AN7384N

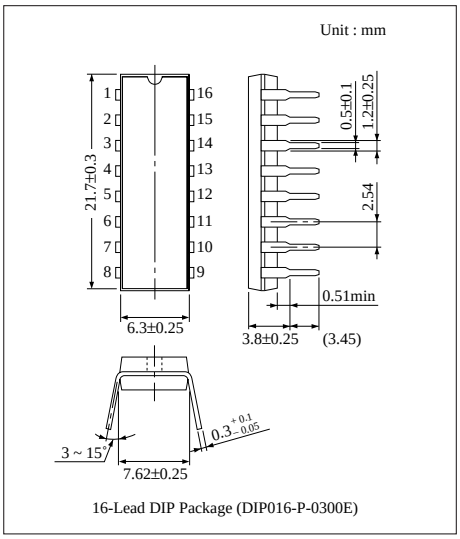
Electronic Volume IC for Cassette Deck

■ Overview

The AN7384N is a volume control IC for recording level adjustment of cassette deck and mini component stereo.

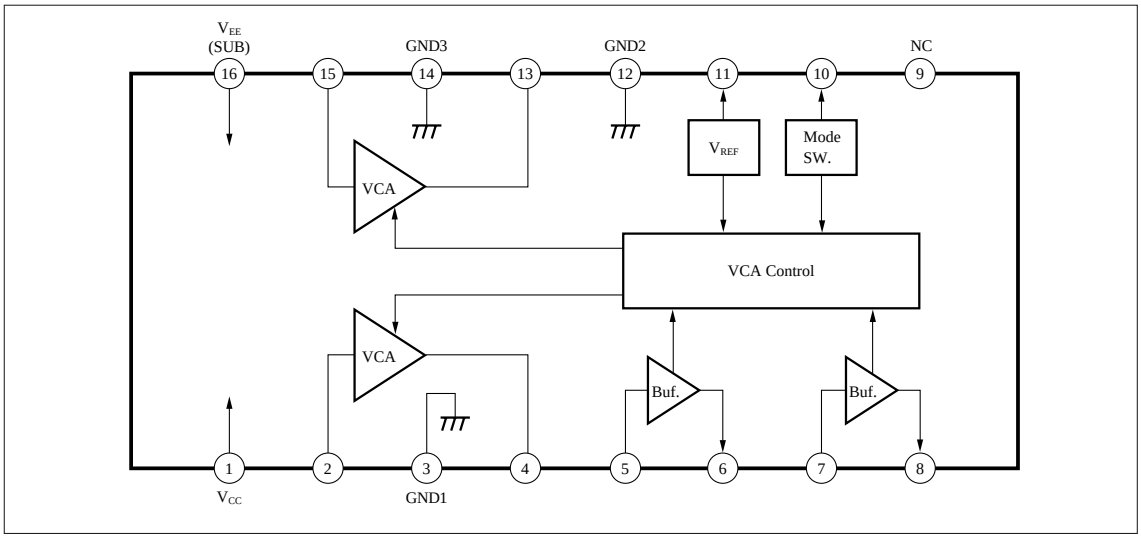
■ Features

- High input dynamic range
- Low output noise voltage
- Capable of selecting two kinds of control mode
  (1) L, R, independent volume
  (2) Coalition volume + L, R balance
- Reference voltage source for control voltage built-in



16-Lead DIP Package (DIP016-P-0300E)

■ Block Diagram



■ Absolute Maximum Ratings (Ta= 25˚C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{CC}	±12	V
Supply Current	I_{CC}	30	mA
Power Dissipation	P_D	800	mW
Operating Ambient Temperature	T_{opr}	–20 ~ + 70	˚C
Storage Temperature	T_{stg}	–55 ~ +150	˚C

■ Recommended Operating Range (Ta = 25˚C)

Parameter	Symbol	Range
Operating Supply Voltage Range	V_{CC}	±7V ~ ±11V

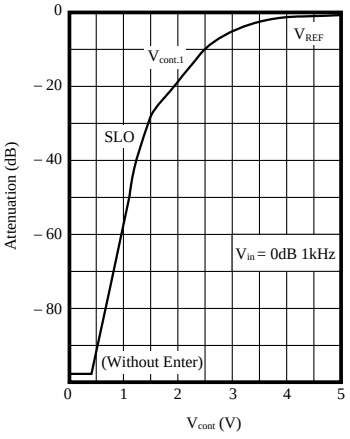
■ Electrical Characteristics (V_{CC} = ±10V, Ta = 25˚C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Positive Side Circuit Current	I_{CC}	V_{in}= 0dBV, Volume mode, V_{cont}= V_{ref}	—	12	20	mA
Negative Side Circuit Current	I_{EE}	V_{in}= 0dBV, Volume mode, V_{cont}= V_{ref}	–20	–9.1	—	mA
Attenuation – 1	ATT – 1 *1	V_{in}= 0dBV, Volume mode, V_{cont}= V_{ref}	–1	0	1	dBV
Attenuation – 2	ATT – 2 *1	V_{in}= 0dBV, Volume mode, V_{cont}= 0V	—	–85	–80	dBV
Channel Balance – 1	CB – 1 *1	V_{in}= 0dBV, Volume mode, V_{cont}= V_{ref}	–2	0	2	dB
Distortion Rate – 1	THD – 1 *1 *2	V_{in}= –20dBV, Volume mode, V_{cont}= V_{ref}	—	0.05	0.1	%
Distortion Rate – 2	THD – 2 *1 *2	V_{in}= 0dBV, Volume mode, at V_{cont}= –20dB	—	0.15	0	%
Noise Output Voltage – 1	V_{no} – 1 *1	Without input (R_g= 0Ω), Volume mode, V_{cont}= V_{ref}, A curve	—	–106	–100	dBV
Noise Output Voltage – 2	V_{no} – 2 *1	Without input (R_g= 0Ω), Volume mode, V_{cont}= 0V, A curve	—	—	–110	dBV
Channel Balance – 2	CB – 2 *1	V_{in}= 0dBV, Volume mode, at ATT= –20dB	–3	0	3	dB
Max. Input Voltage	$V_{i\ (max.)}$ *1	THD= 3%, ATT= –20dB	14.8	16	—	dBV
Max. Output Voltage	$V_{O\ (max.)}$ *1	THD= 3%, V_{cont}= V_{ref}	1.5	—	—	dBV
Control Voltage Range	V_{cont} *1		0	—	V_{ref}	V
Volume Mode Switching Voltage	$V_{10\ (V)}$		0	—	1.5	V
Balance Mode Switching Voltage	$V_{10\ (B)}$		3.5	—	4.8	V
Balance Mode Control Gain (Lch.)	ATT_{BG}	Volume mode, Input –20dBV V_{cont} to Pin5, V_7= 0.5V_{ref}	–22	–20	–18	dBV
Balance Mode Channel Balance	CB – 3	Volume mode, Input –20dBV V_{cont} to Pin5, V_7 = 0.5V_{ref}, L/R	–3	0	3	dB

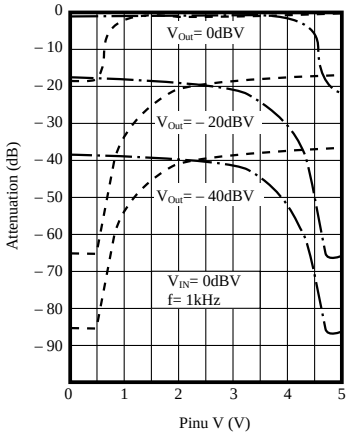
*1 2-channel
*2 Filter of 18dB/oct should be used at measurement.

■ Characteristics Curve

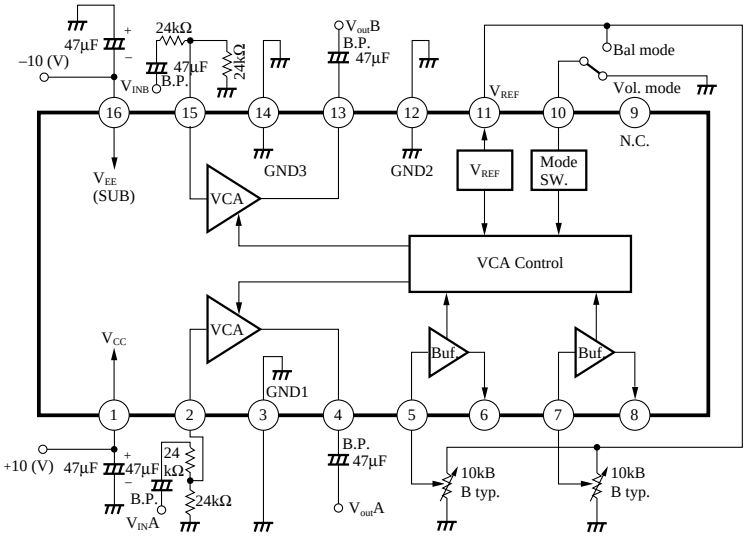
Independent Volume Mode Attenuation Characteristics



Balance Mode Attenuation Characteristics

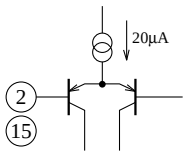
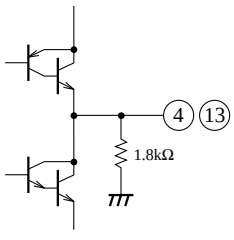
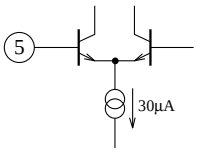


■ Application Circuit

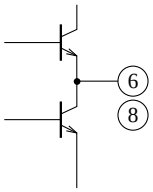
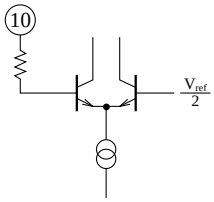
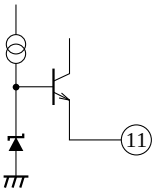


1. Voltage of Pin 7 becomes center at 1/2 V_{REF} in case of using at balance mode.
2. Coupling capacitor of output can be excluded according to system specifications.

■ Pin Descriptions

Pin No.	Pin Name	Description	Impedance	Equivalent Circuit
1	Positive Side Power Supply	Positive side supply voltage pin	—	———
2 · 15	Input Pin	Each channel input pin Pin2 – ch. A Pin15 – ch. B	—	
3	A-ch. GND	A-ch. side VCA system GND pin	—	———
4 · 13	Output Pin	Each channel output pin Pin4 – A-ch. Pin13 – B-ch.	1.8kΩ	
5	A-ch. Control Voltage Input	Control DC input pin · Pin11Low – A-ch. side independent control · Pin11Low – A, B-ch. balance control	—	
7	B-ch. Control Voltage Input	Control DC input pin · Pin11High – B-ch. side independent control · Pin11High – A, B-ch. balance control	—	

■ Pin Descriptions (Cont.)

Pin No.	Pin Name	Description	Impedance	Equivalent Circuit
6	A-ch. Control Voltage Output	Control DC voltage buffer output pin	—	
8	B-ch. Control Voltage Output	Control voltage buffer output input to Pin7	—	
9	NC	———	—	———
10	Volume Mode/Balance Mode Switching	Control mode switching pin Low – independent volume control High – coalition volume balance control mode	—	
11	Reference Voltage Output	Reference voltage output pin	—	
12	GND	Control system GND pin	—	———
14	B-ch. GND	B-ch. side VCA system GND pin	—	———
16	Negative Side Power Supply	Negative side supply pin	—	———

Supplementary Explanation

Electrical Caracteristics Design Reference Value

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Crosstalk	CT	V_{in} = 0dBV, V_{cont} = V_{ref}	—	– 85	– 80	dBV
Control Voltage at –20dB	V_{cont1}	V_{in} = 0dBV, V_{out} = –20dBV	1.8	2	2.2	V
Attenuation Characteristics	SLO	V_{in} = 0dBV, $V_{cont.1} \rightarrow V_{cont.}$ – 0.5V	– 15.5	– 12	– 9.5	dB
Attenuation Characteristics Balance	ATT–B	V_{in} = 0dBV, $V_{cont.}$ = $V_{cont.1} \rightarrow V_{cont.}$ – 0.5V	– 1.4	0	1.4	dB
The ratio of $V_{cont.1}$ to V_{ref}	ATT–V		0.25	0.4	0.55	dB
Control Power Supply	V_{ref}		4.8	5	5.2	V

Operation Mode and Control Pin

Pin No.	Volume Mode	Balance Mode
5	Volume Control	Volume Control
7	Volume Control	Balance Control

Mode	Operation Description
Volume Mode	Control each channel independently
Balance Mode	Control volume at Pin5 simultaneously. Control right and left balance at Pin6

Note) Center at 1/2V_{ref}

Precautions on Use

This IC is an integrated circuit for +, –2 power supply.

When user use this IC at – power supply, making reference voltage outside with OP amp. is needed.

As this IC is apt to be influenced by supply impedance, it needs capacitors of more than 47µF between V_{CC} and GND, more than 47µF between V_{EE} and GND.

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