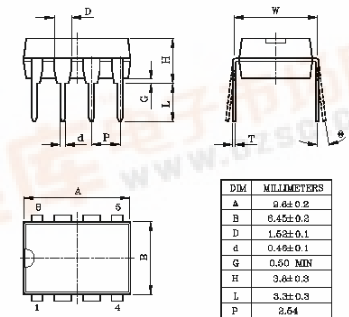
KIA6901P/F

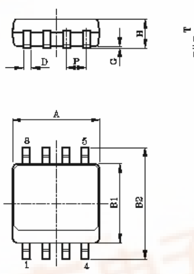
BIPOLAR LINEAR INTEGRATED CIRCUIT

DC MOTOR SPEED CONTROLLER



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	3.6±0.3
L	3.3±0.3
P	2.54
T	0.25+0.1/−0.05
W	7.62
θ	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

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.

MAXIMUM RATINGS (Ta=25℃)

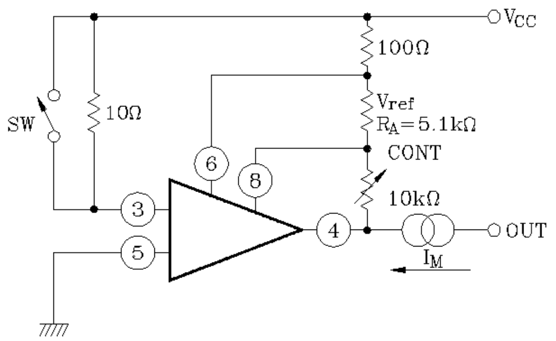
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	10	V
Motor Current		I_M	700	mA
Power Dissipation	KIA6901P	P_D	600	mW
	KIA6901F		240	
Operating Temperature		T_{opr}	-25～75	℃
Storage Temperature		T_{stg}	-55～150	℃

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 : $\frac{\Delta V_{ref}}{V_{ref}}$ /ΔTa, ΔI_M, ΔV_{ref}　　Note 2 : $\frac{\Delta K}{K}$ /ΔTa, ΔI_M, ΔV_{ref}

TEST CIRCUIT



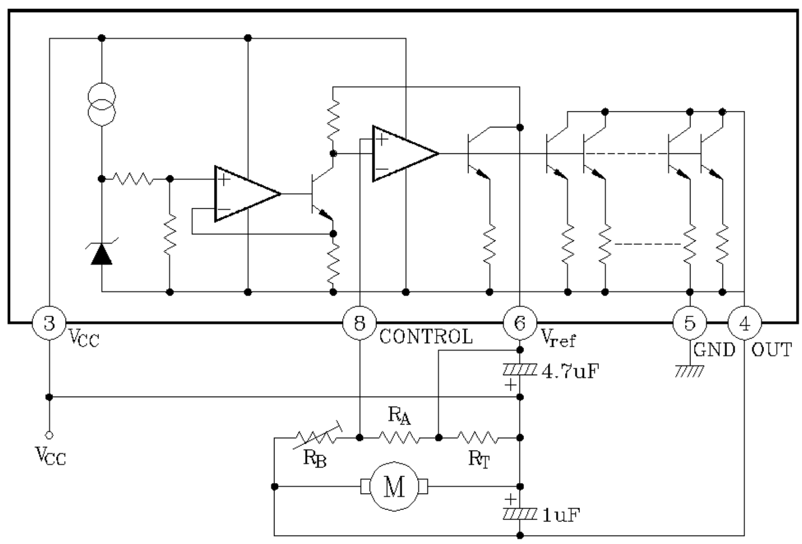
Test Method

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 10Ω.
3. K
   With SW turned ON, measure current I_{50} flowing through resistor 100Ω at I_M=50mA and current I_{150} flowing through resistor 100Ω at I_M=150mA, and calculate K by using the following formula.

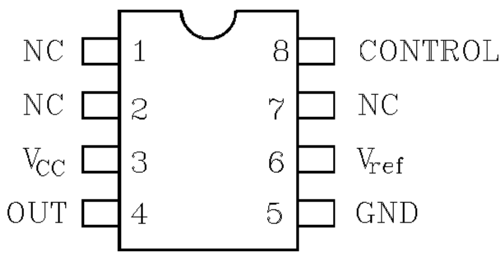
$$K = \frac{100}{I_{150} + I_{50}}$$

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 pin④ and ⑤.

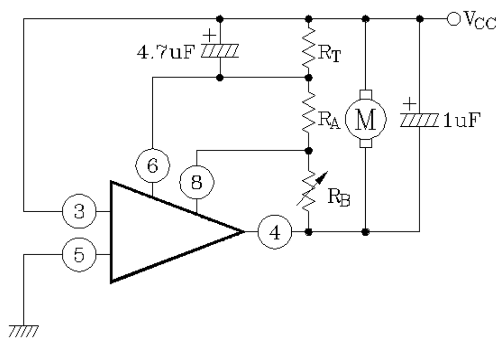
EQUIVALENT CIRCUIT BLOCK DIAGRAM



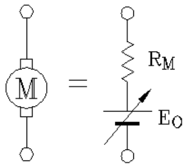
PIN ASSIGNMENT



APPLICATION CIRCUIT 1 :



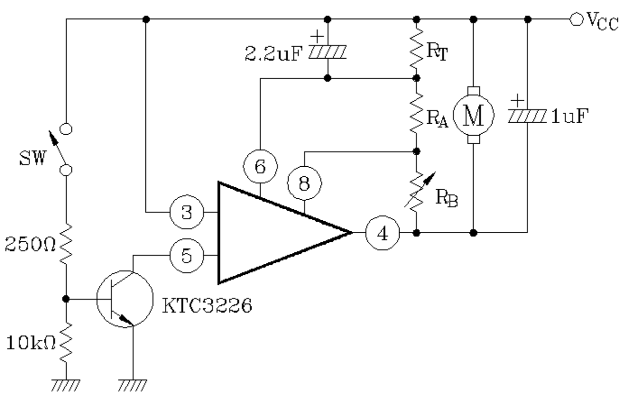
Unless $R_{T(max)} < K \cdot R_{M(min)}$ the operation becomes unstable.
R_A is Set to 5.1kΩ
R_M=Motor DC resistance



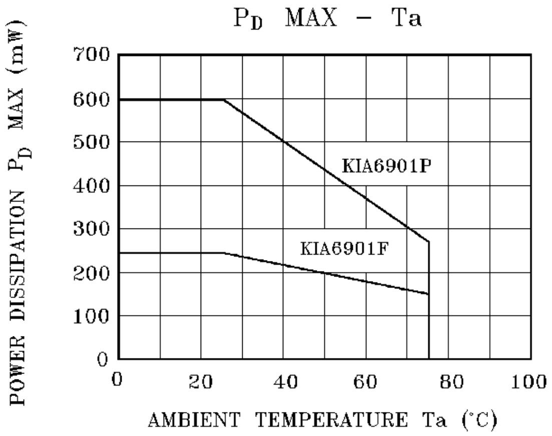
R_M(internal resistance)
E_O(counter electromotive force)

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

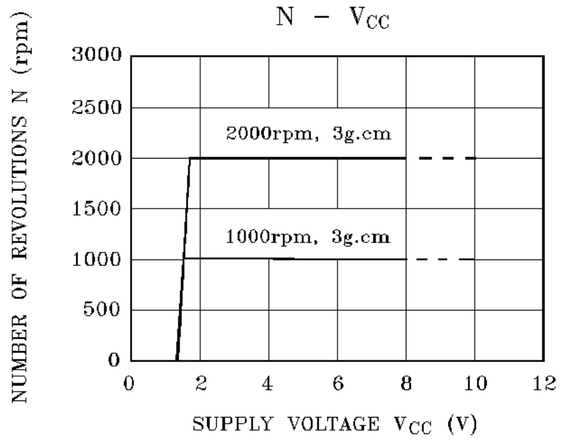
APPLICATION CIRCUIT 2 : WITH STOP CIRCUIT



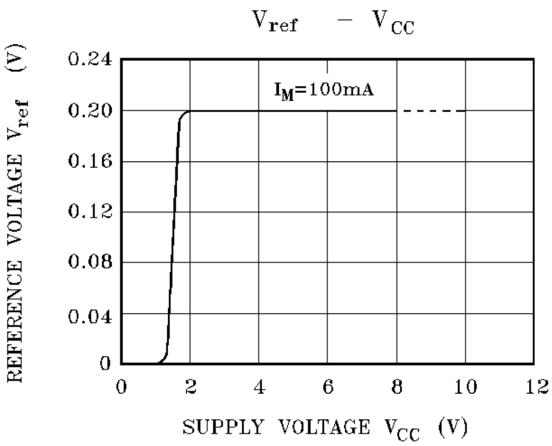
$R_{T(max)} < K \cdot R_{M(min)}$
R_A is set to 5.1kΩ



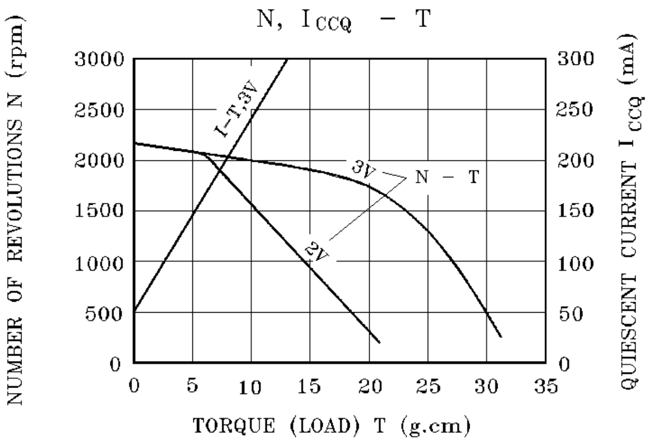
PD MAX - Ta
POWER DISSIPATION PD MAX (mW)
AMBIENT TEMPERATURE Ta (°C)
KIA6901P
KIA6901F



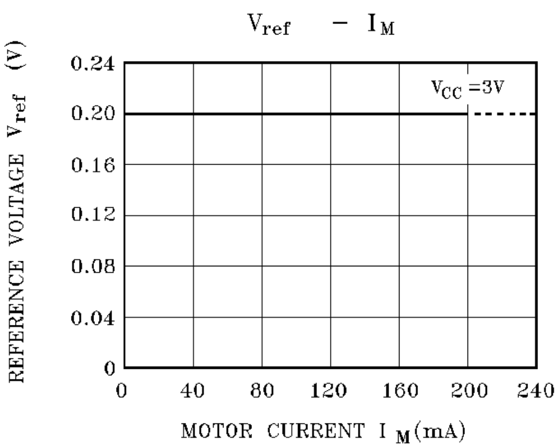
N - VCC
NUMBER OF REVOLUTIONS N (rpm)
SUPPLY VOLTAGE VCC (V)
2000rpm, 3g.cm
1000rpm, 3g.cm



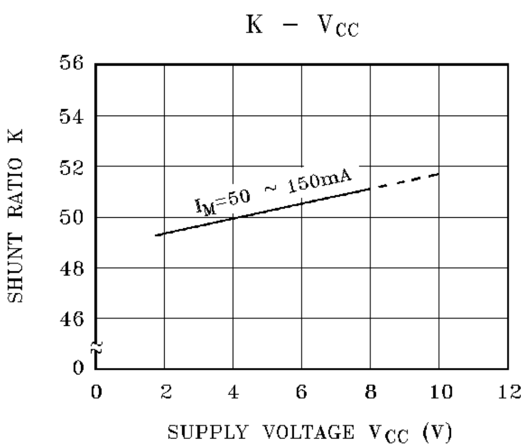
Vref - VCC
REFERENCE VOLTAGE Vref (V)
SUPPLY VOLTAGE VCC (V)
IM=100mA



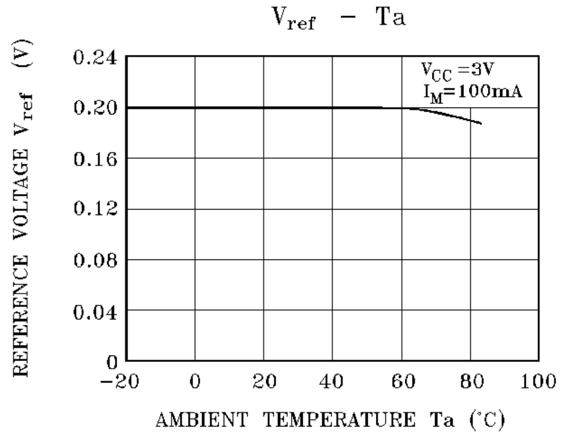
N, ICCQ - T
NUMBER OF REVOLUTIONS N (rpm)
QUIESCENT CURRENT ICCQ (mA)
TORQUE (LOAD) T (g.cm)
I-T,3V
3V
2V
N - T

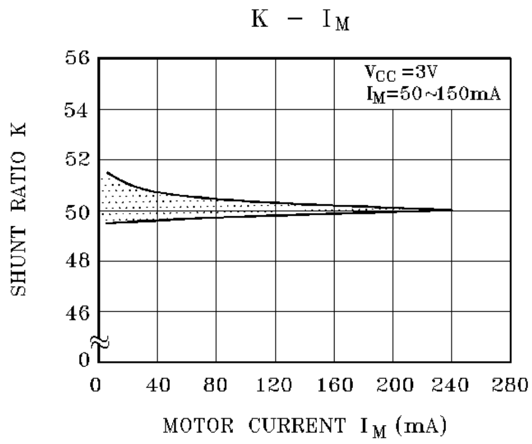


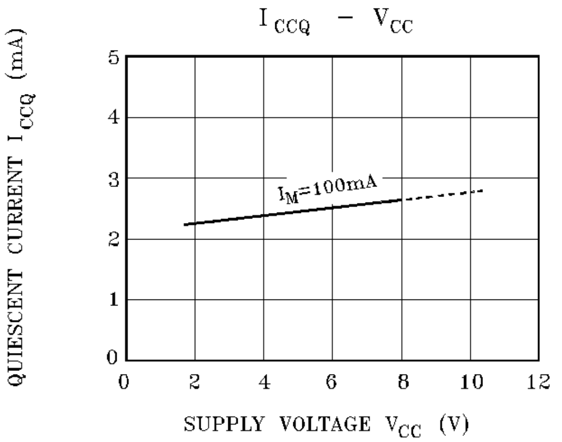
Vref - IM
REFERENCE VOLTAGE Vref (V)
MOTOR CURRENT IM (mA)
VCC =3V

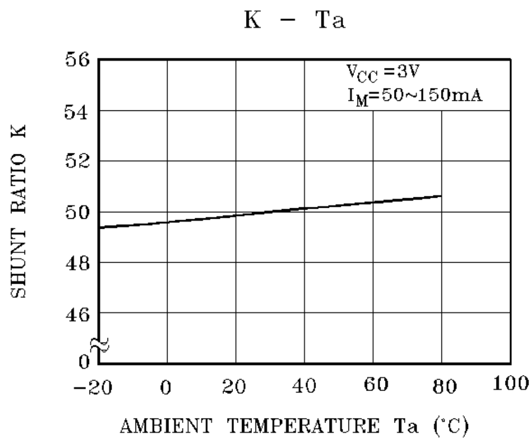


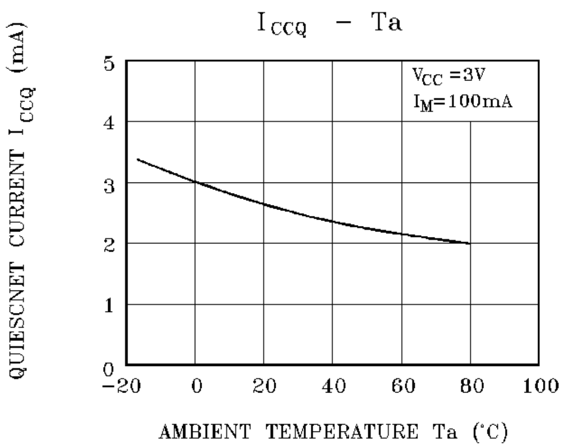
K - VCC
SHUNT RATIO K
SUPPLY VOLTAGE VCC (V)
IM=50 ~ 150mA

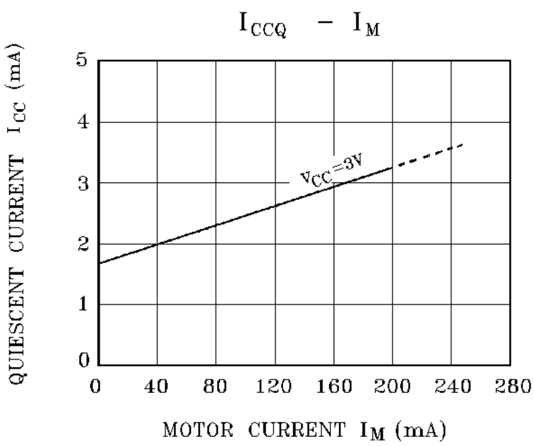

V_{ref} – Ta
REFERENCE VOLTAGE V_{ref} (V)
0.24
0.20
0.16
0.12
0.08
0.04
0
V_{CC} =3V
I_M=100mA
-20 0 20 40 60 80 100
AMBIENT TEMPERATURE Ta (°C)


K – I_M
SHUNT RATIO K
56
54
52
50
48
46
0
V_{CC} =3V
I_M=50~150mA
0 40 80 120 160 200 240 280
MOTOR CURRENT I_M (mA)


I_{CCQ} – V_{CC}
QUIESCENT CURRENT I_{CCQ} (mA)
5
4
3
2
1
0
I_M=100mA
0 2 4 6 8 10 12
SUPPLY VOLTAGE V_{CC} (V)


K – Ta
SHUNT RATIO K
56
54
52
50
48
46
0
V_{CC} =3V
I_M=50~150mA
-20 0 20 40 60 80 100
AMBIENT TEMPERATURE Ta (°C)


I_{CCQ} – Ta
QUIESCNET CURRENT I_{CCQ} (mA)
5
4
3
2
1
0
V_{CC} =3V
I_M=100mA
-20 0 20 40 60 80 100
AMBIENT TEMPERATURE Ta (°C)


I_{CCQ} – I_M
QUIESCENT CURRENT I_{CC} (mA)
5
4
3
2
1
0
V_{CC}=3V
0 40 80 120 160 200 240 280
MOTOR CURRENT I_M (mA)