AN8389S, AN8389SR

4 Ch. Linear Driver IC for CD Player

■ Overview

The AN8389S and AN8389SR employ 4 ch. 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.

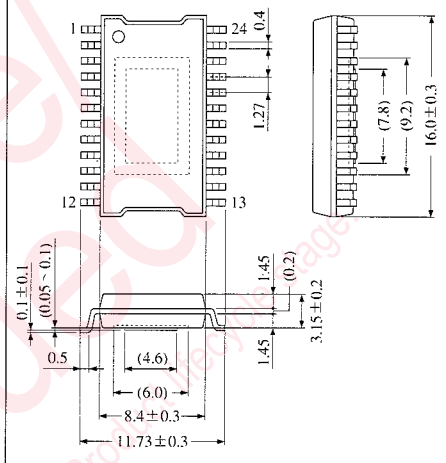
■ Features

- Wide output D-range is available regardless of reference voltage on the system
- 4 ch. BTL Driver built-in. Particularly suitable for driver of actuator or motor of 5 to 20 Ω load.
- Thermal shut down circuit (with hysteresis) built-in
- Control for proper heat of IC by separating the power supplies for signal line and output line.
- Provided with reset output pin
- Shot brake mode

■ Application

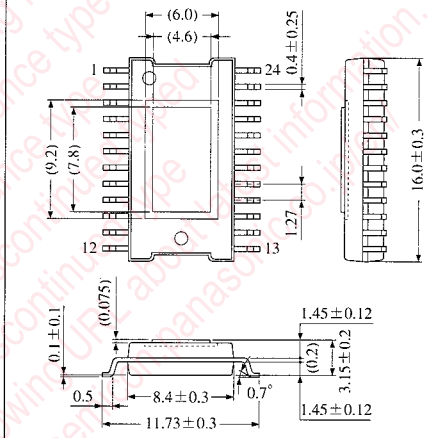
- CD player, CD-ROM, for drive of motor

AN8389S Unit : mm



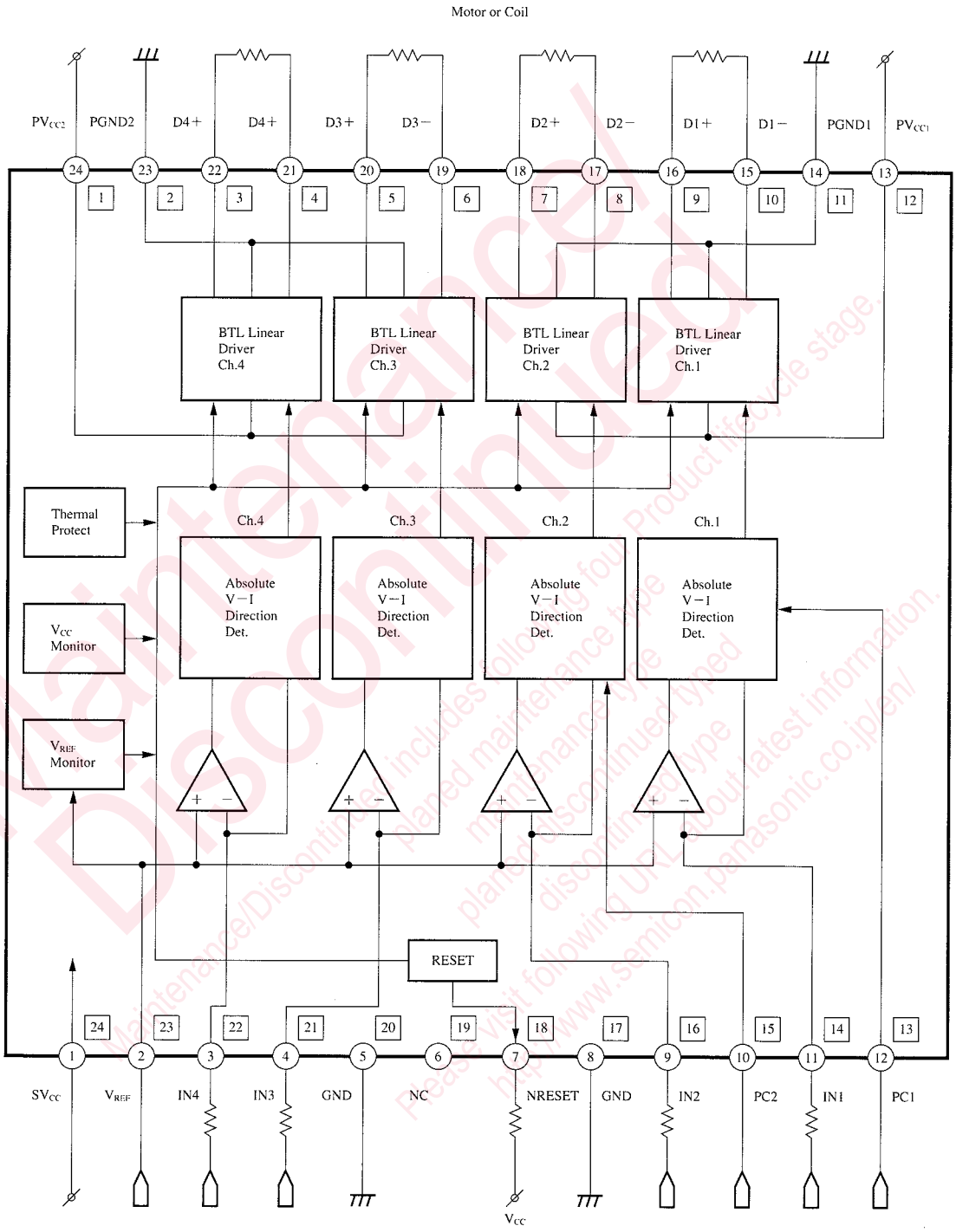
Fin-attached 24-lead SOP package (HSOP024-P-0450)

AN8389SR Unit : mm



Fin-attached 24-lead SOP package (SOP024-P-0450)

■ Block Diagram



Pin No. in a circle, ○ is for the AN8389S.
Pin No. in a square, □ is for the AN8389SR.

■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{CC}	20	V
Supply Current	I_{CC}	—	mA
Power Dissipation Note)	P_D	2083	mW
Operating Ambient Temperature	T_{opr}	−20 ~ +75	℃
Storage Temperature	T_{stg}	−55 ~ +150	℃

Note) For surface mounting on 50×50×1.2 mm glass epoxy board

■ Recommended Operating Range (Ta=25℃)

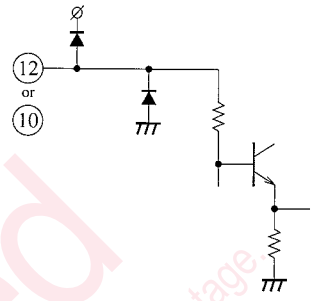
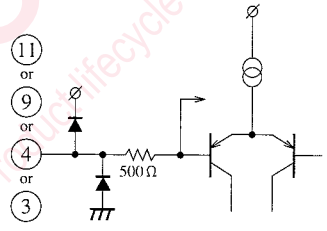
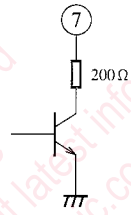
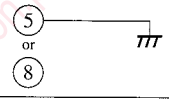
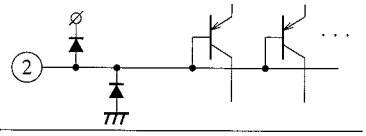
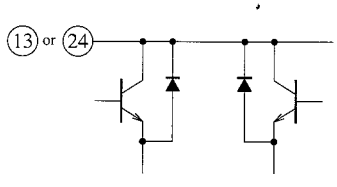
Parameter	Symbol	Range
Operating Supply Voltage Range	SV_{CC}	4.7V ~ 16V
	PV_{CC}	

■ Electrical Characteristics (Ta=25±2℃)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Total Circuit Current	I_{tot}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$	10	20	30	mA
Drivers 1 to 4						
Input Offset Voltage	V_{IOF}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	−7	—	7	mV
Output Offset Voltage	V_{OOF}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	−50	—	50	mV
Gain (+)	G_+	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	15.5	18.5	21.5	dB
(+) (Fin-attached 24-lead) Relative Gain	ΔG	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	−1.0	0	1.0	dB
Limit Voltage (+)	V_{L+}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	4.95	5.3	—	V
Limit Voltage (−)	V_{L-}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	—	−5.3	−4.95	V
Dead Zone Width	V_{DZ}	$PV_{CC1}=PV_{CC2}=SV_{CC}=8V$, $R_L=18\Omega$	−10	—	20	mV
Drivers 1 and 2, PC Operation						
Threshold H	V_{PCH}		1.4	—	—	V
Threshold 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 Temperature Equilibrium Value Note 1)	T_{THD}		(—)	(150)	(—)	℃
Operation Temperature Hysteresis Width Note 1)	ΔT_{THD}		(—)	(20)	(—)	℃

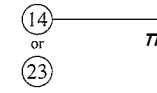
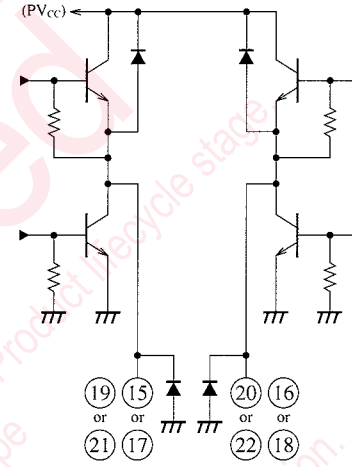
Note 1) Characteristic value in parentheses is a reference value for design but not a guaranteed value.

■ Pin Description

Pin No. AN8389S	Pin No. AN8389SR	Symbol	I/O	DC voltage (V_{CC}/8V)	Pin Description	Equivalent Circuit
12	13	PC1	I	0V	PC (power cut) input pin controlling the output of ⑮ and ⑯	
10	15	PC2	I	0V	PC (power cut) input pin controlling the output of ⑰ and ⑱	
11	14	IN1	I	2.5V	Error input pin of Driver 1	
9	16	IN2	I	2.5V	Error input pin of Driver 2	
4	21	IN3	I	2.5V	Error input pin of Driver 3	
3	22	IN4	I	2.5V	Error input pin of Driver 4	
7	18	NRESET	O	—	Reset output pin	
1	24	SV_{CC}	I	8V	SV_{CC} pin for control circuit of driver, not connected to power V_{CC} pin.	
5 8	20 17	SGND	I	0V	SGND pin for control circuit of driver	
2	23	V_{REF}	I	2.5V	V_{REF} input pin	
13	12	PV_{CC1}	I	8V	Power V_{CC} pin, supplying the current flowing for output power transistors of ⑮, ⑯, ⑰ and ⑱	
24	1	PV_{CC2}	I	8V	Power V_{CC} pin, supplying the current flowing for output power transistors of ⑲, ⑳, ㉑ and ㉒	

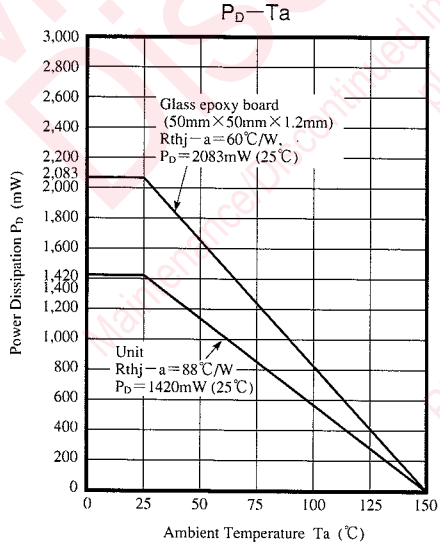
Note) The pin numbers shown in the equivalent circuit diagram are only for the AN8389S. For the AN8389SR, they must be replaced.

Pin Description (Cont.)

Pin No. AN8389S	Pin No. AN8389SR	Symbol	I/O	DC voltage (V_{CC}/8V)	Pin Description	Equivalent Circuit
14	11	PGND1	I	0V	PGND pin for output transistors of ⑮, ⑯, ⑰ and ⑱	
23	2	PGND2	I	0V	PGND pin for output transistors of ⑲, ⑳, ㉑ and ㉒	
15	10	D1−	O	0V	Reverse rotation output pin of Driver 1	
16	9	D1+	O	0V	Normal rotation output pin of Driver 1	
17	8	D2−	O	0V	Reverse rotation output pin of Driver 2	
18	7	D2+	O	0V	Normal rotation output pin of Driver 2	
19	6	D3−	O	0V	Reverse rotation output pin of Driver 3	
20	5	D3+	O	0V	Normal rotation output pin of Driver 3	
21	4	D4−	O	0V	Reverse rotation output pin of Driver 4	
22	3	D4+	O	0V	Normal rotation output pin of Driver 4	

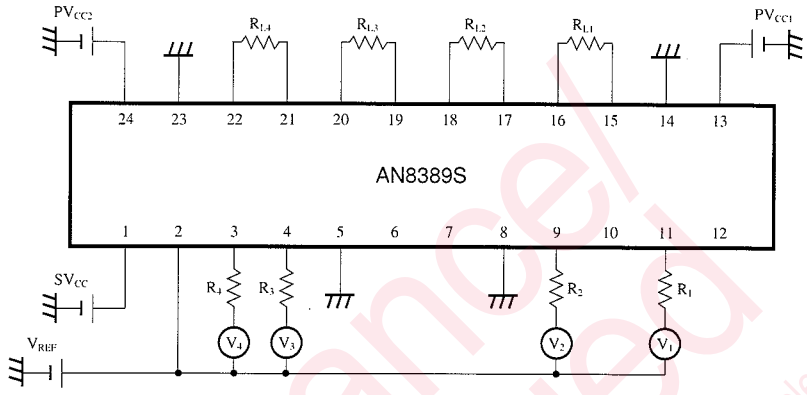
Note) The pin numbers shown in the equivalent circuit diagram are only for the AN8389S. For the AN8389SR, they must be replaced.

Characteristic Curve



■ Cautions for use

• AN8389S



When the AN8389S is used, take into account the following cautions and follow the power dissipation characteristic curve.

(1) Load current, I_{P1} flowing in loads R_{L1}, and RR_{L2} is supplied through Pin⑬.

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

(2) Load current, I_{P2} flowing in loads R_{L3} and RR_{L4} is supplied through Pin㉔.

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

(3) Dissipation increase (ΔP_d) inside the IC (power output stage) caused by loads R_{L1}, RR_{L2}, R_{L3} and RR_{L4} is as follows :

$$\Delta P_d=(PV_{CC1}-|V_{16-15}|)\times\frac{|V_{16-15}|}{R_{L1}}+(PV_{CC1}-|V_{18-17}|)\times\frac{|V_{18-17}|}{R_{L2}}$$
$$+(PV_{CC2}-|V_{20-19}|)\times\frac{|V_{20-19}|}{R_{L3}}+(PV_{CC2}-|V_{22-21}|)\times\frac{|V_{22-21}|}{R_{L4}}$$

(4) Dissipation increase (ΔP_s) inside the IC (signal block supplied from Pin①) caused by loads R_{L1}, RR_{L2}, R_{L3} and RR_{L4} is almost as follows :

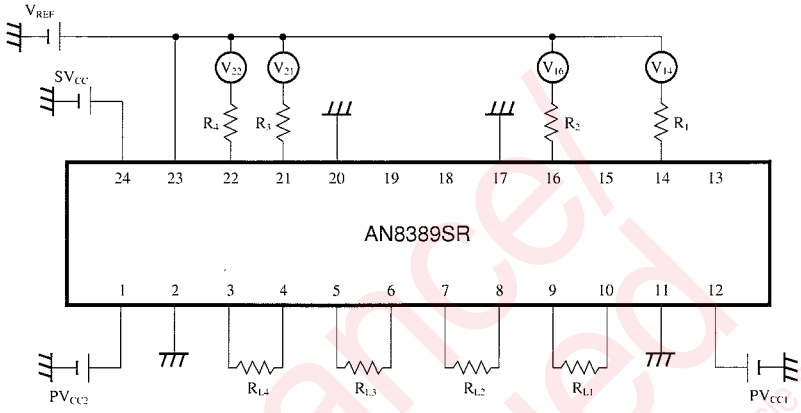
$$IT=\frac{|V_1|}{R_1}+\frac{|V_2|}{R_2}+\frac{|V_3|}{R_3}+\frac{|V_4|}{R_4}$$

$$\Delta P_S=V_{CC}\times IT\times 10+V_{CC}\times(I_{P1}+I_{P2})\times 10^{-2}$$

(5) Dissipation increase inside the IC during driver running is $\Delta P_d+\Delta P_S$.

■ Cautions for use

• AN8389SR



When the AN8389SR is used, take into account the following cautions and follow the power dissipation characteristic curve.

(1) Load current, I_{P1} flowing in loads R_{L1} and RR_{L2} is supplied through Pin⑫.

$$I_{P1}=\frac{|V_{9-10}|}{R_{L1}}+\frac{|V_{7-8}|}{R_{L2}}$$

(2) Load current, I_{P2} flowing in loads R_{L3} and RR_{L4} is supplied through Pin①.

$$I_{P2}=\frac{|V_{5-6}|}{R_{L3}}+\frac{|V_{3-4}|}{R_{L4}}$$

(3) Dissipation increase (ΔP_d) inside the IC (power output stage) caused by loads R_{L1}, RR_{L2}, R_{L3} and RR_{L4} is as follows :

$$\Delta P_d=(PV_{CC1}-|V_{9-10}|)\times\frac{|V_{9-10}|}{R_{L1}}+(PV_{CC1}-|V_{7-8}|)\times\frac{|V_{7-8}|}{R_{L2}}$$
$$+(PV_{CC2}-|V_{5-6}|)\times\frac{|V_{5-6}|}{R_{L3}}+(PV_{CC2}-|V_{3-4}|)\times\frac{|V_{3-4}|}{R_{L4}}$$

(4) Dissipation increase (ΔP_S) inside the IC (signal block supplied from Pin㉔) caused by loads R_{L1}, RR_{L2}, R_{L3} and RR_{L4} is almost as follows :

$$IT=\frac{|V_1|}{R_1}+\frac{|V_2|}{R_2}+\frac{|V_3|}{R_3}+\frac{|V_4|}{R_4}$$

$$\Delta P_S=V_{CC}\times IT\times 10+V_{CC}\times(I_{P1}+I_{P2})\times 10^{-2}$$

(5) Dissipation increase inside the IC during driver running is $\Delta P_d+\Delta P_S$.

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