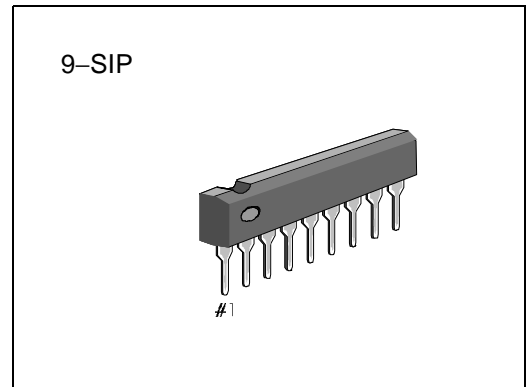


INTRODUCTION

The S1A2220X01 is a monolithic integrated circuit consisting of a pre-amplifier and an ALC circuit for cassette tape recorders.

FEATURES

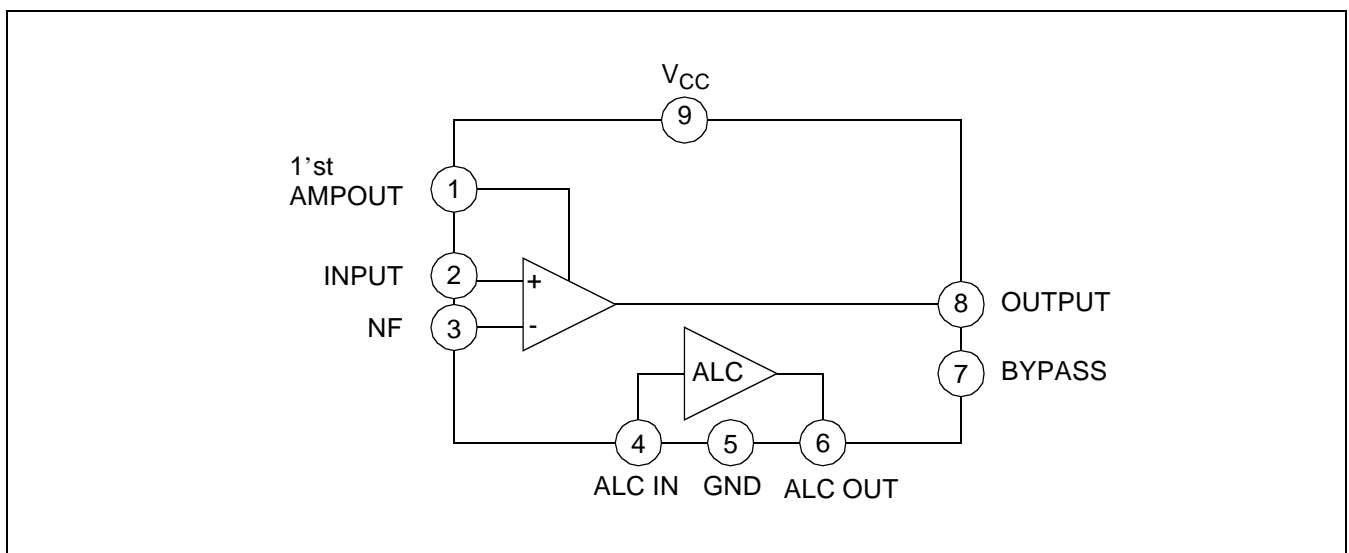
- Low noise amplifier
- Wide operating supply voltage range
 $V_{CC} = 3.5V - 14V$
- High output voltage
- Low distortion
- Wide ALC range
- Good ALC pair characteristic for stereo tape recorders



ORDERING INFORMATION

| Device | Package | Operating Temperature |
|------------------------------------|---------|-----------------------|
| S1A2220X01-IAU0 S1A2220X01-IBU0 | 9-SIP | -20°C — +70°C |

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

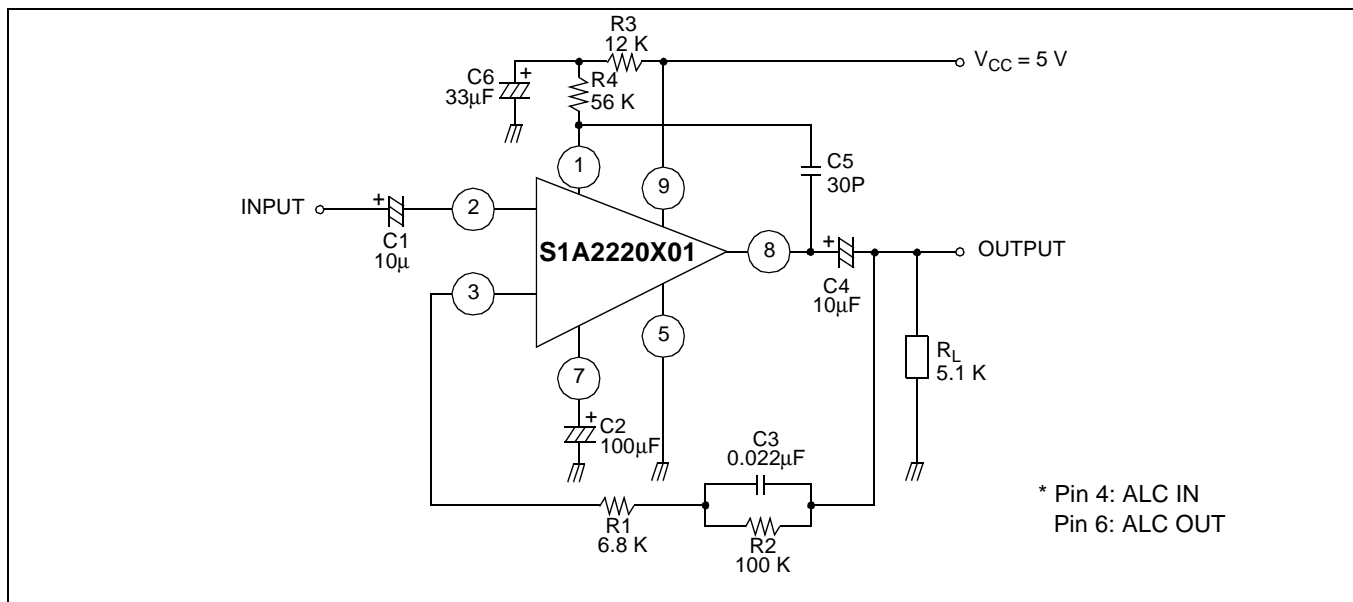
| Characteristic | Symbol | Value | Unit |
|-----------------------|------------------|-------------|------|
| Supply voltage | V _{CC} | 15 | V |
| Power dissipation | P _D | 200 | mW |
| Operating temperature | T _{OPR} | - 20 — +70 | °C |
| Storage temperature | T _{STG} | - 40 — +125 | °C |

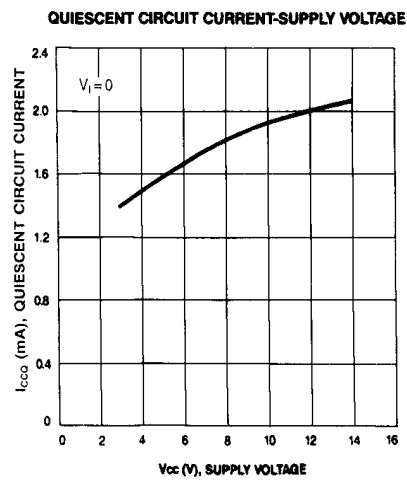
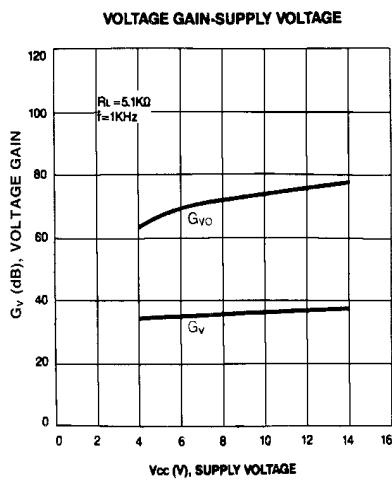
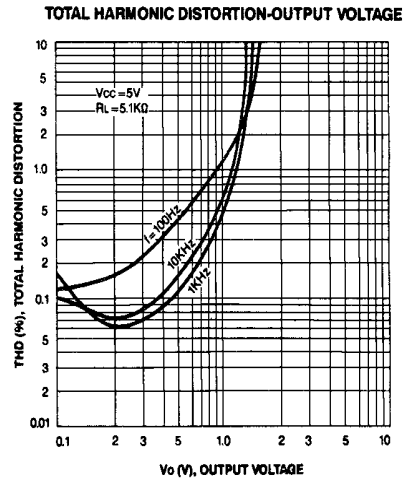
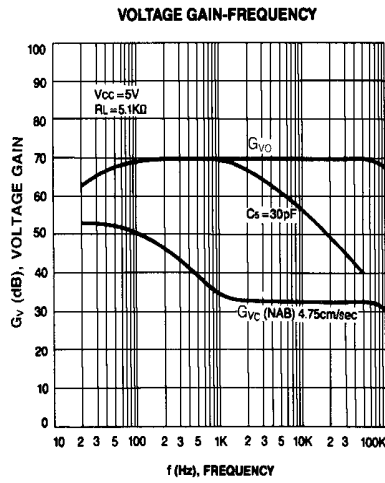
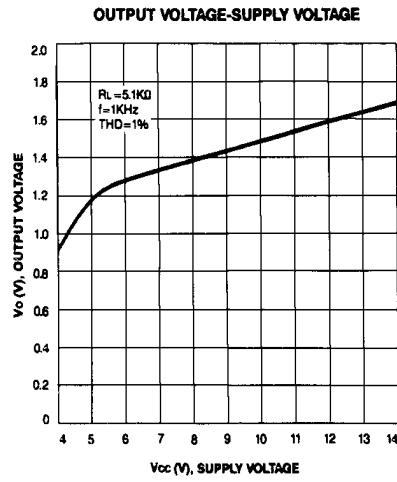
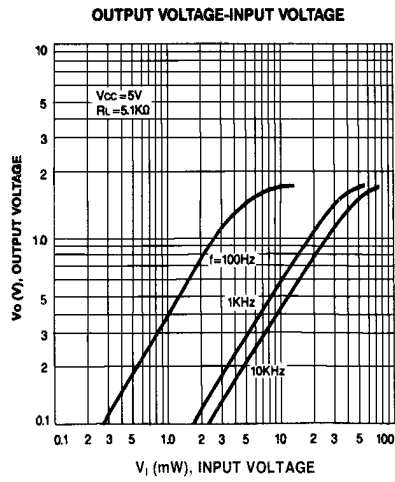
ELECTRICAL CHARACTERISTICS

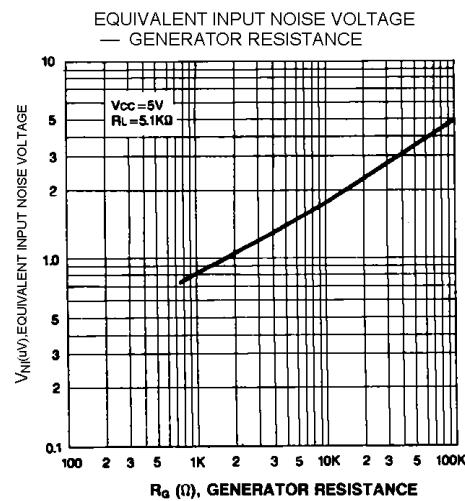
(Ta = 25°C, V_{CC} = 5V, R_L = 5.1K, R_G = 600Ω, f = 1kHz, NAB, unless otherwise specified)

| Characteristic | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|------------------|---|------|------|------|------|
| Quiescent Circuit Current | I _{CCQ} | V _I = 0, ALC OFF | – | 1.4 | 2.0 | mA |
| Open Loop Voltage Gain | G _{VO} | – | 66 | 69 | – | dB |
| Closed Loop Voltage Gain | G _{VC} | V _O = 0.7 V | 33 | 35 | 37 | dB |
| Output Voltage | V _O | THD = 1 % | 0.7 | 1.0 | – | V |
| Total Harmonic Distortion | THD | V _O = 0.2 V | – | 0.1 | – | % |
| Input Resistance | R _I | – | 60 | 100 | – | kΩ |
| Equivalent Input Noise Voltage | V _{NI} | R _G = 2.2kΩ, NAB BW (-3dB) = 15Hz – 30kHz | – | 1.0 | – | μV |
| ALC Transistor Saturation Voltage | V _{SAT} | – | – | 75 | 100 | mV |

TEST CIRCUIT







APPLICATION INFORMATION

ALC Grade Binning Table

| Symbol | A_V (dB) | | ALC Grade (dB) | |
|-----------------|------------|------|----------------|--------|
| | Min. | Max. | Min. | Max. |
| S1A2220X01-IAU0 | 34 | 36 | - 16.0 | - 27.0 |
| S1A2220X01-IBU0 | | | - 25.0 | - 34.0 |

External Components (Refer to test circuits)

C_1 : Input coupling capacitor

The recommended value is 10 μF . If made too small the low frequency characteristics will change for the worse, and too large a capacitance value will increase the rising time when power is applied.

C_2 : Bypass capacitor

A short emitter resistor on the AC, which prevents an AC signal from feedback from being input.

C_3 : R_1 , R_2 : Equalizer network

The closed loop voltage gain is determined by these components in relation to the internal resistance at Pin 3.

C_4 : Output coupling capacitor

C_2 is determined as follows:

$$C_4 = \frac{1}{2\pi \cdot f_L \cdot R_L}$$

f_L : low cut-off frequency

R_L : load resistance

C_5 : Phase compensation capacitor.

Prevents high frequency oscillation by phase error when feedback is heavy.

C_6 : Ripple filter for power supply

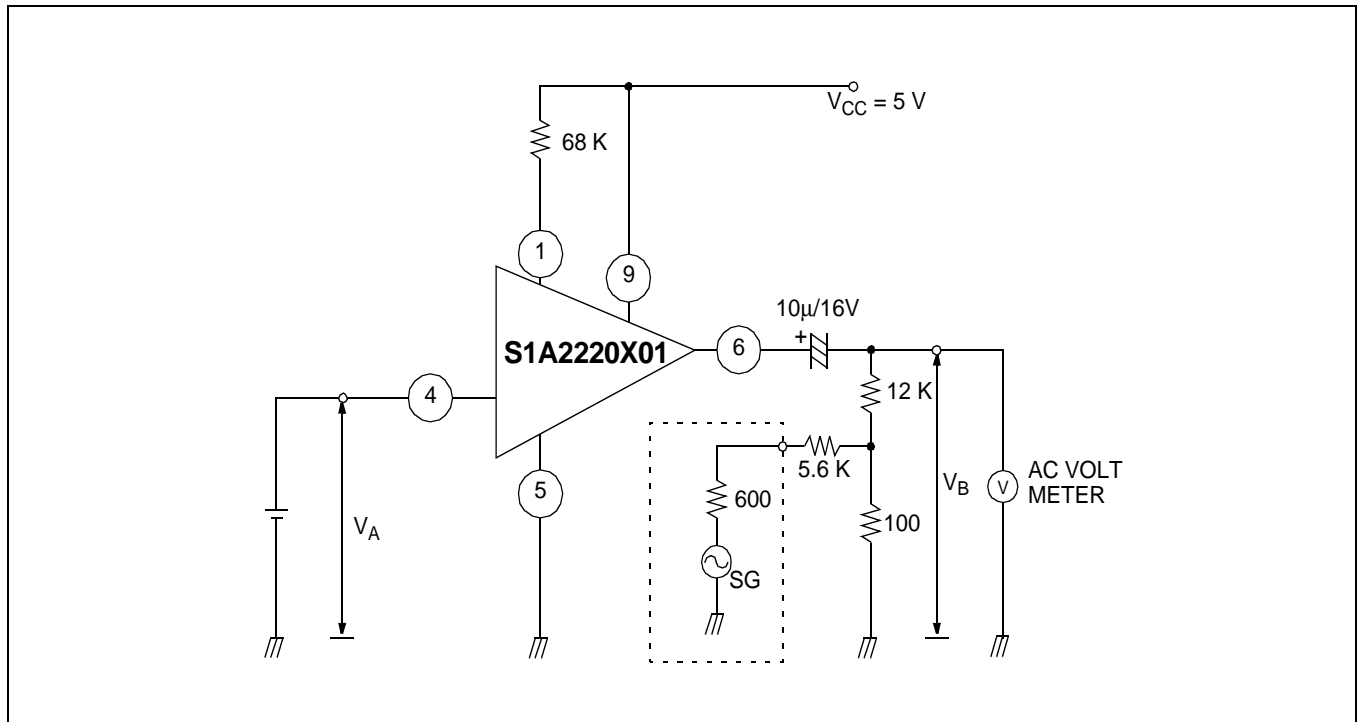
A large value is required to get an excellent ripple characteristic under the line operation, but it must be made smaller to shorten the starting time.

R_3 : Filter resistance

R_4 : Collector resistor of first stage transistor of the IC

Low voltage characteristic can be improved by adjusting this resistance.

ALC GRADE BINNING TEST CIRCUIT



Test condition: S.G. output level should be adjusted to be 13.8 mV of the AC voltmeter reading (V_B) when the D.U.T. is not connected ($V_{CC} = 5V$, $V_A = 1.16V$, $T_a = 25^\circ C$).

ALC RANK is defined as $ALC-G.R = 20 \log V_{B2}/V_{B1}$

where

V_{B1} : AC voltmeter reading when the D.U.T. is not connected,

V_{B2} : AC voltmeter reading when the D.U.T. is connected.

APPLICATION CIRCUIT

