

KA3082

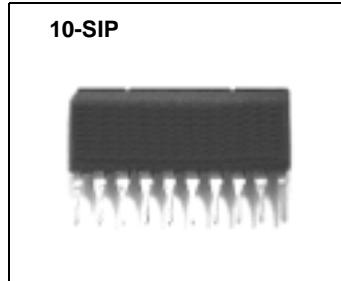
Bi-Directional DC Motor Driver

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.



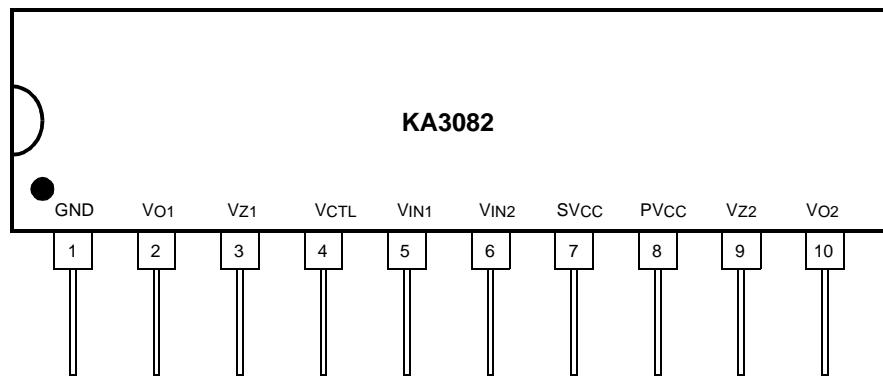
Target Applications

- 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

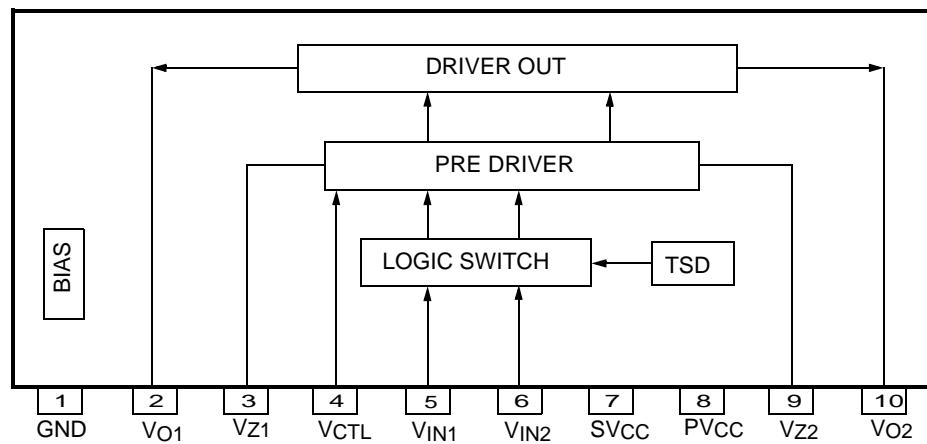
Pin Assignments



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

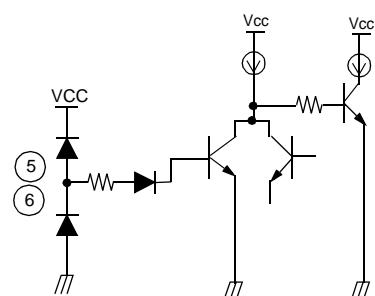
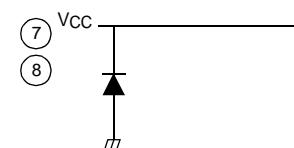
Internal Block Diagram



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	

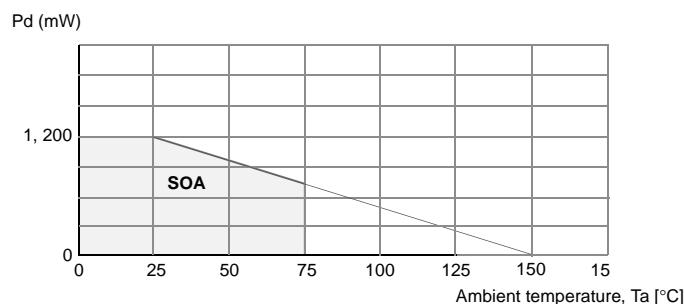
Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Value	Unit	Remark
Supply Voltage	V _{CCmax}	18	V	-
Maximum 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	-

Note:

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 P_d and SOA(Safe Operating Area).

Power Dissipation Curve



Recommended Operating Conditions (Ta=25°C)

Parameter	Symbol	Operating voltage range	Unit
Operating Supply Voltage	S _{VCC} , P _{VCC}	7 ~ 18	V

Note:

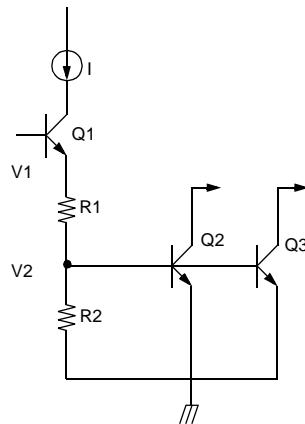
- Caution 1) P_{VCC} ≤ S_{VCC}
 Caution 2) When P_{VCC} is above 16V, the V_{CTL} must be opened or 8.5 ≤ V_{CTL} ≤ P_{VCC}

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Current	I _{CC2}	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	7.6	V
Output Voltage 2	V _{O2}	R _L =60Ω, pin5=L, pin6=H	6.6	7.2	7.6	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 $T_a = 25^\circ\text{C}$, 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.

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

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

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

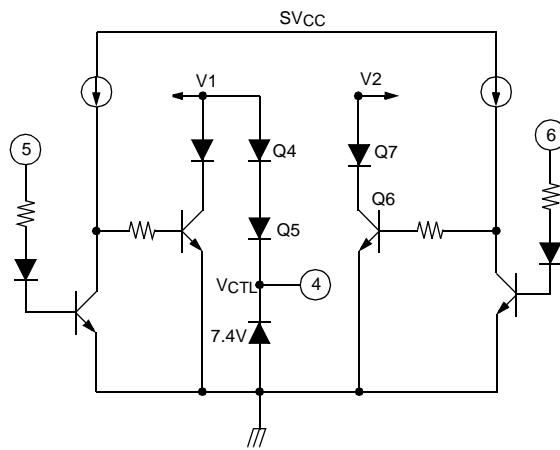
2. Logic Input & Output Table

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.

3. Logic Switch Circuit



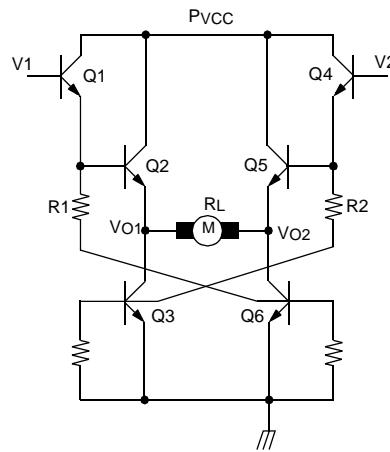
This circuit defines reference voltage of output.

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

- $V1 = VZD + VBEQ4 + VBEQ5 = 8.9V$
- $V2 = VBEQ7 + VSATQ6 = 0.87V$

$V1$ and $V2$ are related with the output voltage of the motor and change according to the voltage of pin #4 ($VCTL$).

4. Drive Output Circuit



$$V1 = 8.9V$$

$$V2 = 0.87V$$

$$VO_1 = V1 - VBEQ1 - VBEQ2$$

$$VO_2 = VQ6SAT$$

$$VO = VO_1 - VO_2$$

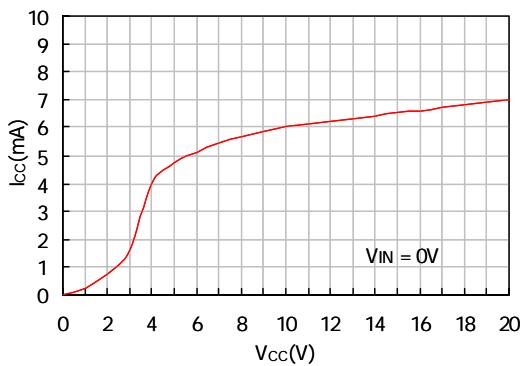
$$= V1 - VBEQ1 - VBEQ2 - VQ6SAT$$

$$IRL = (VO_1 - VO_2) / RL$$

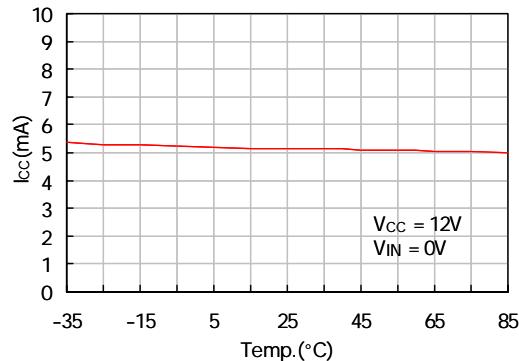
Typical Performance Characteristics

CHARACTERISTIC GRAPHS

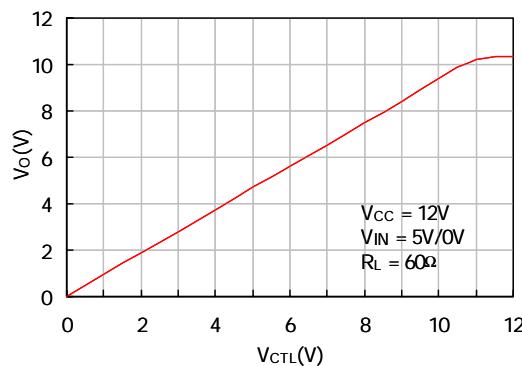
1. V_{CC} vs I_{CC}



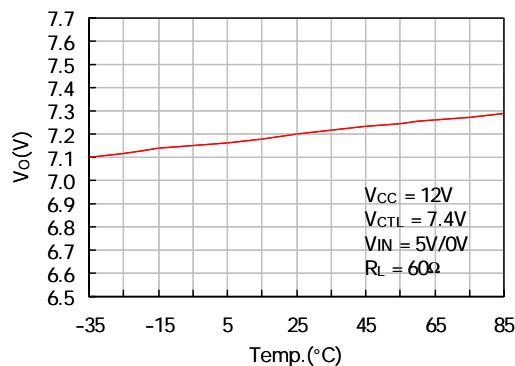
2. Temperature vs I_{CC}



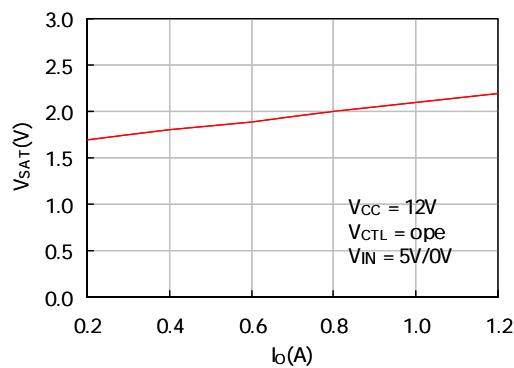
3. V_{CTL} vs. V_O



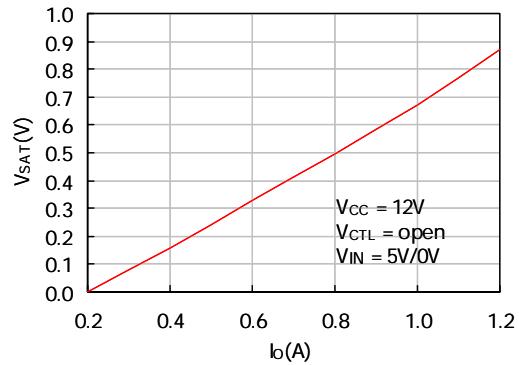
4. Temperature vs. V_O



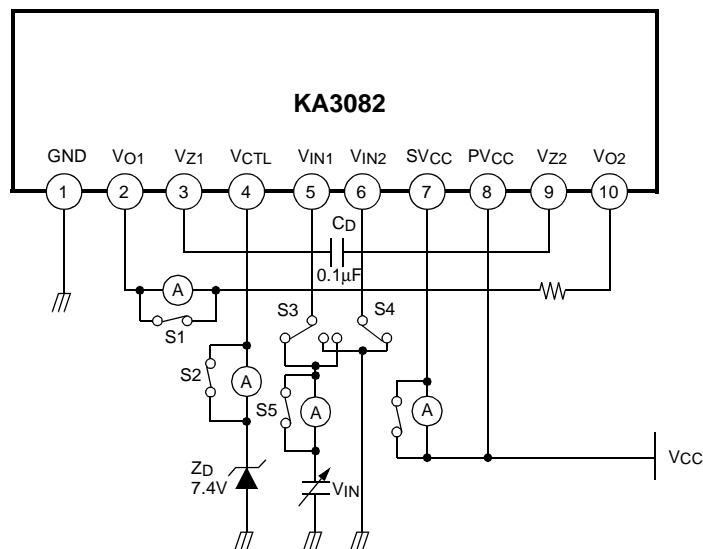
5. I_O vs. V_{SAT(UPPER)}



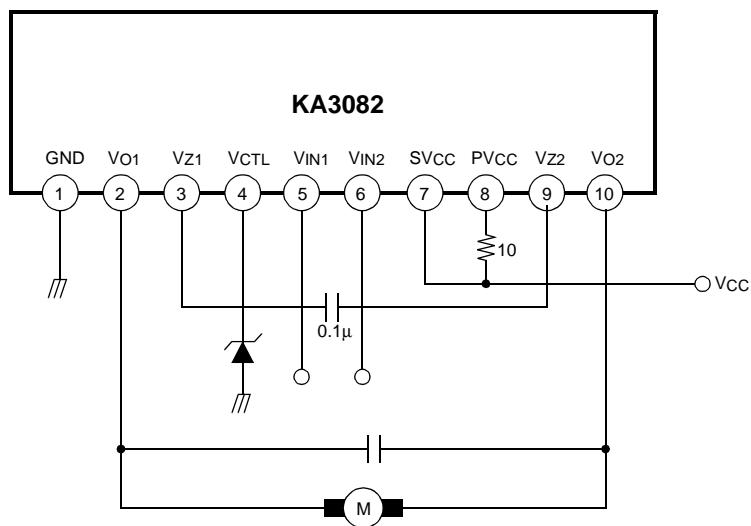
5. I_O vs. V_{SAT(LOWER)}



Test Circuits



Typical Application Circuits



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