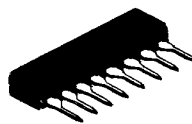


HA12012

2-Channel Audio Preamplifier for Cars and Home Stereo Sets

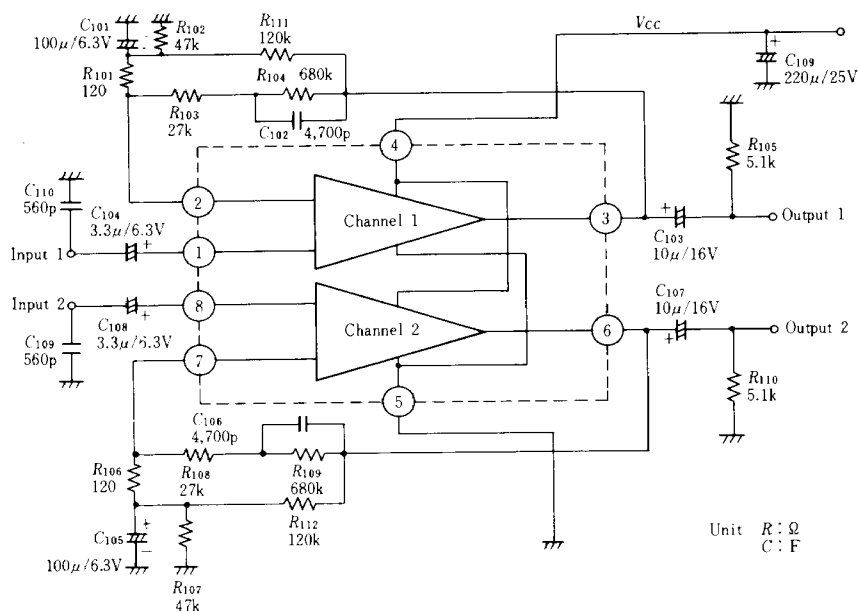
FEATURES

- High open loop voltage gain ($G_{V(OL)} = 105\text{dB}$ at $f = 1\text{kHz}$) for being used at high closed loop voltage gain ($G_v = 51.3\text{dB}$ at $f = 1\text{kHz}$).
- High output voltage level ($V_{out} = 2.5\text{Vrms}$ at T.H.D = 1%).
- Wide range of operating supply voltage.
- Low noise (total equivalent input noise is $0.98\mu\text{V}$ typ. Using NAB weighting $R_g = 2.4\text{k}\Omega$, $BW = 20\text{Hz}$ to 20kHz).
- Low output impedance ($Z_{out} = 10\Omega$, $f = 1\text{kHz}$)
- Good channel balance (G_v is determined by external components).



(SP-8)

TYPICAL APPLICATION



ABSOLUTE MAXIMUM RATINGS (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

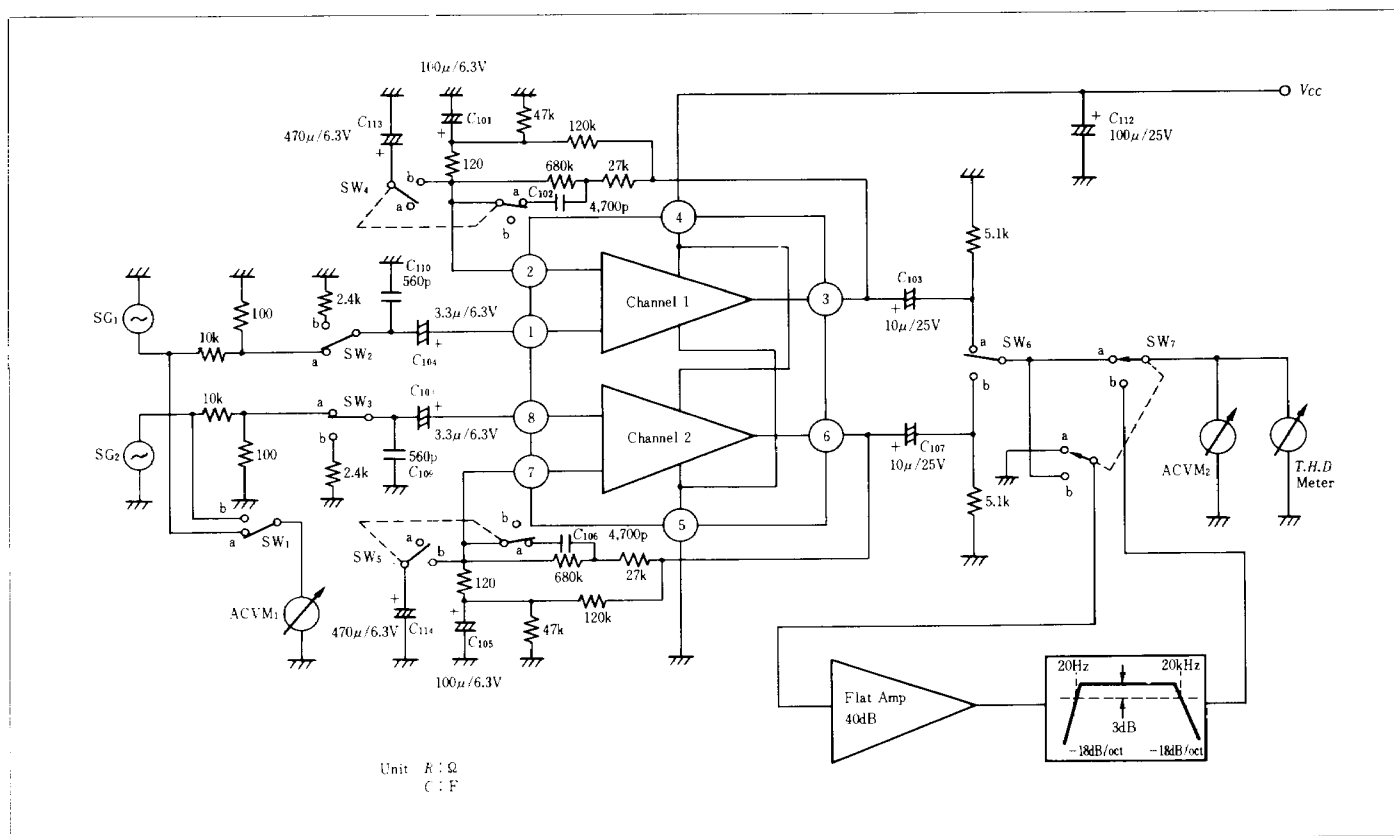
Item	Symbol	Rating	Unit
Supply Voltage	$V_{CC} \text{ max}$	20	V
Power Dissipation*	$P_T \text{ max}$	250	mW
Operating Temperature	T_{opr}	-30 to $+75$	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to $+125$	$^\circ\text{C}$

*Value at $T_a = 75^\circ\text{C}$ and $V_{CC} = 20\text{V}$

ELECTRICAL CHARACTERISTICS ($V_{CC} = 9\text{V}$, $f = 1\text{kHz}$, $G_v = 51.3\text{dB}$, $R_L = 5.1\text{k}\Omega$, $T_a = 25^\circ\text{C}$)

Item	Symbol	Test Condition	min.	typ.	max.	Unit
Quiescent Current	I_Q	no input	3.0	5.7	10.0	mA
Open Loop gain	$G_{V(OL)}$	$f = 1\text{kHz}$	90	105	—	dB
		$f = 100\text{Hz}$	—	110	—	
Total Harmonic Distortion	$T.H.D$	$V_{out} = 1\text{V}$	$f = 1\text{kHz}$	0.07	0.2	%
			$f = 100\text{Hz}$	0.10	—	
Output Voltage	V_{out}	$T.H.D = 1\%$	1.2	2.5	—	Vrms
Total Equivalent Input Noise	V_n	$R_g = 2.4\text{k}\Omega$, $B.W = 20\text{Hz}$ to 20kHz	—	0.98	2.5	μV

■ TEST CIRCUIT



Item	Position of Switches						
	SW1	SW2	SW3	SW4	SW5	SW6	SW7
$G_{V(OL)}$	a / b	a / b	b / a	b / a	a / b	a / b	a
T. H. D	—	a / b	b / a	a	a	a / b	a
V_{out}	—	a / b	b / a	a	a	a / b	a
V_n	—	b	b	a	a	a / b	b

Note 1) Meaning Apparatus

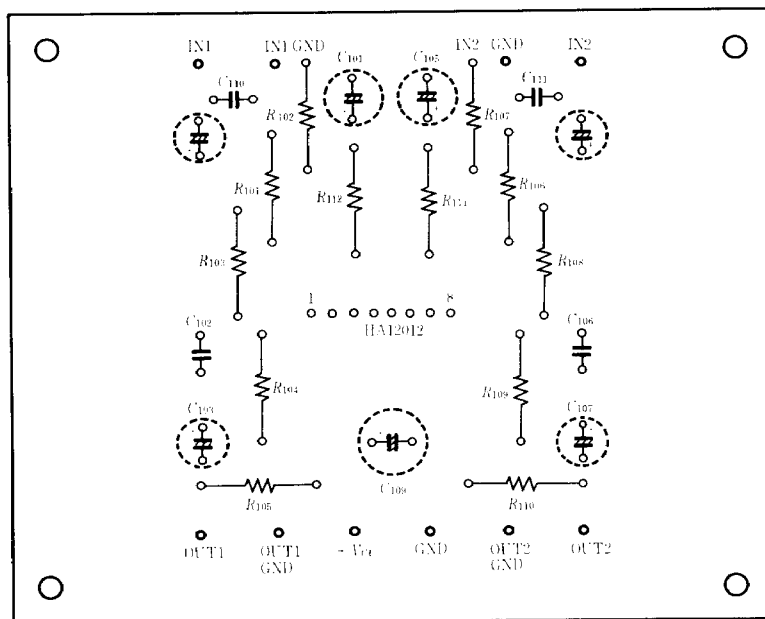
SG_{1,2}: Shibasoku 870, ACVM_{1,2}: HP400E } or equivalent
 Distortion Meter: Shibasoku 870

Note 2) Tolerance of External Parts

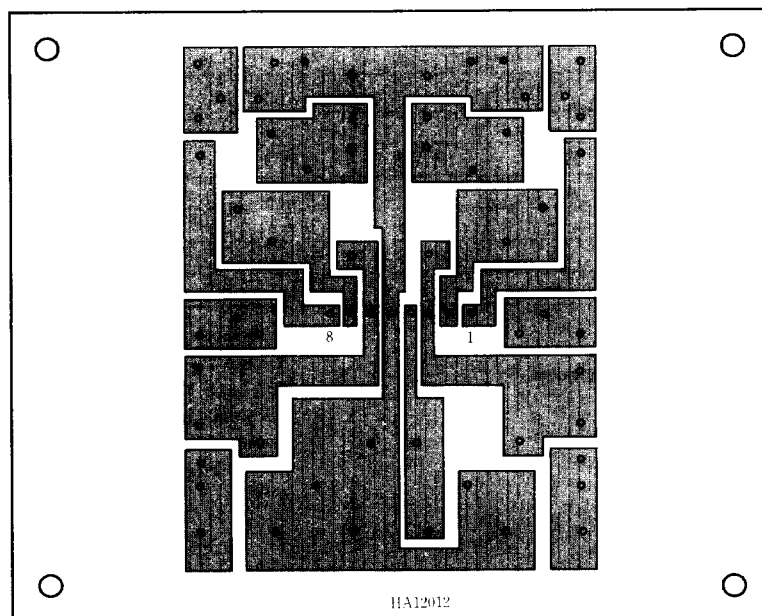
R: Less than $\pm 1\%$ Polyester Film Capacitor (C_{106}, C_{102}): Less than $\pm 2\%$ Chemical Capacitor: Less than $\pm 10\%$ Ceramic Capacitor (C_{109}, C_{110}): Less than $\pm 5\%$

Before using these parts, confirm the precision of them by testing.

■PC-BOARD LAYOUT PATTERN

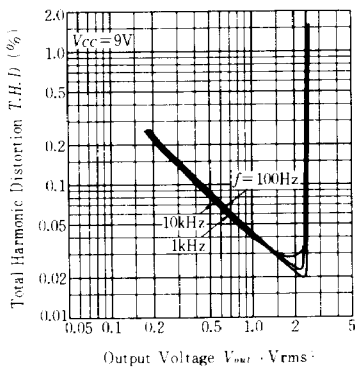


(Top View)

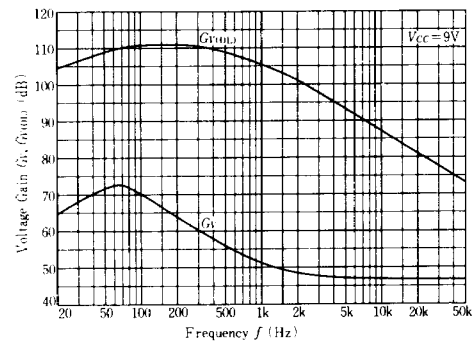


(Bottom View)

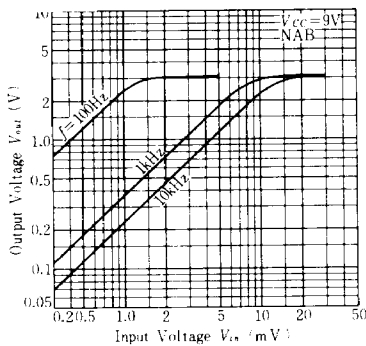
TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



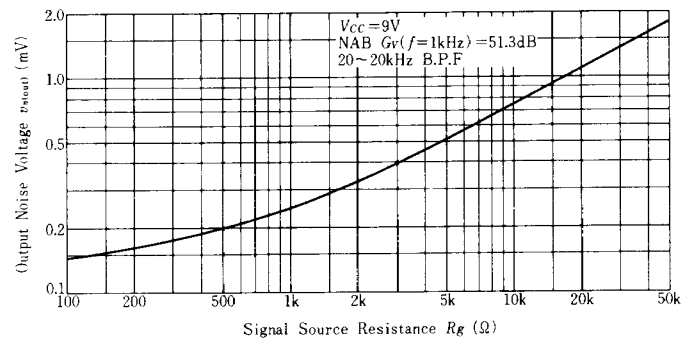
VOLTAGE GAIN VS. FREQUENCY



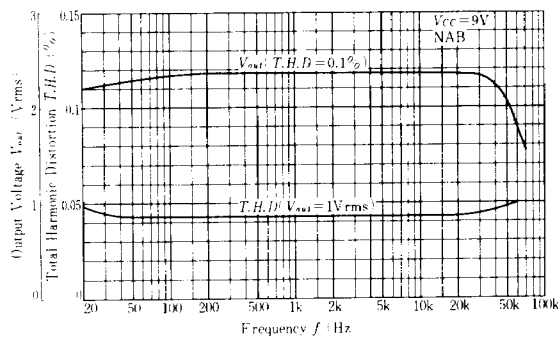
OUTPUT VOLTAGE VS. INPUT VOLTAGE



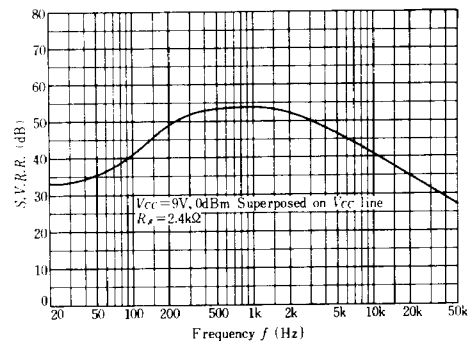
OUTPUT NOISE VOLTAGE VS. SIGNAL SOURCE RESISTANCE



OUTPUT VOLTAGE AND TOTAL HARMONIC DISTORTION VS. FREQUENCY



SUPPLY VOLTAGE REJECTION RATIO VS. FREQUENCY



CROSS-TALK VS. FREQUENCY

