AN6650/S

Motor Control Circuits

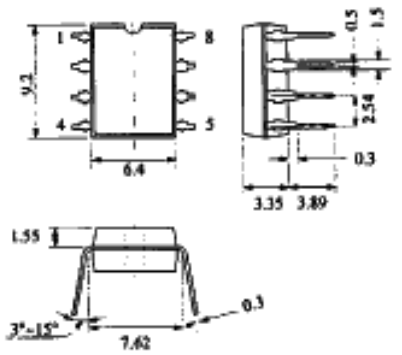
■ Description

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

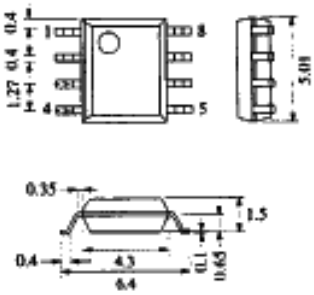
- Wide range of operating voltage
  AN6650: $V_{CC(opr)}$ = 1.8V ~ 7.0V
  AN6650S: $V_{CC(opr)}$ = 1.8V ~ 3.6V
- Fewer external parts
- Speed control in steps with linear fine control

AN6650 Unit : mm



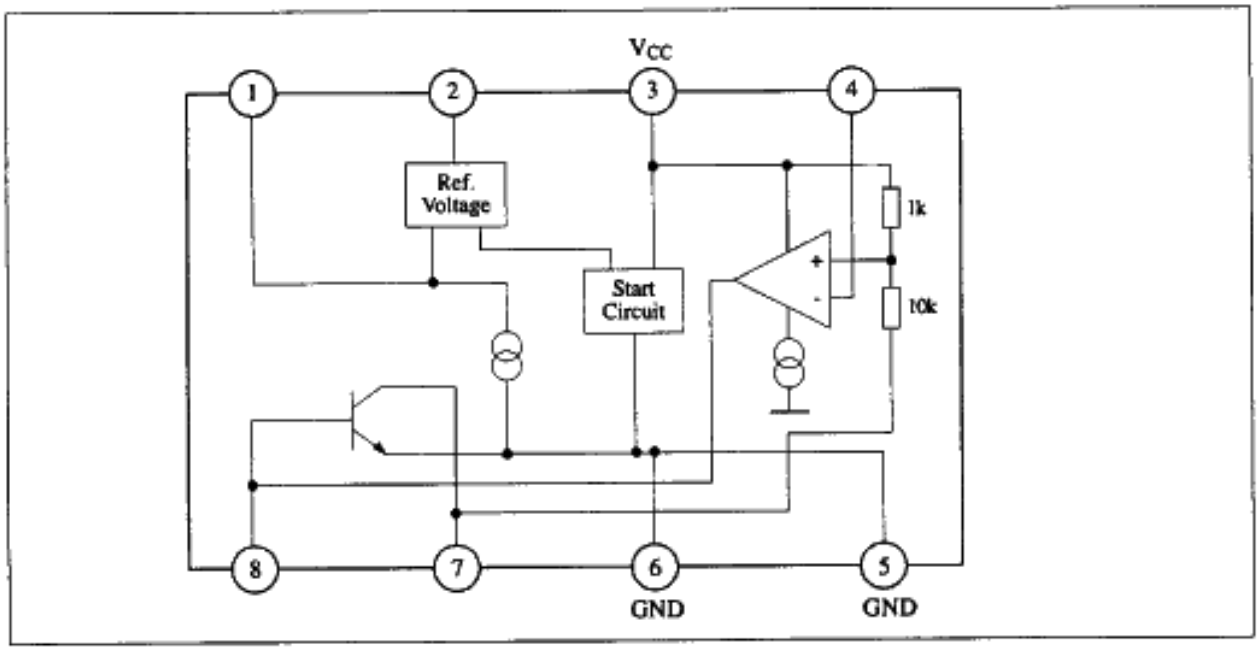
8-Lead DIL Plastic Package (8-DIP)

AN6650S Unit : mm



8-Lead PANAFLAT Plastic Package (SO-8D)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item		Symbol	Rating		Unit
Supply Voltage	AN6650	V_{CC}	7.5		V
	AN6650S		4		
Circuit Voltage	AN6650	$V_{n\text{-}5,6}$ (n = 1, 2, 3, 4)	-0.5	7.5	V
	AN6650S		-0.5	4	
Circuit Voltage		$V_{8\text{-}5,6}$	-0.5	1	V
Supply Current		I_{CC} *	1000		mA
Circuit Current		I_7	-	1000	mA
Power Dissipation	AN6650	P_D	750		mW
	AN6650S		360		
Operating Ambient Temperature	AN6650	Topr	-20 ~ +75		°C
	AN6650S		-20 ~ +60		
Storage Temperature	AN6650	Tstg	-40 ~ +150		°C
	AN6650S		-40 ~ +125		

* AN6650: t ≤ 5s, AN6650S: t ≤ 1s

Operating Supply Voltage Range (AN6650): V_{CC} = 1.8V ~ 7.0V

Operating Supply Voltage Range (AN6650S): V_{CC} = 1.8V ~ 3.6V

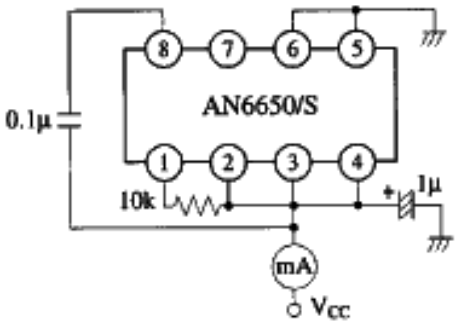
■ Electrical Characteristics (Ta=25°C)

Item		Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Supply Current		I_{CC}	1	V_{CC} = 3V		2	3	mA
Reference Voltage		V_{REF}	4	V_{CC} = 3V, $R_{2\text{-}1}$ > 10kΩ	1.20	1.28	1.35	V
Starting Voltage		$V_{CC(S)}$	2	Supply voltage in which 30mA current flows to R_a		1.0	1.2	V
Saturation Voltage		V_{sat}	2	V_{CC} = 1.8V, R_a = 4.7Ω		0.2	0.5	V
Voltage Characteristics 1	AN6650	$\frac{\Delta V_{REF}}{V_{REF}}/\Delta V_{CC}$	1	V_{CC} = 1.8 ~ 7V, V_{CC} = 1.8 ~ 3.6V	-1.25	0.1	1.25	%/V
	AN6650S							
Voltage Characteristics 2	AN6650	$\frac{\Delta V_a}{V_a}/\Delta V_{CC}$	3	V_{CC} = 1.8 ~ 7V, V_{CC} = 1.8 ~ 3.6V	-1.2	0.1	1.2	%/V
	AN6650S							
Current Characteristics		$\frac{\Delta V_{REF}}{V_{REF}}/\Delta I_7$	4	I_7 = 1mA ~ 20mA	-0.2	0.01	0.2	%/mA
Temperature current Characteristics		$\frac{\Delta V_{REF}}{V_{REF}}/\Delta T_a$	4	V_{CC} = 3V Ta = -20°C ~ 60°C		0.01		%/°C

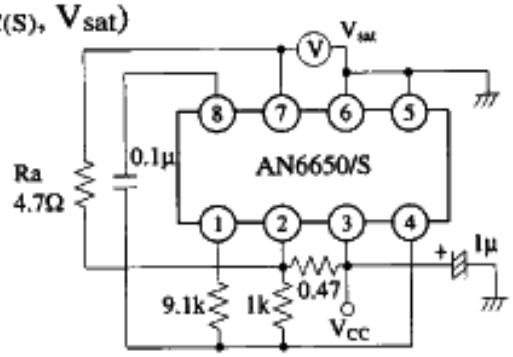
■ Pin

Pin No	Pin Name	Pin No	Pin Name
1	V_{REF} ⊖	5	GND
2	V_{REF} ⊕	6	GND
3	V_{CC}	7	Motor Pin
4	Comparator Input	8	Phase Compensation

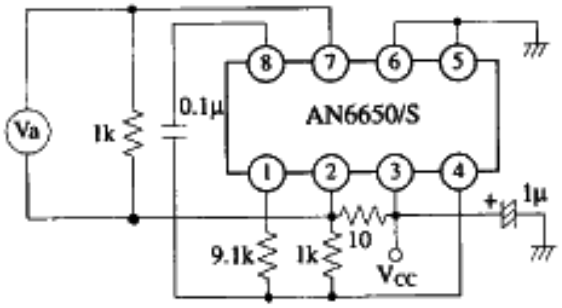
Test Circuit 1 (I_{CC}, $\frac{\Delta V_{REF}}{V_{REF}}/\Delta V_{CC}$)



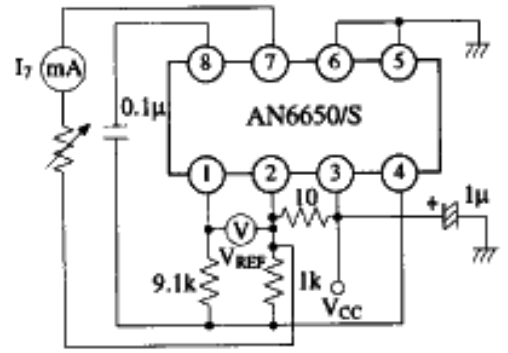
Test Circuit 2 ($V_{CC(S)}$, V_{sat})



Test Circuit 3 ($\frac{\Delta V_a}{V_a}/\Delta V_{CC}$)

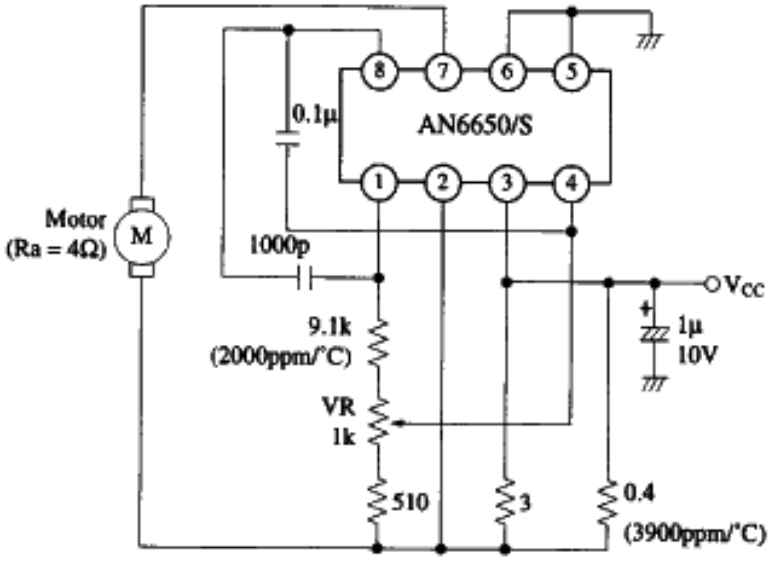


Test Circuit 4 ($\frac{\Delta V_{REF}}{V_{REF}}/\Delta I_7$, $\frac{\Delta V_{REF}}{V_{REF}}/\Delta Ta$)



■ Application Circuit

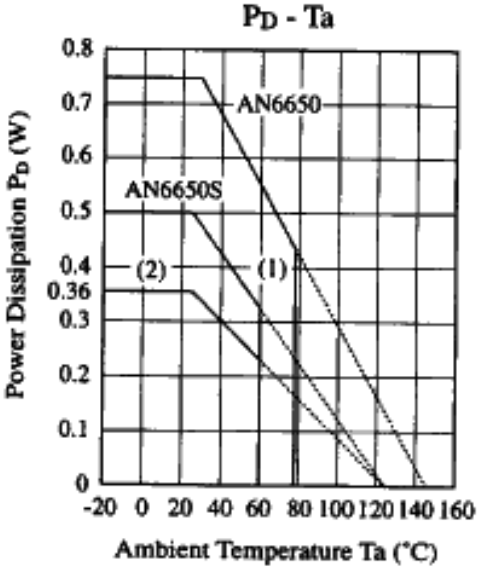
Speed Control Circuit with 3V Core Motor

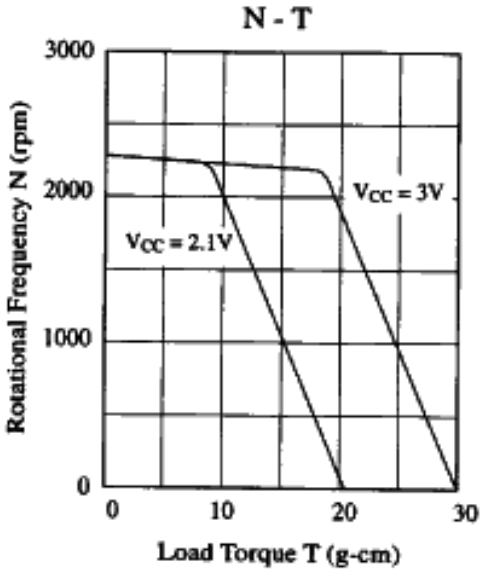


Motor Constants

Ra : Internal resistor = 4Ω
Ka : Electromotive force constant = 0.4mV/rpm
K_T : Torque constant = 30g.cm/A

■ Characteristics Curve





In case of AN6650S
(1) Epoxy substrate mounted (55mm x 20mm x 0.7mm)
(2) Single unit.