

KA3082

Bi-Directional DC Motor Driver

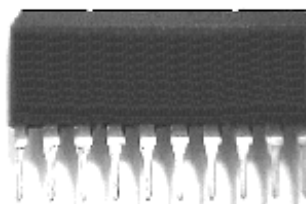
Features

- 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 KA3082 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.

10-SIP



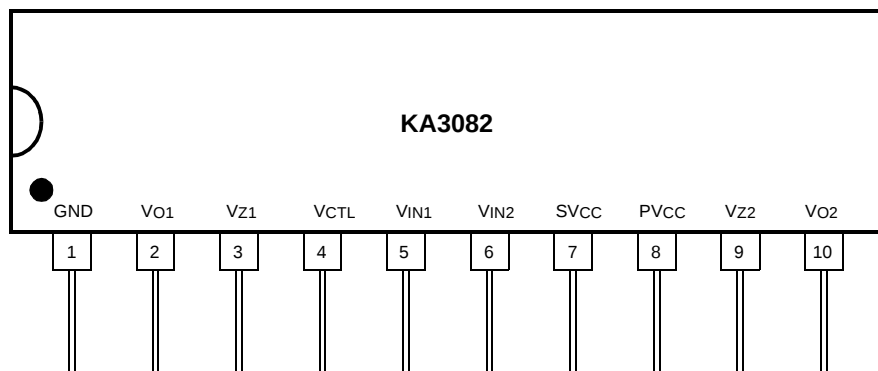
Target Applications

- Video cassette recorder (VCR) loading motor
- Low current DC motor such as audio or video equipment.
- General DC motor

Ordering Information

Device	Package	Operating Temp.
KA3082B	10-SIP	-25°C ~ +75°C

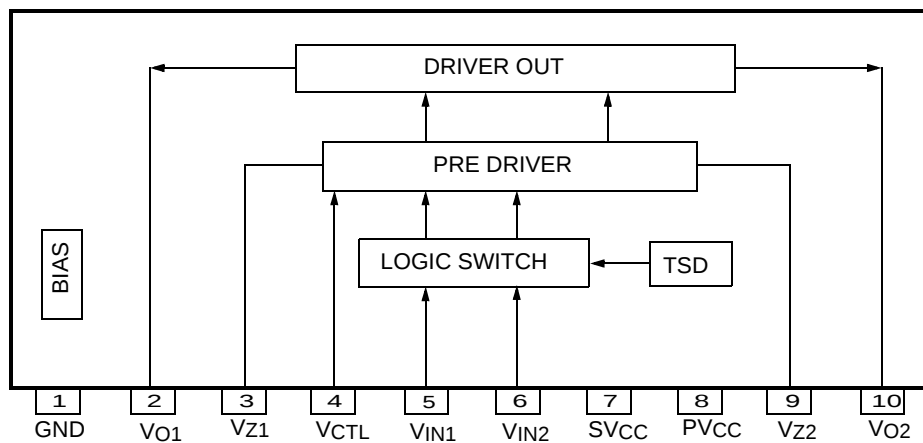
Pin Assignments



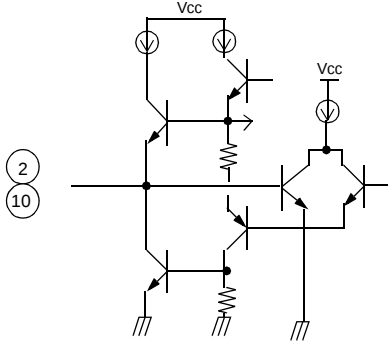
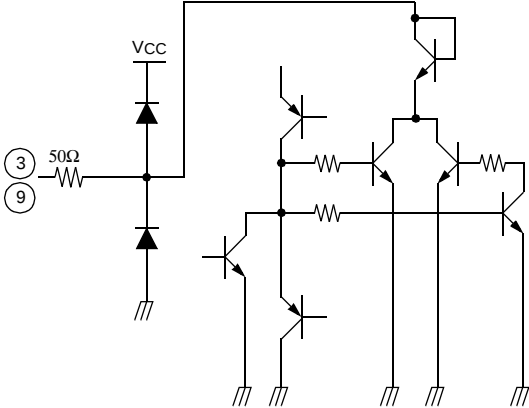
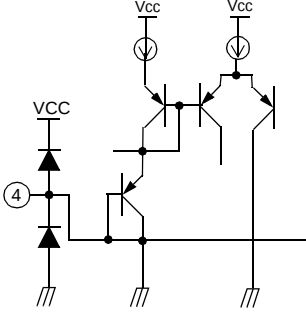
Pin Definitions

Pin Number	Pin Name	I/O	Pin Function Description
1	GND	-	Ground
2	VO1	O	Output 1
3	VZ1	-	Phase compensation
4	VCTL	I	Motor speed control
5	VIN1	I	Input 1
6	VIN2	I	Input 2
7	SVCC	-	Supply voltage (Signal)
8	PVCC	-	Supply voltage (Power)
9	VZ2	-	Phase compensation
10	VO2	O	Output 2

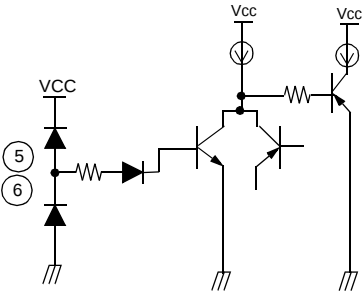
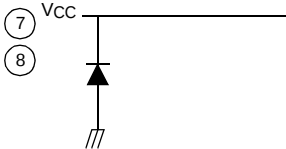
Internal Block Diagram



Equivalent Circuits

Description	Pin No.	Internal circuit
Output	2, 10	
Phase compensation	3, 9	
Speed control	4	

Equivalent Circuit (Continued)

Description	Pin No.	Internal circuit
Input	5, 6	
SVCC PVCC	7 8	

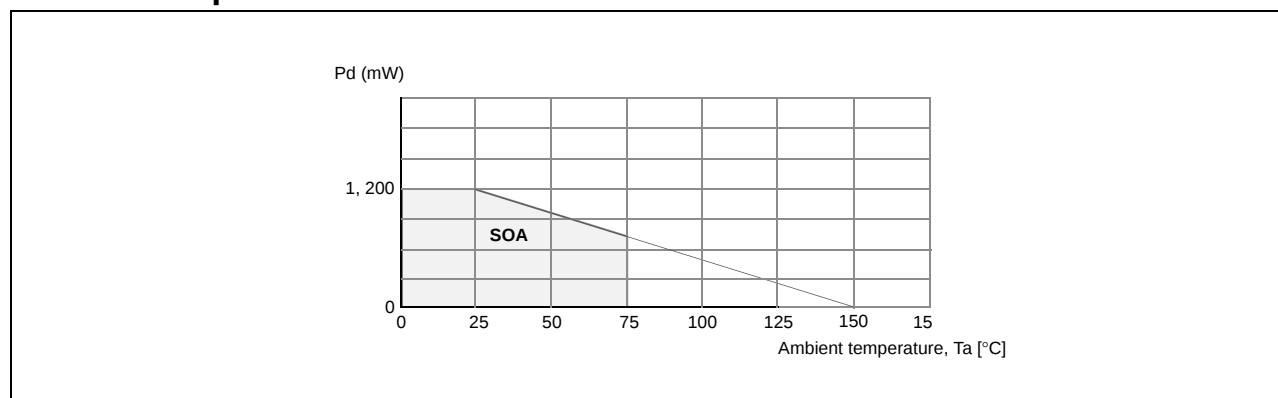
Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Value	Unit	Remark
Supply voltage	V _{CCmax}	18	V	-
Maxium Output current	I _{Omax}	1.6 ^{note1}	A	-
Power dissipation	P _d	1.2 ^{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 9.6mW / °C for using above Ta=25°C.
- 3) Do not exceed P_d and SOA(Safe Operating Area).

Power Dissipation Curve



Recommened Operating Conditions (Ta=25°C)

Parameter	Symbol	Operating voltage range	Unit
Operating supply voltage	SV _{CC} , PV _{CC}	7 ~ 18	V

Notes:

Caution 1) PV_{CC} ≤ SV_{CC}

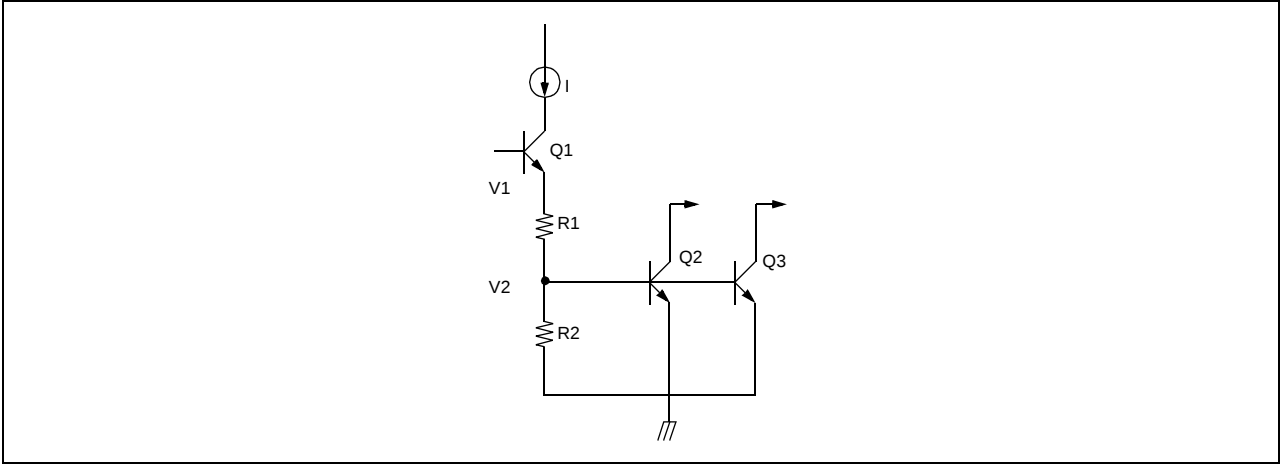
Caution 2) When PV_{CC} is above 16V, the V_{CTL} must be opened or 8.5 ≤ V_{CTL} ≤ PV_{CC}

Electrical Characteristics (Ta=25°C, VCC=SVCC=PVCC=12V)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Quiescent current	ICC	Pin5 & 6: GND, RL=∞	4	6.5	9.5	mA
Min. input-on current 1	IIN1	RL=∞, pin5=IIN1, pin6=L	-	10	30	μA
Min. input-on current 2	IIN2	RL=∞, pin5=L, pin6=IIN	-	10	30	μA
Input threshold voltage 1	VITH1	RL=∞, pin5=VIN, pin6=L	1.0	1.3	1.6	V
Input threshold voltage 2	VITH2	RL=∞, pin5=L, pin6=VIN	1.0	1.3	1.6	V
Output leakage current 1	IOL1	RL=∞, pin5 & 6=GND	-	0.01	1	mA
Output leakage current 2	IOL2	RL=∞, pin5 & 6=GND	-	0.01	1	mA
Zener current 1	Iz1	RL=∞, pin5=H, pin6=L	-	0.85	1.5	mA
Zener current 2	Iz2	RL=∞, pin5=L, pin6=H	-	0.85	1.5	mA
Output voltage 1	VO1	RL=60Ω, pin5=H, pin6=L	6.6	7.2	7.4	V
Output voltage 2	VO2	RL=60Ω, pin5=L, pin6=H	6.6	7.2	7.4	V
Saturation voltage 1 (Upper)	V SAT1	IO=300mA	-	1.9	2.3	V
Saturation voltage 2 (Upper)	VSAT2	IO=500mA	-	1.9	2.3	V
Saturation voltage 1 (Lower)	VSAT3	IO=300mA	-	0.25	0.5	V
Saturation voltage 2 (Lower)	VSAT4	IO=500mA	-	0.4	0.65	V

Application Information

1. THERMAL SHUT DOWN CIRCUIT



When $T_a = 25^{\circ}\text{C}$, Q2 & Q3 are Turn-off and output stage operate normally.

$$V_1 = I \times (R_1 + R_2)$$

$$V_2 = R_2 / (R_1 + R_2) \times V_1 = 0.37\text{V}$$

When $T_a = 165^{\circ}\text{C}$, Q2 & Q3 become Turn-on and it turn-off the output stage.

$$0.70\text{V} - 0.37\text{V} = 330\text{mV} \text{ (When Q2 \& Q3 are Turn-on, } V_{beQ2} = V_{beQ3} = 0.70\text{V)}$$

And temperature coefficient of $Q_2 = Q_3 = -2\text{mV} / ^{\circ}\text{C}$

$$\therefore \text{T.S.D: } 330\text{mV} / 2\text{mV} = 165^{\circ}\text{C}$$

2. LOGIC INPUT & OUTPUT TABLE

Input		Output		Motor
Pin #5	Pin #6	Pin #2	Pin #10	
Low	Low	*Low	*Low	Brake
High	Low	High	Low	Forward
Low	High	Low	High	Reverse
High	High	*Low	*Low	Brake

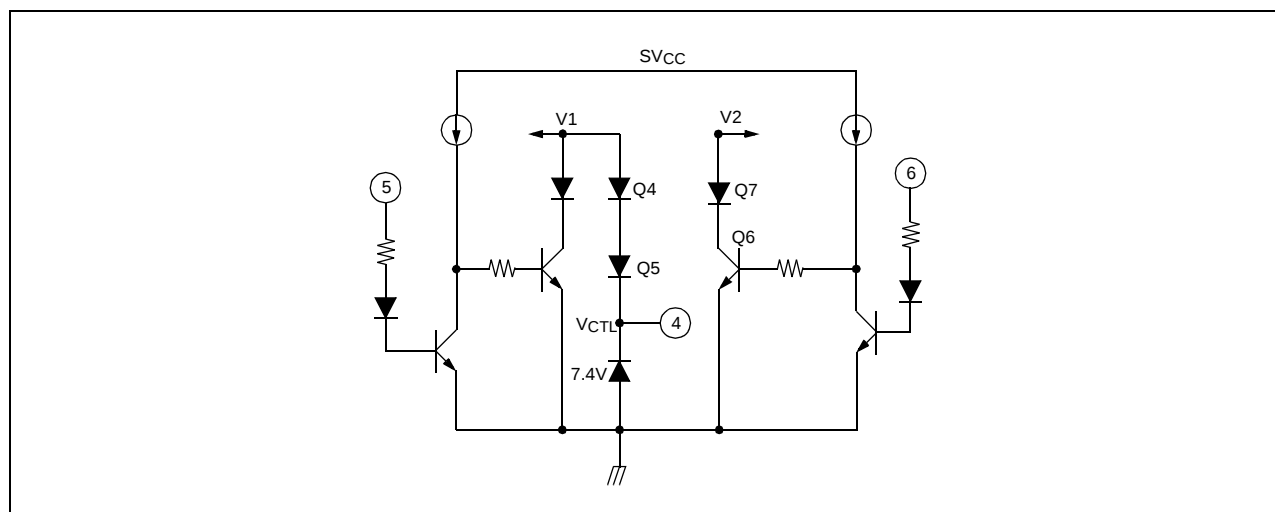
INPUT High is above 2.0V.

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



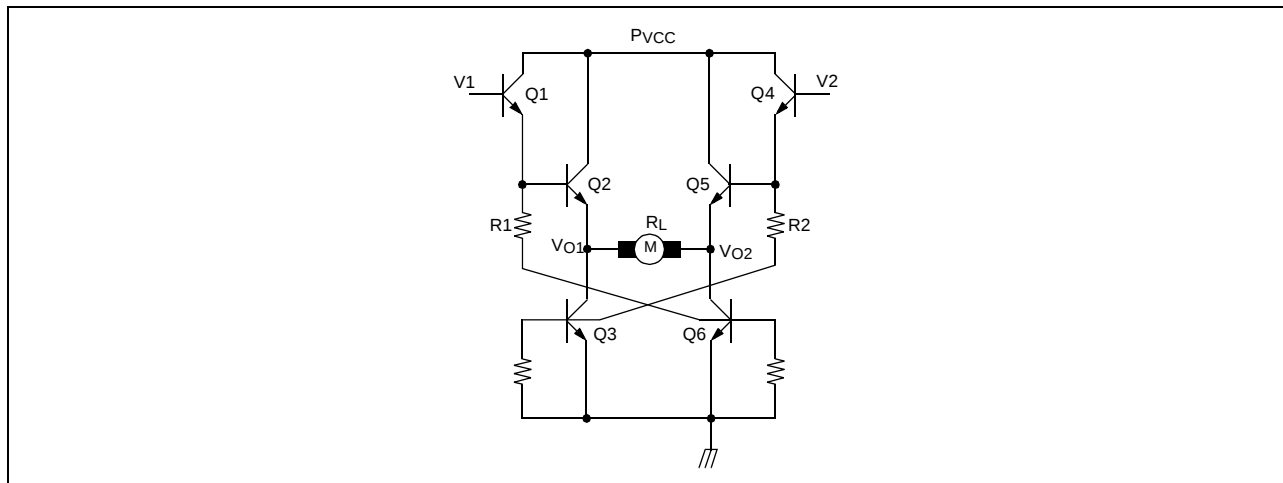
This circuit define reference voltage of output.

When pin #5 is “H” and pin #6 is “L”,

- $V1 = V_{ZD} + V_{BEQ4} + V_{BEQ5} \approx 8.9V$
- $V2 = V_{BEQ7} + V_{SATQ6} \approx 0.87V$

V1 and V2 are related with the output voltage of the motor and change according to the voltage of pin #4 (V_{CTL}).

4. DRIVE OUTPUT CIRCUIT



$$V_1 = 8.9V$$

$$V_2 = 0.87V$$

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

$$V_{O2} = V_{Q6SAT}$$

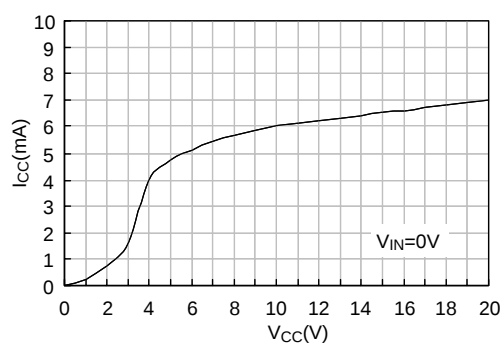
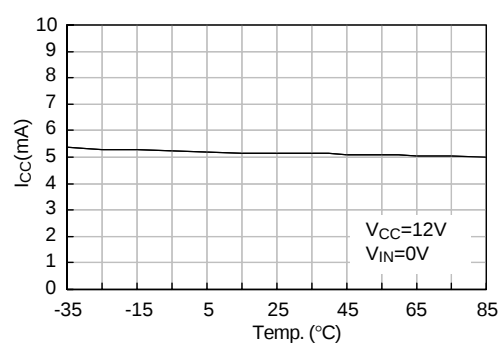
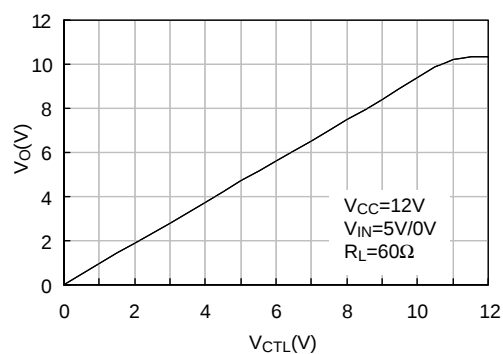
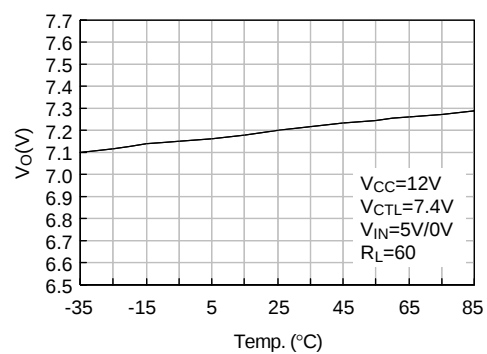
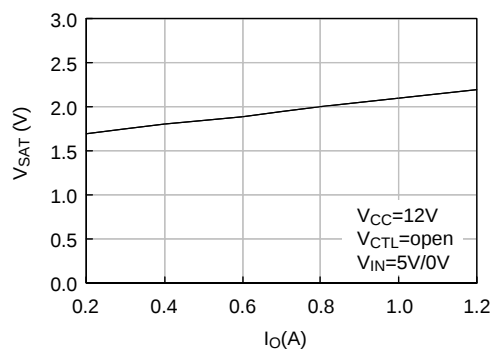
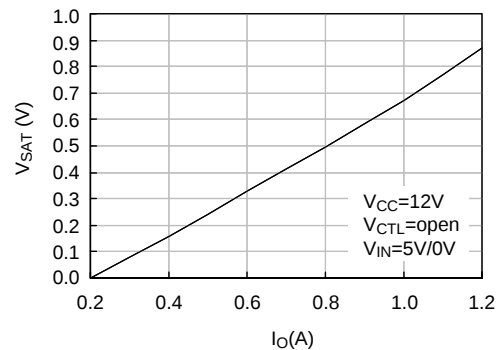
$$V_O = V_{O1} - V_{O2}$$

$$= V_1 - V_{BEQ1} - V_{BEQ2} - V_{Q6SAT}$$

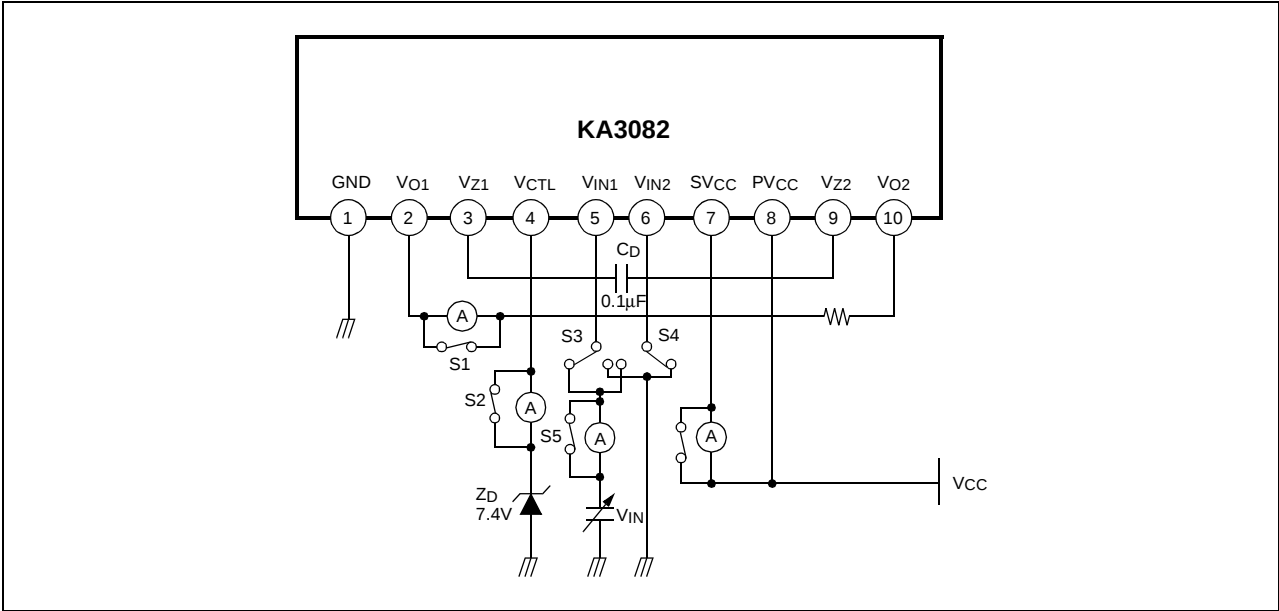
$$I_{RL} = (V_{O1} - V_{O2}) / R_L$$

Typical Performance Characteristics

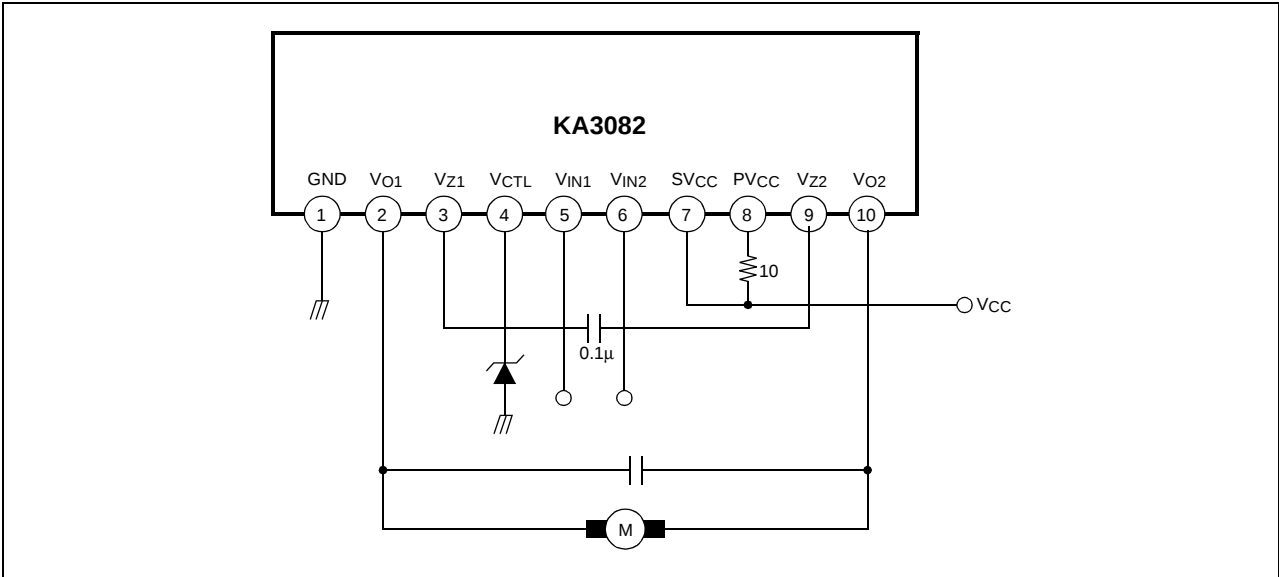
CHARACTERISTICS GRAPHS

1. V_{CC} vs I_{CC} 2. Temperature vs I_{CC} 3. V_{CTL} vs V_O 4. Temperature vs V_O 5. I_O vs V_{SAT} (UPPER)6. I_O vs V_{SAT} (LOWER)

Test Circuits



Typical Application Circuits



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