

# AN3969K

## Electronic volume IC for HiFi VCR

### ■ Overview

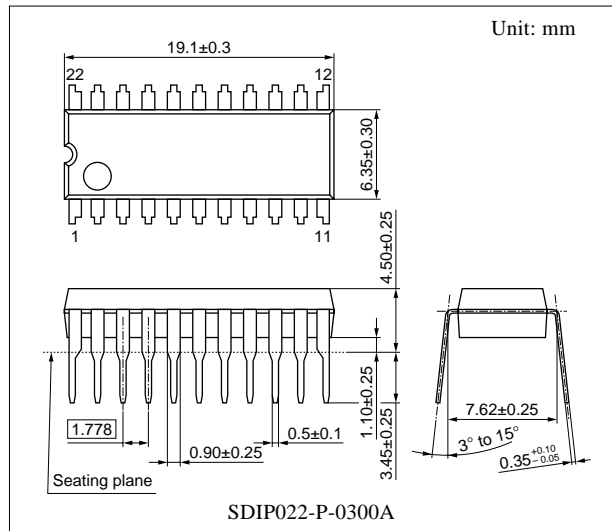
The AN3969K is a stereo electronic volume IC which has been developed for a HiFi video, enabling to switch four inputs of a single channel and to input from microphone.

### ■ Features

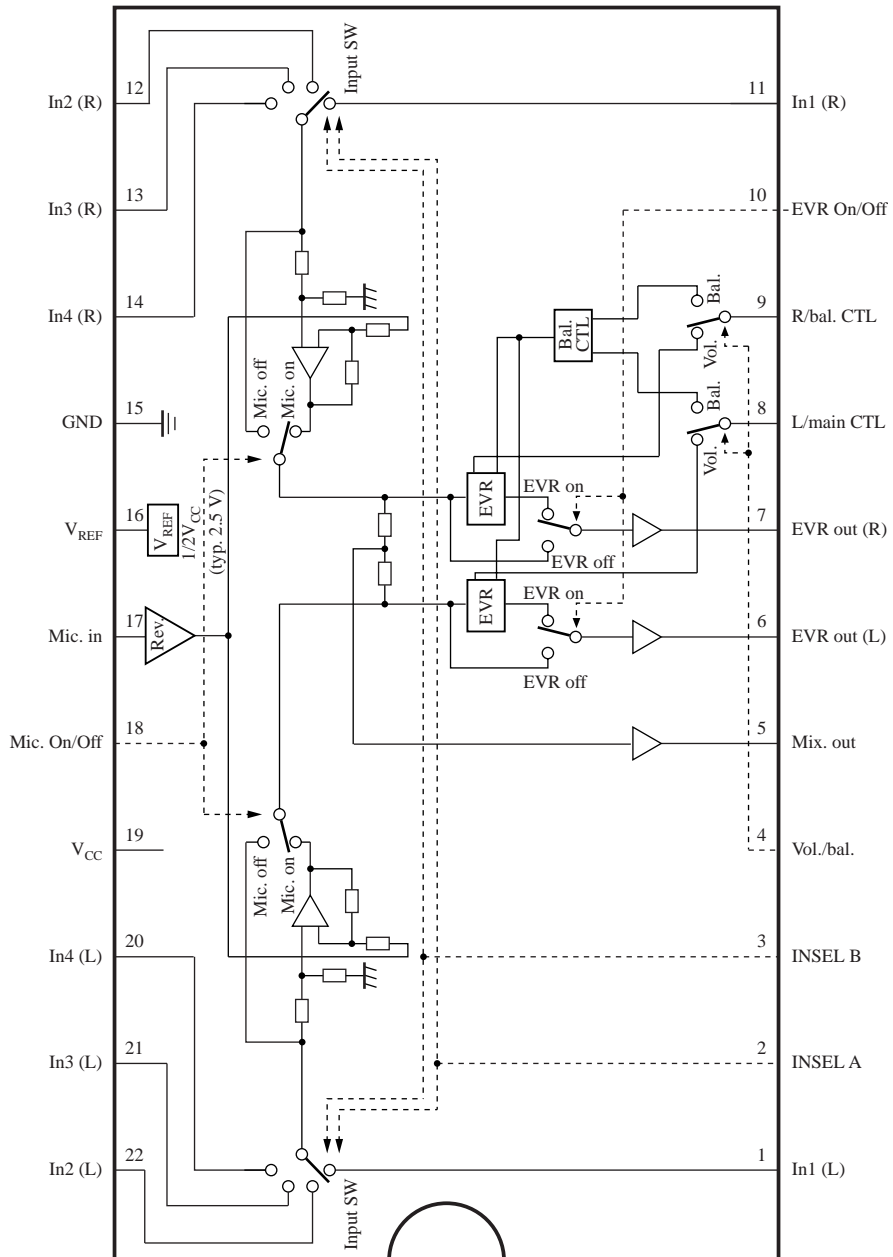
- Both L/R-independent volume control and balance control are available
- Switching four inputs with a single channel is possible
- Electronic volume off function
- Mic. mixing function

### ■ Applications

- HiFi VCR



■ Block Diagram



### ■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	In1 (L-ch.) input pin	11	In1 (R-ch.) input pin
2	Input selection control (CTL) A pin	12	In2 (R-ch.) input pin
3	Input selection control (CTL) B pin	13	In3 (R-ch.) input pin
4	EVR individual/balance mode CTL pin	14	In4 (R-ch.) input pin
5	Mix. output pin	15	GND pin
6	EVR (L-ch.) output pin	16	V <sub>REF</sub> (1/2V <sub>CC</sub> ) pin
7	EVR (R-ch.) output pin	17	Mic. input pin
8	Main volume adjustment pin for individual mode L-ch./balance mode	18	Mic. On/Off CTL pin
		19	V <sub>CC</sub> (5 V) pin
9	Balance volume adjustment pin for individual mode R-ch./balance mode	20	In4 (L-ch.) input pin
		21	In3 (L-ch.) input pin
10	EVR On/Off CTL pin	22	In2 (L-ch.) input pin

### ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	6.0	V
Power dissipation *1, *2	P <sub>D</sub>	186	mW
Operating ambient temperature *1	T <sub>opr</sub>	-20 to +75	°C
Storage temperature *1	T <sub>stg</sub>	-55 to +150	°C

Note) \*1: Except for the power dissipation, operating ambient temperature and storage temperature, all ratings are for T<sub>a</sub> = 25°C.

\*2: The power dissipation shown is the value for T<sub>a</sub> = 75°C.

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V <sub>CC</sub>	4.5 to 5.5	V

### ■ Electrical Characteristics at V<sub>CC</sub> = 5 V, pin 8 = 3 V, pin 9 = 3 V, T<sub>a</sub> = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Circuit current 1	I <sub>VOL</sub>	EVR individual CTL mode with no signal	14	18	23	mA
Circuit current 2	I <sub>BAL</sub>	EVR balance mode with no signal	19	25	31	mA
EVR out level L	VEO <sub>L</sub>	Typical input	-23	-20	-17	dBs
EVR out level R	VEO <sub>R</sub>	Typical input	-23	-20	-17	dBs
EVR out distortion ratio L	TEO <sub>L</sub>	Typical input	—	—	0.2	%
EVR out distortion ratio R	TEO <sub>R</sub>	Typical input	—	—	0.2	%

Note) 1. Unless otherwise specified, set a mode to In1 input selection, EVR on, EVR individual CTL, mic. off and input a typical input that is In1 input, V<sub>IN</sub> = -20 dBs, f<sub>IN</sub> = 1 kHz and L/R simultaneous input.

2. Unless otherwise specified, measure EVR out L for L-ch. parameter and EVR out R for R-ch. parameter.

**■ Electrical Characteristics at  $V_{CC} = 5\text{ V}$ , pin 8 = 3 V, pin 9 = 3 V,  $T_a = 25^\circ\text{C}$  (continued)**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
EVR out max. output L	VEOM <sub>L</sub>	Output level at pin 8 = 5 V and distortion ratio = 1%	1	—	—	dBs
EVR out max. output R	VEOM <sub>R</sub>	Output level at pin 9 = 5 V and distortion ratio = 1%	1	—	—	dBs
EVR out S/N L	NEO <sub>L</sub>	Ratio to VEO <sub>L</sub> to In1, R <sub>G</sub> = 18 k $\Omega$ , JIS A and R <sub>L</sub> = 10 k $\Omega$	70	—	—	dB
EVR out S/N R	NEO <sub>R</sub>	Ratio to VEO <sub>R</sub> to In1, R <sub>G</sub> = 18 k $\Omega$ , JIS A and R <sub>L</sub> = 10 k $\Omega$	70	—	—	dB
EVR max. level L	VMAX <sub>L</sub>	Ratio to VEO <sub>L</sub> with typical input and pin 8 = 5 V	8	10	12	dB
EVR max. level R	VMAX <sub>R</sub>	Ratio to VEO <sub>R</sub> with typical input and pin 9 = 5 V	8	10	12	dB
EVR attenuation level L	VMIN <sub>L</sub>	Ratio to output with V <sub>IN</sub> = -10 dBs, pin 8 = 0 V and pin 8 = 3 V	—	—	-65	dB
EVR attenuation level R	VMIN <sub>R</sub>	Ratio to output with V <sub>IN</sub> = -10 dBs, pin 9 = 0 V and pin 9 = 3 V	—	—	-65	dB
EVR balance characteristics 1-L	VBAL <sub>1L</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 2.5 V	-12	-10	-8	dBs
EVR balance characteristics 1-R	VBAL <sub>1R</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 2.5 V	-12	-10	-8	dBs
EVR balance characteristics 2-L	VBAL <sub>2L</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 1.25 V, ratio to VBAL <sub>1L</sub>	-12	-10	-7	dB
EVR balance characteristics 2-R	VBAL <sub>2R</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 3.75 V, ratio to VBAL <sub>1R</sub>	-12	-10	-7	dB
EVR balance characteristics 3-L	VBAL <sub>3L</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 0 V, ratio to VBAL <sub>1L</sub>	—	—	-50	dB
EVR balance characteristics 3-R	VBAL <sub>3R</sub>	EVR balance mode, pin 8 = 5 V, pin 9 = 5 V, ratio to VBAL <sub>1R</sub>	—	—	-50	dB
Mix. out level	VMIX	Mix. out measurement in a typical input	-22	-20	-18	dBs
Mix. out distortion ratio	TMIX	Mix. out measurement in a typical input	—	—	0.2	%
Mic. mix. level	VMIC	Mix. out measurement with mic. on mode, mic in = -32 dBs, 1 kHz	-22	-20	-18	dBs
Mic. mix. muting ratio	VMUTE	Mic. off mode, mic <sub>IN</sub> = -32 dBs, 1 kHz, mix. out measurement, ratio to VMIC	—	—	-70	dB
Crosstalk 1 between channels (R→L)	CCH1 <sub>RL</sub>	In1R = -10 dBs, L-ch. measurement, DIN audio, ratio to VEO <sub>L</sub> is -10 dB.	—	—	-75	dB
Crosstalk 2 between channels (L→R)	CCH1 <sub>LR</sub>	In1L = -10 dBs, R-ch. measurement, DIN audio, ratio to VEO <sub>R</sub> is -10 dB.	—	—	-75	dB
Crosstalk between inputs	CIN1	In2, In3, In4 = -10 dBs, mix. measurement, DIN audio, ratio to VMIX is -10 dB.	—	—	-60	dB

Note) 1. Unless otherwise specified, set a mode to In1 input selection, EVR on, EVR individual CTL, mic. off and input a typical input that is In1 input, V<sub>IN</sub> = -20 dBs, f<sub>IN</sub> = 1 kHz and L/R simultaneous input.

2. Unless otherwise specified, measure EVR out L for L-ch. parameter and EVR out R for R-ch. parameter.

## ■ Electrical Characteristics at $V_{CC} = 5\text{ V}$ , pin 8 = 3 V, pin 9 = 3 V, $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input selection CTL A (low) *	DINA <sub>L</sub>	Pin 2 input	0	—	1.5	V
Input selection CTL A (high) *	DINA <sub>H</sub>	Pin 2 input	3.5	—	5	V
Input selection CTL B (low) *	DINB <sub>L</sub>	Pin 3 input	0	—	1.5	V
Input selection CTL B (high) *	DINB <sub>H</sub>	Pin 3 input	3.5	—	5	V
EVR individual CTL mode	DVOLL	Pin 4 input (low)	0	—	1.5	V
EVR balance mode	DBALH	Pin 4 input (high)	3.5	—	5	V
EVR on mode	DEONL	Pin 10 input (low)	0	—	1.5	V
EVR off mode	DEOFFH	Pin 10 input (high)	3.5	—	5	V
Mic. on mode	DMONL	Pin 18 input (low)	0	—	1.5	V
Mic. off mode	DMOFFH	Pin 18 input (high)	3.5	—	5	V
EVR out L/R difference	VEOLR	Typical input, pin 8, pin 9 = 3 V, ratio of EVR out L to R	—	0	—	dB
EVR off level L	VEOFFL	EVR off mode, typical input, EVR out L measurement	—	-20	—	dBs
EVR off level R	VEOFFR	EVR off mode, typical input, EVR out R measurement	—	-20	—	dBs

Note) 1. Typical input = (In1 input,  $V_{IN} = -20\text{ dBs}$ ,  $f_{IN} = 1\text{ kHz}$ , L/R simultaneous input)

2. \*: In1 input selection mode: pin 2 = low, pin 3 = low, In2 input selection mode: pin 2 = high, pin 3 = low

In3 input selection mode: pin 2 = low, pin 3 = high, In4 input selection mode: pin 2 = high, pin 3 = high

## ■ Terminal Equivalent Circuits

Pin No.	Equivalent circuit	Description	Pin voltage (typ) (V)
1		In1(L-ch.) input: Audio signal Typical = -20 dBs (1 kHz)	2.5

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Pin voltage (typ) (V)
<p>2 3</p>		<p>Pin 2: input selection CTL A; Pin 3: input selection CTL B</p>	<p>—</p>
<p>4</p>		<p>Vol./bal. CTL</p>	<p>—</p>
<p>5 6 7</p>		<p>Pin 5: mix. input; Pin 6: EVR (L-ch.) output; Pin 7: EVR (R-ch.) output</p>	<p>2.5</p>
<p>8</p>		<p>L-ch. CTL (individual mode) Main CTL (balance mode)</p>	<p>—</p>

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Pin voltage (typ) (V)
9		R-ch. CTL (individual mode) Balance CTL (balance mode)	—
10		EVR On/Off CTL	—
11 12 13 14	Refer to pin 1.	Pin 11: In1 (R-ch.) input; Pin 12: In2 (R-ch.) input; Pin 13: In3 (R-ch.) input; Pin 14: In4 (R-ch.) input	Refer to pin 1.
15	—	GND	0
16		$V_{REF}$	2.5
17		Mic. input	2.5

### ■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Pin voltage (typ) (V)
18		Mic. On/Off CTL	—
19	—	$V_{CC}$	5
20	Refer to pin 1.	Pin 20: In4 (L-ch.) input;	Refer to pin 1.
21	Refer to pin 1.	Pin 21: In3 (L-ch.) input;	
22	Refer to pin 1.	Pin 22: In2 (L-ch.) input	



■ Application Circuit Example

