

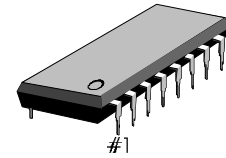
## INTRODUCTION

The S5A2250A01 is a CMOS designed for the electronization of dual volume. It is suitable for M/C, and car stereos.

## FEATURES

- Wide supply voltage range:  $V_{DD} = 6V - 12V$   
(Backup is possible up to 4V)
- Attenuation can be controlled from 0dB to -66dB by 2dB/step.
- Controlling attenuation by means of the built in osc and the up/down terminals.
- Single power supply operation as well as split power supply operation.

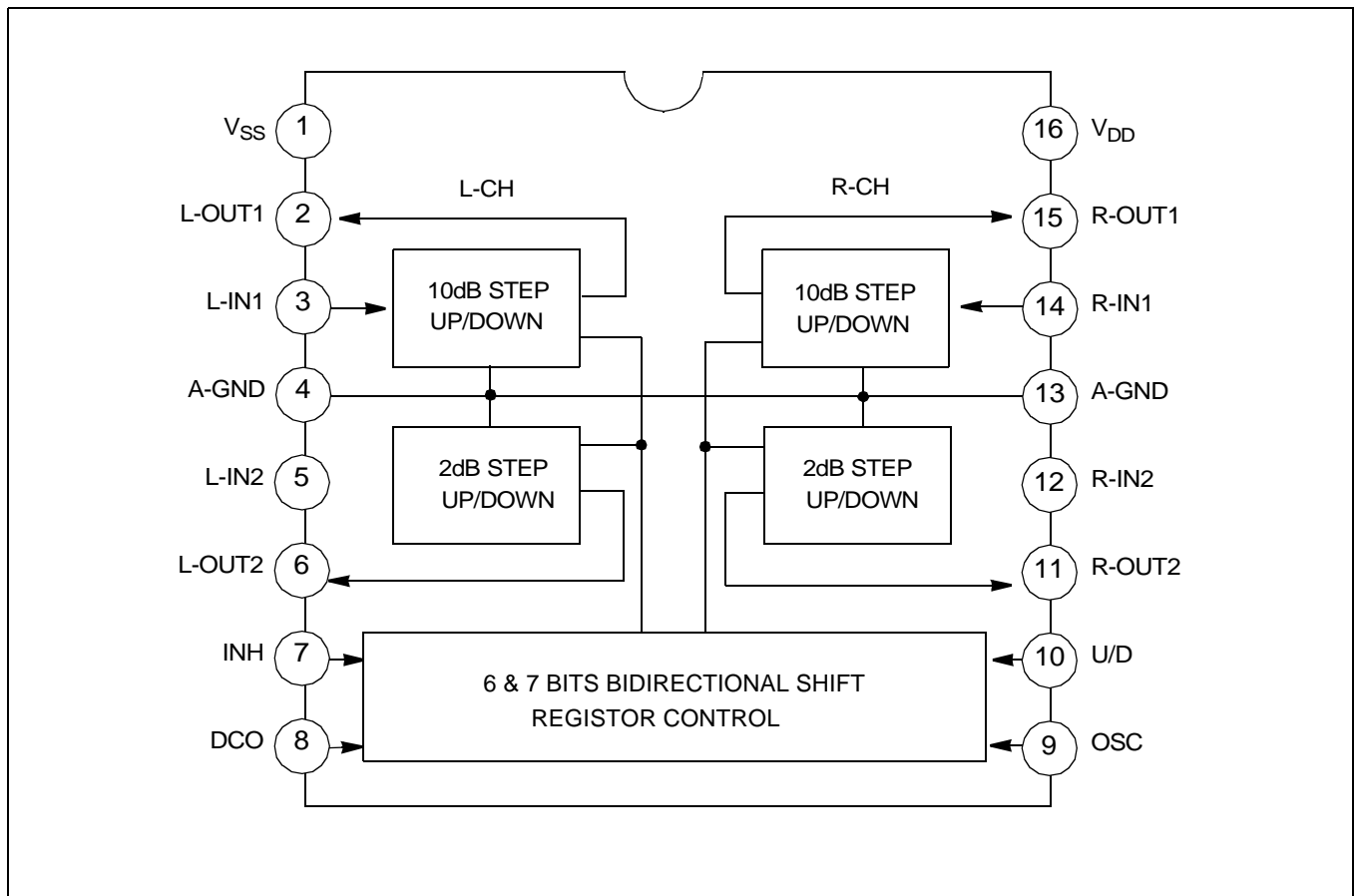
16-DIP-300A



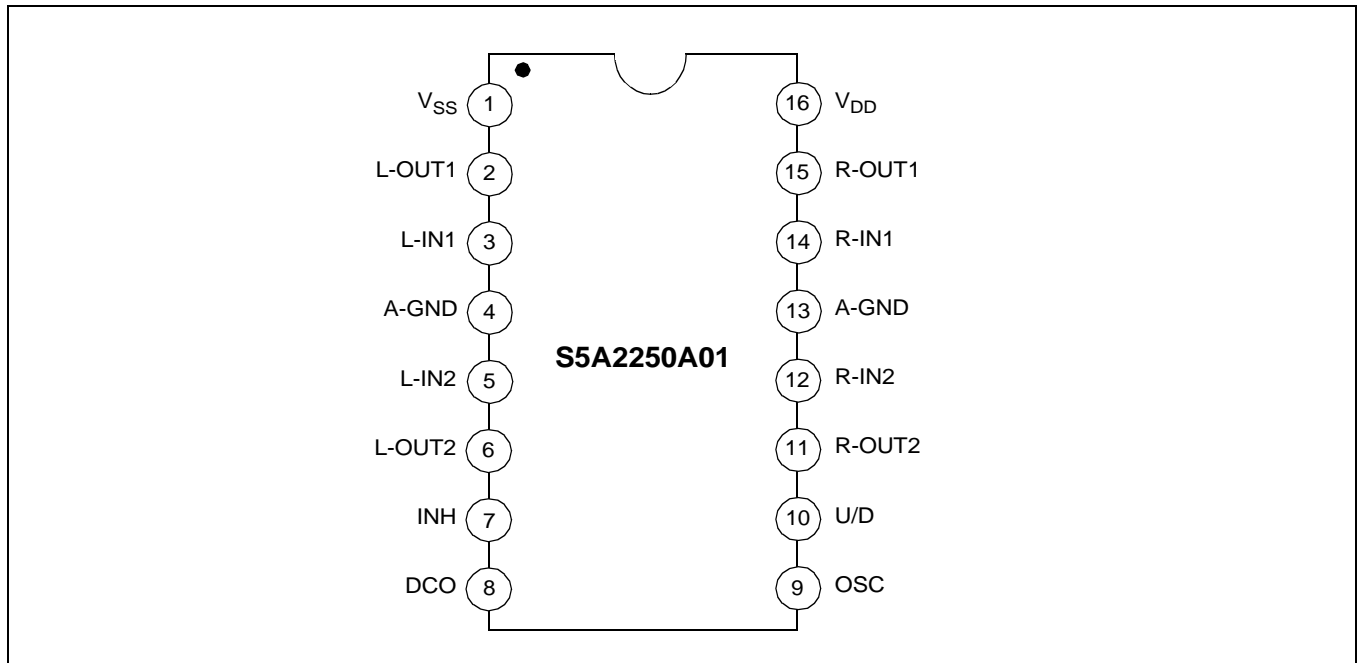
## ORDERING INFORMATION

Device	Package	Operating Temperature
S5A2250A01-D0B0	16-DIP-300A	-20°C - +70°C

BLOCK DIAGRAM



**PIN CONFIGURATION**



**PIN DESCRIPTION**

Pin No.	Symbol	Descriptions
1	V <sub>SS</sub>	(-) power supply (GND)
2, 15	L-OUT1 R-OUT1	10dB/step attenuator output. A signal applied to IN is attenuated in 7 steps from 0dB to 60dB at 10dB
3, 14	L-IN1 R-IN2	10dB/step attenuator inputs
4, 13	A-GND	Analog ground
5, 12	L-IN2 R-IN2	2dB/step attenuator inputs
6, 11	L-OUT2 R-OUT2	2dB/step attenuator output. A signal applied to IN is attenuated in 5 steps from 0dB to 60dB at 2dB
16	V <sub>DD</sub>	(+) power supply (V <sub>DD</sub> )
7	INH	When at "H" level, normal operation
8	DCO	DC current output for displaying attenuation
9	OSC	R, C connecting pin for the oscillator
10	U/D	Attenuation up/down control input

**ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)**

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{DD}$	13	V
Power Dissipation	$P_D$	150	mW
Operating Temperature	$T_{OPR}$	- 20 - + 75	°C
Storage Temperature	$T_{STG}$	- 55 - + 125	°C
Input Voltage	$V_I$	$V_{DD} + 0.3 - V_{SS} - 0.3$	V

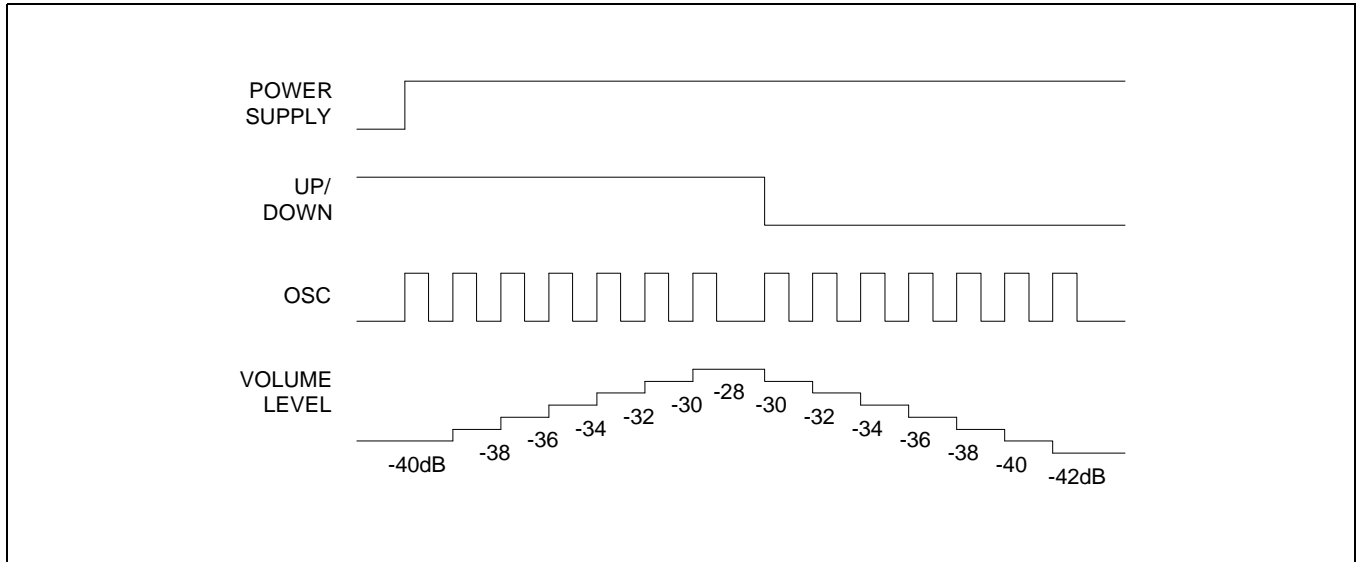
**ELECTRICAL CHARACTERISTICS**(V<sub>DD</sub> = 12V, f = 1kHz, Ta = 25°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Circuit Current	$I_{DD1}$	$V_{DD} = 13V$	0.1	1.0	2.5	mA
	$I_{DD2}$	$V_{DD} = 6V$	0.1	0.8	2.0	
Attenuator Resistor	RATT1	pin 3 - pin 4 pin 14 - pin 13	25	50	70	kΩ
	RATT2	pin 5 - pin 4 pin 12 - pin 13	10	20	30	
Backup Current	$I_{BACKUP}$	$V_{DD} = 4V$ , s/w1 = b	-	-	10	μA
Input High Voltage	$V_{IH}$	-up (down) s/w on	9.6	11.8	12.3	V
Input Low Voltage	$V_{IL}$	s/w1 = a				
Total Harmonic Distortion	THD	$V_I = 1.0 V_{pp}$ , ATT = 10dB, f = 15kHz	-	0.005	0.01	%
Attenuator Error	$V_{ATT(ERR)}$	$V_O = 5$ step	-2	0	2	dB
Max Input Amplitude	$V_{I(MAX)}$	THD = 1%, $V_{OL} = \max$	1.0	2.5	4.0	V <sub>rms</sub>
DCO Output current	$I_{O(DCO)}$	1 step	70	100	140	μA
Cross Talk	CT	ATT = - 10dB	55	65	-	dB
Operating Frequency	$f_{OSC1}$	UP/SW ON, S/W 3 = a	5	13	20	Hz
	$f_{OSC2}$	S/W 3 = d	9	11	13	kHz

**APPLICATION INFORMATION**

**Setting of Attenuation**

Attenuation is automatically set at the -40dB position when power is applied.

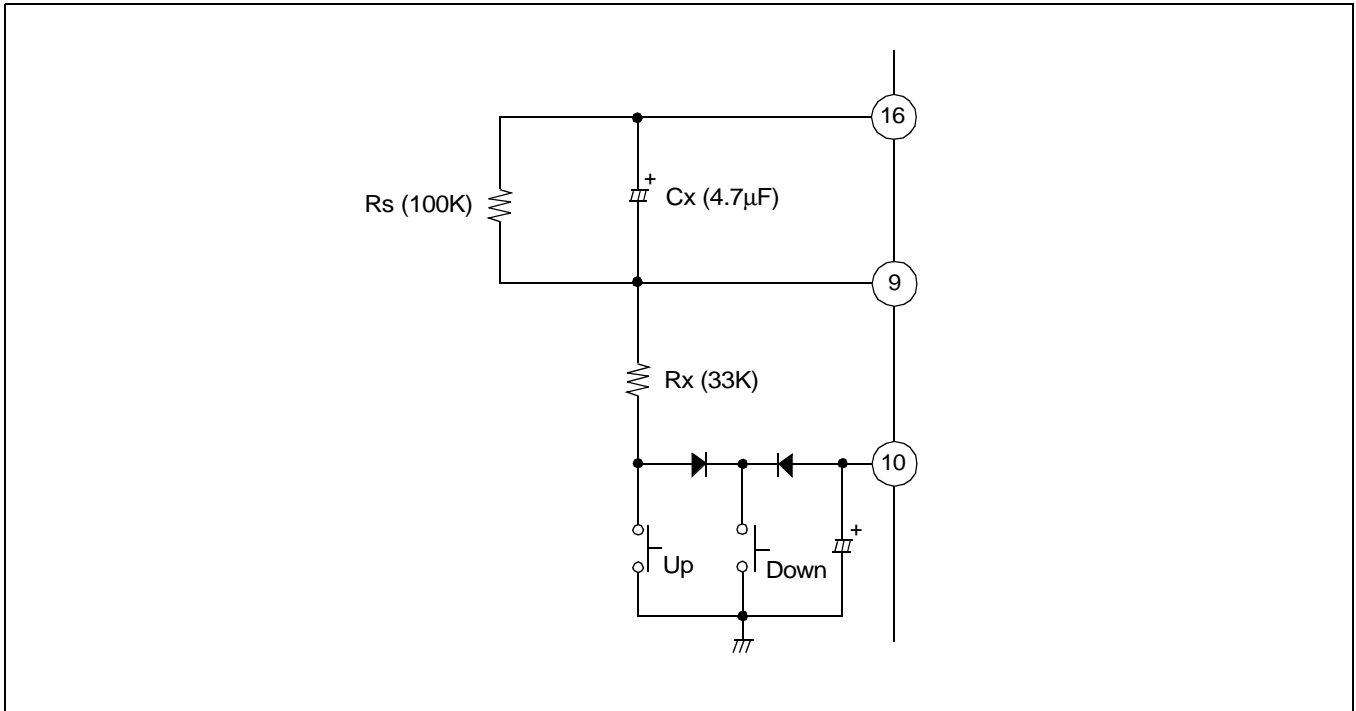


As soon as the UP key is pressed after power on, the U/P pin is placed in the up state at “H” level, and the oscillator is actuated.

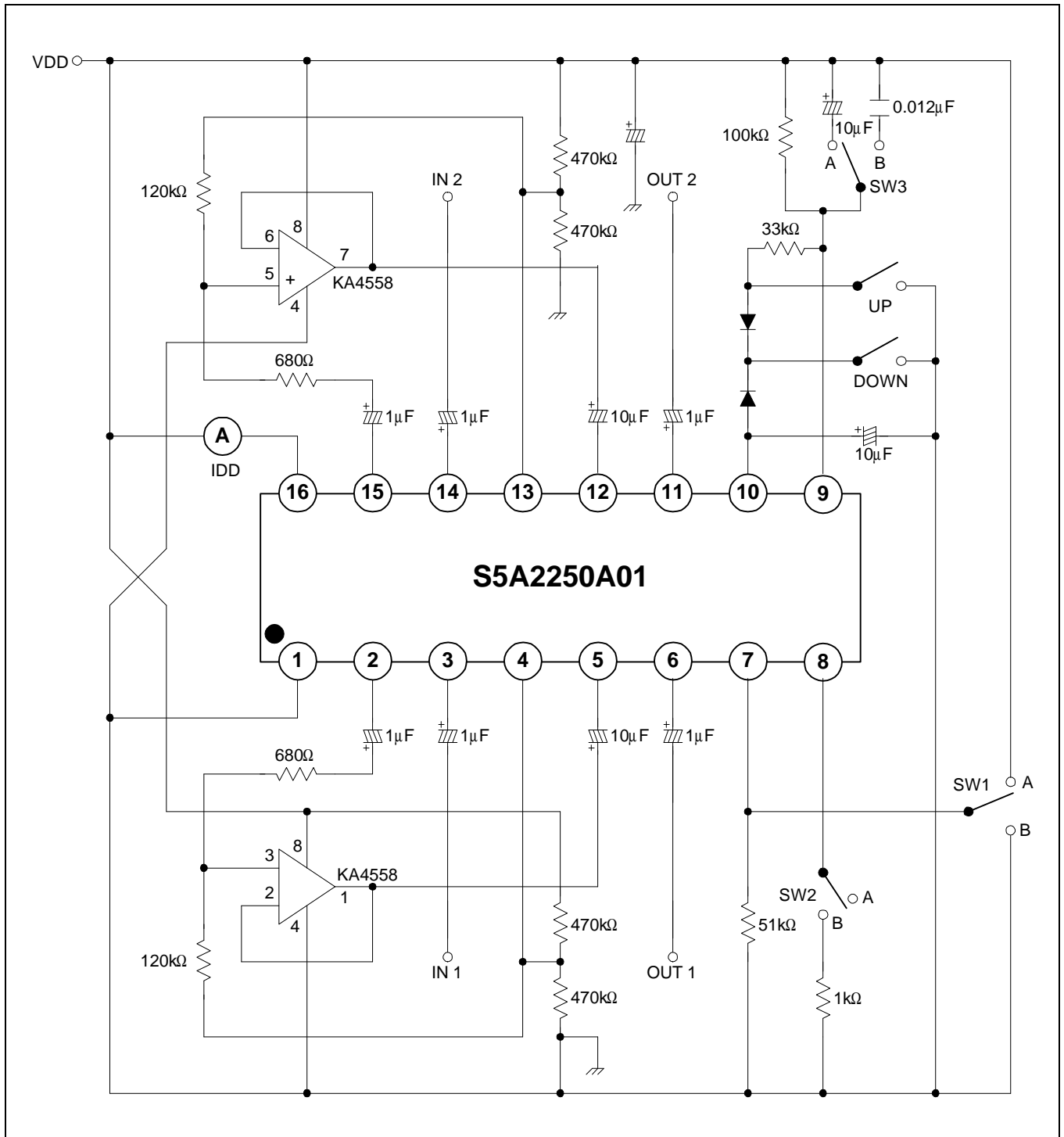
When the DOWN key is pressed, the U/P pin is kept at “L” level as long as the DOWN key is pressed, and the oscillator is actuated in the down State, decreasing the attenuation.

Oscillation frequency is decided by Cx & Rx.

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



TEST CIRCUIT



**Attenuation Display Output**

The S5A2250A01 is provided with the DC current output pin for displaying attenuation.

Steps of attenuation from 0 dB - - ∞ are shown in the table below.

The current of each step is increased or decreased approximately 100/uA.

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

\* Current value may fluctuate depending upon the IC.

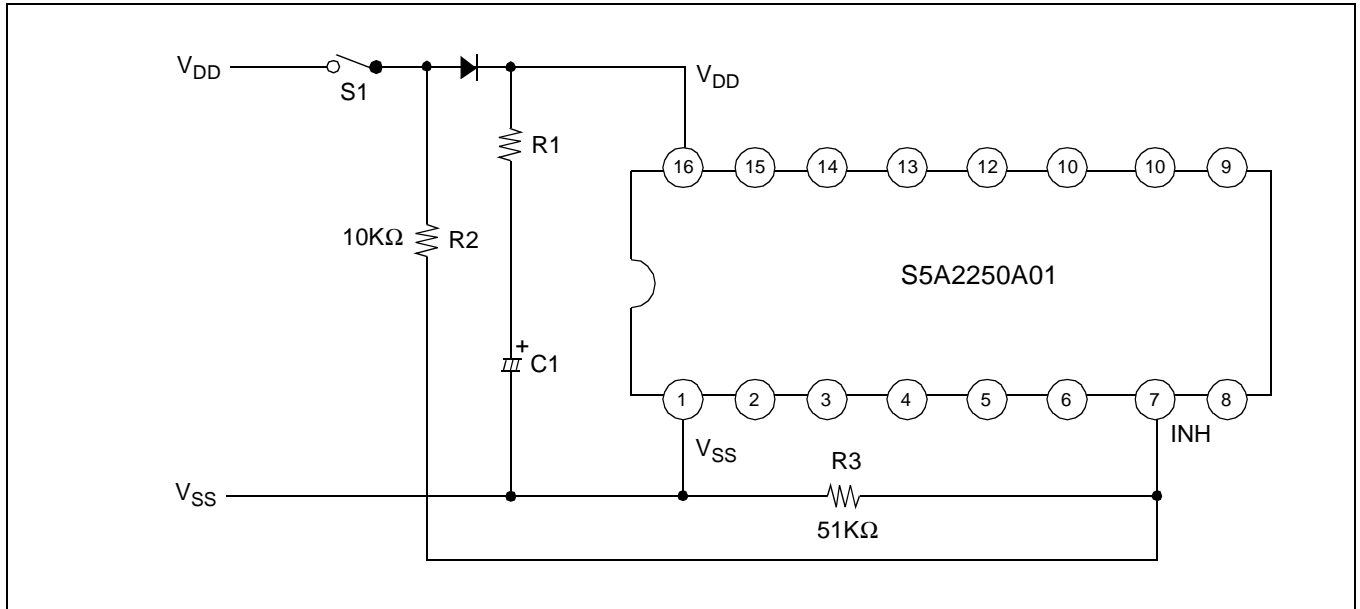
When high precision is required use a variable resistor as a load resistor.



**BACKUP**

On the S5A2250A01, when power is off (S1 spon) or the INH pin is set at L (- VSS) level, all I/O pin are shut off and current consumption is reduced to the minimum.

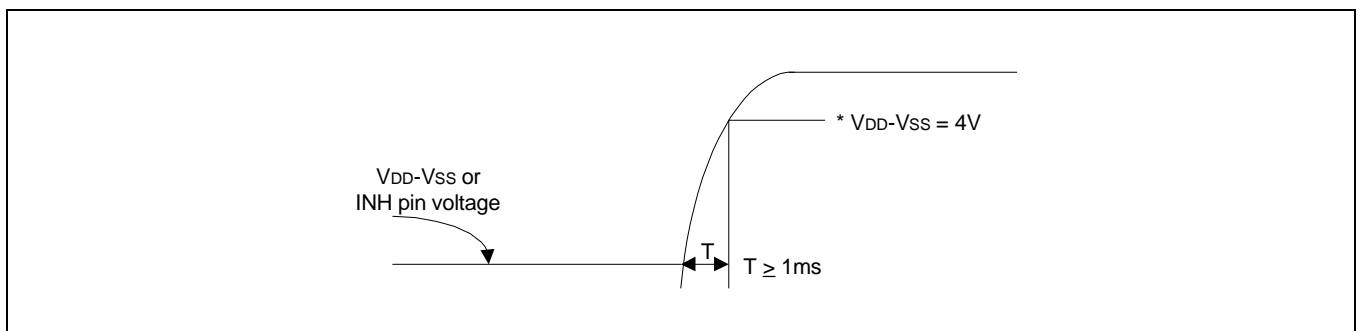
Backup by means of a capacitor (C1) becomes possible in this condition. Fig 6 shows an example of an application when a backup capacitor is used.



**NOTE:** If  $V_{DD}-V_{SS}$  become below 4.0V, the backup is impossible.

**Initialization When Power On**

The S5A2250A01 has a built-in auto-initializing function for initialization when power is on. As the initializing system is adopted through detection of supply voltage level, if rise of power supply is too fast, the initialization may not be fully effected (no external initialization is necessary) In addition for effective initialization, it is necessary that the INH pin is raised simultaneously with the supply voltage. Further, the initializing level is -40dB. It is recommended to raise the supply voltage and the INH pin as illustrated Fig.

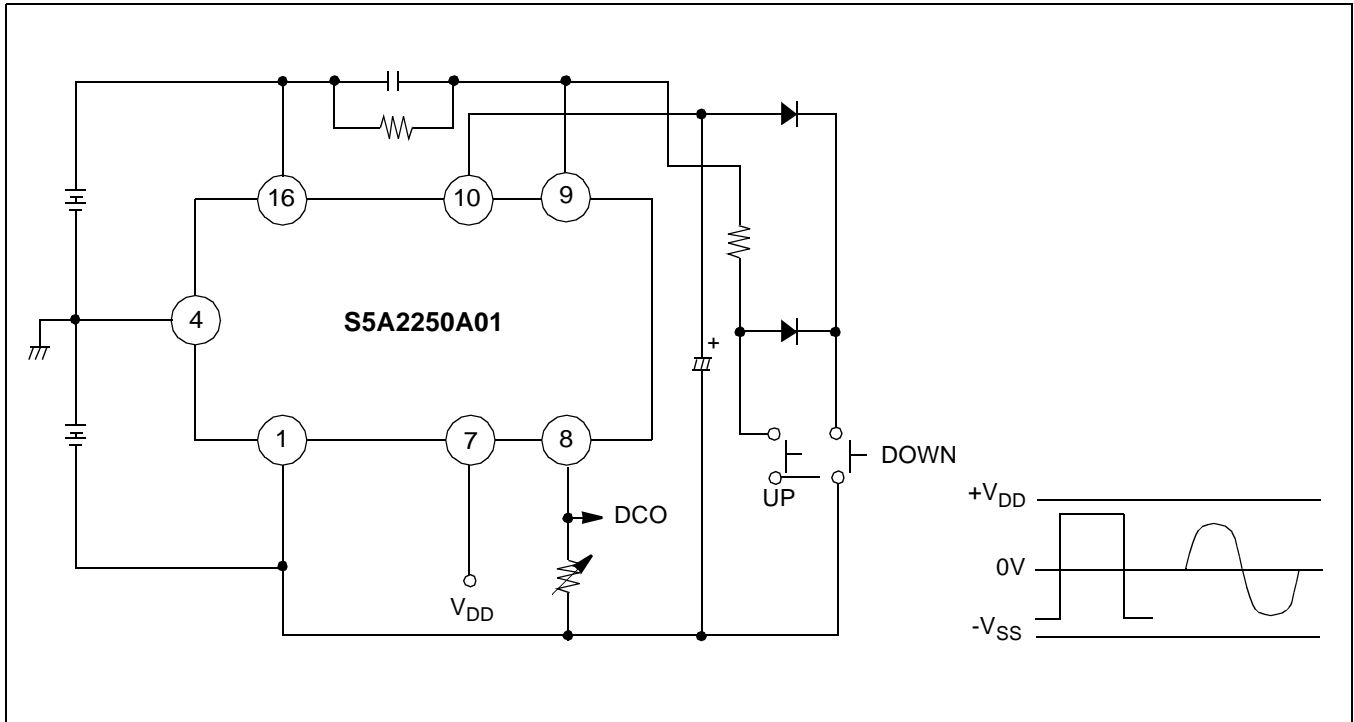


**NOTE:** If the voltage between  $V_{DD}$  and  $V_{SS}$  is below 4.0V, the auto-initializing function is actuated.

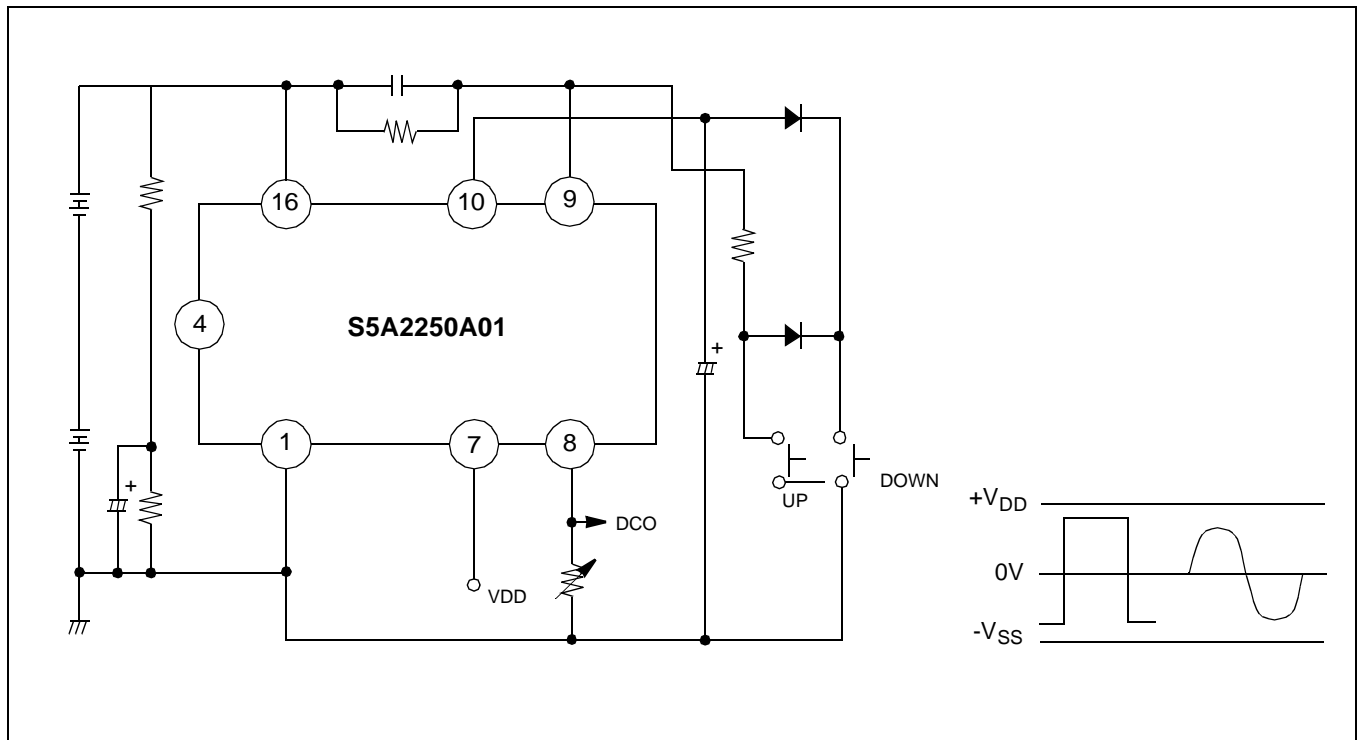
**POWER SUPPLY**

The S5A2250A01 is able to carry out single power supply operation as well as split power supply operation.

**Split Power Supply**



Single Power Supply



APPLICATION CIRCUIT

