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# Audio digital potentiometers

## BH3532FS

The BH3532FS is a digital potentiometer designed for use in audio devices. Its built-in 22kΩ resistance systems can be used to set the data from the microcomputer in 256 steps.

● Applications

Volume of recording and playing

● Features

- 1) Resistance can be set to any of 256 steps using digital codes (serial data).
- 2) Two built-in channels (Lch, Rch)
- 3) SSOP-A20 package

● Absolute maximum ratings (Ta = 25°C)

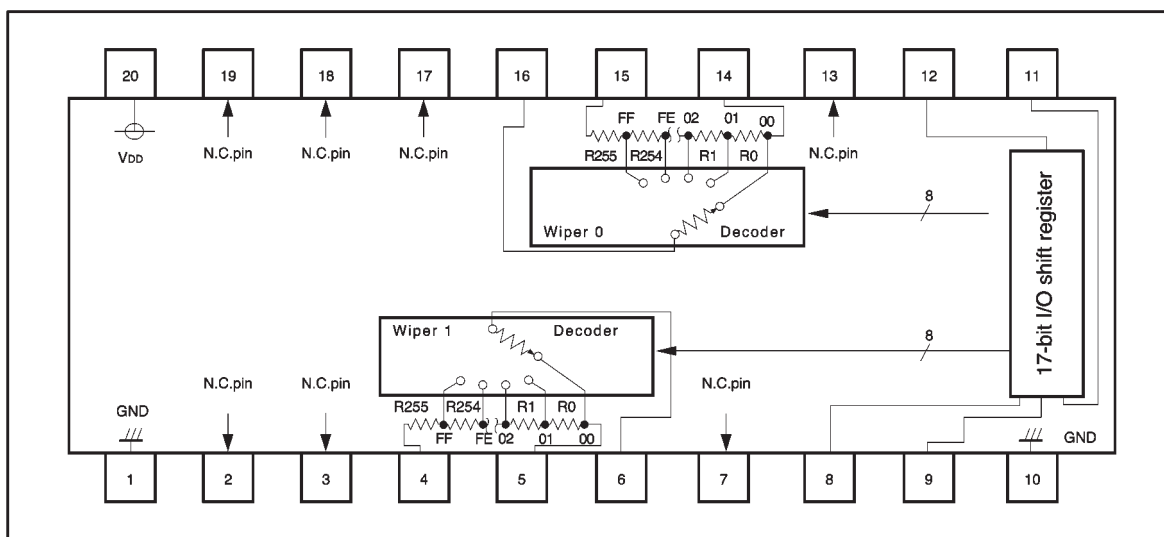
Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	7	V
Power dissipation	P <sub>d</sub>	600*	mW
Operating temperature	T <sub>opr</sub>	-25~+75	°C
Storage temperature	T <sub>stg</sub>	-55~+125	°C

\* Reduced by 6mW for each increase in Ta of 1°C over 25°C

● Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V <sub>DD</sub>	3	—	5.5	V

● Block diagram

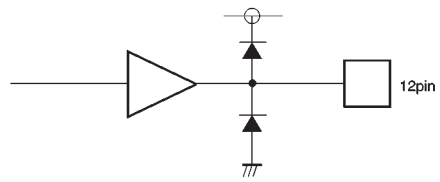
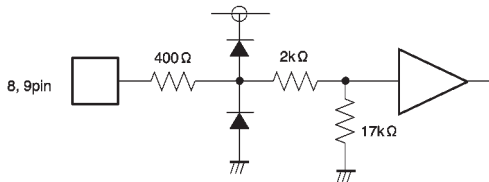
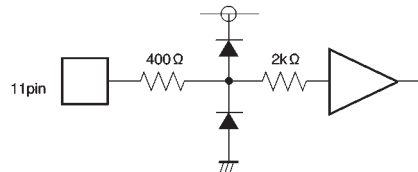
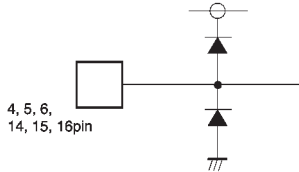


● Pin descriptions

Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	GND	GND	11	DIN	Serial data input
2	N.C.	N.C.	12	DOUT	Serial data output
3	N.C.	N.C.	13	N.C.	N.C.
4	H1	Ch 1 high position resistance	14	L0	Ch 0 low position resistance
5	L1	Ch 1 low position resistance	15	H0	Ch 0 high position resistance
6	W1	Pin for ch 1 wiper	16	W0	Pin for Ch 0 wiper
7	N.C.	N.C.	17	N.C.	N.C.
8	EN	Overwrite authorization input	18	N.C.	N.C.
9	CLK	Clock input	19	N.C.	N.C.
10	GND	GND	20	VDD	VDD

\* Do not connect anything to the N.C. pin.

● Input/output circuits



●Electrical characteristics (unless otherwise noted, Ta = 25°C, Vcc = 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
<DC characteristics>						
Quiescent current	I <sub>Q</sub>	50	100	150	μA	
Input leakage current	I <sub>LI</sub>	-1.0	-	1.0	μA	*1
Input high level voltage	I <sub>IH</sub>	3.0	-	-	V	
Input low level voltage	I <sub>IL</sub>	-	-	0.5	V	
Output high level voltage	I <sub>OH</sub>	3.0	-	-	V	I <sub>OH</sub> =-100 μA
Output low level voltage	I <sub>OL</sub>	-	-	0.5	V	I <sub>OL</sub> =100 μA
Total resistance	R <sub>T</sub>	17.6	22	26.4	kΩ	
Wiper resistance	R <sub>w</sub>	0.4	0.8	1.6	kΩ	I <sub>OP</sub> =500 μA
<AC characteristics> *2						
Clock frequency	F <sub>CLK</sub>	-	-	1	MHz	
Clock pulse width	T <sub>w</sub>	500	-	-	ns	
Data setup time	T <sub>SU</sub>	300	-	-	ns	
Data hold time	T <sub>H</sub>	100	-	-	ns	
Transmission lag time CLK→DOUT	T <sub>OLH</sub> T <sub>OHL</sub>	- -	- -	500 500	ns	
Transmission lag time EN→CLK	T <sub>CLH</sub> T <sub>CHL</sub>	500 500	- -	- -	ns	

◎Not designed for radiation resistance

\*1 CLK input and EN input are pulled down when internal resistance is 17 kΩ.

\*2 V<sub>DD</sub>=3.5V

\*3 Input capacity (reference value): 5 pF (Max.) Output capacity (reference value): 7 pF (Max.)

●Measurement circuit

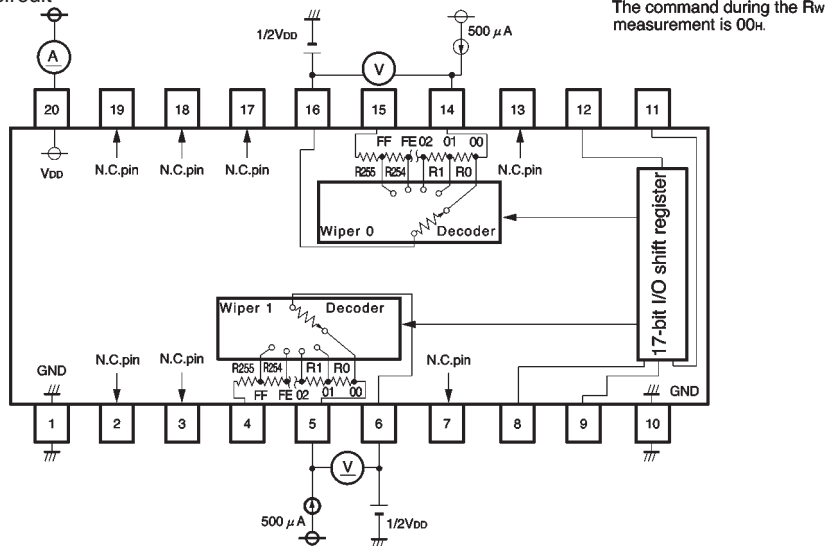


Fig. 1

●Circuit operation

The BH3532FS has two 22kΩ variable resistance systems which can be set in 256 steps (86Ω intervals). Resistance can be set in 256 steps using the MSB first 8-bit data.

Input data is 17-bit serial data. The first bit is always “L”. The next eight bits set the resistance for wiper 1. The last eight bits set the resistance for wiper 0.

Input data is effective when the EN terminal is set to “H”, and is put on hold when the EN terminal is set to “L”. Also, the reading of the data is performed when CLK rises.

When input data is effective, the previous output data is output serially to the DOUT terminal.

See the figures below for more details.

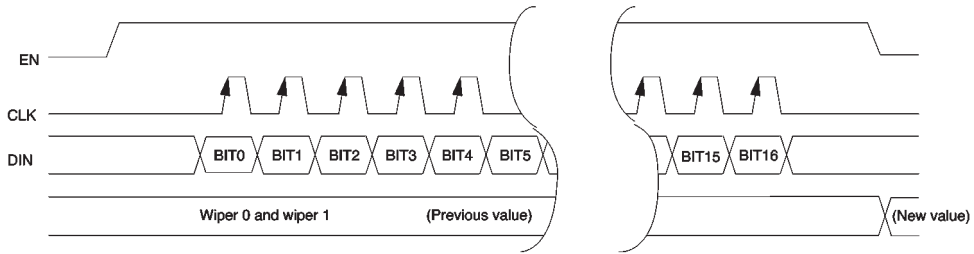


Fig. 2 Timing chart 1

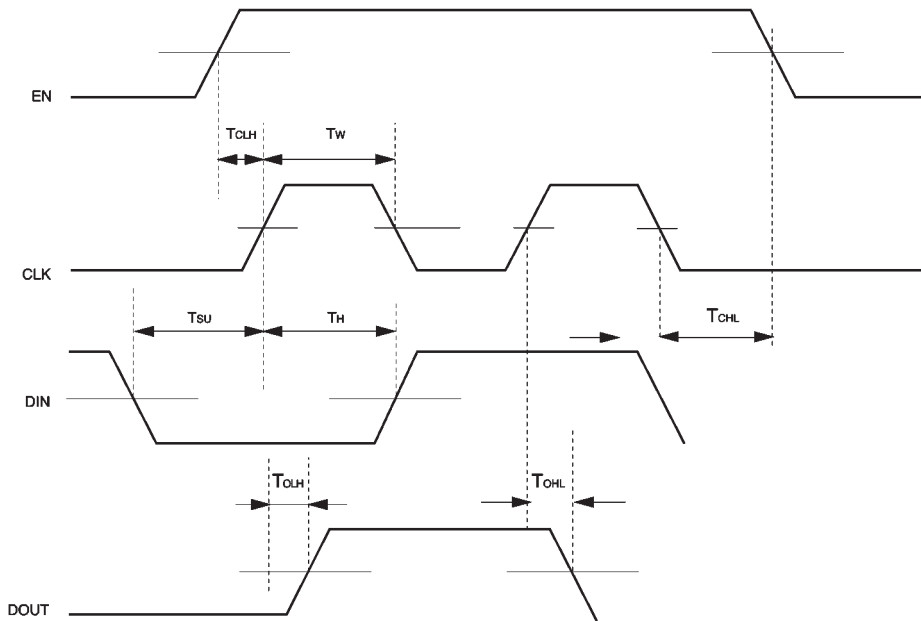


Fig. 3 Timing chart 2

●Electrical characteristic curves

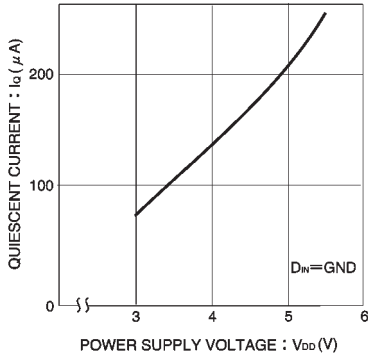


Fig. 4 Power supply voltage vs. quiescent curve

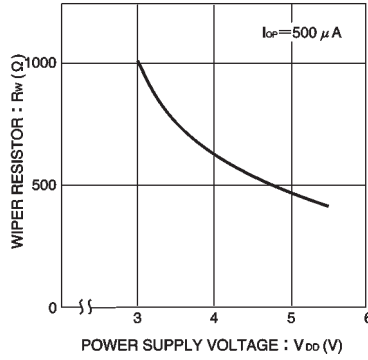
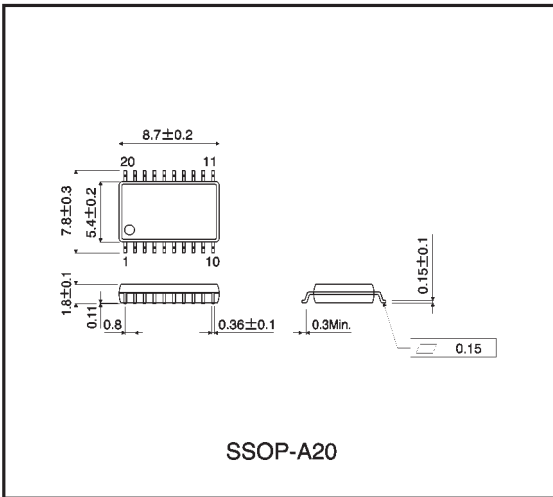


Fig. 5 Power supply voltage vs. wiper resistance

●External dimensions (Units: mm)



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