

AN7384N

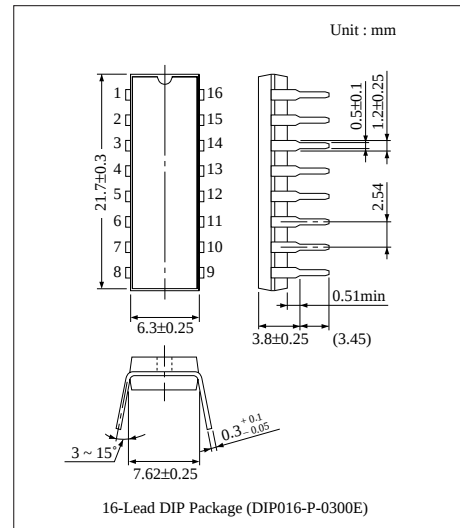
Electronic Volume IC for Cassette Deck

■ Overview

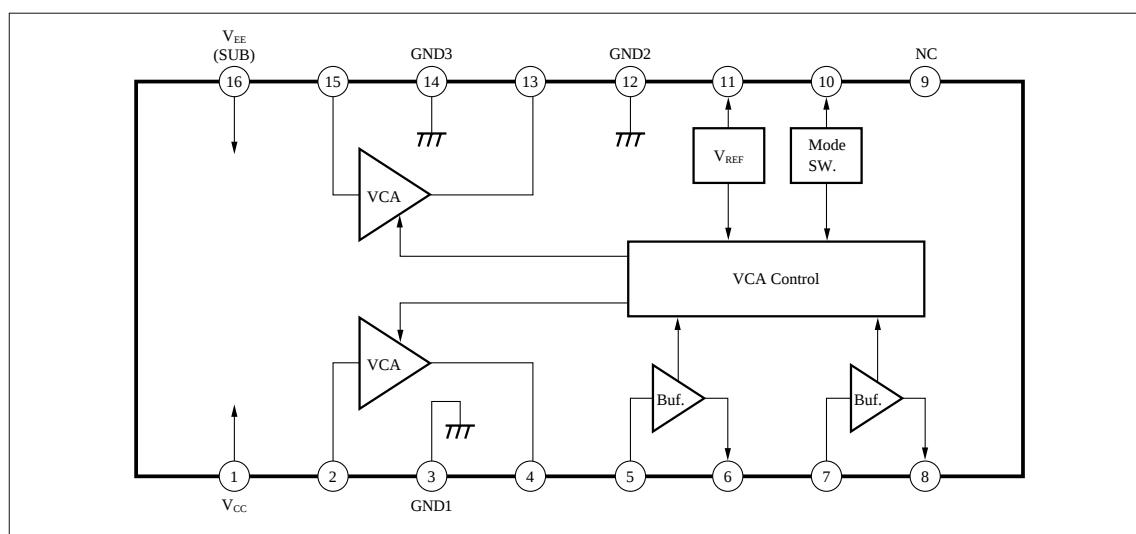
The AN7384N is a volume control IC for recording level adjustment of cassette deck and mini component stereo.

■ 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



■ 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)

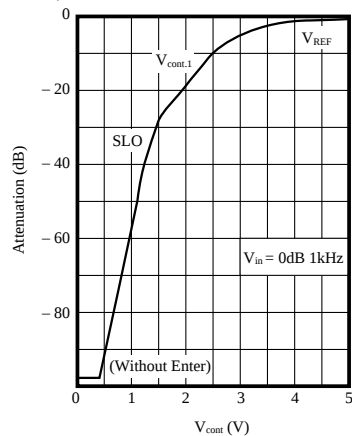
Parameter	Symbol	Condition	min.	typ.	max.	Unit
Positive Side Circuit Current	I _{CC}	V _{in} = 0dBV, Volume mode, V _{cont} = V _{ref}	—	12	20	mA
Negative Side Circuit Current	I _{EE}	V _{in} = 0dBV, Volume mode, V _{cont} = V _{ref}	-20	-9.1	—	mA
Attenuation - 1	ATT - 1 *1	V _{in} = 0dBV, Volume mode, 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

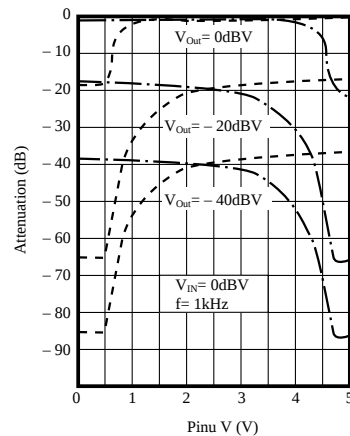
*2 Filter of 18dB/oct should be used at measurement.

■ Characteristics Curve

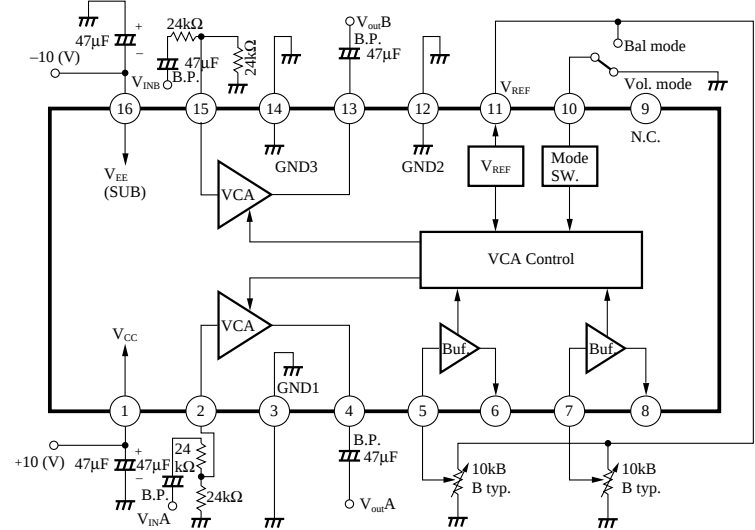
Independent Volume Mode Attenuation Characteristics



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 Characteristics Design Reference Value

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Crosstalk	CT	$V_{in} = 0\text{dBV}$, $V_{cont} = V_{ref}$	—	– 85	– 80	dBV
Control Voltage at –20dB	V_{cont1}	$V_{in} = 0\text{dBV}$, $V_{out} = -20\text{dBV}$	1.8	2	2.2	V
Attenuation Characteristics	SLO	$V_{in} = 0\text{dBV}$, $V_{cont.1} \rightarrow V_{cont.} - 0.5\text{V}$	– 15.5	– 12	– 9.5	dB
Attenuation Characteristics Balance	ATT–B	$V_{in} = 0\text{dBV}$, $V_{cont.} = V_{cont.1} \rightarrow V_{cont.} - 0.5\text{V}$	– 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 $47\mu\text{F}$ between V_{CC} and GND, more than $47\mu\text{F}$ between V_{EE} and GND.