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)

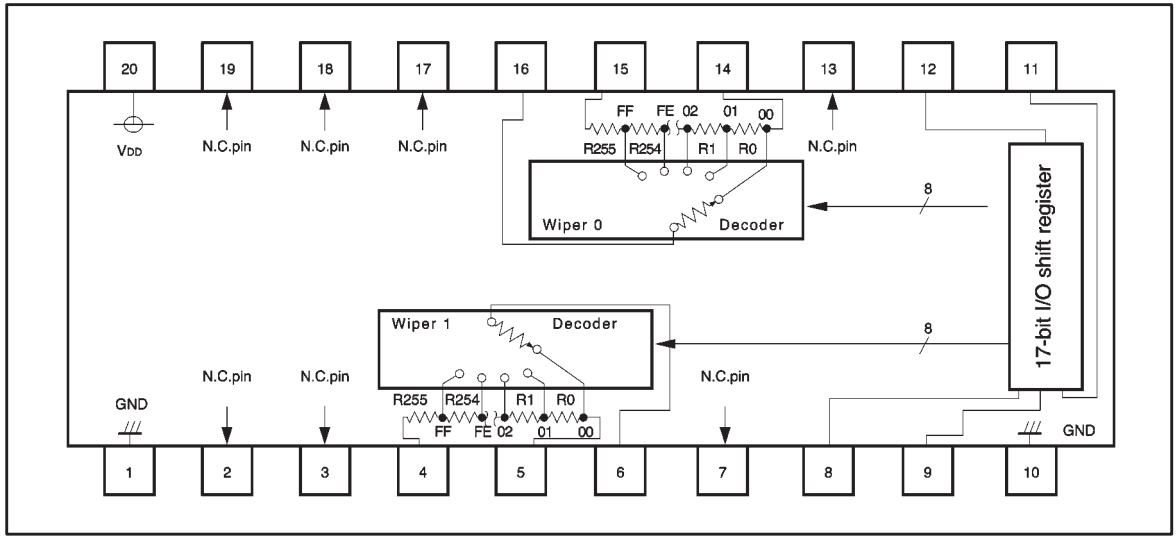
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	7	V
Power dissipation	Pd	600*	mW
Operating temperature	Topr	−25～+75	℃
Storage temperature	Tstg	−55～+125	℃

* Reduced by 6mW for each increase inTa of 1℃ over 25℃

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}	3	—	5.5	V

●Block diagram

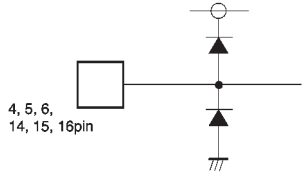


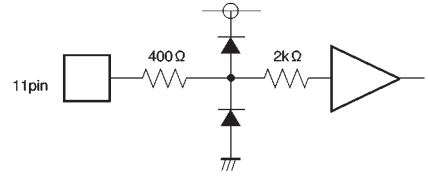
●Pin descriptions

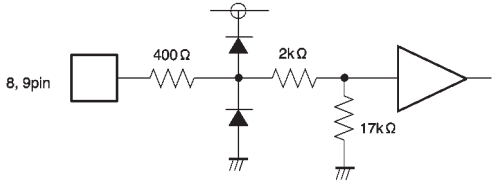
Pin No.	Pin name	Function	Pin No.	Pin name	Function
1	GND	GND	11	DIN	Serial data input
2	N.C.	N.C.	12	DOUT	Serial data output
3	N.C.	N.C.	13	N.C.	N.C.
4	H1	Ch 1 high position resistance	14	L0	Ch 0 low position resistance
5	L1	Ch 1 low position resistance	15	H0	Ch 0 high position resistance
6	W1	Pin for 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	V_{DD}	V_{DD}

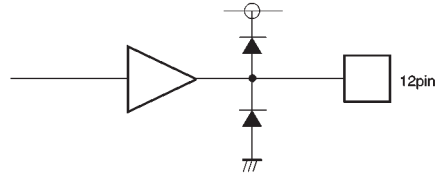
✻ Do not connect anything to the N.C. pin.

●Input/output circuits









●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
〈DC characteristics〉						
Quiescent current	I_Q	50	100	150	μA	
Input leakage current	I_{LI}	−1.0	—	1.0	μA	*1
Input high level voltage	I_{IH}	3.0	—	—	V	
Input low level voltage	I_{IL}	—	—	0.5	V	
Output high level voltage	I_{OH}	3.0	—	—	V	I_{OH}=−100 μA
Output low level voltage	I_{OL}	—	—	0.5	V	I_{OL}=100 μA
Total resistance	R_T	17.6	22	26.4	kΩ	
Wiper resistance	R_W	0.4	0.8	1.6	kΩ	I_{OP}=500 μA
〈AC characteristics〉 *2						
Clock frequency	F_{CLK}	—	—	1	MHz	
Clock pulse width	T_W	500	—	—	ns	
Data setup time	T_{SU}	300	—	—	ns	
Data hold time	T_H	100	—	—	ns	
Transmission lag time CLK→DOUT	T_{OLH} T_{OHL}	— —	— —	500 500	ns	
Transmission lag time EN→CLK	T_{CLH} T_{CHL}	500 500	— —	— —	ns	

◎Not designed for radiation resistence

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

*2 V_{DD}=3.5V

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

●Measurement circuit

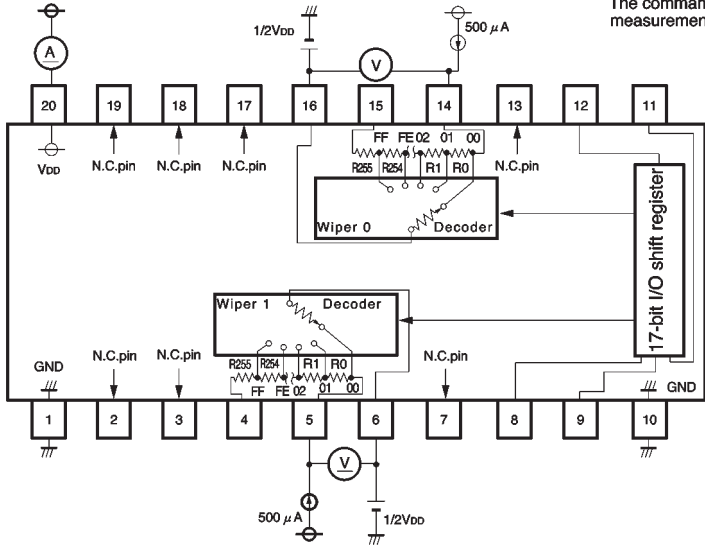


Fig. 1

●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.

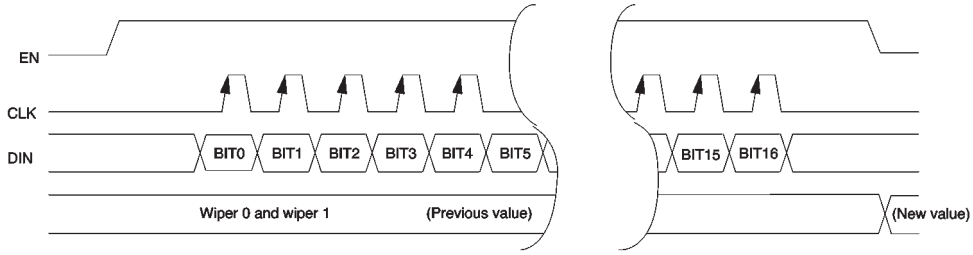


Fig. 2 Timing chart 1

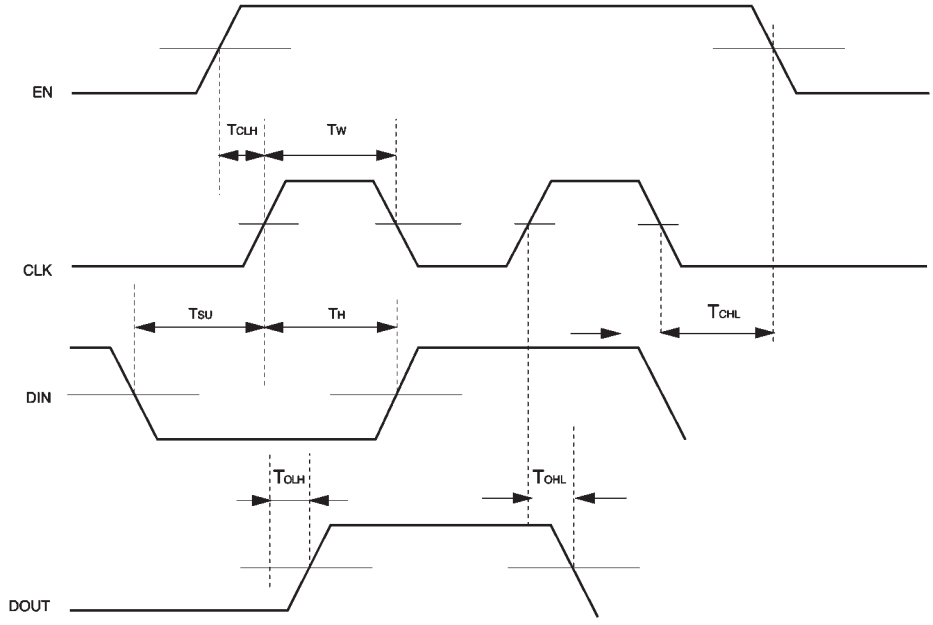


Fig. 3 Timing chart 2

●Electrical characteristic curves

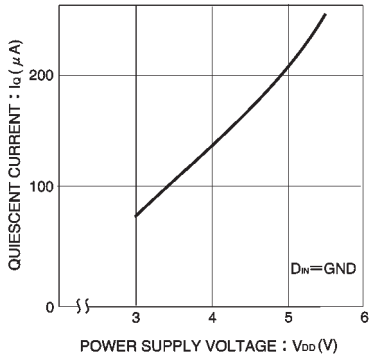


Fig. 4 Power supply voltage vs. quiescent curve

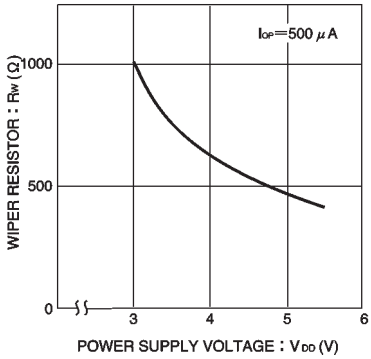
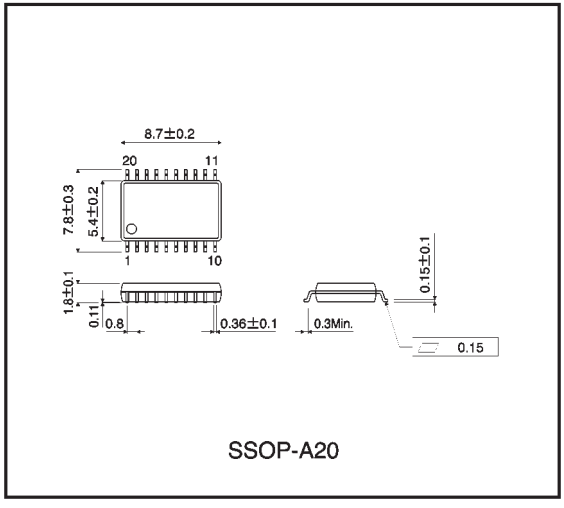


Fig. 5 Power supply voltage vs. wiper resistance

●External dimensions (Units: mm)



SSOP-A20