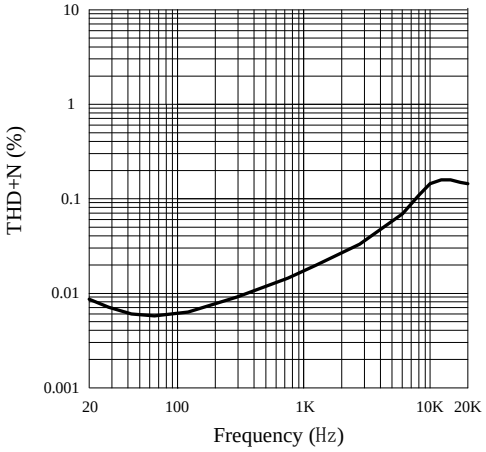
Power Derating Curve



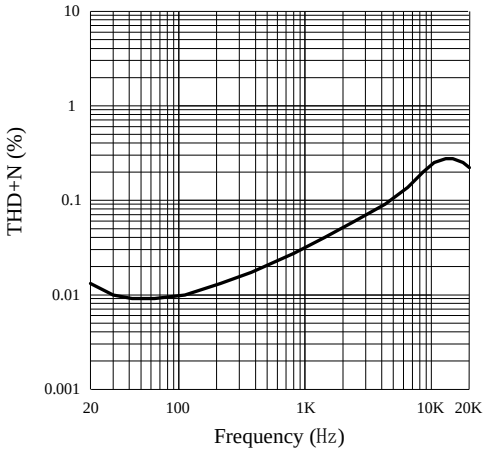
THD+N vs Frequency
V_{DD}=5V, R_L=8Ω ,P_O=600mW



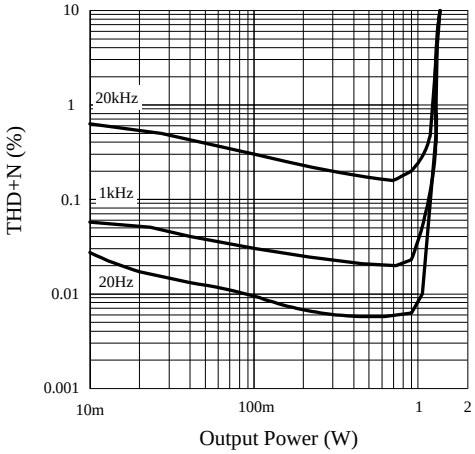
THD+N vs Frequency
V_{DD}=3.6V, R_L=8Ω ,P_O=400mW



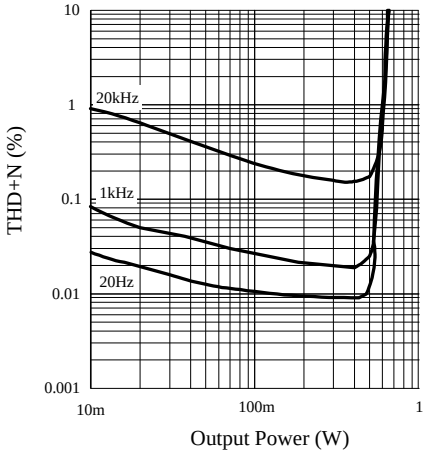
THD+N vs Frequency
V_{DD}=2.5V, R_L=8Ω ,P_O=150mW



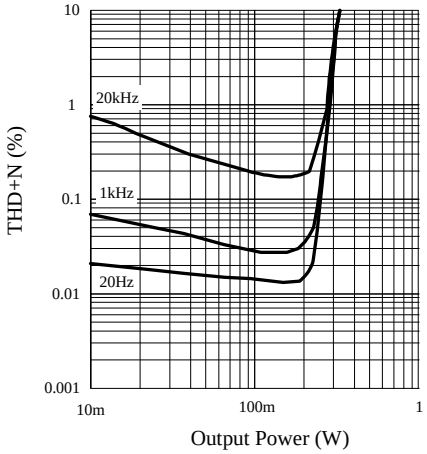
THD+N vs Output Power
V_{DD}=5V, R_L=8Ω



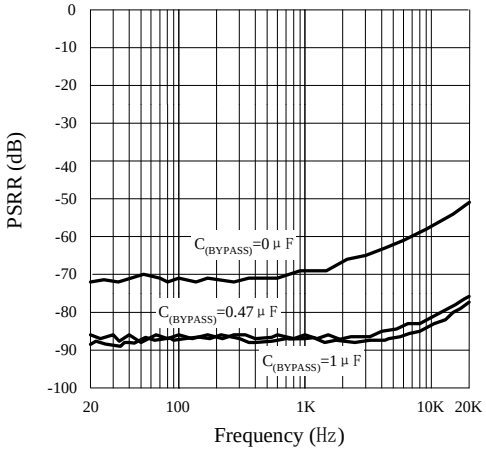
THD+N vs Output Power
V_{DD}=3.6V, R_L=8Ω



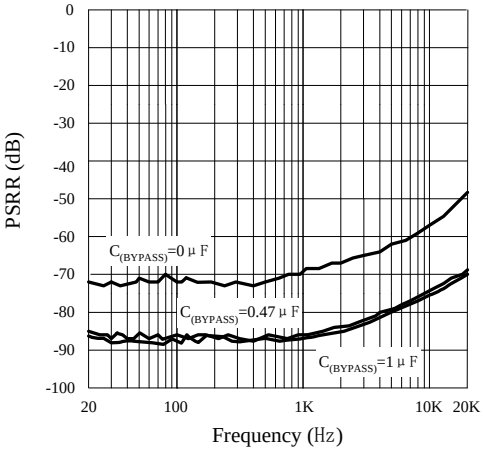
THD+N vs Output Power
V_{DD}=2.5V, R_L=8Ω



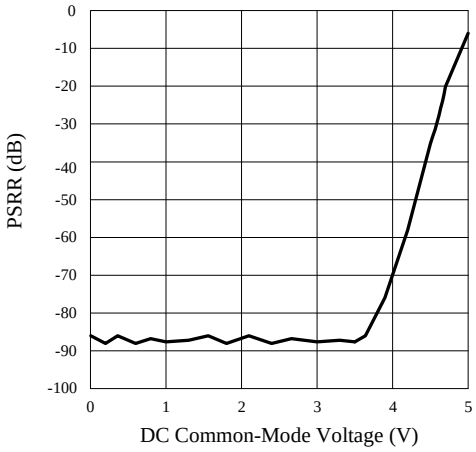
PSRR vs Frequency
V_{DD}=5.0V, R_L=8Ω ,input 10Ω Terminated



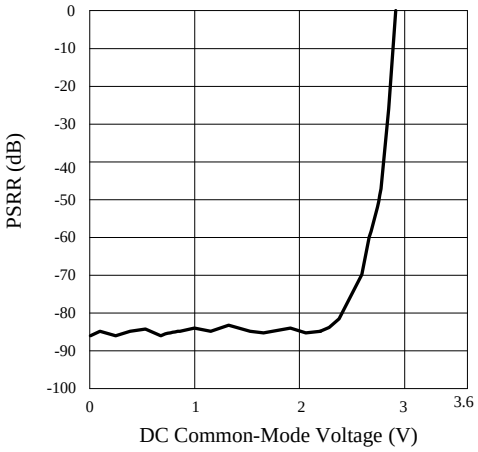
PSRR vs Frequency
V_{DD}=3.6V, R_L=8Ω ,input 10Ω Terminated



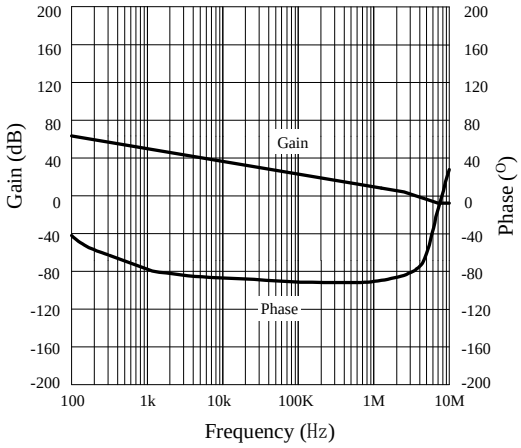
PSRR vs Common Mode voltage
V_{DD}=5.0V, R_L=8Ω, 217Hz, 200mV_{PP}



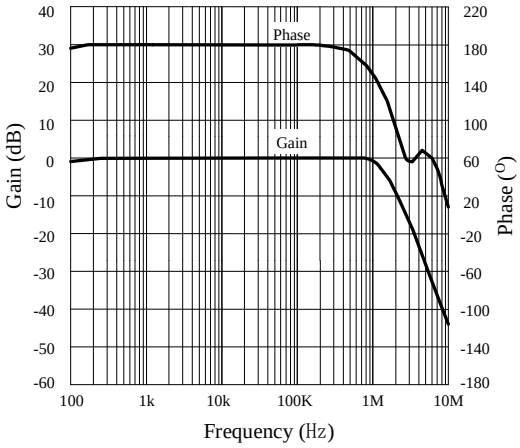
PSRR vs Common Mode voltage
V_{DD}=3.6V, R_L=8Ω, 217Hz, 200mV_{PP}



Open Loop Frequency Response



Closed Loop Frequency Response



Application

From Figure 3 to Figure 5 show application schematics for differential and single-ended inputs.

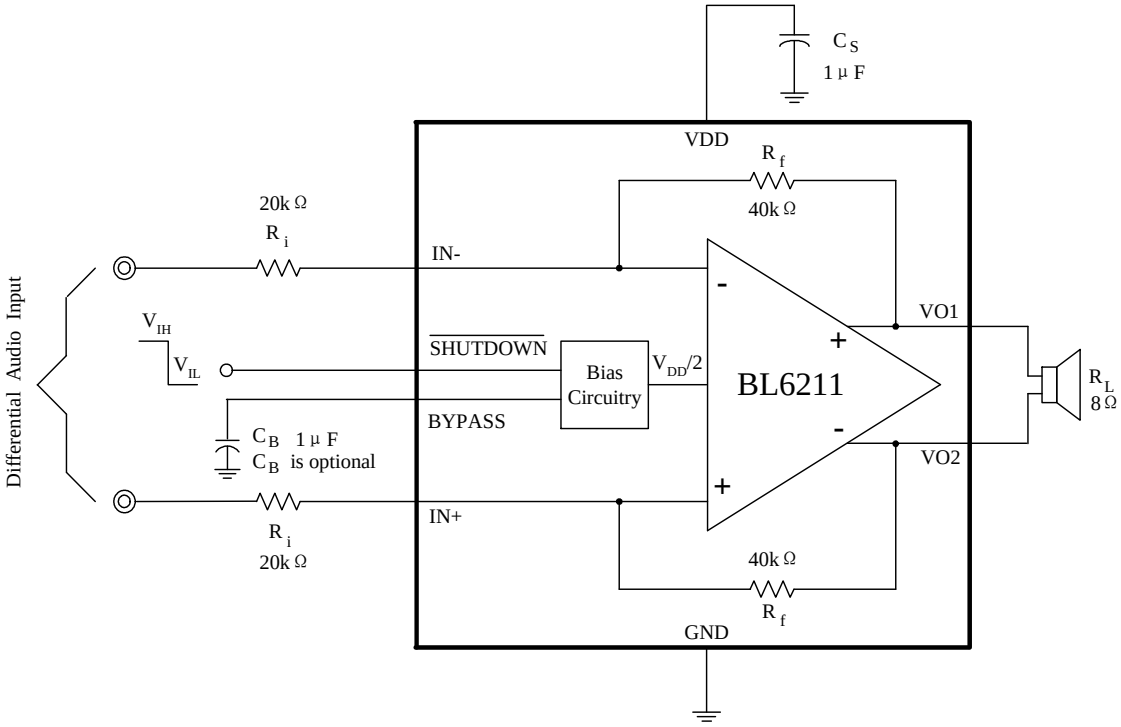


Figure 2 Typical Differential Input Application

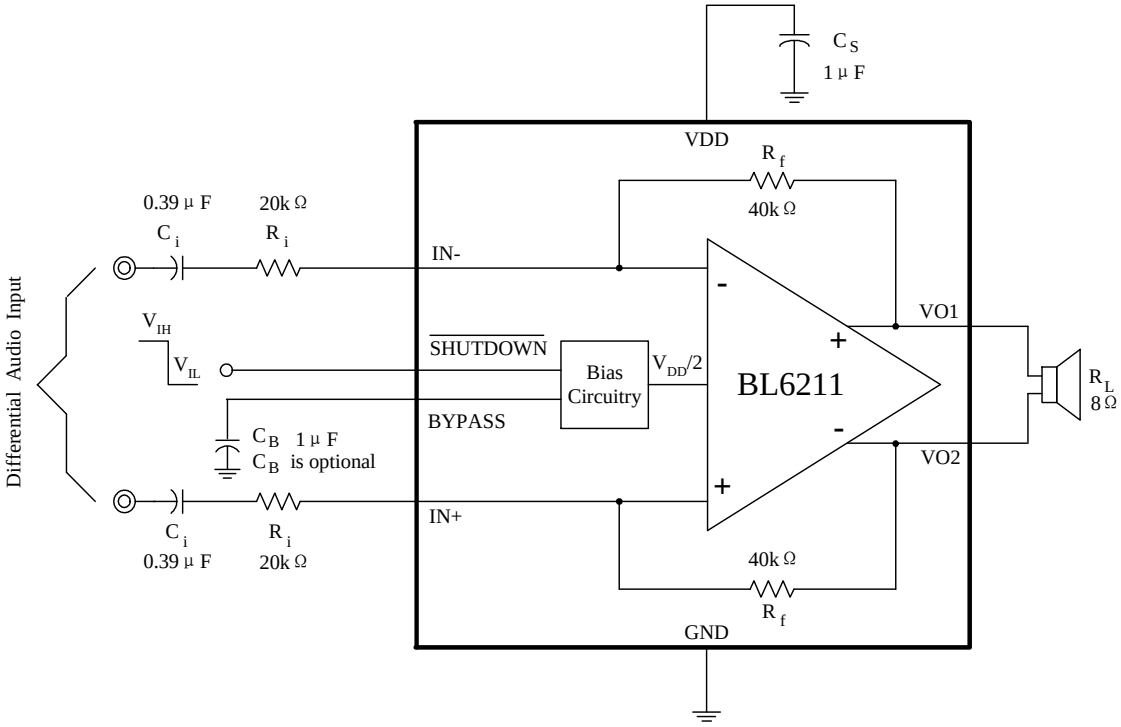


Figure3 Differential Input Application With Input Capacitors

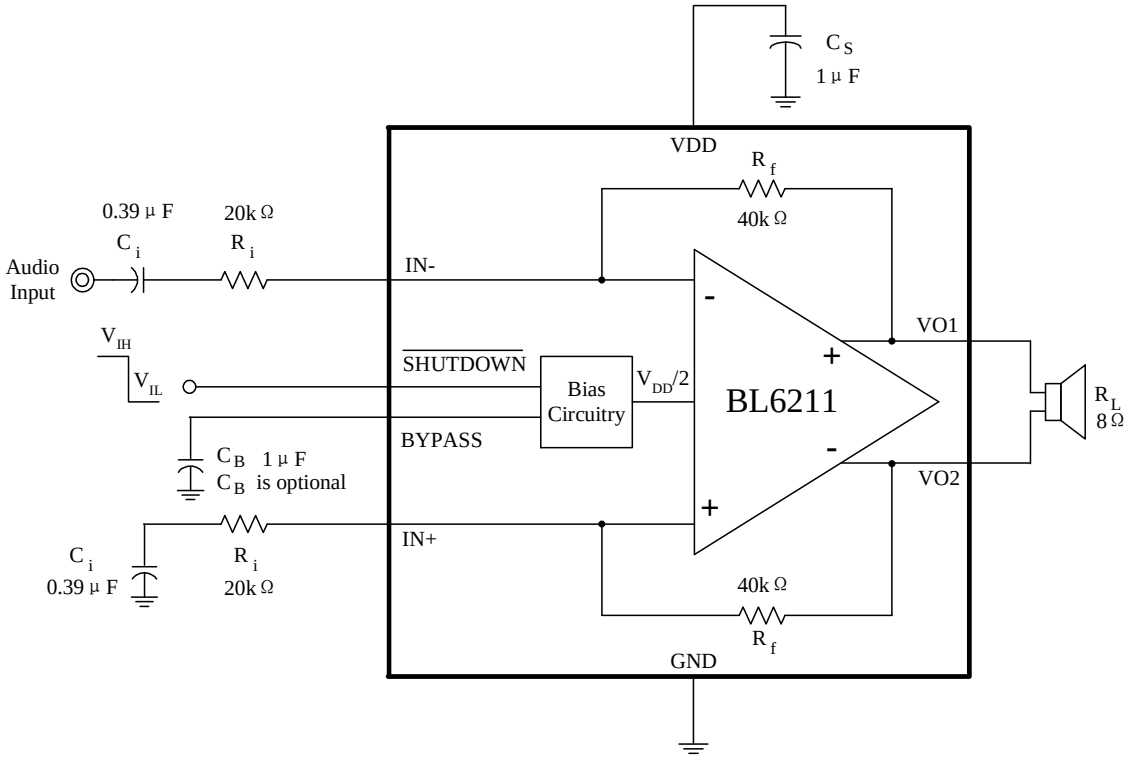


Figure4 Single-Ended Input Application