



Monolithic Linear IC

LA7285, 7285M**VCR Audio Signal Recording and Playback Processor**

Overview

The LA7285 and LA7285M include on chip all functions required for the record and playback of VCR audio signals. In addition, the inclusion of a switching circuit for switching between tuner and line input in addition to the circuits provided by earlier ICs makes the LA7285 truly optimal for audio VCR products.

Functions

- Equalizer amplifier
- Line amplifier
- Recording/playback switch
- Recording amplifier
- Mute
- SP, LP, EP switch
- Ripple filter
- ALC
- Tape head switch
- Line/tuner input switch

Features

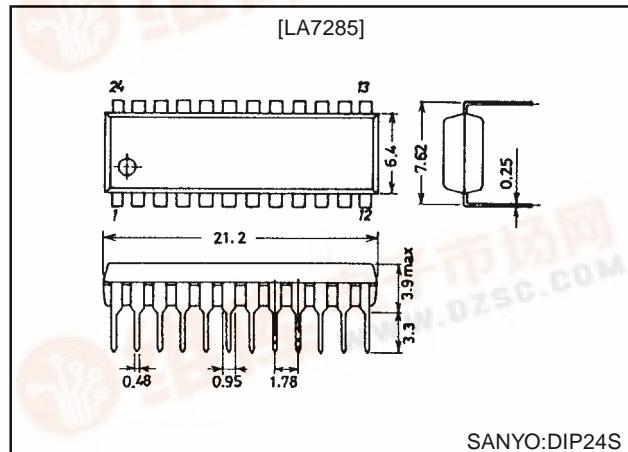
- Built-in input switching circuit (for the line and tuner inputs).
- Smaller package leaves large space for other components.
- Equalizer input/output capacitors not required.
- Low gain variation eliminates the need for external adjustment.
- Supply voltage : 9V and 12V operation.

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

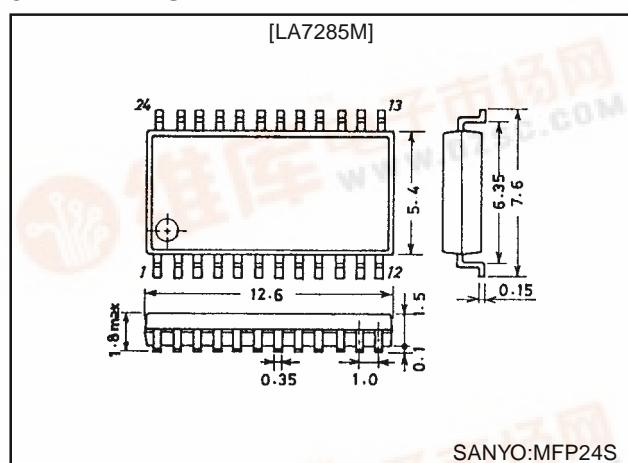
Package Dimensions

unit:mm

3067-DIP24S

SANYO:DIP24S

unit:mm

3112-MFP24S

SANYO:MFP24S

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\max}$		14	V
Pin1 input voltage	V_{IN1}	DC	+65	V _{p-p}
Pin1 input current	V_{IN1}		± 1.5	mA
Allowable power dissipation	$P_d \max$	$T_a \leq 65^\circ\text{C}$	400	mW
Operating temperature	T_{opr}		-10 to +65	°C
Storage temperature	T_{stg}		-55 to +150	°C

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		12	V
Operating supply voltage range	V_{CCop}		8.5 to 12.75	V

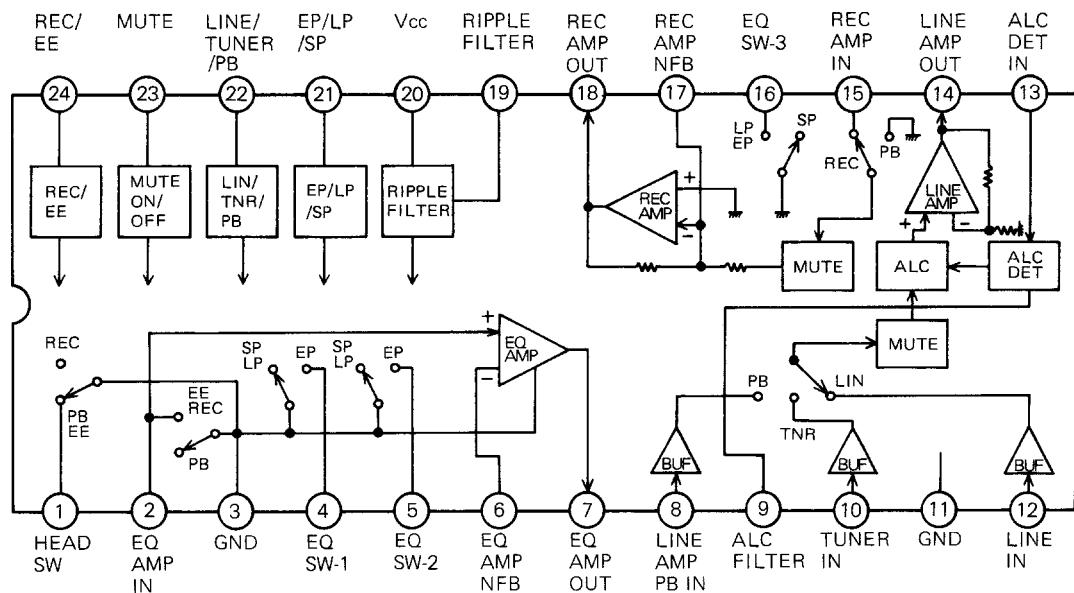
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Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{CC}=12\text{V}$, $f=1\text{kHz}$, $0\text{dBV} : 1.0\text{ Vrms}$

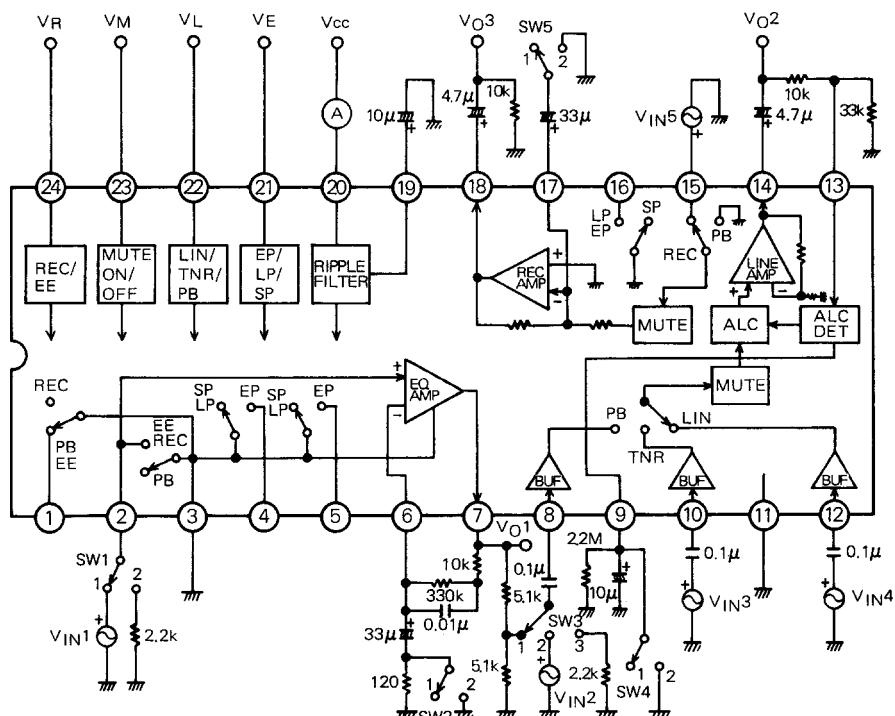
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current consumption (EE)	I_{CCE}	No signal	9.5	13.0	16.5	mA
Current consumption (PB)	I_{CCP}	No signal	9.5	13.0	16.5	mA
Current consumption (REC)	I_{CCR}	No signal	8.0	11.0	14.0	mA
[Equalizer amplifier]						
Open-circuit voltage gain	V_{GOE}	$V_O=-7\text{dBV}$	66.0	71.0		dB
Equivalent input noise voltage	V_{NIE}	$R_g=2.2\text{k}\Omega$, DIN Audio filter		1.2	1.8	μVrms
[Line amplifier]						
Voltage gain (PB input)	V_{GLP}	$V_O=-7\text{dBV}$	21.0	21.5	22.0	dB
Voltage gain (EE, LINE input)	V_{GLE}, V_{GLL}	$V_O=-7\text{dBV}$	21.0	21.5	22.0	dB
Total harmonic distortion	THD_L	$V_O=-7\text{dBV}$		0.05	0.3	%
Output noise voltage	V_{NOL}	$R_g=2.2\text{k}\Omega$, DIN Audio filter		-72	-66	dBV
Maximum output voltage	V_{OML}	THD=1%	1.5	2.1		Vrms
Output voltage when ALC is on	V_{OA}	$V_{IN}=-27\text{dBV}$	-8.0	-7.0	-6.0	dBV
ALC effect	ALC	$V_{IN}=-27\text{dBV}$ to -7dBV		1.0	3.0	dB
Distortion when ALC is on	$THDA$	$V_{IN}=-27\text{dBV}$		0.05	0.6	%
[Recording amplifier]						
Voltage gain (open)	V_{GOR}	$V_O=-7\text{dBV}$	47.0	52.0		dB
Voltage gain (coise)	V_{GOR}	$V_O=-7\text{dBV}$	12.5	13.0	13.5	dB
Total harmonic distortion	$THDR$	$V_O=-7\text{dBV}$		0.1	0.3	%
Maximum output voltage	V_{OMR}	THD=1%	1.5	2.0		Vrms
[Mute circuit]						
On voltage	V_{MON}	Pin 23 DC voltage	2.5		6.0	V
Off voltage	V_{MOFF}	Pin 23 DC voltage	0		1.5	V
Mute attenuation (PB,EE)	M_{P,M_E}		80	90		dB
Mute attenuation (REC)	M_R		65	75		dB
[EP, LP, SP switch circuit]						
EP mode hold voltage	V_{EE}	Pin 21 DC voltage	3.6		6.0	V
LP mode hold voltage	V_{EL}	Pin 21 DC voltage	1.8		2.6	V
SP mode hold voltage	V_{ES}	Pin 21 DC voltage	0		1.0	V
[Line/Tuner PB switch circuit]						
Line mode hold voltage	V_{LL}	Pin 22 DC voltage	3.6		6.0	V
Tuner mode hold voltage	V_{LT}	Pin 22 DC voltage	1.8		2.6	V
PB mode hold voltage	V_{LP}	Pin 22 DC voltage	0		1.0	V
[REC, EE switch circuit]						
REC mode hold voltage	V_{RR}	Pin 24 DC voltage	3		V_{CC}	V
EE mode hold voltage	V_{RE}	Pin 24 DC voltage	0		1.0	V
[Head Select Switch]						
Pin 1 on resistance	R_{ON1}	$I_1=\pm 1\text{mA}$		20	30	Ω
Pin 2 on resistance	R_{ON2}	$I_2=\pm 1\text{mA}$		5	10	Ω
Pin 2 input voltage	V_{IN1}	$T_a=65^\circ\text{C}$, $f=80\text{kHz}$ (sin), $I_{LK}=10\mu\text{A}$			± 45	V

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Block Diagram



Test Circuit



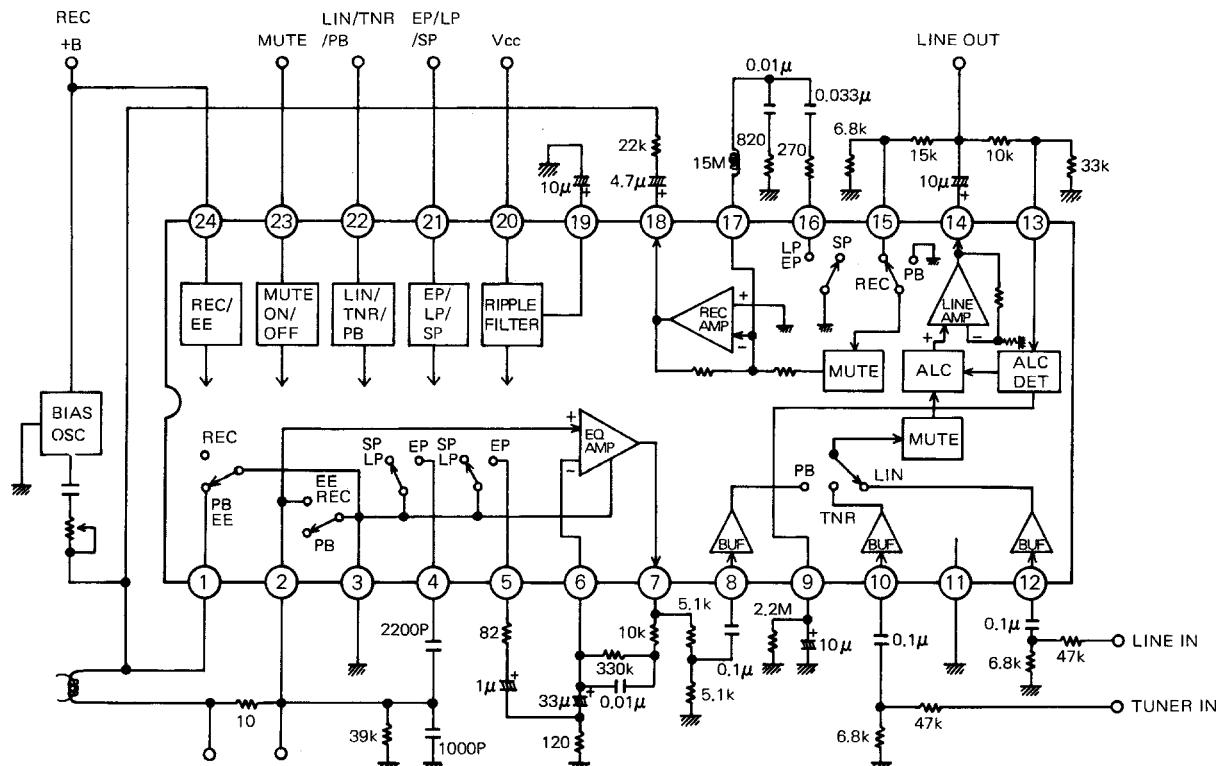
Unit (resistance: Ω , capacitance: F)

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Switch Operation Table

Test item (symbol)	SW1	SW2	SW3	SW4	SW5	V _M	V _L	V _R	Input	Measure
I _{CCE}	2	1	1	2	1	GND	5V	GND	—	A
I _{CCP}	2	1	1	2	1	GND	GND	GND	—	A
I _{CCR}	2	1	1	2	1	GND	5V	5V	—	A
V _{GOE}	1	2	3	2	1	GND	GND	GND	V _{IN1}	V _{O1}
V _{NIE}	2	1	3	2	1	GND	GND	GND	—	V _{O1}
V _{GLP} , THD _L , V _{OML}	2	1	2	2	1	GND	GND	GND	V _{IN2}	V _{O2}
V _{GLE} , V _{GLL}	2	1	1	2	1	GND	2.5V, 5V	GND	V _{IN3} , V _{IN4}	V _{O2}
V _{NOL}	2	1	3	2	1	GND	5V	GND	—	V _{O2}
V _{OA} , ALC, THD _A	2	1	3	1	1	GND	2.5V, 5V	GND	V _{IN3} , V _{IN4}	V _{O2}
V _{GOR}	2	1	3	2	2	GND	5V	GND	V _{IN5}	V _{O3}
V _{GOR} , THD _R , V _{OMR}	2	1	3	2	1	GND	5V	GND	V _{IN5}	V _{O3}
M _P	1	1	1	2	1	5V	GND	GND	V _{IN1}	V _{O2}
M _R	2	1	1	2	1	5V	5V	GND	V _{IN5}	V _{O3}
M _E	2	1	3	2	1	5V	5V	GND	V _{IN2}	V _{O2}

Sample Application Circuit



Unit (resistance:Ω, capacitance:F)

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Pin Function

Pin No.	Function name	Internal circuit for pin	Unit (resistance:Ω)
1	Head switch1 (high withstand voltage)		EE, PB → off, REC → off On resistance → 20Ω(typ) Withstand voltage when off → ±45V (f=80kHz)
2	EQ AMP input and Head switch2		Input impedance for playback signal input from head → 80kΩ (typ) EE, REC → on PB → off On resistance → 5Ω (typ)
3	GND		GND for pin 1 head switch and Equalizer Amplifier only
4	EP mode switch1		Use to change tape heads and resonant frequency. On resistance → 15Ω (typ) Input impedance → 10kΩ (typ) (EP mode)
5	EP mode switch2		Switches the Playback Equalizer Amplifier high-region frequency voltage gain. On resistance → 15kΩ (typ) Input impedance → 10kΩ (typ) (EP mode)
6	EQ AMP NFB		Equalizer Amplifier negative feedback pin
7	EQ AMP output		
8	LINE AMP PB input		Inputs the playback signal from the Equalizer Amplifier. Because the input impedance is as high as 110kΩ, a 0.1μF ceramic capacitor can be used for the coupling capacitor on pin 8.
9	ALC FILTER		Wave detection is performed when connected to GND through a capacitor. In addition, the attack and recovery time is set by C and R time constants.
10	TUNER input		Inputs EE and REC signals. The reference input is set by resistors R1 and R2. The amplifier gain is fixed at 21.5dB. In addition, because the input impedance is as high as 110kΩ, a 0.1μF ceramic capacitor can be used for the coupling capacitor on pin 10.
11	GND		GND for all circuit blocks except the head switch and Equalizer Amplifier.

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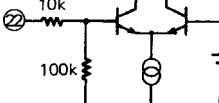
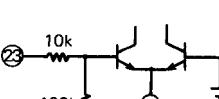
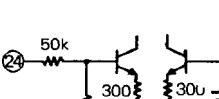
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Pin No.	Function name	Internal circuit for pin	Unit (resistance:Ω)	Description of function
12	LINE input	Internal reference 		Inputs EE and RE signals. The reference input is set by resistors R1 and R2. The amplifier gain is fixed at 21.5 dB. In addition, because the input impedance is as high as 110kΩ, a 0.1μF ceramic capacitor can be used for the coupling capacitor on pin 12.
13	ALC input wave detection			 Inputs the Line Amplifier output signal. The ALC level is set by the resistors R1 and R2.
14	LINE AMP output			Output impedance → 50Ω (typ)
15	REC AMP input			Inputs the recording signal from Line Amplifier. The recording current is set by the resistors R1 and R2. A coupling capacitor is unnecessary as pin 15 is a zero bias input.
16	LP mode switch			Used to adjust the high-region peaking frequency during recording amplifier in LP mode. On resistance → 15Ω (typ) Input impedance → 50Ω (typ)
17	REC AMP NFB			Recording amplifier negative-feedback input. Used to adjust the high-region peaking frequency of the recording amplifier with an L, C, R network connected to ground.
18	REC AMP output			Output impedance → 40Ω (typ)
19	Ripple filter	Power supply of each circuit block 		Ripple rejection is performed when connected to GND through an electrolytic capacitor for the filter.
20	Supply voltage (V _{CC})			V _{CC} max=14V V _{CC} =8.5V to 12.75V
21	EP/LP/SP Control			When the voltage on pin 21 is 3.6V to 6.0V:EP; when 1.8V to 2.6V:LP; when 0V to 1.8V:SP Switch On Pin Number EP mode:4,5,16 LP mode:16

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Pin No.	Function name	Internal circuit for pin	Description of function
22	LINE/TUNER/PB Control		When the voltage on pin 22 is 3.6V to 6.0V:LINE; when 1.8V to 2.6V:TUNER when 0V to 1.0V:PB
23	MUTE Control		When the voltage on pin 23 is 2.5V to 6.0V:MUTE on; when 0V to 1.5V:MUTE off
24	REC/EE Control		When the voltage on pin 24 is 2.5V to Vcc:REC; when 0V to 1.0V:EE

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