

# FAN8047G3

## 4-CH Motor Driver (5 Input & 4 Output)

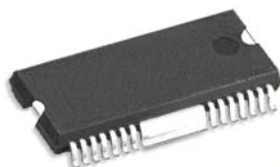
### Features

- 4-CH Balanced transformerless (BTL) driver
- Optional input (CH4,5) for output CH4
- Operating supply voltage : 4.5 V ~ 14V
- Built-in thermal shut down circuit (TSD)
- Built-in channel mute circuit
- Built-in 3.3 volt regulator

### Description

The FAN8047G3 is a monolithic integrated circuit suitable for a 4-ch motor driver which drives a tracking actuator, a focus actuator, a sled motor, a spindle motor, and a tray motor of the CDP/CAR-CD/DVDP systems.

28-SSOPH-375SG2



### Typical Application

- Compact disk player
- Video compact disk player
- Car compact disk player
- Digital video disk player

### Ordering information

| DEVICE                        | PACKARE          | OPERATING TEMP |
|-------------------------------|------------------|----------------|
| FAN8047G3                     | 28-SSOPH-375-SG2 | -35°C ~ +85°C  |
| FAN8047G3X <sup>note1</sup>   | 28-SSOPH-375-SG2 | -35°C ~ +85°C  |
| FAN8047G3_NL <sup>note2</sup> | 28-SSOPH-375-SG2 | -35°C ~ +85°C  |
| FAN8047G3X_NL                 | 28-SSOPH-375-SG2 | -35°C ~ +85°C  |

#### Notes:

1. X : Tape&Reel
2. NL : Lead free

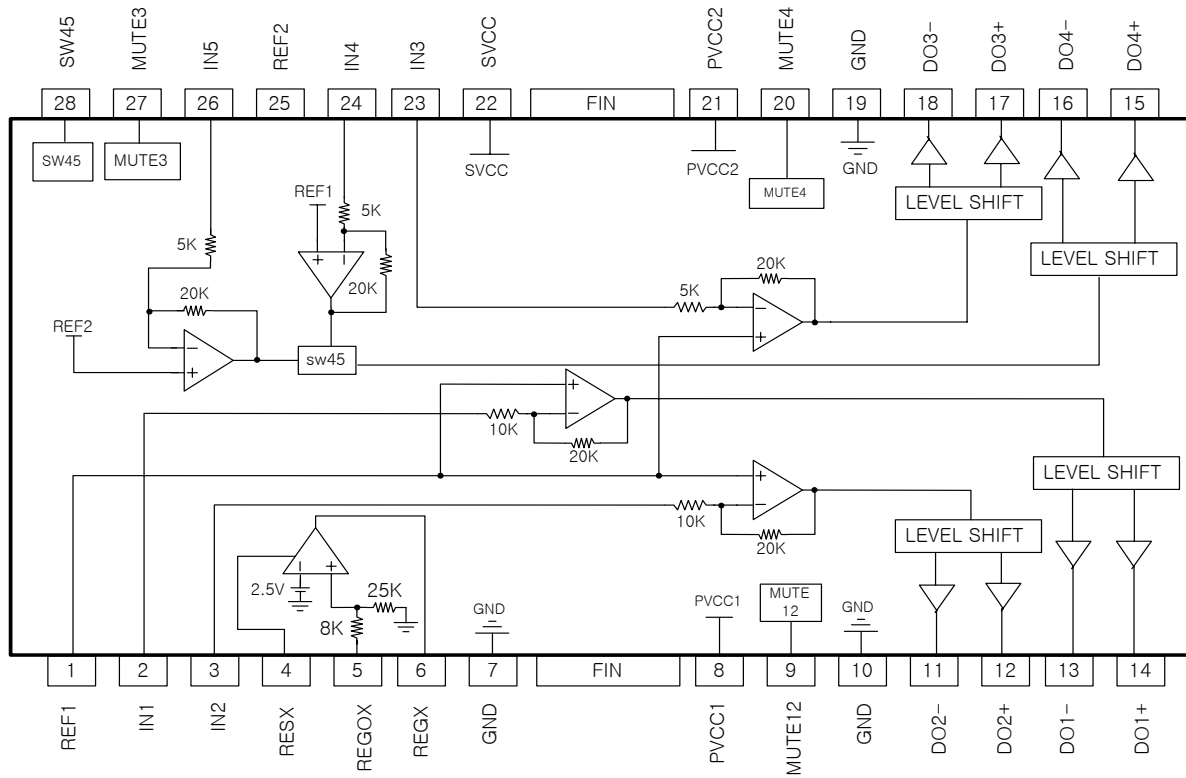
Pin assignments



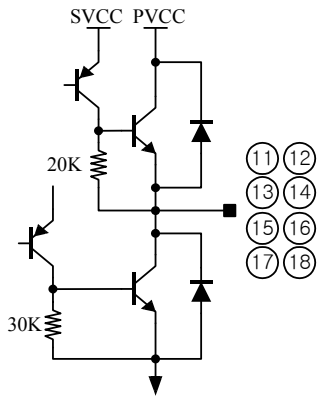
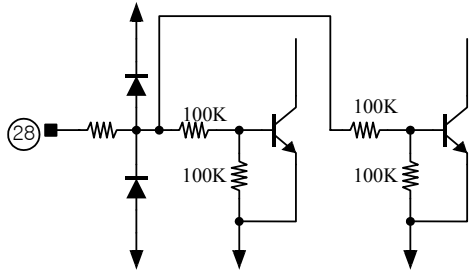
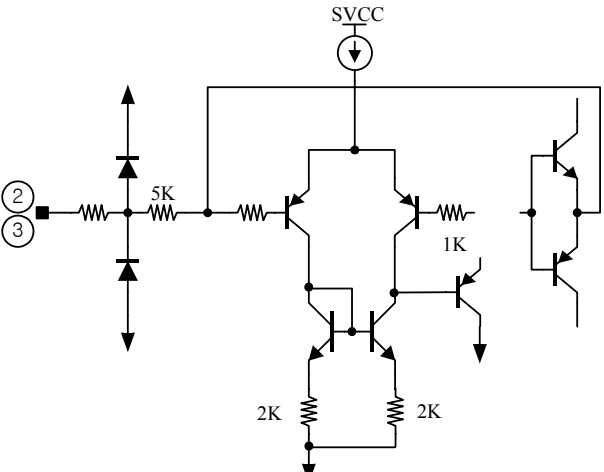
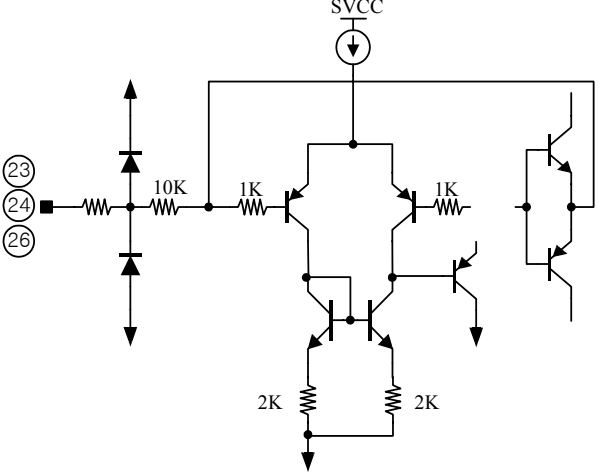
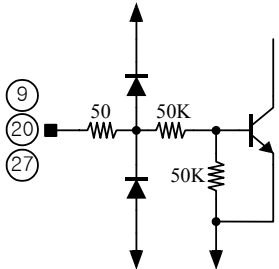
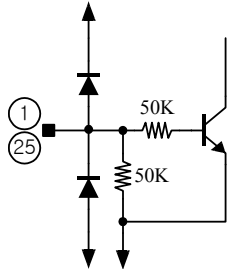
## Pin definitions

| PIN NUMBER | PIN NAME | I/O | PIN FUNCTION DESCRIPTION |
|------------|----------|-----|--------------------------|
| 1          | REF1     | I   | Bias voltage input       |
| 2          | IN1      | I   | CH1 Input                |
| 3          | IN2      | I   | CH2 Input                |
| 4          | RESX     | I   | Regulator reset          |
| 5          | REGOX    | I   | Regulator feedback input |
| 6          | REGX     | O   | Regulator output         |
| 7          | GND      | -   | Signal ground            |
| 8          | PVcc1    | -   | Power Vcc (CH1,CH2)      |
| 9          | MUTE12   | I   | Mute 1,2                 |
| 10         | GND      | -   | Power ground (CH1,CH2)   |
| 11         | DO2-     | O   | CH2 Drive output (-)     |
| 12         | DO2+     | O   | CH2 Drive output (+)     |
| 13         | DO1-     | O   | CH1 Drive output (-)     |
| 14         | DO1+     | O   | CH1 Drive output (+)     |
| 15         | DO4+     | O   | CH4 Drive output (+)     |
| 16         | DO4-     | O   | CH4 Drive output (-)     |
| 17         | DO3+     | O   | CH3 Drive output (+)     |
| 18         | DO3-     | O   | CH3 Drive output (-)     |
| 19         | GND      | -   | Power ground (CH3,CH4)   |
| 20         | MUTE4    | I   | Mute 4                   |
| 21         | PVcc2    | -   | Power Vcc (CH3,CH4)      |
| 22         | SVcc     | -   | Signal Vcc               |
| 23         | IN3      | I   | CH3 Input                |
| 24         | IN4      | I   | CH4 Input                |
| 25         | REF2     | I   | REF2                     |
| 26         | IN5      | I   | CH5 Input                |
| 27         | MUTE3    | I   | Mute 3                   |
| 28         | SW45     | I   | Select switch for CH4,5  |

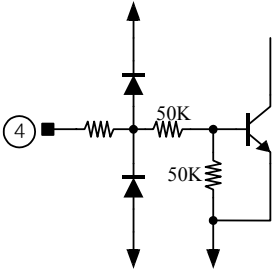
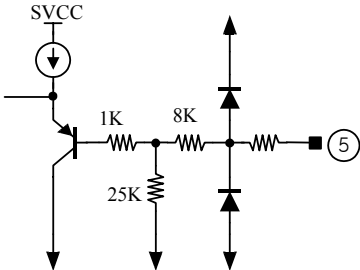
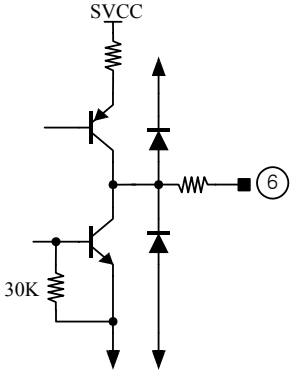
## Internal block diagram



## Equivalent circuits

| BTL Driver output                                                                   | SW45                                                                                  |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |     |
| BTL Input(CH1,2)                                                                    | BTL Input(CH3,4,5)                                                                    |
|   |    |
| Mute                                                                                | Reference                                                                             |
|  |  |

Equivalent circuits(Continued)

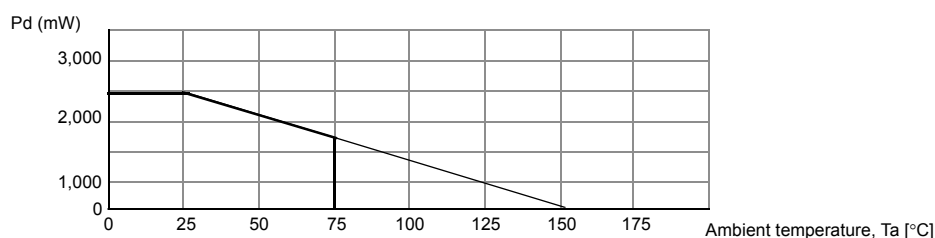
| Regulator reset                                                                    | Regulator feedback input                                                           |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|   |  |
| Regulator output                                                                   |                                                                                    |
|  |                                                                                    |

## Absolute maximum ratings ( Ta=25°C)

| PARAMETER              | SYMBOL   | VALUE                    | UNIT |
|------------------------|----------|--------------------------|------|
| Maximum supply voltage | SVCCMAX  | 18                       | V    |
|                        | PVCC1MAX | 18                       | V    |
|                        | PVCC2MAX | 18                       | V    |
| Power dissipation      | PD       | 2.5 <sup>note1,2,3</sup> | W    |
| Operating temperature  | TOPR     | −35 ~ +85                | °C   |
| Storage temperature    | TSTG     | −55 ~ +150               | °C   |
| Maximum output current | IOMAX    | 1                        | A    |

### Notes:

1. When it is mounted on 70mm × 70mm × 1.6mm PCB.
2. Power dissipation decreases at the rate of 20mW/°C in T<sub>A</sub> >25°C.
3. Do not exceed P<sub>D</sub> and SOA.



## Recommended operating conditions ( Ta=25°C)

| PARAMETER                | SYMBOL | MIN | TYP | MAX  | UNIT |
|--------------------------|--------|-----|-----|------|------|
| Operating supply voltage | SVCC   | 4.5 | -   | 14   | V    |
|                          | PVCC1  | 4.5 | -   | SVCC | V    |
|                          | PVCC2  | 4.5 | -   | SVCC | V    |

## Electrical characteristics

(SVCC = PVCC2 = 12V, TA = 25°C, PVCC1 = 5V, Ref1= 1.65V, Ref2 = 2.5V, RL = 8Ω)

| PARAMETER                                 | SYMBOL | CONDITIONS            | MIN    | TYP  | MAX   | UNITS |
|-------------------------------------------|--------|-----------------------|--------|------|-------|-------|
| Quiescent circuit current                 | ICC    | Under no-load         | -      | 17   | 25    | mA    |
| <b>BTL Driver circuit (RL=8Ω)</b>         |        |                       |        |      |       |       |
| Output offset voltage(CH12)               | VOOF1  | VIN=1.65V             | -50    | -    | +50   | mV    |
| Output offset voltage(CH34)               | VOOF2  | VIN=1.65V             | -100   | -    | +100  | mV    |
| Output offset voltage(CH5)                | VOOF3  | VIN=2.5V              | -100   | -    | +100  | mV    |
| Maximum output voltage(CH12)              | VOM1   | PVcc1=5V, RL=8Ω       | 3.6    | 4.0  | -     | V     |
| Maximum output voltage(CH34)              | VOM2   | PVcc2=12V, RL=24Ω     | 9.6    | 10.5 | -     | V     |
| Close-loop voltage gain(CH12)             | AVF    | VIN= 0.3V             | 15.5   | 17.5 | 19.5  | dB    |
| Close-loop voltage gain(CH34)             | AVF    | VIN= 0.3V             | 21.5   | 23.5 | 25.5  | dB    |
| <b>Regulator circuit (SVCC,PVCC2=12V)</b> |        |                       |        |      |       |       |
| Load regulation                           | ΔVRL   | IL=0 → □ 200mA        | -10    | 0    | +10   | mV    |
| Line regulation                           | ΔVCC   | IL=200mA, V=6V → □ 9V | -20    | 0    | +30   | mV    |
| Regulator output voltage 1                | VREG1  | IL=100mA              | 3.135' | 3.3  | 3.465 | V     |
| Regulator reset on voltage                | Reson  | Pin4=Variation        | -      | -    | 0.5   | V     |
| Regulator reset off voltage               | Resoff | Pin4=Variation        | 2      | -    | -     | V     |
| <b>Mute and other function circuit</b>    |        |                       |        |      |       |       |
| Mute on voltage                           | VMON   | Pin9,20,27=Variation  | -      | -    | 0.5   | V     |
| Mute off voltage                          | VMOFF  | Pin9,20,27=Variation  | 2      | -    | -     | V     |
| SW on voltage                             | VSWL   | Pin28=Variation       | -      | -    | 0.5   | V     |
| SW off voltage                            | VSWH   | Pin28=Variation       | 2      | -    | -     | V     |
| Mute low level sink current               | IMTL   | VMUTE = 0V            | -15    | 0    | 15    | uA    |
| Mute high level sink current              | IMTH   | VMUTE = 5V            | -      | 85   | 170   | uA    |
| SW45 Low level sink current               | ISWL45 | SW45 = 0V             | -15    | 0    | 15    | uA    |
| SW45 High level sink current              | ISWH45 | SW45 = 5V             | -      | 85   | 170   | uA    |
| REF1 Sink current                         | IRL    | REF1 = 1.65V          | -      | 52   | 104   | uA    |
| REF2 Sink current                         | IRH    | REF2 = 2.5V           | -      | 85   | 170   | uA    |

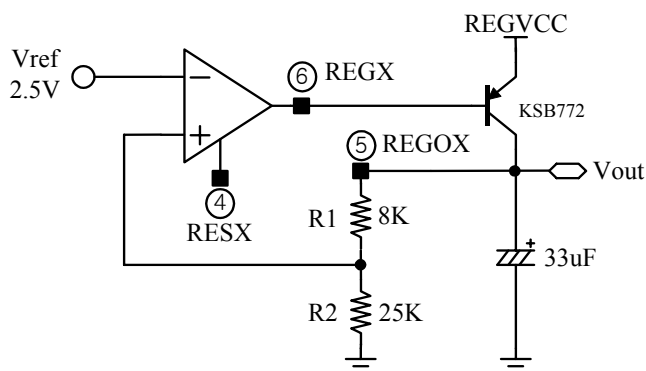
(\* note) : Guaranteed field. ( No EDS/ Final test . )

## Application information

### 1. MUTE, REF & SW45 Function

| INPUT |        |       |       |      |      | OUTPUT |     |     |         |     |     |
|-------|--------|-------|-------|------|------|--------|-----|-----|---------|-----|-----|
| SW45  | MUTE12 | MUTE3 | MUTE4 | REF1 | REF2 | BTL    |     |     | PRE-AMP |     | REG |
|       |        |       |       |      |      | CH12   | CH3 | CH4 | CH4     | CH5 |     |
| H     | H      | H     | -     | H    | -    | ON     | ON  | IN4 | ON      | ON  | ON  |
| H     | H      | L     | -     | H    | -    | ON     | OFF | IN4 | ON      | ON  | ON  |
| H     | H      | H     | -     | L    | -    | OFF    | OFF | OFF | OFF     | ON  | ON  |
| H     | L      | H     | -     | H    | -    | OFF    | ON  | OFF | ON      | ON  | ON  |
| H     | L      | L     | -     | H    | -    | OFF    | OFF | OFF | ON      | ON  | ON  |
| L     | -      | -     | L     | -    | -    | OFF    | OFF | OFF | OFF     | ON  | ON  |
| L     | -      | -     | H     | -    | H    | OFF    | OFF | IN5 | OFF     | ON  | ON  |
| L     | -      | -     | H     | -    | L    | OFF    | OFF | OFF | OFF     | ON  | ON  |

### 2. Regulator & Reset function



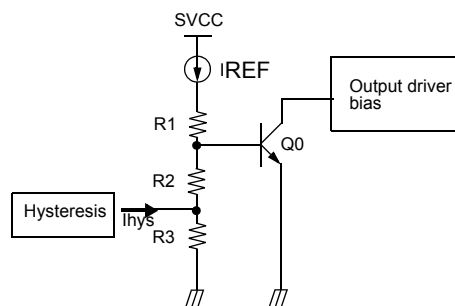
- The external circuit is composed of the transistor, KSB772 and a capacitor, about 33uF.
- The capacitor is used as a ripple eliminator.
- The capacitor must have a good temperature characteristics.
- The regulator output voltage is decided as follows.

$$\begin{aligned}
 V_{out} &= V_{ref} \times \left(1 + \frac{R1}{R2}\right) \\
 &= 2.5 \times \frac{8K}{25K} = 3.3V
 \end{aligned}$$

- When the voltage of the pin 4(RESX) is high, the regulator circuit operates normally. When the voltage of pin 4(RESX) is low, the regulator circuit is disabled.

### 3. TSD Function

- When the chip temperature reaches to 160°C by abnormal condition, the TSD circuit is activated.
- This makes the bias current of the output drivers shut down, and all the output drivers are on cut-off state. Therefore the chip temperature begins to decrease.
- When the chip temperature falls to 140°C, the TSD circuit is deactivated and the output drivers start to operate normally.
- The TSD function does not affect regulator operation.



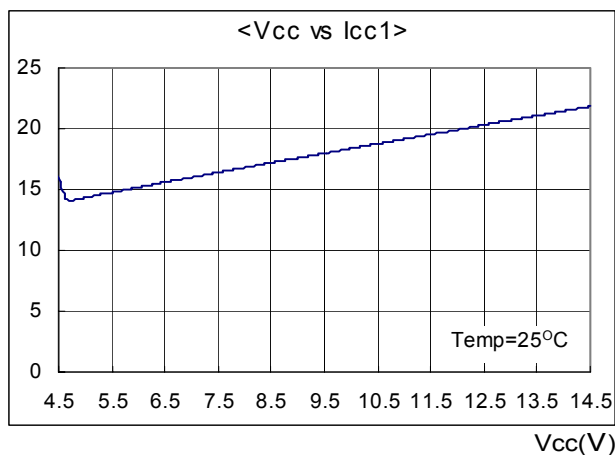
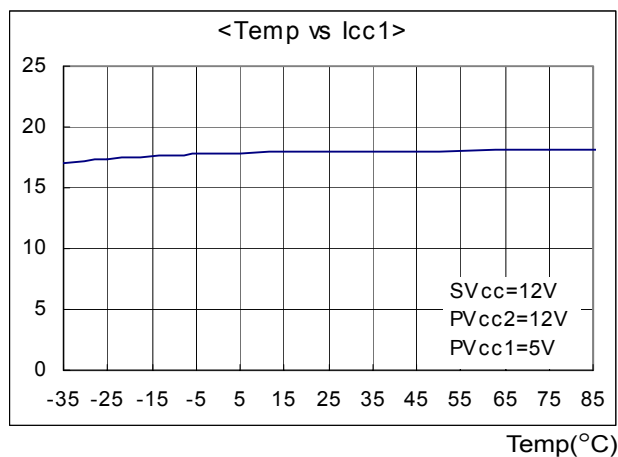
### 4. Notice

- When REF1(pin1) or REF2(pin25) is lower than 0.7V, BTL output is off.
- Under Voltage Protection Function. ( If SVcc is lower than 3.8V, Chip is disable. Hysterisis is 0.2V)
- Mute on BTL output voltage is as followed:
  - Mute ON BTL Output (CH1,2) =  $(PV_{cc1}) / 2$
  - Mute ON BTL Output (CH3,4) =  $((PV_{cc2} - 0.6) / 2)$

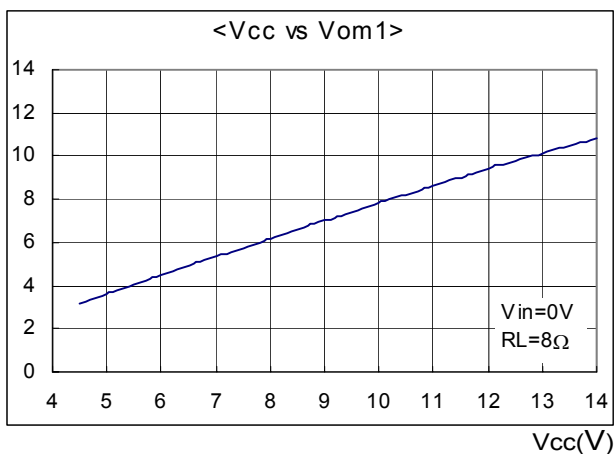
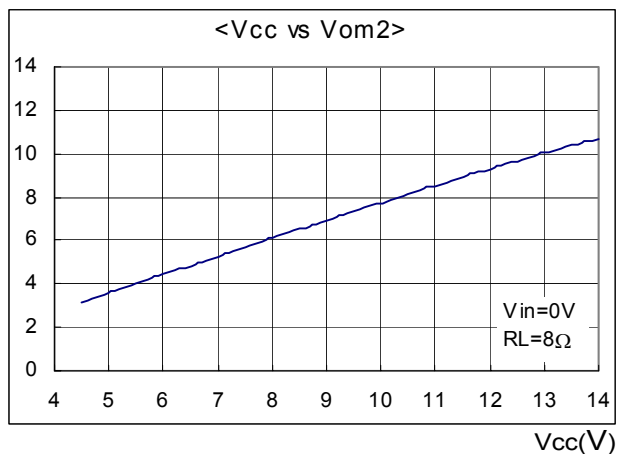
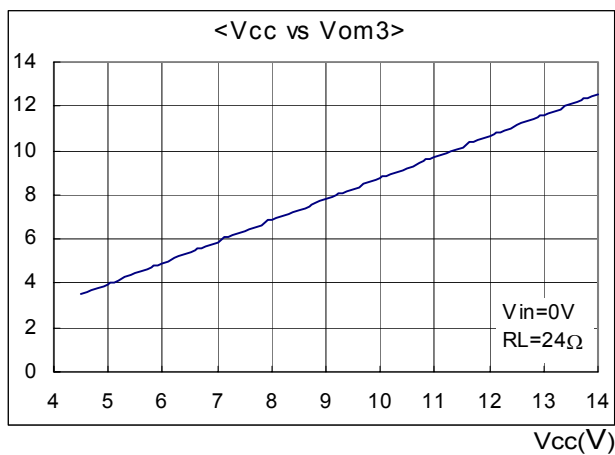
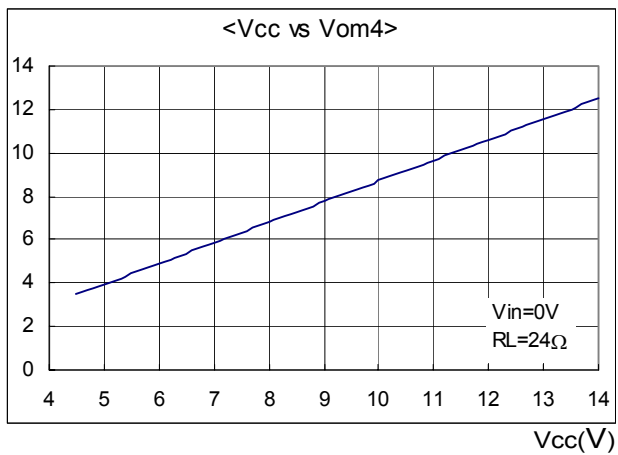
Each output to output and output to GND short should be kept away.

## Typical performance characteristics

### Total circuit

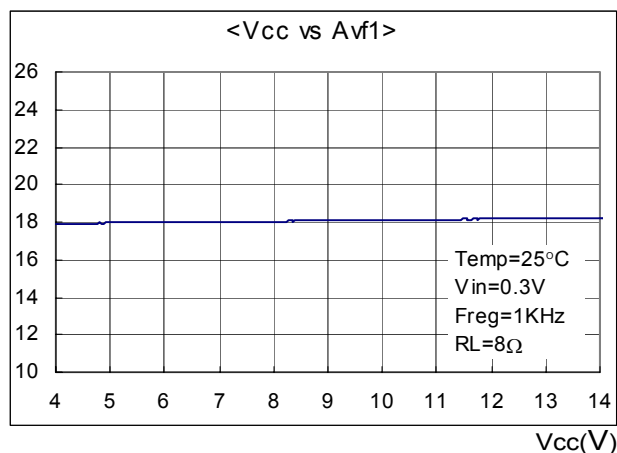
I<sub>cc</sub>(mA)I<sub>cc</sub>(mA)

### BTL Drive part

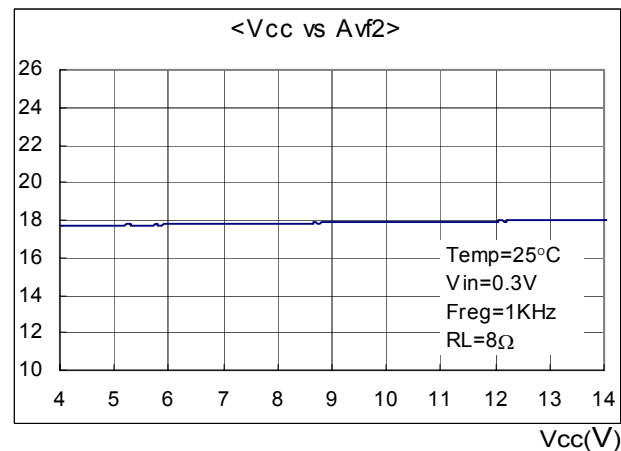
V<sub>om</sub>(V)V<sub>om</sub>(V)V<sub>om</sub>(V)V<sub>om</sub>(V)

## Typical performance characteristics (Continued)

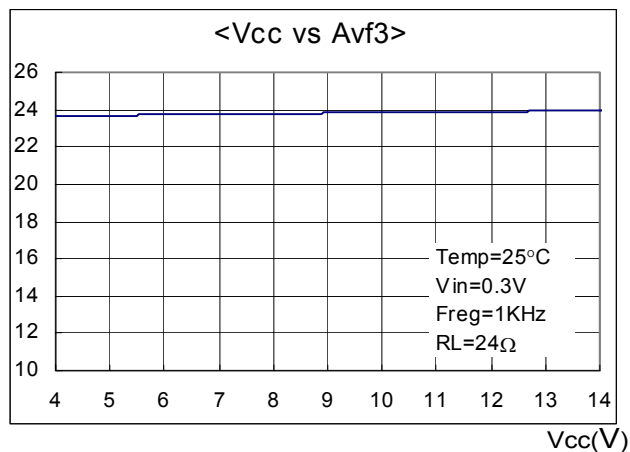
Avf(dB)



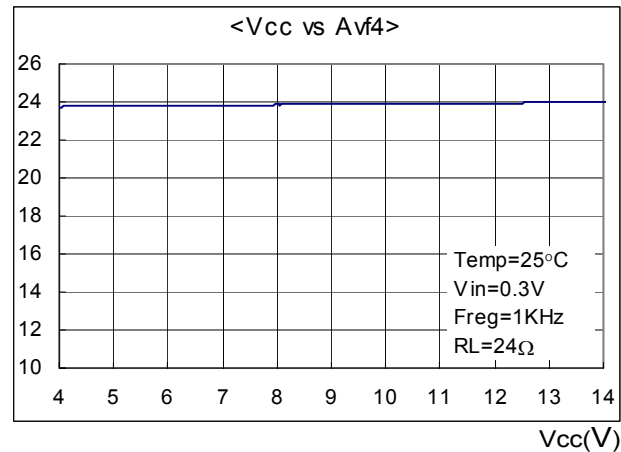
Avf(dB)



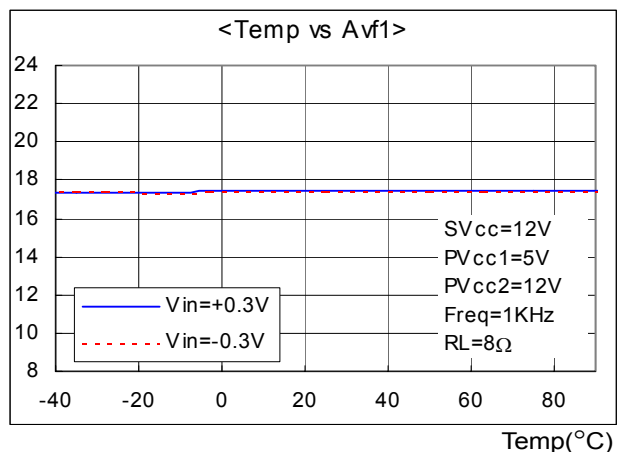
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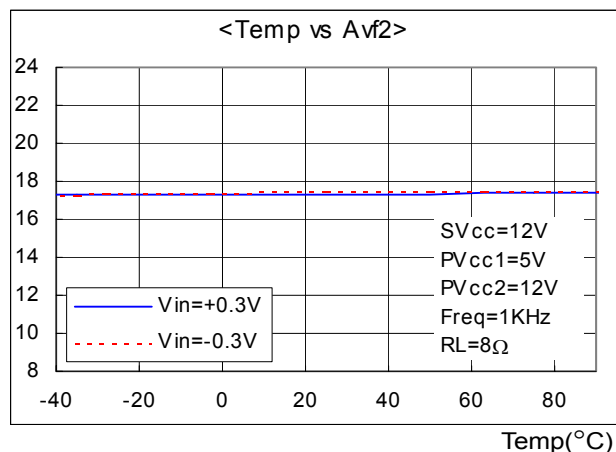
Avf(dB)



Avf(dB)

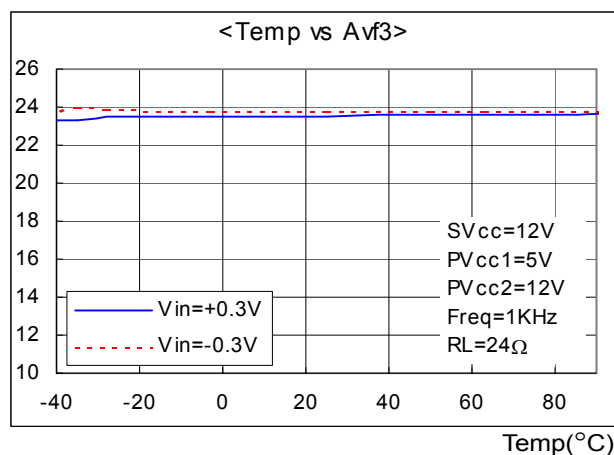


Avf(dB)

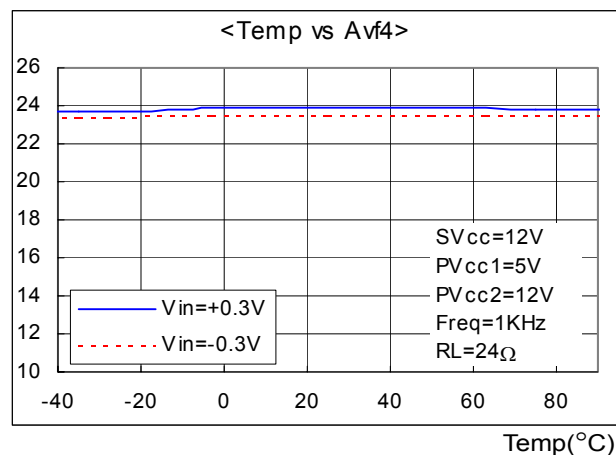


## Typical performance characteristics (Continued)

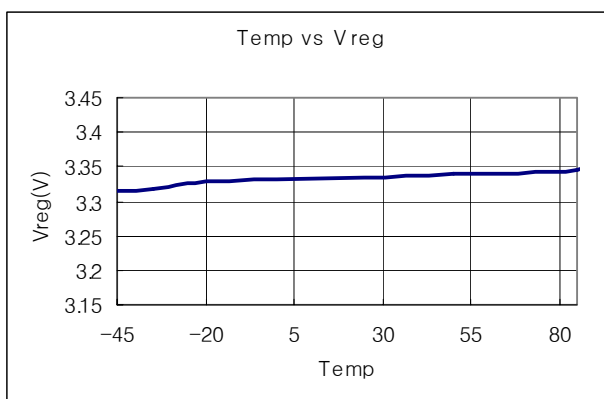
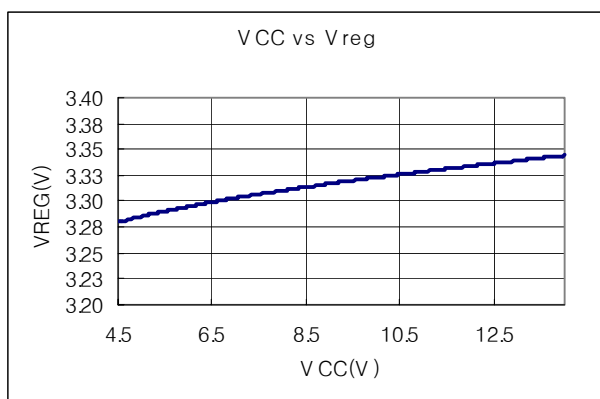
Avf(dB)



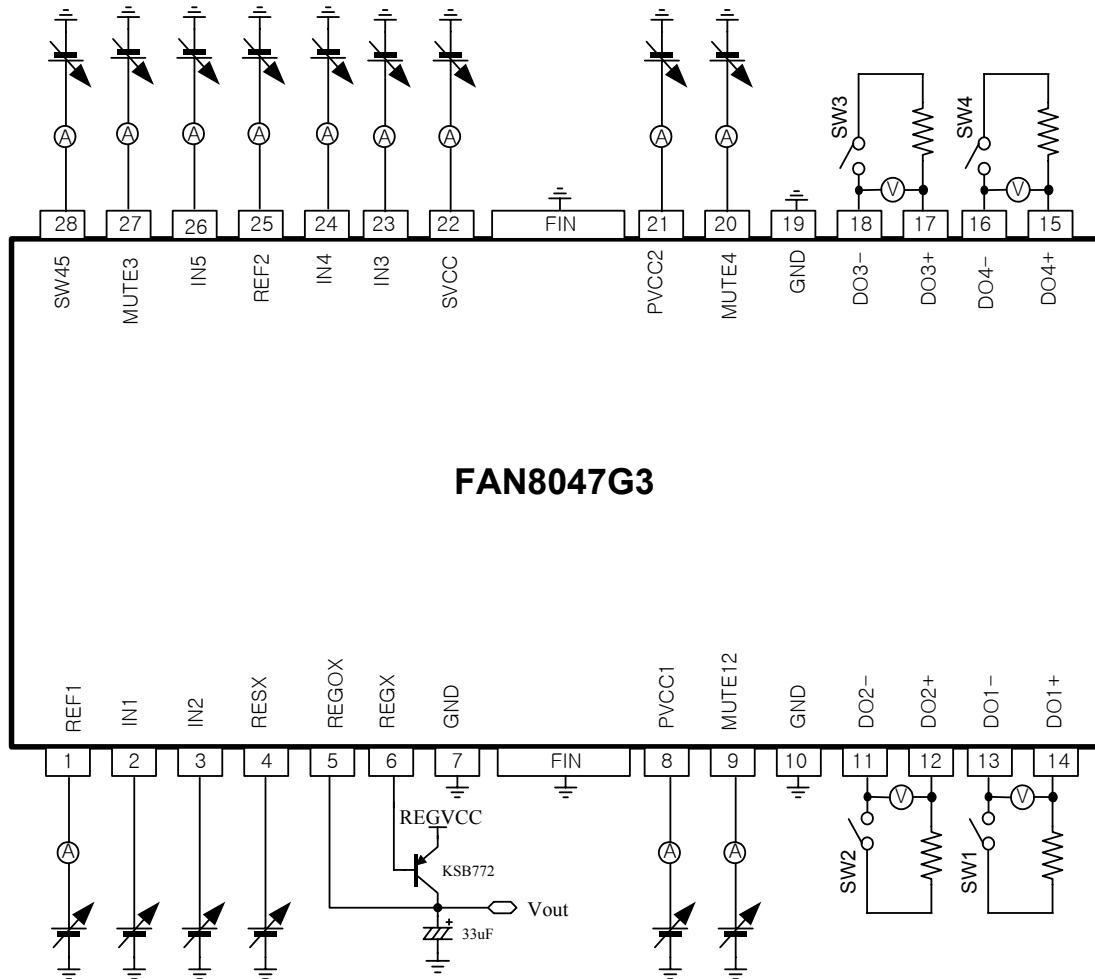
Avf(dB)



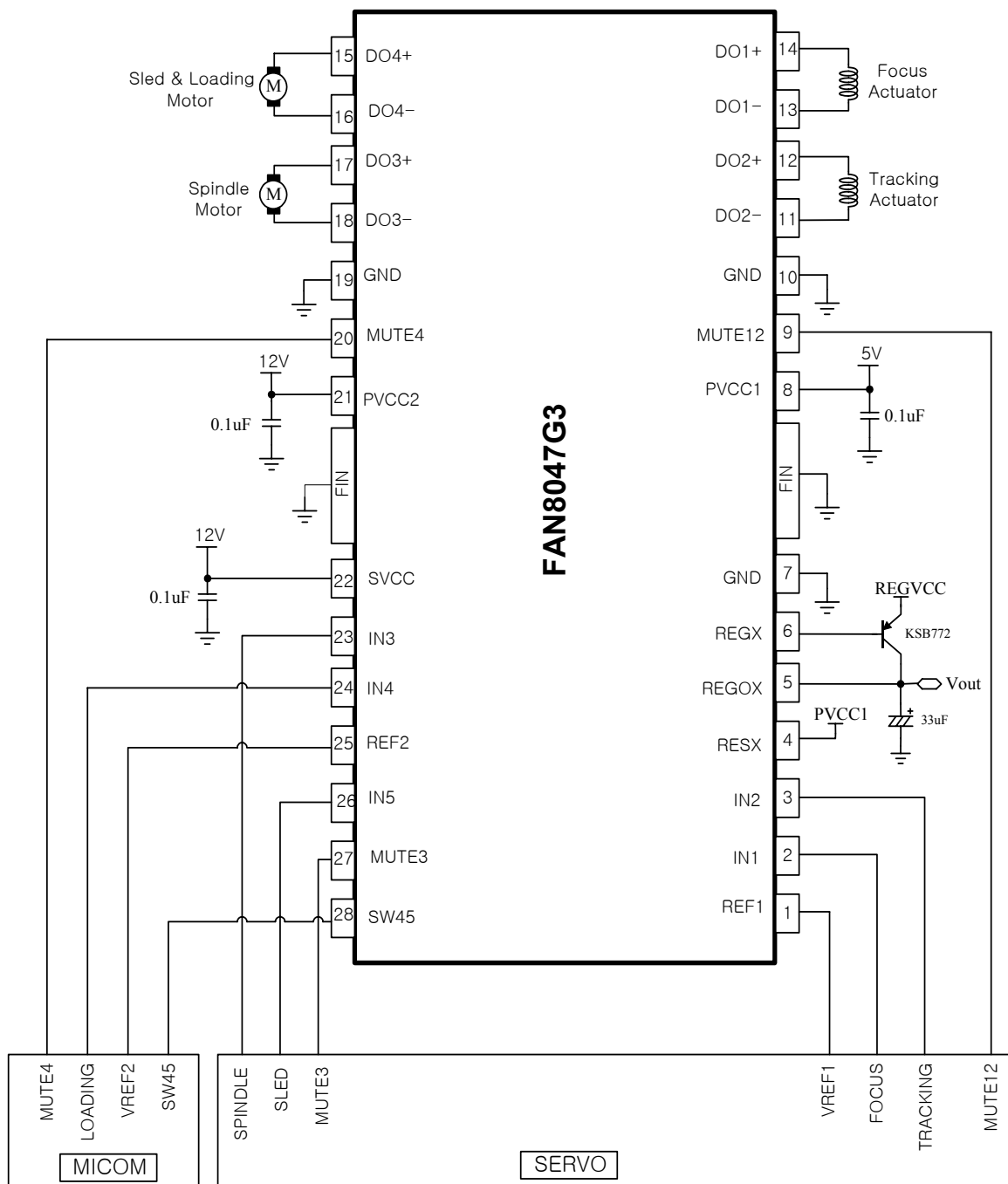
### Regulator part



## Test circuits



## Typical application circuit



Technical drawing of a rectangular component, likely a PCB or a similar electronic component, showing dimensions and labels.

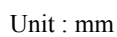
Dimensions:

- Overall width:  $18.40 \pm 0.20$
- Overall height:  $10.00 \pm 0.30$
- Internal width (excluding mounting holes):  $16.00$
- Internal height (excluding mounting holes):  $7.50 \pm 0.20$
- Mounting hole diameter:  $\phi 1.20 \text{ TYP}$

Labels:

- A**: Label for the top edge.
- B**: Label for the right edge.
- #26**: Label for the top-left mounting hole.
- #15**: Label for the top-right mounting hole.
- #1**: Label for the bottom-left mounting hole.
- #14**: Label for the bottom-right mounting hole.

The drawing shows a rectangular component with a central rectangular area and four mounting holes (two on the left, two on the right). The component is labeled with dimensions and labels A, B, #26, #15, #1, and #14.



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