Electronic volume for VCRs and audio devices

BA7735FS

The BA7735FS is an electronic volume IC developed for VCRs and audio devices.

●Applications
VCRs

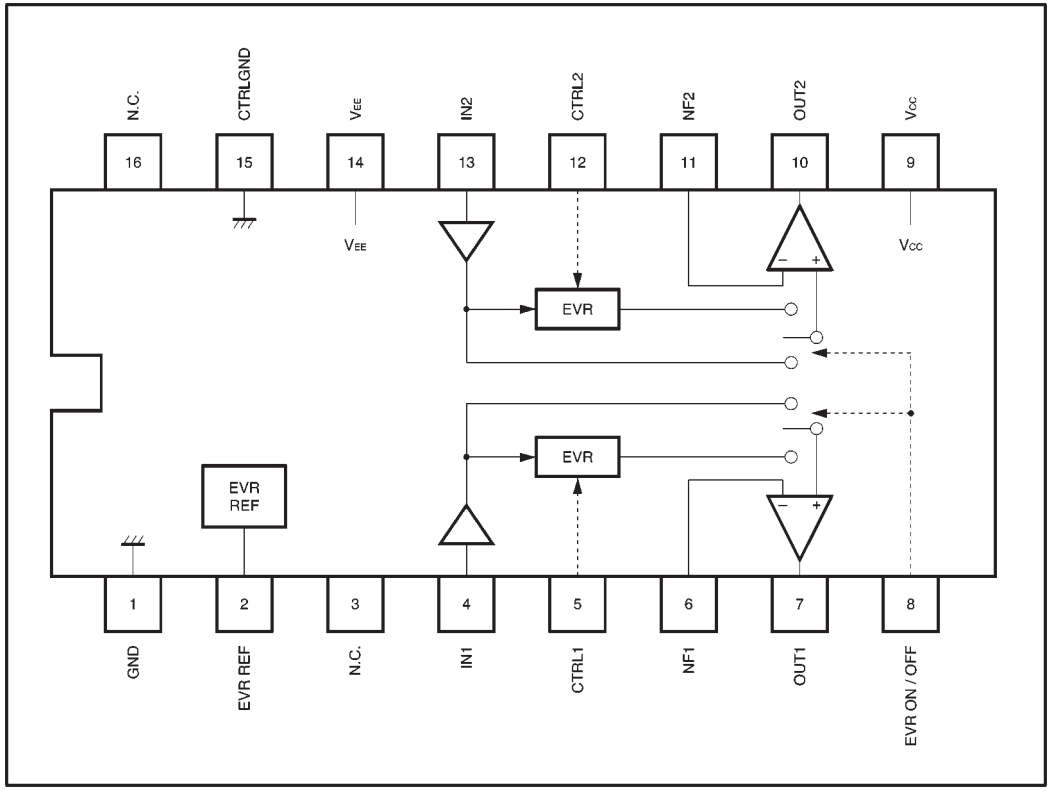
●Features
1) Internal high-performance electronic volume with a dynamic range of 100dB (Typ.).
2) Internal switching between EVR ON and EVR OFF modes.
3) Gain of output amplifier can be set to any value between 0 and 12dB using an external resistor.
4) ±2 power supply supported.

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	6.0	V
	V_{EE}	−6.0	V
Power dissipation	Pd	500*	mW
Operating temperature	Tstg	−55～+125	℃
Storage temperature	Topr	−10～+70	℃

*Reduced by 5.0mW for each increase in Ta of 1℃ over 25℃.

●Block diagram

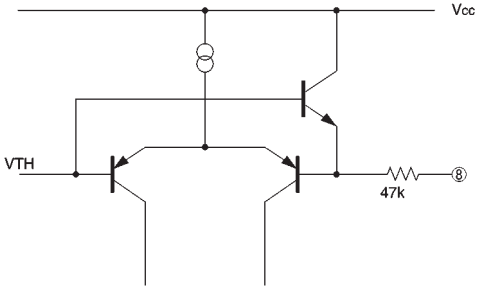


●Pin descriptions

Pin No.	Pin name	Function	Pin voltage	Pin model
1	GND	GND	0.0	—
2	EVR REF	Reference voltage output for control	2.6	EF（NPN）
3	N.C.	N.C.	—	—
4, 13	IN1 / IN2	Input	0.0	100kΩ
5, 12	CTRL1 / CTRL2	EVR control GND: VR=MAX, EVR REF: VR=MIN	—	B（NPN）
6, 11	NF1 / NF2	Output amplifier negative feedback	0.0	B（NPN）
7, 10	OUT1 / OUT2	Output	0.0	EE（P-P）
8	EVR ON / OFF	EVR ON / OFF control High: ON, Low: OFF	—	47kΩ～B（PNP）
9	V_{CC}	V_{CC}	5.0	—
14	V_{EE}	V_{EE}	−5.0	—
15	CTRL GND	GND	0.0	—
16	N.C.	N.C.	—	—

Note: Abbreviations for pin models have the following meanings: EF: emitter follower; P-P: push-pull; B: base.
All numeric values are design values (V_{CC}=+5.0V, V_{EE}=−5.0V) based on the measurement circuit in Fig.1.
The standards are not guaranteed for these values.

●Input / output circuit



●Electrical characteristics (unless otherwise noted, V_{CC} = +5.0V, V_{EE} = –5.0V, Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Coniditions
Circuit current (positive power supply)	I_{CC}	5.4	7.5	12.5	mA	No input, EVR ON mode, V_{EVR}=Typ.
Circuit current (negative power supply)	I_{EE}	4.9	6.8	11.3	mA	No input, EVR ON mode, V_{EVR}=Typ.
EVR REF pin voltage	V_{REF}	2.20	2.60	3.00	V	R_L=10kΩ, positive thermal characteristic
〈EVR ON mode〉						
Output level	V_O	−21.3	−20.0	−18.7	dBV	V_{IN}=−18dBV, V_{EVR}=Typ.
Output distortion	THD	−	0.02	0.20	%	V_{IN}=−18dBV, V_{EVR}=Typ.*1
Max. output level	V_{OM}	−2.4	−0.4	−	dBV	THD=1%*1
Max. gain allowance	G_{VM}	9.9	11.7	−	dB	V_{IN}=−18dBV, V_{EVR}=Typ., Max. level deviation
Noise level	V_{ON}	−	−100	−95	dBV	No input, Rg=1kΩ *2
Crosstalk 1	CT_1	−	−94	−	dBV	V_{IN}=dBV, V_{EVR}=Max.*2
Crosstalk 2	CT_2	−	−100	−	dBV	V_{IN}=dBV, V_{EVR}=Typ.*2
〈EVR OFF mode〉						
Output level	V_{OFF}	−19.3	−18.0	−16.7	dBV	V_{IN}=−18dBV
Output distortion	THD_{OFF}	−	0.03	0.20	%	V_{IN}=−18dBV *1
〈Mode retention voltage〉						
EVR OFF mode	V_{ON}	GND	−	0.5	V	−
EVR ON mode	V_{OFF}	4.5	−	5.0	V	−

Signal frequency: 1kHz

*1 B.W.=0.4 to 30kHz

*2 DIN AUDIO

●Measurement circuit

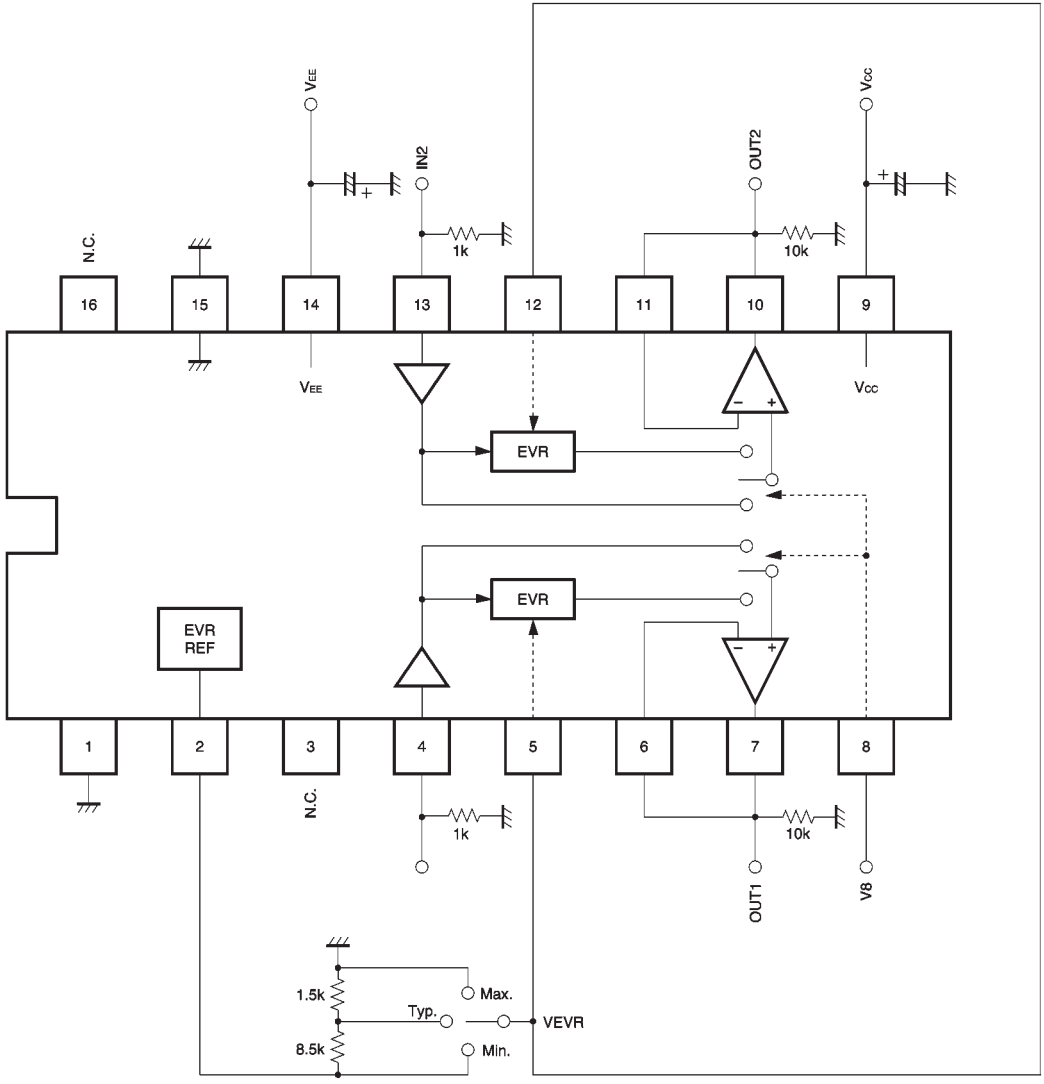


Fig.1

●Control pin description

EVR ON/OFF

This selects the EVR ON or EVR OFF mode.

V8 (8pin)	
L	H
EVR OFF	EVR ON

●Circuit operation

EVR control characteristic

Gain control is carried out by means of voltage divider between the GND and the EVR REF pin (pin 2).

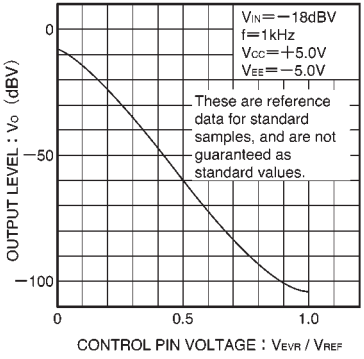


Fig.2 EVR control characteristic

●Operation notes

(1) Since muting measures are not taken in the IC when the power supply is turned on or off, these measures should be taken externally if necessary.

(2) The gain for the output amplifier should be set to a value between 0 and 12dB.

(3) DC offset voltage may be produced, depending on the EVR control point. If this is a problem, insert a coupling capacitor at the point where connection is made to the next stage.

(4) If DC offset voltage is a problem when switching modes, countermeasures such as providing a time constant to the control pin (pin 8) can be taken.

●External dimensions (Units: mm)