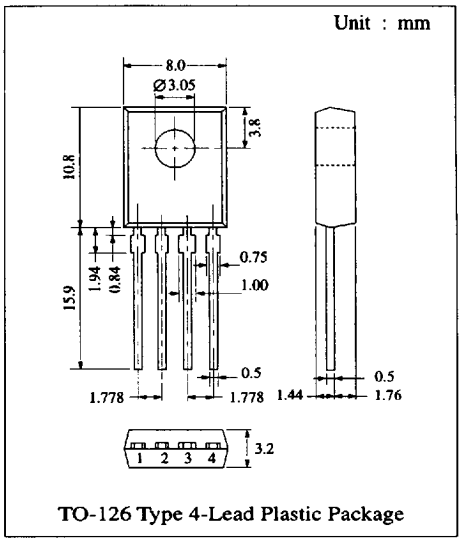
AN6652

Motor Control Circuit

■ Description

The AN6652 is a monolithic integrated circuit designed for the rotating speed control of a compact DC motor which is used for a tape recorder, record player, etc.

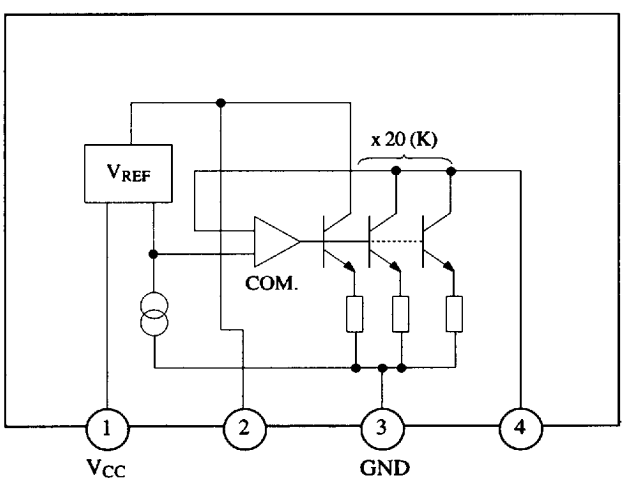


TO-126 Type 4-Lead Plastic Package

■ Features

- Small four-lead plastic package for compact motor
- Fewer external parts
- Stable low reference voltage (1.25V typ.), wide motor speed setting
- Highly stable operation over a wide range of supply voltage and torque supply voltage, V_{CC} = 6V ~ 20V
- Reverse voltage protection circuit

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{CC}	22	V
Supply Current	I_{CC} *2	1500	mA
Power Dissipation	P_D *1	1300	mW
Operating Ambient Temperature	Topr	-20 ~ +75	°C
Storage Temperature	Tstg	-40 ~ +150	°C

*1) Ta = 25°C, with a 10mm x 10mm bakelite printed circuit board (35μm Cu leaf) *2) t ≤ 5s
Operating Supply Voltage Range: V_{CC} = 6.0V ~ 20.0V

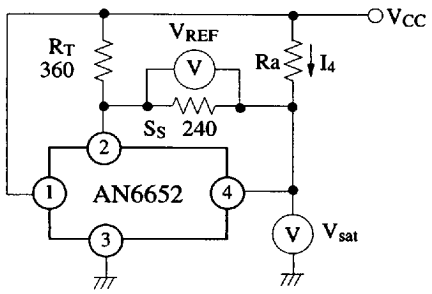
■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Reference Voltage	V_{REF}	1	V_{CC} = 12V, R_a = 1kΩ	1.15	1.25	1.40	V
Bias Current	I_{Bias}	3	V_{CC} = 12V		0.1	1	mA
Current Proportional Constant	K	2	V_{CC} = 12V, ΔI_4 = 20mA	18	20	22	
Saturation Voltage	V_{sat}	1	V_{CC} = 8V, R_a = 18Ω		1	2	V
Voltage Characteristics (1)	$\frac{\Delta V_{REF}}{V_{REF}} / V_{CC}$	1	V_{CC} = 9 ~ 16V, R_a = 1kΩ	-0.6	-0.02	0.6	%/V
Voltage Characteristics (2)	$\frac{\Delta K}{K} / V_{CC}$	2	V_{CC} = 9 ~ 16V, ΔI4 = 20mA	-0.7	0.2	0.7	%/V
Current Characteristics (1)	$\frac{\Delta V_{REF}}{V_{REF}} / I_4$	1	I_4 = 10mA ~ 50mA	-0.1	-0.03	0.1	%/mA
Current Characteristics (2)	$\frac{\Delta K}{K} / I_4$	2	I_4 = 50mA ~ 100mA	-0.15	-0.01	0.15	%/mA
Temperature Characteristics (1)	$\frac{\Delta V_{REF}}{V_{REF}} / Ta$	1	Ta = -20°C ~ +75°C, V_{CC} = 12V, R_a = 1kΩ		0.01		%/°C
Temperature Characteristics (2)	$\frac{\Delta K}{K} / Ta$	2	Ta = -20°C ~ +75°C, ΔI_4 = 20mA		0.01		%/°C

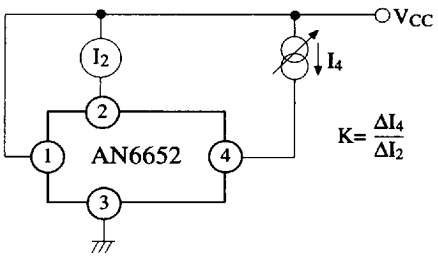
■ Pin

Pin No	Name
1	V_{CC}
2	Control Pin
3	GND
4	Motor Pin

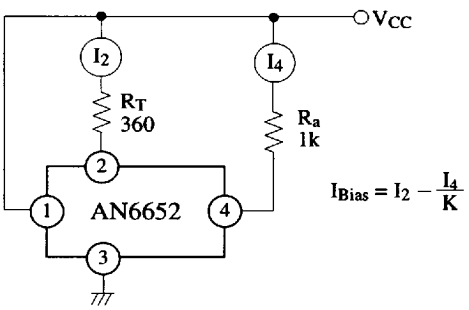
Test Circuit 1 (V_{REF}, V_{sat}, $\frac{\Delta V_{REF}}{V_{REF}}/V_{CC}$, $\frac{\Delta V_{REF}}{V_{REF}}/I_4$, $\frac{\Delta V_{REF}}{V_{REF}}/T_a$)



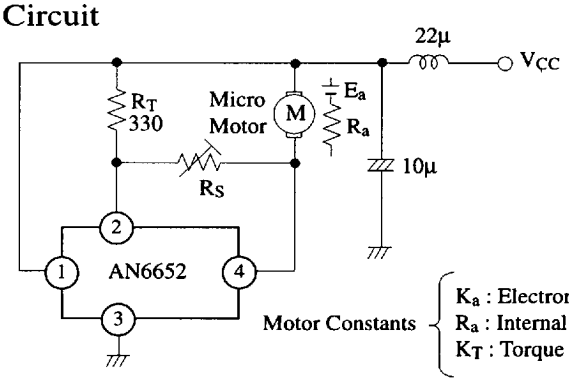
Test Circuit 2 (K, $\frac{\Delta K}{K}/V_{CC}$, $\frac{\Delta K}{K}/I_4$, $\frac{\Delta K}{K}/T_a$)



Test Circuit 3 (I_{Bias})



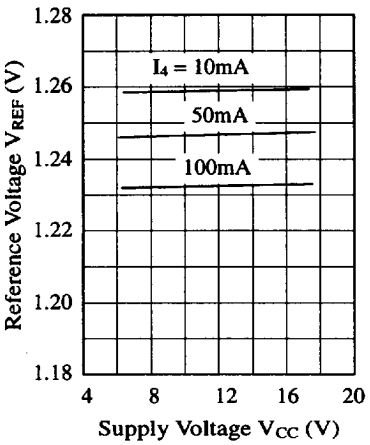
■ Application Circuit



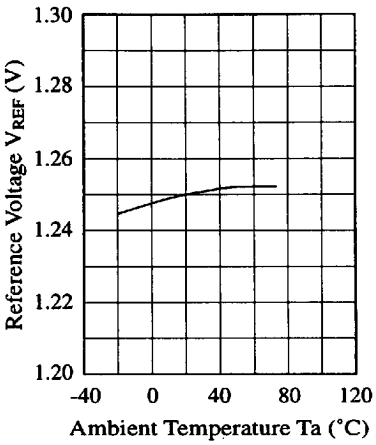
Motor Constants
- K_a : Electromotive force constant = 2.4mV/rpm
- R_a : Internal resistor = 18Ω
- K_T : Torque constant = 200g.cm/A

■ Characteristics Curve

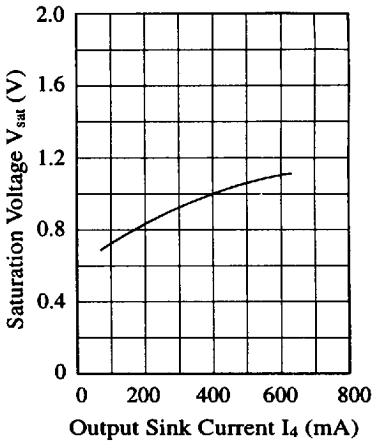
V_{REF} - V_{CC}



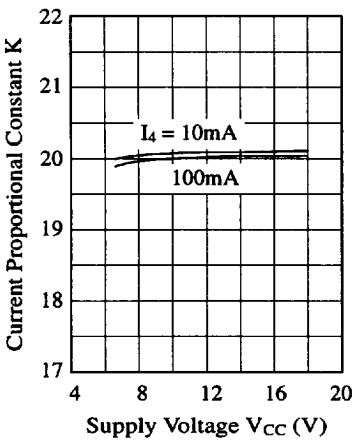
V_{REF} - Ta



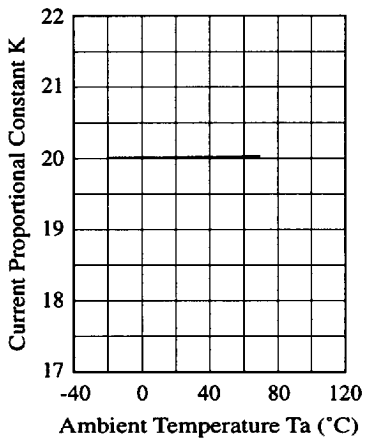
V_{sat} - I_4



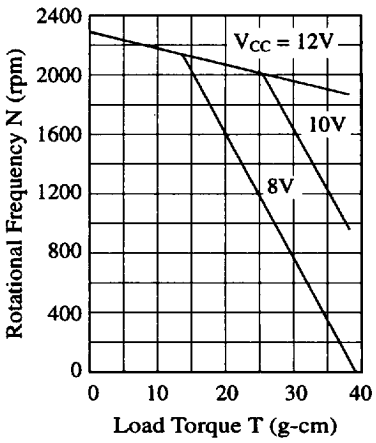
K - V_{CC}



K - Ta



N - T



P_D - Ta