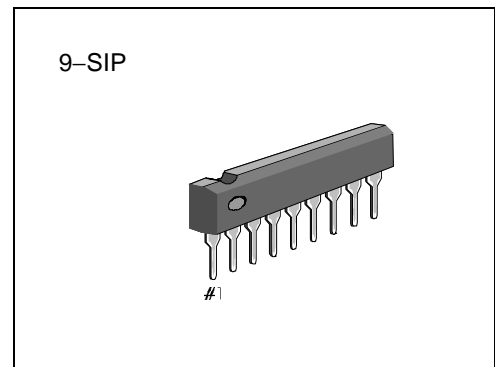


INTRODUCTION

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

FEATURES

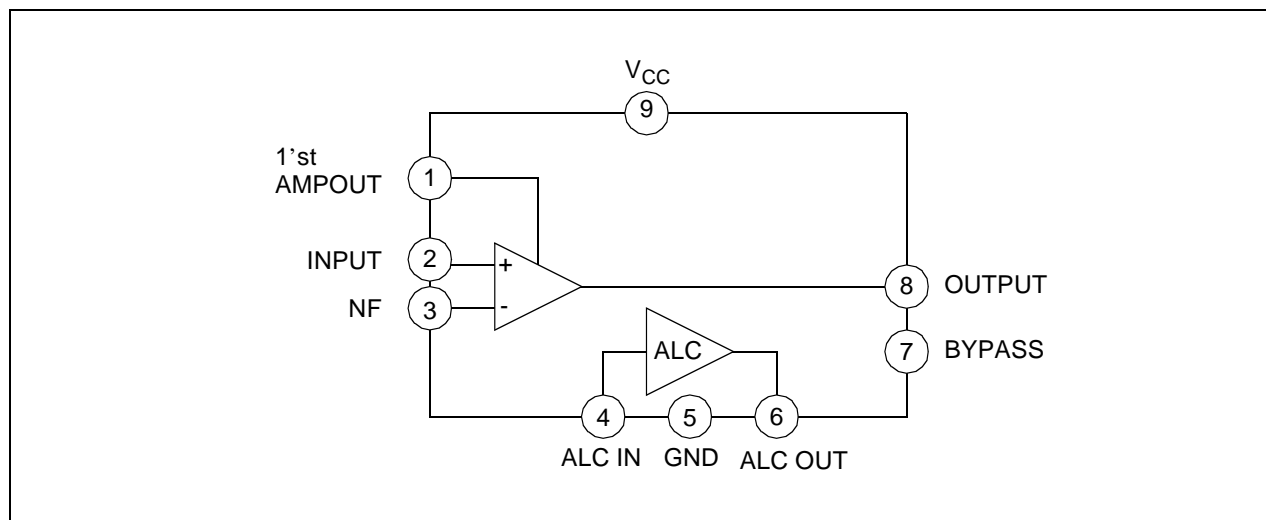
- Low noise amplifier
- Wide operating supply voltage range
 $V_{CC} = 3.5V - 14V$
- High output voltage
- Low distortion
- Wide ALC range
- Good ALC pair characteristic for stereo tape recorders



ORDERING INFORMATION

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

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

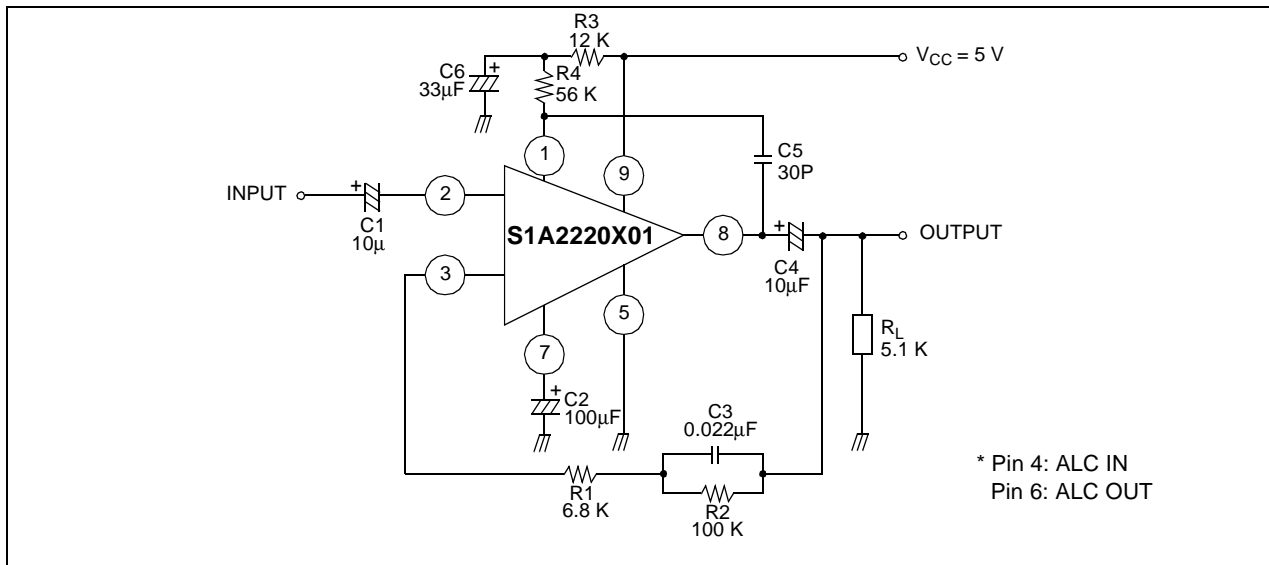
Characteristic	Symbol	Value	Unit
Supply voltage	V_{CC}	15	V
Power dissipation	P_D	200	mW
Operating temperature	T_{OPR}	- 20 — +70	°C
Storage temperature	T_{STG}	- 40 — +125	°C

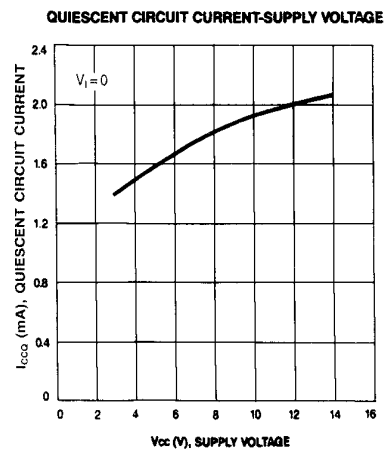
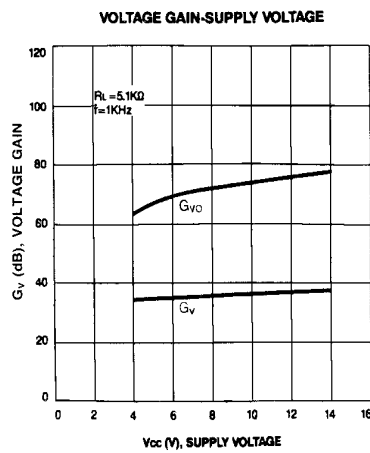
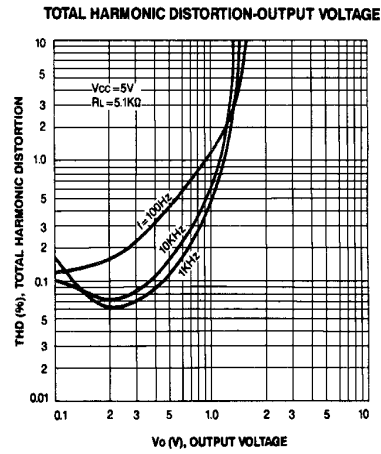
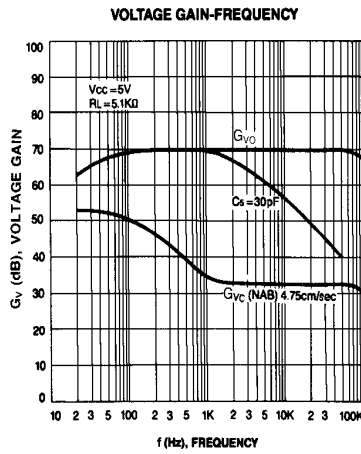
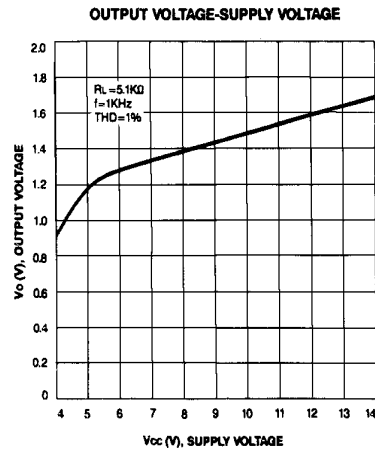
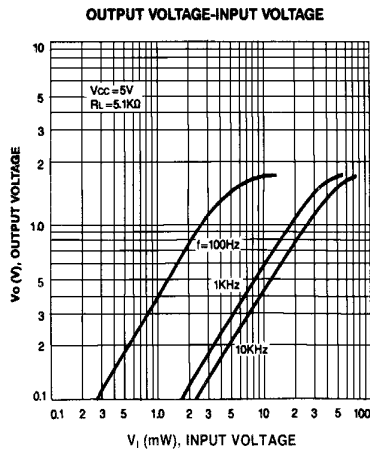
ELECTRICAL CHARACTERISTICS

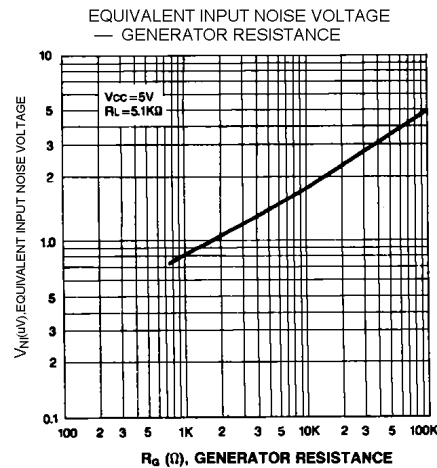
(Ta = 25°C, V_{CC} = 5V, R_L = 5.1K, R_G = 600Ω, f = 1kHz, NAB, unless otherwise specified)

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}	$R_G = 2.2k\Omega$, 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 S1A2220X01-IBU0	34	36	- 16.0 - 25.0	- 27.0 - 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

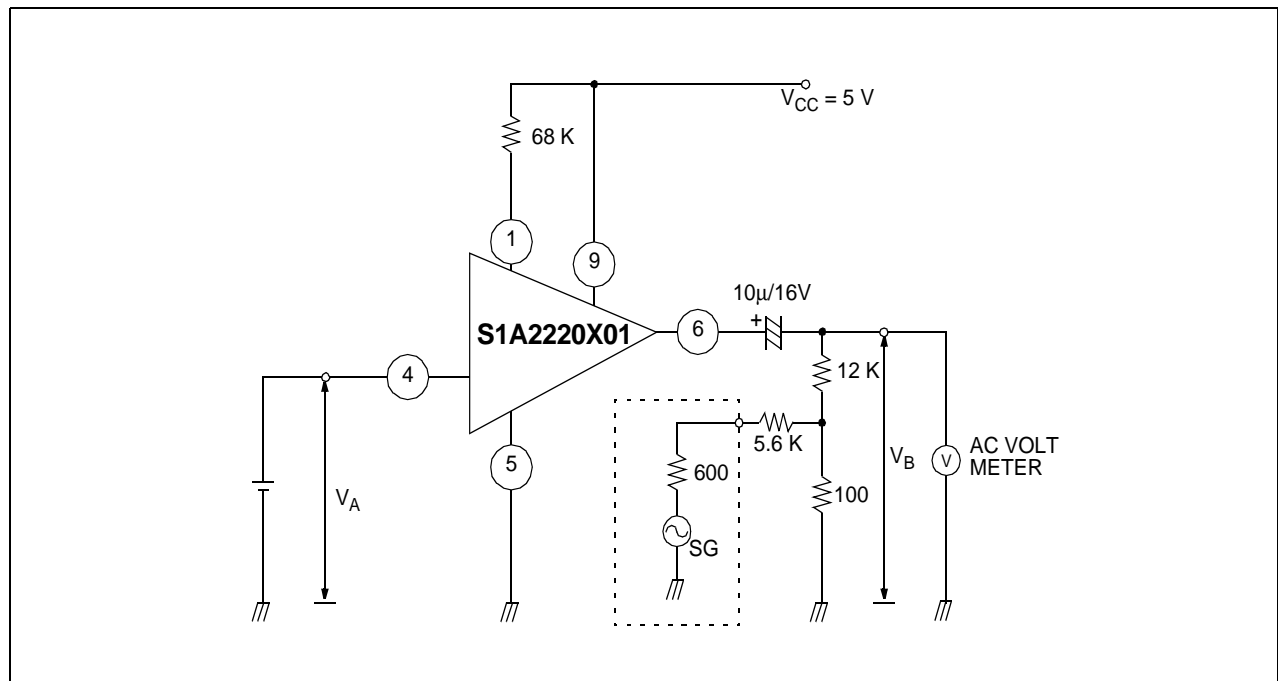
A large value is required to get an excellent ripple characteristic under the line operation, but it must be made smaller to shorten the starting time.

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

