DATA SHEET

Part No.	AN44063A
Package Code No.	SSOP032-P-0300B

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AN44063A

Driver IC for Stepping Motor

■ Overview

AN44063A is a two channels H-bridge driver IC.Bipolar stepping motor can be controlled by a single driver IC.
2-phase,1-2(type 2) phase, W1-2 phase can be selected.

■ Features

- 4-phase input (W 1- and 2-phase excitation enabled; exclusive OR function incorporated for simultaneous-ON prevention)
- Built-in CR chopping (with frequency selected)
- Built-in thermal protection and low voltage detection circuit
- Built-in 5 V power supply

■ Applications

- IC for stepping motor drives

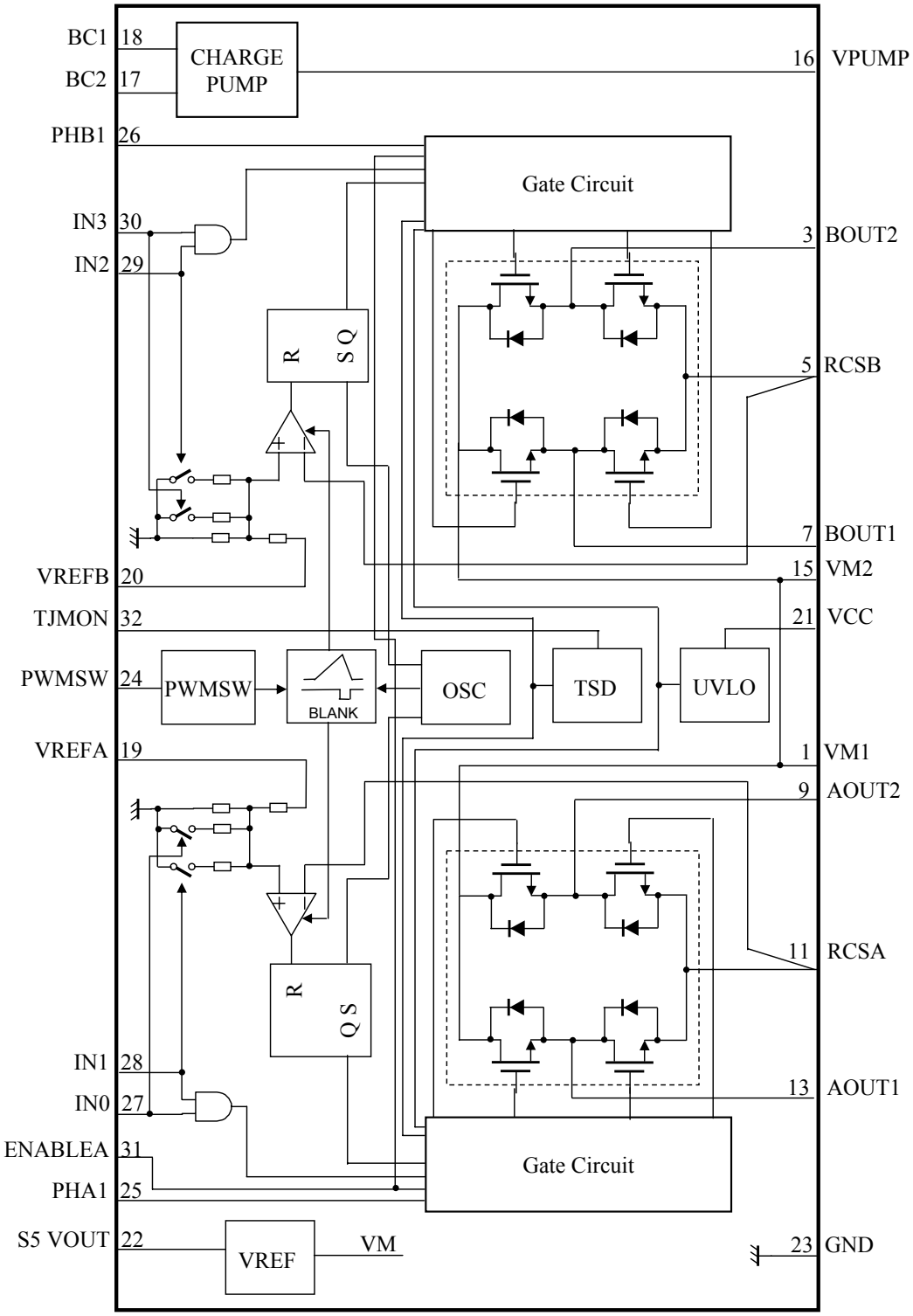
■ Package

- 32-pin plastic shrink small outline package (SSOP type)

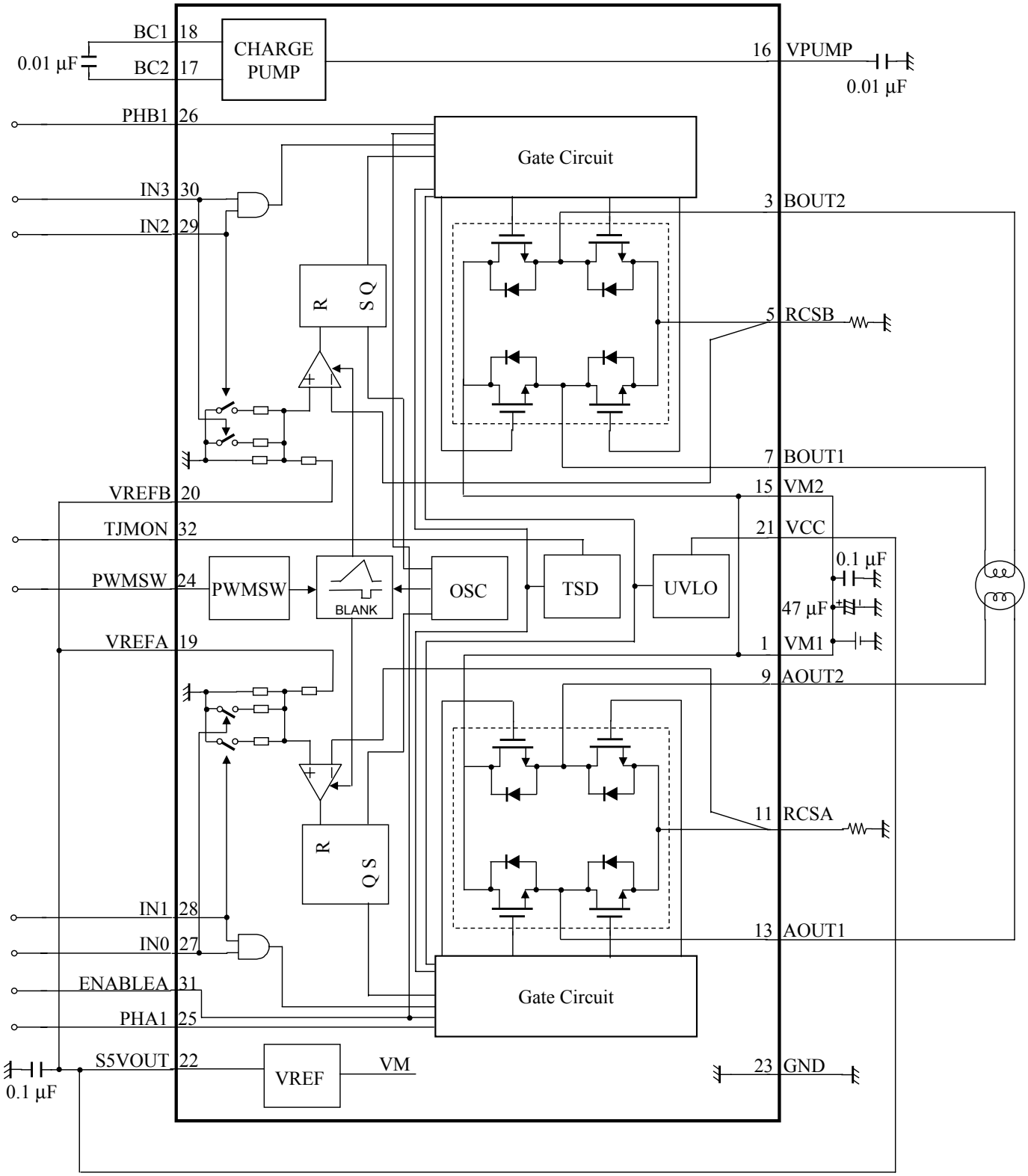
■ Type

- Silicon monolithic Bi-CDMOS IC

■ Block Diagram



■ Application Circuit Example



■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	VM1	Power supply	Motor power supply 1
2	N.C.	—	N.C.
3	BOUT2	Output	Phase B motor drive output 2
4	N.C.	—	N.C.
5	RCSB	Input / Output	Phase B current detection
6	N.C.	—	N.C.
7	BOUT1	Output	Phase B motor drive output 1
8	N.C.	—	N.C.
9	AOUT2	Output	Phase A motor drive output 2
10	N.C.	—	N.C.
11	RCSA	Input / Output	Phase A current detection
12	N.C.	—	N.C.
13	AOUT1	Output	Phase A motor drive output 1
14	N.C.	—	N.C.
15	VM2	Power supply	Motor power supply 2
16	VPUMP	Output	Charge Pump circuit output
17	BC2	Output	Charge Pump capacitor connection 2
18	BC1	Output	Charge Pump capacitor connection 1
19	VREFA	Input	Phase A torque reference voltage input
20	VREFB	Input	Phase B torque reference voltage input
21	VCC	Power supply	Signal power supply
22	S5 VOUT	Output	Internal reference voltage (5-V output)
23	GND	Ground	Signal ground
24	PWMSW	Input	PWM frequency selection input
25	PHA1	Input	Phase A phase selection input
26	PHB1	Input	Phase B phase selection input
27	IN0	Input	Phase A output torque control 1
28	IN1	Input	Phase A output torque control 2
29	IN2	Input	Phase B output torque control 1
30	IN3	Input	Phase B output torque control 2
31	ENABLEA	Input	Phase A/B Enable/Disable CTL
32	TJMON	Output	VBE monitor use

■ Absolute Maximum Ratings

A No.	Parameter	Symbol	Rating	Unit	Note
1	Supply voltage1 (pin 1, pin 15)	V_M	37	V	*1
2	Supply voltage2 (pin 21)	V_{CC}	− 0.3 to +6	V	*1
3	Power dissipation	P_D	0.427	W	*2
4	Operating ambient temperature	T_{opr}	−20 to +70	°C	*3
5	Storage temperature	T_{stg}	−55 to +150	°C	*3
6	Output pin voltage (pin 3, pin 7, pin 9, pin 13)	V_{OUT}	37	V	*1
7	Motor drive current (pin 3, pin 7, pin 9, pin 13)	I_{OUT}	±0.8	A	*1
8	Flywheel diode current (pin 3, pin 7, pin 9, pin 13)	I_f	0.8	A	*1

Note) *1: Do not apply current or voltage from outside to any pin not listed above.
In the circuit current, (+) means the current flowing into IC and (−) means the current flowing out of IC.
*2: The power dissipation is the value of a discrete IC package without a heat sink at T_a = 70°C.
*3: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are at T_a = 25°C.

■ Operating Supply Voltage Range

Parameter	Symbol	Range	Unit	Note
Supply voltage range 1	V_M	16.0 to 34.0	V	*
Supply voltage range 2	V_{CC}	4.5 to 5.5	V	*

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

■ Electrical Characteristics at V_M = 24 V, V_{CC} = 5 V

Note) T_a = 25°C±2°C unless otherwise specified.

B No.	Parameter	Symbol	Test circuits	Conditions	Limits			Unit	Note
					Min	Typ	Max		
Output Drivers									
1	High-level output saturation voltage	V_{OH}	3	I = – 0.5 A	V_M–0.47	V_M–0.31	—	V	—
2	Low-level output saturation voltage	V_{OL}	3	I = 0.5 A	—	0.47	0.71	V	—
3	Flywheel diode forward voltage	V_{DI}	4	I = 0.5 A	0.5	1.0	1.5	V	—
4	Output leakage current 1	I_{LEAK1}	1	V_M = V_{OUT} = 37 V, V_{RCS} = 0 V	—	10	50	µA	—
5	Supply current (with two circuits turned off)	I_M	1	ENABLEA = 5 V	—	4	6	mA	—
I/O Block									
6	Supply current(with two circuits turned off)	I_{CC}	1	ENABLEA = 5 V	—	1.4	2.2	mA	—
7	High-level IN input voltage	V_{INH}	1	—	2.2	—	V_{CC}	V	—
8	Low-level IN input voltage	V_{INL}	1	—	0	—	0.6	V	—
9	High-level IN input current	I_{INH}	1	IN0 = IN1 = IN2 = IN3 = 5 V	–10	—	10	µA	—
10	Low-level IN input current	I_{INL}	1	IN0 = IN1 = IN2 = IN3 = 0 V	–15	—	15	µA	—
11	High-level PHA1/PHB1 input voltage	V_{PHAH} V_{PHBH}	1	—	2.2	—	V_{CC}	V	—
12	Low-level PHA1/PHB1 input voltage	V_{PHAL} V_{PHBL}	1	—	0	—	0.6	V	—
13	High-level PHA1/PHB1 input current	I_{PHAH} I_{PHBH}	1	PHA1 = PHB1 = 5 V	25	50	100	µA	—
14	Low-level PHA1/PHB1 input current	I_{PHAL} I_{PHBL}	1	PHA1 = PHB1 = 0 V	–15	—	15	µA	—
15	High-level ENABLEA input voltage	$V_{ENABLEAH}$	1	—	2.2	—	V_{CC}	V	—
16	Low-level ENABLEA input voltage	$V_{ENABLEAL}$	1	—	0	—	0.6	V	—
17	High-level ENABLEA input current	$I_{ENABLEAH}$	1	ENABLEA = 5 V	–10	—	10	µA	—
18	Low-level ENABLEA input current	$I_{ENABLEAL}$	1	ENABLEA = 0 V	–15	—	15	µA	—
19	High-level PWMSW input voltage	V_{PWMSWH}	2	—	2.2	—	V_{CC}	V	—
20	Low-level PWMSW input voltage	V_{PWMSWL}	2	—	0	—	0.6	V	—
21	High-level PWMSW input current	I_{PWMSWH}	1	PWMSW = 5 V	25	50	100	µA	—
22	Low-level PWMSW input current	I_{PWMSWL}	1	PWMSW = 0 V	–15	—	15	µA	—

■ Electrical Characteristics at V_M = 24 V, V_{CC} = 5 V

Note) T_a = 25°C±2°C unless otherwise specified.

B No.	Parameter	Symbol	Test circuits	Conditions	Limits			Unit	Note
					Min	Typ	Max		
Torque Control Block									
23	Input bias current	I_{REFA} I_{REFB}	1	V_{REFA} = 5 V V_{REFB} = 5 V	70	100	130	µA	—
24	PWM frequency1	f_{PWM1}	2	PWMSW = 0 V	34	52	70	kHz	—
25	PWM frequency2	f_{PWM2}	2	PWMSW = 5 V	17	26	35	kHz	—
26	Pulse blanking time	T_B	2	V_{REFA} = V_{REFB} = 0 V	0.38	0.75	1.12	µs	—
27	Cmp threshold H (100%)	VT_H	1	IN0 = IN1 = 0 V IN2 = IN3 = 0 V	475	500	525	mV	—
28	Cmp threshold C (67%)	VT_C	1	IN0 = 5 V, IN1 = 0 V IN2 = 5 V, IN3 = 0 V	308	333	359	mV	—
29	Cmp threshold L (33%)	VT_L	1	IN0 = 0 V, IN1 = 5 V IN2 = 0 V, IN3 = 5 V	151	167	184	mV	—
Reference Voltage Block									
30	Reference voltage	$V_{S5\ VOUT}$	1	$I_{S5\ VOUT}$ = –2.5 mA	4.5	5.0	5.5	V	—
31	Output impedance	$Z_{S5\ VOUT}$	1	$I_{S5\ VOUT}$ = –5 mA	—	18	27	Ω	—

■ Technical Data

• Control mode

Truth table

ENABLEA	PHA1/PHB1	AOUT1/BOUT1	AOUT2/BOUT2
"L"	"H"	"H"	"L"
"L"	"L"	"L"	"H"
"H"	—	OFF	OFF

IN0/IN2	IN1/IN3	Output Current
"L"	"L"	$(VREF / 10) \times (1 / Rs) = I_{OUT}$
"H"	"L"	$(VREF / 10) \times (1 / Rs) \times (2 / 3) = I_{OUT}$
"L"	"H"	$(VREF / 10) \times (1 / Rs) \times (1 / 3) = I_{OUT}$
"H"	"H"	0

Note) 1. Rs: current detection region

2. When ENABLEA = "H" or IN0 = IN1 = "H"/IN2 = IN3 = "H", all output transistors switch off at the same time.

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