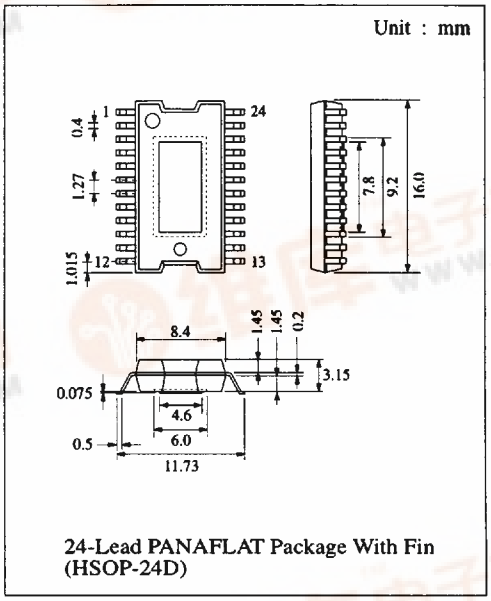
AN8389S

4 Channel Linear Driver IC

■ Description

The AN8389S is a monolithic integrated circuit which employ 4 channel H-bridge system that they are suitable for driving motor or actuator of CD player. Also they employ the surface mounting type package superior in radiation characteristics.

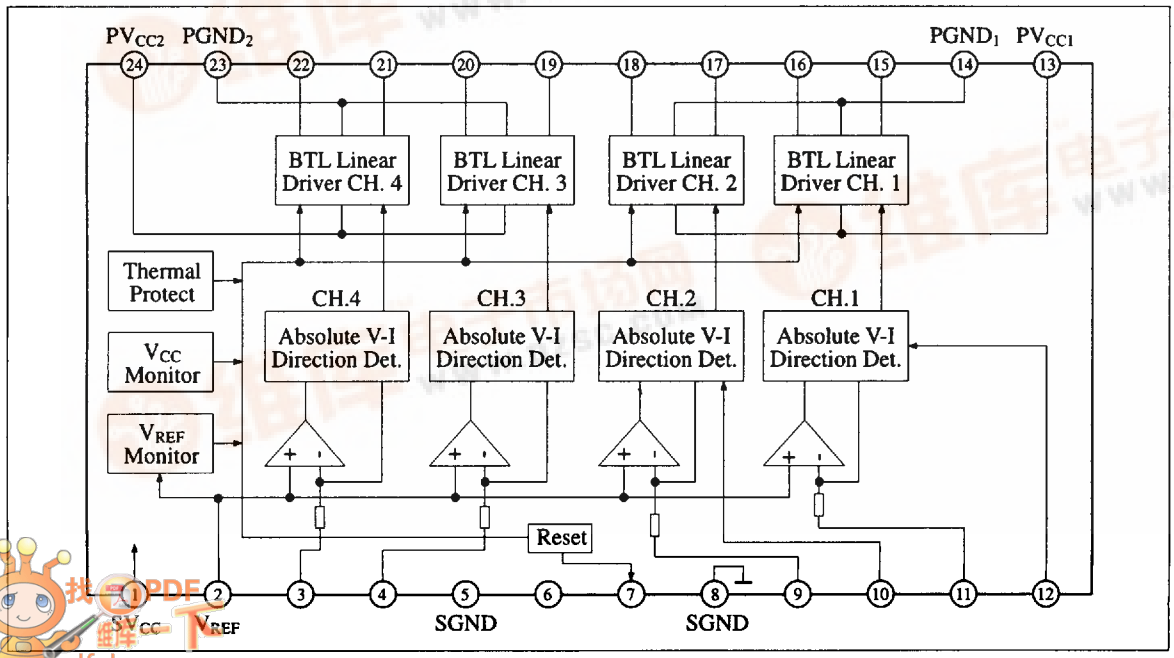


24-Lead PANAFLAT Package With Fin (HSOP-24D)

■ Features

- Wide output D-range, regardless of the system reference voltage
- Built-in 4-channel BTL driver best suited for driving motors or actuators of 5 to 20Ω load
- Built-in thermal shutdown circuit (with Hysteresis)
- Separation between the signal and output line power supplies, allowing control of IC heating
- Reset output pin
- Shorting brake mode

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	20	V
Output Current	I_{out}	500	mA
Power Disssipation	P_D	1420	mW
Operating Ambient Temperature	Topr	-20 ~ +75	°C
Storage Temperature	Tstg	-55 ~ +150	°C

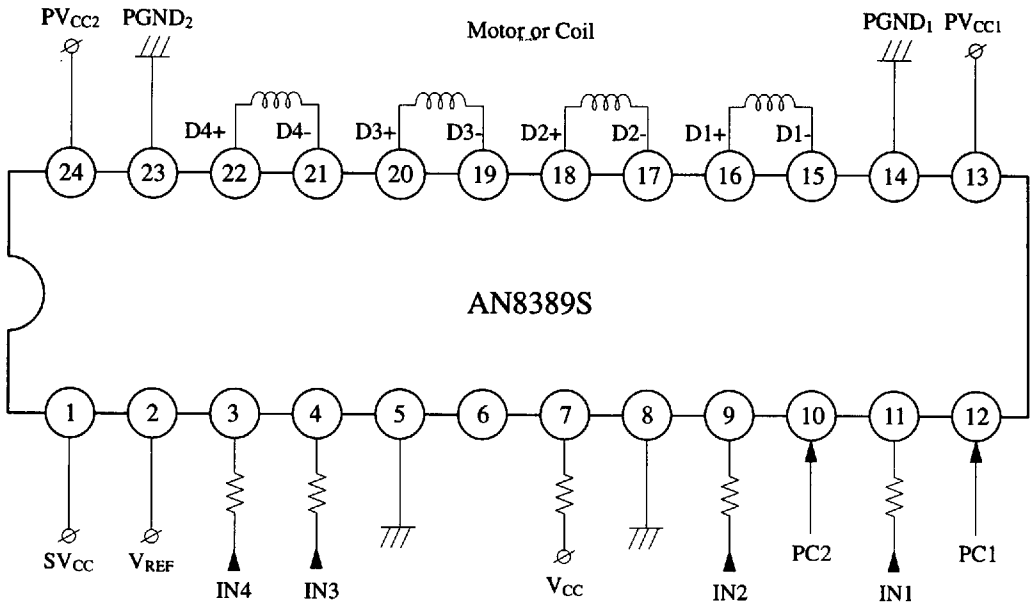
Operating Supply Voltage Range: PV_{CC}, SV_{CC} = 4.7V ~ 16.0V

■ Electrical Characteristics (Ta=25°C)

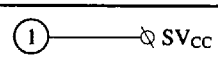
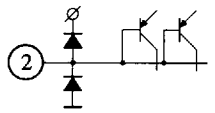
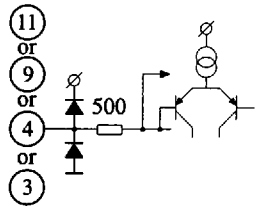
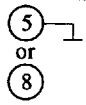
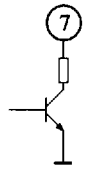
Item	Symbol	Condition	min.	typ.	max.	Unit
Total Circuit Current	I_{tot}	$PV_{CC1} = PV_{CC2} = SV_{CC1}$ = 8V	10	20	30	mA
Drivers 1 to 4						
Input Offset Voltage	V_{IOF}	$PV_{CC1} = PV_{CC2} = SV_{CC1}$ = 8V, R_L = 18Ω, R_{in} = 10kΩ	-7		7	mV
Output Offset Voltage	V_{OOF}		-50		50	mV
Gain (+)	G_+		15.5	18.5	21.5	dB
(+) Relative Gain	ΔG		-1.0	0	1.0	dB
Limit Voltage (+)	VL_+		4.95	5.3		V
Limit Voltage (-)	VL_-			-5.3	-4.95	V
Dead Zone Width	V_{DZ}		-10		20	mV
Drivers 1 and 2, PC Operation						
Threshold H	V_{PCH}		14			V
Thresholh L	V_{PCL}				0.5	V
Reset Circuit						
Reset Operation Release Supply Voltage	V_{RST}		4.2	4.6	4.85	V
Threshold Hysteresis Width	V_{HYS}		0.09	0.17	0.31	V
V_{REF} Detection	V_R		1.85			V
Heat Protection Circuit						
Operation Temperation Equilibrium Value*1	T_{THD}			(150)		°C
Operation Temperation Hysteresis Width*1	ΔT_{THD}			(20)		°C

*1 : Characteristics value in parentheses is a reference value for design but not a guaranteed value.

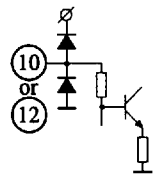
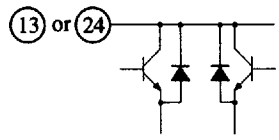
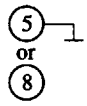
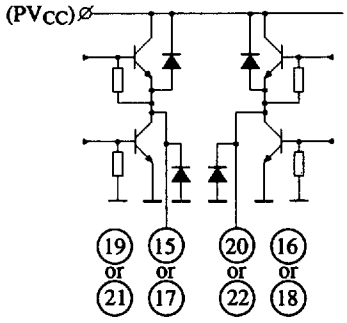
■ Application Circuit



■ Pin Descriptions

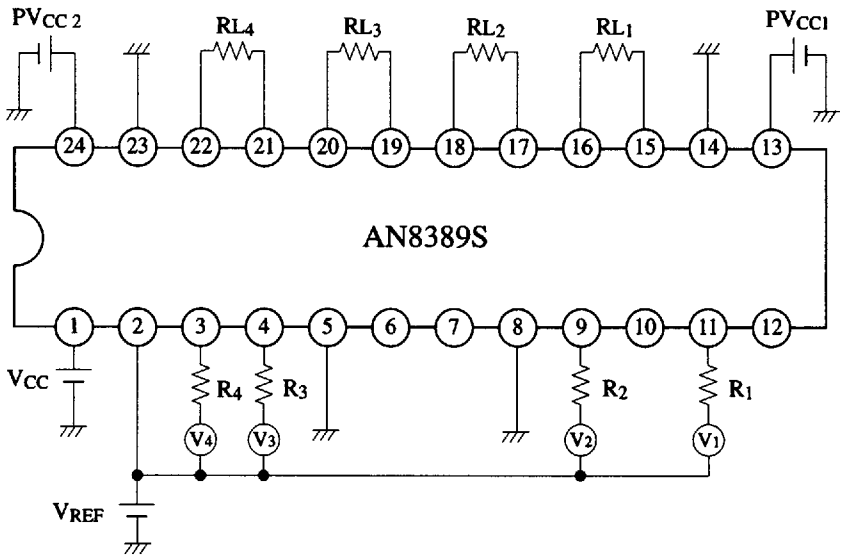
Pin No.	Pin Name	I/O	DC Voltage (V_{CC} = 8V)	Equivalent Circuit	Description
1	Power Supply (SV_{CC})	I	8V		PC (power cut) input pin controlling the output of Pin 15 and Pin 16.
2	V_{REF} Input	I	2.5V		V_{REF} input pin.
3	Motor Driver 4 Input (IN4)	I	2.5V		Error input pin of Driver 4.
4	Motor Driver 3 Input (IN3)	I	2.5V		Error input pin of Driver 3.
9	Motor Driver 2 Input (IN2)	I	2.5V		Error input pin of Driver 2.
11	Motor Driver 1 Input (IN1)	I	2.5V		Error input pin of Driver 1.
5 8	GND	I	0V		GND pin for control circuit of driver.
6	No Connection (NC)				
7	Reset Output (NRESET)	O			Reset output pin.

■ Pin Descriptions

Pin No.	Pin Name	I/O	DC Voltage (V_{CC} = 8V)	Equivalent Circuit	Description
10	Power Cut Input 2 (PC2)	I	0V		PC (power cut) input pin controlling the output of Pin 15 and Pin 16.
12	Power Cut Input 2 (PC1)	I	0V		PC (power cut) input pin controlling the output of Pin 17 and Pin 18.
13	Power Supply 1 for Driver (PV_{CC1})	I	8V		Power V_{CC} pin, supplying the current flowing for output power transistors of Pin 15, 16, 17 and 18.
24	Power Supply 2 for Driver (PV_{CC2})	I	8V		Power V_{CC} pin, supplying the current flowing for output power transistors of Pin 19, 20, 21 and 22.
14	GND 1 for Driver	I	0V		GND pin for output power transistors of Pin 15, 16, 17 and 18.
23	GND 1 for Driver	I	0V		GND pin for output power transistors of Pin 15, 16, 17 and 18.
15	Motor Driver 1 Reverse Output (D1-)	0	0V		Reverse rotation output pin of Driver 1.
16	Motor Driver 1 Forward Output (D1+)	0	0V		Normal rotation output pin of Driver 1.
17	Motor Driver 2 Reverse Output (D2-)	0	0V		Reverse rotation output pin of Driver 2.
18	Motor Driver 2 Forward Output (D2+)	0	0V		Normal rotation output pin of Driver 2.
19	Motor Driver 1 Reverse Output (D3-)	0	0V		Reverse rotation output pin of Driver 3.
20	Motor Driver 1 Forward Output (D3+)	0	0V		Normal rotation output pin of Driver 3.
21	Motor Driver 2 Reverse Output (D4-)	0	0V		Reverse rotation output pin of Driver 4.
22	Motor Driver 2 Forward Output (D4+)	0	0V		Normal rotation output pin of Driver 4.

■ Supplementary Explanation

● Cautions for use



When using AN8389S, refer to the following notes and follow the power dissipation characteristics curve.

(1) The load current, I_{P1}, passing through loads R_{L1} and R_{L2} is supplied through pin No.13.

$$I_{P1} = |V_{16\text{-}15}|/R_{L1} + |V_{18\text{-}17}|/R_{L2}$$

(2) The load current, I_{P2}, passing through loads R_{L3} and R_{L4} is supplied through pin No.24.

$$I_{P2} = |V_{20\text{-}19}|/R_{L3} + |V_{22\text{-}21}|/R_{L4}$$

(3) The dissipation increment, ΔP_D, in the IC (power output step) through loads R_{L1}, R_{L2}, R_{L3} and R_{L4} is as follows.

$$\begin{aligned}\Delta P_D = {} & (P_{VCC1} - |V_{16\text{-}15}|) \times |V_{16\text{-}15}|/R_{L1} \\ & + (P_{VCC1} - |V_{18\text{-}17}|) \times |V_{18\text{-}17}|/R_{L2} \\ & + (P_{VCC2} - |V_{20\text{-}19}|) \times |V_{20\text{-}19}|/R_{L3} \\ & + (P_{VCC2} - |V_{22\text{-}21}|) \times |V_{22\text{-}21}|/R_{L4}\end{aligned}$$

(4) The dissipation increment, ΔP_S, in the IC (signal block, supplied from pin No.1) through loads R_{L1}, R_{L2}, R_{L3}, and R_{L4} is approximately as follows.

$$I_T = |V_1|/R_1 + |V_2|/R_2 + |V_3|/R_3 + |V_4|/R_4$$
$$\Delta P_S = V_{CC} \times I_T \times 10 + V_{CC} \times (I_{P1}+I_{P2}) \times 10^{-2}$$

(5) The dissipation increment of the IC, when the driver operates, is $\Delta P_D + \Delta P_S$.