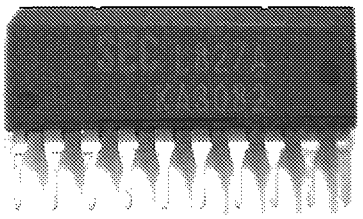
BI-DIRECTIONAL DC MOTOR DRIVER

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.

10-SIP



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)

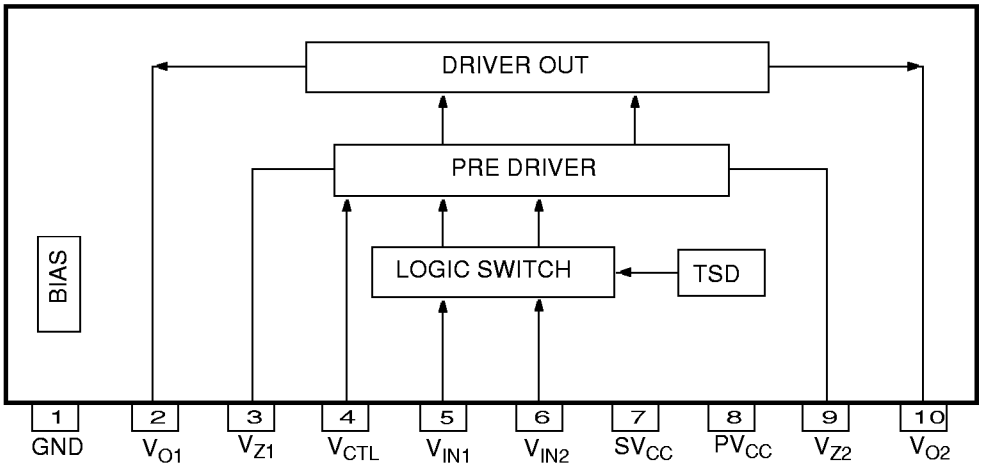
ORDERING INFORMATION

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

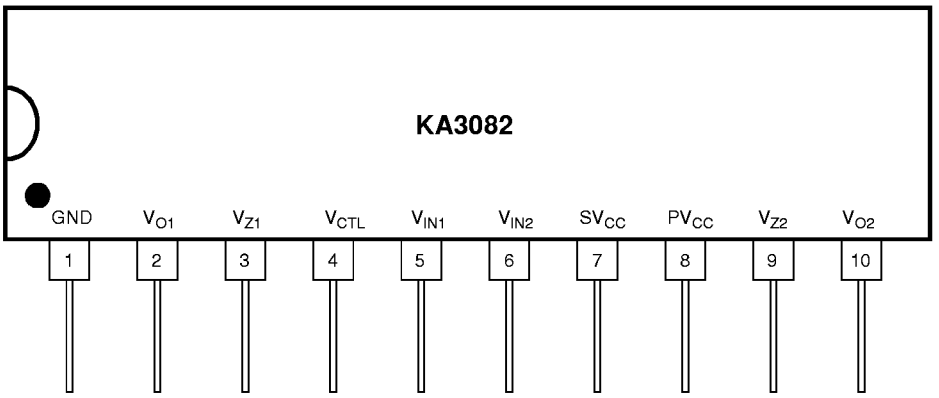
TARGET APPLICATIONS

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

BLOCK DIAGRAM



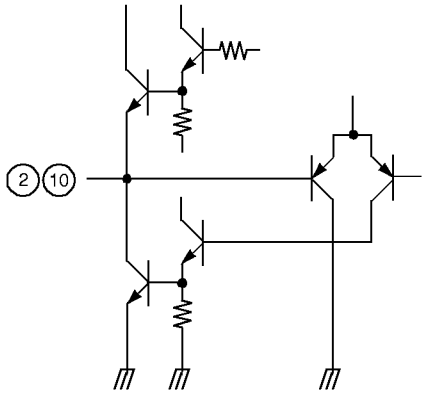
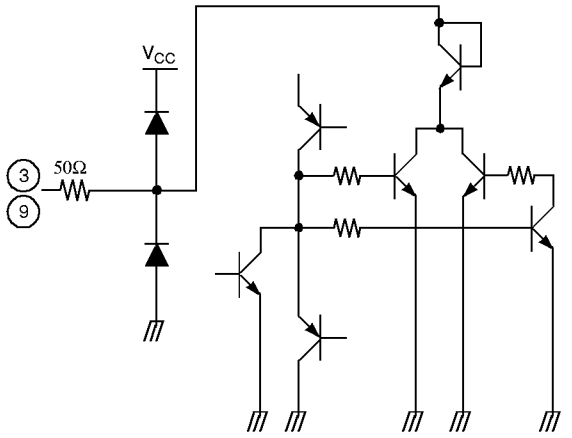
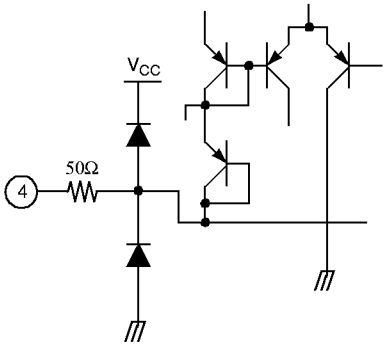
PIN CONFIGURATIONS



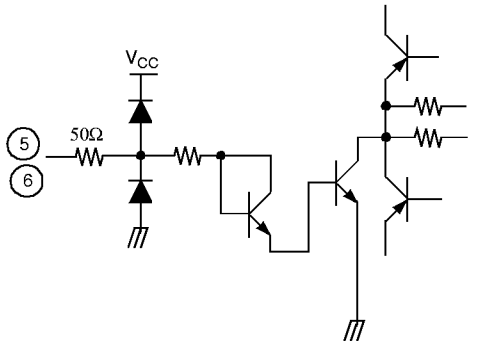
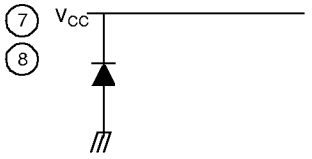
PIN DESCRIPTION

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	

INTERMAL CIRCUIT (Continued)

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

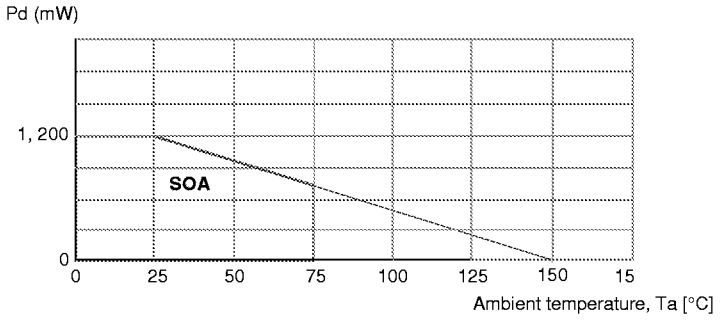
ABSOLUTE MAXIMUM RATING (Ta=25°C)

Characteristics	Symbol	Value	Unit	Remark
Supply voltage	V_{CCmax}	18	V	–
Maxium Output current	I_{Omax}	1.6[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 9.6mV / °C for using above Ta=25°C.
   3) 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) $V_{CC2} \leq V_{CC1}$

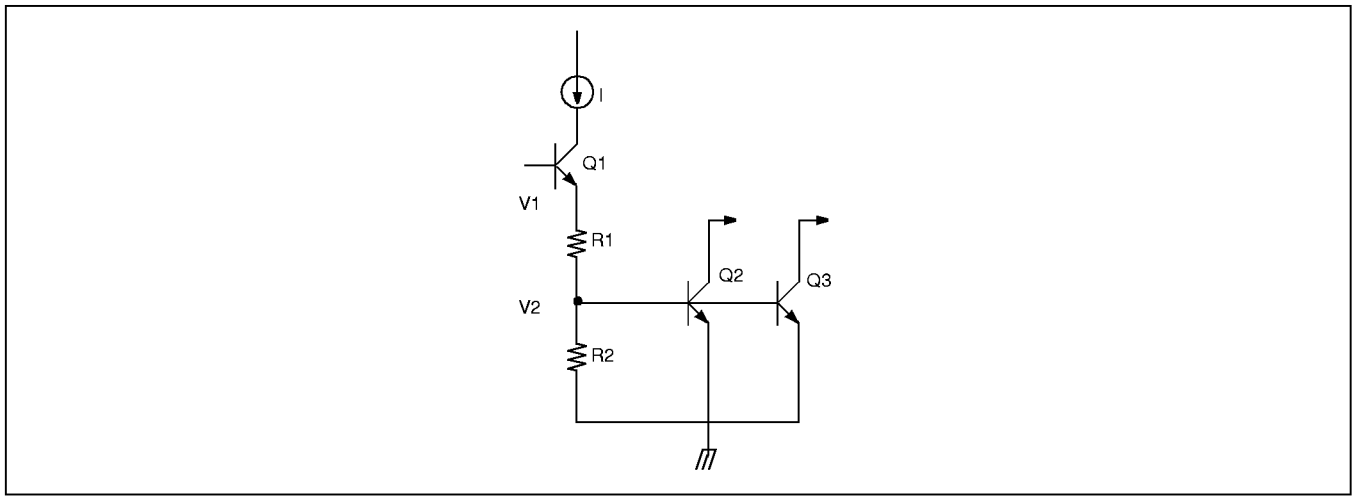
Caution 2) When V_{CC} is above 16V, the V_{CTL} must be opened or $8.5 \leq V_{CTL} \leq V_{CC2}$

ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC}=SV_{CC}=PV_{CC}=12V)

Characteristic	Symbol	Test conditions	Min.	Typ.	max.	Unit
Quiescent current	I_{CC}	Pin5 & 6: GND, R_L=∞	4	6.5	9.5	mA
Min. input-on current 1	I_{IN1}	R_L=∞, pin5=I_{IN1}, pin6=L	–	10	30	μA
Min. input-on current 2	I_{IN2}	R_L=∞, pin5=L, pin6=I_{IN}	–	10	30	μA
Input threshold voltage 1	V_{ITH1}	R_L=∞, pin5=V_{IN}, pin6=L	1.0	1.3	1.6	V
Input threshold voltage 2	V_{ITH2}	R_L=∞, pin5=L, pin6=V_{IN}	1.0	1.3	1.6	V
Output leakage current 1	I_{OL1}	R_L=∞, pin5 & 6=GND	–	0.01	1	mA
Output leakage current 2	I_{OL2}	R_L=∞, pin5 & 6=GND	–	0.01	1	mA
Zener current 1	I_{Z1}	R_L=∞, pin5=H, pin6=L	–	0.85	1.5	mA
Zener current 2	I_{Z2}	R_L=∞, pin5=L, pin6=H	–	0.85	1.5	mA
Output voltage 1	V_{O1}	R_L=60Ω, pin5=H, pin6=L	6.6	7.2	7.4	V
Output voltage 2	V_{O2}	R_L=60Ω, pin5=L, pin6=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 INFORMATIONS

1. THERMAL SHUT DOWN CIRCUIT



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

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

When Ta = 25°C, Q2 & Q3 are Turn-off. (because $V_2 = 0.37V$)

0.73V - 0.37V = 360mV (When Q_2 & Q_3 are Turn-on, $Vbe_{Q2} = Vbe_{Q3} = 0.73V$)

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

∴ T.S.D: 360mV / 2mV = 180°C

When temperature of TR is 180°C, Q2 & Q3 become Turn-on and make the bias voltage of output stage saturate.

2. LOGIC INPUT & OUTPUT TABLE

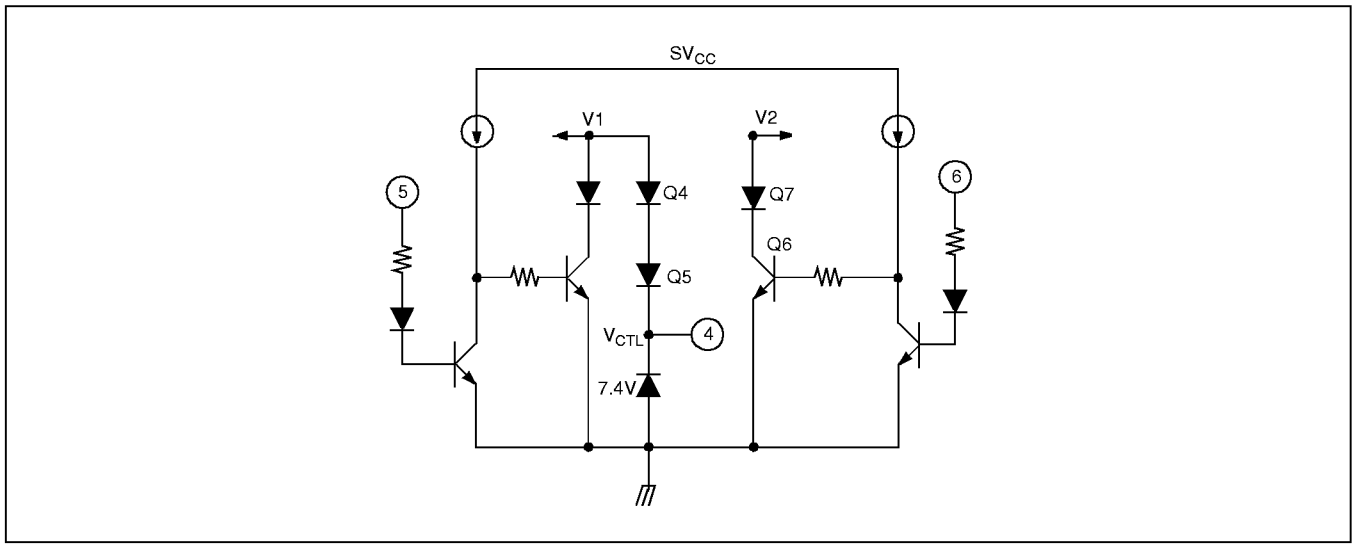
Input		Output		Motor
Pin #5	Pin #6	Pin #2	Pin #10	
Low	Low	*Low	*Low	Brake
High	Low	High	Low	Forward
Low	High	Low	High	Reverse
High	High	*Low	*Low	Brake

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.

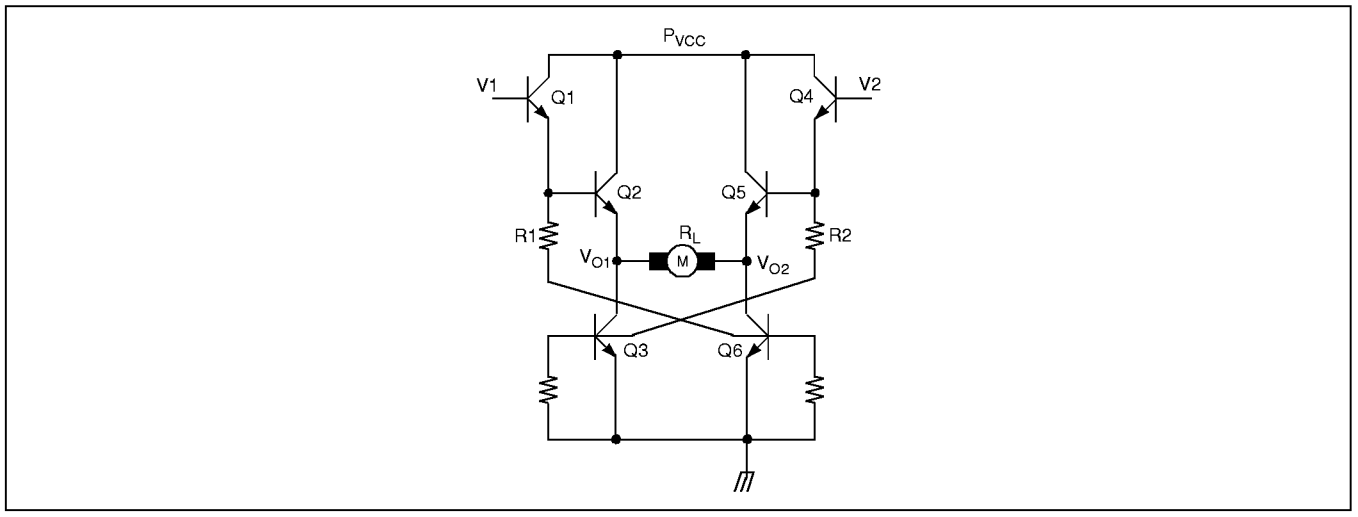
When pin #5 is "H" and pin #6 is "L",

— $V1 = Vzd + Vbe_{Q4} + Vbe_{Q5} \dot{=} 8.9V$

— $V2 = Vbeq\ 7 + Vsat_{Q6} \dot{=} 0.87V$

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

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

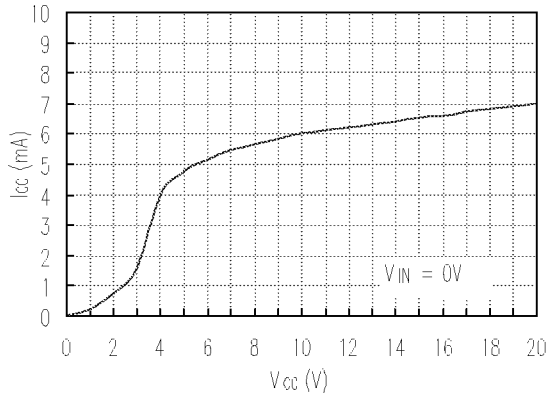
$V_{O2} = V_{Q6SAT}$

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

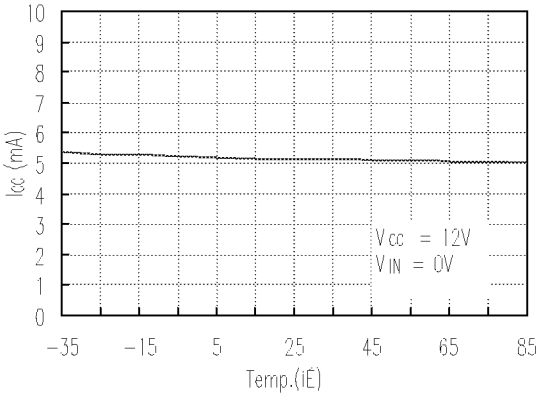
$= V_1 - V_{BEQ1} - V_{BEQ2} - V_{Q6SAT}$

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

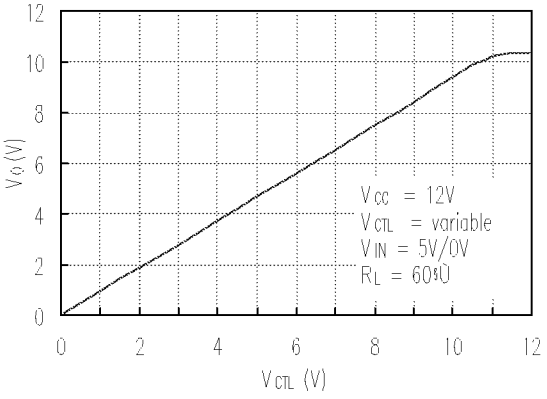
CHARACTERISTICS GRAPHS



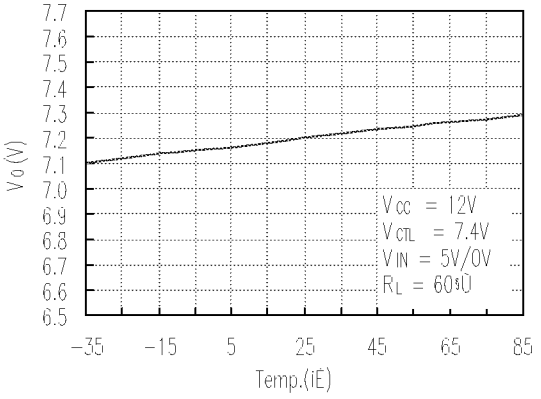
1. V_{CC} vs I_{CC}



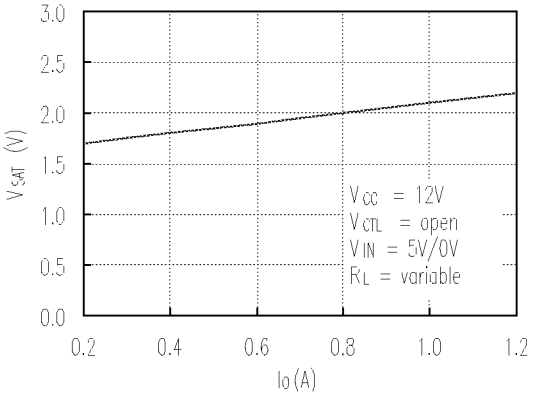
2. Temperature vs I_{CC}



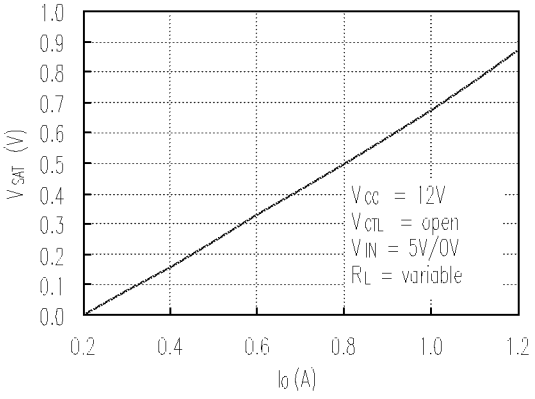
3. V_{CTL} vs I_O



4. Temperature vs V_O

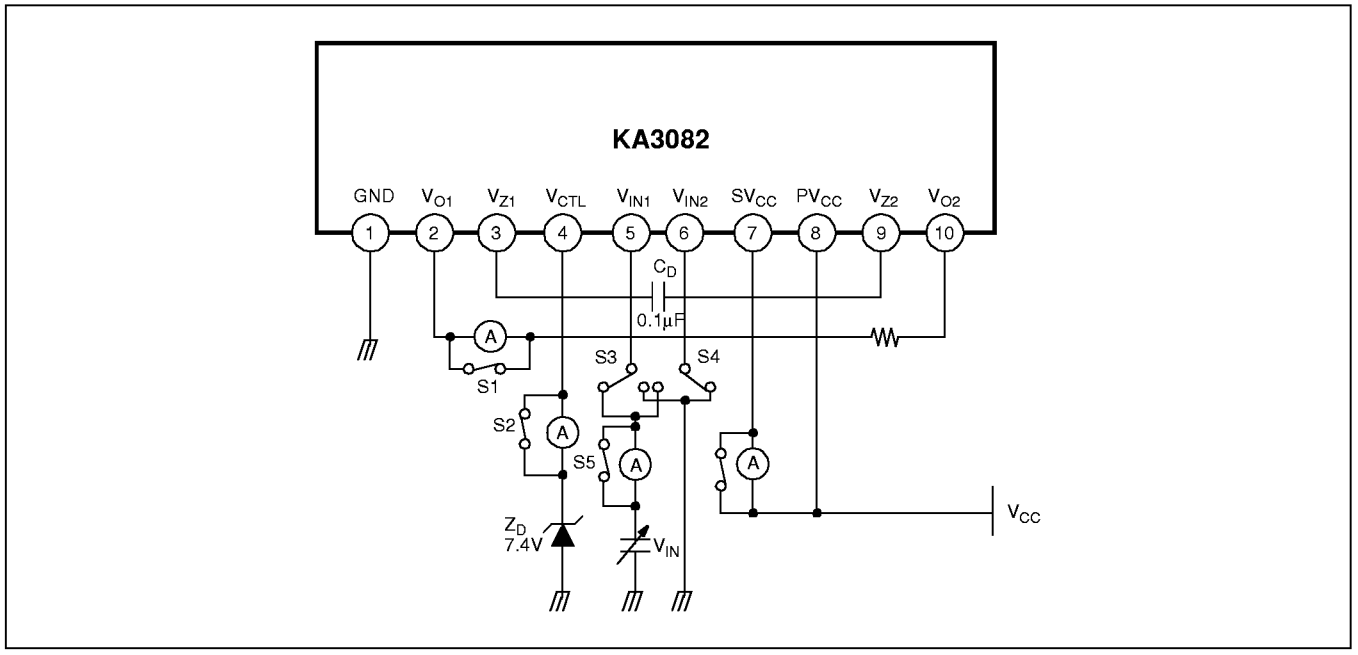


5. I_O vs V_{SAT} (Upper)

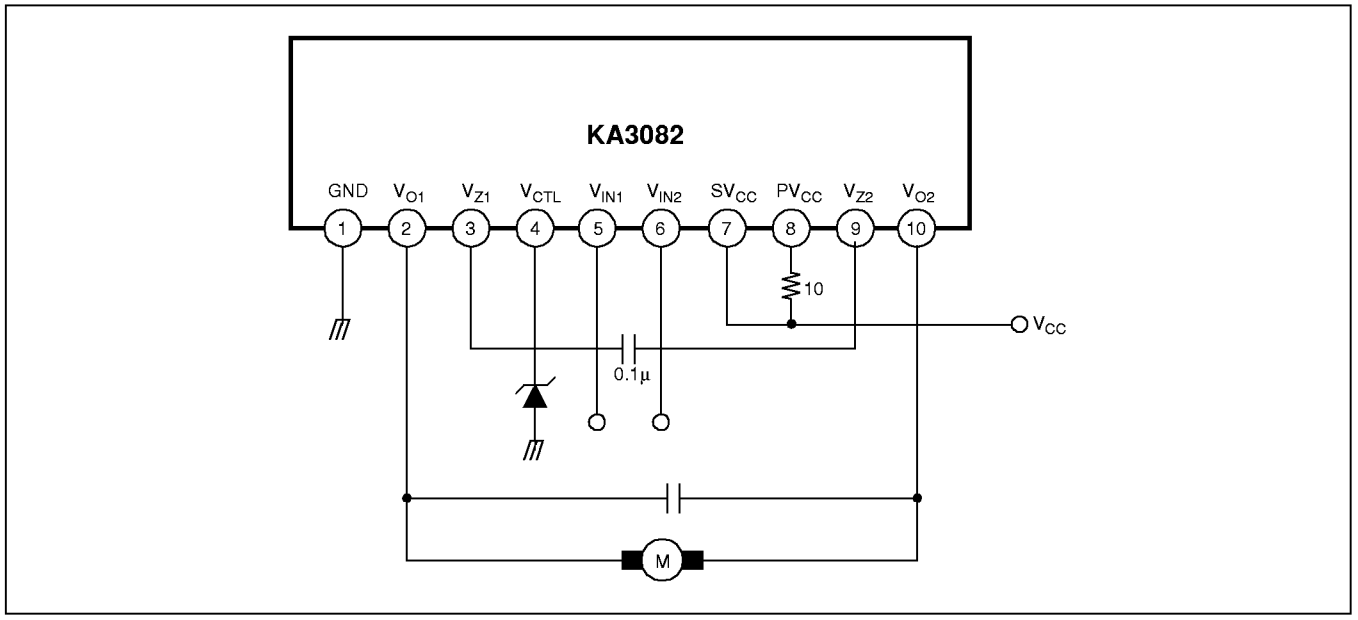


6. I_O vs V_{SAT} (Lower)

TEST CIRCUIT



APPLICATION CIRCUIT



NOTES

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™
CoolFET™
CROSSVOLT™
E^2CMOS^{TM}
FACT™
FACT Quiet Series™
FAST®
FASTr™
GTO™
HiSeC™
ISOPLANAR™
MICROWIRE™
POP™
PowerTrench™
QS™
Quiet Series™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
TinyLogic™

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.