



# LA4585M

## 3-V Preamplifier + Power Amplifier for Headphone Stereo Products

### Overview

The LA4585M is a preamplifier plus power amplifier IC that supports auto-reverse and was developed for use in 3-V headphone stereo products.

### Features

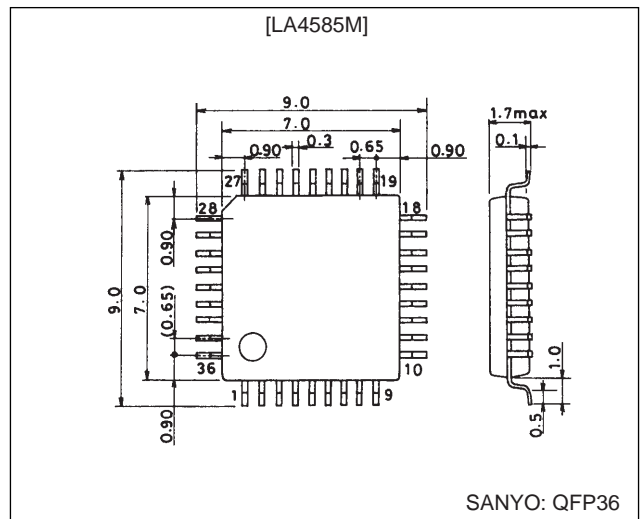
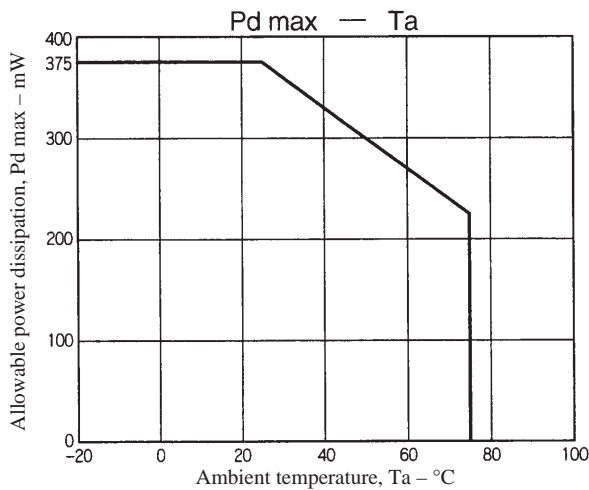
- The LA4585M is designed for use in playback-only compact cassette players. In addition to preamplifier and power amplifier functions, the LA4585M also provides low boost and automatic power output limiter (PVSS:Peak Volume Select System) functions.

- Provided in a mini-flat 36-pin quad package (0.65 mm lead pitch) optimal for miniature end products.
- Two auto-reverse playback preamplifiers
- Two headphone power amplifiers (16 Ω)
- Low boost function (auto-loudness effect)
- Output limiter function (PVSS)
- Two radio input switches (pre-muting switches)
- Power muting switch

### Package Dimensions

unit: mm

3162B-QFP36



### 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	T <sub>opr</sub>		-20 to +75	°C
Storage temperature	T <sub>stg</sub>		-40 to +150	°C

#### Operating Conditions at Ta = 25°C

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

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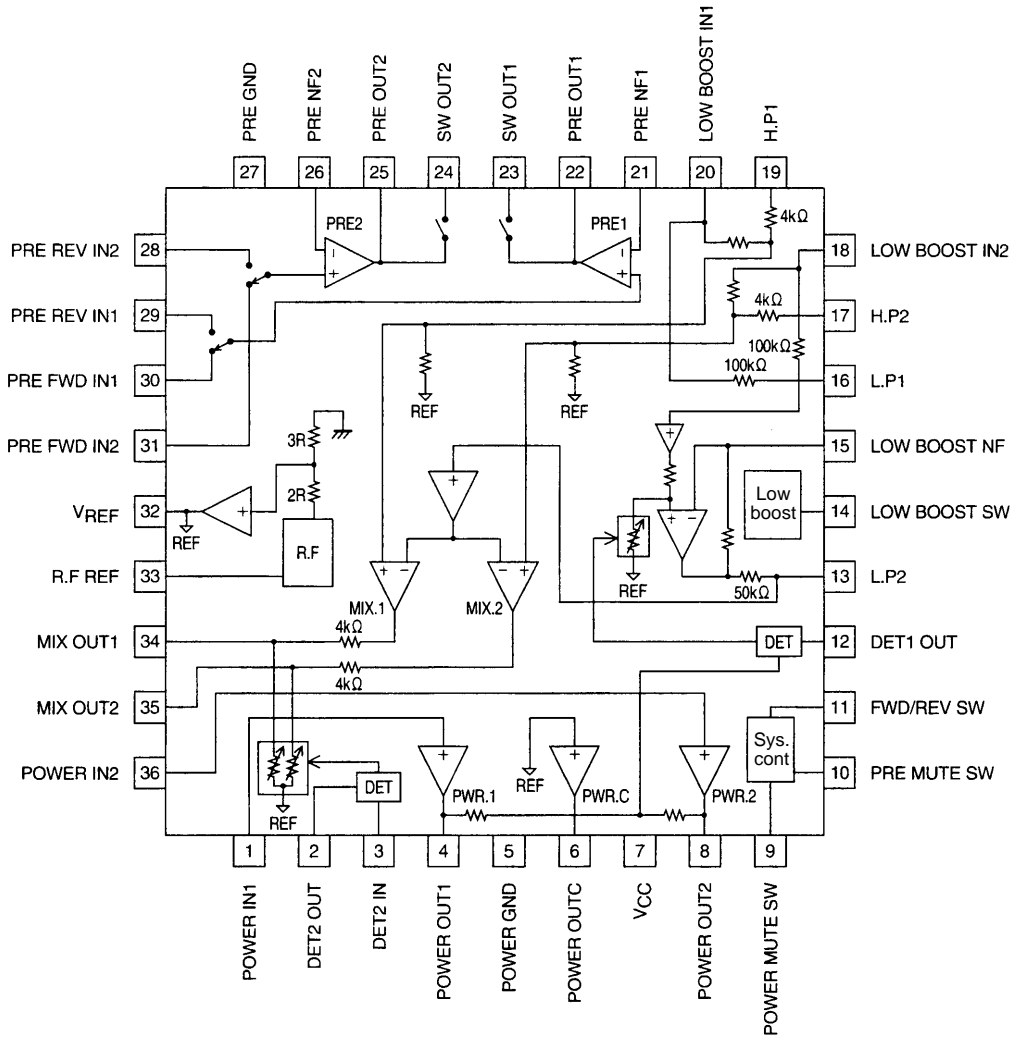
**Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3.0\text{ V}$ ,  $f_i = 1\text{ kHz}$ ,  $0.775 = 0\text{ dBm}$ , preamplifier  $R_L = 10\text{ k}\Omega$ , low boost, power amplifier  $R_L = 10\ \Omega$**

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[PRE + LOW BOOST + PVSS + PWR]						
Quiescent current	$I_{CCO1}$	$R_g = 2.2\text{ k}\Omega$ , low boost off, PVSS off	12	15	21	mA
	$I_{CCO2}$	$R_g = 2.2\text{ k}\Omega$ , low boost on, PVSS on	12	15	21	$\mu\text{A}$
Voltage gain (closed loop)	$V_{GT}$	$V_O = -5\text{ dBm}$	62	64	67	dB
[PRE AMP]						
Voltage gain (open loop)	$V_{G0}$	$V_O = -5\text{ dBm}$	70	83		dB
Voltage gain (closed loop)	$V_{G1}$	$V_O = -5\text{ dBm}$		40		dB
Maximum output voltage	$V_{O\text{ max}1}$	THD = 1 %, $V_{CC} = 1.8\text{ V}$	0.1	0.2		V
Total harmonic distortion	THD1	$V_O = 0.2\text{ V}$ , $V_G = 40\text{ dB/NAB}$		0.05	0.5	%
Equivalent input noise voltage	$V_{NI}$	$R_g = 2.2\text{ k}\Omega$ , BPF = 20 Hz to 20 kHz		1.3	2.0	$\mu\text{V}$
Crosstalk	CT1	$R_g = 2.2\text{ k}\Omega$ , TUNE 1 kHz	60	80		dB
Ripple rejection ratio	SVRR	$R_g = 2.2\text{ k}\Omega$ , $V_{CC} = 1.8\text{ V}$ , $V_r = -20\text{ dBm}$ , $f_r = 100\text{ Hz}$	40	50		dB
[POWER AMP]						
Output voltage	$P_O$	THD = 10 %	23	34		mW
Voltage gain	$V_{G2}$	$V_O = -5\text{ dBm}$	27	29	32	dB
Total harmonic distortion	THD2	$P_O = 1\text{ mW}$		0.4	1.0	%
Interchannel crosstalk	CT2	$V_O = -5\text{ dBm}$ , $R_V = 0\ \Omega$	30	40		dB
Output noise voltage	$V_{NO1}$	$R_V = 0\ \Omega$ , BPF = 20 Hz to 20 kHz		25	40	$\mu\text{V}$
Ripple rejection ratio	$R_{r2}$	$R_V = 0\ \Omega$ , $V_r = -20\text{ dBm}$ , $f_r = 100\text{ Hz}$ , $V_{CC} = 1.8\text{ V}$	45	55		dB
Input resistance	$R_i$		22	30	38	$\text{k}\Omega$
DC offset voltage	$V_{ODC\text{ OFF}}$	Between pin 6 and pins 4 and 8	-90		+90	mV
[LOW BOOST]						
Voltage gain	$V_{G3}$	$V_i = -30\text{ dBm}$ , boost on/off	-2.3	-3.8	-5.3	dB
Boost*	BST1	$V_{i\text{BST}} = -30\text{ dBm}$ , $f = 100\text{ Hz}$ , boost on	11.2	14.7	18.2	dB
	BST2	$V_{i\text{BST}} = -30\text{ dBm}$ , $f = 10\text{ kHz}$ , boost on	7.0	8.5	10	dB
Maximum output voltage	$V_{O\text{ max}2}$	THD = 1%, boost on	0.25	0.4		V
Total harmonic distortion	THD3	$V_O = 0.1\text{ V}$ , boost on		0.1	0.5	%
Interchannel crosstalk	CT3	$V_O = -20\text{ dBm}$ , $R_g = 0$ , boost on	25	32		dB
Output noise voltage	$V_{NO2}$	$R_g = 0$ , BPF = 20 Hz to 20 kHz, boost on		2.0	5.0	$\mu\text{V}$
Ripple rejection ratio	$R_{r3}$	$R_g = 0$ , $f_R = 100\text{ Hz}$ , $V_R = -20\text{ dBm}$ , $V_{CC} = 1.8\text{ V}$ , boost on	45	53		dB
[LOW BOOST + PVSS + POWER] The following items are measured at an $R_V$ of 10 $\text{k}\Omega$ maximum.						
Voltage gain	$V_{G4}$	$V_i = -40\text{ dBm}$ , $f = 1\text{ kHz}$ , boost off/on	22	24	27	dB
LOW BOOST output voltage	$V_{O1}$	$V_i = -43\text{ dBm}$ , $f = 100\text{ Hz}$ , boost on	0.13	0.23	0.33	V
LOW BOOST output voltage	$V_{O2}$	$V_i = -28\text{ dBm}$ , $f = 100\text{ Hz}$ , boost on	0.25	0.40	0.55	V
LOW BOOST total harmonic distortion	THD4	$V_i = -40\text{ dBm}$ , $f = 100\text{ Hz}$ , boost on		0.5	1.2	%
Output noise voltage	$V_{NO3}$	$R_g = 0$ , CCIR-ARM, boost off, with the power input switch K18 set to B.	-88	-85	-82	dBm
PVSS voltage	$V_{O3}$	$V_i = -40\text{ dBm}$ , PVSS 2	-40	-37	-34	dBm
PVSS width	$W_{PVSS}$	The input amplitude between the start point and the point where the output is +4 dB. PVSS on	30	40		dB
PVSS harmonic distortion	THD5	$V_i = -40\text{ dBm}$ , PVSS 2		0.5	1.2	%
PVSS start input level	$V_{OPi}$	PVSS 2	-67	-63	-59	dBm

Note: \*The amount of boost for a 1-kHz input.

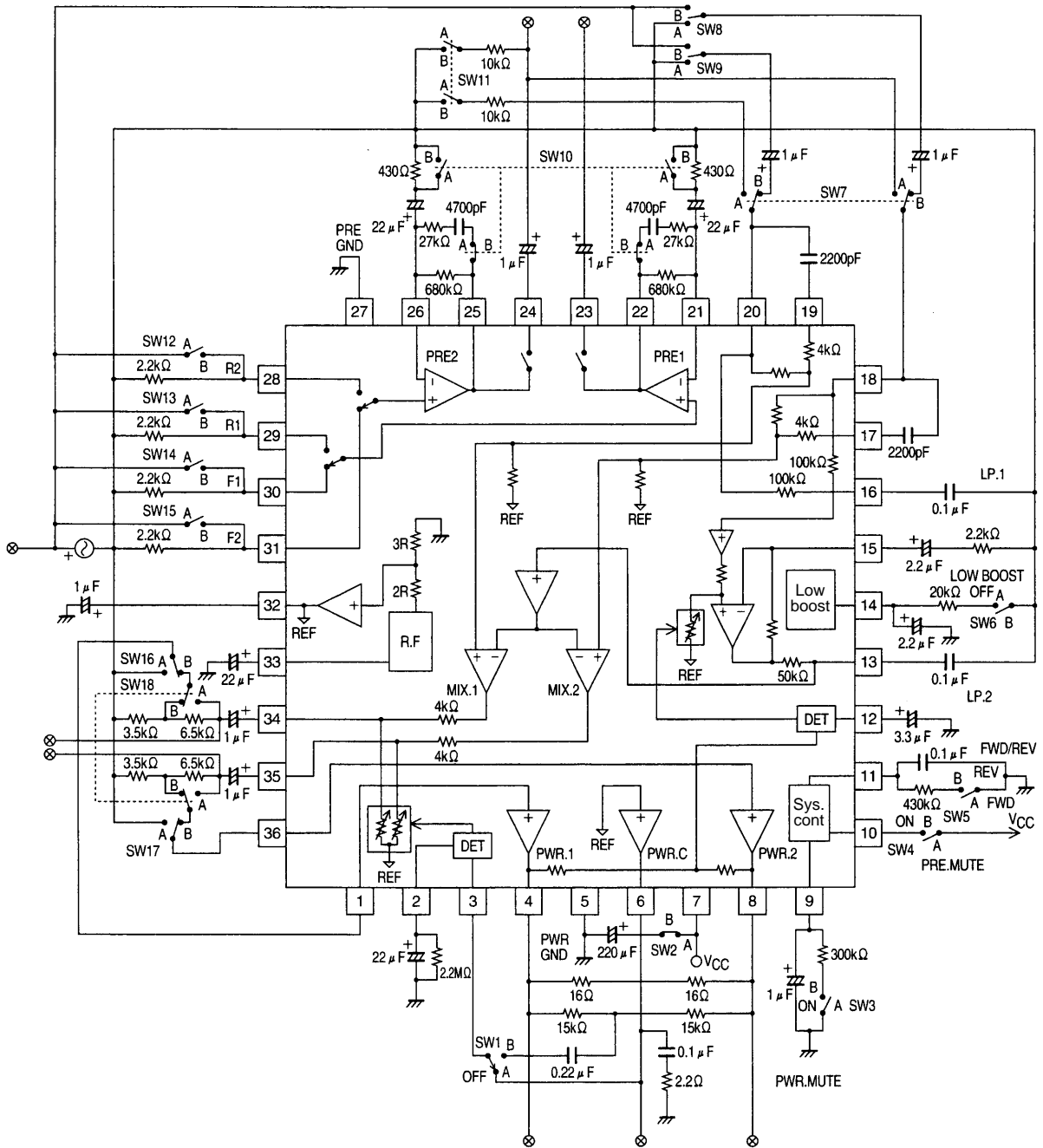
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Block Diagram



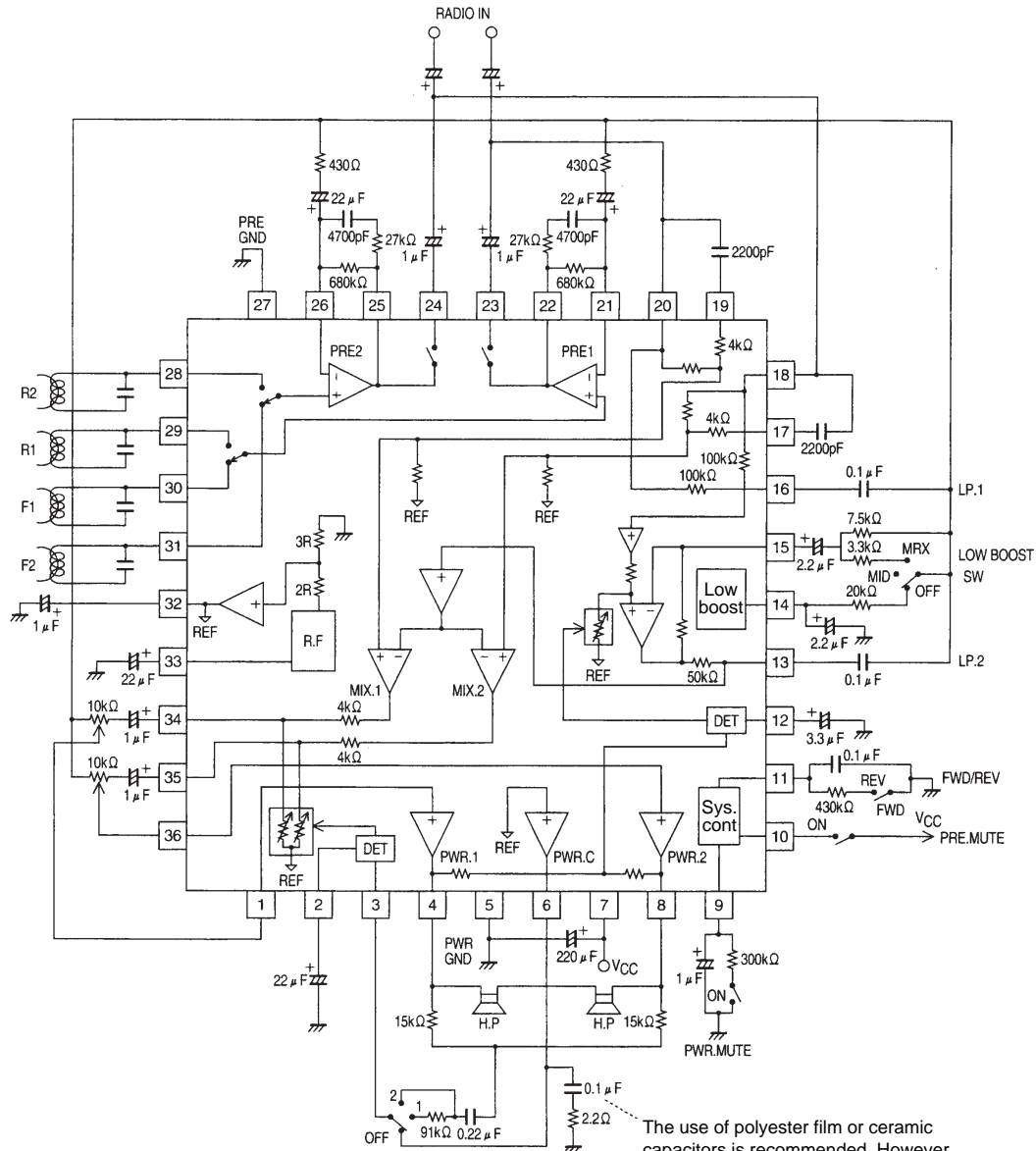
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Test Circuit Diagram



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Sample Application Circuit



The use of polyester film or ceramic capacitors is recommended. However, capacitors whose capacitances are guaranteed for the operating temperature range of the end product should be used.

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