

# DATA SHEET

Part No.	AN44075A
Package Code No.	HSOP034-P-0300A

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# AN44075A

## Driver IC for DC motor

### ■ Overview

AN44075A is a one channel H-bridge driver IC. 1-ch. DC motor can be controlled by a single driver IC.

### ■ Features

- Built-in thermal protection and low voltage detection circuit
- Built-in over current protection (when external resistance is added to pin 7 and pin 8.)
- Built-in 5 V power supply

### ■ Applications

- IC for DC motor drives

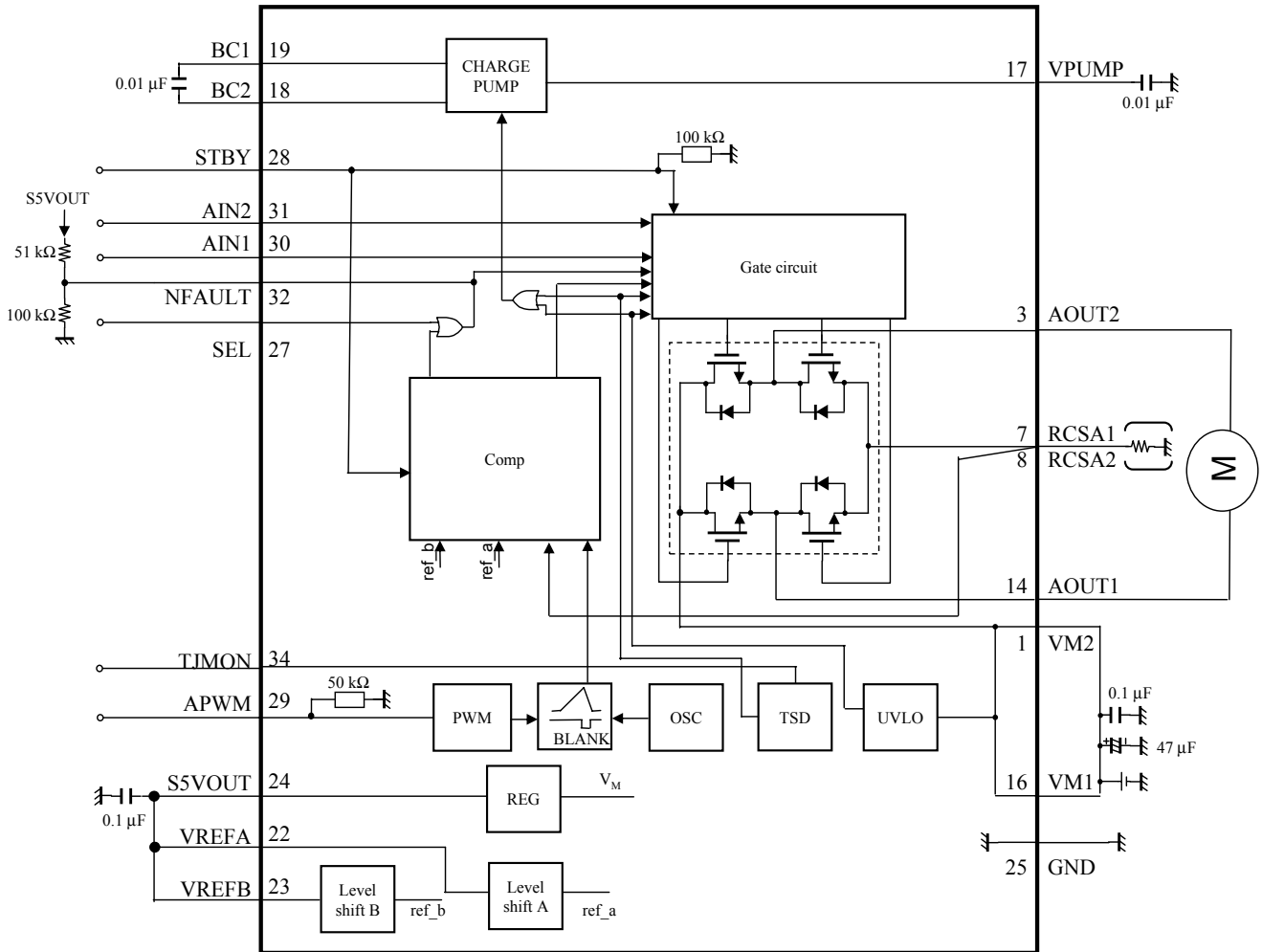
### ■ Package

- 34 pin plastic small outline package with back heat sink (SOP type)

### ■ Type

- Bi-CDMOS IC

■ Application Circuit Example (Block Diagram)



Note) This application circuit is shown as an example but does not guarantee the design for mass production set.

### ■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	VM2	Power supply	Motor power supply 2
2	N.C.	—	not used
3	AOUT2	Output	Motor drive output 2
4	N.C.	—	not used
5	N.C.	—	not used
6	N.C.	—	not used
7	RCSA1	Input / Output	Current detection 1
8	RCSA2	Input / Output	Current detection 2
9	GND	Ground	Die pad ground
10	N.C.	—	not used
11	N.C.	—	not used
12	N.C.	—	not used
13	N.C.	—	not used
14	AOUT1	Output	Motor drive output 1
15	N.C.	—	not used
16	VM1	Power supply	Motor power supply 1
17	VPUMP	Output	Charge pump circuit output
18	BC2	Output	Charge pump capacitor connection 2
19	BC1	Output	Charge pump capacitor connection 1
20	N.C.	—	not used
21	N.C.	—	not used
22	VREFA	Input	Peak current setting input
23	VREFB	Input	Load short threshold input
24	S5VOUT	Output	Internal reference voltage (5 V output)
25	GND	Ground	Signal ground
26	GND	Ground	Die pad ground
27	SEL	Input	Test mode input
28	STBY	Input	Standby input
29	APWM	Input	PWM input
30	AIN1	Input	Forward-reverse input
31	AIN2	Input	Brake mode input
32	NFAULT	Output	Abnormal detection output
33	N.C.	—	not used
34	TJMON	Output	VBE monitor

### ■ Absolute Maximum Ratings

A No.	Parameter	Symbol	Rating	Unit	Note
1	Supply voltage (pin 1, pin 16)	$V_M$	37	V	*1
5	Output pin voltage (pin 3, pin 14)	$V_{OUT}$	37	V	*2
6	Motor drive current (pin 3, pin 14)	$I_{OUT}$	$\pm 3.0$	A	*2, *3
7	Flywheel diode current (pin 3, pin 14)	$I_f$	3.0	A	*2, *3
2	Power dissipation	$P_D$	0.466	W	*4
3	Operating ambient temperature	$T_{opr}$	-20 to +70	°C	*5
4	Storage temperature	$T_{stg}$	-55 to +150	°C	*5

Note) \*1: The range under absolute maximum ratings, power dissipation.

\*2: Do not apply external currents to any pin specially mentioned. For circuit currents, (+) denotes current flowing into the IC and (-) denotes current flowing out of the IC.

\*3: Rating when cooling fin on the back side of the IC is connected to the GND pattern of the glass epoxy 4-layer board.  
(GND area: 2nd-layer or 3rd-layer: more than 1 500 mm<sup>2</sup>)

In case of no cooling fin on the back side of the IC, rating current is 1.5 A on the glass epoxy 2-layer board.

\*4: Power dissipation shows the value of only package at  $T_a = 70^\circ\text{C}$ .

When using this IC, refer to the  $\bullet P_D - T_a$  diagram in the ■ Technical Data and use under the condition not exceeding the allowable value.

\*5: Expect for the storage temperature and operating ambient temperature, all ratings are for  $T_a = 25^\circ\text{C}$ .

### ■ Operating Supply Voltage Range

Parameter	Symbol	Range	Unit	Note
Supply voltage range	$V_M$	10.0 to 35.0	V	—

Note) The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

### ■ Electrical Characteristics at $V_{CC} = 24\text{ V}$

Note)  $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$  unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
<b>Output drivers</b>								
1	High-level output saturation voltage	$V_{OH}$	$I_{SA1} = I_{SA2} = -1\text{ A}$	$V_M$ -0.47	$V_M$ -0.36	—	V	—
2	Low-level output saturation voltage	$V_{OL}$	$I_{SA1} = I_{SA2} = 1\text{ A}$	—	0.50	0.65	V	—
3	Flywheel diode forward voltage	$V_{DI}$	$I_{DI} = \pm 1\text{ A}$	0.5	1.0	1.5	V	—
4	Output leakage current	$I_{LEAK}$	$V_M = 37\text{ V}, V_{SRCS} = 0\text{ V}$	—	10	20	$\mu\text{A}$	—
<b>Power supply</b>								
5	Supply current 1 (sleep)	$I_{M1}$	$V_{STBY} = 0\text{ V}$	—	65	105	$\mu\text{A}$	—
6	Supply current 2 (with circuit turned on)	$I_{M2}$	$V_{STBY} = 5\text{ V}$	—	7.3	12	mA	—
7	Reference voltage	$V_{SSVOUT}$	$I_{SSVOUT} = -2.5\text{ mA}$	4.5	5.0	5.5	V	—
8	Output impedance	$Z_{SSVOUT}$	$\Delta I_{SSVOUT} = -5\text{ mA}$	—	18	27	$\Omega$	—
<b>IN input</b>								
9	High-level IN input voltage	$V_{INH}$	—	2.1	—	5	V	—
10	Low-level IN input voltage	$V_{INL}$	—	0	—	0.6	V	—
11	High-level IN input current	$I_{INH}$	$V_{AIN1} = V_{AIN2} = 5\text{ V}$	-10	—	10	$\mu\text{A}$	—
12	Low-level IN input current	$I_{INL}$	$V_{AIN1} = V_{AIN2} = 0\text{ V}$	-10	—	10	$\mu\text{A}$	—
<b>Standby input</b>								
13	High-level STBY input voltage	$V_{STBYH}$	—	2.1	—	5	V	—
14	Low-level STBY input voltage	$V_{STBYL}$	—	0	—	0.6	V	—
15	High-level STBY input current	$I_{STBYH}$	$V_{STBY} = 5\text{ V}$	30	—	80	$\mu\text{A}$	—
16	Low-level STBY input current	$I_{STBYL}$	$V_{STBY} = 0\text{ V}$	-10	—	10	$\mu\text{A}$	—
<b>PWM input</b>								
17	High-level PWM input voltage	$V_{PWMH}$	—	2.1	—	5	V	—
18	Low-level PWM input voltage	$V_{PWML}$	—	0	—	0.6	V	—
19	High-level PWM input current	$I_{PWMH}$	$V_{APWM} = 5\text{ V}$	60	—	150	$\mu\text{A}$	—
20	Low-level PWM input current	$I_{PWML}$	$V_{APWM} = 0\text{ V}$	-10	—	10	$\mu\text{A}$	—
21	PWM input max. frequency	$f_{PWM}$	—	—	—	200	kHz	—
22	Input min. pulse width	$t_w$	—	2	—	—	$\mu\text{s}$	—

■ Electrical Characteristics at  $V_{CC} = 24\text{ V}$  (continued)

Note)  $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$  unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
Peak current detection / over current protection								
23	Input bias current	$I_{REF}$	$V_{REFA} = V_{REFB} = 5\text{ V}$	83	100	125	$\mu\text{A}$	—
24	PWM frequency	$f_{PWM}$	$V_{REFA} = 0\text{ V}, V_{REFB} = 5\text{ V}$	17	26	35	kHz	—
25	Pulse blanking time	$T_B$	$V_{REFA} = 0\text{ V}, V_{REFB} = 5\text{ V}$	1.5	2.5	4.5	$\mu\text{s}$	—
26	Comp threshold 1	$V_{TH1}$	$V_{REFA} = V_{REFB} = 5\text{ V}$	480	500	520	mV	—
27	Comp threshold 2	$V_{TH2}$	$V_{REFA} = 5.5\text{ V}, V_{REFB} = 2.5\text{ V}$	475	500	525	mV	—
28	NFAULT output voltage	$V_{NFLT}$	$I_{NFLT} = 1\text{ mA}$	—	—	0.4	V	—



### ■ Electrical Characteristics (Reference values for design) at $V_{CC} = 9\text{ V}$

Note)  $T_a = 25^\circ\text{C} \pm 2^\circ\text{C}$  unless otherwise specified.

The characteristics listed below are reference values for design of the IC and are not guaranteed by inspection.

If a problem does occur related to these characteristics, Panasonic will respond in good faith to user concerns.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
Output drivers								
29	Output slew rate 1	$VT_r$	Rising edge	—	270	—	V/ $\mu\text{s}$	—
30	Output slew rate 2	$VT_f$	Falling edge	—	330	—	V/ $\mu\text{s}$	—
31	Dead time	$T_D$	—	—	0.45	—	$\mu\text{s}$	—
Thermal protection								
32	Thermal protection operating temperature	$TSD_{on}$	—	—	150	—	$^\circ\text{C}$	—
33	Thermal protection hysteresis width	$\Delta TSD$	—	—	40	—	$^\circ\text{C}$	—
Low voltage protection								
34	Protection operating voltage	UVLO1	—	—	8.0	—	V	—
35	Protection release voltage	UVLO2	—	—	8.6	—	V	—

■ Technical Data

- Control mode (truth table)

INPUT				OUTPUT		
STBY	AIN1	AIN2	APWM	AOUT1	AOUT2	Mode
"H"	—	"H"	"L"	"H"	"H"	Short brake
	"L"	—	"H"	"L"	"H"	Forward
	"H"	—	"H"	"H"	"L"	Reverse
	—	"L"	"L"	OFF	OFF	Stop
"L"	—	—	—	OFF	OFF	Standby

INPUT	OUTPUT
SEL	Mode
"H"	Short detect off
"L"	Short detect on

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