

# Electronic Governor for DC Motors

## Monolithic IC LAG674

### Outline

This is an IC for DC motor electronic governors, developed with emphasis on low-voltage operation; it has control functions operating at voltages as low as 0.9 V (with performance guaranteed to 1.0 V).

### Features

1. Stabilized internal reference voltage generation circuit with a flat temperature characteristic ( $\pm 100$  ppm) and excellent reduced-voltage characteristics (operation stable down to 0.9 V)
2. Low startup voltage of 0.75 V max.
3. Internal power transistor ensures large startup currents (500 mA-min at 1.0 V using the standard circuit)
4. On/off switching pin provided; on/off control possible at low startup voltages, power supply current while off is 5 $\mu$ A or less

### Package

SOP-8A (LAG674F)

### Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Operating temperature	T <sub>OPR</sub>	-20~+60	°C
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Power supply current	V <sub>CC</sub>	7	V
Power consumption I	Pd1	600	mW
Power consumption II	Pd2	900 *1	mW
Operating voltage	V <sub>OP</sub>	5	V
Output current	I <sub>L</sub>	1.0 *2	A

\*1: When mounted on a 20×30×0.5 mm printed circuit board (glass-reinforced epoxy).

\*2: When Pd exceeds the rated value, the value of Pd takes precedence.

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C)

Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Recommended operating voltage range	V <sub>ccopr</sub>			1.0		5.0	V
Leakage current while off I	I <sub>leak1</sub>	1	V <sub>CC</sub> =5V, SW OFF			20	μA
Leakage current while off II	I <sub>leak2</sub>	1	V <sub>CC</sub> =1.2V, SW OFF			5	μA
Power supply current while on I	I <sub>cc1</sub>	2	V <sub>CC</sub> =5V, SW ON		1.2	1.8	mA
Power supply current while on II	I <sub>cc2</sub>	2	V <sub>CC</sub> =1.2V, SW ON		1.0	1.5	mA
Reference voltage	V <sub>ref</sub>	2	V <sub>CC</sub> =1.2V	115	127	140	mV
Reference voltage fluctuation	ΔV <sub>ref</sub>	2	V <sub>CC</sub> =1.0~5.0V	-0.5		0.5	mV/V
Output voltage	V <sub>M</sub>	3	V <sub>CC</sub> =1.2, R <sub>M</sub> =6Ω	0.56	0.61	0.66	V
Reference voltage fluctuation	ΔV <sub>M</sub>	3	V <sub>CC</sub> =1.0~5.0V, R <sub>M</sub> =6Ω	-5		5	mV/V
Pin 7 threshold Motor ON/OFF SW	V <sub>TH</sub>	1	Voltage at which I <sub>cc</sub> reaches 90mA R <sub>M</sub> =6Ω, I <sub>M</sub> =I <sub>cc</sub> -1mA	0.3	0.43	0.5	V
Pin 7 input current I	I <sub>IN1</sub>	1	V <sub>IN</sub> (7PIN) =0.5V	0.8	1.6	3.4	μA
Pin 7 input current II	I <sub>IN2</sub>	1	V <sub>IN</sub> (7PIN) =3V	35	50	70	μA
Starting power supply voltage	V <sub>ccs</sub>	3	Voltage at which I <sub>M</sub> reaches 30mA R <sub>M</sub> =1.2Ω, I <sub>M</sub> =V <sub>M</sub> /1.2			0.75	V
Startup current	I <sub>MS</sub>	3	V <sub>CC</sub> =1.0V, R <sub>M</sub> =1.2Ω	500			mA
Output saturation voltage	V <sub>osat</sub>	4	V <sub>CC</sub> =1.0V, I <sub>M</sub> =200mA			0.2	V
Bridge ratio	K	5	V <sub>CC</sub> =1.0~5.0V I <sub>M</sub> =25~200mA K=ΔV <sub>M</sub> /ΔV <sub>A</sub> *1	6.7	7.0	7.3	
Output resistance	R <sub>o</sub>	5	V <sub>CC</sub> =1.0~5.0V I <sub>M</sub> =25~225mA R <sub>o</sub> =ΔV <sub>M</sub> /ΔI <sub>A</sub> *2	50	80	120	mΩ
Reference voltage temperature characteristic	ΔV <sub>ref</sub> /ΔTa	2	V <sub>CC</sub> =1.2V Ta=-20~60°C *3		±100		ppm/T
Output voltage temperature characteristic	ΔV <sub>M</sub> /ΔTa	3	V <sub>CC</sub> =1.2V, R <sub>M</sub> =6Ω Ta=-20~60°C *3		±150		ppm/T
Bridge ratio temperature characteristic	ΔK /ΔTa	5	V <sub>CC</sub> =1.0~5.0V I <sub>M</sub> =25~200mA Ta=-20~60°C *3		±100		ppm/T
Output voltage aging drift characteristic	ΔV <sub>MT</sub>	3	V <sub>CC</sub> =1.2, R <sub>M</sub> =6Ω T=15S~10M		±0.1		%

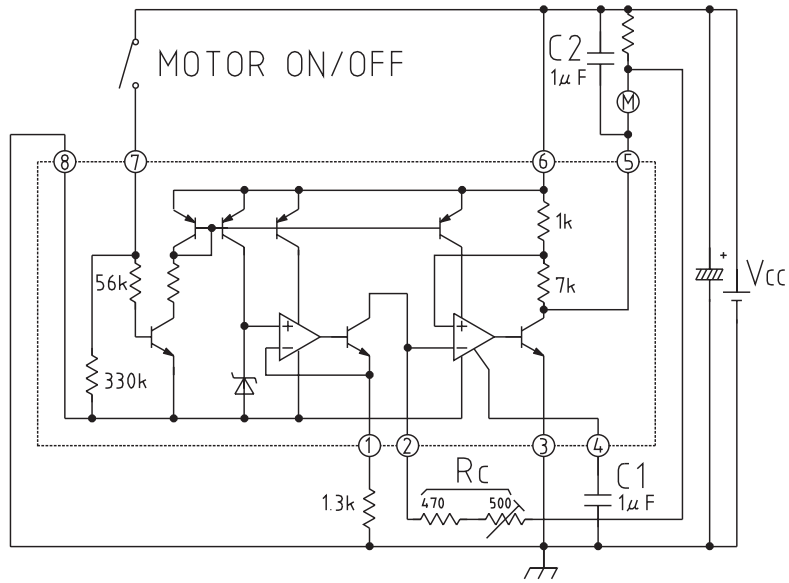
Measurement conditions: Except where noted otherwise, in measurement circuits V<sub>CC</sub>=1.2V

\*1: At a certain point within the range V<sub>CC</sub>=1.0 to 5.0 V, I<sub>M</sub>=25 to 200 mA, the value of V<sub>A</sub> is varied and the value ΔV<sub>M</sub>/ΔV<sub>A</sub> is determined.

\*2: At a certain point within the range V<sub>CC</sub>=1.0 to 5.0 V, the value of I<sub>M</sub> is varied between 25 to 225 mA, and the value ΔV<sub>M</sub>/ΔI<sub>A</sub> is determined.

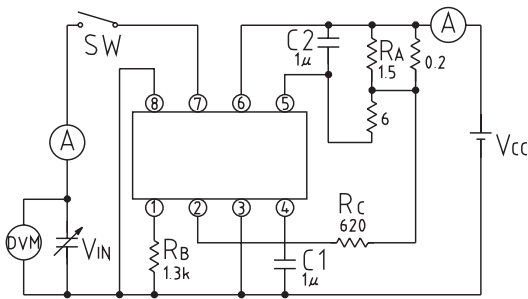
\*3: The temperature characteristics of the reference voltage, output voltage and bridge ratio, as well as the drift characteristic, are all reference values and are not guaranteed.

Block Diagram

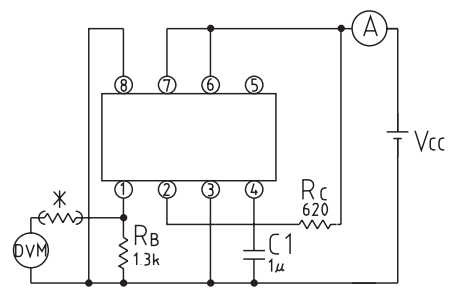


Measuring Circuit

Measurement circuit 1

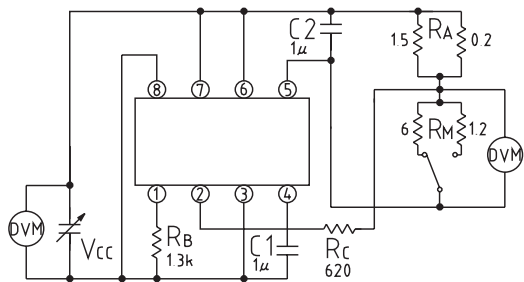


Measurement circuit 2

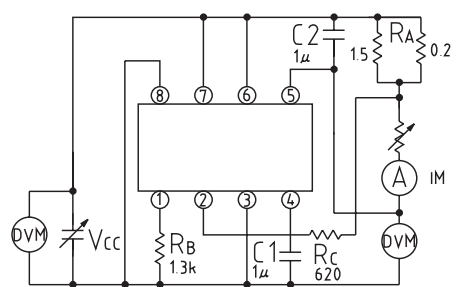


\* If DVM is connected oscillation may result; when connecting DVM, please insert a resistance of 10 kΩ or so.

Measurement circuit 3



Measurement circuit 4



Measurement circuit 5

