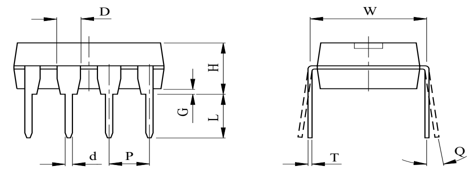
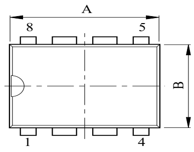
KIA6901P/F

DC MOTOR SPEED CONTROLLER

FEATURES

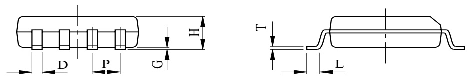
- Wide operation voltage range : 1.8 ~ 8V
- Possible to make applicable sets compact because of minimum number of external parts required.
- Easy to adjust speed.
- On-chip stable low reference voltage capable of providing 2 speed.
- V_{ref}=0.5V.

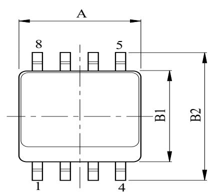




DIM	MILLIMETERS
A	9.6±0.2
B	6.45±0.2
D	1.52±0.1
d	0.46±0.1
G	0.50 MIN
H	3.8±0.3
L	3.3±0.3
P	2.54
T	0.25+0.1/-0.05
W	7.62
Q	0 - 15°

DIP-8





DIM	MILLIMETERS
A	4.85±0.2
B1	3.94±0.2
B2	6.02±0.3
D	0.4±0.1
G	0.15+0.1/-0.05
H	1.63±0.2
L	0.65±0.2
P	1.27
T	0.20+0.1/-0.05

FLP-8

MAXIMUM RATINGS (Ta=25℃)

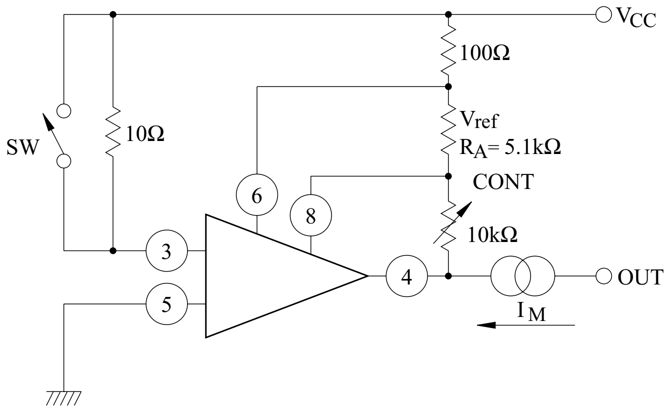
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	10	V
Motor Current		I_M	700	mA
Power Dissipation	KIA6901P	P_D	600	mW
	KIA6901F		240	
Operating Temperature		T_{opr}	-25 ~ 75	℃
Storage Temperature		T_{stg}	-55 ~ 150	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃, V_{CC}=3V, I_M=100mA)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_{ref}	I_M=100mA	0.44	0.50	0.54	V
Quiescent Current	I_{CCQ}	I_M=100mA	-	2.4	6.0	mA
Shunt Ratio	K	I_M=50 ~ 150mA	45	50	55	
Output Saturation Voltage	$V_{CE(sat)}$	I_M=200mA	-	0.32	0.5	V
Reference Voltage Variance (Note 1)	ΔV_{ref1}	Ta=-20 ~ 80℃, I_M=100mA	-	-0.008	-	%/℃
	ΔV_{ref2}	I_M=20 ~ 200mA	-	0.005	-	%/mA
	ΔV_{ref3}	V_{CC}=1.8 ~ 8V, I_M=100mA	-	0.1	-	%/V
Shunt Ratio Variance (Note 2)	ΔK_1	Ta=-20 ~ 80℃, I_M=50 ~ 150mA	-	0.02	-	%/℃
	ΔK_2	I_M=20 ~ 50mA to 170 ~ 200mA	-	-0.07	-	%/mA
	ΔK_3	V_{CC}=1.8 ~ 8V, I_M=50 ~ 150mA	-	0.3	-	%/V

Note 1 : $\frac{\Delta V_{ref}}{V_{ref}} / \Delta Ta, \Delta I_M, \Delta V_{ref}$ Note 2 : $\frac{\Delta K}{K} / \Delta Ta, \Delta I_M, \Delta V_{ref}$

TEST CIRCUIT



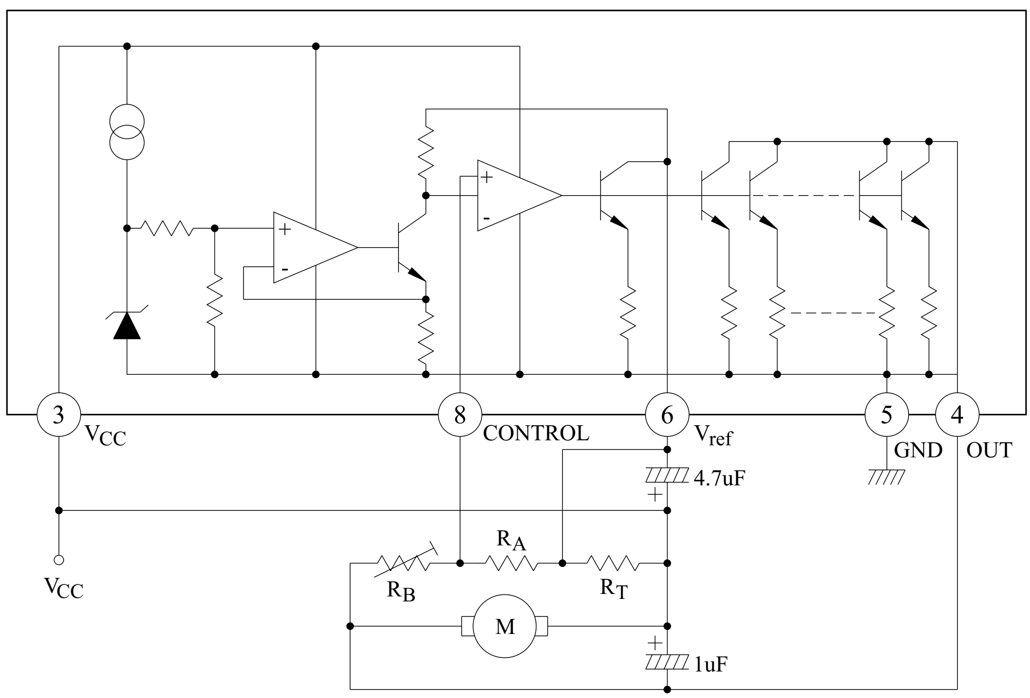
Test Method

1. V_{ref}
   With SW turned ON, measure the voltage developed across R_A.
2. I_{CCQ}
   With SW turned OFF, measure I_{CCQ} for the voltage developed across resistor 10 Ω.
3. K
   With SW turned ON, measure current I_{50} flowing through resistor 100 Ω at I_M=50mA and current I_{150} flowing through resistor 100 Ω at I_M=150mA, and calculate K by using the following formula.

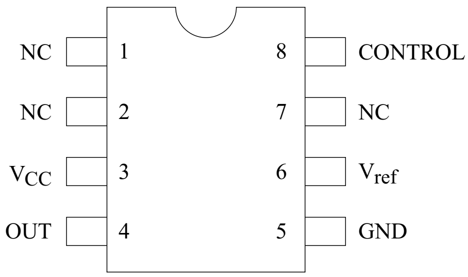
$$K= \frac{100}{I_{150} + I_{50}}$$

4. $V_{CE(sat)}$
   With SW turned ON, connect each pin of V_{CC}, V_{ref}, CONT to 3V and feed I_M=200mA and measure the voltage developed across pin ④ and ⑤.

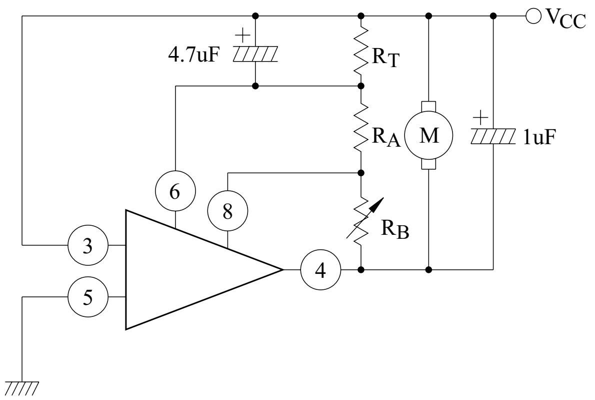
EQUIVALENT CIRCUIT BLOCK DIAGRAM



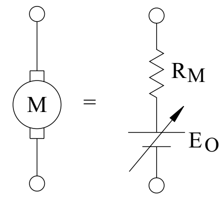
PIN ASSIGNMENT



APPLICATION CIRCUIT 1



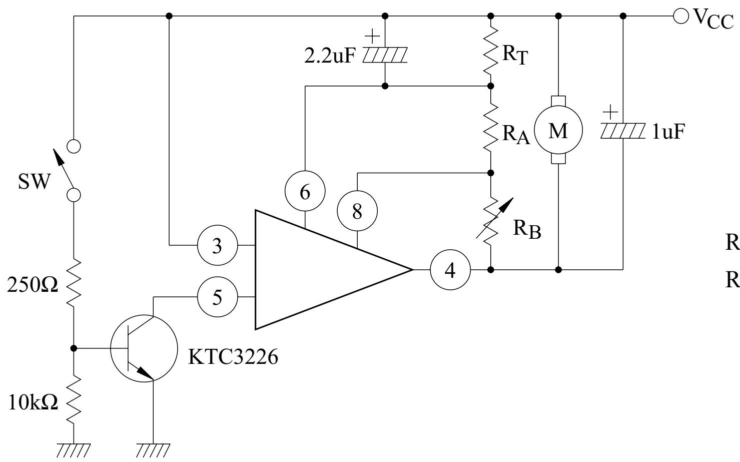
Unless $R_{T(max)} < K \cdot R_{M(min)}$ the operation becomes unstable.
R_A is Set to 5.1kΩ
R_M=Motor DC resistance



R_M(internal resistance)
E_O(counter electromotive force)

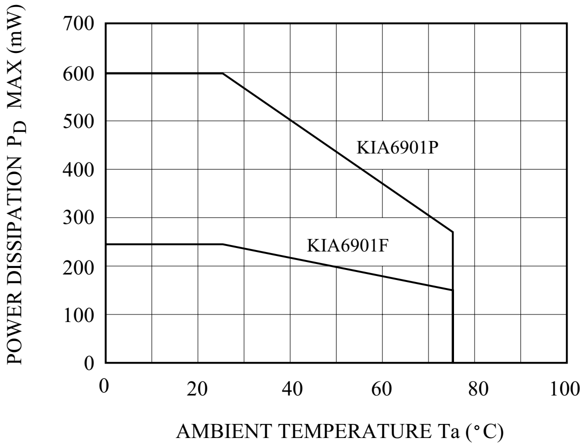
The values and positions of electrolytic capacitors depend on the type of a motor to be used.

APPLICATION CIRCUIT 2 : WITH STOP CIRCUIT

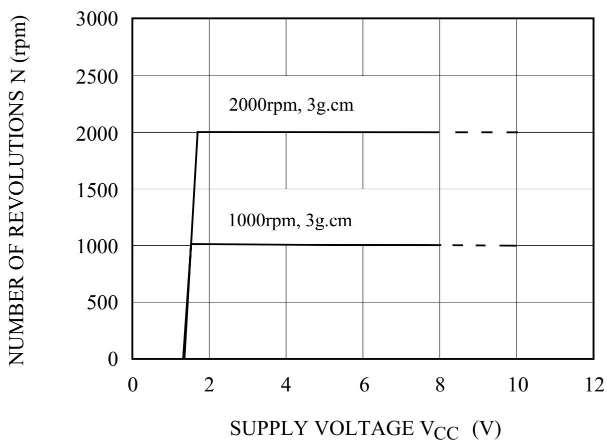


$R_{T(max)} < K \cdot R_{M(min)}$
R_A is set to 5.1kΩ

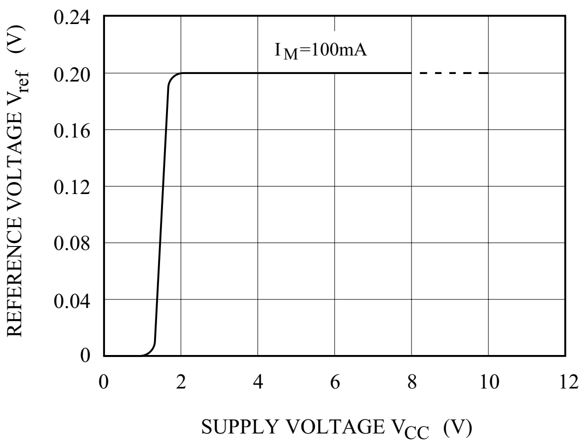
P_D MAX - Ta



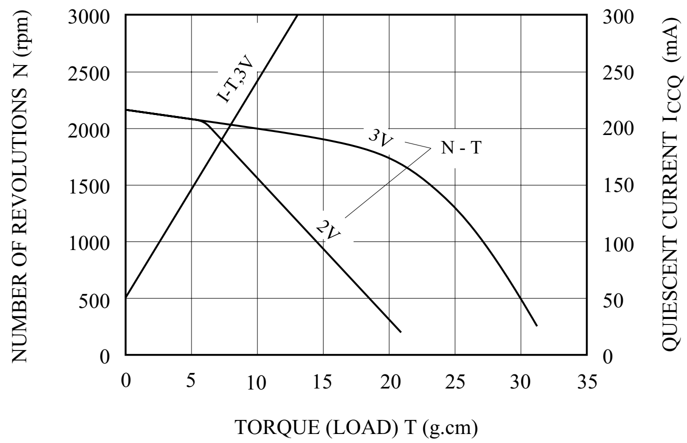
N - V_{CC}



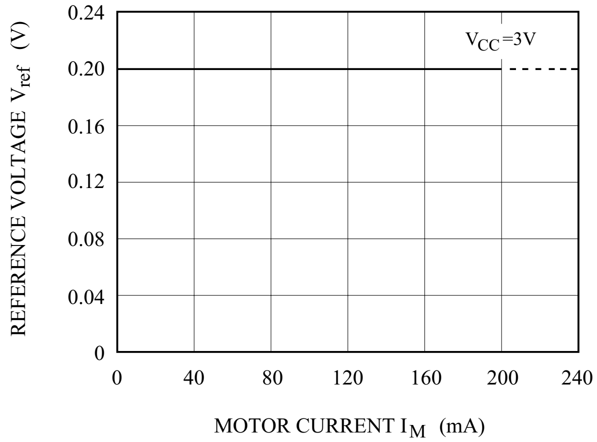
V_{ref} - V_{CC}



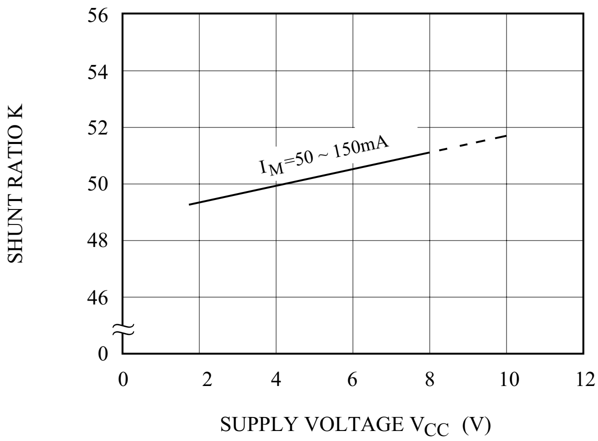
N, I_{CCQ} - T

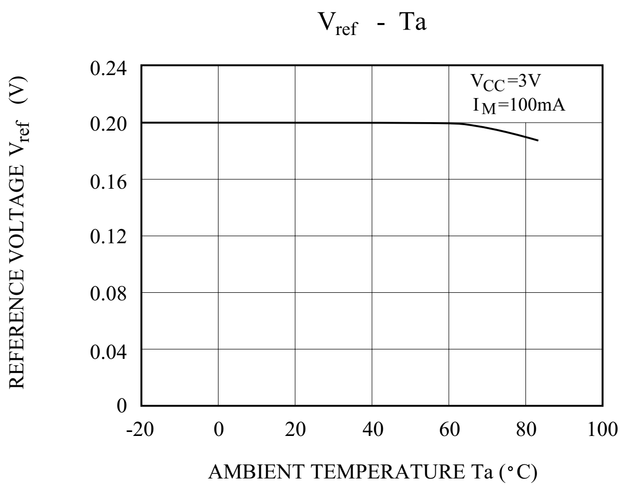


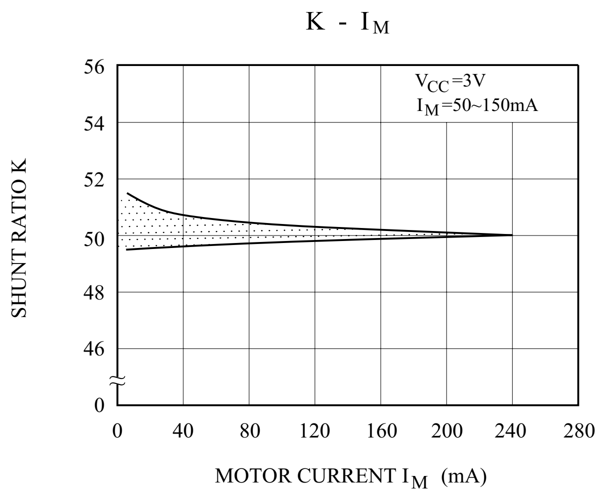
V_{ref} - I_M

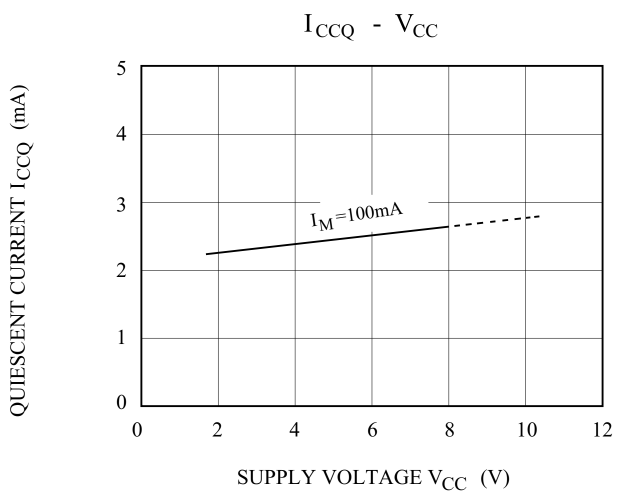


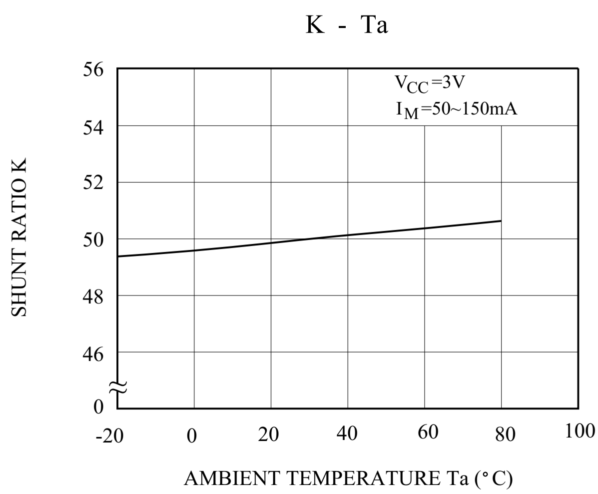
K - V_{CC}

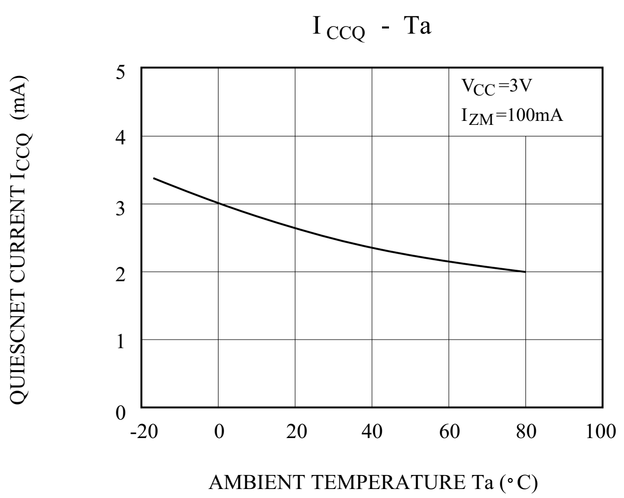


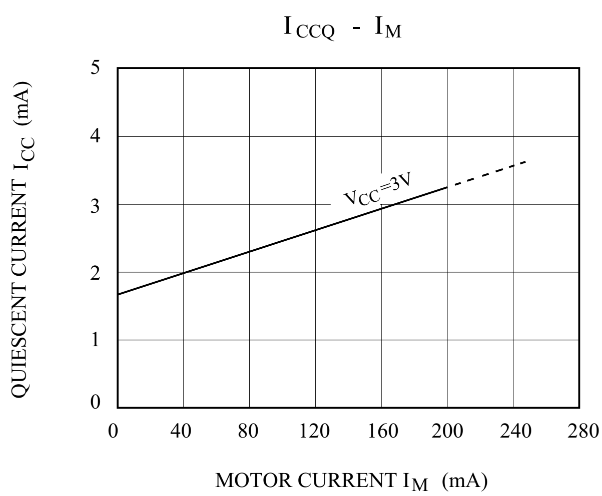

Vref - Ta
REFERENCE VOLTAGE Vref (V)
0.24
0.20
0.16
0.12
0.08
0.04
0
-20
0
20
40
60
80
100
AMBIENT TEMPERATURE Ta (°C)
VCC=3V
IM=100mA


K - IM
SHUNT RATIO K
56
54
52
50
48
46
0
0
40
80
120
160
200
240
280
MOTOR CURRENT IM (mA)
VCC=3V
IM=50~150mA


ICCQ - VCC
QUIESCENT CURRENT ICCQ (mA)
5
4
3
2
1
0
0
2
4
6
8
10
12
SUPPLY VOLTAGE VCC (V)
IM=100mA


K - Ta
SHUNT RATIO K
56
54
52
50
48
46
0
-20
0
20
40
60
80
100
AMBIENT TEMPERATURE Ta (°C)
VCC=3V
IM=50~150mA


ICCQ - Ta
QUIESCNET CURRENT ICCQ (mA)
5
4
3
2
1
0
-20
0
20
40
60
80
100
AMBIENT TEMPERATURE Ta (°C)
VCC=3V
IZM=100mA


ICCQ - IM
QUIESCENT CURRENT ICC (mA)
5
4
3
2
1
0
0
40
80
120
160
200
240
280
MOTOR CURRENT IM (mA)
VCC=3V