



# 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

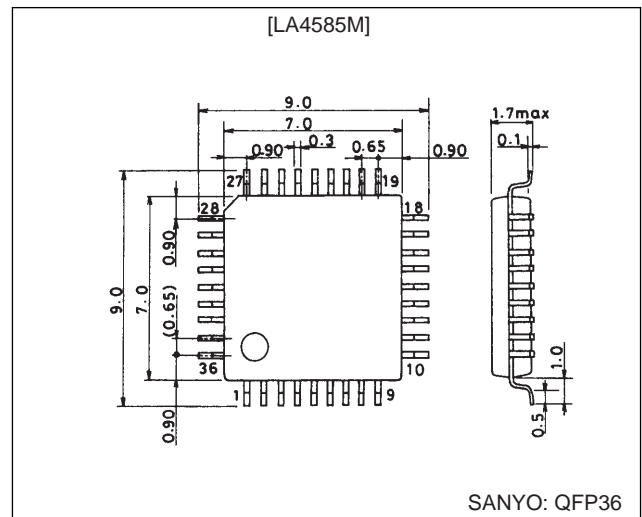
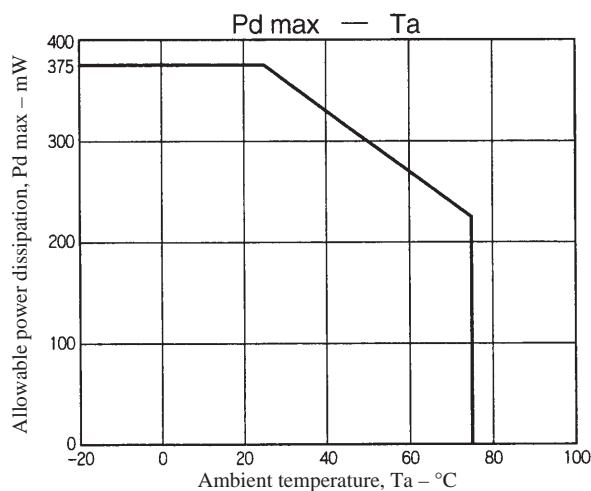
- The LA4585M is designed for use in playback-only compact cassette players. In addition to preamplifier and power amplifier functions, the LA4585M also provides low boost and automatic power output limiter (PVSS:Peak Volume Select System) functions.

- 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  $\Omega$ )
- 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 $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max		4.5	V
Allowable power dissipation	$P_d$ max		375	mW
Operating temperature	$T_{opr}$		-20 to +75	°C
Storage temperature	$T_{stg}$		-40 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		3.0	V
Operating supply voltage range	$V_{CCOP}$		1.8 to 3.6	V

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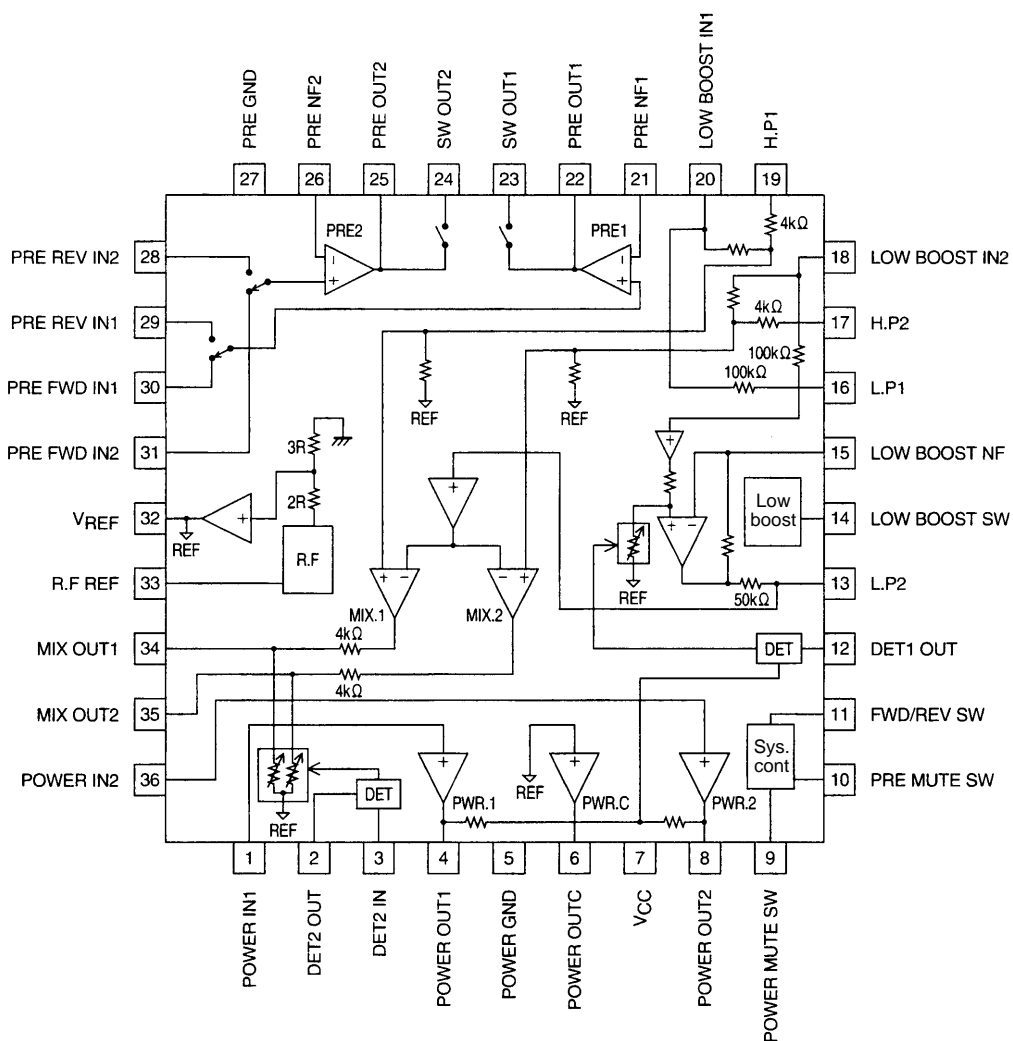
**Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3.0\text{ V}$ ,  $f_i = 1\text{ kHz}$ ,  $0.775 = 0\text{ dBm}$ , preamplifier  $R_L = 10\text{ k}\Omega$ , low boost, power amplifier  $R_L = 10\ \Omega$**

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.

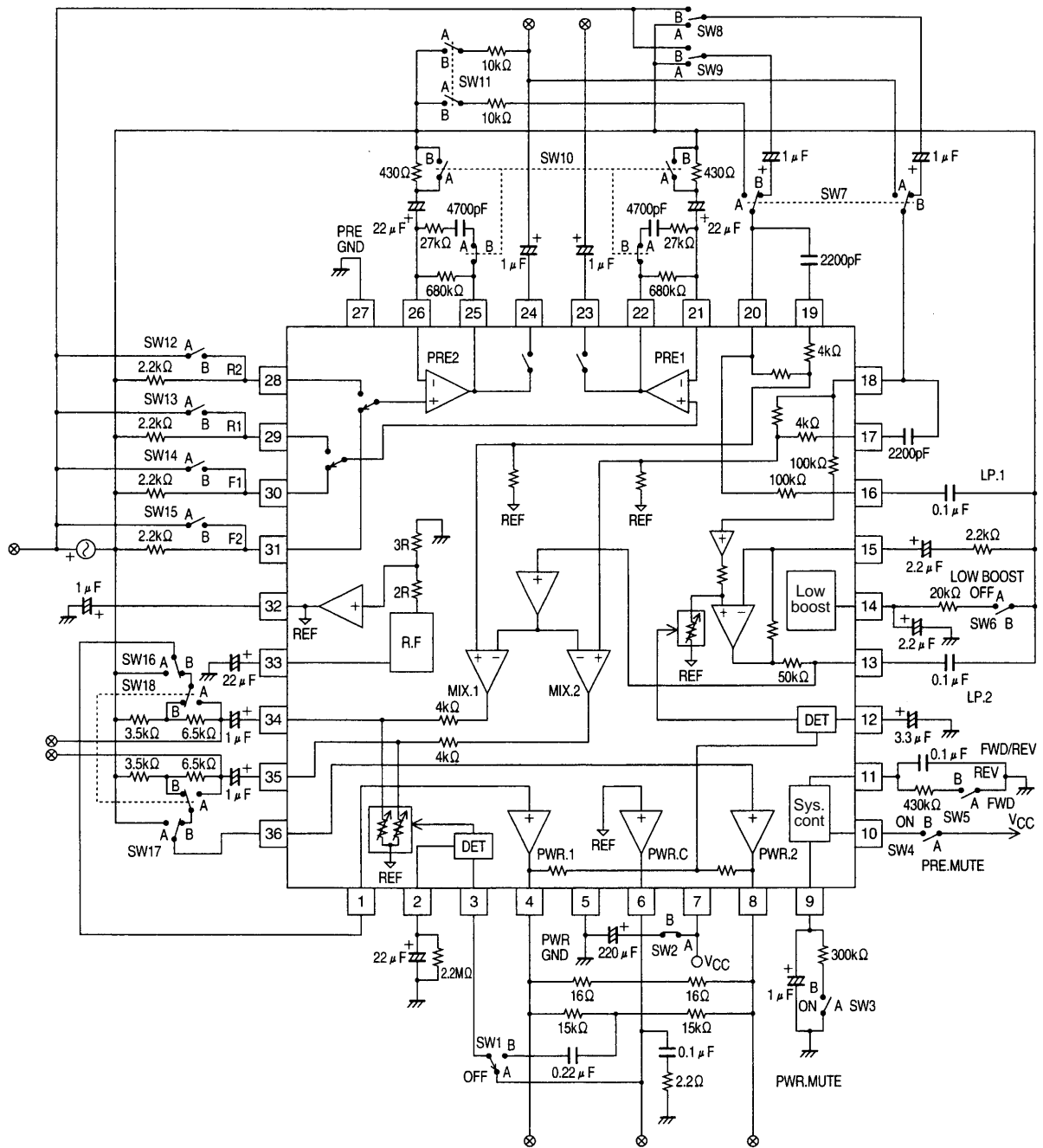
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## Block Diagram



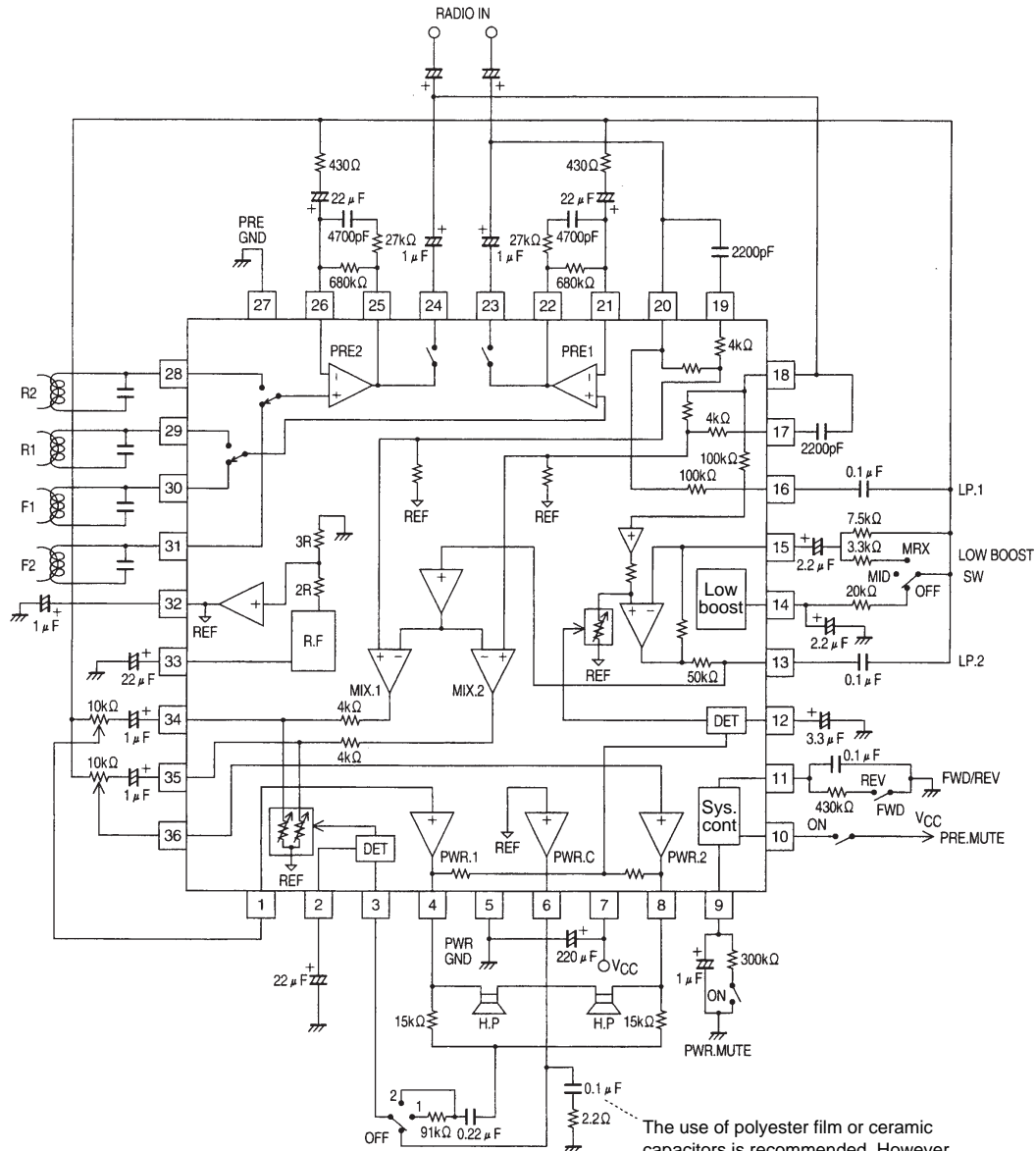
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Test Circuit Diagram



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Sample Application Circuit



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