Monolithic Linear IC



# LA4582CM

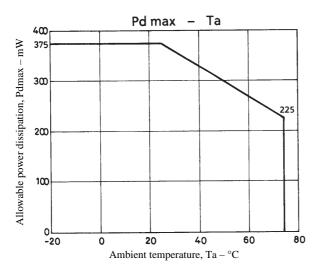
# Pre + Power Amplifier for 3-V Headphone Stereo Systems

## Overview

The LA4582CM is a preamplifier plus power amplifier IC that support auto-reverse, and was developed for 3-V headphone stereo systems.

## **Features**

• The LA4582CM was developed for cassette playback systems, and in addition to preamplifier and power amplifier functions, it also provides low boost and automatic power limitation (PVSS: Peak Volume Select System) functions.

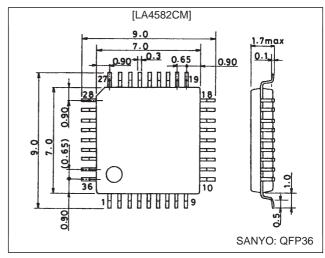


# • Provided in a 36-pin miniature flat package (0.65 mm lead pitch) that is optimal for set miniaturization.

- Capable of driving 8- $\Omega$  speakers
- Two-channel playback auto-reverse preamplifier
- Two-channel headphone power amplifier
- Low-frequency boost function (auto-loudness effect)
- Output suppression function (PVSS)
- Two-channel radio input switch (pre-mute switch)
- Power mute switch

## **Package Dimension**

unit: mm



#### **Specifications** Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		4.5	V
Allowable power dissipation	Pd max		375	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		3.0	V
Operating voltage range	V <sub>CC</sub> op		1.8 to 3.6	V

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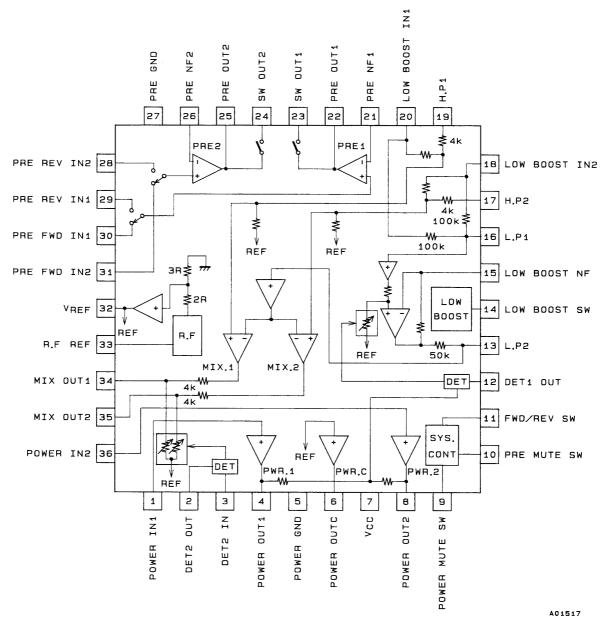
# Operating Characteristics at Ta = 25°C, V<sub>CC</sub> = 3.0 V, fi = 1 kHz, 0.775 V = 0 dBm $R_L = 10 \text{ k}\Omega$ (preamplifier), $R_L = 30 \text{ k}\Omega$ (low boost), $R_L = 16 \Omega$ (power amplifier)

Parameter	Symbol	Conditions	Ratings			Unit
	Cymbol		min	typ	max	
[PRE + L.BOOST + PVSS + POWER]						
Quiescent current	I <sub>CCO</sub> 1	Rg = 2.2 k $\Omega$ , low boost off, PVSS off	13	19	29	mA
	I <sub>CCO</sub> 2	Rg = 2.2 k $\Omega$ , low boost on, PVSS on	14	20	30	mA
Voltage gain (closed loop)	VGT	$V_0 = -5 \text{ dBm}$	62.5	64.5	67.5	dB
[Preamplifier]						_
Voltage gain (open loop)	VG <sub>0</sub>	$V_0 = -5 \text{ dBm}$	70	83		dB
Voltage gain (closed loop)	VG <sub>1</sub>	$V_0 = -5 \text{ dBm}$		40		dB
Maximum output voltage	V <sub>O</sub> max1	THD = 1%, V <sub>CC</sub> = 1.8 V	0.1	0.2		V
Total harmonic distortion	THD <sub>1</sub>	V <sub>O</sub> = 0.2 V, VG = 40 dB/NAB		0.05	0.5	%
Equivalent input noise voltage	V <sub>NI</sub>	Rg = 2.2 kΩ, BPF = 20 Hz to 20 kHz		1.3	2.0	μV
Crosstalk	CT <sub>1</sub>	Rg = 2.2 kΩ, TUNE 1 kHz	60	80		dB
Ripple rejection	Rr <sub>1</sub>	Rg = 2.2 kΩ, $V_{CC}$ = 1.8 V, Vr = -20 dBm, fr = 100 Hz	40	50		dB
[Power Amplifier]	•					
Output power	Po	THD = 10%	23	34		mW
Voltage gain (closed loop)	VG <sub>2</sub>	V <sub>O</sub> =5 dBm	27	29	32	dB
Total harmonic distortion	THD <sub>2</sub>	$P_0 = 1 \text{ mW}$		0.4	1.0	%
Interchannel crosstalk	CT <sub>2</sub>	$V_0 = -5 \text{ dBm}, R_V = 0 \Omega$	30	40		dB
Output noise voltage	V <sub>NO1</sub>	$R_V = 0 \Omega$ , BPF = 20 Hz to 20 kHz		25	40	μV
Ripple rejection	Rr <sub>2</sub>	$R_V = 0 \Omega$ , V <sub>r</sub> = -20 dBm fr = 100 Hz, V <sub>CC</sub> = 1.8 V	45	55		dB
Input resistance	Ri		22	30	38	kΩ
DC offset voltage	V <sub>ODC OFF</sub>	Between pin 8 and pins 4 to 6	-90		+90	mV
[L· BOOST]	1		1 1	I		L
Voltage gain	VG <sub>3</sub>	V <sub>IN</sub> = -30 dBm, boost: on/off	-2.3	-3.8	-5.3	dB
Boost	BST <sub>1</sub>	$V_{INBST} = -30 \text{ dBm}, \text{ f} = 100 \text{ Hz}, \text{ boost: on}$	11.2	14.7	18.2	dB
	BST <sub>2</sub>	$V_{\text{INBST}} = -30 \text{ dBm}, \text{ f} = 10 \text{ Hz}, \text{ boost: on}$	7.0	8.5	10	dB
Maximum output voltage	V <sub>O</sub> max2	THD = 1%, boost: on	0.3	0.5		V
Total harmonic distortion	THD <sub>3</sub>	$V_{O} = 0.1 V$ , boost: on		0.04	0.5	%
Interchannel crosstalk	CT <sub>3</sub>	$V_0 = -20$ dBm, Rg = 0, boost: on	25	32		dB
Output noise voltage	V <sub>NO2</sub>	Rg = 0, BPF = 20 Hz to 20 kHz, boost: off		2.0	5.0	μV
Ripple rejection	Rr3	Rg = 0, f <sub>R</sub> = 100 Hz, V <sub>R</sub> = -20 dBm, V <sub>CC</sub> = 1.8 V, boost: on	45	53		dB
[L· BOOST + PVSS + POWER] $R_V = 30 \text{ k}\Omega$	max		11			
Voltage gain	VG <sub>4</sub>	$V_{IN} = -40 \text{ dBm}, \text{ f} = 1 \text{ kHz}, \text{ boost: on/off}$	22.0	24.5	28.0	dB
	V <sub>0</sub> 1	$V_{IN} = -43 \text{ dBm}, \text{ f} = 100 \text{ Hz}, \text{ boost: on}$	0.13	0.23	0.33	V
Low boost output voltage	V <sub>0</sub> 2	$V_{IN} = -28 \text{ dBm}, \text{ f} = 100 \text{ Hz}, \text{ boost: on}$	0.25	0.4	0.55	V
Low boost total harmonic distortion	THD <sub>4</sub>	$V_{IN} = -40 \text{ dBm}, \text{ f} = 100 \text{ Hz}, \text{ boost: on}$		0.5	1.2	%
PVSS voltage	V <sub>O</sub> 3	$V_{IN} = -40 \text{ dBm}, \text{PVSS2}$	-40	-37	-34	dBm
PVSS width	W <sub>PVSS</sub>	Input increment between the point where operation starts and the point where the output is +4 dB from there. PVSS: on	30	40		dB
PVSS total harmonic distortion	THD <sub>5</sub>	V <sub>IN</sub> = -40 dBm, PVSS2		0.5	1.2	%
PVSS start input	V <sub>OPIN</sub>	PVSS2	-67	-63	-59	dBm

Note: The amount of boost for a 1-kHz signal.

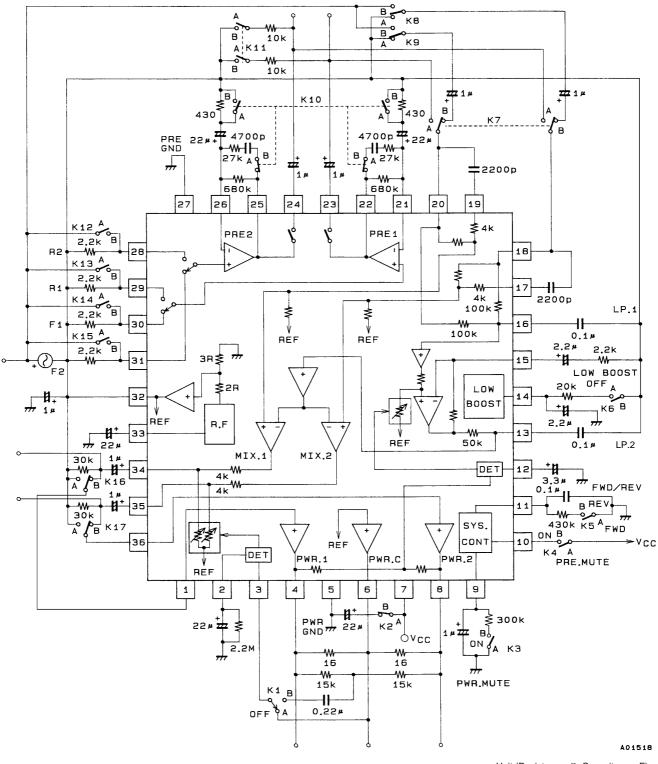
#### LA4582CM

#### **Block Diagram**



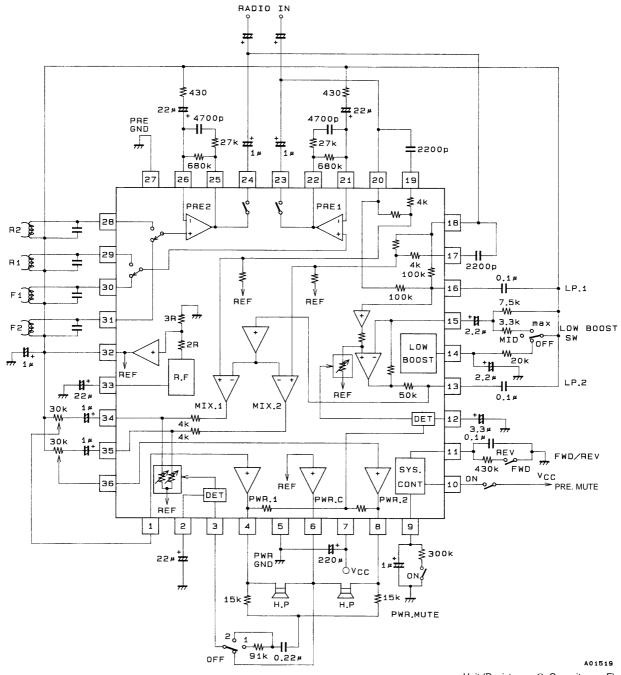
Unit (Resistance: Ω)

#### **Test Circuit**



Unit (Resistance: Ω, Capacitance: F)

#### **Sample Application Circuit**



Unit (Resistance:  $\Omega$ , Capacitance: F)

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