Ordering number:EN4091

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.

Funtions

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

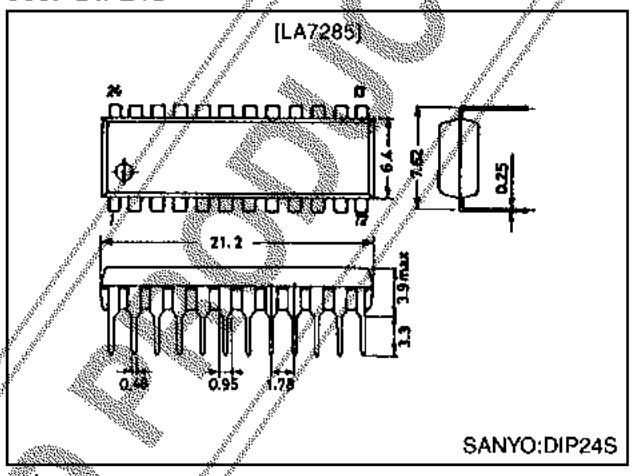
Features

- 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 ajustment.
- Supply voltage : 9V and 12V operation.

Package Dimensions

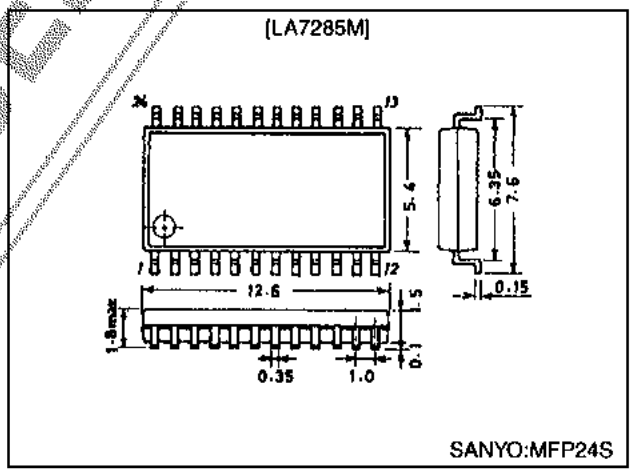
unit:mm

3067-DIP24S



unit:mm

3112-MFP24S



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC}max		14	V
Pin1 input voltage	V_{IN}1	DC	+65	Vp-p
Pin1 input current	V_{IN}1		±1.5	mA
Allowable power dissipation	Pd max	Ta≤65°C	400	mW
Operating temperature	Topr		–10 to +65	°C
Storage temperatrure	Tstg		–55 to +150	°C

Operating Conditions at Ta=25°C

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

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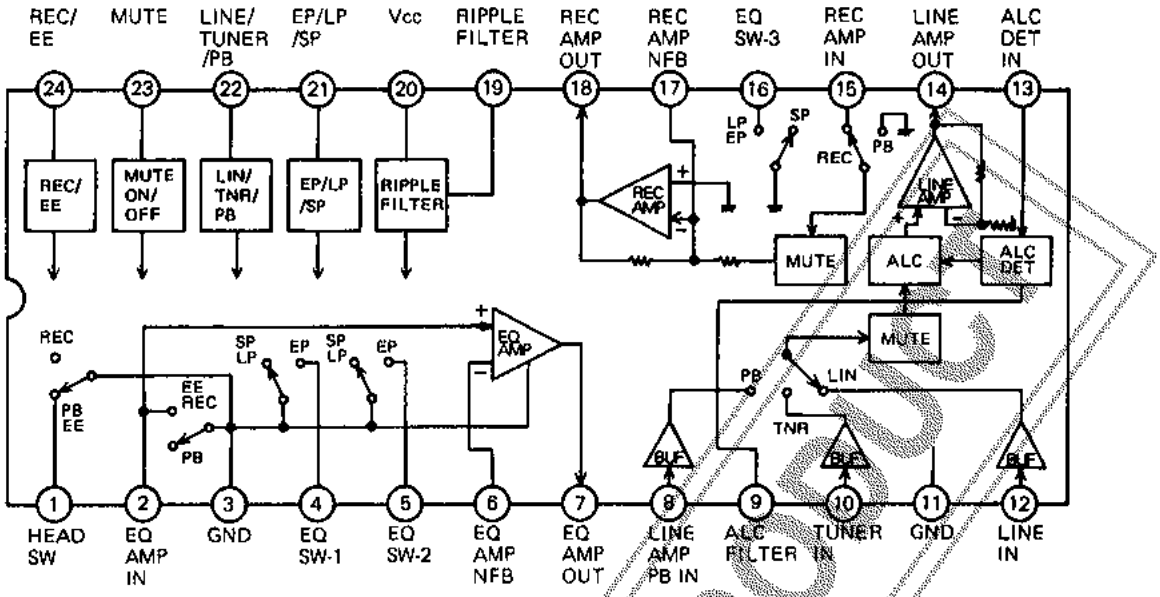
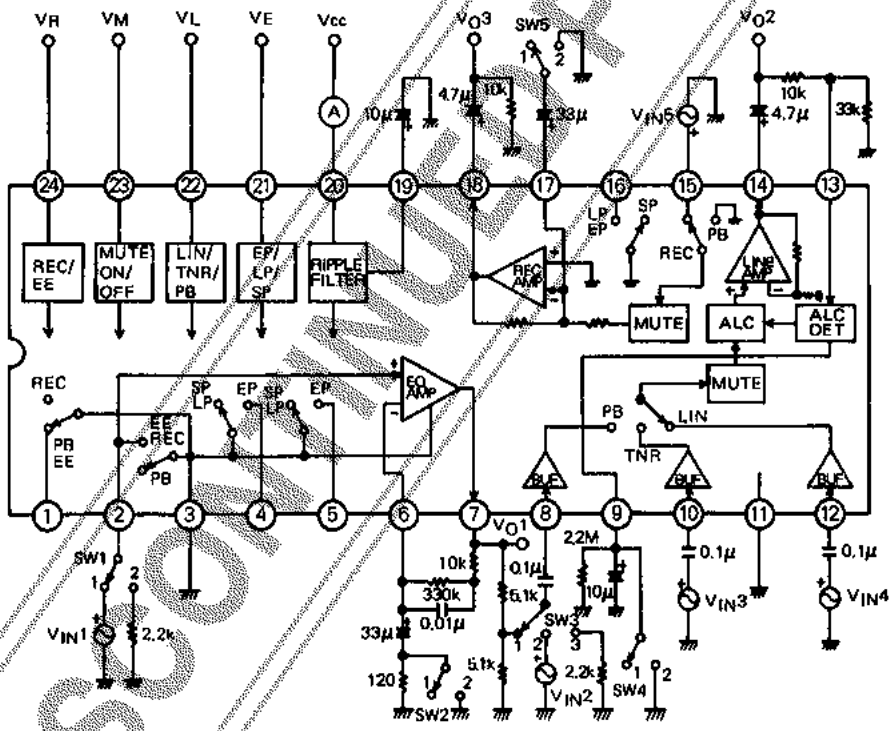
Operating Characteristics at Ta=25°C, V_{CC}=12V, f=1kHz, 0dBV : 1.0 Vrms

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	VG_{OE}	V_O=–7dBV	66.0	71.0		dB
Equivalent input noise voltage	V_{NIE}	Rg=2.2kΩ, DIN Audio filter		1.2	1.8	μVrms
[Line amplifier]						
Voltage gain (PB input)	VG_{LP}	V_O=–7dBV	21.0	21.5	22.0	dB
Voltage gain (EE, LINE input)	VG_{LE}, VG_{LL}	V_O=–7dBV	21.0	21.5	22.0	dB
Total harmonic distortion	THD_L	V_O=–7dBV		0.05	0.3	%
Output noise voltage	V_{NOL}	Rg=2.2kΩ, 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}=–27dBV	–8.0	–7.0	–6.0	dBV
ALC effect	ALC	V_{IN}=–27dBV to –7dBV		1.0	3.0	dB
Distortion when ALC is on	THD_A	V_{IN}=–27dBV		0.05	0.6	%
[Recording amplifier]						
Voltage gain (open)	VG_{OR}	V_O=–7dBV	47.0	52.0		dB
Voltage gain (colse)	VG_{OR}	V_O=–7dBV	12.5	13.0	13.5	dB
Total harmonic distortion	THD_R	V_O=–7dBV		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	$R_{ON}1$	I1=±1mA		20	30	Ω
Pin 2 on resistance	$R_{ON}2$	I2=±1mA		5	10	Ω
Pin 2 input voltage	$V_{IN}1$	Ta=65°C, f=80kHz (sin), I_{LK}=10μA			±45	V

Block Diagram



Test Circuit

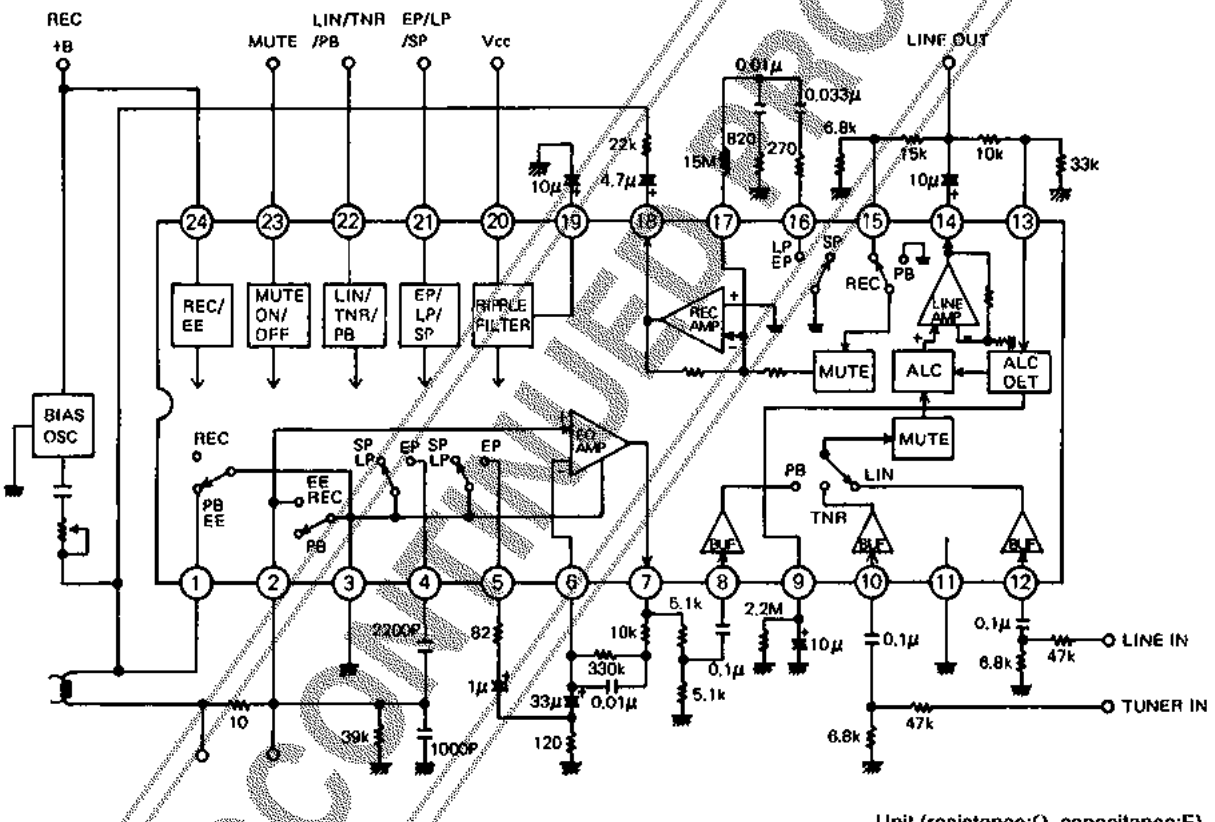


Unit (resistance:Ω, capacitance:F)

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
VG_{OE}	1	2	3	2	1	GND	GND	GND	$V_{IN}1$	V_O1
V_{NIE}	2	1	3	2	1	GND	GND	GND	–	V_O1
VG_{LP}, THD_L, V_{OML}	2	1	2	2	1	GND	GND	GND	$V_{IN}2$	V_O2
VG_{LE}, VG_{LL}	2	1	1	2	1	GND	2.5V, 5V	GND	$V_{IN}3$, $V_{IN}4$	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	$V_{IN}3$, $V_{IN}4$	V_O2
VG_{OR}	2	1	3	2	2	GND	5V	GND	$V_{IN}5$	V_O3
VGO_R, THD_R, V_{OMR}	2	1	3	2	1	GND	5V	GND	$V_{IN}5$	V_O3
M_P	1	1	1	2	1	5V	GND	GND	$V_{IN}1$	V_O2
M_R	2	1	1	2	1	5V	5V	GND	$V_{IN}5$	V_O3
M_E	2	1	3	2	1	5V	5V	GND	$V_{IN}2$	V_O2

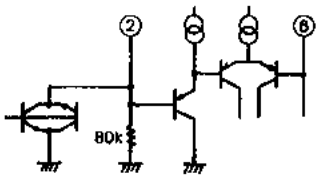
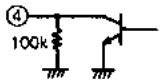
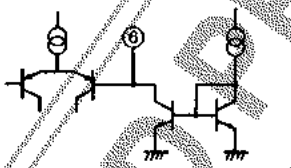
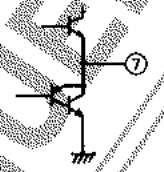
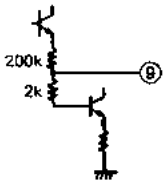
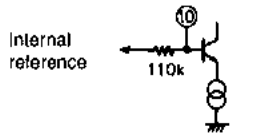
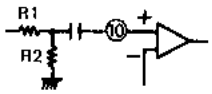
Sample Application Circuit



Unit (resistance:Ω, capacitance:F)

Pin Function

Unit (resistance:Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
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 impendance 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 impendance → 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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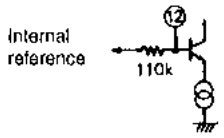
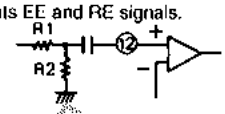
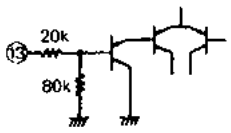
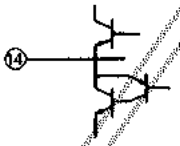
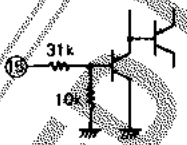
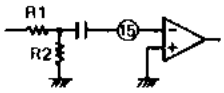
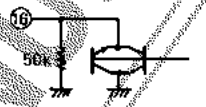
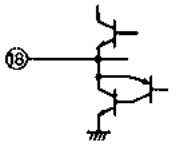
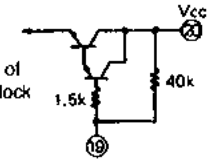
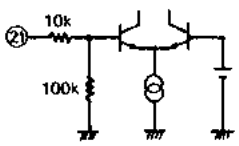
Unit (resistance:Ω)

Pin No.	Function name	Internal circuit for pin	Description of function
12	LINE input		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 inpedance → 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 inpedance → 40Ω (typ)
19	Ripple filter		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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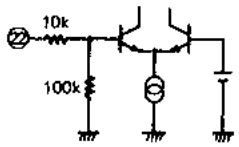
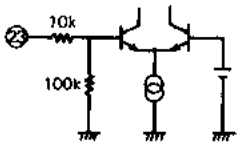
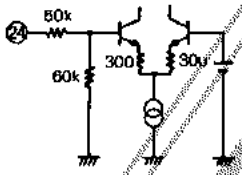
Unit (resistance:Ω)

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 V_{CC}:REC; when 0V to 1.0V:EE