

# AN6650, AN6650S

## Motor Control Circuits

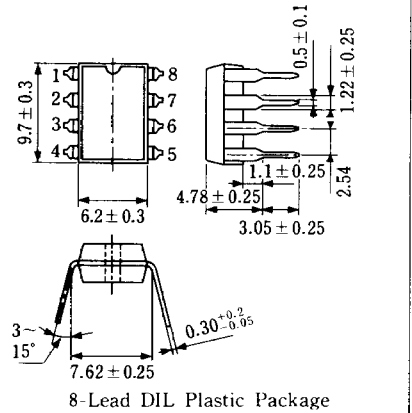
### ■ Outline

The AN6650 and the AN6650S are electronic governor circuits suitable for a low-voltage and compact DC motor which is used for a tape recorder, etc.

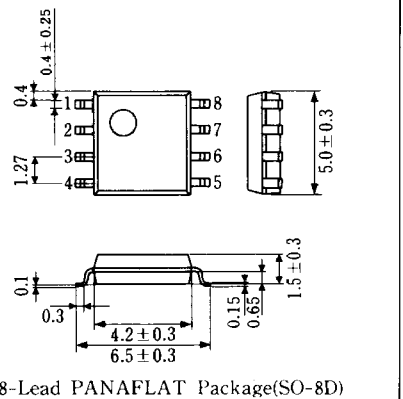
### ■ Features

- Wide range of operating voltage :  $V_{CC(OPP)} = 1.8 \sim 7V$   
 AN6650 :  $V_{CC(OPP)} = 1.8 \sim 7V$   
 AN6650S :  $V_{CC(OPP)} = 1.8 \sim 3.6V$
- 2 package types
- Fewer external components
- Speed control in steps with linear fine control

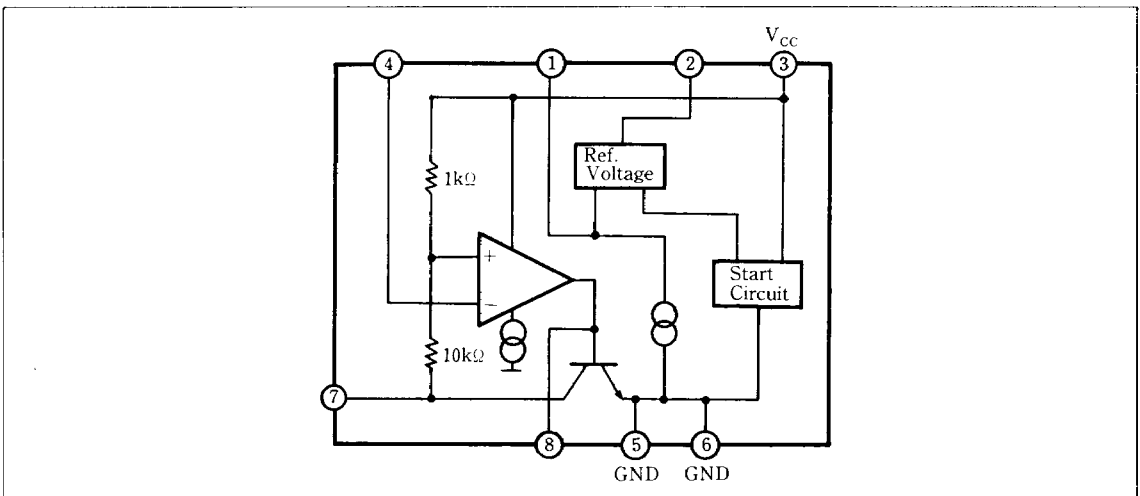
AN6650 Unit : mm



AN6650S Unit : mm



### ■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	$V_{REF} \ominus$	5	GND
2	$V_{REF} \oplus$	6	GND
3	$V_{CC}$	7	Motor Pin
4	Comparator Input	8	Phase Correction

■ Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

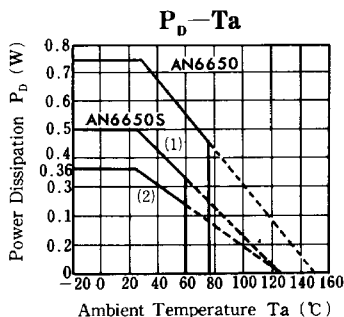
Item	Symbol	Rating	Unit
Supply Voltage	$V_{CC}$	AN6650: 7.5	V
		AN6650S: 4	
Circuit Voltage	$V_{n-5,6}$ ( $n=1,2,3,4$ )	AN6650: -0.5, 7.5	V
		AN6650S: -0.5, 4	
Circuit Voltage	$V_{8-5,6}$	-0.5, 1	V
Supply Current	$I_{CC}^*$	1000	mA
Circuit Current	$I_7$	—, 1000	mA
Power Dissipation	$P_D$	AN6650: 750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

\*AN6650 :  $t \leq 5\mu\text{s}$ , AN6650S :  $t \leq 1\mu\text{s}$

■ Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Supply Current	$I_{CC}$	1	$V_{CC} = 3\text{V}$		2	3	mA
Reference Voltage	$V_{REF}$	4	$V_{CC} = 3\text{V}$ , $R_{2-1} > 10\text{k}\Omega$	1.20	1.28	1.35	V
Starting Voltage	$V_{CC(S)}$	2	Supply voltage in which 30 mA current flows to $R_a$		1.0	1.2	V
Saturation Voltage	$V_{SAT}$	2	$V_{CC} = 1.8\text{V}$ , $R_a = 4.7\Omega$		0.2	0.5	V
Voltage Characteristics 1	AN6650	1	$V_{CC} = 1.8 \sim 7.0\text{V}$ $V_{CC} = 1.8 \sim 3.6\text{V}$	-1.25	0.1	1.25	%/V
	AN6650S						
Voltage Characteristics 2	AN6650	3	$V_{CC} = 1.8 \sim 7.0\text{V}$ $V_{CC} = 1.8 \sim 3.6\text{V}$	-1.2	0.1	1.2	%/V
	AN6650S						
Temperature Characteristics	$\frac{\Delta V_{REF}}{V_{REF}} / \Delta I_7$	4	$I_7 = 1\text{mA} \sim 20\text{mA}$	-0.2	0.01	0.2	%/mA
Temperature Characteristics	$\frac{\Delta V_{REF}}{V_{REF}} / \Delta T_a$	4	$T_a = -20 \sim 60^\circ\text{C}$ , $V_{CC} = 3.0\text{V}$		0.01		%/ $^\circ\text{C}$

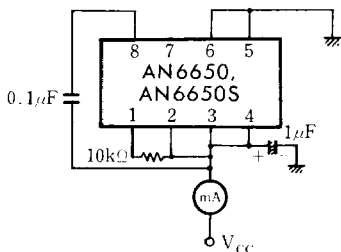
Note) Operating Supply Voltage Characteristics :  $V_{CC(OPR)} = 1.8 \sim 3.6\text{V}$



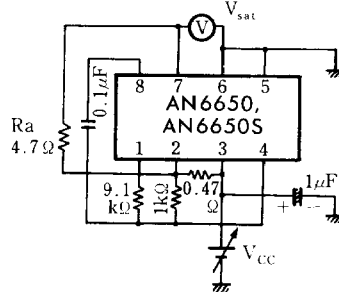
In Case of AN6650S

- (1) Epoxy substrate mounted (55mm×20mm×0.7mm)
- (2) Single unit

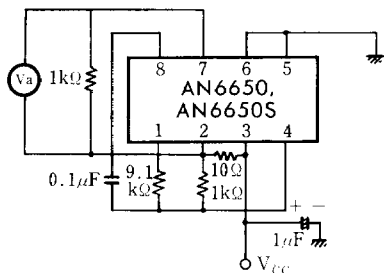
Test Circuit 1 ( $I_{CC}$ ,  $\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_{CC}$ )



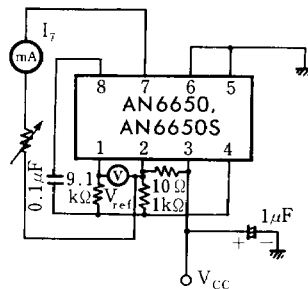
Test Circuit 2 ( $V_{CC(S)}$ ,  $V_{sat}$ )



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

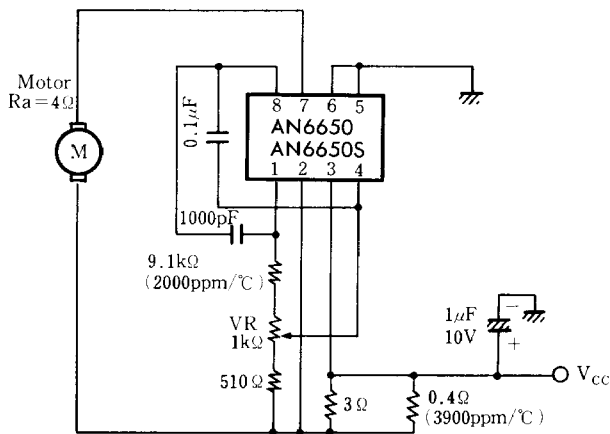


Test Circuit 4



■ Application Circuit

Speed Control Circuit with 3V Core Motor



- Motor Const.
- R<sub>a</sub>: Internal resistance = 4Ω
- K<sub>s</sub>: Electromotive force constant = 0.4mV/rpm
- K<sub>T</sub>: Torque constant = 30g·cm/A

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