AN8737SB

3-channel driver IC for optical disk drive

■ Overview

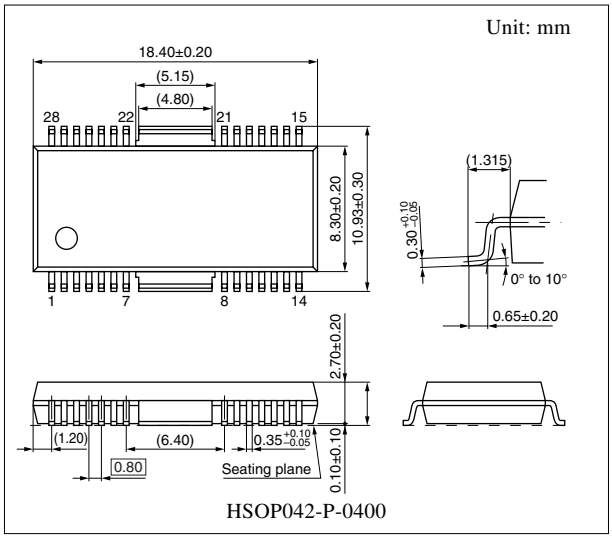
The AN8737SB is a BTL type 3-channel driver IC, adopting a current feedback system for 2 channels, which makes it optimum for an actuator and a motor driver of CD-ROM/DVD-ROM. It can also constitute an optimum system in combination with the AN8488SB, a spindle plus loading driver IC. A surface mount-type package of good heat radiation characteristic is used.

■ Features

- Little phase delay due to a current feedback system (2 channels for actuator)
- The remaining channel is available for either traverse or loading motor drive.
- Wide output dynamic range (4 V/I_O = 800 mA)
- Standby function built in (all channels can be muted.)
- Thermal shut-down circuit built in
- With thermal flag pin

■ Applications

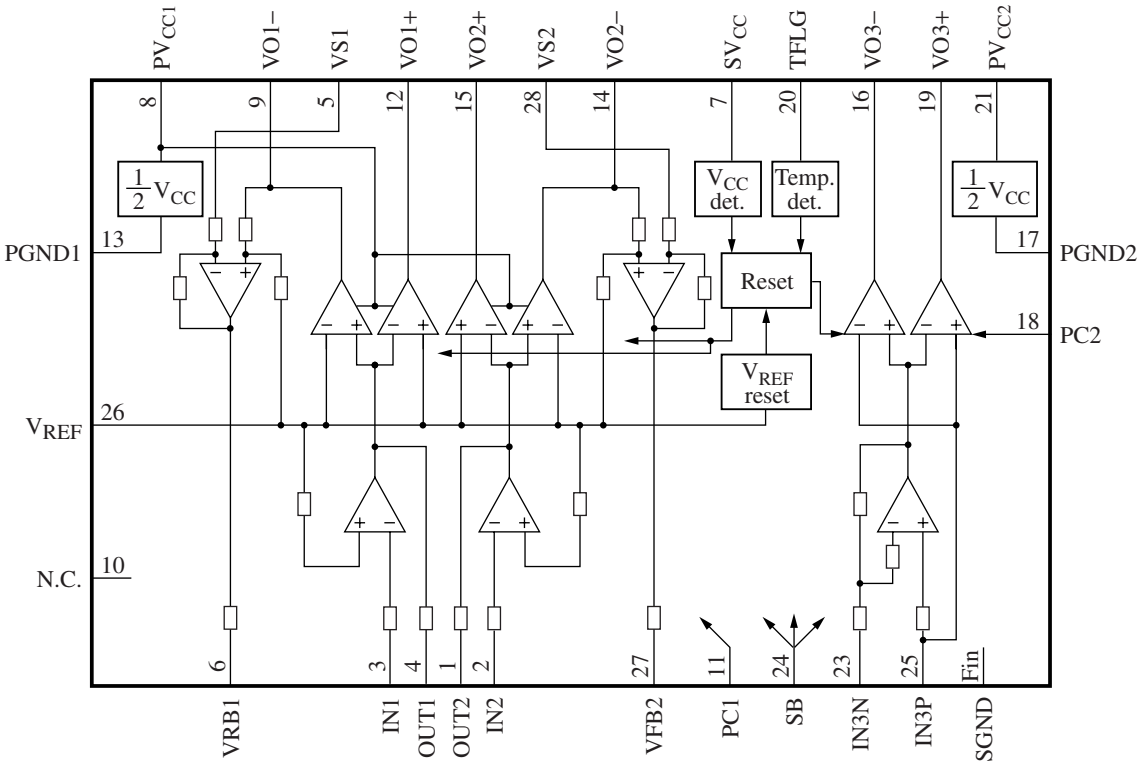
- CD/CD-ROM player
- DVD/DVD-ROM drive



HSOP042-P-0400

Note) The package of this product will be changed to lead-free type (HSOP042-P-0400D). See the new package dimensions section later of this datasheet.

■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Ch. 2 first stage feedback pin	16	Ch. 3 reverse direction output pin
2	Ch. 2 first stage input pin	17	Ch. 3 power side grounding pin
3	Ch. 1 first stage input pin	18	Ch. 3 mute pin
4	Ch. 1 first stage feedback pin	19	Ch. 3 forward direction output pin
5	Ch. 1 current feedback input pin	20	TDS flag pin
6	Ch. 1 current feedback output pin	21	Ch. 3 power side power supply pin
7	Control side power supply pin	22	N.C.
8	Ch. 1 & ch. 2 power side power supply pin	23	Ch. 3 reverse rotation input pin
9	Ch. 1 reverse direction output pin	24	Standby input pin
10	N.C.	25	Ch. 3 forward rotation input pin
11	Ch. 1 & Ch. 2 mute pin	26	Reference voltage input pin
12	Ch. 2 forward direction output pin	27	Ch. 2 current feedback output pin
13	Ch. 1 & ch. 2 power side grounding pin	28	Ch. 2 current feedback input pin
14	Ch. 2 reverse direction output pin	Fin	Control side grounding pin
15	Ch. 2 forward direction output pin		

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	14.0	V
Supply voltage range	SV_{CC} , PV_{CC1} , PV_{CC2}	− 0.3 to +14.0	V
Supply current *2	I_{SVCC}	500	mA
	I_{PVCC1}	2.0	A
	I_{PVCC2}	800	mA
Power dissipation *3	P_D	542	mW
Operating ambient temperature *1	T_{opr}	−30 to +85	°C
Storage temperature *1	T_{stg}	−55 to +150	°C

Note) *1: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

*2: I_{PVCC1} be 1 A or less for channel 1 and channel 2, respectively.

*3: Use within the range of P_D = 542 mW or less at T_a = 85°C, following the allowable power dissipation characteristic curve of "■ Application Notes".

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	SV_{CC}	4.5 to 13.5	V
	PV_{CC1} , PV_{CC2}	3.5 to 13.5	

■ Electrical Characteristics at SV_{CC} = 12 V, PV_{CC1} = 5 V, PV_{CC2} = 5 V, R_L = 8 Ω, V_{REF} = 1.65 V, $V_{SB} = V_{PC1} = V_{PC2}$ = 3.3 V, $V_{IN1} = V_{IN2} = V_{IN3}$ = 1.65 V, T_a = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Current consumption 1 (no signal)	I_{SVO}	$V_{IN1} = V_{IN2} = V_{REF}$, V_{IN3P} = 2.5 V $V_{SB} = V_{PC1} = V_{PC2}$ = 3.3 V	—	25	45	mA
Current consumption 2 (no signal)	I_{PVO}	$V_{IN1} = V_{IN2} = V_{REF}$, V_{IN3P} = 2.5 V $V_{SB} = V_{PC1} = V_{PC2}$ = 3.3 V	—	25	45	mA
Current consumption 1 (standby)	I_{SVSB}	$V_{IN1} = V_{IN2} = V_{REF}$, V_{IN3P} = 2.5 V $V_{SB} = V_{PC1} = V_{PC2}$ = 0 V	—	0.6	1.5	mA
Current consumption 2 (standby)	I_{PVSB}	$V_{IN1} = V_{IN2} = V_{REF}$, V_{IN3P} = 2.5 V $V_{SB} = V_{PC1} = V_{PC2}$ = 0 V	—	0.2	1.0	mA
Driver 1, Driver 2	R_{L1} , R_{L2} = 4 Ω, R_{S1} , R_{S2} = 0.5 Ω, R_{IN1} , R_{IN2} = 10 kΩ, R_{F1} , R_{F2} = 4.3 kΩ					
Output offset voltage	V_{OF1}	$V_{IN} = V_{REF}$	−100	0	100	mV
Gain (+)	G1+	$V_{IN} = V_{REF}$ ±50 mV	9	11	13	dB
Relative gain (+/−)	G1		−1.5	—	+1.5	dB
Maximum output amplitude (+)	V_{L1+}	V_{IN} = 3.3 V, R_{L1} , R_{L2} = 4 Ω R_{S1} , R_{S2} = 0.5 Ω	3.65	4.0	—	V
Maximum output amplitude (−)	V_{L1-}	V_{IN} = 0 V, R_{L1} , R_{L2} = 4 Ω R_{S1} , R_{S2} = 0.5 Ω	—	−4.0	−3.65	V

■ Electrical Characteristics at SV_{CC} = 12 V, PV_{CC1} = 5 V, PV_{CC2} = 5 V, R_L = 8 Ω, V_{REF} = 1.65 V, V_{SB} = V_{PC1} = V_{PC2} = 3.3 V, V_{IN1} = V_{IN2} = V_{IN3} = 1.65 V, T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Driver 3 R_L = 8 Ω						
Output offset voltage	V_{OF3}	V_{IN3P} = V_{IN3N} = 2.5 V	−150	0	150	mV
Gain (+)	G3+	V_{IN3P} = 2.5 V, V_{IN3P} = 2.5 V±50 mV No external resistor	19	20.5	22	dB
Relative gain (+/−)	G3		−1.5	—	+1.5	dB
Output voltage (+)	V_{3+}	V_{IN3N} = 5 V, R_{A1} = 27 kΩ, R_{A2} = 6.8 kΩ	3.05	3.4	3.75	V
Output voltage (−)	V_{3-}	V_{IN3N} = 0 V, R_{A1} = 27 kΩ, R_{A2} = 6.8 kΩ	−3.75	−3.4	−3.05	V
Input pin bias current	I_{IN3}	V_{IN3N} = 0 V	—	—	1	µA
Standby operation High: Active, low or Hi-Z: Standby						
High-level SB threshold voltage	V_{SBH}	SV_{CC} = 12 V	2.6	—	—	V
Low-level SB threshold voltage	V_{SBL}	SV_{CC} = 12 V	—	—	0.7	V
SB input current	I_{SB}	V_{SB} = 5 V	—	50	120	µA
Power cut operation High: Active, low or Hiz: Power cut						
High-level PC1 threshold voltage	V_{PC1H}	SV_{CC} = 12 V	2.6	—	—	V
Low-level PC1 threshold voltage	V_{PC1L}	SV_{CC} = 12 V	—	—	0.7	V
High-level PC2 threshold voltage	V_{PC2H}	SV_{CC} = 12 V	2.6	—	—	V
Low-level PC2 threshold voltage	V_{PC2L}	SV_{CC} = 12 V	—	—	0.7	V
PC1 input current	I_{PC1}	V_{PC1} = 5 V	—	70	120	µA
PC2 input current	I_{PC2}	V_{PC2} = 5 V	—	70	120	µA
Reset current						
Reset operation release supply voltage	V_{RST}		—	—	4.5	V
V_{REF} detection voltage	V_R		1.20	—	—	V

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal protection circuit						
Operating temperature equilibrium value	T_{THD}		—	160	—	°C
Operating temperature hysteresis width	ΔT_{THD}		—	40	—	°C
Temperature flag balancing value	T_{FLG}		—	150	—	°C
Temperature flag hysteresis width	ΔT_{FLG}		—	20	—	°C

■ Electrical Characteristics at SV_{CC} = 12 V, PV_{CC1} = 5 V, PV_{CC2} = 5 V, R_L = 8 Ω, V_{REF} = 1.65 V, V_{SB} = V_{PC1} = V_{PC2} = 3.3 V, V_{IN1} = V_{IN2} = V_{IN3} = 1.65 V, T_a = 25°C (continued)

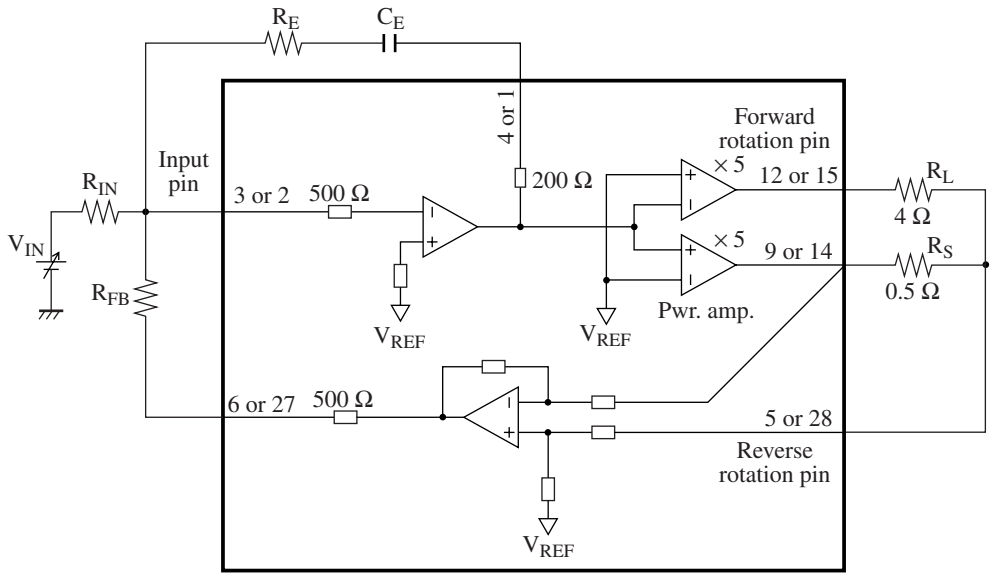
• Design reference data (continued)

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal protection circuit (continued)						
Operating temperature difference bet. thermal protection/temperature flag	ΔT_{TF}		—	10	—	°C
Temperature flag output high value	V_{FLH}	SV_{CC} = 12 V	—	5	—	V
Supply voltage detection hysteresis width	ΔV_{HD}		—	0.2	—	V

■ Usage Notes

1. Use SV_{CC} at the maximum potential.
   Otherwise it will cause operation error.
2. Do not use PV_{CC1} and PV_{CC2} at 2 V or less, or at the high impedance.
3. Driver 1, driver 2 gain setting
   (Use a resistor of sufficient power dissipation for R_S .)



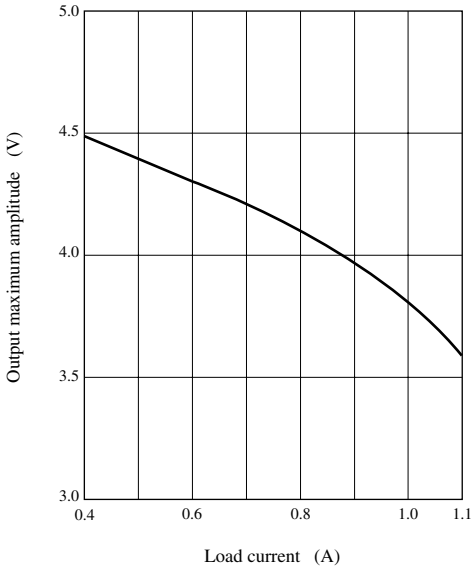
4. On the mode of mute:

	SB = PC1 = high		SB = PC1 = low or Hi-Z
	PC2 = high	PC2 = low or Hi-Z	—
Ch. 1, Ch. 2	Active	Active	All mute, power save
Ch. 3	Active	Mute	

Never fail to input the same signal into SB pin (pin 24) and PC1 pin (pin 11).

■ Usage Notes (continued)

5. On the output maximum amplitude (Reference data: typical value)



Use load current at 1 A or less.

6 Appropriate care should be taken on the characteristics.
When changing an external circuit constant on actual use, secure an appropriate margin in consideration of characteristic fluctuation of external parts and our ICs including transient characteristics as well as static ones.

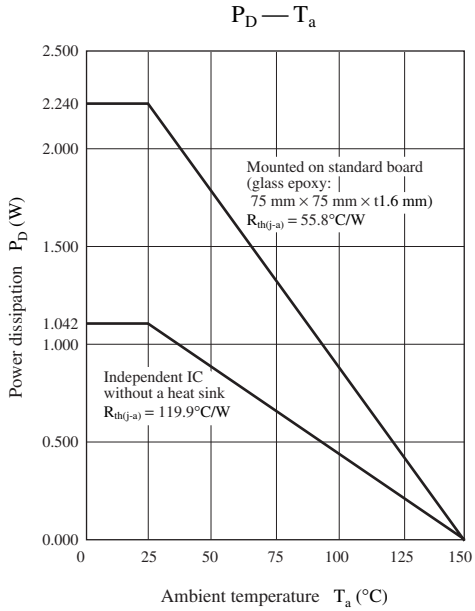
7 Avoid the short-circuits between output pin or current detection pin and V_{CC} (line-to-supply fault), output pin or current detection pin and GND (line-to-ground fault), and output pins or output pin and current detection pin (load short-ciruit).

8 An appropriate prior study should be done for use of dip soldering.

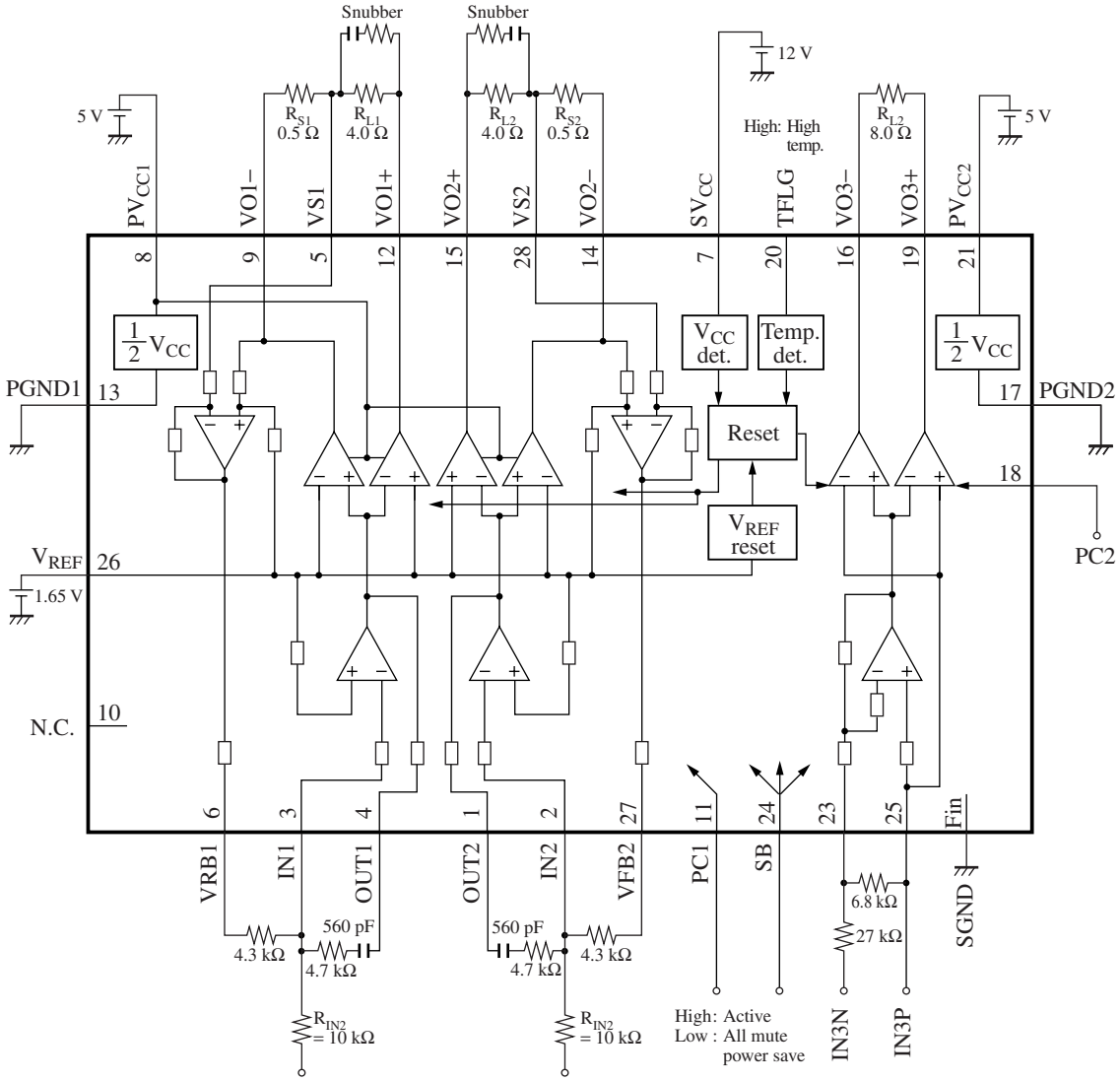
9 Care should be taken on use of the following pin because of its low static breakdown voltage (C = 200 pF, R = 0 Ω).
Pin 18: Breakdown at 200 V

■ Application Notes

• P_D — T_a curves of HSOP042-P-0400

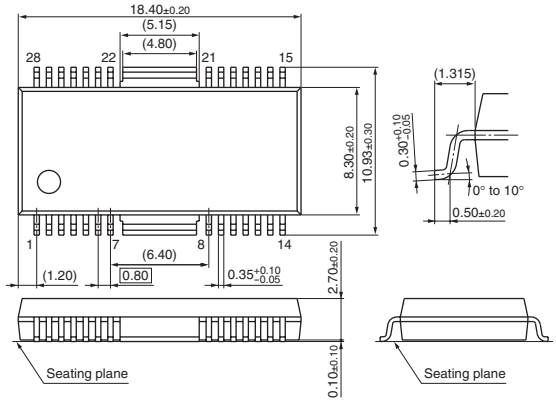


■ Application Circuit Example



■ New Package Dimensions (Unit: mm)

• HSOP042-P-0400D (Lead-free package)



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