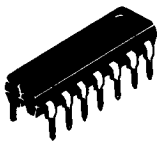
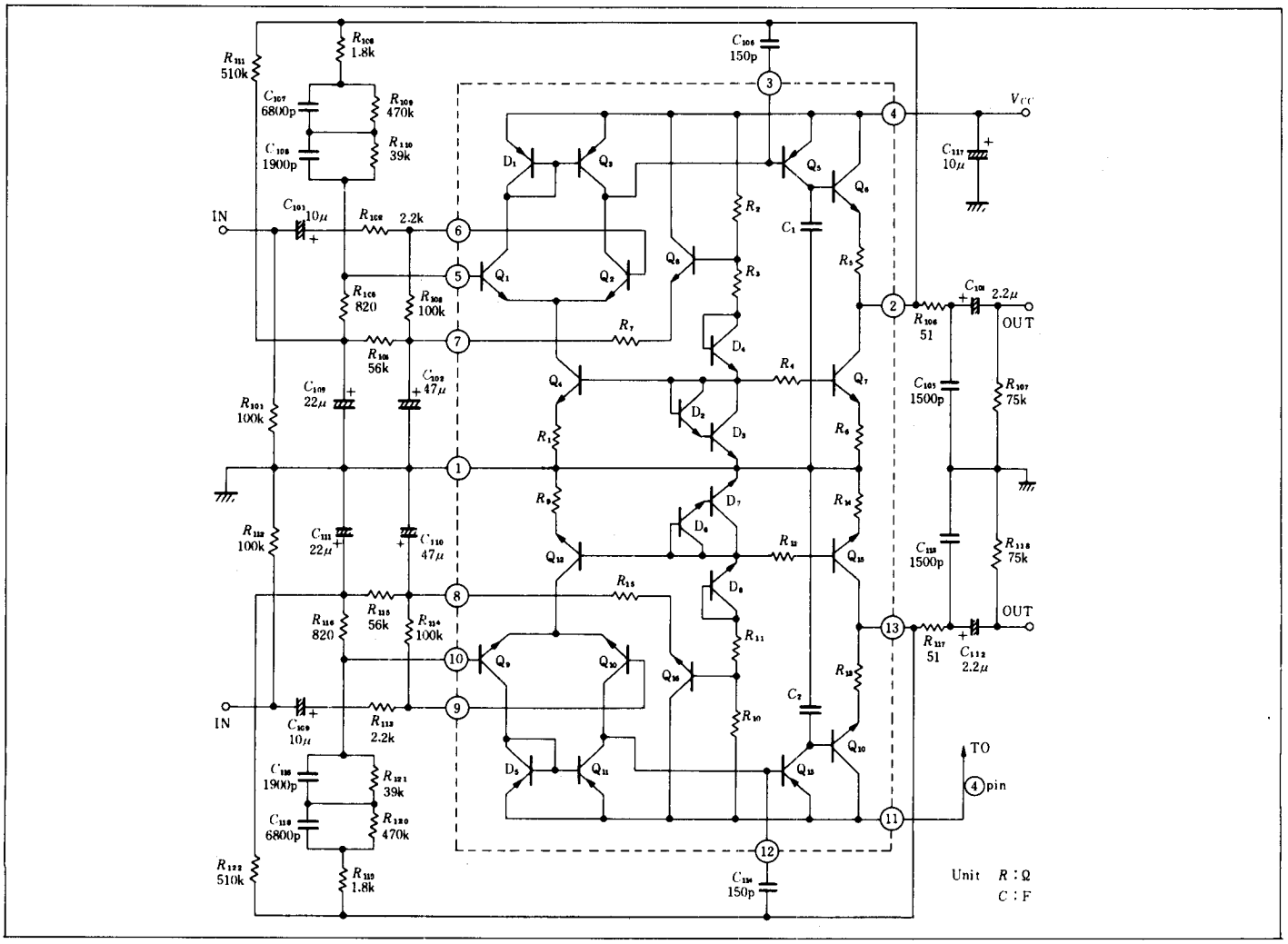
HA1452W

2-CHANNEL AUDIO PREAMPLIFIER



(DP-14)

■ CIRCUIT SCHEMATIC AND TYPICAL EXTERNAL COMPONENTS



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	30	V
Power Dissipation	P_T	540	mW
Operating Temperature	T_{opr}	−20 to +75	°C
Storage Temperature	T_{stg}	−30 to +125	°C

■ ELECTRICAL CHARACTERISTICS (V_{CC}=25V, Ta=25°C)

Item	Symbol	Test Condition	min	typ	max	Unit
Quiescent Current	I_Q	2-channel Total	8.9	11.9	17.8	mA
Open-loop Voltage Gain	$G_{V(OL)}$	f=1kHz	80	95	—	dB
Output Voltage	V_{out}	f=1kHz, R_L=10kΩ, T.H.D=10%	6.0	7.5	—	V
Total Harmonic Distortion	T.H.D	f=1kHz, V_{out}=1V	—	0.02	0.05	%
Total Equivalent Input Noise	W.B.N	R_g=3.3kΩ, B.W=30Hz to 30kHz	—	1.0	2.0	μV

■ OPERATING CONSIDERATIONS

Regarding the selection of external parts, refer to all of the following comments:

(1) C_{101} (C_{109}) : Input Coupling Capacitor. Since the RIAA equalizer amplifiers has a higher gain at low frequency, the majority of output noise is 1/f noise generated by TRS in the IC. Therefore, determine the value of the capacitor, so that the capacitor reactance at low frequency is not greater than the signal source impedance. Our recommended value for the capacitor is 10μF. The breakdown voltage requires a higher value than $V_{CC}/2$, and must be small leak current capacitor.

(2) C_{102} (C_{110}) : This is determined by the low cutoff frequency f_L. G_V at low frequency is boosted by the RIAA characteristic and determined as follows.

$$G_V = \frac{R_{104} + R_{105}}{R_{102}} \text{ (at low frequency)}$$

f_L is the frequency where G_V decreases 3dB.

$$C_{102} = \frac{1}{2\pi f_L \cdot R_{102}} (F)$$

(3) C_{103} (C_{111}) : This functions to eliminate supply voltage ripple.

(4) C_{104}, C_{105} (C_{112}, C_{113}) : C_{104}, C_{105}, R_{104}, and R_{105} determine the frequency characteristic of the equlizer amplifier. For example, to gain the standard RIAA frequency characteristic, the values should be: $C_{104} \cdot R_{104}$ = 3180μsec., $C_{104} \cdot R_{105}$ = 318μsec, and $C_{105} \cdot R_{105}$ = 75μsec.

(5) C_{106}, C_{107} (C_{114}, C_{115}) : Capacitors for use as phase compensation. Determine from the G_V required.

(6) C_{108} (C_{116}) : This is determined by the load impedance R_L and the low cutoff frequency f_L as follows.

$$C_{108} = \frac{1}{2\pi f_L \cdot R_L} (F)$$

(7) R_{101} (R_{109}) : This determines the input impedance. Input impedance and R_{101} are much the same.

(8) R_{102} (R_{107}) : This is a feedback resistor which determines the amplifier voltage gain.

In addition, it comes to a signal source impedance for the first stage differential amplifier; consequently, too large a resistaor should be avoided.

On the other hand, too small a resistor will increase the C_{102}. Use a resistor of 400 to 600Ω.

(9) R_{103} (R_{108}) :

This functions as the amplifier rise time becomes shorter, preventing an abnormal noise at power switch-on. For the first stage differential amplifier, the time constants on the input side and the feedback side must be nearly the same. To avoid abnormal noise at power switch-on, effect a design in which the time constants on the feedback side are smaller than that on the input side. R_{103} is determined as follows:

$$R_{103} = 0.7 \times R_{101} \times \frac{C_{101}}{C_{102}}$$

(10) R_{104}, R_{105} (R_{110}, R_{111}) :

Determine R_{104} from G_V at low frequency through the value of R_{102}. The relations between C.

The relations between $C_{104} \cdot R_{104}$, and R_{105} are as follows:

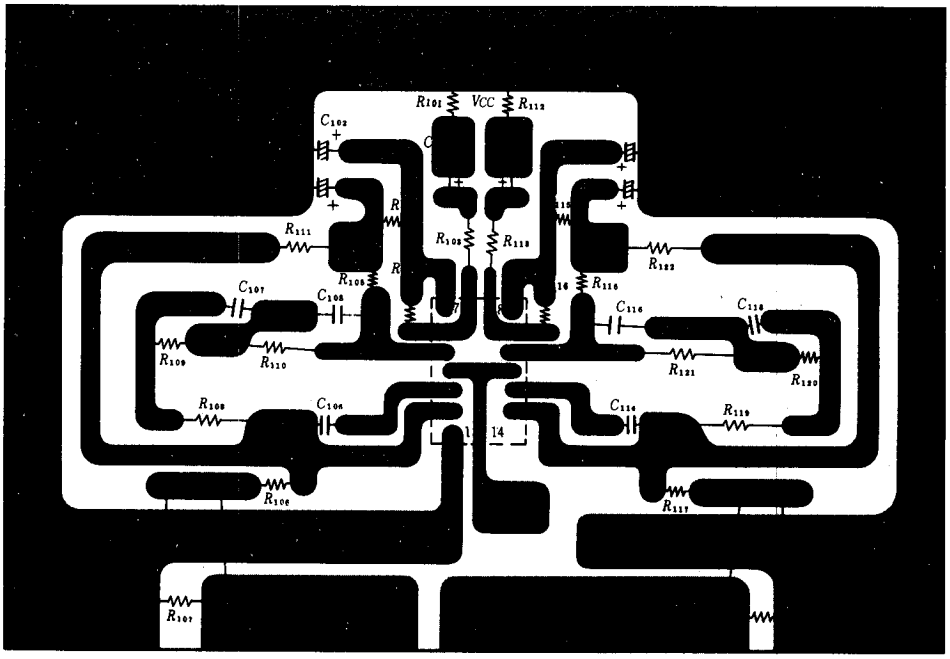
$C_{104} \cdot R_{104} = 3180\mu sec.$

$C_{104} \cdot R_{105} = 318\mu sec.$

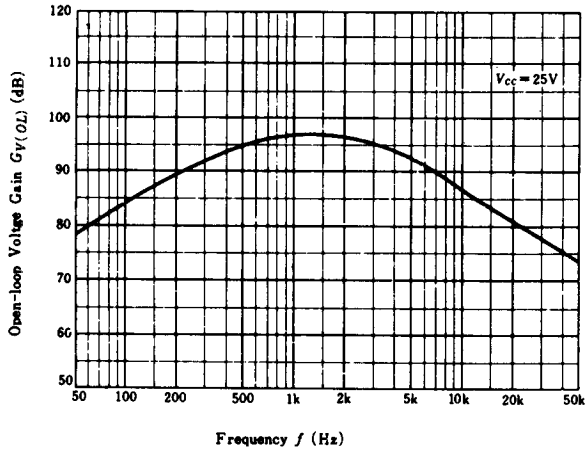
(11) R_{106} (R_{112}) :

A capacitor used to prevent oscillation. Determine it from the G_V required.

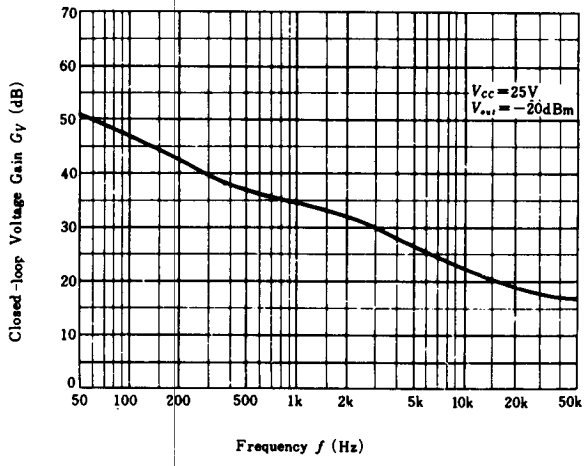
■ **PRINTED CIRCUIT BOARD-TWO CHANNEL (Bottom View)**



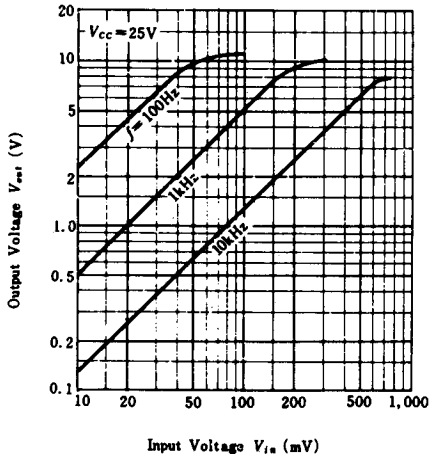
OPEN-LOOP VOLTAGE GAIN VS. FREQUENCY



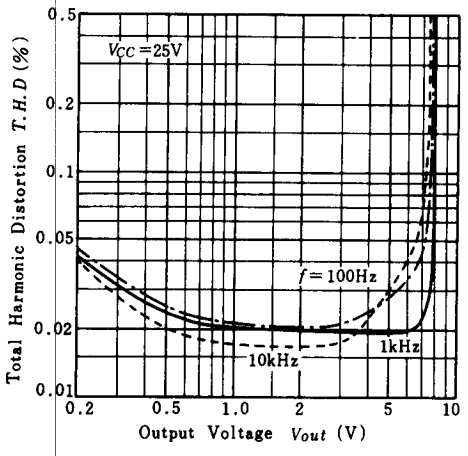
CLOSED-LOOP VOLTAGE VS. FREQUENCY



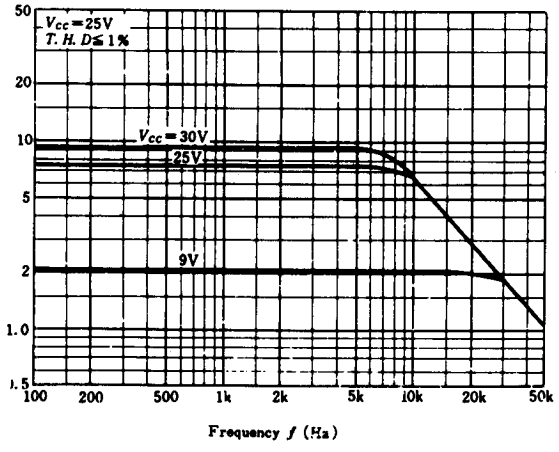
MAXIMUM OUTPUT VOLTAGE VS. INPUT VOLTAGE



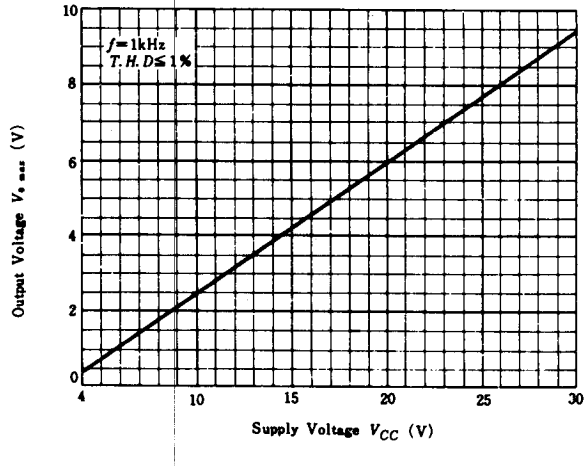
TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



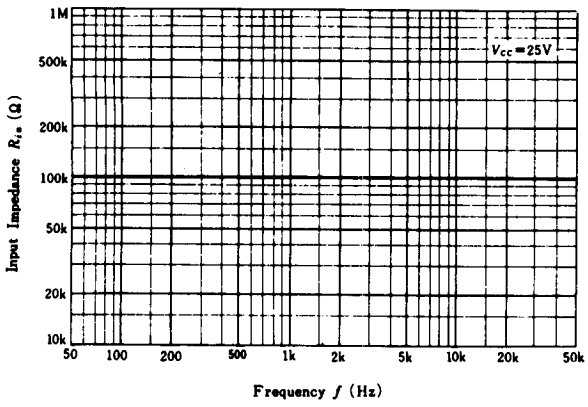
MAXIMUM OUTPUT VOLTAGE VS. FREQUENCY



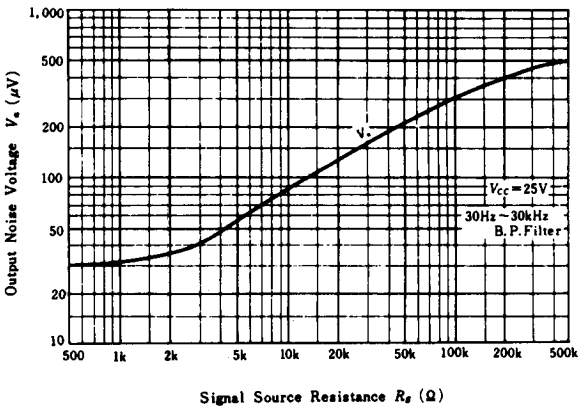
MAXIMUM OUTPUT VOLTAGE VS. SUPPLY VOLTAGE



INPUT IMPEDANCE VS. FREQUENCY



OUTPUT NOISE VS. SIGNAL SOURCE RESISTANCE



OUTPUT NOISE VOLTAGES VS. SUPPLY VOLTAGE