

HK725

AUDIO CONTROLLER IC AUDIO VOLUME CONTROL PROCESSOR (I)

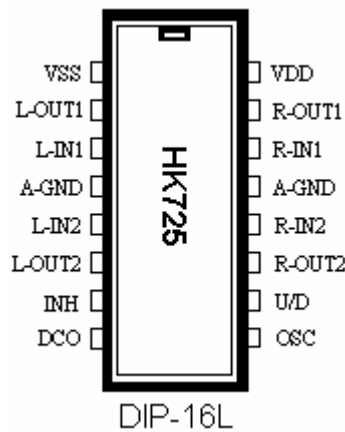
Features

- * 0dB to-66dB attenuation controlled by 2dB/step
- * 2 channels built in
- * High voltage CMOS technology operating voltage range : VCC=6~12V

Application

- * VCD
- * Karaoke
- * TV
- * Audio System
- * Car Stereo
- * VCR

PinOut Diagram



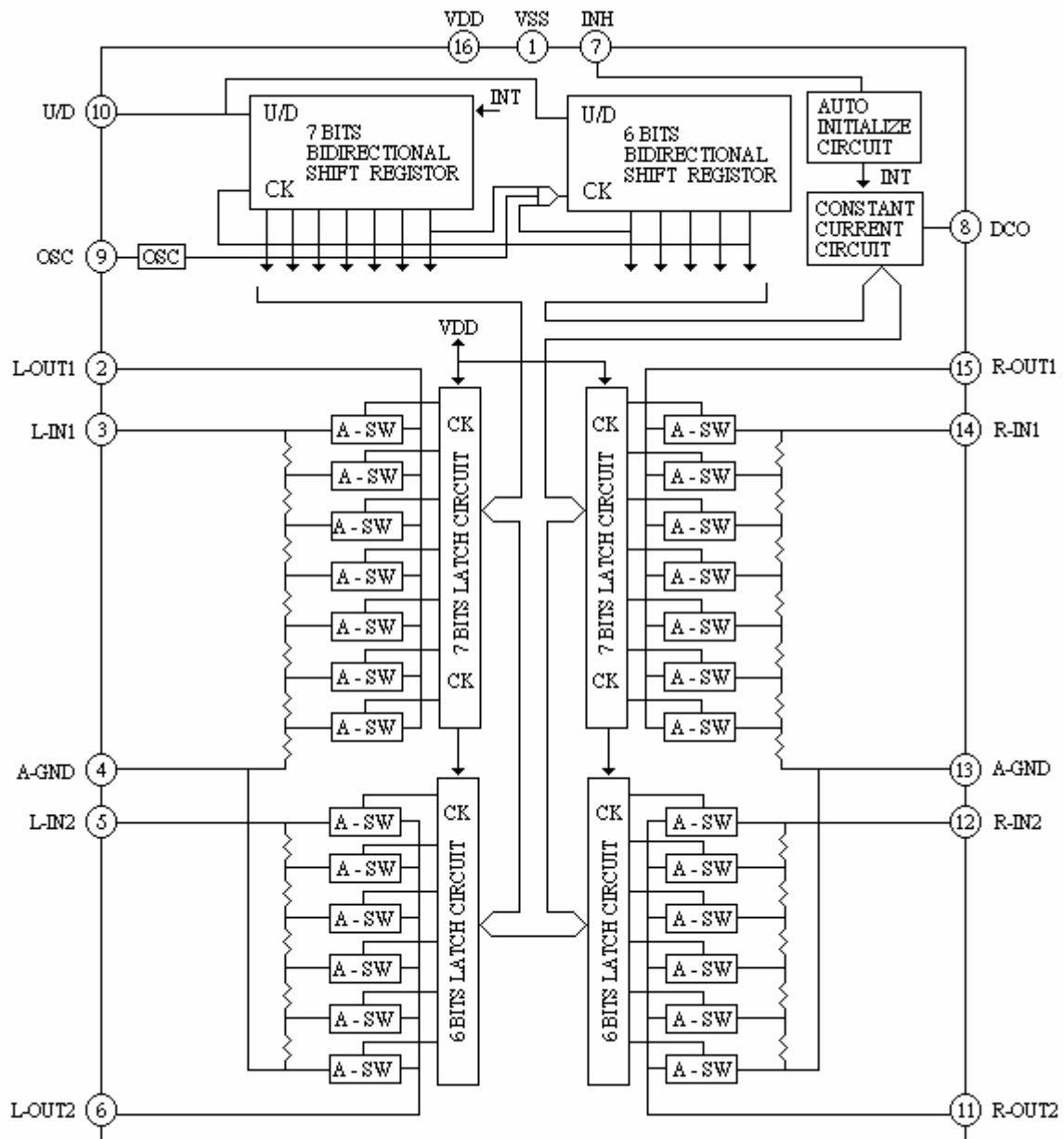
Pin Description

PIN NO	PIN NAME	DESCRIPTION
1	VSS	Negative Power Supply
2	L-OUT1	10 dB/step attenuator outputs.
3	L-IN1	10 dB/step attenuator inputs
4	A-GND	Analog ground terminal
5	L-IN2	2 dB/step attenuator inputs
6	L-OUT2	2 dB/step attenuator outputs
7	INH	Inhibit terminal. When this terminal is at ' L ' level, all input/output cut off and the HK725 is placed in the inhibit state. When at ' H ' level, the HK725 operates normally.
8	DCO	DC current output for displaying attenuation.
9	OSC	C, R connecting terminal for the oscillator up/down speed of attenuation is decided by the attenuation up/down control oscillator according to this time constant.
10	U/D	Attenuation up/down control input terminal. When this terminal is at ' H ' level, sound volume is increased synchronizing with rise of the oscillator. Conversely, when this pin is at ' L ' level, sound volume is decreased.
11	R-OUT2	A signal applied to IN is attenuated in 5 steps from 0 dB to 8 dB at 2 dB/step.
12	R-IN2	2 dB/step attenuator inputs
13	A-GND	Analog ground terminal
14	R-IN1	10 dB/step attenuator inputs
15	R-OUT1	A signal applied to IN is attenuated in 7 steps from 0dB to 60dB at 10dB/step.
16	VDD	Positive Power Supply

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Block Diagram

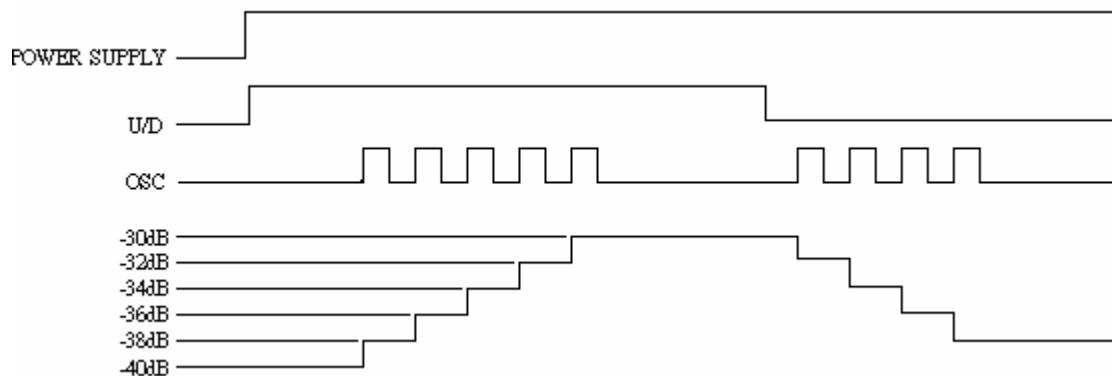


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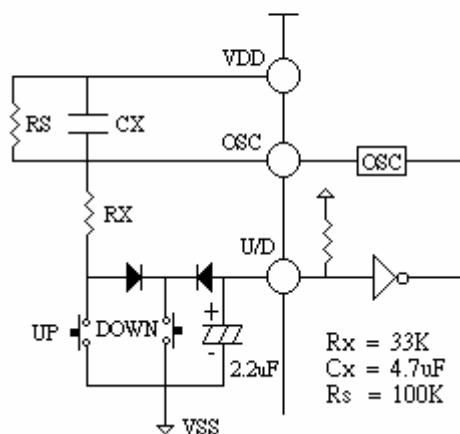
Functional Description

(1) Setting of Attenuation



After power on, attenuation is automatically set at -40dB. When the UP key is pressed after power ON, the U/D terminal is placed in the up state at ' H ' level, and the oscillator is actuated. When the DOWN key is pressed, the U/D terminal is kept at ' L ' level as long as the DOWN key is pressed, and the oscillator is actuated in the down state and therefore, attenuation is decreased. Oscillation frequency is decided by Cx and Rx.

$$F_{osc} \approx \frac{1}{0.7 C_x * R_x} \text{ (Hz) } (R_s \geq 3 R_x)$$



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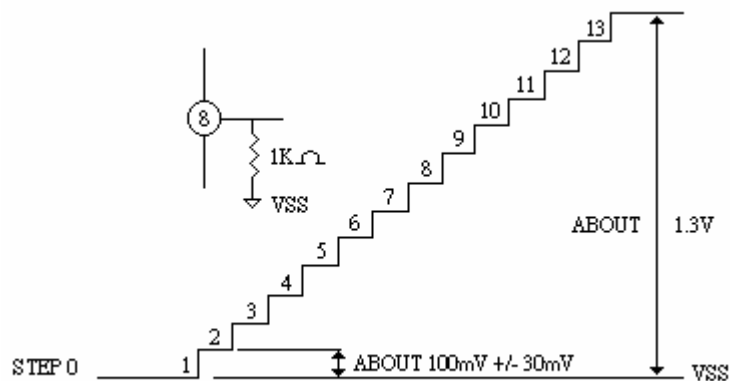
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(2) Attenuation Display Output

The HK725 is provided with the DC current output terminal for displaying attenuation. With 0dB ~ ∞ divided into 13 steps, current of approx. 100 μA/step is transmitted.

Step	Dco	Attenuation
0	0	-64dB ~ ∞
1	$I = 100 \mu\text{A} \pm 30 \mu\text{A}$	-60dB ~ -62dB
2	$2 \times I$	-54dB ~ -58dB
3	$3 \times I$	-50dB ~ -52dB
4	$4 \times I$	-44dB ~ -48dB
5	$5 \times I$	-40dB ~ -42dB
6	$6 \times I$	-34dB ~ -38dB
7	$7 \times I$	-30dB ~ -32dB
8	$8 \times I$	-24dB ~ -28dB
9	$9 \times I$	-20dB ~ -22dB
10	$10 \times I$	-14dB ~ -18dB
11	$11 \times I$	-10dB ~ -12dB
12	$12 \times I$	-4dB ~ -8dB
13	$13 \times I$	0dB ~ -2dB

Table 1



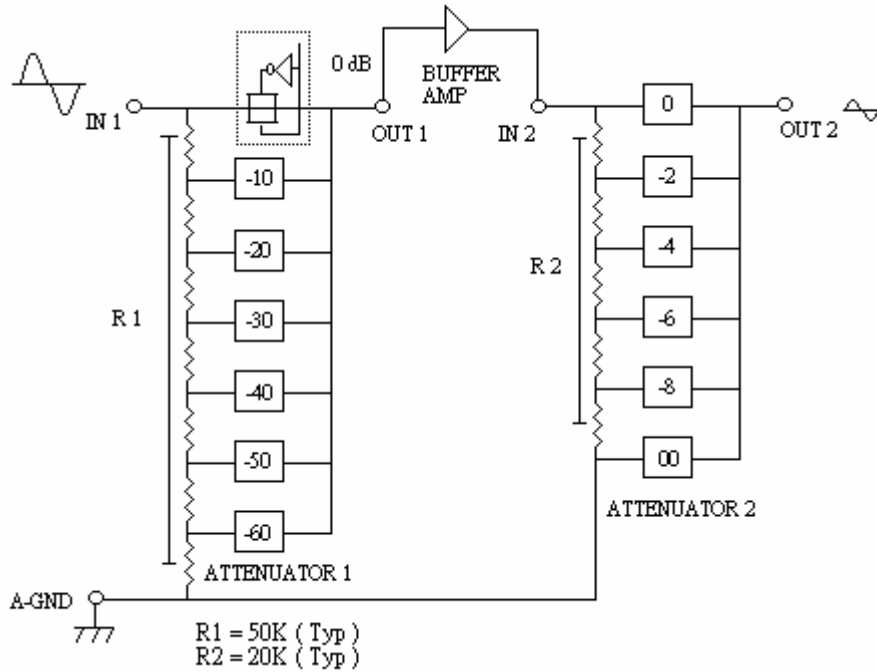
When high precision is required, use a variable resistor as a load resistor.

(3) Attenuator

The attenuator unit consist of diffused resistors and analog switches. Attenuator 1 attenuates 0 ~ 60 dB at 10 dB/step while attenuator 2 attenuates 2 ~ 8 dB at 2 dB/step, a total of 0 ~ 66dB at 2 dB/step.

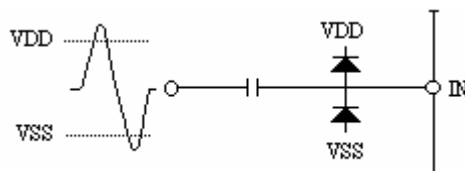
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If there is the possibility for excessive voltage being to the attenuator, it is recommended to insert a protective diode as show in Figure 5.

Figure 5



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(4) Power Supply

a. Dual Power Supply

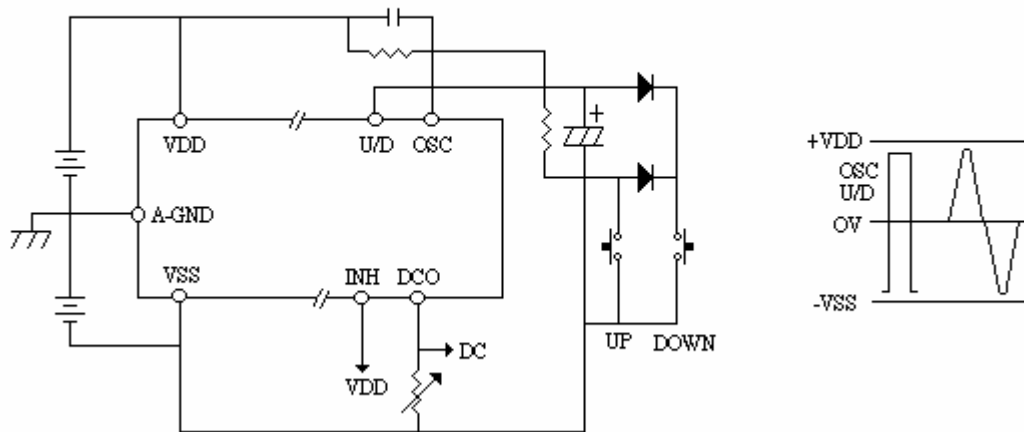


Figure 6

b. Single Power Supply

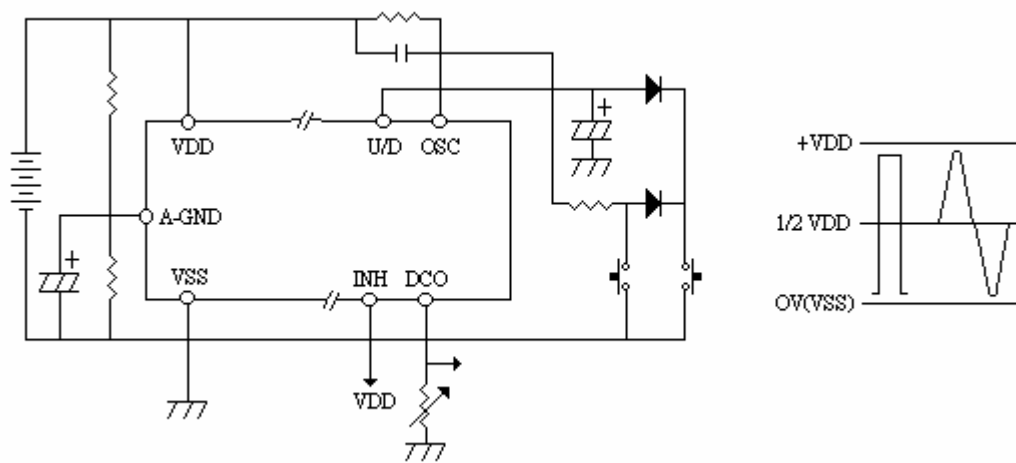


Figure 7

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(5) Backup When Power Off

When the INH terminal is set at ' L ' level, all input/output terminals are shut off and current consumption is reduced to the minimum. The back up by means of a capacitor becomes possible in this condition. An application circuit is shown in Figure 8.

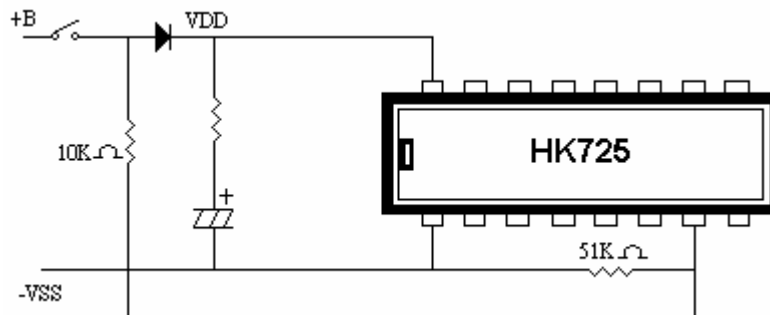
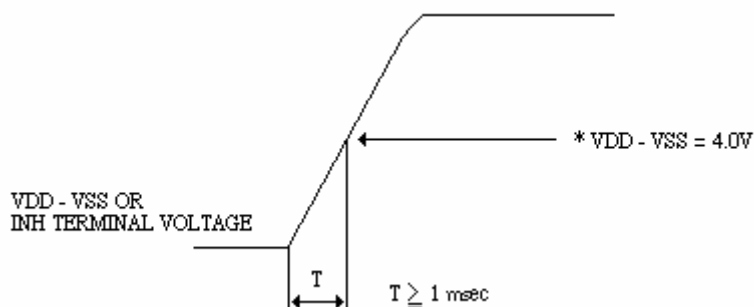


Figure 8

If VDD-VSS drops below 4V, the backup becomes impossible.

(6) Initialization When Power On

When VDD-VSS drops below 4V, the auto-initializing function is actuated. The initializing level is -40dB. If rise of power supply is too fast, the initialization may not be fully effected. It is recommend to rise supply voltage and the INH terminal as illustrated below.



Maximum Rating (Ta = 25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	VDD	15	V
Input Voltage	VIN	VSS-0.3 ~ VDD+0.3	V
Power Dissipation	PD	150	mW
Operating Temperature	Topr	-20 ~ 75	°C
Storage Temperature	Tstg	-40 ~ 125	°C

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Electrical Characteristics

(unless otherwise specified, VDD = 12V, VSS = 0V, Ta = 25°C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Voltage	VDD		6	-	12	V
Supply Current	IDD		-	1	3	mA
Stand-by Current	IB	VDD = 4V, INH = L	-	-	300	μA
Input Voltage	'H' LEVEL	INH, U/D Terminal	0.8VDD	-	VDD + 0.3	V
	'L' LEVEL		VSS - 0.3	-	VDD x 0.2	
Attenuator 1 Resistor (10dB/step)	RATT-1	R-IN1 -A-GND (L-IN1)	25	50	70	KΩ
Attenuator 2 Resistor (2dB/step)	RATT-2	R-IN2 -A-GND (L-IN2)	10	20	28	KΩ
Attenuation Error	-		-	-	2	dB
Max input Amplitude	Vin	Biase 0V	-	-	4.0	Vrms
Max clock Frequency	fck		-	-	100	KHz
Min clock Width	Tck		5	-	-	μs

Application Circuit (L-ch only)

