

LOW VOLTAGE AUDIO AMPLIFIER

S1T8602B

INTRODUCTION

The S1T8602B is the audio power amplifier available for low voltages. S1T8602B supplies differential outputs for maximizing output swing at low voltages. S1T8602B doesn't need coupling capacitors to the speaker. The gain of this amp is controlled easily by two external resistors.

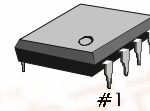
FEATURES

- Wide Supply Voltage (2 to 16V)
- Low Quiescent Supply Current ($I_{CC} = 2.7\text{mA}$: Typ)
- Easy Gain Control
- Medium Output Power
 $P_O = 250\text{mW}$ at $V_{CC} = 6\text{V}$, $R_L = 32\Omega$, THD = 10%
- Minimum External Parts
- Various Load Impedance Range (8Ω to 100Ω)
- Low Distortion
- Mute Function ($I_{CC} = 65\mu\text{A}$: Typ)

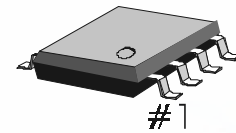
ORDERING INFORMATION

Device	Package	Operating Temperature
S1T8602B01-D0B0	8-DIP-300	- 20°C to +70°C
S1T8602B01-S0B0	8-SOP-225	

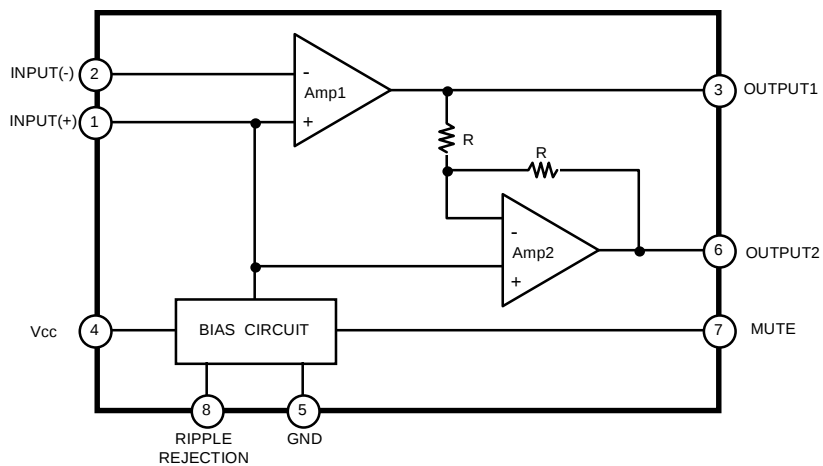
8-DIP-300



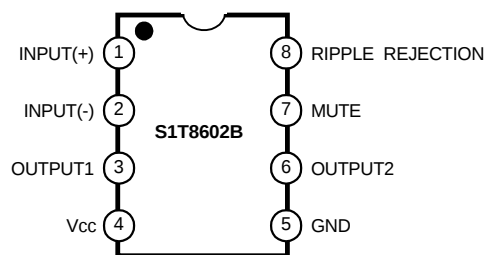
8-SOP-225



BLOCK DIAGRAM



PIN CONFIGURATION



PIN DESCRIPTION

Pin No	Symbol	Description
1	Input (+)	Analog Ground for the amplifiers. A 1.0 μ F capacitor at this pin (with a 5.0 μ F capacitor at pin 8) provides 52dB (Typ) of power supply rejection. Turn-on time of the circuit is affected by the capacitor on this pin. This pin can be used as an alternative input.
2	Input (–)	Amplifier input. The input capacitor and resistor set low frequency roll-off and input impedance. The feedback resistor is connected between this pin and output1.
3	Output 1	The output of Amplifier 1. DC Level is $(V_{CC} - 0.7V)/2$.
4	V_{CC}	DC supply voltage (+2.0 to +16V) is applied to this pin.
5	GND	Ground pin.
6	Output 2	The output of Amplifier 2. This signal is equal in amplitude, but 180° out of phase with that at output1. The DC level is $(V_{CC} - 0.7V)/2$.
7	Mute	This pin can be used to power down the IC to conserve power or for muting, or both. When at a logic Low (0 to 0.8 volts), the S1T8602B is enabled for normal operation. When at a logic High (2.0 to V_{CC} volts), the IC is disabled. If Mute is open, that is equivalent to a logic Low.
8	Ripple Rejection	A capacitor at this pin increases power supply rejection, and affects turn-on time. This pin can be left open if the capacitor at pin 1 is sufficient.

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	– 1.0 to + 18	V
Output Current (output pin)	I_O	± 250	mA
Maximum Voltage (input, Ripple rejection, Mute pin)	$V_{I(MAX)}$	– 1.0 to $V_{CC} + 1.0$	V
Applied Output Voltage (output pin) when disabled	V_O	– 1.0 to $V_{CC} + 1.0$	V
Junction Temperature	T_J	– 55 to + 140	°C

RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	+2.0	–	+16	V
Load Impedance	Z_L	8	–	100	W
Peak Load Current	I_L (PK)	– 200	–	± 200	mA
Differential Gain (5KHz Bandwidth)	ΔG_V	0	–	46	dB
Voltage at Mute (Pin 7)	V_I (MUTE)	0	–	V_{CC}	V
Ambient Temperature	T_a	–20	–	470	°C

ELECTRICAL CHARACTERISTIC

(V_{CC} = 6V, T_a = 25°C, unless otherwise noted)

Characteristic		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
DC ELECTRICAL CHARACTERISTICS							
Operating Current (RL = 0)		I_{CC}	$V_{CC} = 3.0V$, Mute = 0.8V $V_{CC} = 16.0V$, Mute = 0.8V	–	2.7 3.3	4.0 5.0	mA
			$V_{CC} = 3.0V$, Mute = 2.0V	–	65	100	μA
Output Voltage (output pin)		V_O	$R_L = 16\Omega$ $R_1 = 75k\Omega$ $V_{CC} = 3.0V$ $V_{CC} = 6.0V$ $V_{CC} = 12.0V$	1.0	1.15 2.65 5.65	1.25	V
Output Offset Voltage		V_{OO}	$V_{CC} = 6.0V$, $R_f = 75k\Omega$, $R_L = 32\Omega$	–30	0	+30	mV
Output High Level		V_{OH}	$2.0V \leq V_{CC} \leq 16V$, $I_{out} = -75mA$	–	$V_{CC}-1.0$	–	V
Output Low Level		V_{OL}	$2.0V \leq V_{CC} \leq 16V$, $I_{out} = 75mA$	–	0.16	–	V
Input Bias Current (pin 2)		I_{BIAS}	–	–	–100	–200	nA
Equivalent Resistance		R_{EQ}	pin 1 pin 8	100 18	150 25	220 40	kΩ
Mute	Input Low Voltage	V_{IL} (MUTE)	–	–	–	0.8	V
	Input High Voltage	V_{IH} (MUTE)	–	2.0	–	–	V
	Input Resistance	R_I (MUTE)	$V_{CC} = \text{Mute} = 16V$	50	90	175	kΩ
AC ELECTRICAL CHARACTERISTICS							
Open Loop Gain (Amp 1)		G_V (AMP1)	–	80	–	–	dB
Close Loop Gain (Amp 2)		G_V (AMP2)	$f = 1.0kHz$, $R_L = 32\Omega$	–0.35	0	+0.35	dB
Output Power		P_O	$V_{CC} = 3.0V$, $R_L = 6\Omega$, THD ≤ 10% $V_{CC} = 6.0V$, $R_L = 32\Omega$, THD ≤ 10% $V_{CC} = 12V$, $R_L = 100\Omega$, THD ≤ 10%	55 250 400	–	–	mW

ELECTRICAL CHARACTERISTIC (Continued)(V_{CC} = 6V, Ta = 25°C, unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Total Harmonic Distortion (f = 1.0kHz)	THD	V _{CC} = 6.0V, R _L = 32Ω, P _O = 125mW V _{CC} ≤ 3.0V, R _L = 8Ω, P _O = 20mW V _{CC} ≤ 12V, R _L = 32Ω, P _O = 200mW	–	0.5 0.5 0.6	1.0	%
Gain Bandwidth Product	GBW	–	–	1.5	–	MHz
Power Supply Rejection (V _{CC} = 6.0V, ΔV _{CC} = 3.0V)	PSRR	C ₁ = ∞, C ₂ = 0.01μF C ₁ = 0.1μF, C ₂ = 0, f = 1.0kHz C ₁ = 1.0μF, C ₂ = 5.0μF, f = 1.0kHz	50	12 52	–	dB
Muting	G _{V (MUTE)}	Mute = 2.0V, 1.0Khz ≤ f ≤ 20kHz	–	> 70	–	dB

APPLICATION CIRCUIT

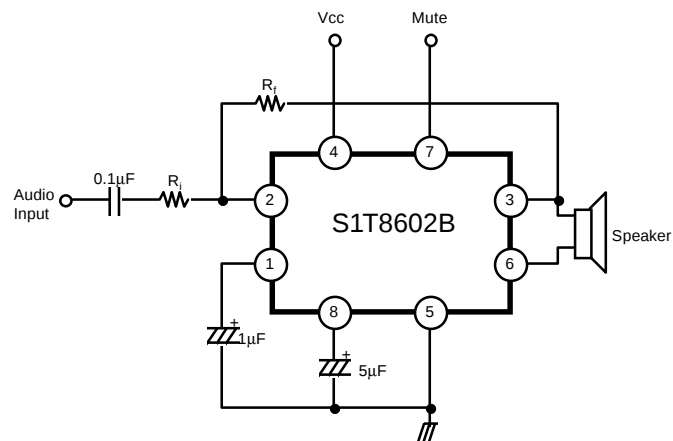


Figure 1.

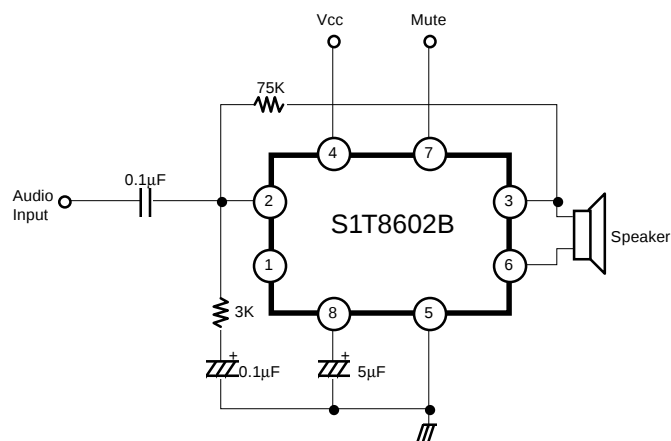


Figure 2.

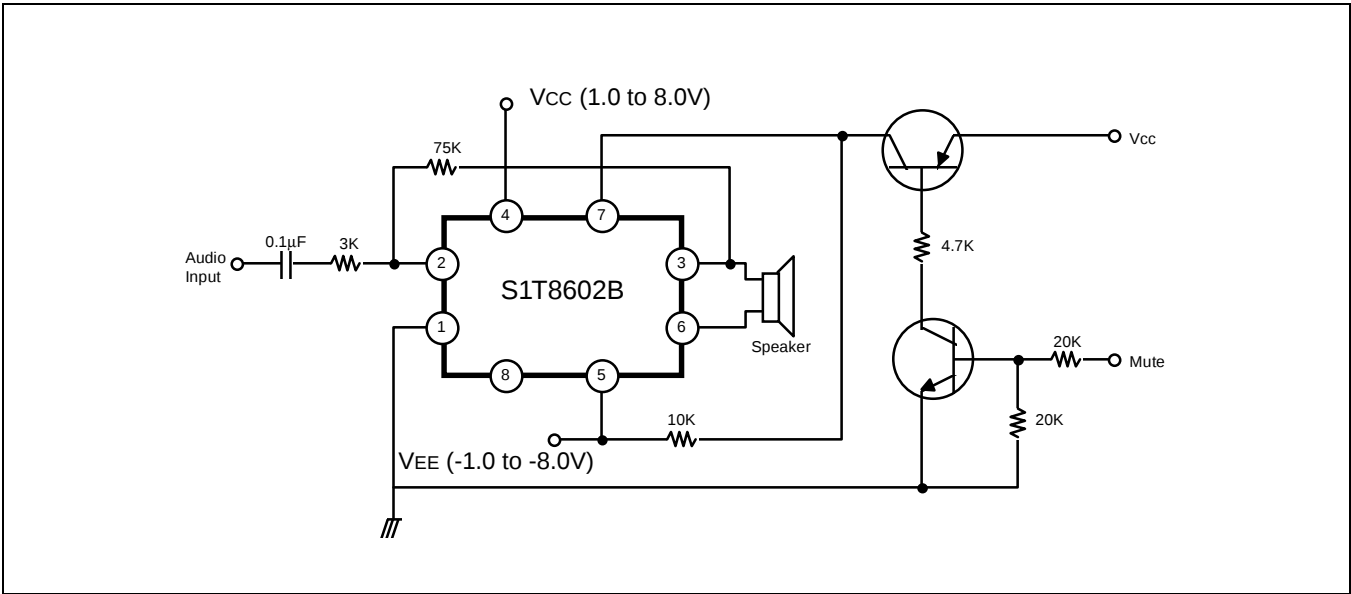


Figure 3.

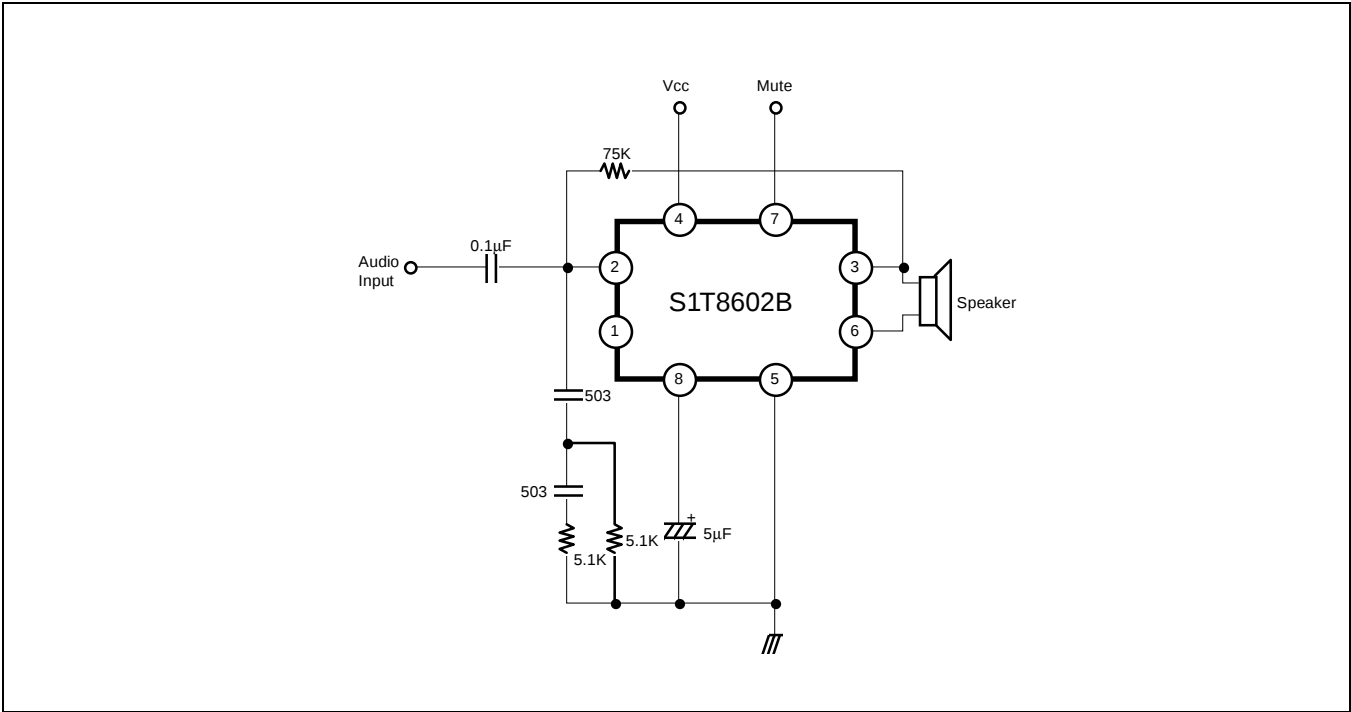


Figure 4.

