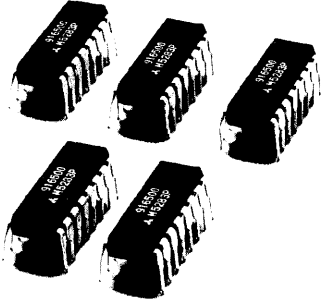


DUAL VCA IC FOR HI-FI ELECTRONIC VOLUME CONTROL A VCA TYPE FOR THE AUDIO VISUAL ERA, REDUCING THE NUMBER OF PARTS AND MANPOWER

M5283P



DESCRIPTION

Attention is being paid to electronic volume control as an essential key to miniaturization, in order to reduce the number of parts and production costs. However, electronic volume controls have met with a variety of problems and mechanical volume control has been employed in most Hi-Fi system components. The conventional products are classified into two types: VCA (Voltage Controlled Amplifier) for analog circuits, and resistor ladder attenuators for MOS resistor types. It is generally known that the VCA has disadvantages in the rate of distortion, S/N and maximum allowable input voltage, while the MOS-type resistor ladder has bad switching noise and poor sound quality.

The newly produced IC for electronic volume control, M5283P, realizes a VCA type electronic volume with high performance equivalent to mechanical volume controls, and is applicable to the previously inaccessible market for system components, Hi-Fi VCRs, TVs and electronic musical instruments.

Considerable reduction in the number of parts and reduction of manpower can be realized especially for those products which previously employed electric mechanical volume control with a remote control function. The M5283P minimizes tracking errors between channels that occur in multi-channel systems of surround or Dolby prologic which are recently becoming very popular. The device is suitable not only for audio equipment but also for a variety of audio-visual products, such as large-screen Hi-Fi TVs.

FEATURES

- Low distortion THD = 0.003% (@ 1 Vrms)
- Large S/N voltage 87dB (@ Vi = 150mVrms)
- Large maximum allowable input voltage Vi = 7 Vrms (@THD = 1%)
- The device has a control pin which can be easily controlled by the D-A (PWM output is also acceptable) of a microcomputer and the control signal is controlled by DC, preventing internal noise or bad effects between circuits in the set
- Very small change of attenuation (ATT0dB) by temperature
- Input and output are positive phase amplifiers

APPLICATION

Hi-Fi Stereos, cassette decks, and Hi-Fi TVs equipped with a remote control volume function.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range ± 7V ~ ± 16V

PRECAUTIONS FOR USE

The circuit current is increased (typ. = 34mA) to improve the total harmonic distortion characteristics or S/N voltage. Therefore, power dissipation is high and the thermal derating should be considered when designing the layout of the printer circuit board. To improve heat dissipation (heat radiation), attach sheets of copper leaf as widely as possible. If the copper leaves cannot be enlarged, or if a sheet of copper leaf for heat radiation is not applicable, the power dissipation Pd increases to 1.3W. Use the device within the rated 3Pd as shown in Fig. 3, considering the used temperature and Vcc applied voltage by calculating the maximum power with $\pm V_{cc} \times I_{ccmax}$.

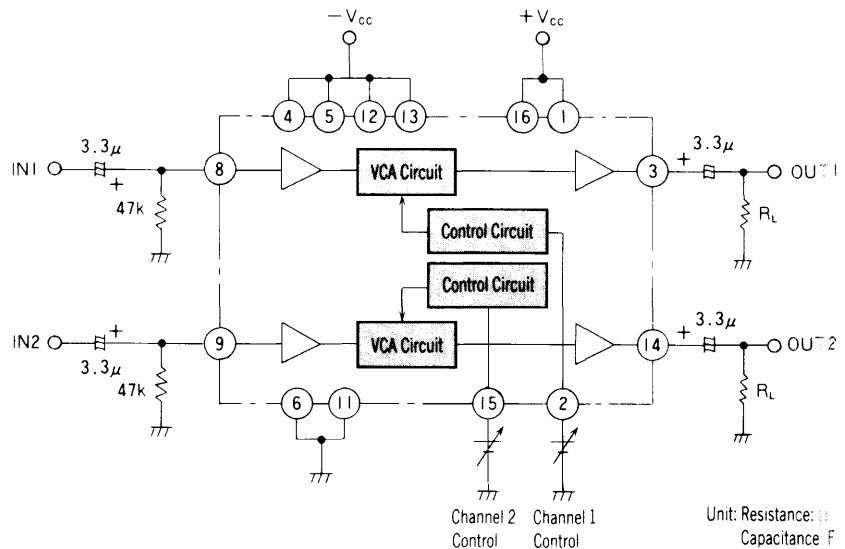


Fig. 1 Application Example

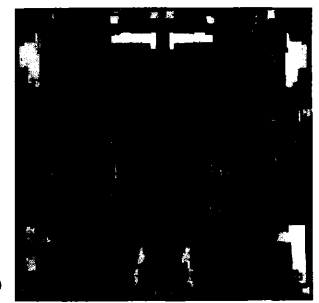


Table 1 Typical Characteristics

($V_{CC} = 15V, V_c = 5V$)				
Symbol	Parameter	Conditions	Limits (Typ.)	Unit
$V_{cc \text{ max}}$	Max Supply Voltage		$\pm 18(36)$	V
I_{cc}	Circuit Current	$V_i = 0$	34	mA
THD	Total Harmonic Distortion	$V_D = 1V_{rms}$	0.003	%
V_{OM}	Max Output Voltage	THD = 1%	5	Vrms
V_{IM}	Max Input Voltage	$V_c = 3V, THD = 1\%$	7	Vrms
S/N	Signal/Noise Ratio	$V_i = 150mV_{rms}$	87	dB
V_{NO}	Output/Noise Voltage	IHF = A FILTER	6.5	μV_{rms}
A_{TM}	Max Attenuation	$V_c = 0$	95	dB
A_{TT}	Attenuation Error	$V_i = 0dBm$	-0.3	dB
ΔA_{TT}	Attenuation Deviation Between Channels	$V_i = 0dBm$	± 0.1	dB

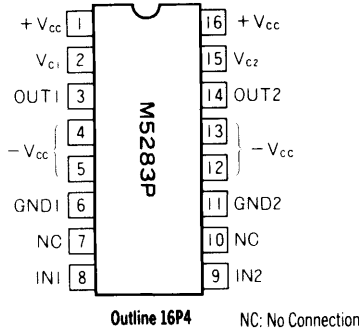


Fig. 2 Pin Configuration (top view)

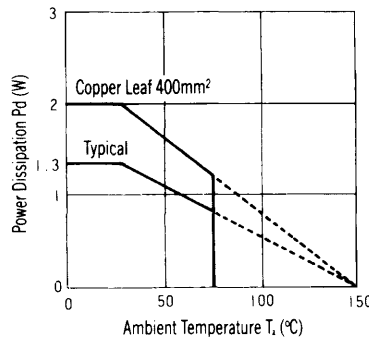


Fig. 3 Thermal Derating Curve

Example of Printed Circuit Board Layout

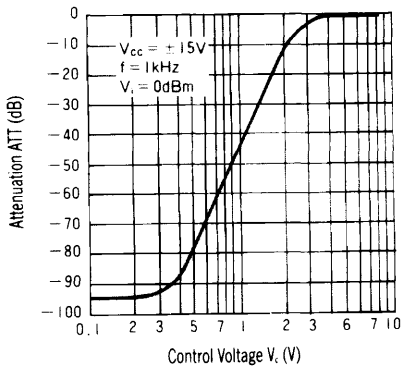
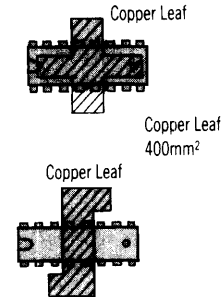


Fig. 4 Attenuation vs. Control Voltage Characteristics

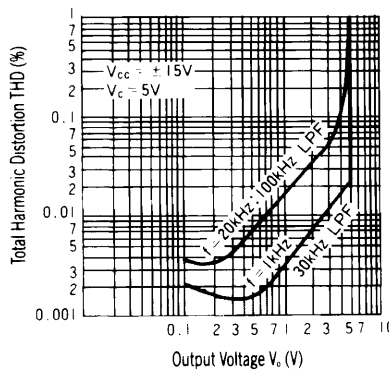


Fig. 5 Total Harmonic Distortion vs. Output Voltage Characteristics

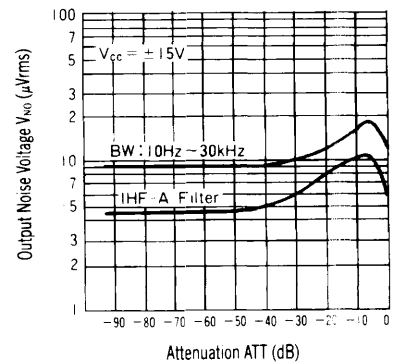


Fig. 6 Output Noise Voltage vs. Control Voltage Characteristics

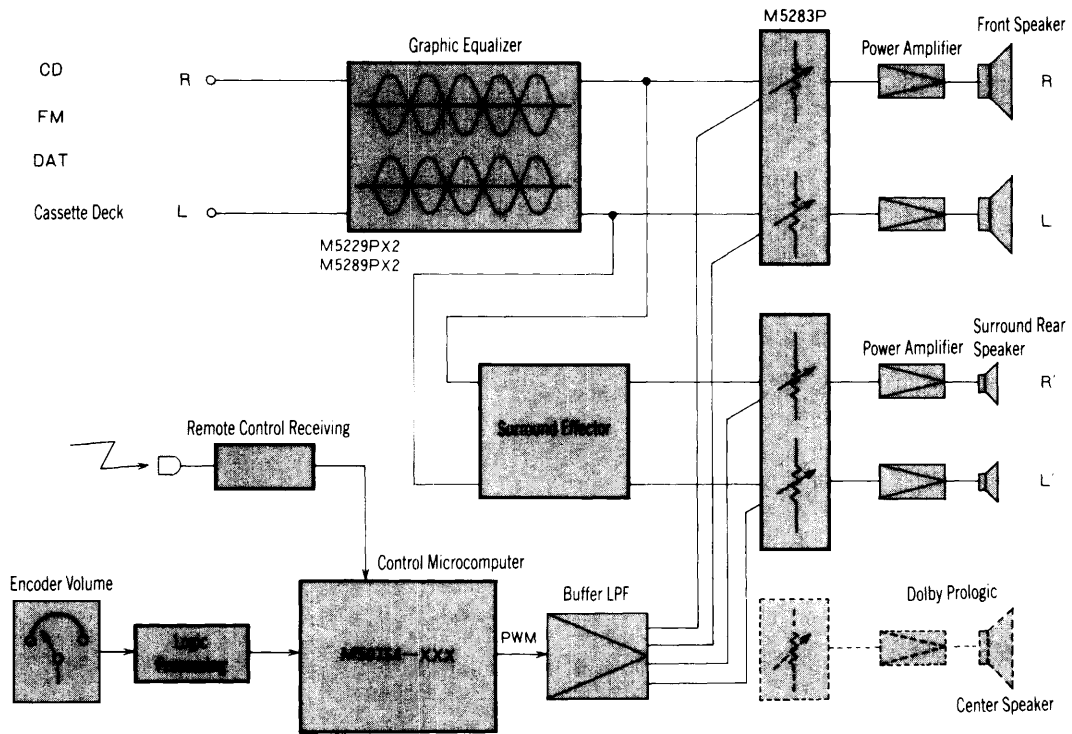


Fig. 7 Application Example (Outline Diagram of Stereo System Control Amplifier)