Rail-to-Rail I/O Op. Amp.

Features

- Single-supply operation: 2.0V to 5.5V
- Low supply current: 700 µA
- Wide bandwidth: 3 MHz
- Slew rate: 1 V/µs
- No phase reversal
- Unity-gain stable
- Small 5-pin SOT-23-5 package

Applications

- Battery-Powered Instruments
- Portable Equipment
- Audio Signal Conditioning
- Multimedia Audio
- ASIC Input or Output Amplifier

Description

The SS8012G is a single-supply amplifier supporting rail-to-rail input and output. High output current makes these amplifiers excellent for driving either resistive or capacitive loads. AC performance is very good with 3.0MHz bandwidth.

The very low input bias currents allow the SS8012G to be used for integrators and diode amplification and other applications requiring low input bias current. The supply current is only 700µA per amplifier at 3.0V, allowing low current applications to control high current loads.

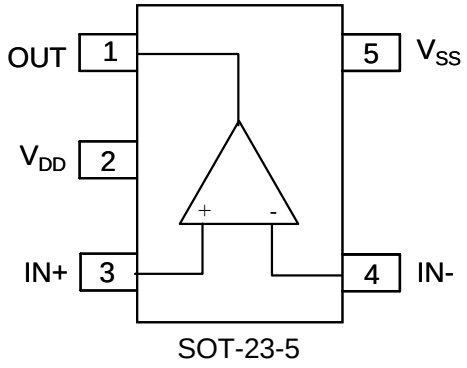
Applications include audio amplification for computers, sound ports, sound cards and set-top boxes. The SS8012G is very stable and capable of driving capacitive loads. The ability to swing rail-to-rail at the inputs and outputs enables designers to buffer CMOS ADC/DACs, ASICs or other wide output swing devices in single-supply systems.

Ordering Information

SS8012GTR : SS8012 in SOT-23-5 with Pb-free lead finish, shipped on tape and reel.

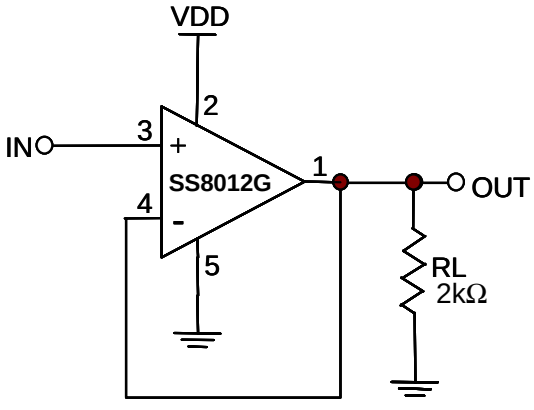
This device is only available with Pb-free lead finish (second-level interconnect).

Pin Configuration



SOT-23-5

Typical Application Circuit



Absolute Maximum Ratings (Note1)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DD}	Supply voltage		0	7.0	V
T_{stg}	Storage temperature		-65	+150	°C
T_{amb}	Operating ambient temperature		0	+70	°C

Notes:
1. Absolute Maximum Ratings are limits beyond which damage to the device may occur.

Thermal Characteristics

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	Thermal resistance from junction to ambient in free air SOT-23-5	240	°C/W

Electrical Characteristics

V_{DD} = 2V, V_{SS} = 0V, T_{amb} = 25°C, R_L >1MΩ, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
I_{DD}	Supply current	no load	-	0.13	0.4	mA
P_{tot}	Total power dissipation	no load	-	0.26	0.8	mW
DC Characteristics						
$V_{I\ (OS)}$	Input offset voltage			±1mV	±15	mV
V_{CM}	Common mode voltage		0	-	2.0	V
I_B	Input Bias Current			±0.05		nA
I_{OS}	Input Bias Current Offset			±0.05		nA
R_{IN}	Input Resistance			1000	-	MΩ
A_V	Open Loop Gain			95	-	dB
I_O	Maximum output current	V_{OUT} = ±V_{IN} x 90%	-	±12	-	mA
V_O	Output Voltage Swing	R_L = 2kΩ	0.04	-	1.96	V
PSRR	Power supply rejection ratio			50	-	dB
CMRR	Common-Mode Rejection Ratio			55		dB
AC Characteristics						
GBWP	Gain-Bandwidth Product	Open-loop; No Load	-	1.0	-	MHz
SR	Slew-Rate	Measured from 20% to 80% of $2V_{P\text{-}P}$ step		0.3		V/µs
PM	Phase Margin		-	60	-	deg

Electrical Characteristics

V_{DD} = 3V, V_{SS} = 0V, T_{amb} = 25°C, R_L =1MΩ, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
I_{DD}	Supply current	no load	-	0.7	2.1	mA
P_{tot}	Total power dissipation	no load	-	2.1	6.3	mW
DC Characteristics						
$V_{I(OS)}$	Input offset voltage			±1.5	±15	mV
V_{CM}	Common mode voltage		0	-	3.0	V
I_B	Input Bias Current			±0.05		nA
I_{OS}	Input Bias Current Offset			±0.05		nA
R_{IN}	Input Resistance			1000	-	MΩ
A_V	Open Loop Gain			90	-	dB
I_O	Maximum output current	V_{OUT} = ±V_{IN} x 90%	-	±27	-	mA
V_O	Output Voltage Swing	R_L = 2kΩ	0.04	-	2.96	V
PSRR	Power supply rejection ratio			65	-	dB
CMRR	Common-Mode Rejection Ratio			55		dB
AC Characteristics						
GBWP	Gain-Bandwidth Product	Open-loop; No Load	-	3.0	-	MHz
SR	Slew-Rate	Measured from 20% to 80% of $5V_{P-P}$ step		1		V/µs
PM	Phase Margin		-	60	-	deg

Electrical Characteristics

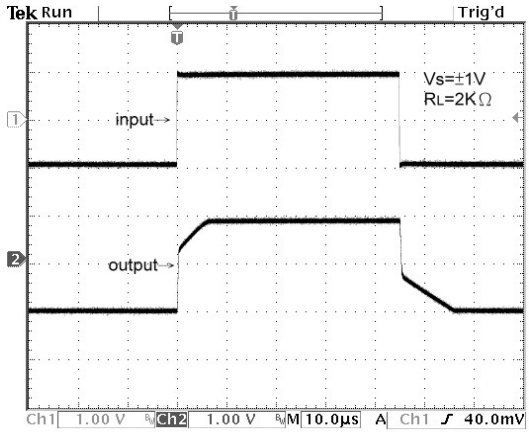
V_{DD} = 5V, V_{SS} = 0V, T_{amb} = 25°C; R_L = 1MΩ, unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
I_{DD}	Supply current	no load	-	0.9	2.4	mA
P_{tot}	Total power dissipation	no load	-	4.5	12	mW
DC Characteristics						
$V_{I(OS)}$	Input offset voltage			±3	±15	mV
V_{CM}	Common mode voltage		0	-	5.0	V
I_B	Input Bias Current			±0.05		nA
I_{OS}	Input Bias Current Offset			±0.05		nA
R_{IN}	Input Resistance			1000	-	MΩ
A_V	Open Loop Gain			65	-	dB
I_O	Maximum output current	V_{OUT} = ±V_{IN} x 90%	-	±60	-	mA
V_O	Output Voltage Swing	R_L = 2kΩ	0.05	-	4.95	V
PSRR	Power supply rejection ratio			65	-	dB
CMRR	Common-Mode Rejection Ratio			45		dB
AC Characteristics						
GBWP	Gain-Bandwidth Product	Open-loop; No Load	-	13	-	MHz
SR	Slew-Rate	Measured from 10% to 90% of $5V_{P-P}$ step		6		V/µs
PM	Phase Margin		-	60	-	deg

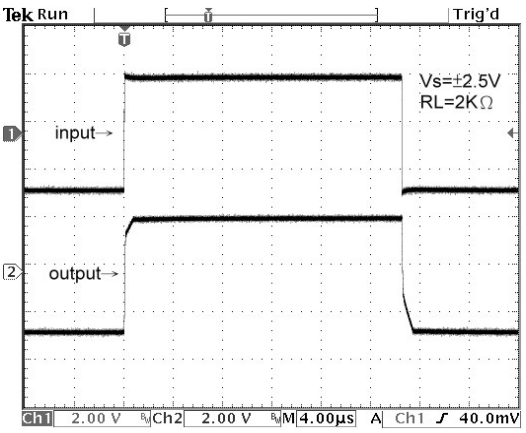
Large Signal Transient Response Characteristics

Test Condition: T_A = 25°C, AV = 1 , RL = 2kΩ

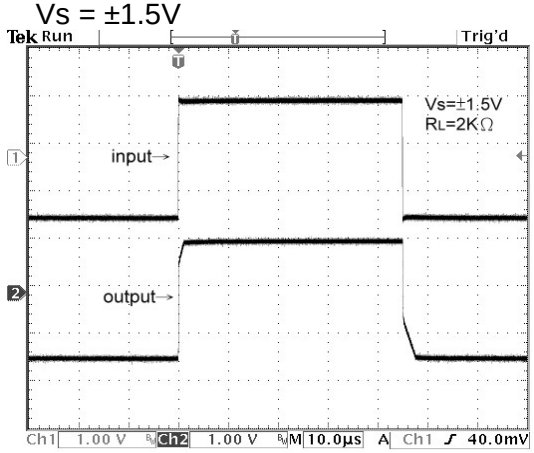
Vs = ±1V

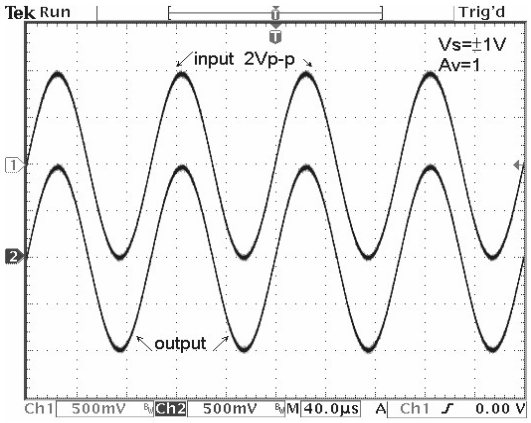


Vs = ±2.5V

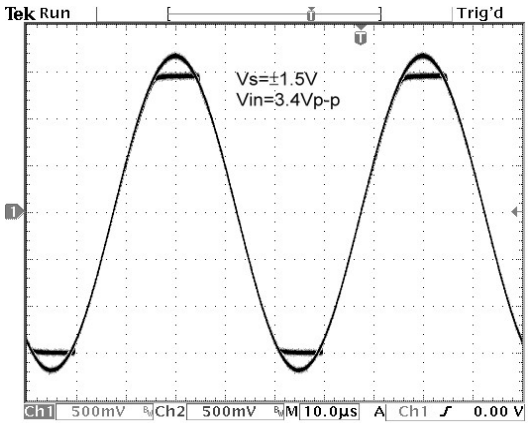


Vs = ±1.5V





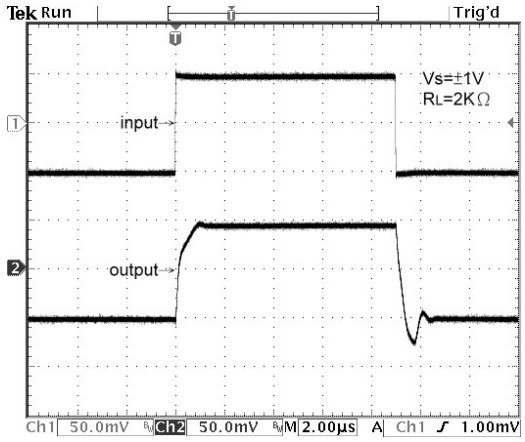
Operation with input beyond the rail



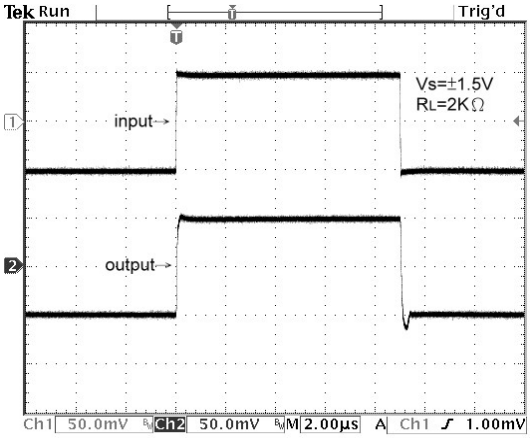
Small Signal Transient Response Characteristics

Test Condition: T_A = 25°C, A_V = 1 , R_L = 2kΩ

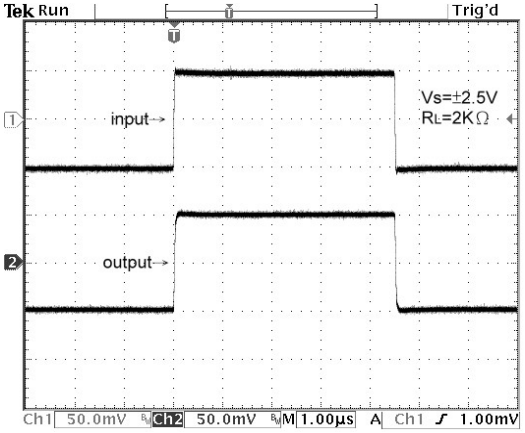
Vs = ±1V



Vs = ±1.5V

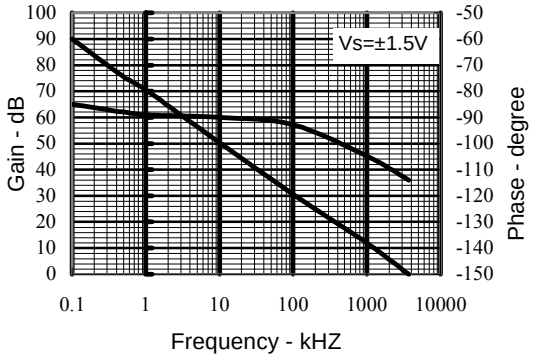


Vs = ±2.5V



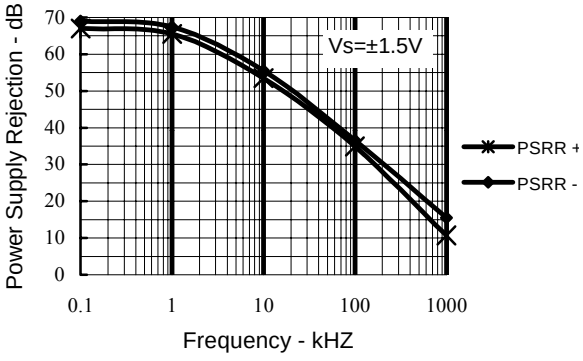
Test Condition: Vs =±1.5V,T_A = 25°C

Open-Loop Gain & Phase vs. Frequency

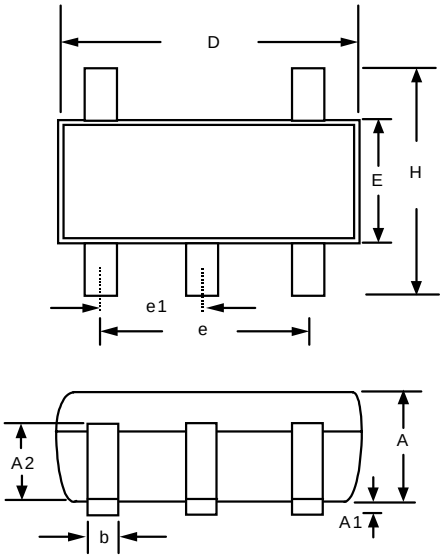


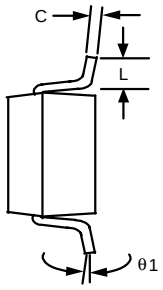
Test Condition: V_S =±1.5V,T_A = 25°C

PSRR

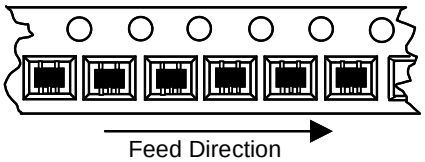


Package Information





Taping Specification (Unit: mm)



Feed Direction
SOT-23-5 Package Orientation

Note:

1. Package body sizes exclude mold flash protrusions or gate burrs
2. Tolerance ±0.1000 mm (4mil) unless otherwise specified
3. Coplanarity: 0.1000mm
4. Dimension L is measured in gage plane

SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A1	0.00	-----	0.10
A2	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.60	1.80
e	-----	1.90(TYP)	-----
e1	-----	0.95	-----
H	2.60	2.80	3.00
L	0.37	------	-----
θ1	1º	5º	9º

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