FAN8024CD

4-Channel Motor Driver

Features

- 2-Channel BTL driver with current feedback
- 2-Channel BTL DC motor driver
- Built-in thermal shutdown circuit
- Built-in mute circuit
- Operating supply voltage: 4.5~13.2V

Description

The FAN8024CD is a monolithic IC, suitable for 2-ch BTL DC motor drivers and 2-ch motor drivers with current feedback which drive the focus and tracking actuators of a CD- media system.

28-SSOPH-375



Typical Applications

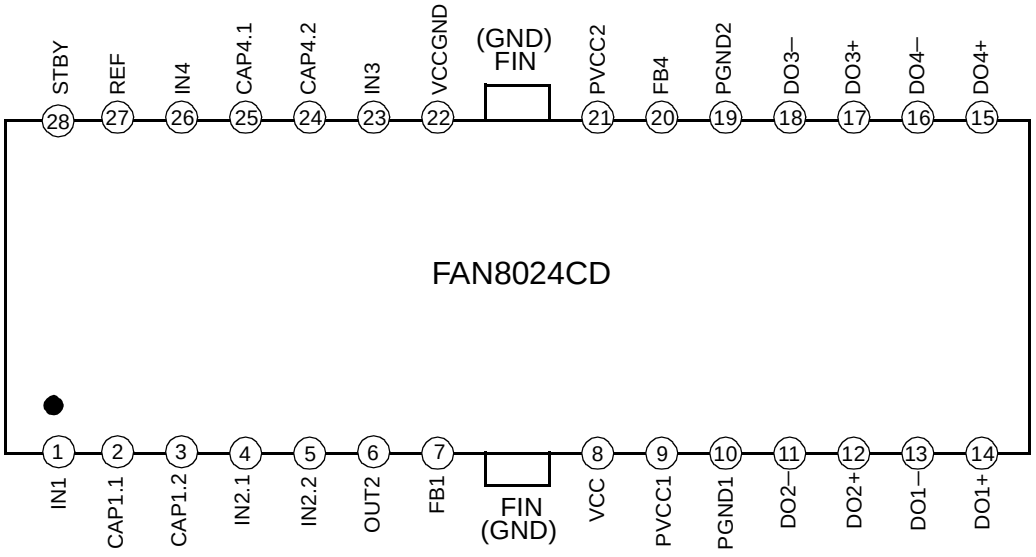
- Compact disk ROM (CD-ROM)
- Compact disk RW (CD-RW)
- Digital video disk ROM (DVD-ROM)
- Digital video disk RAM (DVD-RAM)
- Digital video disk player (DVDP)
- Other compact disk media

Ordering Information

Device	Package	Operating Temp.
FAN8024CD	28-SSOPH-375	-25 °C ~ 85 °C
FAN8024CDTF	28-SSOPH-375	-25 °C ~ 85 °C

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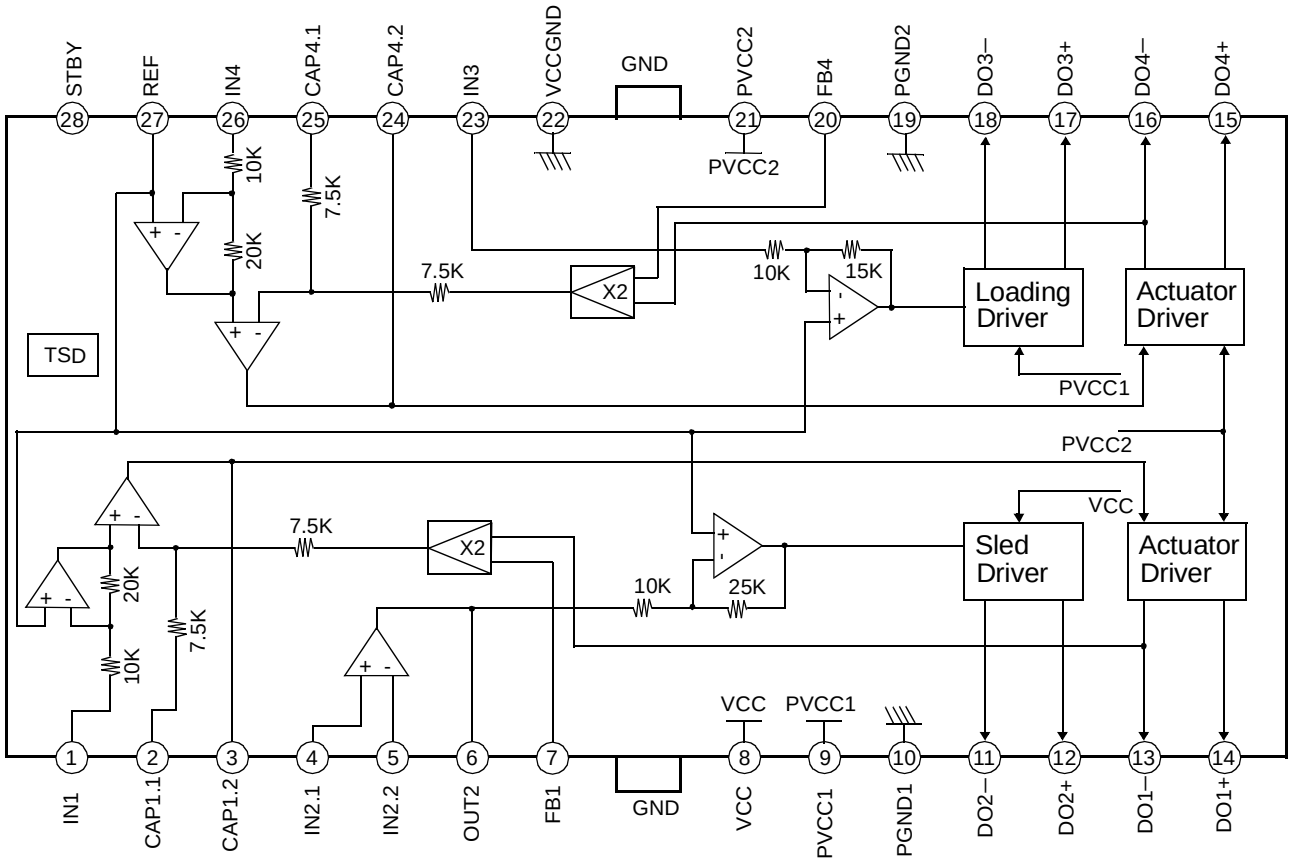
Pin Assignments



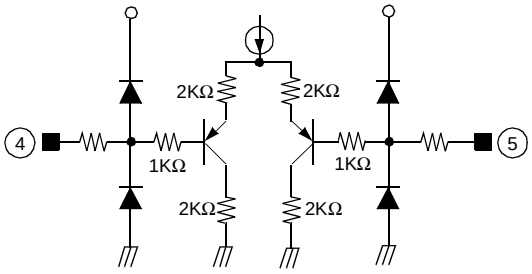
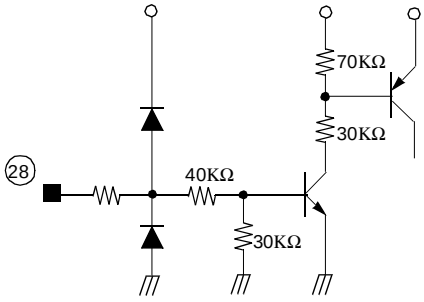
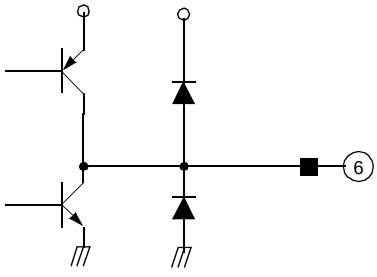
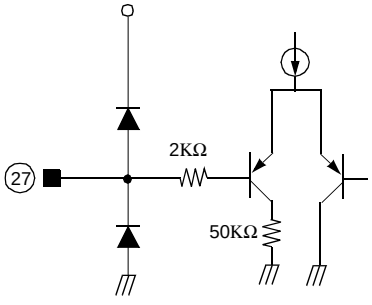
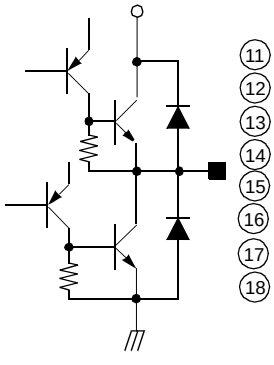
Pin Definitions

Pin Number	Pin Name	I/O	Pin Function Description
1	IN1	I	CH1 input
2	CAP1.1	-	Connection with capacitor
3	CAP1.2	-	for CH1
4	IN2.1	I	OP-AMP CH2 input(+)
5	IN2.2	I	OP-AMP CH2 input(-)
6	OUT2	O	OP-AMP CH2 output
7	FB1	I	Feedback for CH1
8	VCC	-	Signal Vcc
9	PVCC1	-	Power Supply 1
10	PGND1	-	Power Ground 1
11	DO2–	O	Drive2 Output (-)
12	DO2+	O	Drive2 Output (+)
13	DO1–	O	Drive1 Output (-)
14	DO1+	O	Drive1 Output (+)
15	DO4+	O	Drive4 Output (+)
16	DO4–	O	Drive4 Output (-)
17	DO3+	O	Drive3 Output (+)
18	DO3–	O	Drive3 Output (-)
19	PGND2	-	Power Ground 2
20	FB4	-	Feedback for CH4
21	PVCC2	-	Power Supply 2
22	VCCGND	-	Vcc ground
23	IN3	I	CH3 input
24	CAP4.2	-	Connection with capacitor
25	CAP4.1	-	for CH4
26	IN4	I	CH4 input
27	REF	I	Bias voltage input
28	STBY	I	Stand-by input

Internal Block Diagram



Equivalent Circuits

ERROR AMP INPUT	STAND-BY INPUT
	
ERROR AMP OUTPUT	**SIGNAL REFERENCE INPUT**
	
POWER AMP OUTPUT	
	

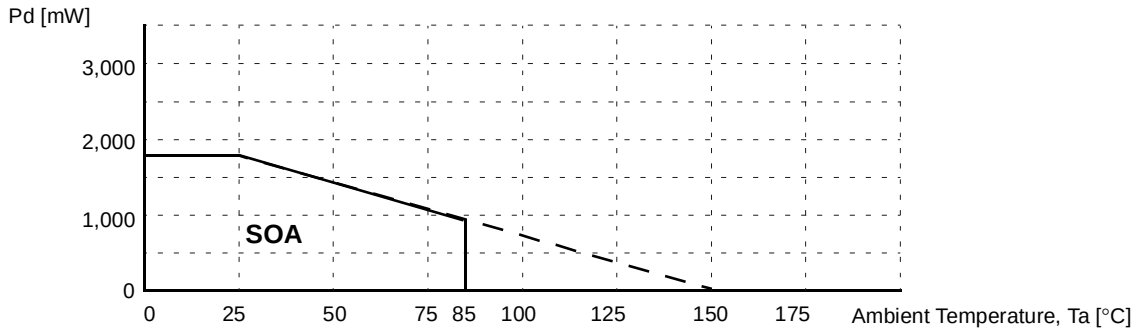
Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit
Maximum supply voltage	V_{CCmax}	15	V
Power dissipation	P_D	1.7[note]	W
Operating temperature range	T_{OPR}	-25 ~ +85	°C
Storage temperature range	T_{STG}	-55 ~ +150	°C

NOTE:

1. When mounted on a 50mm × 50mm × 1mm PCB (Phenolic resin material).
2. Power dissipation derating rate : -13.6mW/°C(Ta≥25°C)
3. Should not exeed Pd(Power dissipation) and SOA(Safe operating area).

Power Dissipation Curve



Recommended Operating Conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.5	-	13.2	V
Supply Voltage	PV_{CC1},PV_{CC2}	-	V_{CC}	-	V

Electrical Characteristics

(Unless otherwise specified, Ta = 25 °C, V_{CC} = 12V, $PV_{CC}1,2$ = 5V)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Current1	I_{CC1}	Stand-by off	-	18	27	mA
Quiescent Current1	I_{CC2}	Stand-by on	-	-	0.5	mA
Stand-by On Voltage	V_{STon}	-	-	-	0.5	V
Stand-by Off Voltage	V_{SToff}	-	2.0	-	-	V
ACTUATOR DRIVE CIRCUIT						
Output Offset Current	$I_{OO1,4}$	-	-6	0	+6	mA
Maximum Output Voltage1	$V_{OM1,4}$	-	3.6	4.0	-	V
Transconductance	$G_{M1,4}$	V_{IN} = 100mVp-p, f=1kHz	1.5	1.7	1.9	A/V
PRE OP AMP (SLED DRIVER)						
Common mode Input Range*	V_{OOM}	-	0	-	11.0	V
Input Bias Current	I_B	-	-300	-30	-	nA
Low Level Output Voltage	V_{OL}	-	-	0.1	0.3	V
High Level Output Voltage	V_{OH}	-	10	10.9	-	V
Output Source Current	I_{SOURCE}	-	1	4	-	mA
Output Sink Current	I_{SINK}	-	5	10	-	mA
SLED DRIVE CIRCUIT						
Output Offset voltage2	V_{OF2}	-	-100	0	+100	mV
Maximum Output Voltage2	V_{OM2}	-	10.0	10.9	-	V
Closed loop Voltage Gain1	G_{VLO2}	V_{IN} = 100mVp-p, f=1kHz	18.0	20.0	22.0	dB
Loading DRIVE CIRCUIT						
Output Offset Voltage1	V_{OF3}	-	-50	0	50	mV
Maximum Output Voltage 3	V_{OM3}	-	3.6	4.0	-	V
Closed loop Voltage Gain 2	G_{VLO3}	V_{IN} = 100mVp-p, f=1KHz	13.5	15.5	17.5	dB

* : Guaranteed design value

Application Information

1. Reference Input & Stand-by Function

- Reference input (PIN 27)
  The applied voltage at the reference input pin must be ranged between 0.8V and 6.5V, when V_{CC}=8.5V.
- Stand-by input (PIN 28)
  The following input conditions must be satisfied for the stand-by function.

Stand-by input voltage	OPERATION
below 0.5V or open	The stand-by function is activated so the bias block and power block are disabled
above 2.0V	Recover the normal operation

2. Protection Function

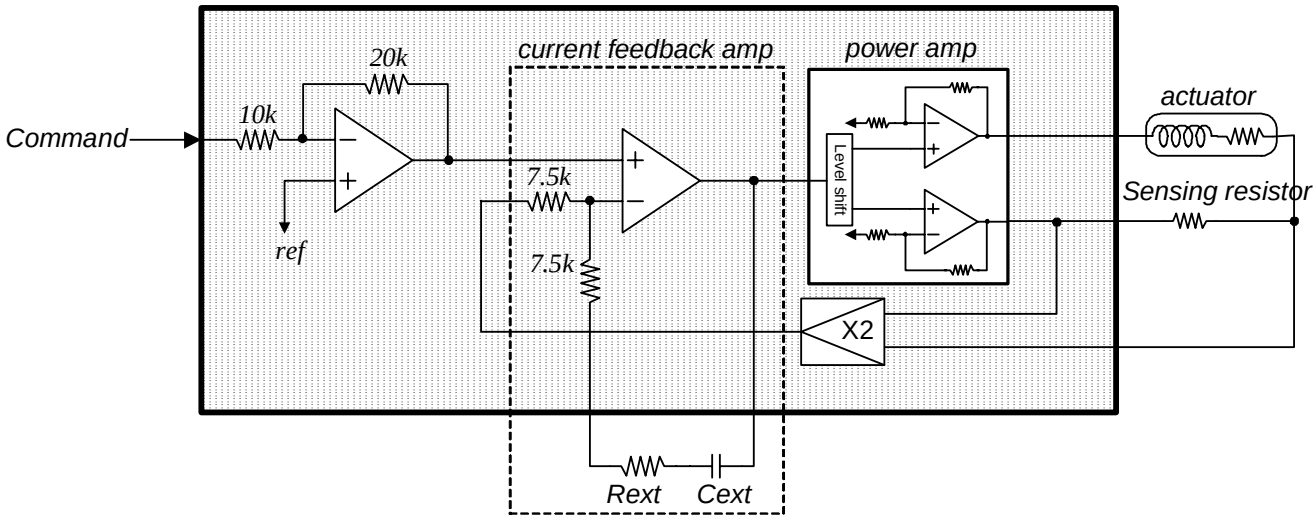
Thermal shutdown (TSD)

If the chip temperature rises above 175°C, the thermal shutdown (TSD) circuit is activated and the output circuit enters the mute state, that is off state. The TSD circuit has a temperature hysteresis of 25°C

3. Separation Of Power Supply

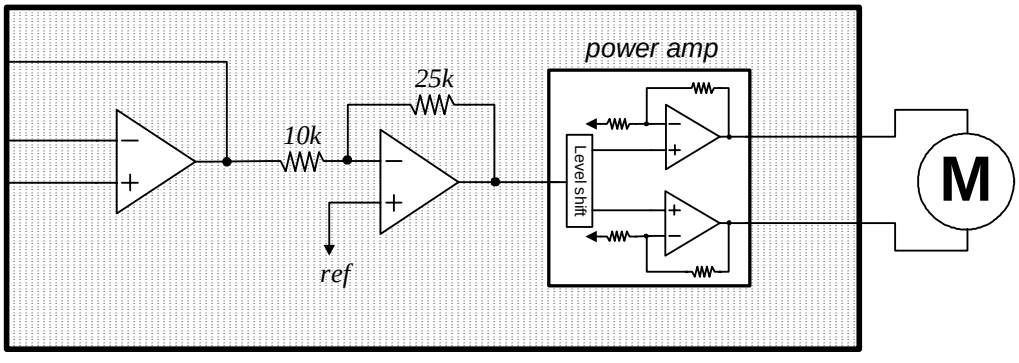
- PV_{CC1} (PIN 9)
  PV_{CC1} is the power supply for the loading driver. The range is between 5V ~ 12V.
- PV_{CC2} (PIN 21)
  PV_{CC2} is the power supply for the actuator drivers that include focus and tracking actuators. The range is between 5V ~ 12V
- V_{CC} (PIN 8)
  V_{CC} pin supplies power for the sled driver and the signal logic part. $V_{CC} \geq PV_{CC1}(PV_{CC2})$.

4. Current feedback channels(channel 1 & 4)



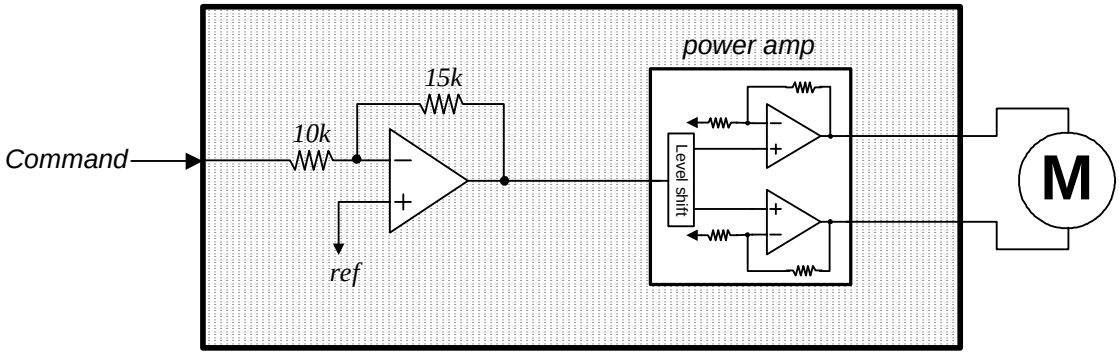
- The reference voltage(ref) is given externally through pin 27.
- The input OP-amp output signal is amplified by (20K/10K) times and then fed to the current feedback amplifier.
- The current feedback amplifier compares the output current sensed input and command input then makes the controlled output to eliminate delay effect of the load. Please refer to the application note for more information about current feedback theory(http://www.fairchildsemi.com/an/AN/AN-4109.pdf).
- The DC gain of current feedback amplifier and power amplifier is unity, that is 1 [A/V]. Users can change the gain by adding external resistor at the command input.

5. Channel 2 schematic



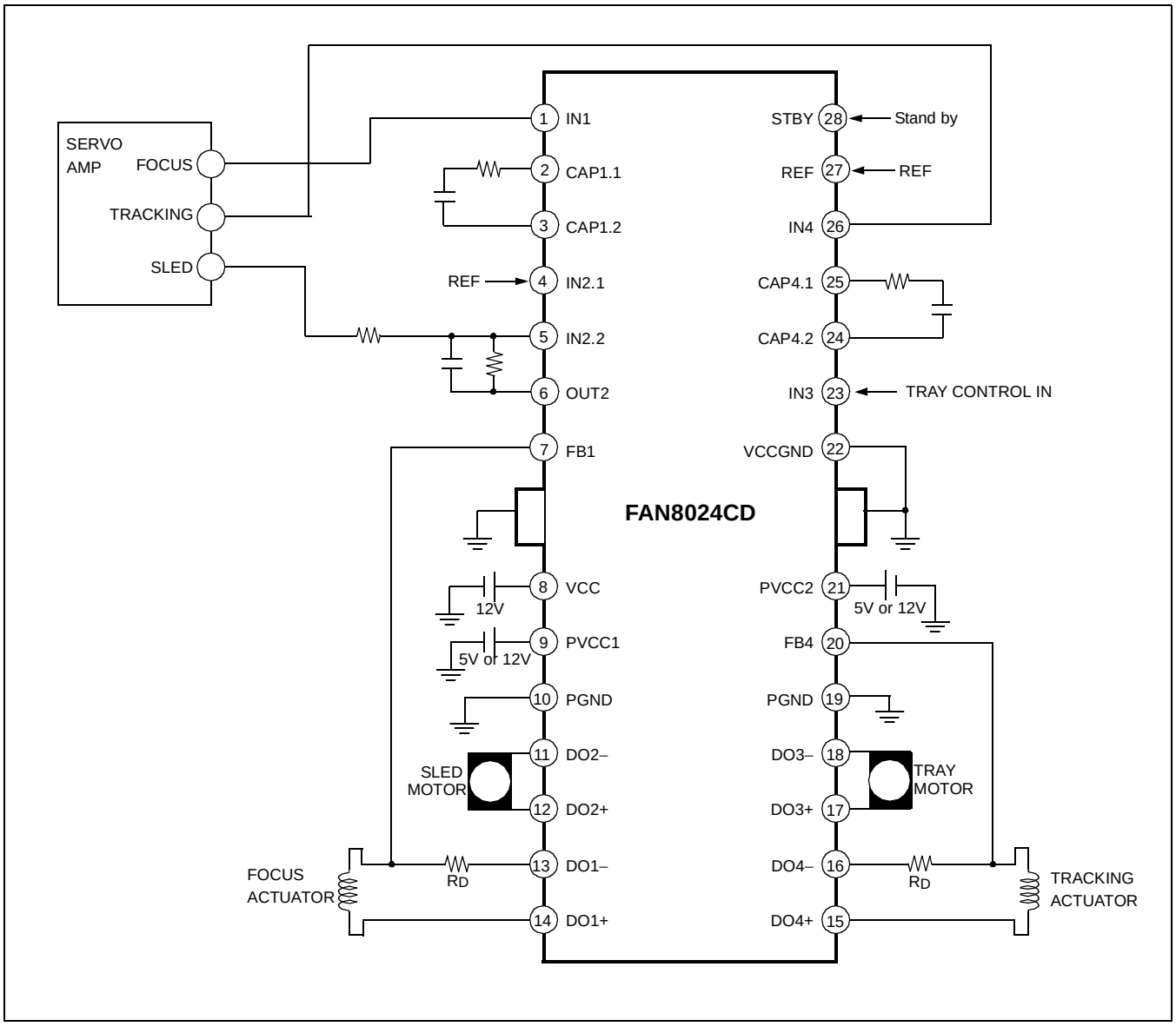
- The reference voltage(ref) is given externally through pin 27.
- The input OP-amp can be used for several purposes, for example low pass filter, differential input coordinator, gain scaler and so on.

6. Channel 3 schematic



- The reference voltage(ref) is given externally through pin 27.
- The input OP-amp output signal is amplified by (15K/10K) times and then fed to the power amplifier. The gain of power amplifier is 4 so the total max gain of channel 3 is 6.
- Users must check input command range to use max output voltage because the total gain is relatively smaller than other channels.

Typical Application Circuits



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