Ordering number: EN5205A

Monolithic Linear IC

LA4820M

Monaural Speaker/Stereo Headphone Power Amplifier

Overview

The LA4820M compound power IC is designed for portable information processing equipment, such as electronic book players and personal notebook computers, and provides on chip headphone stereo amplifier and monaural speaker amplifier functions required of such devices. This system IC also provides on chip a power-saving headphone jack plug-in/out detection function, which automatically switches the amplifiers, and an optimum volume level controller.

Features

- Power-saving headphone jack plug-in/out detection function on chip that electronically switches between the stereo headphone amplifier and the monaural BTL amplifier according to jack plug-in/out.
- The monaural amplifier has, as output control functions, a built-in output limiter that permits adjustment in accordance with the speaker impedance and a non-clipping circuit that outputs a sine wave suited to the output D range, while the headphone amplifier has a built-in user-friendly PVSS (Peak Volume Select System).
- On-chip ripple filter with a high ripple rejection ratio in order to reduce power line noise.
- Less external components needed thanks to system and circuit technology, and low-capacitance design (22 µF or less) allowing support for chip components.

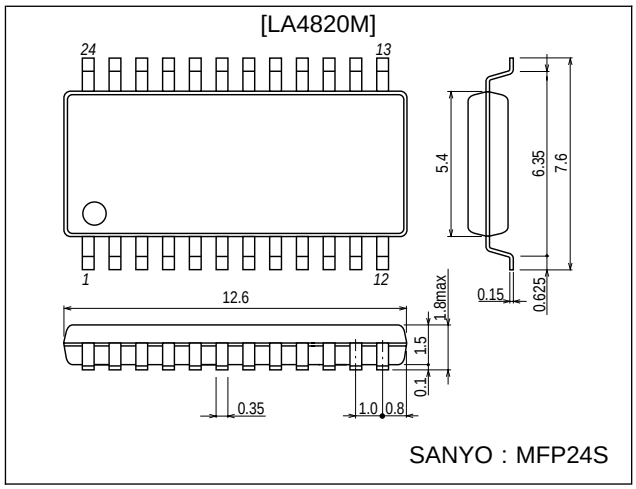
Functions

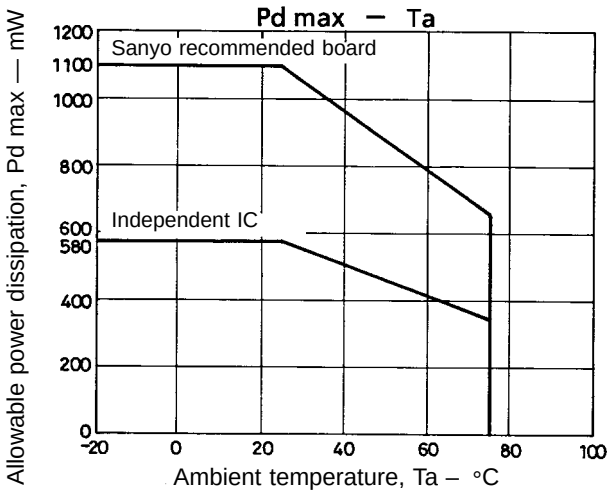
- Monaural BTL power amplifier
- Headphone OCL power amplifier (16 Ω) × 2
- Output control functions:
  - Headphone power: PVSS
  - Monaural power: Non-clipping circuit and output limiter
- Headphone jack plug-in/out detection function (monaural amplifier/headphone amplifier switching)
- Ripple filter
- Power mute switch
- Common amplifier on/off switching

Package Dimensions

unit : mm

3112-MFP24S





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Specifications

Maximum Ratings at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}1,2 max		8.0	V
Allowable power dissipation	Pd max		580	mW
		With Sanyo evaluation board (84.2 × 92.6 mm^2)	1.1	W
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–40 to +150	°C

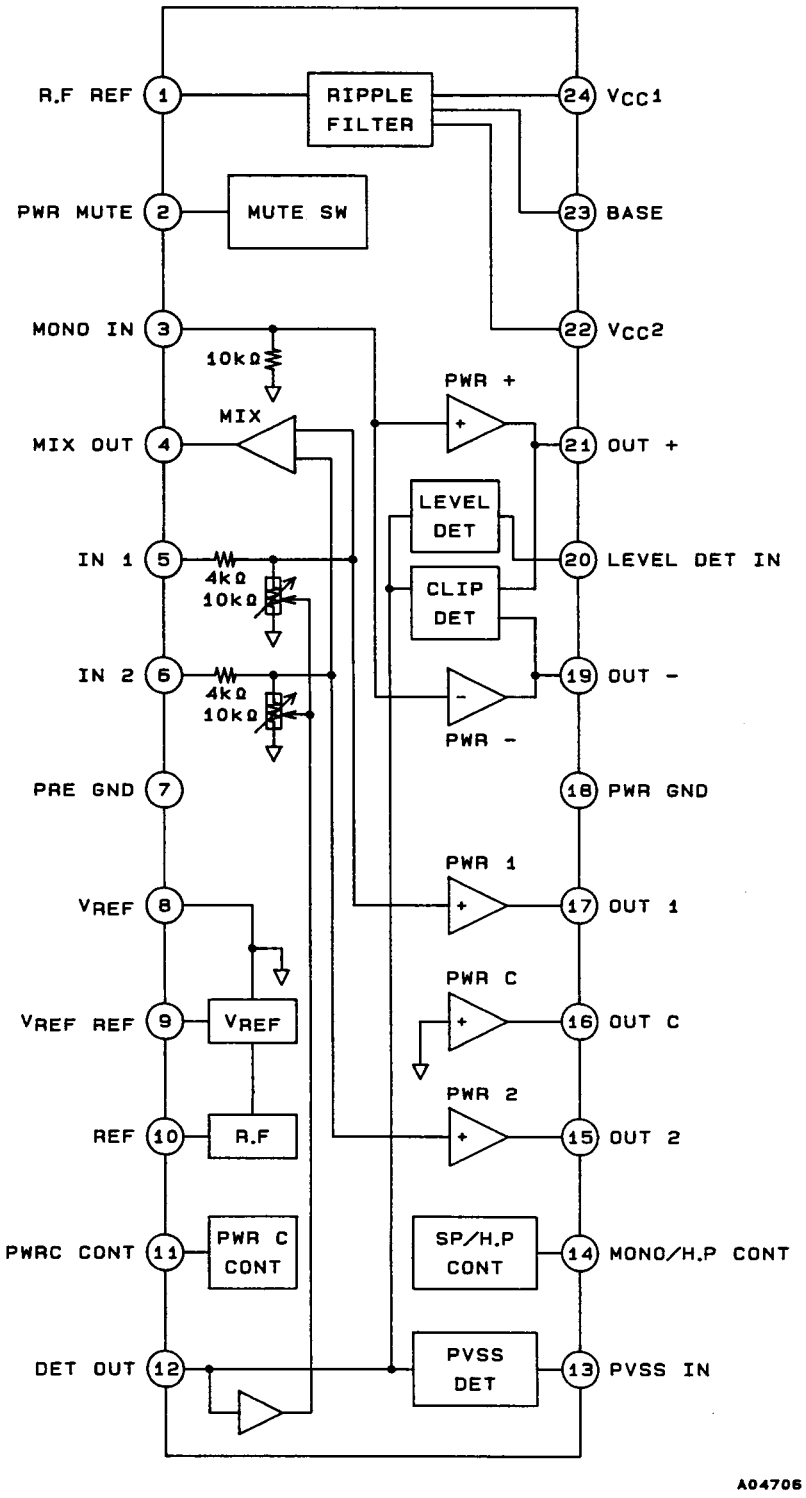
Operating Conditions at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}1		6.0	V
Operating voltage range	V_{CC}1 op		2.5 to 7.2	V
	V_{CC}2 op		2.0 to 7.2	V

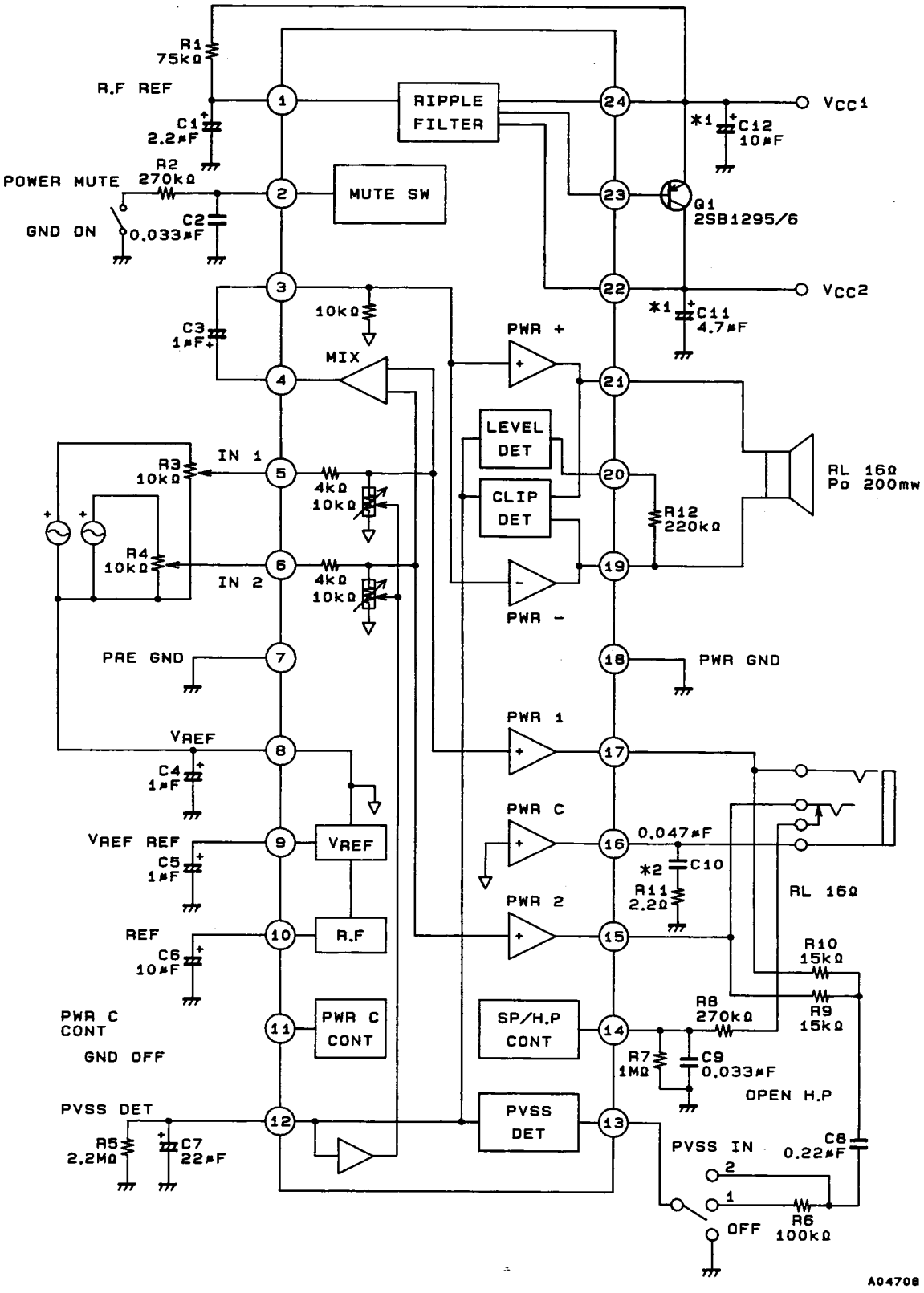
Operating Characteristics at Ta = 25 °C, V_{CC}1 = 6.0 V, fi = 1 kHz, 0.775 V = 0 dBm, R_L = 16 Ω: monaural amplifier, R_L = 16 Ω : headphone amplifier

Parameter	Symbol	Conditions	min	typ	max	Unit
[Total]						
Quiescent current	I_{CCO}1	Rg = 0 kΩ, monaural amplifier	7.0	11.5	21.0	mA
	I_{CCO}2	Rg = 0 kΩ, headphone amplifier	5.5	9.0	14.0	mA
	I_{CCO}3	Headphone common amplifier off	4.0	6.3	10.0	mA
Input resistance	Ri		10	13	16	kΩ
[Monaural Amplifier]						
Output power	P_O1	THD = 10%, pin 12 connected to GND	500	760		mW
Voltage gain (closed)	VG1	V_O = 0 dBm	36.0	39.0	42.0	dB
Total harmonic distortion	THD1	P_O = 100 mW		0.1	1.0	%
Output noise voltage	V_{NO} 1	Rg = 0 Ω, BPF = 20 to 20 kHz		170	300	μV
Ripple rejection ratio	Rr1	Rg = 0 Ω, Vr = –10 dBm, fr = 100 Hz	60	77		dB
DC offset voltage	V_{OFF}1	Between pin 19 and pin 21	–80	0	+80	mV
[Non-clipping + Monaural Amplifier]						
Output power	P_O2	Vi = 0 dBm	300	450		mW
Total harmonic distortion	THD2	Vi = 0 dBM		1.2	2.0	%
[Output Limiter + Monaural Amplifier]						
Output power	P_O3	Vi = 0 dBm, output limiter input resistance 220 Ω	120	200	300	mW
Total harmonic distortion	THD3	Vi = 0 dBm, output limiter input resistance 220 Ω		0.5	1.2	%
[Headphone Amplifier]						
Output power	P_O4	THD = 10%	30	120		mW
Voltage gain (closed)	VG2	V_O = –10 dBm	15.3	18.3	21.3	dB
Total harmonic distortion	THD4	P_O = 1 mW		0.1	0.5	%
Interchannel crosstalk	CT	VO = –5 dBm, Rg = 0 Ω	30	39		dB
Output noise voltage	V_{NO}2	Rg = 0 Ω, BPF = 20 to 20 kHz		16	35	μV
Ripple rejection ratio	Rr2	Rg = 0 Ω, Vr = –10 dBm, fr = 100 Hz	70	92		dB
DC offset voltage	V_{OFF}2	Between pin 15 and pin 16, and pin 16 and pin 17	–40	0	+40	mV
[PVSS + Headphone Amplifier]						
PVSS voltage	V_O	Vi = –30 dBm, PVSS2	–39	–36	–33	dBm
PVSS distortion factor	THD5	Vi = –30 dBm, PVSS2		0.25	1.6	%
PVSS start input	V_{OPi}	PVSS2	–59	–55	–51	dBm
PVSS width	W_{PVSS}	Input width from the starting point to the point where the output is +4 dB, PVSS ON	28	35		dB
[Ripple Filter]						
Output voltage	V_{RF}	I_{RF} = 300 mA, 2SB1295 h_{FE}6 used	5.30	5.49	5.70	V
Ripple rejection ratio	Rr3	Vr = –10 dBm, fr = 100 Hz, I_{RF} = 300 mA, 2SB1295 h_{FE}6 used	30	34		dB

Block Diagram



Sample Application Circuit 1

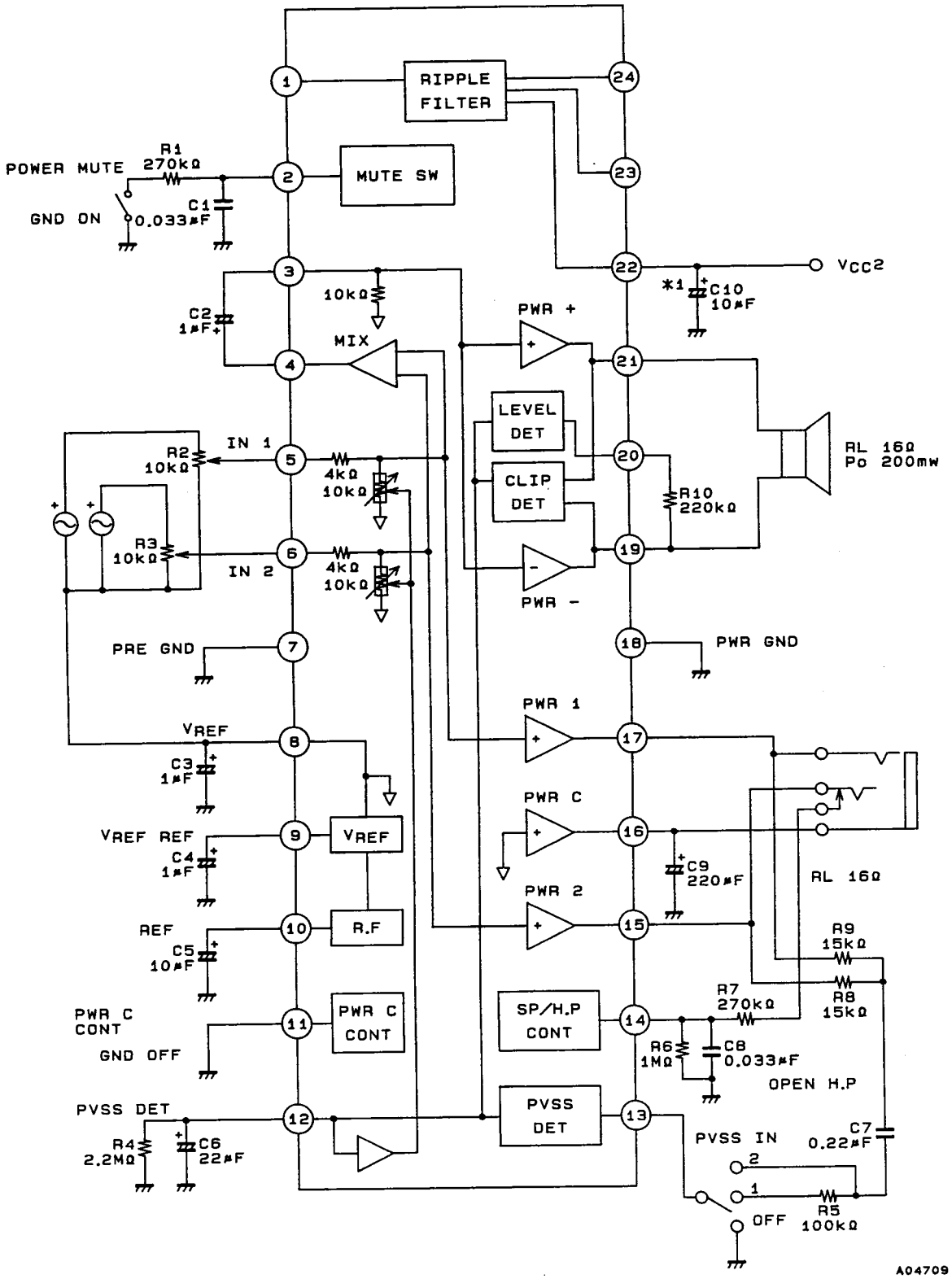


*1 A Tantalum capacitor is recommended.

*2 A polyester film or ceramic capacitor (of which capacitance specified must be independent of temperature changes) is recommended.

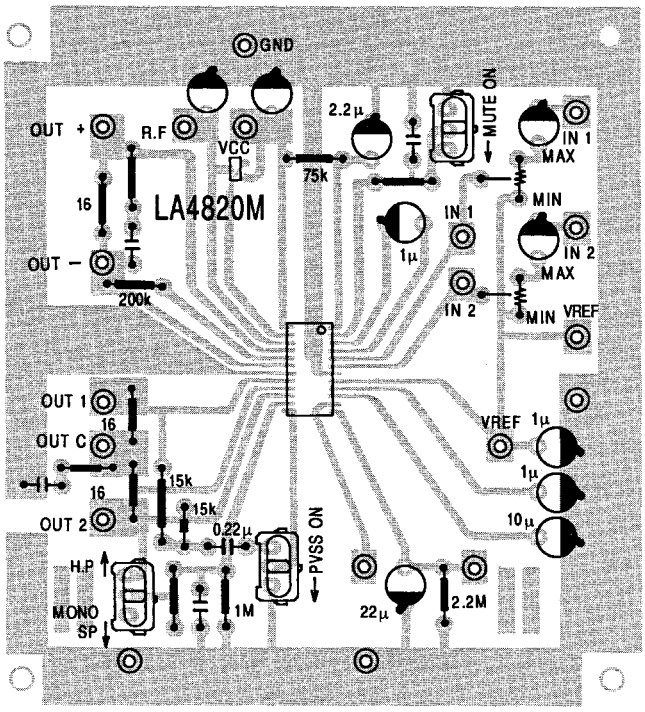
Sample Application Circuit 2

(When neither ripple filter nor common amplifier is used.)



*1 A Tantalum capacitor is recommended.

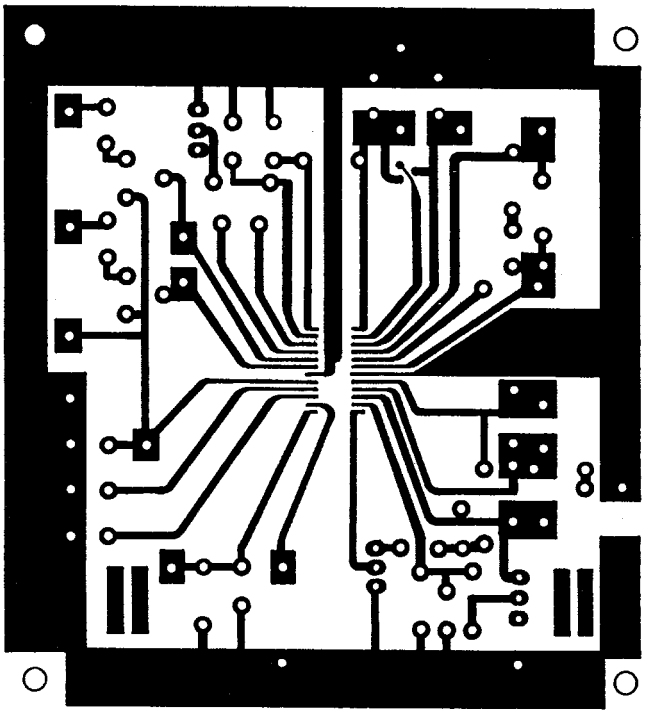
Sanyo Evaluation Board Pattern



Surface
(silk side)

Tone block
(copper foiled side)

Unit (resistance: Ω, capacitance: F)



Copper foiled side