DATA SHEET

Part No.	AN41224A
Package Code No.	HSOP056-P-0300

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Contents

AN41224A

Motor drive IC for Optical Disk

■ Overview

The AN41224A is a single chip IC that uses 1-hall-sensor drive on the input side of the spindle motor drive block and low-noise direct PWM drive of sine wave on the output side, incorporating a PWM 6-channel driver necessary for optical pickup and mechanism driving.

It is effective for reducing noise, vibration and power consumption of the optical disk drive.

■ Features

- 1-hall-sensor, 3 phase full-wave and less-noise Direct-PWM driving for Spindle motor driver.
- The actuator (Focus, Tracking, Tilt) drive blocks use linear input and direct PWM drive technique. Moreover, the driver are low in power consumption.
- Sled (Stepping) motor use linear input and direct PWM drive technique. Less external components are used as the current detection resistors are built-in.
- Independent power supply pins are provided for each of the spindle motor, actuator, sled (Stepping) motor, and loading motor drive channels.
- Functions : Motor drive for optical disk /Actuator drive
  Spindle motor driver, Actuator (Focus, Tracking, Tilt) driver,
  Sled (Stepping) motor driver, Loading motor driver
- Drive voltage : 12V (V_{MSP}, V_{MST}), 5 V (V_{DD}, V_{MAC}), 12V/ 5V (V_{MLO})
- Additional features : Built-in Stand-by function (Spindle and Ch.1 to Ch.6 ALL mute)
  1 time / 3 times FG output frequency switch
  Short brake / Reverse brake / Auto brake switch
  Normal Torque / Low Torque Mode switch
  Bias pin for Hall elements
  Thermal shutdown
  Loading power supply selectable, 12 V / 5 V.
  Sled (Stepping) gain switch

■ Applications

- CD-ROM, DVD-ROM, CD-R/RW,
  DVD recorder, various combination types.

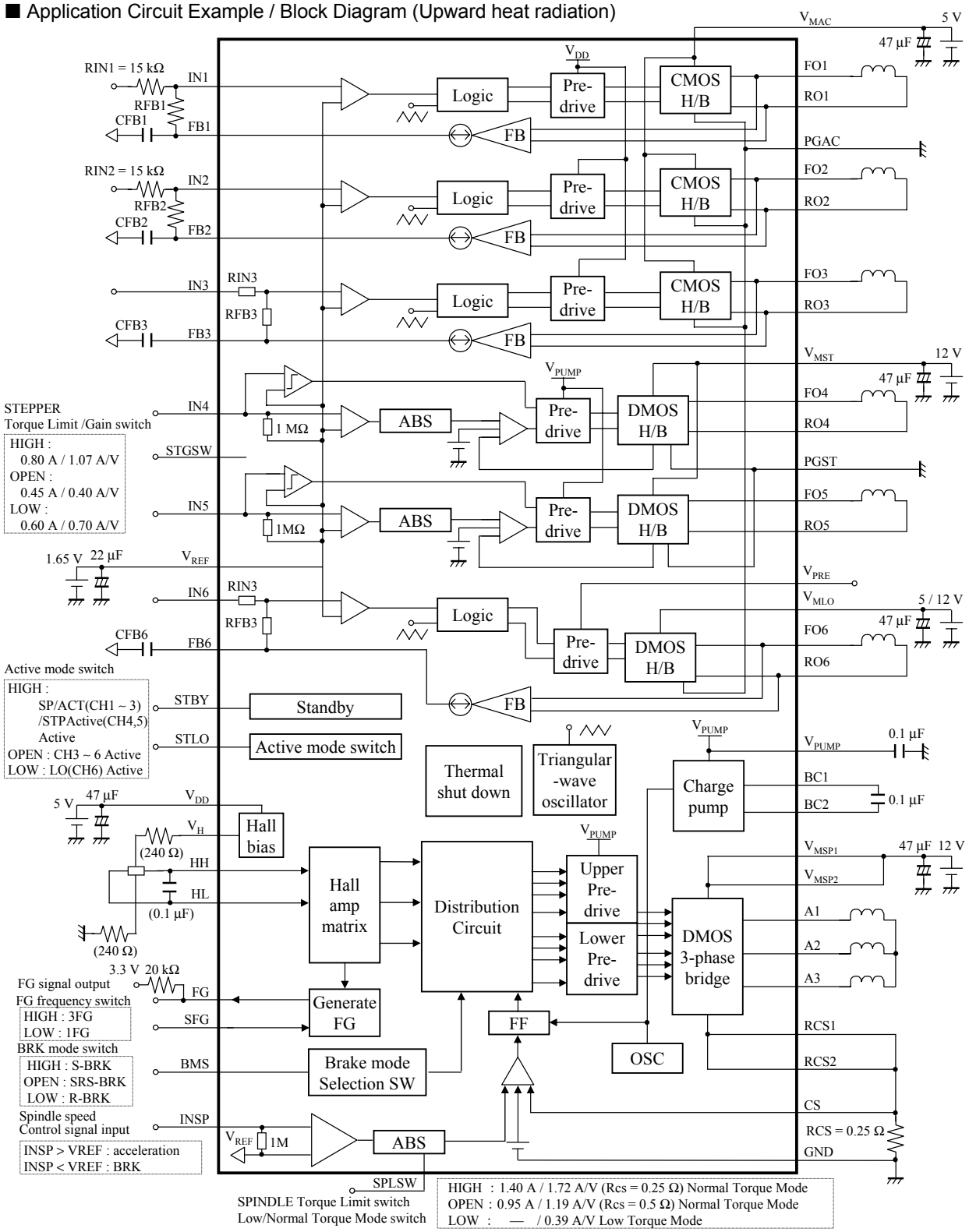
■ Package

- 56 pin plastic small outline package with heat sink (SOP Type)

■ Type

- Bi-CDMOS IC

■ Application Circuit Example / Block Diagram (Upward heat radiation)



■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	RCS2	Output	Spindle motor drive common source output 2
2	A3	Output	Spindle motor drive output 3
3	A2	Output	Spindle motor drive output 2
4	RCS1	Output	Spindle motor drive common source output 1
5	CS	Input	Spindle motor drive output current detection
6	A1	Output	Spindle motor drive output 1
7	V_{MSP1}	Power supply	Spindle motor drive power supply 1
8	STBY	Input	Total shutdown input
9	STLO	Input	LO shutdown input
10	SFG	Input	Spindle motor drive FG mode switching input
11	FB6	Output	Ch.6 feedback output
12	BMS	Input	Spindle motor drive brake mode switching input
13	STGSW	Input	Ch.4, Ch.5 motor drive input/output Gain switching input
14	SPLSW	Input	Spindle motor torque limit current / Spindle motor drive input/output Gain switching input
15	N.C.	—	N.C.
16	FG	Output	Spindle motor drive FG signal output
17	V_{DD}	Power supply	Control current power supply
18	HH	Input	Spindle motor drive hall element positive input
19	HL	Input	Spindle motor drive hall element negative input
20	V_H	Output	Spindle motor drive hall bias output
21	FO1	Output	Ch.1 non-inverting output
22	RO1	Output	Ch.1 inverting output
23	V_{MAC}	Power supply	Ch.1, Ch.2, Ch.3 coil drive power supply
24	PGAC1	Ground	Ch.1, Ch.2, Ch.3, Ch.6 drive GND1
25	FO2	Output	Ch.2 non-inverting output
26	RO2	Output	Ch.2 inverting output
27	FO3	Output	Ch.3 non-inverting output
28	RO3	Output	Ch.3 inverting output
29	PGAC2	Ground	Ch.1, Ch.2, Ch.3, Ch.6 drive GND2
30	FO6	Output	Ch.6 non-inverting output
31	V_{MLO}	Power supply	Ch.6 motor drive power supply
32	RO6	Output	Ch.6 non-inverting output
33	FB3	Output	Ch.3 feedback output
34	IN3	Input	Ch.3 control signal input
35	IN1	Input	Ch.1 control signal input

■ Pin Descriptions (continued)

Pin No.	Pin name	Type	Description
36	FB1	Output	Ch.1 feedback output
37	V_{PRE}	Input	Ch.6 Pre-Drive power supply
38	FB2	Output	Ch.2 feedback output
39	IN2	Input	Ch.2 control signal input
40	IN6	Input	Ch.6 control signal input
41	INSP	Input	Spindle motor drive control signal input
42	N.C.	—	N.C.
43	V_{REF}	Input	Reference voltage input
44	IN5	Input	Ch.5 control signal input
45	IN4	Input	Ch.4 control signal input
46	GND	Ground	Control current GND
47	V_{PUMP}	Output	Charge pump output
48	BC2	Output	Charge pump setup capacitor 2
49	BC1	Output	Charge pump setup capacitor 1
50	V_{MST}	Power supply	Ch.4, Ch.5 motor drive power supply
51	RO5	Output	Ch.5 inverting output
52	FO5	Output	Ch.5 non-inverting output
53	PGST	Ground	Ch.4, Ch.5 drive GND
54	RO4	Output	Ch.4 inverting output
55	FO4	Output	Ch.4 non-inverting output
56	V_{MSP2}	Power supply	Spindle motor drive power supply 2

■ Absolute Maximum Ratings

A No.	Parameter	Symbol	Rating	Unit	Pin	Notes
1	Supply voltage	V_{DD} , V_{MAC}	6.0	V	—	*1
		V_{MSP} , V_{MST} , V_{MLO}	14.0			
2	Supply current	I_{DD}	100	mA	—	—
		I_{MSP}	1 700			
		I_{MAC}	2 500			
		I_{MST}	1 900			
		I_{MLO}	950			
3	Power dissipation	P_D	448	mW	—	*2
4	Operating ambient temperature	T_{opr}	–30 to +85	°C	—	*3
5	Storage temperature	T_{stg}	–55 to +150	°C	—	*3
6	Drive power supply / output instantaneous current spindle	$I_{(p)}$	±3 500	mA	p = 1, 2, 3, 4, 6, 7, 56	*4, *5
7	Drive output current Ch.1, Ch.2	$I_{(q)}$	±1 000	mA	q = 21, 22, 25, 26	*5
8	Drive output current Ch.3	$I_{(r)}$	±500	mA	r = 27, 28	
9	Drive output current Ch.4, Ch.5, Ch.6	$I_{(s)}$	±1 000	mA	s = 30, 32, 51, 52, 54, 55	*5
10	Drive output voltage	$V_{(m)}$	14.7	V	m = 2, 3, 6, 30, 32, 51, 52, 54, 55	*5
11	Drive output voltage	$V_{(l)}$	6.7	V	l = 21, 22, 25, 26, 27, 28	*5
12	Control signal input voltage	$V_{(n)}$	GND to V_{DD}	V	n = 8, 9, 10, 12, 13, 14, 18, 19, 34, 35, 39, 40, 41, 43, 44, 45	*5
13	Hall bias current	$I_{HB(x)}$	30	mA	x = 20	*5

Notes) *1: The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.
The charge pump output circuit voltage will exceed the supply voltage. The limit of the charge pump output circuit voltage is shown in "Operating Supply Voltage / Current Range" on Page8.
*2: The power dissipation shown is the value at T_a = 85°C for the independent (unmounted) IC package.
When using this IC, refer to the P_D-T_a diagram of the package standard and use under the condition not exceeding the allowable value.
*3: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for T_a = 25°C.
*4: Each output current of ±3 500 mA, ±2 000 mA is only permissible for a period within 1 ms and 50 ms respectively.
*5: Do not apply current or voltage from outside to any pin not listed other than the power supply and ground pins.
For the circuit currents, '+' denotes current flowing into the IC, and '−' denotes current flowing out of the IC.

■ Operating supply voltage range

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Supply voltage range	V_{DD}	4.5	5.0	5.5	V	—
	V_{MAC}	4.5	5.0	5.5		*
	V_{MSP} , V_{MST}	10.0	12.0	13.5		
	V_{MLO} (5V) V_{MLO} (12V)	4.5 10.0	5.0 12.0	5.5 13.5		

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

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