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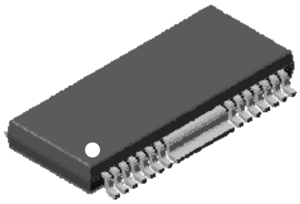


**SSOPH-28N**

**With Heat-sink**

## ORDERING INFORMATION

| Product Name | Marking | Package Name |
|---|---|---|
| S3058 | S3058 | SSOPH-28N |

▲ **Marking Information**


① Device Code

② Year & Week Code

## Description

The S3058 is 5 Channel BTL DC motor driver IC for controlling the motors and actuators of CD-P/VCD-P/DVD-Player.

It is organized 2 channel actuator with 2 input OPAMP, 2 channel BTL Driver, 1 channel bi-directional dc motor driver.

Furthermore, it offers gain control pin for bi-directional dc motor driver.

It supports various applications with pb free package.

## Application

◈ CAR-Audio

◈ CD-Player

◈ DVD-Player

## Features and Benefits

◈ 1 Channel is bi-directional DC motor driver for tray.

◈ 2 Channels are voltage-type BTL drivers for sled and spindle motors.

◈ 2 Channels are voltage-type BTL drivers for actuators with 2 OPAMP

◈ Built in Thermal shut down circuit.

◈ Built in Mute mode, OVP, UVLO circuit.

◈ Built in 2 OP-Amps for Gain Control and noise filtering

◈ **Dual Actuator drivers**

A general purpose input OP Provides differential input for signal addition.

The output structure is two power OPAMPS in bridge configuration.

◈ **Sled motor driver**

Single input linear BTL driver.

The output structure are two power OPAMP in bridge configuration.

◈ **Spindle driver**

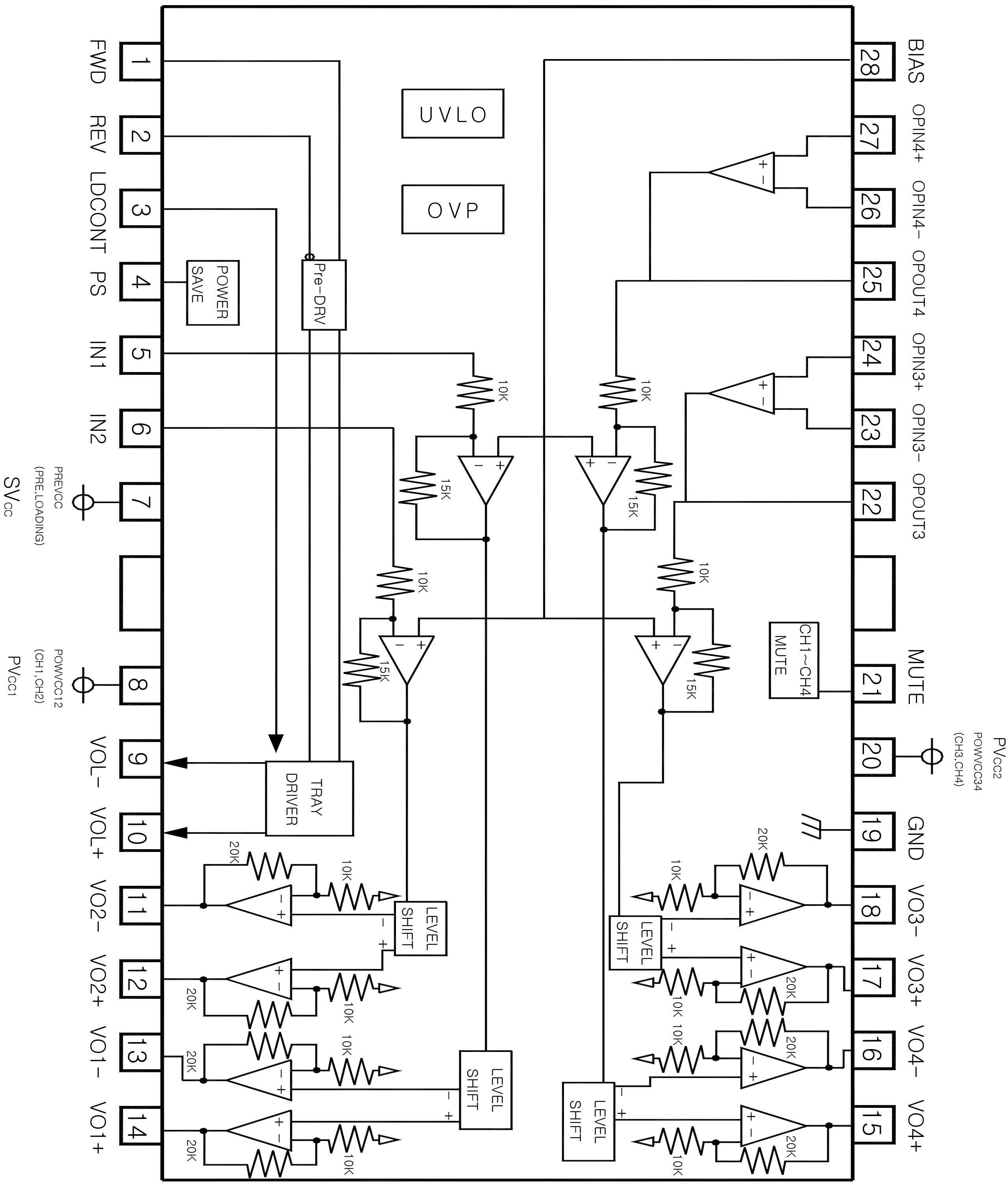
Single input linear BTL driver.

The output structure are two power OPAMPS in bridge configuration.

◈ **Tray Bi-directional driver**

The DC motor driver supports forward/reverse control for tray motor.

## ◈ Internal Block Diagram & Pin Assignment



## ◈ Pin Description

| NO | SYMBOL | I/O | DESCRIPTION |
|---|---|---|---|
| 1 | FWD | I | Tray(Loading) motor forward input |
| 2 | REV | I | Tray(Loading) motor reverse input |
| 3 | LDCONT | I | Tray(Loading) motor speed control |
| 4 | PS | I | Power Save |
| 5 | IN1 | I | Input for channel 1 |
| 6 | IN2 | I | Input for channel 2 |
| 7 | $SV_{CC}$ | PWR | $V_{CC}$ for pre-driver block and power block of Tray |
| 8 | $PV_{CC1}$ | PWR | $V_{CC}$ for power block of channel 1, channel 2 |
| 9 | VOL- | O | Tray(Loading) driver output (-) |
| 10 | VOL+ | O | Tray(Loading) driver output (+) |
| 11 | VO2- | O | Channel 2 driver output (-) |
| 12 | VO2+ | O | Channel 2 driver output (+) |
| 13 | VO1- | O | Channel 1 driver output (-) |
| 14 | VO1+ | O | Channel 1 driver output (+) |
| 15 | VO4+ | O | Channel 4 driver output (+) |
| 16 | VO4- | O | Channel 4 driver output (-) |
| 17 | VO3+ | O | Channel 3 driver output (+) |
| 18 | VO3- | O | Channel 3 driver output (-) |
| 19 | GND | - | Ground |
| 20 | $PV_{CC2}$ | PWR | $V_{CC}$ for power block of channel 3, channel 4 |
| 21 | MUTE | I | Input for mute control |
| 22 | OPOUT3 | O | Channel 3 OPAMP output |
| 23 | OPIN3- | I | Channel 3 OPAMP input - |
| 24 | OPIN3+ | I | Channel 3 OPAMP input + |
| 25 | OPOUT4 | O | Channel 4 OPAMP output |
| 26 | OPIN3- | I | Channel 4 OPAMP input - |
| 27 | OPIN3+ | I | Channel 4 OPAMP input + |
| 28 | BIAS | I | Input for bias control |

Symbol of + and – [ output of drives ] means polarity to input/output pin.

## ◈ Absolute Maximum Ratings ( Ta = 25℃ )

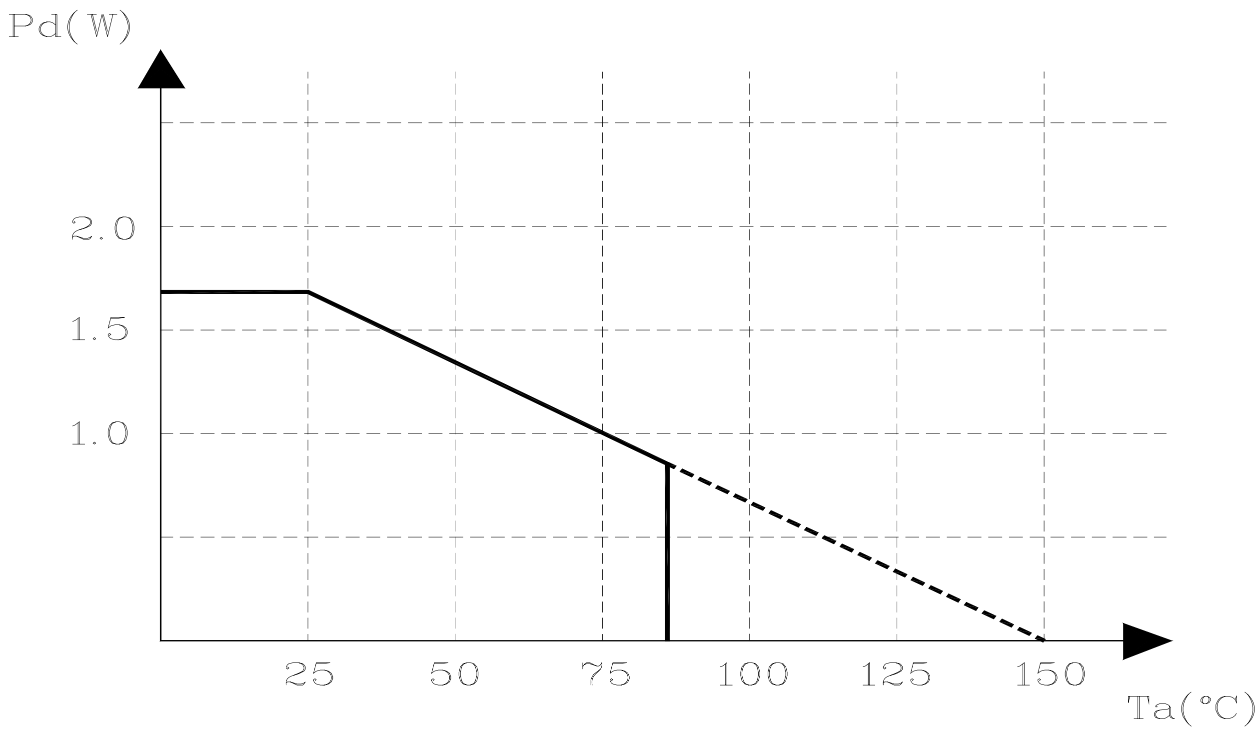
| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Maximum Supply Voltage | $V_{CC}$ max | 13.5 | V |
| Power Dissipation | $P_d$ | 1.7 | W |
| Operate Temperature Range | $T_{opr}$ | -40 ~ +85 | ℃ |
| Storage Temperature Range | $T_{stg}$ | -55 ~ +150 | ℃ |

[ Pd ] When mounted on a 70mm×70mm×1.6mm glass epoxy board.
Reduced by 13.6mW for each increase in $T_a$ of 1℃
[ $T_{stg}$ ] Should not exceed Pd or SOA and $T_j$=150℃ values

## ◈ Guaranteed Operating Conditions ( Ta = 25℃ )

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power Supply Voltage | $SV_{CC}$ | 4.3 ~ 13.2 | V |
| | $PV_{CC1}$ | 4.3 ~ $SV_{CC}$ | V |
| | $PV_{CC2}$ | 4.3 ~ $SV_{CC}$ | V |

## ◈ Power Dissipation Curve [ Pd ]




◈ 70mm×70mm×1.6mm glass epoxy board .
◈ De-rating is done at 13.6mW/℃ for operating above $T_a$=25℃

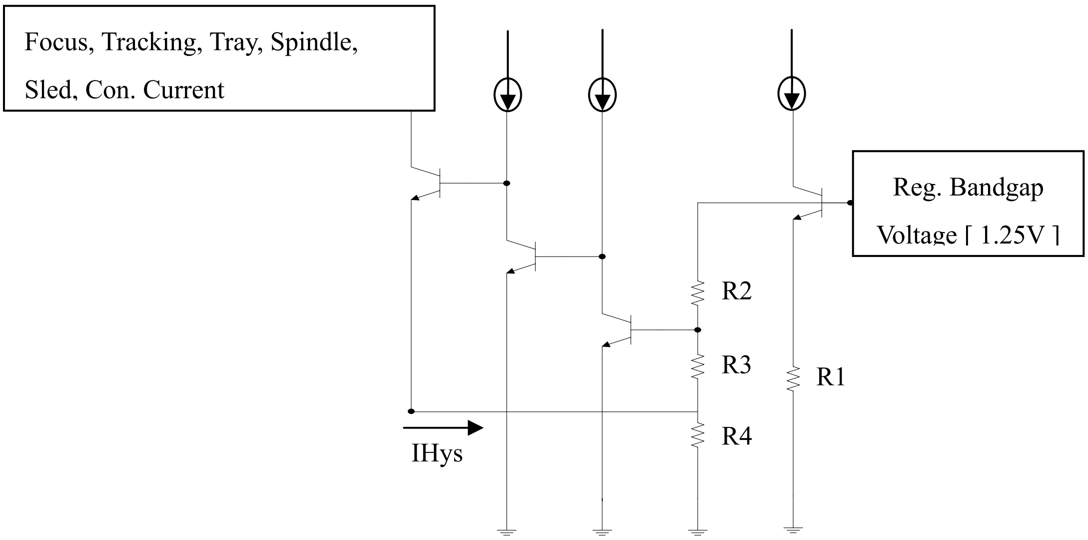
## ◈ Electrical characteristics

( Unless otherwise specified Ta=25℃, SVcc=12V, PVcc1=PVcc2=5V, BIAS=1.65V, PS=2V, RL=12Ω)

| NO | Characteristics | Symbol | Condition | Specification | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | MIN. | TYP. | MAX. | |
| 1 | Quiescent current | Iqc | RL = Open | - | 23 | 34 | mA |
| 2 | Power save on current | Ips | PS = GND | - | 1.65 | 2.8 | mA |
| 3 | Power save on voltage | Vpson | | - | - | 0.5 | V |
| 4 | Voltage for mute off | Vpsoff | | 2.0 | - | - | V |
| 5 | Mute on voltage | Vmon | | - | - | 0.5 | V |
| 6 | Mute off voltage | Vmoff | | 1.5 | - | - | V |
| 7 | Input current for mute pin | Imute | | - | 200 | 300 | uA |
| 8 | Input current for bias pin | Ibias | | - | 80 | 120 | uA |
| < BTL Driver Part : Channel 1, 2, 3, 4 > | | | | | | | |
| 9 | Output offset voltage | Voo | Vin=Vbias (Channel 1, 2) | -50 | - | 50 | mV |
| | | | Vin=Vbias (Channel 3, 4) | -80 | - | 80 | mV |
| 10 | Maximum output voltage | Vom | RL=12Ω Load | 3.6 | 4.0 | - | V |
| 11 | Closed loop voltage gain | Gvc | VIN=BIAS+0.2Vpp ac @1khz | 17 | 19 | 21 | dB |
| < Input OPAMP Part : Channel 3, 4 > | | | | | | | |
| 12 | Common mode input range | Vicm | Vbias=4V | 0.5 | - | 10 | V |
| 13 | Input bias current | Ibop | | - | - | 300 | nA |
| 14 | High level output voltage | Vohop | Vbais=6V | 11.5 | - | - | V |
| 15 | Low level output voltage | Volop | Vbais=6V | - | - | 0.5 | V |
| 16 | Output sink current | Isink | | 1 | - | - | mA |
| 17 | Output source current | Isource | | 1 | - | - | mA |
| 18 | Slew rate | Srop | Vin=2Vp-p @100KHz | - | 1 | - | V/us |
| < Tray(Loading) Motor driver > | | | | | | | |
| 19 | Output saturation voltage1 | Vsat12<br>Vsat21 | Upper + Lower saturation voltage<br>@ IL= 200mA | 0.7 | 1.1 | 1.5 | V |
| 20 | Output saturation voltage<br>Between FWD & REV | ΔVsat1 | \| Vsat12 - Vsat21 \| | - | - | 0.1 | V |
| 21 | Output saturation voltage2 | Vsat34<br>Vsat43 | Upper + Lower saturation voltage<br>@ IL= 500mA | 1.0 | 1.55 | 2.2 | V |
| 22 | Output adjustable gain on<br>"H" side voltage | Gvh | LDCONT= 2V | 7.4 | 9.2 | 11 | dB |
| < Tray(Loading) driver input logic > | | | | | | | |
| 23 | Input high level voltage | Vihld | | 1.5 | - | Vcc | V |
| 24 | Input low level voltage | Villd | | -0.3 | - | 0.5 | V |
| 25 | Input high level current | Iihld | FWD=REV=5V | - | 180 | 270 | uA |

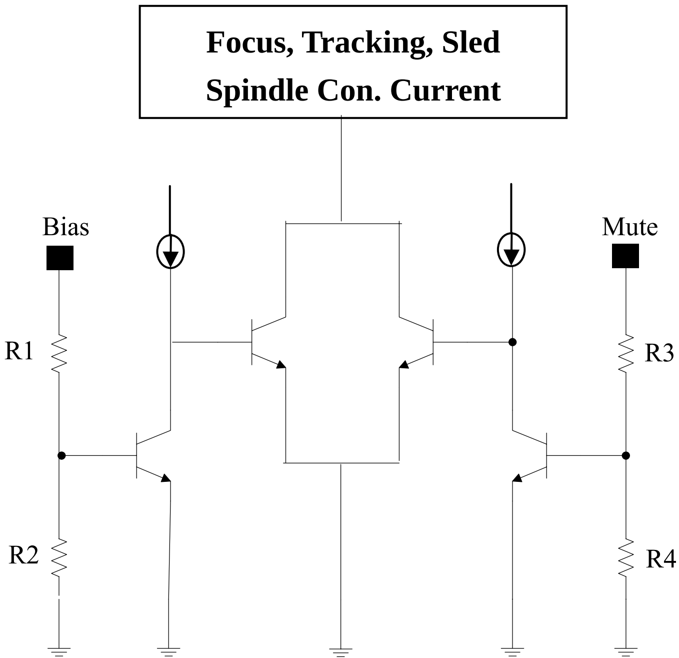
# Application Information

## 1] Thermal Shut Down Circuit



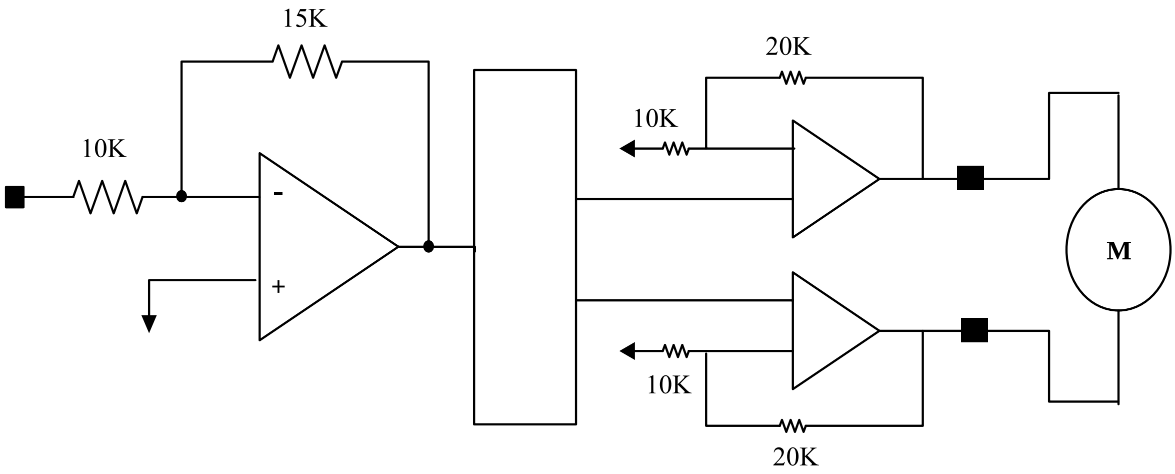

The built-in thermal shutdown circuit mutes the output current when the chip temperature reaches 175℃ (typ.). The hysteresis is set to 25℃ (typ.) by IHys,
so the circuit will start up again when the chip temperature falling to 150℃ (typ.)

## 2] Bias & Mute Circuit




Bias pin (pin 28) should be pulled up to more than 1.2V. In case the bias pin's voltage is pulled down below 1.2V (typ.), the output current is muted, also Mute pin is same as Bias pin.
[Except Tray, Input 2 OPAMP. those are only controlled by SVcc. ]

## 3] BTL Driver Circuits [Channel 1, 2, 3, 4]




BTL Driver Circuits are composed of VI-Converter, Level Shifter and Output power AMP.
VI-Converter converts voltage of Vin into current [Iconv ]

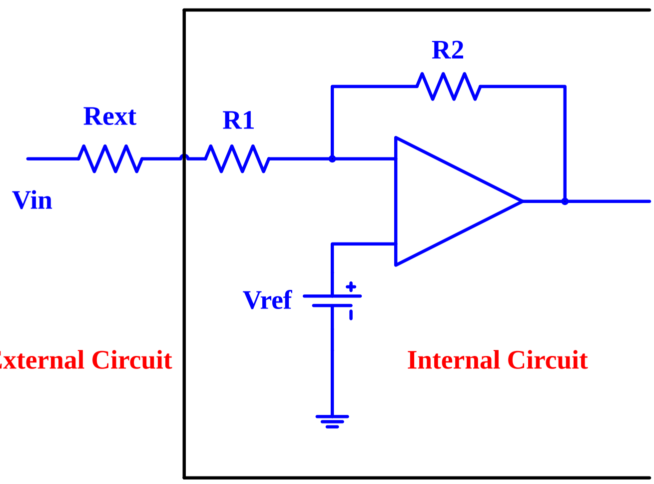
$$Iconv = (Vin - Bias) / R1[10K\Omega]$$

**► Closed Loop Voltage Gain**

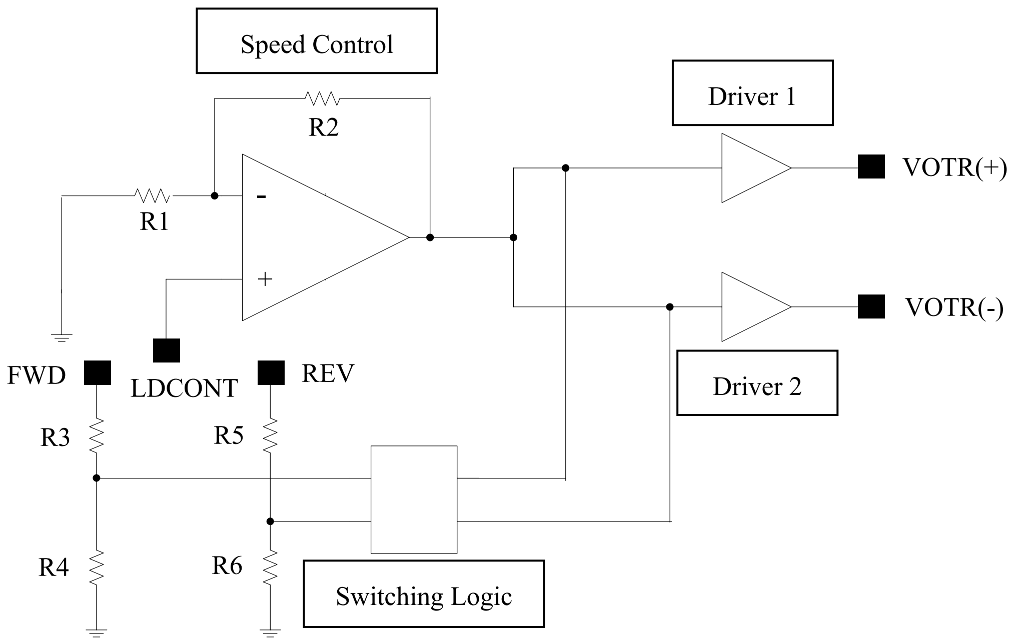
Gain = 20 log [2× (15K/10K)×{1+(20K/10K)} ]
= 19.08 [dB]

**► Gain Control by Using external resistor**

Gain = 20 log [2× (15K/Rext+10K)×{1+(20K/10K)} ]



## 4] Tray driver logic input




| FWD [pin6] | REV [pin7] | VOTR+ [pin10] | VOTR- [pin9] | FUNCTION |
|---|---|---|---|---|
| L | L | OPEN | OPEN | Open mode |
| L | H | L | H | Reverse mode |
| H | L | H | L | Forward mode |
| H | H | L | L | Brake mode |

Input circuit of pin1 [FWD] and pin2 [REV] is designed to avoid simultaneous activation of upper and lower output power TR. however, in order to improve reliability, apply motor forward/reverse input once through open mode. We recommend that the time period of open state is longer than 10msec.

“H” side output voltage on output voltage [VOL+, VOL-] varies depending on output control terminal for tray. [pin3]“H” side output voltage is set three times (9.2dB typ.) LDCONT [pin3], and “L” side output voltage is equal to output saturation voltage.

## Characteristic Diagrams

**Fig. 1 $V_{CC}$ - $I_{QC}$**

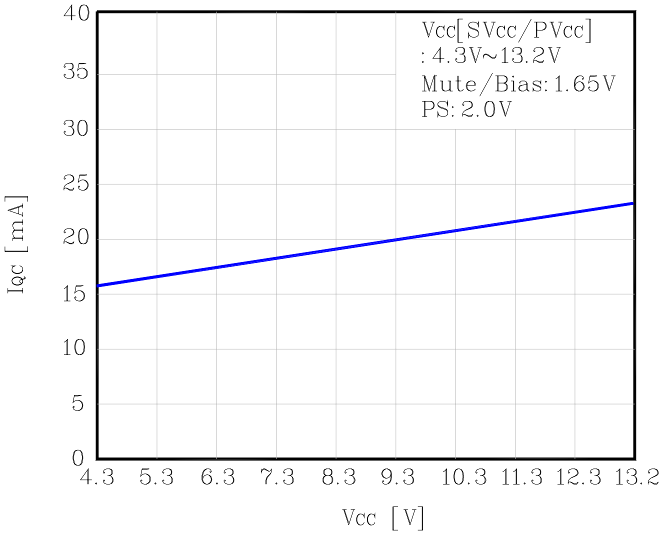



**Fig. 2 Temperature - $I_{QC}$**

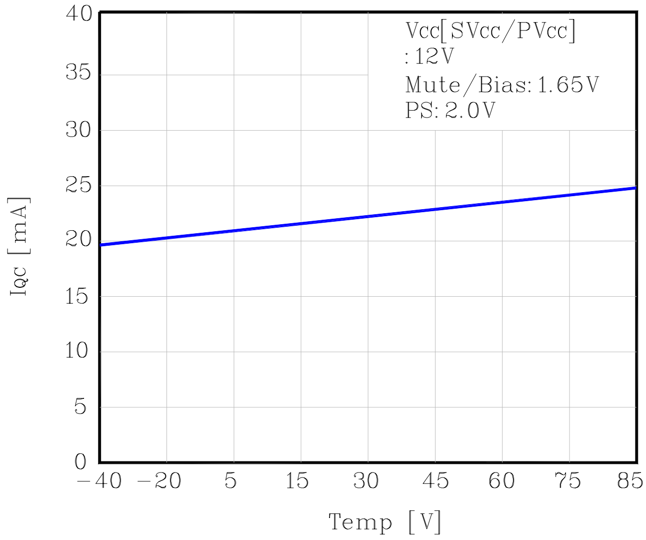



**Fig. 3 $V_{OM}$ - $V_{CC}$**

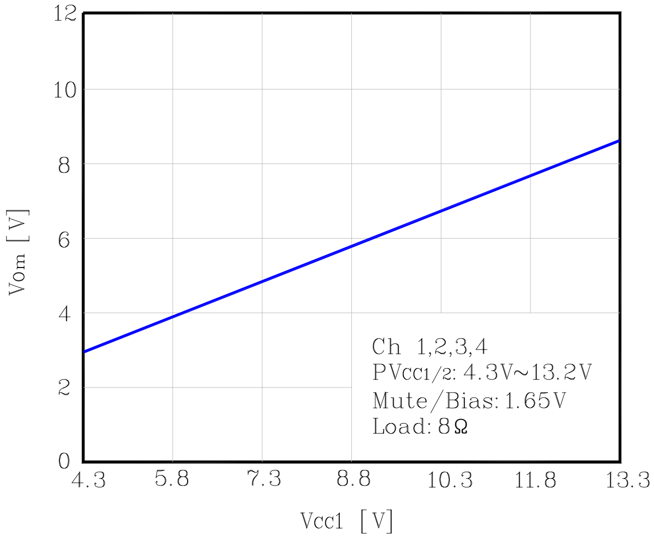



**Fig.4 GV - Frequency**

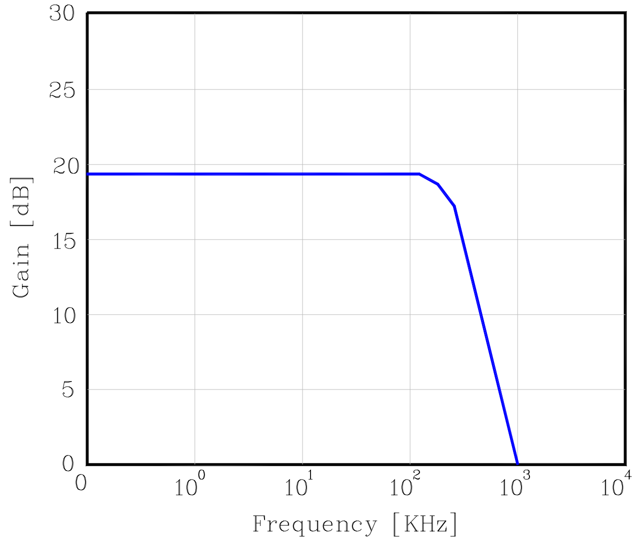
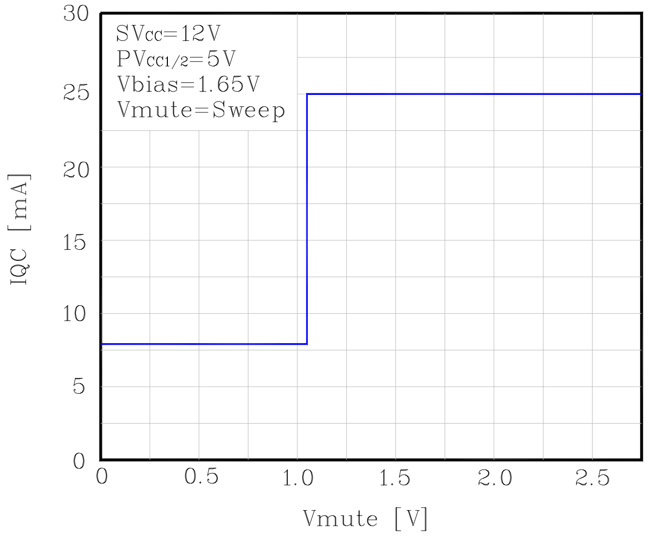
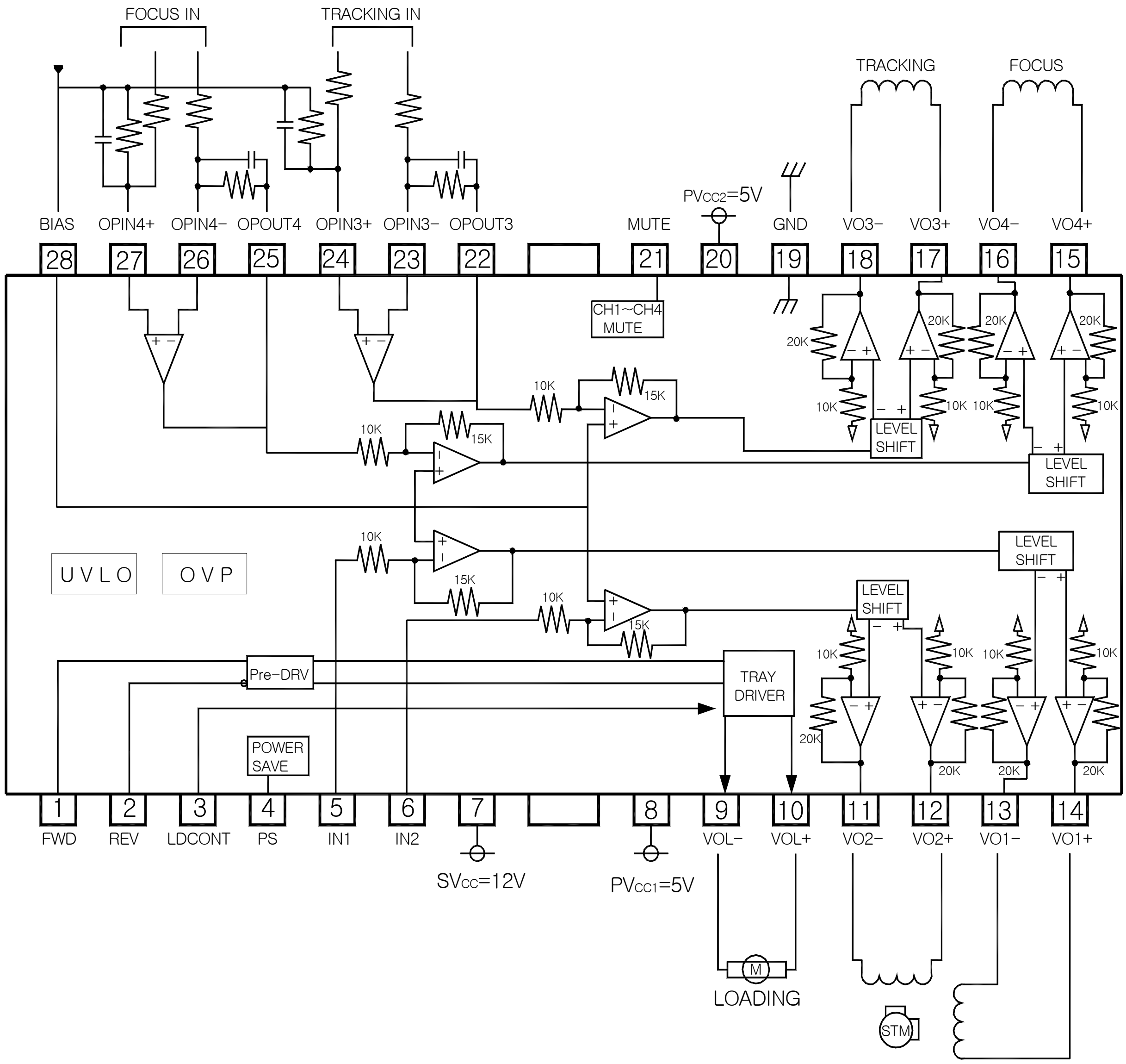


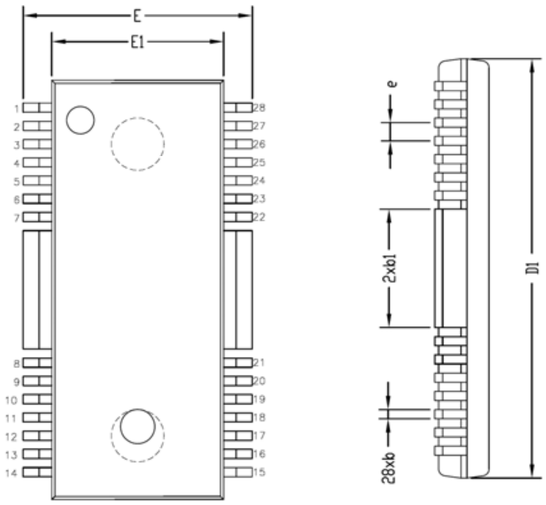

**Fig. 5 Mute Threshold Voltage**



## ◈ Application Circuit

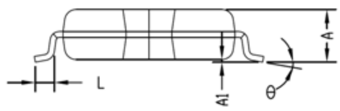


## ◈ Outline Dimension (Unit : mm)




**SSOPH-28N**

**With Heat-sink**




| SYMBOL | MM | | | NOTE |
|---|---|---|---|---|
| | MINIMUM | NOMINAL | MAXIMUM | |
| A | 2.200 | – | 2.400 | |
| A1 | 0.050 | – | 0.250 | |
| A2 | – | – | 0.250 | |
| A3 | – | – | 0.030 | |
| b | 0.300 | 0.400 | 0.500 | |
| b1 | 5.100 | 5.200 | 5.300 | |
| D1 | 18.300 | 18.400 | 18.500 | |
| E | 9.800 | – | 10.200 | |
| E1 | 7.400 | 7.500 | 7.600 | |
| e | 0.800 BSC | | | |
| L | 0.450 | – | 0.850 | |
| θ | 0 ° | – | 8 ° | |

**※ Recommend PCB solder land (Unit : mm)**