

# AN6650/S

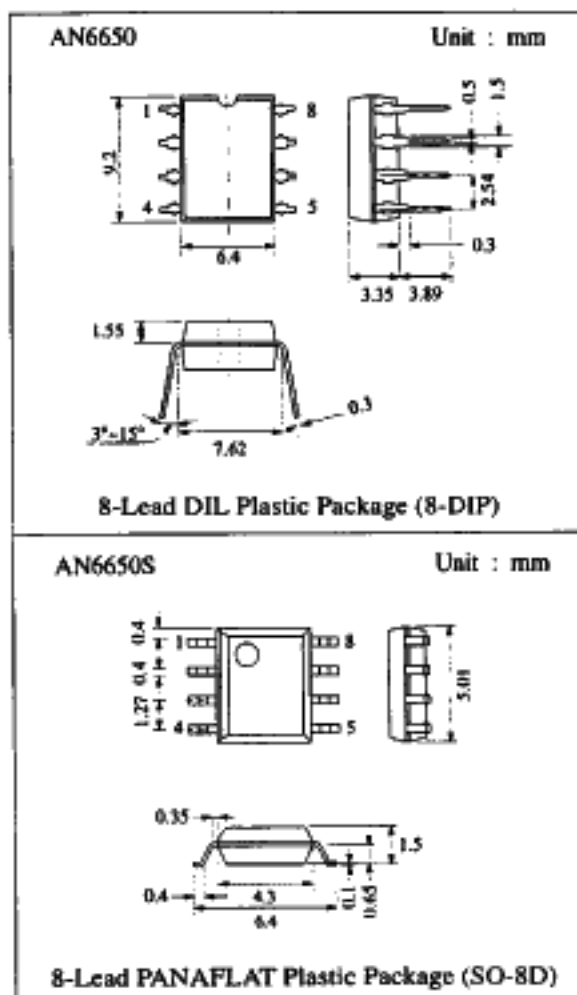
## Motor Control Circuits

### ■ Description

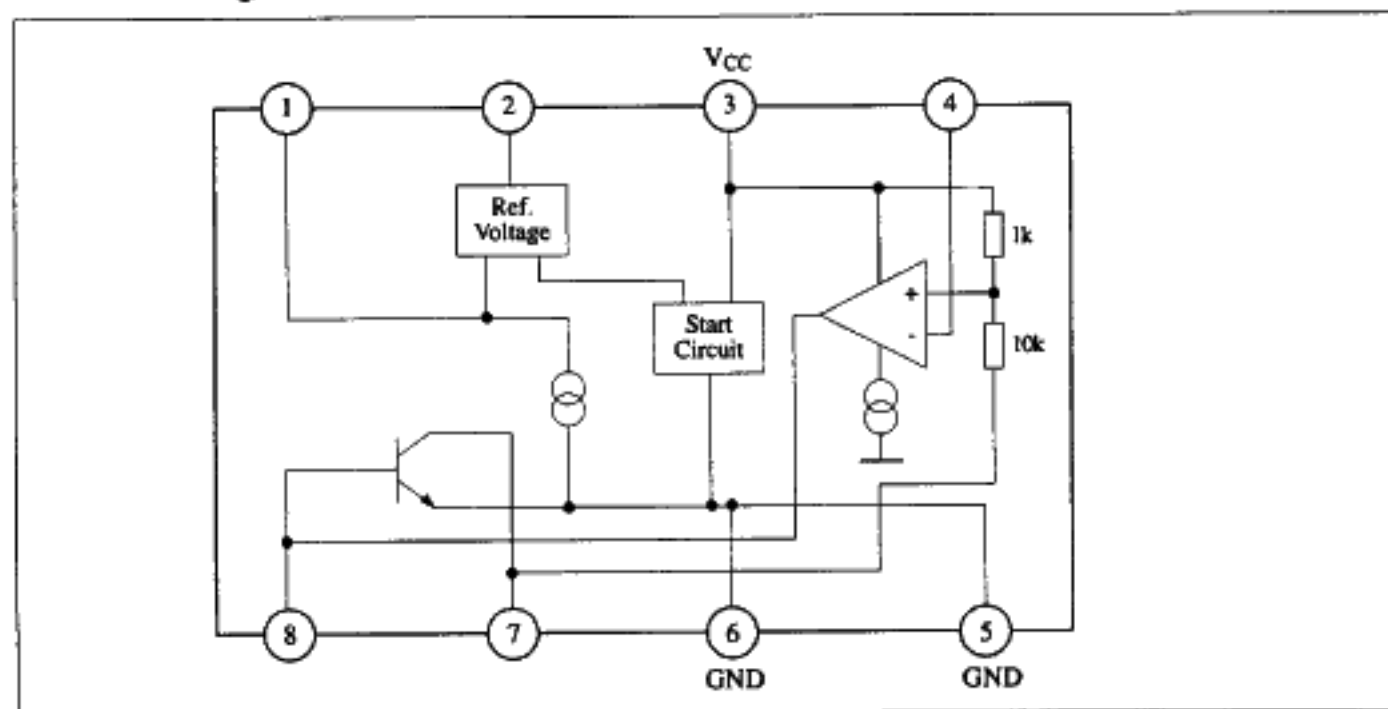
The AN6650/S are the monolithic electronic governor integrated circuits suitable for a low-voltage and compact DC motor which is used for a tape recorder, etc.

### ■ Features

- Wide range of operating voltage  
AN6650:  $V_{CC(opr)} = 1.8V \sim 7.0V$   
AN6650S:  $V_{CC(opr)} = 1.8V \sim 3.6V$
- Fewer external parts
- Speed control in steps with linear fine control



### ■ Block Diagram



### ■ Absolute Maximum Ratings (Ta=25°C)

Item		Symbol	Rating		Unit
Supply Voltage	AN6650	V <sub>CC</sub>	7.5		V
	AN6650S		4		
Circuit Voltage	AN6650	V <sub>n-5,6</sub> (n = 1, 2, 3, 4)	-0.5	7.5	V
	AN6650S		-0.5	4	
Circuit Voltage		V <sub>8-5,6</sub>	-0.5	1	V
Supply Current		I <sub>CC</sub> *	1000		mA
Circuit Current		I <sub>T</sub>	-	1000	mA
Power Dissipation	AN6650	P <sub>D</sub>	750		mW
	AN6650S		360		
Operating Ambient Temperature	AN6650	T <sub>opr</sub>	-20 ~ +75		°C
	AN6650S		-20 ~ +60		
Storage Temperature	AN6650	T <sub>stg</sub>	-40 ~ +150		°C
	AN6650S		-40 ~ +125		

\* AN6650: t ≤ 5s, AN6650S: t ≤ 1s

Operating Supply Voltage Range (AN6650): V<sub>CC</sub> = 1.8V ~ 7.0V

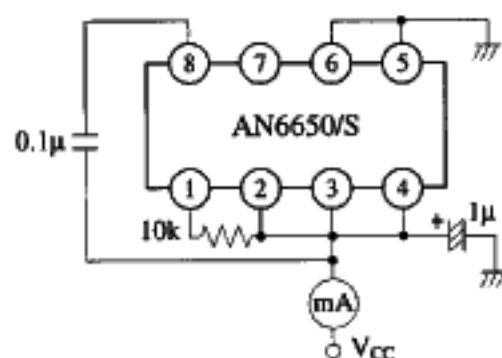
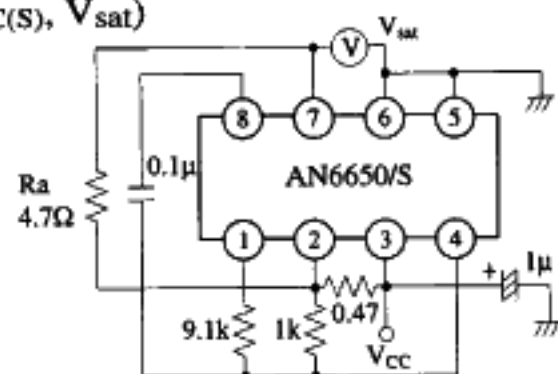
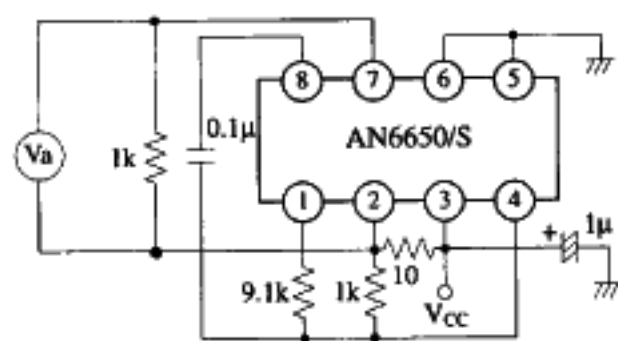
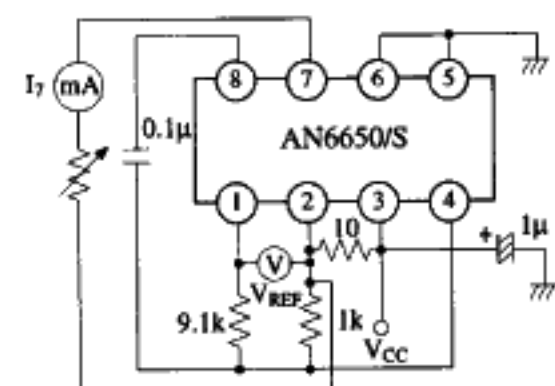
Operating Supply Voltage Range (AN6650S): V<sub>CC</sub> = 1.8V ~ 3.6V

### ■ Electrical Characteristics (Ta=25°C)

Item		Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Supply Current		I <sub>CC</sub>	1	V <sub>CC</sub> = 3V		2	3	mA
Reference Voltage		V <sub>REF</sub>	4	V <sub>CC</sub> = 3V, R <sub>2-1</sub> > 10kΩ	1.20	1.28	1.35	V
Starting Voltage		V <sub>CC(S)</sub>	2	Supply voltage in which 30mA current flows to R <sub>s</sub>		1.0	1.2	V
Saturation Voltage		V <sub>sat</sub>	2	V <sub>CC</sub> = 1.8V, R <sub>s</sub> = 4.7Ω		0.2	0.5	V
Voltage Characteristics 1	AN6650	$\frac{\Delta V_{REF}}{V_{REF}} / \Delta V_{CC}$	1	V <sub>CC</sub> = 1.8 ~ 7V, V <sub>CC</sub> = 1.8 ~ 3.6V	-1.25	0.1	1.25	% / V
	AN6650S							
Voltage Characteristics 2	AN6650	$\frac{\Delta V_s}{V_s} / \Delta V_{CC}$	3	V <sub>CC</sub> = 1.8 ~ 7V, V <sub>CC</sub> = 1.8 ~ 3.6V	-1.2	0.1	1.2	% / V
	AN6650S							
Current Characteristics		$\frac{\Delta V_{REF}}{V_{REF}} / \Delta I_T$	4	I <sub>T</sub> = 1mA ~ 20mA	-0.2	0.01	0.2	% / mA
Temperature current Characteristics		$\frac{\Delta V_{REF}}{V_{REF}} / \Delta T_a$	4	V <sub>CC</sub> = 3V T <sub>a</sub> = -20°C ~ 60°C		0.01		% / °C

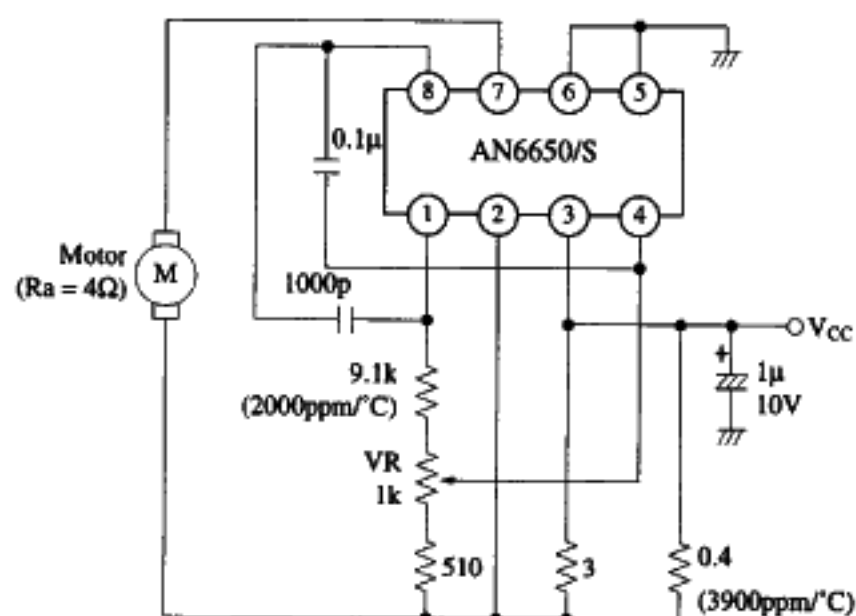
### ■ Pin

Pin No	Pin Name	Pin No	Pin Name
1	V <sub>REF</sub> ⊖	5	GND
2	V <sub>REF</sub> ⊕	6	GND
3	V <sub>CC</sub>	7	Motor Pin
4	Comparator Input	8	Phase Compensation

Test Circuit 1 ( $I_{CC}$ ,  $\frac{\Delta V_{REF}}{V_{REF}}/\Delta V_{CC}$ )Test Circuit 2 ( $V_{CC(S)}$ ,  $V_{sat}$ )Test Circuit 3 ( $\frac{\Delta V_a}{V_a}/\Delta V_{CC}$ )Test Circuit 4 ( $\frac{\Delta V_{REF}}{V_{REF}}/\Delta I_7$ ,  $\frac{\Delta V_{REF}}{V_{REF}}/\Delta T_a$ )

## ■ Application Circuit

### Speed Control Circuit with 3V Core Motor



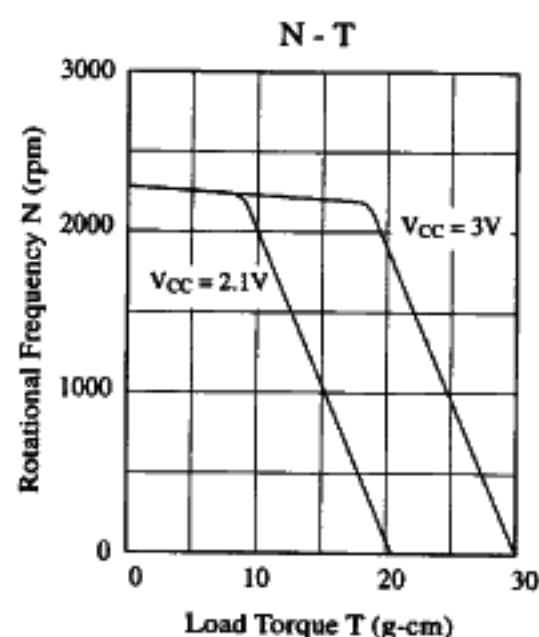
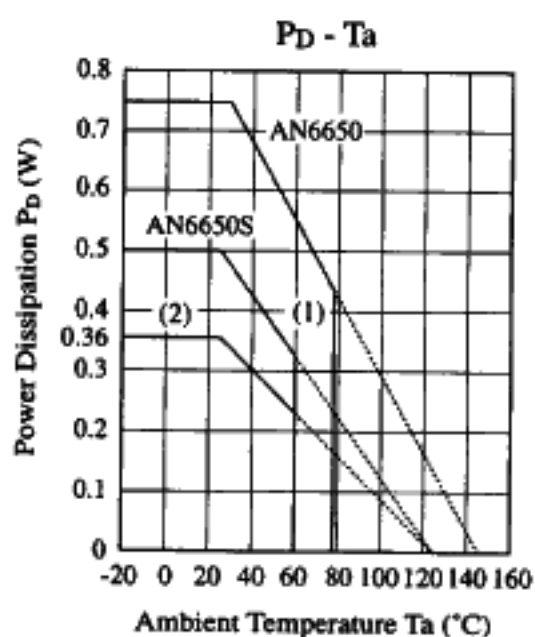
#### Motor Constants

$R_a$  : Internal resistor =  $4\Omega$

$K_a$  : Electromotive force constant =  $0.4\text{mV/rpm}$

$K_T$  : Torque constant =  $30\text{g}\cdot\text{cm/A}$

## ■ Characteristics Curve



In case of AN6650S

(1) Epoxy substrate mounted (55mm x 20mm x 0.7mm)

(2) Single unit.