FAN8082 (KA3082N)

Bi-directional DC Motor Driver

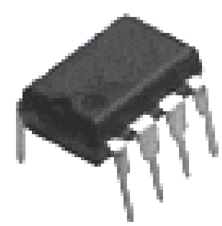
Features

- Built-in brake function for stable brake characteristics.
- Built-in element to absorb a surge current derived from changing motor direction and braking motor drive.
- Motor speed control by an external voltage.
- Stable motor direction change.
- Interfaces with CMOS devices.
- Built-in the thermal shut down circuit (165°C).
- Low standby current. (6.5mA)

Description

The FAN8082 is a monolithic integrated circuit designed for driving bi-directional DC motor with braking and speed control, and it is suitable for the loading motor driver of VCR, CDP, and TOY systems. The speed control can be achieved by adjusting the external voltage of the speed control pin.
It has two pins of logic inputs for controlling the forward/reverse and braking.

8-DIP-300



Typical Applications

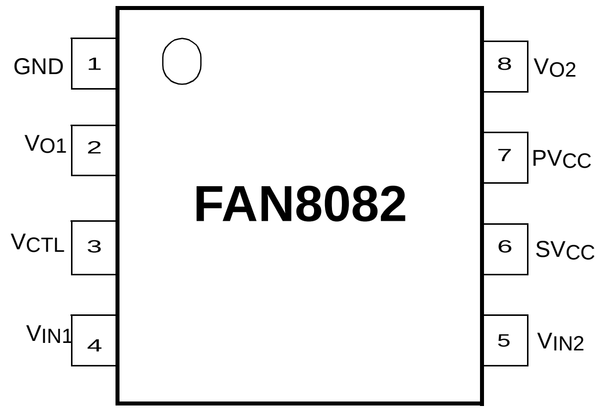
- Compact disk player (CDP) tray or changer
- Low current DC motor such as audio or video equipment.
- General DC motor

Ordering Information

Device	Package	Operating Temp.
FAN8082	8-DIP-300	–25°C ~ +75°C

Rev. 1.0.1
February. 2000.

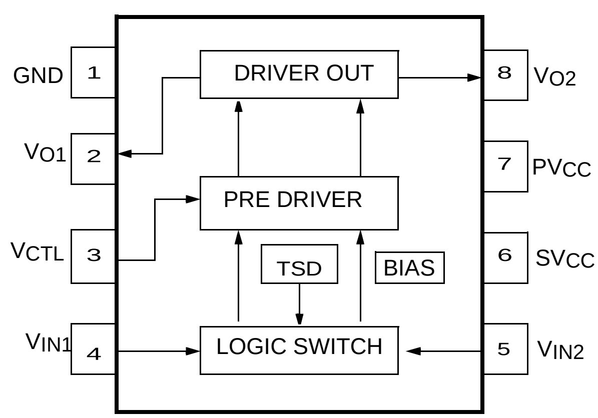
Pin Assignments



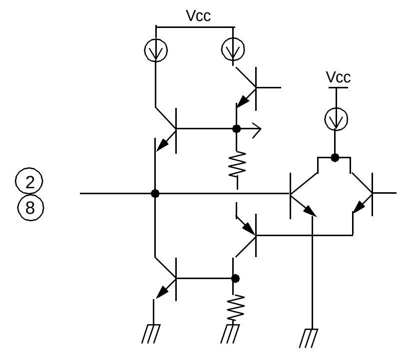
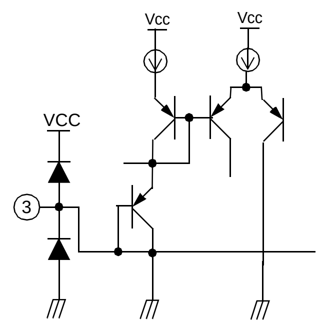
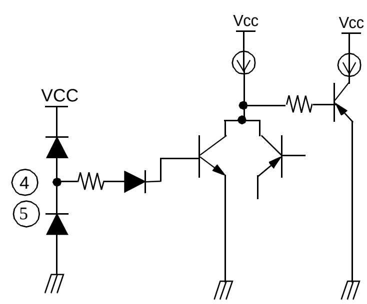
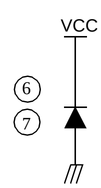
Pin Definitions

Pin Number	Pin Name	I/O	Pin Function Description
1	GND	-	Ground
2	V_{O1}	O	Output 1
3	V_{CTL}	I	Motor speed control
4	V_{IN1}	I	Input 1
5	V_{IN2}	I	Input 2
6	SV_{CC}	-	Supply voltage (Signal)
7	PV_{CC}	-	Supply voltage (Power)
8	V_{O2}	O	Output 2

Internal Block Diagram



Equivalent Circuit

Description	Pin No.	Internal circuit
Output	2, 8	
Speed control	3	
Input	4, 5	
SVCC PVCC	6 7	

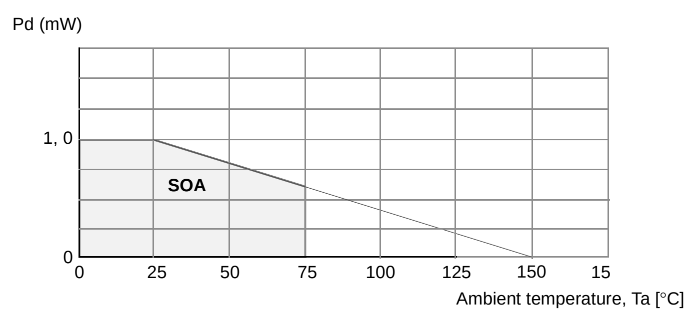
Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit	Remark
Supply voltage	V_{CCmax}	18	V	-
Maxium Output current	I_{Omax}	1.6 note1	A	-
Power dissipation	P_d	1.0 note2	W	-
Operating temperature	T_{OPR}	–25 ~ +75	°C	-
Storage temperature	T_{STG}	–55 ~ +125	°C	-

NOTES:

1. Duty 1 / 100, pulse width 500µs
2. 1) When mounted on glass epoxy PCB (76.2 × 114 × 1.57mm)
   2) Power dissipation reduces 9.6mV / °C for using above Ta=25°C.
   3) Do not exceed Pd and SOA(Safe Operating Area).

Power Dissipation Curve



Recommened Operating Conditions (Ta = 25°C)

Parameter	Symbol	Operating voltage range	Unit
Operating supply voltage note	SV_{CC},PV_{CC}	7 ~ 18	V

NOTE:

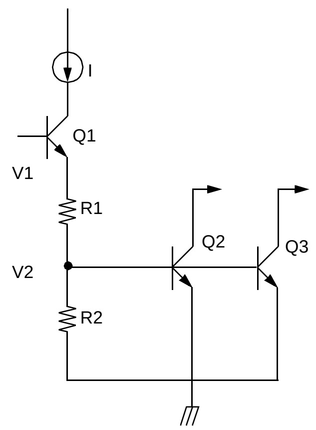
Caution 1) $PV_{CC} \le SV_{CC}$
Caution 2) When PV_{CC} is above 16V, the V_{CTL} must be opened or $8.5 \le V_{CTL} \le PV_{CC}$

Electrical Characteristics (Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Quiescent current	I_{CC}	Pin4 & 6: GND, $R_L=\infty$	4	6.5	9.5	mA
Min. input-on current 1	I_{IN1}	$R_L=\infty$, Pin4=I_{IN1}, Pin5=L	-	10	30	μA
Min. input-on current 2	I_{IN2}	$R_L=\infty$, Pin4=L, Pin5=I_{IN}	-	10	30	μA
Input threshold voltage 1	V_{ITH1}	$R_L=\infty$, Pin4=V_{IN}, Pin5=L	1.0	1.3	1.6	V
Input threshold voltage 2	V_{ITH2}	$R_L=\infty$, Pin4=L, Pin5=V_{IN}	1.0	1.3	1.6	V
Output leakage current 1	I_{OL1}	$R_L=\infty$, Pin4 & 6=GND	-	0.01	1	mA
Output leakage current 2	I_{OL2}	$R_L=\infty$, Pin4 & 6=GND	-	0.01	1	mA
Zener current 1	I_{Z1}	$R_L=\infty$, Pin4=H, Pin5=L	-	0.85	1.5	mA
Zener current 2	I_{Z2}	$R_L=\infty$, Pin4=L, Pin5=H	-	0.85	1.5	mA
Output voltage 1	V_{O1}	$R_L=60\Omega$, Pin4=H, Pin5=L	6.6	7.2	7.4	V
Output voltage 2	V_{O2}	$R_L=60\Omega$, Pin4=L, Pin5=H	6.6	7.2	7.4	V
Saturation voltage 1 (Upper)	V_{SAT1}	I_O=300mA	-	1.9	2.3	V
Saturation voltage 2 (Upper)	V_{SAT2}	I_O=500mA	-	1.9	2.3	V
Saturation voltage 1 (Lower)	V_{SAT3}	I_O=300mA	-	0.25	0.5	V
Saturation voltage 2 (Lower)	V_{SAT4}	I_O=500mA	-	0.4	0.65	V

Application Information

1. THERMAL SHUT DOWN CIRCUIT



When Ta = 25°C, Q2 & Q3 are Turned-off and output stage operates normally.

$V_1 = I \times (R1 + R2)$

$V_2 = R2 / (R1 + R2) \times V1 = 0.37V$

When Ta = 165°C, Q2 & Q3 Turn-on and it turns-off the output stage.

0.70V - 0.37V = 330mV (When Q_2 & Q_3 are Turn-on, $Vbe_{Q2} = Vbe_{Q3} = 0.70V$)

And temperature coefficient of $Q_2 = Q_3 = -2mV$ / °C

$\therefore$ T.S.D: 330mV / 2mV = 165°C

2. LOGIC INPUT & OUTPUT TABLE

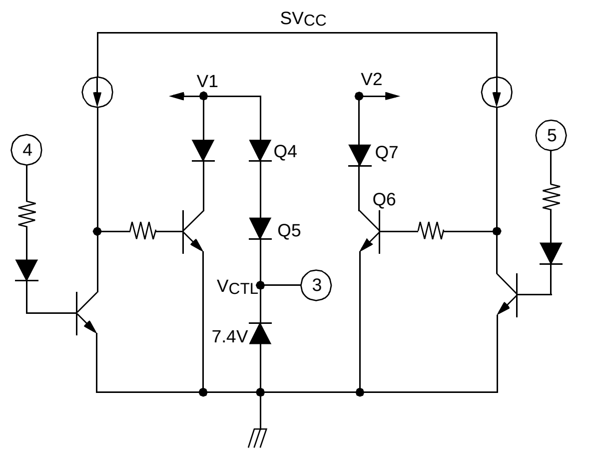
Input		Output		Motor
Pin #4	Pin #5	Pin #2	Pin #8	
Low	Low	*Low	*Low	Brake
High	Low	High	Low	Forward
Low	High	Low	High	Reverse
High	High	*Low	*Low	Brake

INPUT High is above 2.0V.
INPUT Low is below 0.7V.

*Low : All Power TRs are off-state.

But internal Bias makes output Voltage low state.

3. LOGIC SWITCH CIRCUIT



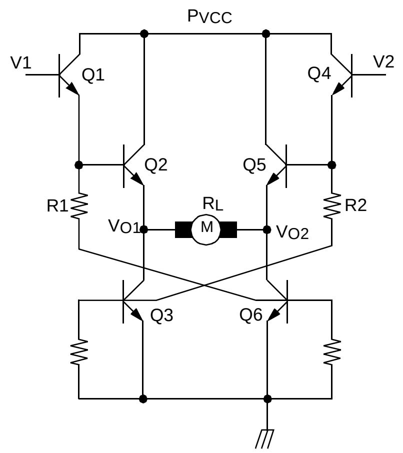
This circuit define reference voltage of output.

When pin #4 is "H" and pin #5 is "L",

- $V1 = Vzd + Vbe_{Q4} + Vbe_{Q5} \doteq 8.9V$
- $V2 = Vbeq\ 7 + Vsat_{Q6} \doteq 0.87V$

V1 and V2 are related with the output voltage of the motor and change according to the voltage of pin #3 (V_{CTL}).

4. DRIVE OUTPUT CIRCUIT



$V_1 = 8.9V$

$V_2 = 0.87V$

$V_{O1} = V_1 - V_{BEQ1} - V_{BEQ2}$

$V_{O2} = V_{Q6SAT}$

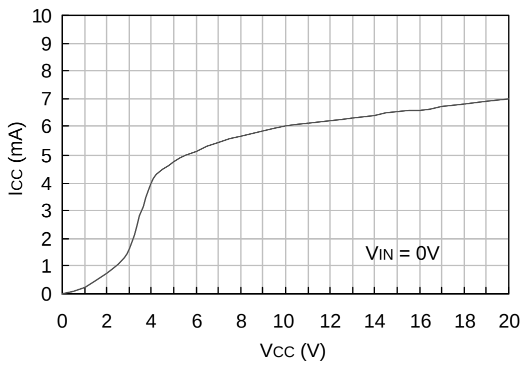
$V_O = V_{O1} - V_{O2} = V_1 - V_{BEQ1} - V_{BEQ2} - V_{Q6SAT}$

$I_{RL} = (V_{O1} - V_{O2}) / R_L$

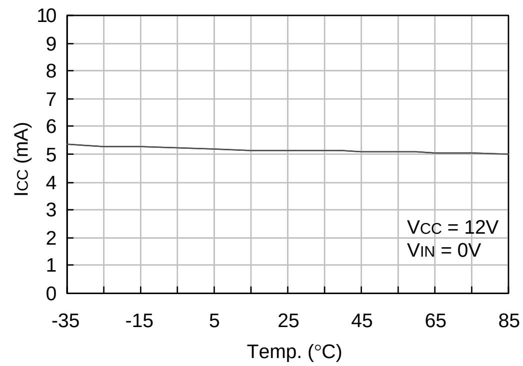
Typical Perfomance Chracteristics

CHARACTERISTICS GRAPHS

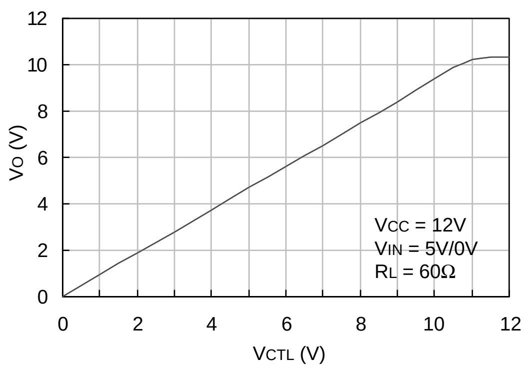
1. VCC vs ICC



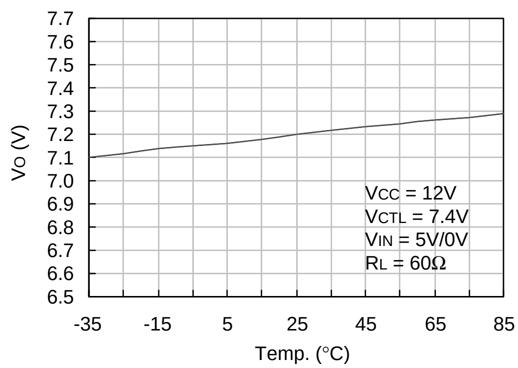
2. Temperature vs ICC



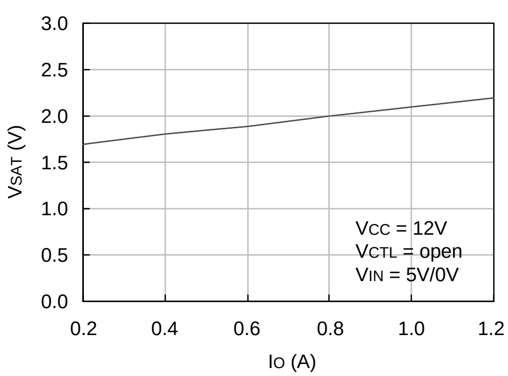
3. VCTL vs. VO



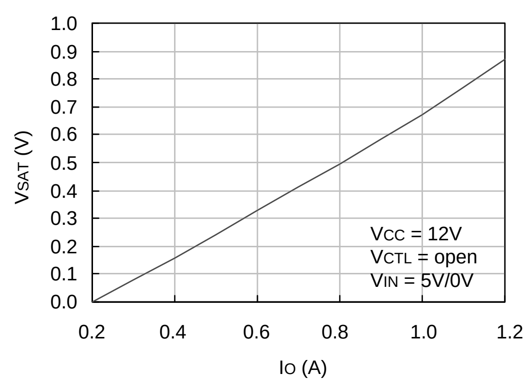
4. Temperature vs. VO



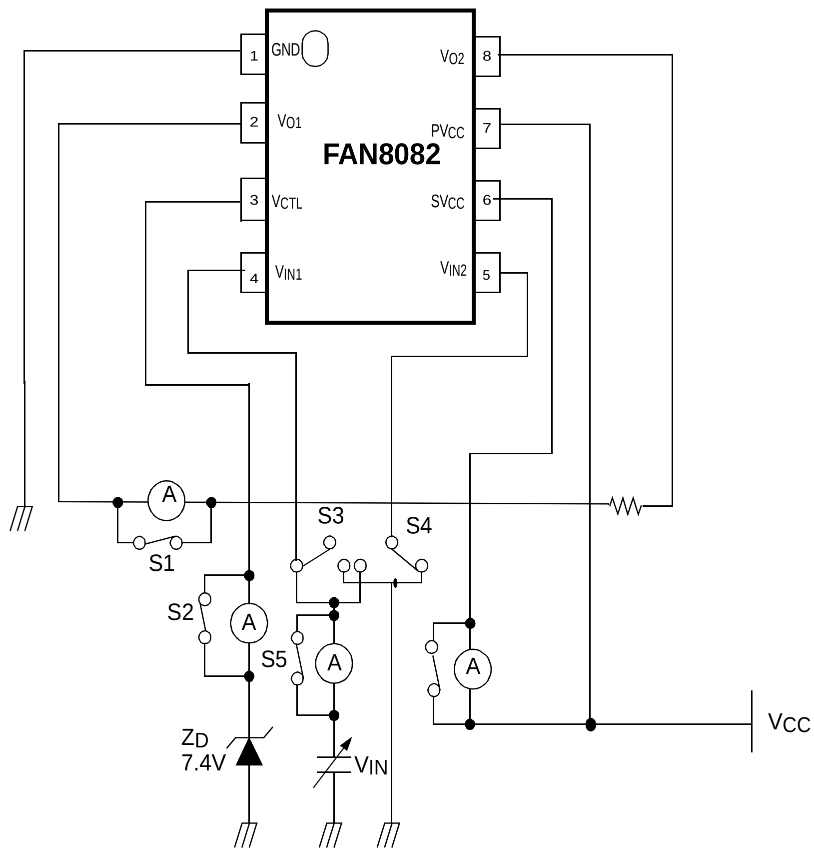
5. IO vs. VSAT (UPPER)



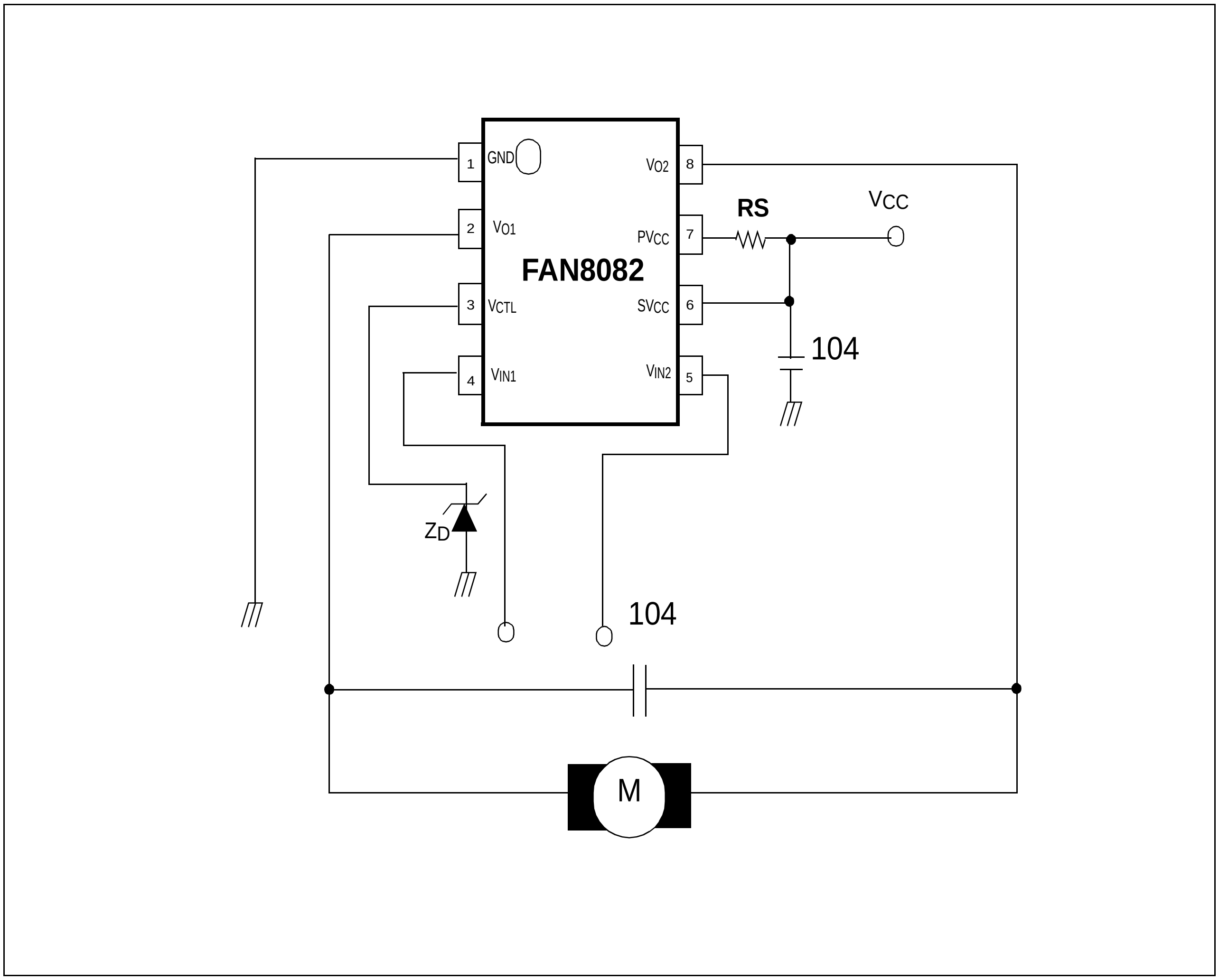
6. IO vs. VSAT (LOWER)



Test Circuits



Application Circuits



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