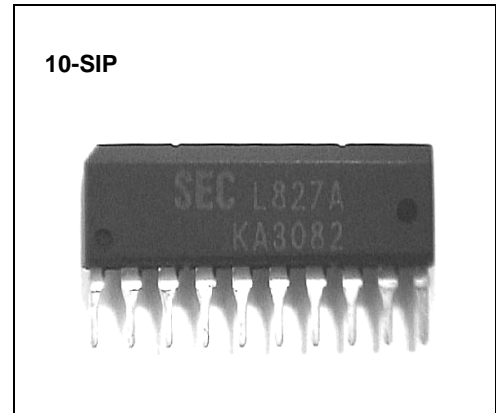


### BI-DIRECTIONAL DC MOTOR DRIVER

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.

And it has two pins of logic inputs for controlling the direction as forward, reverse and braking.



### FEATURES

- Built-in brake function for stable brake characteristics.
- Built-in element to absorb a dash 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)

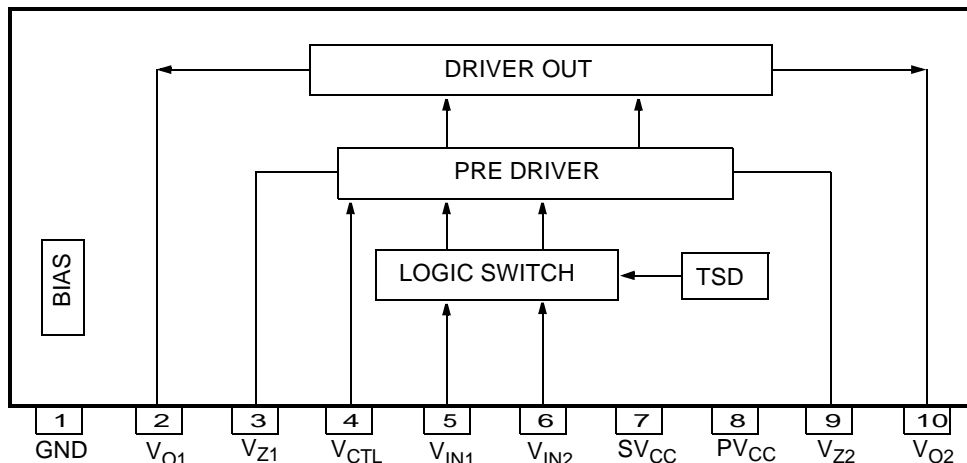
### ORDERING INFORMATION

Device	Package	Operating Temperature
KA3082	10-SIP	-25°C ~ +75°C

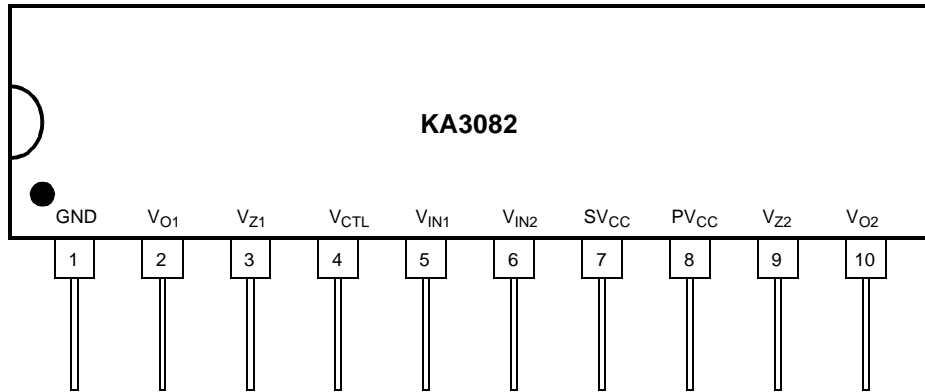
### TARGET APPLICATIONS

- VCR
- low current DC motor such as Audio equipment.

### BLOCK DIAGRAM



## PIN CONFIGURATIONS



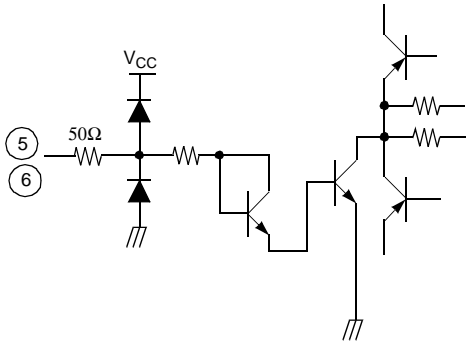
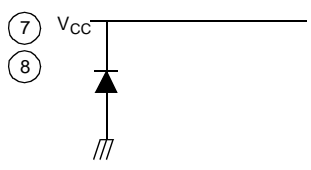
## PIN DESCRIPTION

Pin No.	Symbol	I/O	Description	Pin No.	Symbol	I/O	Description
1	GND	–	Ground	6	$V_{IN2}$	I	Input 2
2	$V_{O1}$	O	Output 1	7	$SV_{CC}$	–	Supply voltage (Signal)
3	$V_{Z1}$	–	Phase compensation	8	$PV_{CC}$	–	Supply voltage (Power)
4	$V_{CTL}$	I	Motor speed control	9	$V_{Z2}$	–	Phase compensation
5	$F_{IN1}$	I	Input 1	10	$V_{O2}$	O	Output 2

**INTERNAL CIRCUIT**

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

**INTERNAL CIRCUIT (Continued)**

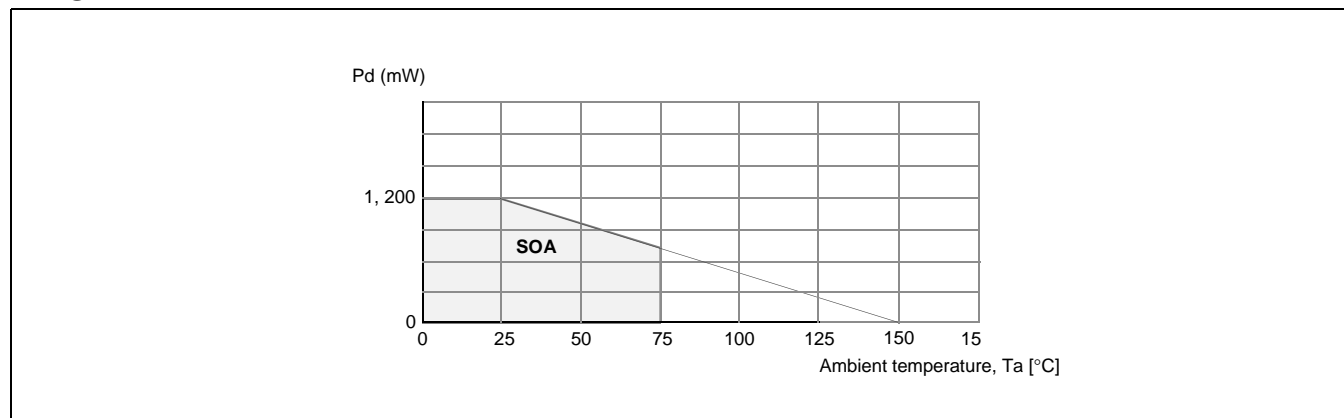
Description	Pin No.	Internal circuit
Input	5, 6	
SVCC PVCC	7 8	

**ABSOLUTE MAXIMUM RATING (Ta=25°C)**

Characteristics	Symbol	Value	Unit	Remark
Supply voltage	$V_{CCmax}$	18	V	–
Maxium Output current	$I_{Omax}$	1.6 <sup>note1</sup>	A	–
Power dissipation	$P_d$	1.2 <sup>note2</sup>	W	–
Operating temperature	$T_{OPR}$	–25 ~ +75	°C	–
Storage temperature	$T_{STG}$	–55 ~ +125	°C	–

**NOTES:**

- Duty 1 / 100, pulse width 500 $\mu$ s
- When mounted on glass epoxy PCB (76.2 × 114 × 1.57mm)
  - Power dissipation reduces 9.6mV / °C for using above Ta=25°C.
  - Do not exceed Pd and SOA.

**PD GRAPH****RECOMMENED OPERATING CONDITIONS (Ta=25°C)**

Characteristics	Symbol	Operating voltage range	Unit
Operating supply voltage	$V_{CC}$	7 ~ 18	V

**NOTE:**

Caution 1)  $V_{CC2} \leq V_{CC1}$

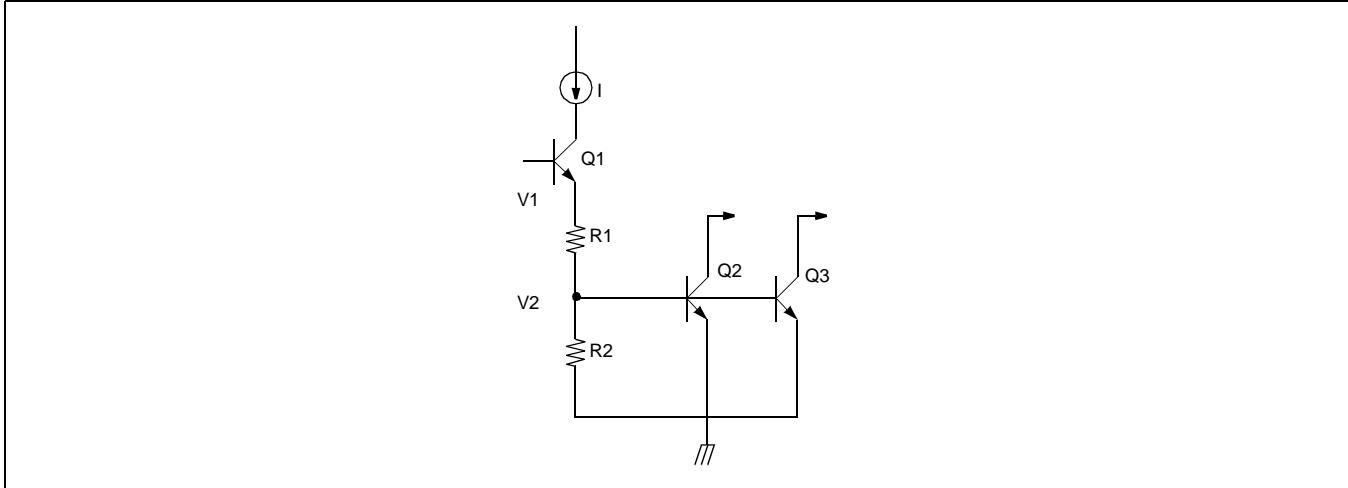
Caution 2) When  $V_{CC}$  is above 16V, the  $V_{CTL}$  must be opened or  $8.5 \leq V_{CTL} \leq V_{CC2}$

**ELECTRICAL CHARACTERISTICS** ( $T_a=25^\circ\text{C}$ ,  $V_{CC}=SV_{CC}=PV_{CC}=12\text{V}$ )

Characteristic	Symbol	Test conditions	Min.	Typ.	max.	Unit
Quiescent current	$I_{CC}$	Pin5 & 6: GND, $R_L=\infty$	4	6.5	9.5	mA
Min. input-on current 1	$I_{IN1}$	$R_L=\infty$ , pin5= $I_{IN1}$ , pin6=L	–	10	30	$\mu\text{A}$
Min. input-on current 2	$I_{IN2}$	$R_L=\infty$ , pin5=L, pin6= $I_{IN}$	–	10	30	$\mu\text{A}$
Input threshold voltage 1	$V_{ITH1}$	$R_L=\infty$ , pin5= $V_{IN}$ , pin6=L	1.0	1.3	1.6	V
Input threshold voltage 2	$V_{ITH2}$	$R_L=\infty$ , pin5=L, pin6= $V_{IN}$	1.0	1.3	1.6	V
Output leakage current 1	$I_{OL1}$	$R_L=\infty$ , pin5 & 6=GND	–	0.01	1	mA
Output leakage current 2	$I_{OL2}$	$R_L=\infty$ , pin5 & 6=GND	–	0.01	1	mA
Zener current 1	$I_{Z1}$	$R_L=\infty$ , pin5=H, pin6=L	–	0.85	1.5	mA
Zener current 2	$I_{Z2}$	$R_L=\infty$ , pin5=L, pin6=H	–	0.85	1.5	mA
Output voltage 1	$V_{O1}$	$R_L=60\Omega$ , pin5=H, pin6=L	6.6	7.2	7.4	V
Output voltage 2	$V_{O2}$	$R_L=60\Omega$ , pin5=L, pin6=H	6.6	7.2	7.4	V
Saturation voltage 1 (Upper)	$V_{SAT1}$	$I_O=300\text{mA}$	–	1.9	2.3	V
Saturation voltage 2 (Upper)	$V_{SAT2}$	$I_O=500\text{mA}$	–	1.9	2.3	V
Saturation voltage 1 (Lower)	$V_{SAT3}$	$I_O=300\text{mA}$	–	0.25	0.5	V
Saturation voltage 2 (Lower)	$V_{SAT4}$	$I_O=500\text{mA}$	–	0.4	0.65	V

**APPLICATION INFORMATIONS**

**1. THERMAL SHUT DOWN CIRCUIT**



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

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

When  $T_a = 25^\circ C$ ,  $Q_2$  &  $Q_3$  are Turn-off. (because  $V_2 = 0.37V$ )

$0.73V - 0.37V = 360mV$  (When  $Q_2$  &  $Q_3$  are Turn-on,  $V_{beQ2} = V_{beQ3} = 0.73V$ )

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

$\therefore$  T.S.D:  $360mV / 2mV = 180^\circ C$

When temperature of TR is  $180^\circ C$ ,  $Q_2$  &  $Q_3$  become Turn-on and make the bias voltage of output stage saturate.

**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

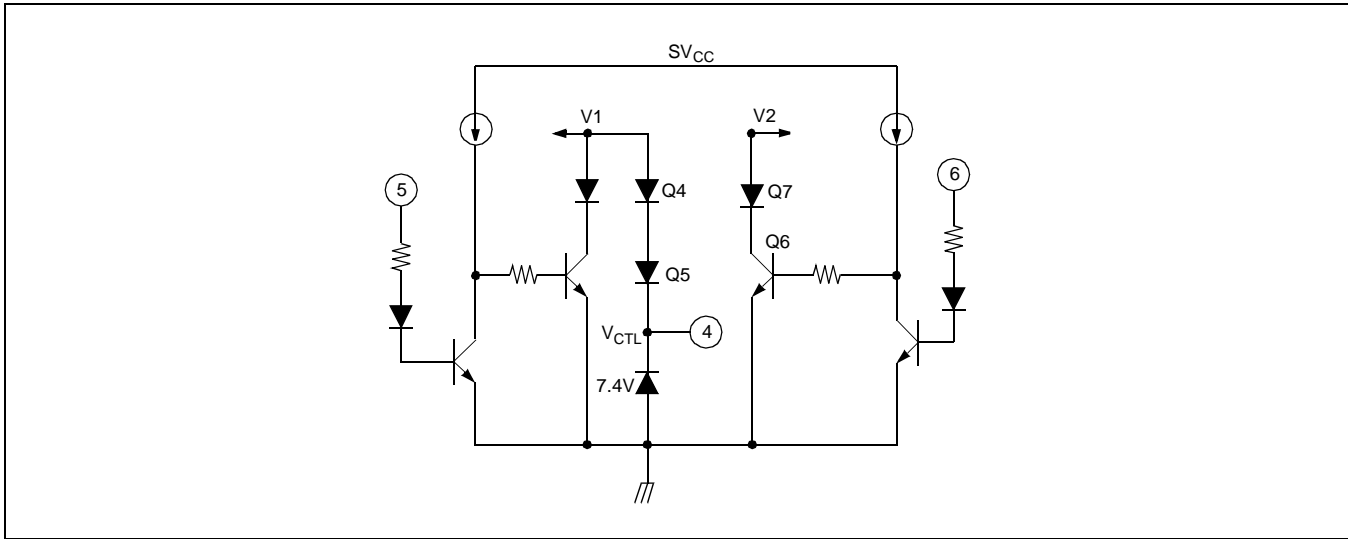
INPUT High is above 2.0V.

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



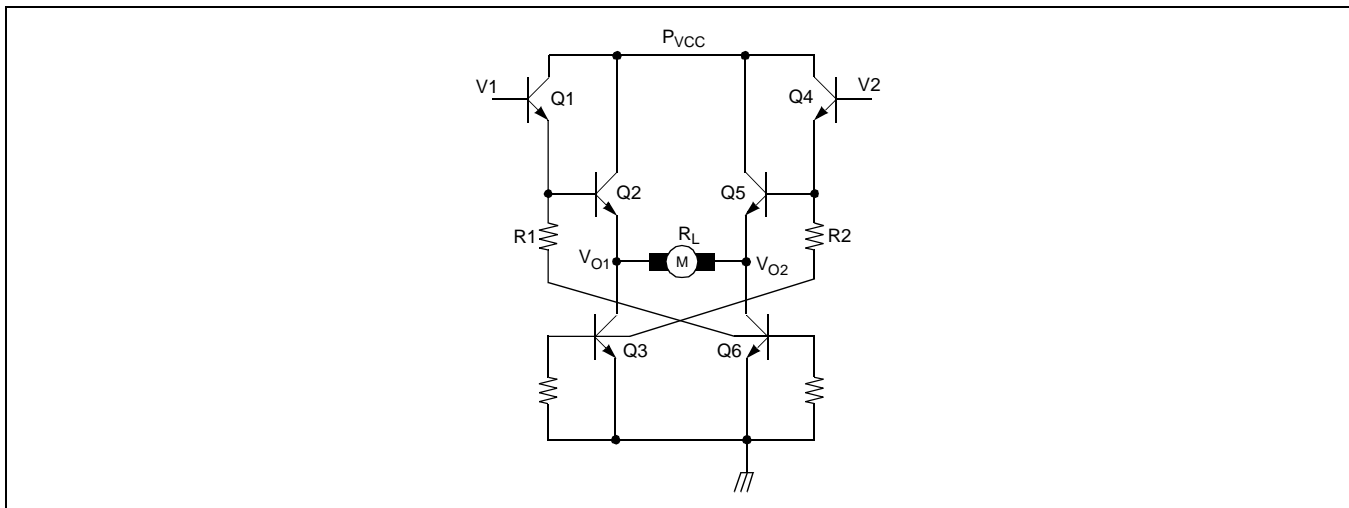
This circuit define reference voltage of output.

When pin #5 is "H" and pin #6 is "L",

- $V1 = V_{zd} + V_{be_{Q4}} + V_{be_{Q5}} = 8.9V$
- $V2 = V_{be_{Q7}} + V_{sat_{Q6}} = 0.87V$

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

## 4. DRIVE OUTPUT CIRCUIT



$$V_1 = 8.9V$$

$$V_2 = 0.87V$$

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

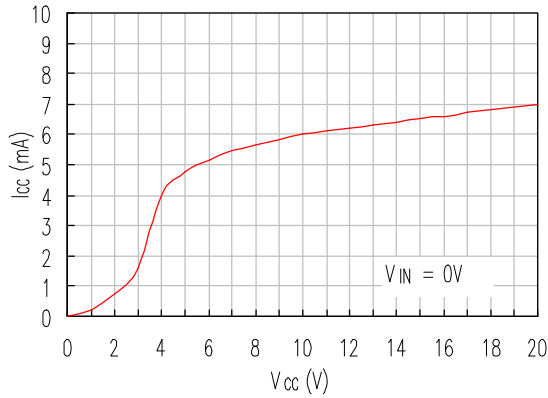
$$V_{O2} = V_{Q6SAT}$$

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

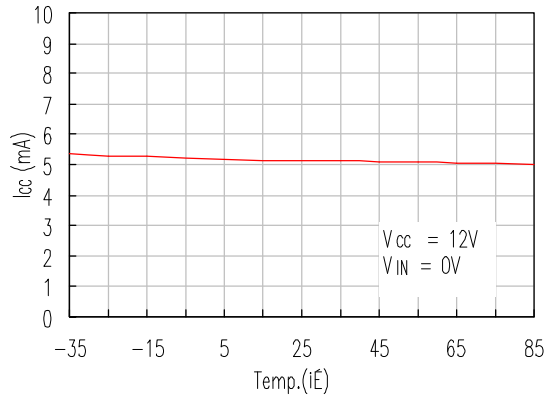
$$= V_1 - V_{BEQ1} - V_{BEQ2} - V_{Q6SAT}$$

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

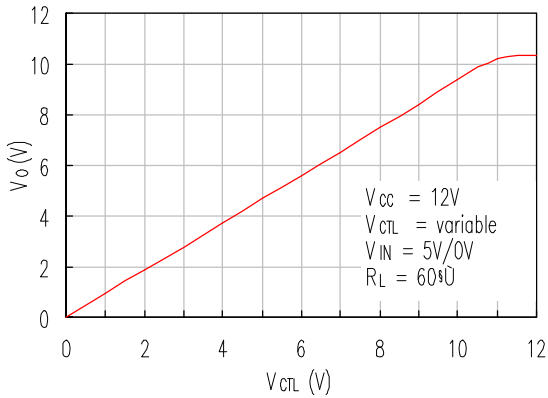
CHARACTERISTICS GRAPHS



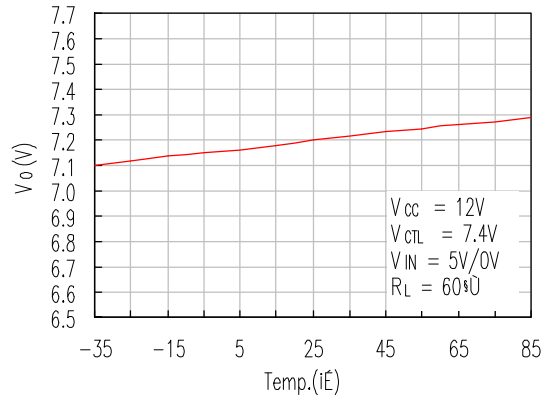
1.  $V_{CC}$  vs  $I_{CC}$



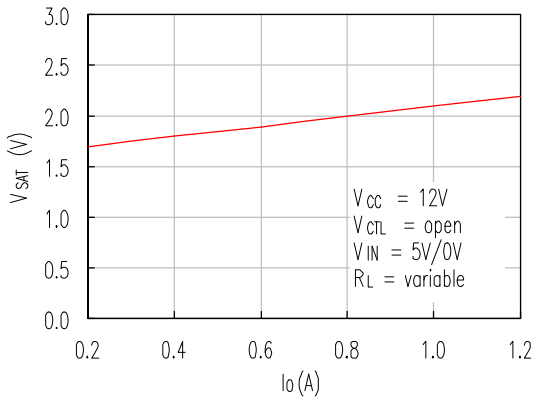
2. Temperature vs  $I_{CC}$



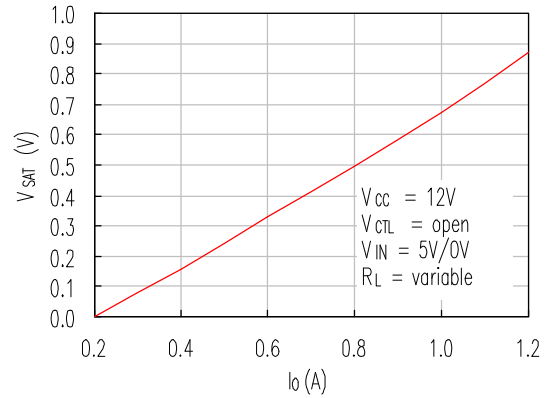
3.  $V_{CTL}$  vs  $I_O$



4. Temperature vs  $V_O$

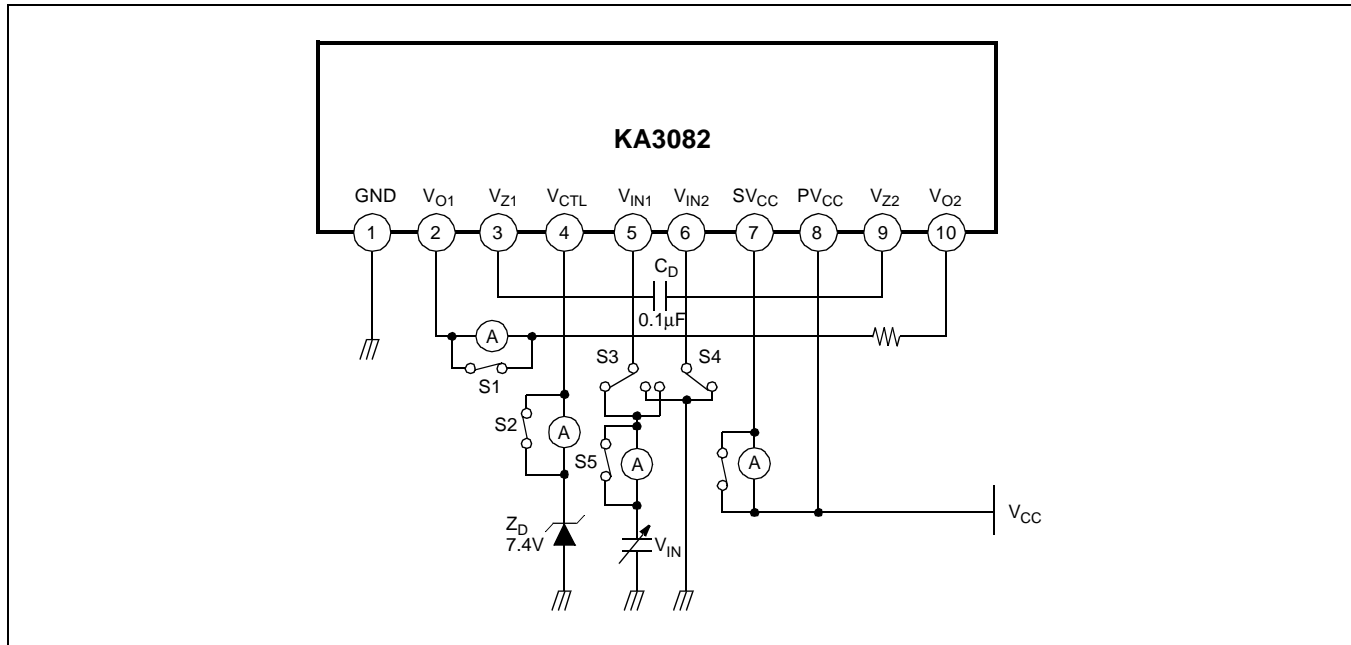


5.  $I_O$  vs  $V_{SAT}$  (Upper)

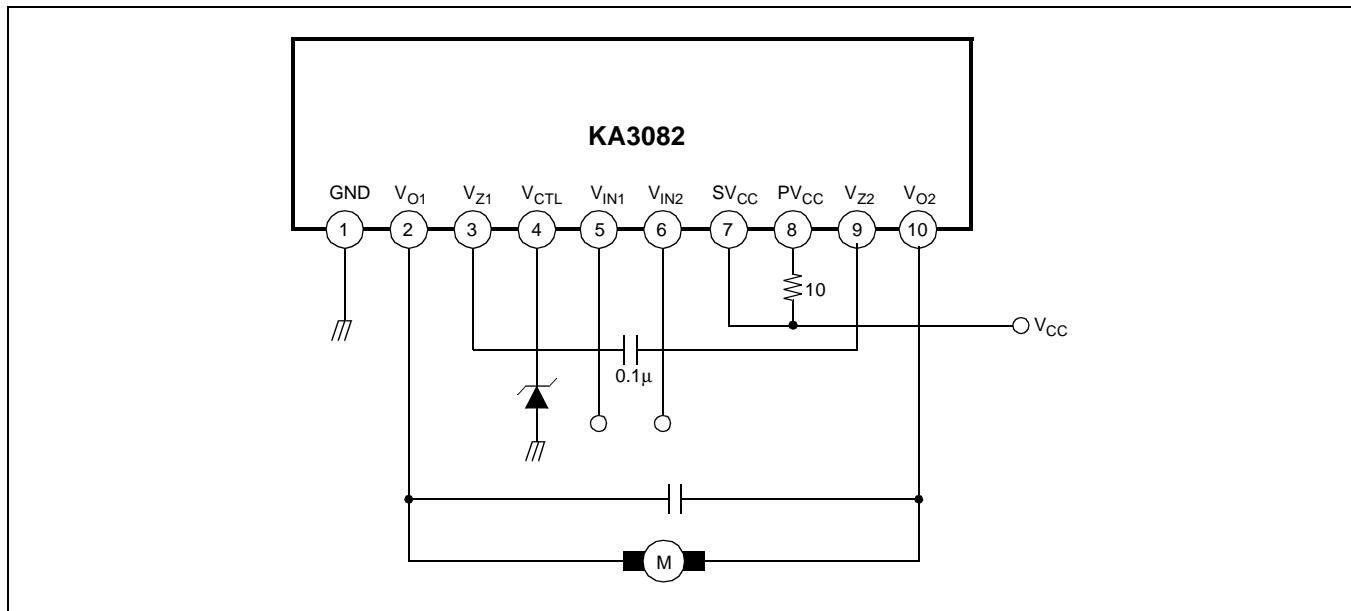


6.  $I_O$  vs  $V_{SAT}$  (Lower)

TEST CIRCUIT



APPLICATION CIRCUIT



NOTES

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