



# LA3210

## Equalizer Amplifier with ALC

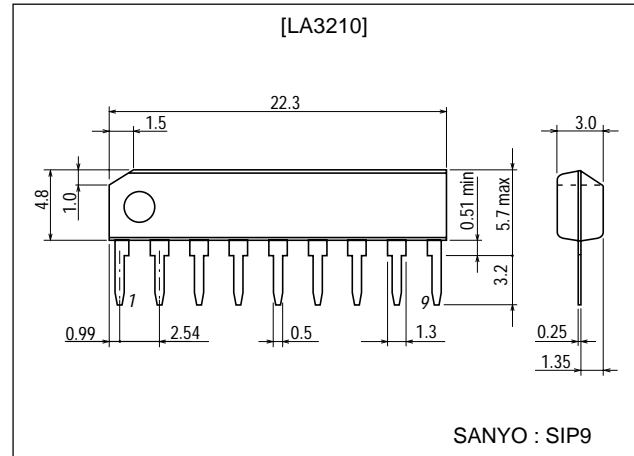
### Features

- Low noise use.
- Wide automatic level control range.
- Good reduced voltage characteristics.

### Package Dimensions

unit:mm

3017C-SIP9



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply Voltage	$V_{CC \text{ max}}$		15	V
Allowable Power Dissipation	$P_d \text{ max}$		200	mW
Current Dissipation in Amplifier	$I_{CC \text{ max}}$		3.0	mA
Allowable Current in ALC Transistor	$I_6 \text{ max}$		3.5	mA
Operating Temperature	$T_{opr}$		-20 to +80	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

#### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply Voltage	$V_{CC}$		5	V
Recommended Load Resistance	$R_L$		5.1k	$\Omega$

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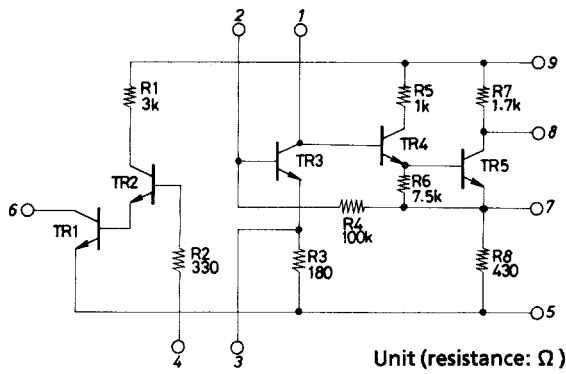
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

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**Operating Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{CC}=5\text{V}$ ,  $R_L=5.1\text{k}\Omega$ ,  $R_g=600\Omega$ ,  $f=1\text{kHz}$ , See specified Test Circuit.

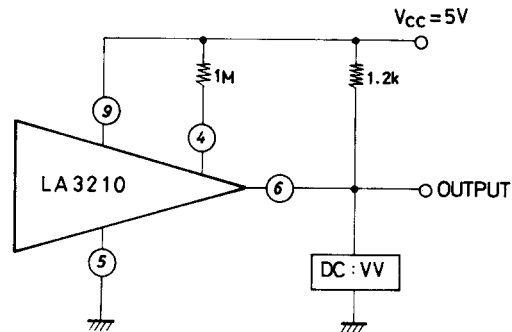
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current Dissipation	$I_{CC}$	$V_i=0$ , ALC off		1.4	2.0	mA
Voltage Gain	$V_{G0}$	Open loop	66	69		dB
	$V_G$	Closed loop	33	35	37	dB
Output Voltage	$V_O$	THD=1%	0.7	1.0		V
Total Harmonic Distortion	THD	$V_O=0.2\text{V}$		0.1		%
Input Resistance	$r_i$		60	100		$\text{k}\Omega$
Equivalent Input Noise Voltage	$V_{NI}$	$R_g=2.2\text{k}\Omega$ , NAB		1	2	$\mu\text{V}$
ALT Transistor Saturation Voltage	$V_{sat}$			75	100	mV

## Equivalent Circuit

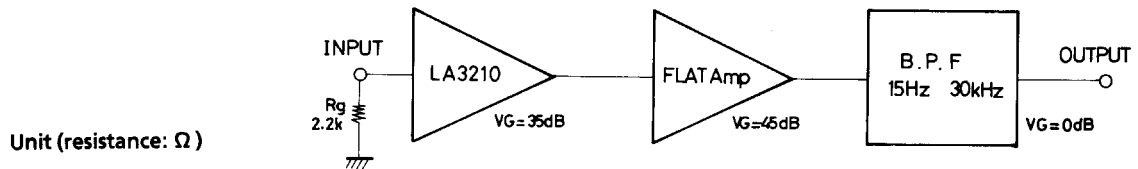


## Test Circuit

· ALC saturation voltage

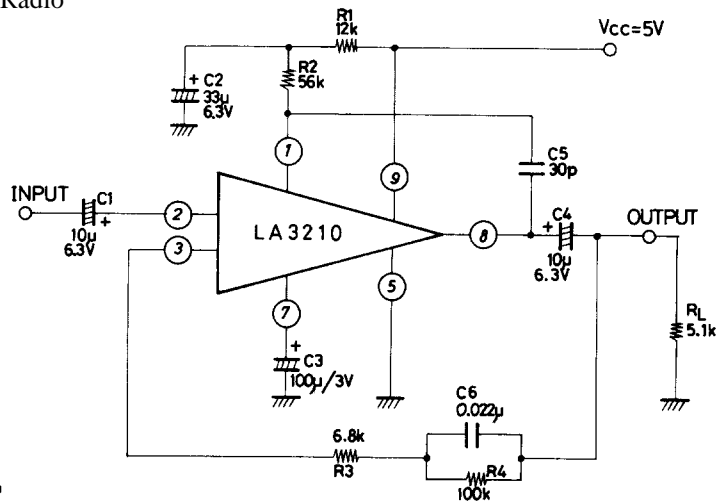


· Noise Voltage



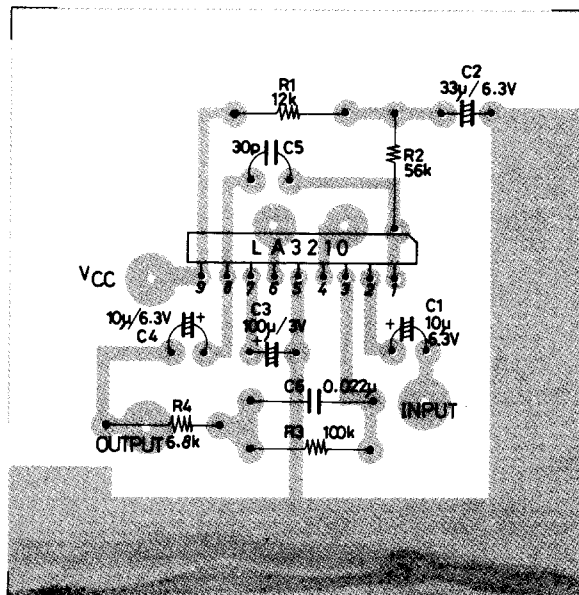
Unit (resistance:  $\Omega$ )

## Sample Application Circuit : Equalizer Amplifier with Automatic Level Control designed for Cassette Tape Recorder, Radio



Unit (resistance: Ω, capacitance: F)

Sample Printed Circuit Pattern  
(Cu-foiled side, 60 x 60mm<sup>2</sup>)



Unit (resistance: Ω, capacitance: F)

### Description of External Parts

**C1 : Input coupling capacitor (10µF)**

DC current blocking capacitor used to prevent the DC current applied to the base from mixing in the AC signal source.

The C1 is calculated using  $C1 = 1/2\pi f_T z_i$  ( $z_i$  : input resistance,  $f_T$  : low cutoff frequency). If the capacitance value is too decreased, your set is subjected to inductive hum. We recommend using a capacitor of 2.2µF or greater. We also recommend using 6.3WV or greater because the chemical capacitor becomes less leaky as the withstand voltage gets higher.

**C2 : Decoupling capacitor (33µF)**

Used to bypass the power source ripple.

Decreasing the capacitance value makes the starting time shorter. We recommend using a capacitor of 33µF.

**C3 : Bypass capacitor (100µF)**

Used to AC-Short the emitter resistance and prevent AC components from being fed back to the input.

**C4 : Output capacitor (10µF)**

Used to block DC components and pass AC Components only.

The C4 is calculated using  $C4 = 1/1\pi f_L \cdot R_L$  ( $f_L$  : low cutoff frequency,  $R_L$  : load resistance).

**C5 : Phase compensation capacitor (30pF)**

Used to prevent high-frequency oscillation caused by phase shift when a deep feedback is provided. It should be noted that the high frequency response depends on the capacitance value of C5.

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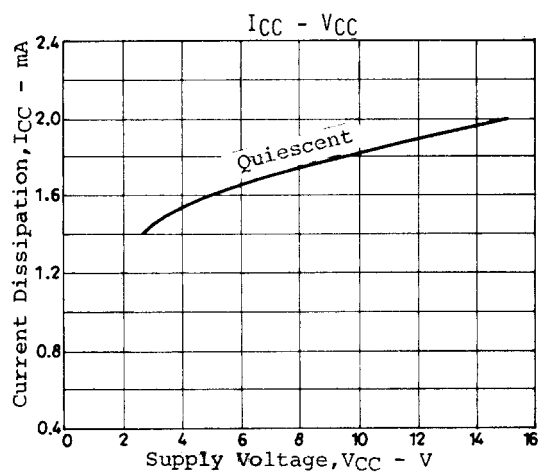
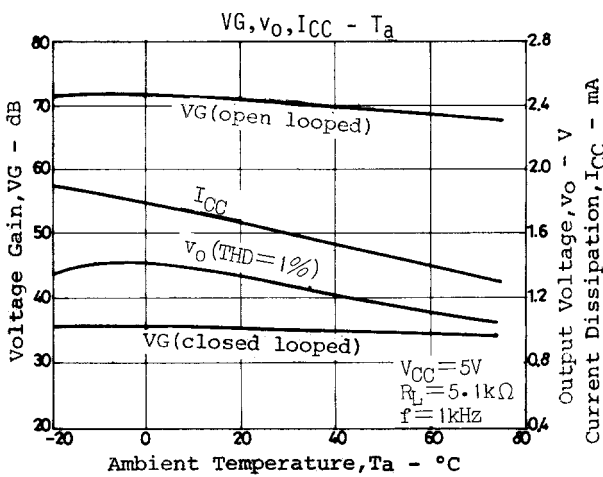
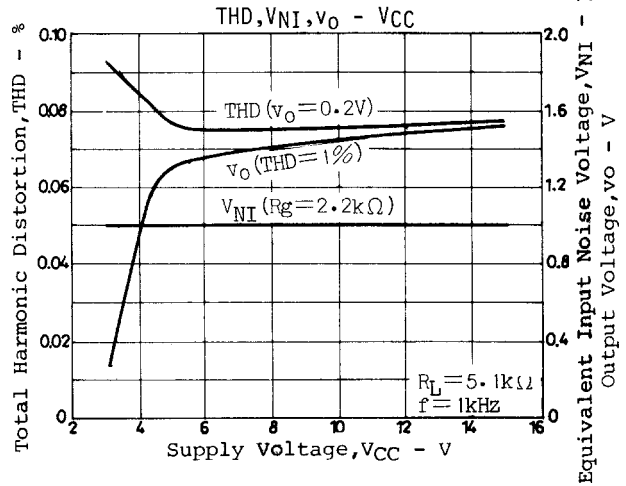
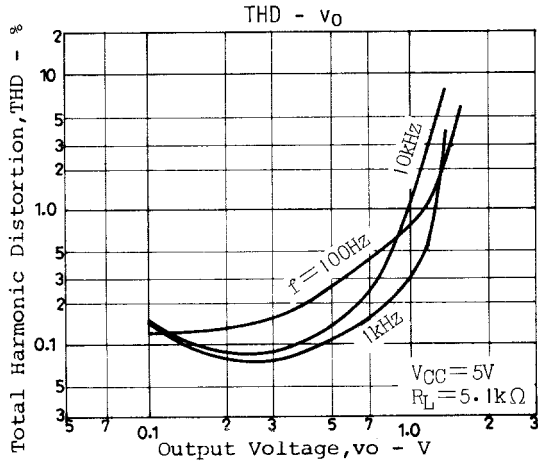
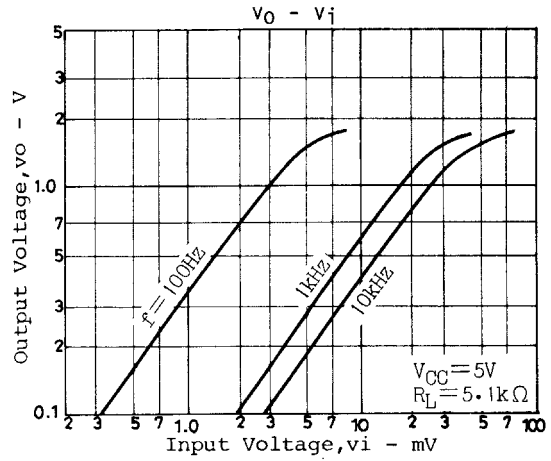
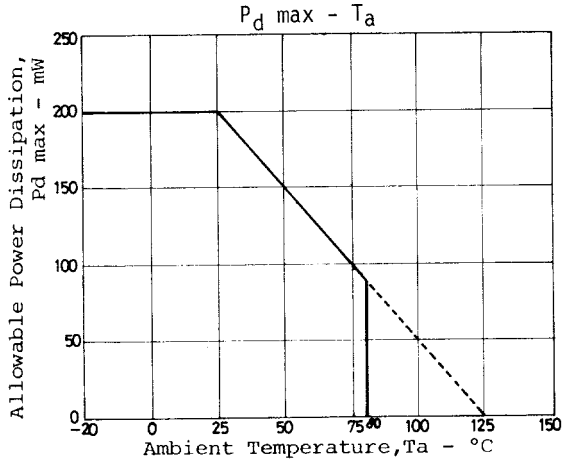
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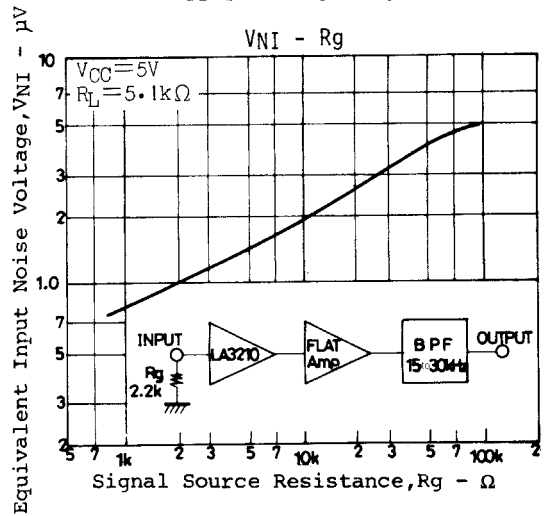
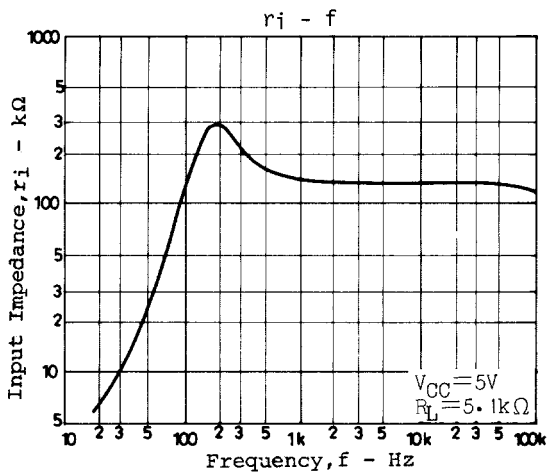
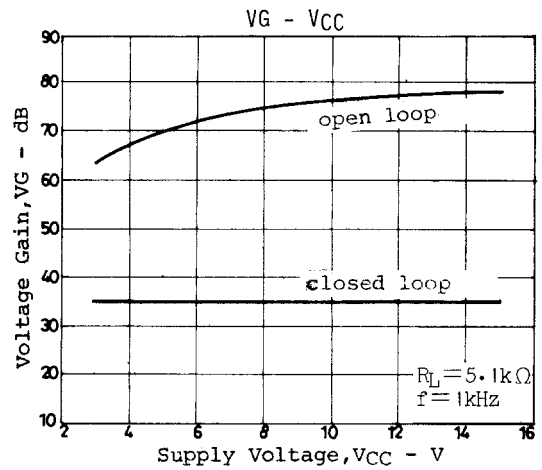
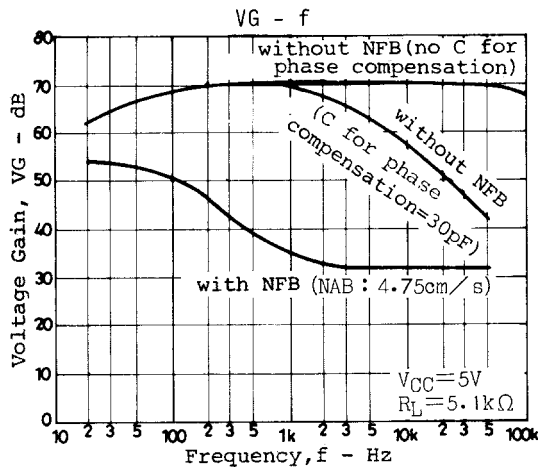
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R1 : Decoupling resistor used to bypass the power source ripple through C2.

R2 : Collector resistor of the first stage transistor of IC. Taken as load resistance in terms of AC.

C6, R3, R4 : Equalizer parts on which the closed-loop voltage gain depends. NAB 4.75cm/s is provided.





**Proper Cares in Using IC**

1. If the IC is used in the vicinity of the maximum rating, even a slight variation in conditions may cause the maximum rating to be exceeded, thereby leading to a breakdown. Allow an ample margin of variation for supply voltage, etc. and use the IC in the range where the maximum rating is not exceeded.
2. Pin-to-pin short  
 If the supply voltage is applied when the space between pins is shorted, a breakdown or deterioration may occur. When installing the IC on the board or applying the supply voltage, make sure that the space between pins is not shorted with solder, etc.

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