
**SSOPH-28N**

With Heat-sink

## ORDERING INFORMATION

Product	Marking	Package
S3045	S3045	SSOPH-28N

### ▲ Marking Detail Information



① Device Code

② Year &amp; Week Code

## Description

The S3045 is a four-channels BTL motor driver for driving the actuators and motors for products of DVD-P/R/RW.

It embrace a two channels of current feed-back BTL drivers.

those use current feed-back process to minimize the current phase shift from the load inductance of actuators

It supports various applications with pb free and heat-sink package.

## Application

- ◆ CD-ROM
- ◆ CD-RW
- ◆ DVD-PLAYER
- ◆ DVD-ROM
- ◆ DVD-RW

## Features and Benefits

- ◆ 2 Channel are current feedback motor driver for actuators
- ◆ 2 Channels are voltage-type BTL drivers for sled and loading motors.
- ◆ Separating power of SVcc and PVcc1, PVcc2 are to improve power efficiency.
- ◆ Built in Level shift circuit.
- ◆ Built in Thermal shut down circuit.
- ◆ Built in Standby mode.

### ◆ Dual Actuator drivers [ Current Feedback ]

The current feedback technique can reduce the current phase shift caused By the load inductance of actuators

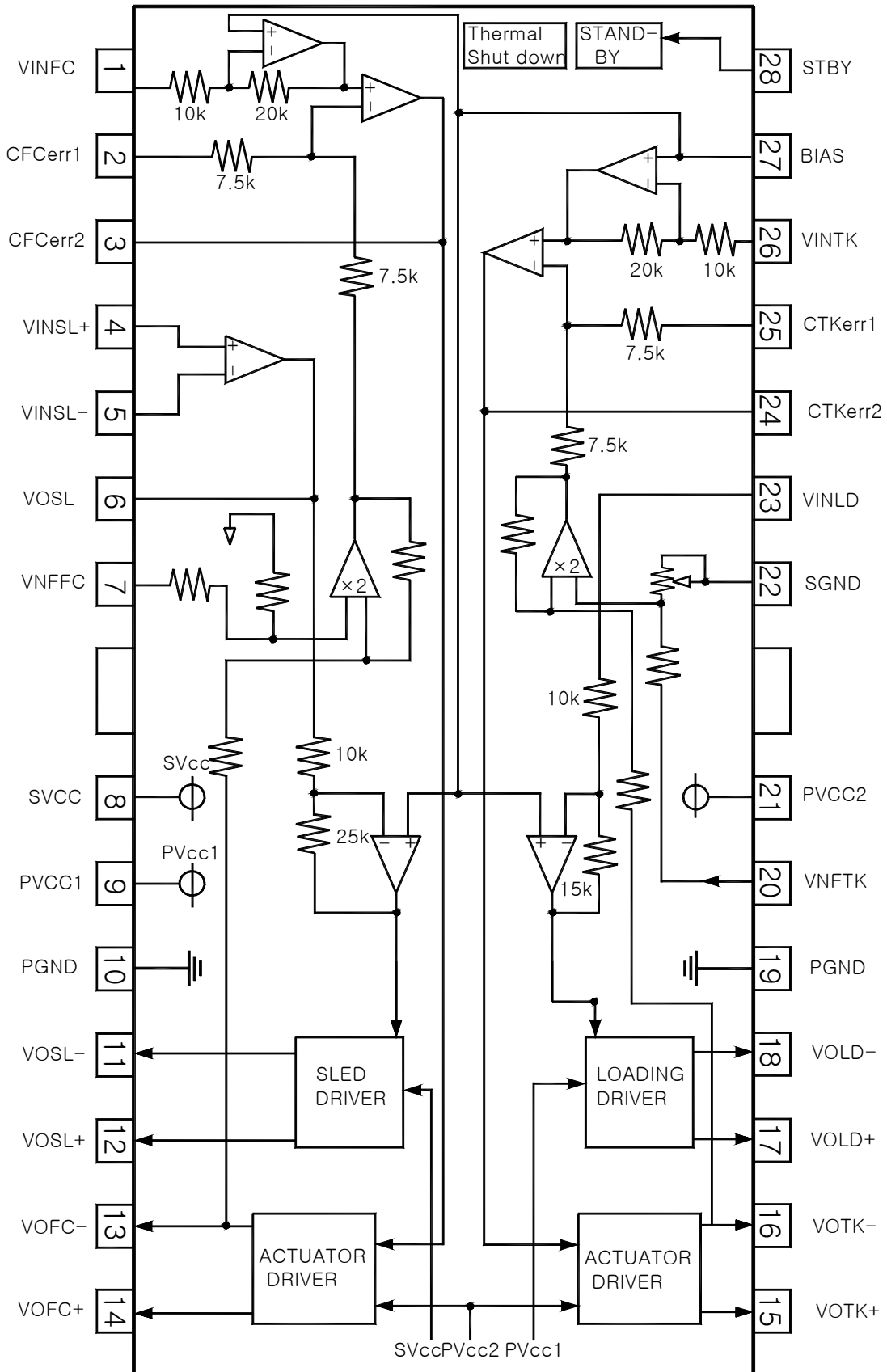
### ◆ Sled motor driver

A general OP-AMP connected to the input terminal helps compute additions of differential inputs or signals.

### ◆ Loading motor driver

Single input linear BTL driver. The output structure are two power OP-AMPS in bridge configuration.

◆ Internal Block Diagram & Pin Assignment



◆ Pin Description

NO	SYMBOL	I/O	DESCRIPTION
1	VINFC	I	Input for focus driver
2	CFCerr1	I	Connect with capacitor for error amplifier.
3	CFCerr2	I	Connect with capacitor for error amplifier.
4	VINSL+	I	Op amp input (+) for the sled driver
5	VINSL-	I	Op amp input (-) for the sled driver
6	VOSL	O	Op amp output for the sled driver
7	VNFFC	-	Focus driver feedback pin
8	SV <sub>cc</sub>	PWR	Supply voltage for pre-driver block and power block of sled
9	PV <sub>cc1</sub>	PWR	Supply voltage for power block of loading
10	PGND	-	GND for power block
11	VOSL-	O	Sled driver output (-)
12	VOSL+	O	Sled driver output (+)
13	VOFC-	O	Focus driver output (-)
14	VOFC+	O	Focus driver output (+)
15	VOTK+	O	Tracking driver output (+)
16	VOTK-	O	Tracking driver output (-)
17	VOLD+	O	Loading driver output (+)
18	VOLD-	O	Loading driver output (-)
19	PGND	-	GND for power block
20	VNFTK	I	Feedback for tracking driver
21	PV <sub>cc2</sub>	PWR	Supply voltage for power block of actuator
22	SGND	-	GND for pre-driver block
23	VINLD	I	Input for loading driver
24	CTKerr2	I	Connect with capacitor for error amplifier.
25	CTkerr1	I	Connect with capacitor for error amplifier.
26	VINTK	I	Input for tracking driver
27	BIAS	I	Input for reference voltage
28	STBY	I	Input for standby control

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

For example : if voltage level of pin1 is high, pin14 is high

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

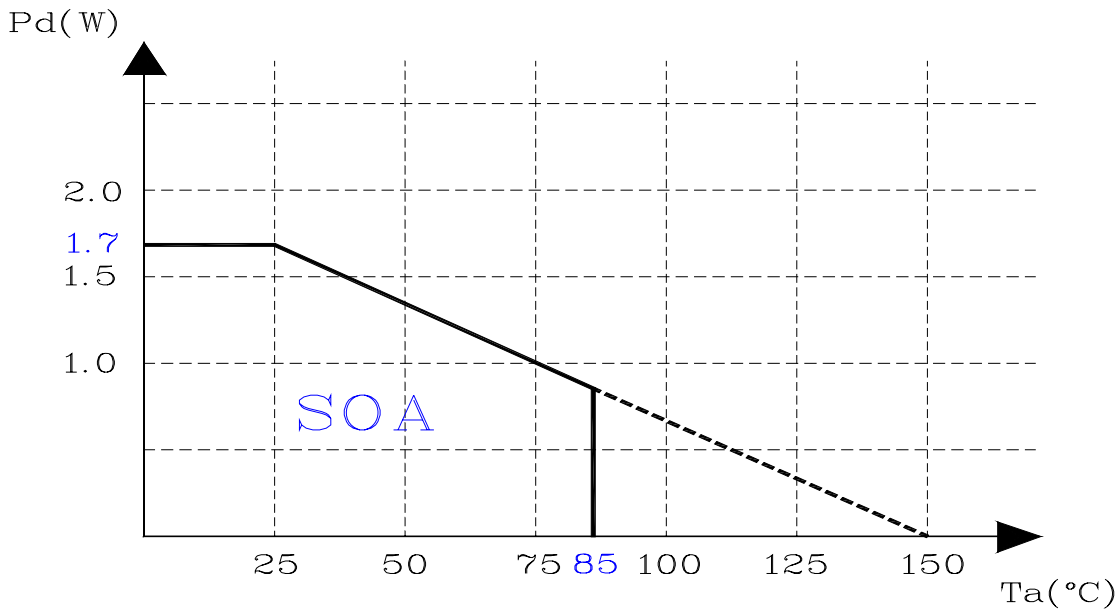
Parameter	Symbol	Limits	Unit
Supply Voltage	$SV_{CC}/PV_{CC}$	15	V
Power Dissipation	$P_d$	1.7	W
Operate Temperature Range	$T_{opr}$	-35 ~ +85	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 ~ +150	$^\circ\text{C}$

- [ Note ]
- 1) When mounted on a 50mm×50mm×1mm PCB
  - 2) Power dissipation reduces 20mW/ $^\circ\text{C}$  for using above  $T_a=25^\circ\text{C}$
  - 3) Do not exceed  $p_d$  and SOA

◆ Guaranteed Operating Conditions (  $T_a = 25^\circ\text{C}$  )

Parameter	Symbol	Limits	Unit
Power Supply Voltage	$SV_{CC}$	4.5 ~ 13.2	V
	$PV_{CC1}/PV_{CC2}$	4.5 ~ $SV_{CC}$	V

◆ Power Dissipation Curve [  $P_d$  ]



- ◆ 50mm×50mm×1mm PCB
- ◆ Power dissipation reduces 20mW/ $^\circ\text{C}$  for using above  $T_a=25^\circ\text{C}$

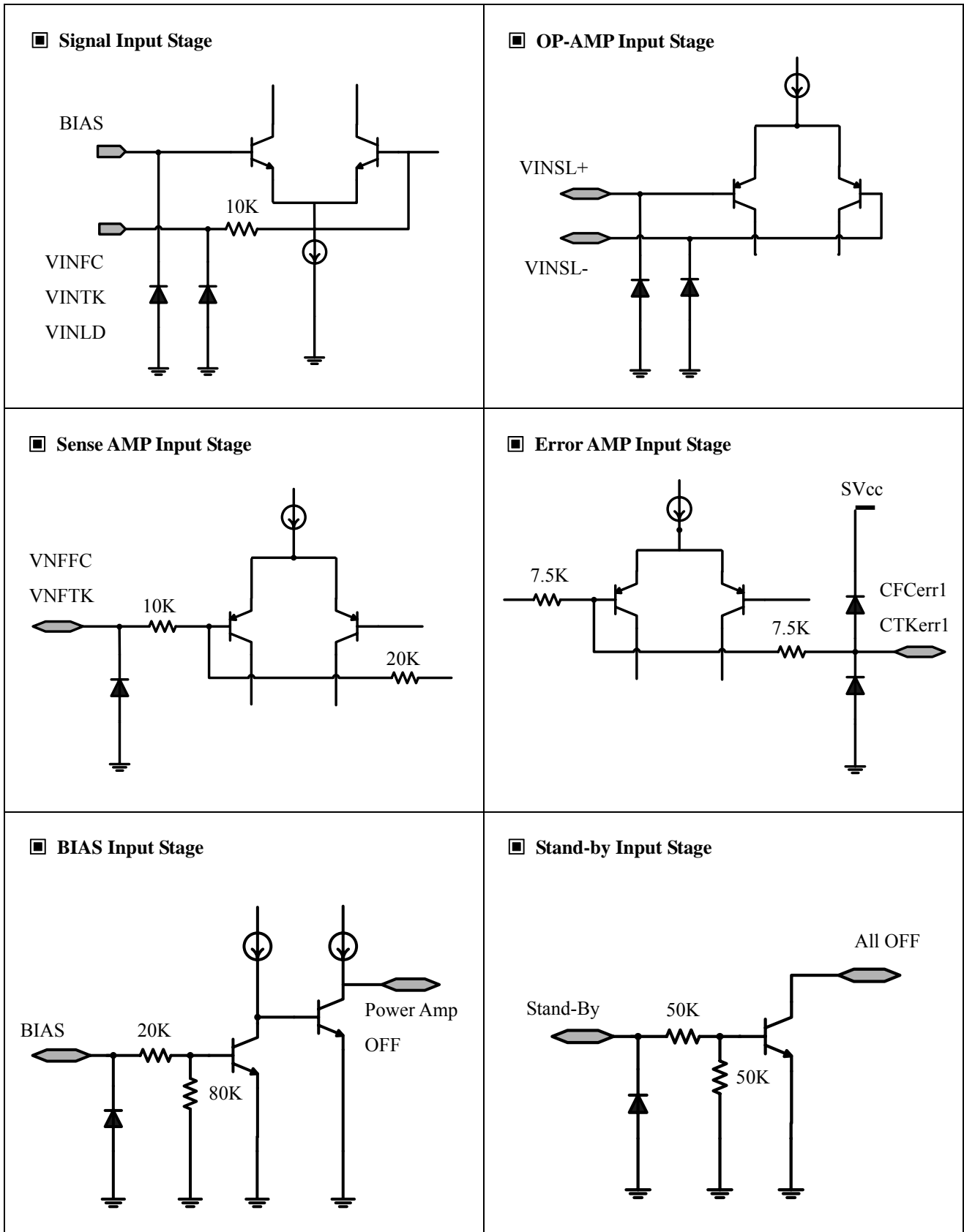
### ◆ Electrical characteristics

( Unless otherwise specified  $T_a=25^\circ\text{C}$ ,  $V_{CC}=12\text{V}$ ,  $PV_{CC1}=PV_{CC2}=5\text{V}$ ,  $BIAS=2.5\text{V}$ ,

$R_{L1}=R_{L2}=R_{L3}=R_{L4}=12\Omega$ ,  $R_D=0.5\Omega$ ,  $C_{FC}=C_{TK}=100\text{pF}$ )

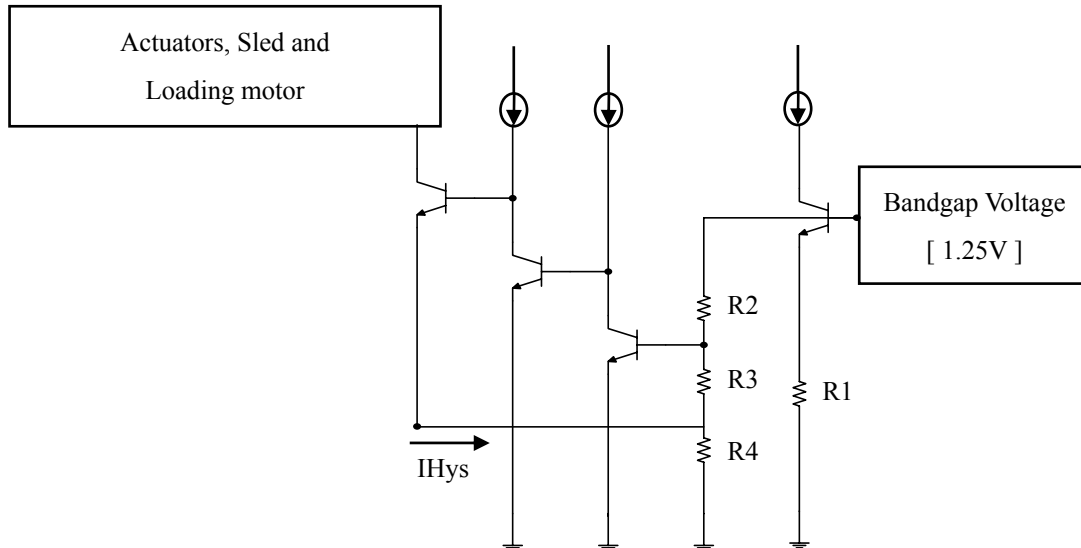
NO	Characteristics	Symbol	Condition	Specification			Unit
				MIN.	TYP.	MAX.	
1	Quiescent Current	$I_{QC}$		-	15	27	mA
2	Standby Circuit Current	$I_{ST}$		-	-	0.5	mA
3	Standby ON Voltage	$V_{STON}$		0	-	0.5	V
4	Standby OFF Voltage	$V_{STOFF}$		2.0	-	-	V
<b>&lt; Actuator Driver: Focus, Tracking &gt;</b>							
5	Output Offset Current	$I_{OO}$		-15	-	15	mA
6	Maximum Output Voltage	$V_{OM}$		3.6	4	-	V
7	Transmission Gain	$G_m$	$V_{IN}=BIAS+0.1V_{pp}$ ac @1kHz	1.3	1.5	1.7	dB
<b>&lt; Sled Motor Driver / Pre Op Amp &gt;</b>							
8	OP AMP Input Common Mode Voltage Range	$V_{ICM}$		-0.3	-	11.0	V
9	OP AMP Input Bias Current	$I_{BOP}$			30	300	nA
10	OP AMP Low Saturation Voltage	$V_{OLOP}$		-	0.1	0.3	V
11	Maximum Output Source Current	$I_{SO}$		0.3	0.5	-	mA
12	Maximum Output Sink Current	$I_{SI}$		1	-	-	mA
<b>&lt; Sled Motor driver &gt;</b>							
13	Output Offset Voltage	$V_{OOFSL}$	$V_{CC}=5\text{V}$	-100	-	100	mV
14	Maximum Output Voltage	$V_{OMSL}$		7.5	9.0	-	V
15	Closed-loop Voltage Gain	$G_{VSL}$	$V_{IN}=BIAS+0.1V_{pp}$ ac @1kHz	18.0	20.0	22.0	dB
<b>&lt; Loading Motor Driver&gt;</b>							
16	Output Offset Voltage	$V_{OOFLD}$		-50	0	50	mV
17	Maximum Output Voltage	$V_{OMLD}$		3.6	4.0	-	V
18	Closed-loop Voltage Gain	$G_{VLD}$	$V_{IN}=BIAS+0.1V_{pp}$ ac @1kHz	13.5	15.5	17.5	dB
19	Gain Error by Polarity	$\Delta G_{VLD}$	$V_{IN}=BIAS+0.1V_{pp}$ ac @1kHz	0	1	2	dB

Equivalent Circuits



## Application Information

### 1. Thermal Shut Down Circuit



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

### 2. Reference Input & Stand-by Function

#### •Reference input [ BIAS PIN : PIN 27 ]

The applied voltage at the reference input pin must be between 0.8V and 6.5V  
( when SVcc=8.5V )

#### •Standby input [ PIN28 ]

The following input conditions must be satisfied for the standby function

Stand-by input voltage	OPERATION
Below 0.5V [ or Open ]	The stand-by function is activated so the bias block and power block are disabled
Above 2.0V	Recover the normal operation

### 3. Separation of Power Supply

#### ■ $SV_{CC}$

$SV_{CC}$  supplies power to the sled motor driver and the signal logic part (  $SV_{CC} \geq PV_{CC1}/PV_{CC2}$  )

#### ■ $PV_{CC1}$

$PV_{CC1}$  is the power supply for the loading motor driver.

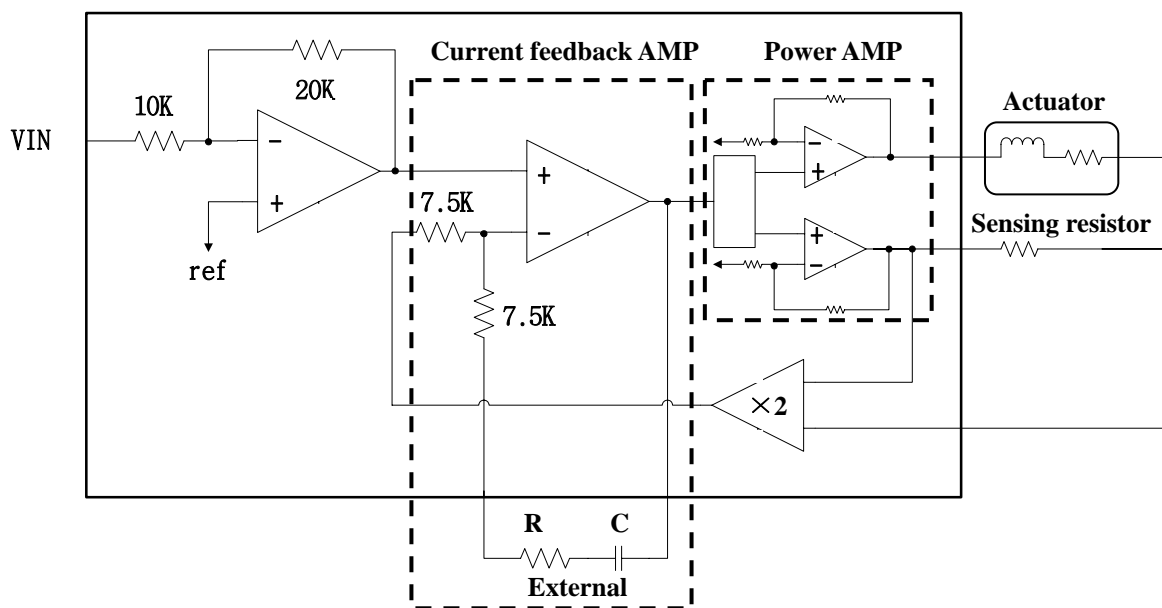
The recommend operating voltage range is between 4.3V~13.2V

#### ■ $PV_{CC2}$

$PV_{CC2}$  is the power supply for the actuators that include focus and tracking motor drivers

The range is between 4.3V~13.2V

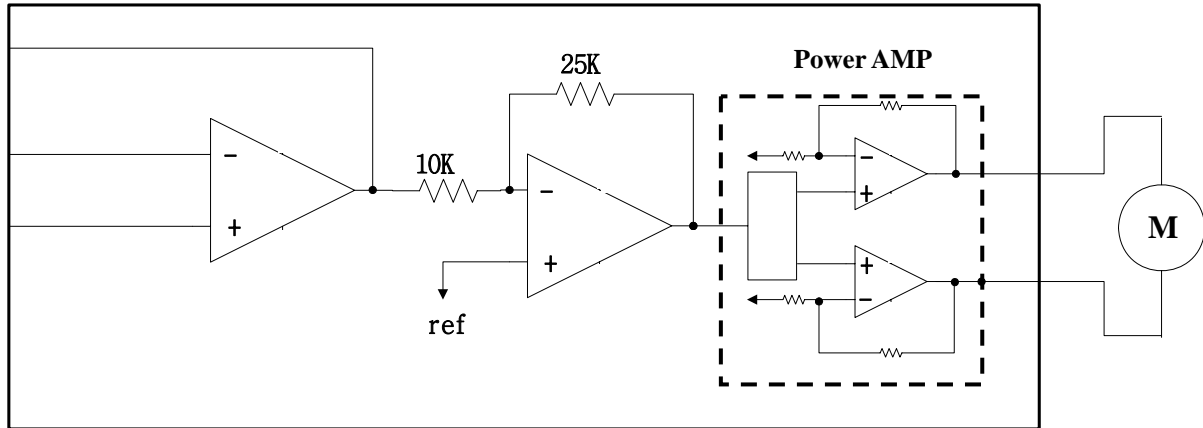
### 4. Current Feedback Channel [ Actuators ]



- The reference voltage is supplied externally through pin 27.
- The input OP-AMP output signal is amplified by (20K/10K) times and then fed to the current feedback amplifier.
- The current feedback amplifier compares the output current sensed input and command input and then makes the controlled output to eliminate delay effect of the load.
- The DC gain of current feedback amplifier and power amplifier is unity, which is 1 [A/V]. Users can change the gain by adding external resistor at the command input.

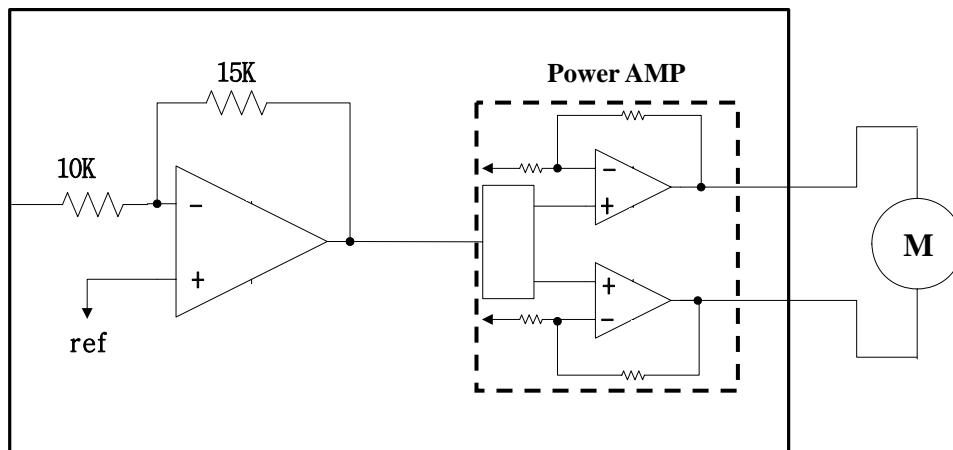


### 5. Sled Driver Circuits [ with input OP AMP ]



- The reference voltage is given externally through pin 27.
- The input OP-AMP can be used for several purpose, for example low pass filter, differential input coordinator, gain scaler and so on.

### 6. Loading Driver Circuits [ BTL Motor Driver ]



- The reference voltage is given externally through pin 27.
- The input OP-AMP output signal is amplified by  $(15K/10K)$  times and then fed to the power Amplifier. The gain of power amplifier is 4; therefore, the total max gain of Loading driver is 6.
- Users must check input command range to use max output voltage because the total gain is relatively smaller than other drivers.

### Characteristic Diagrams

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

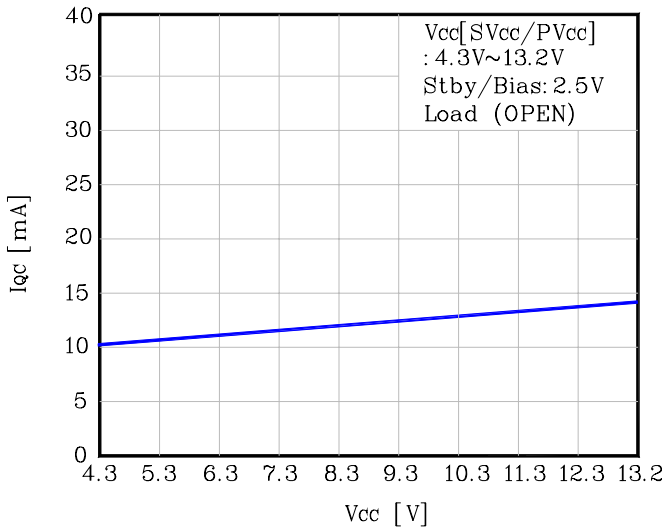


Fig. 2 Temperature -  $I_{QC}$

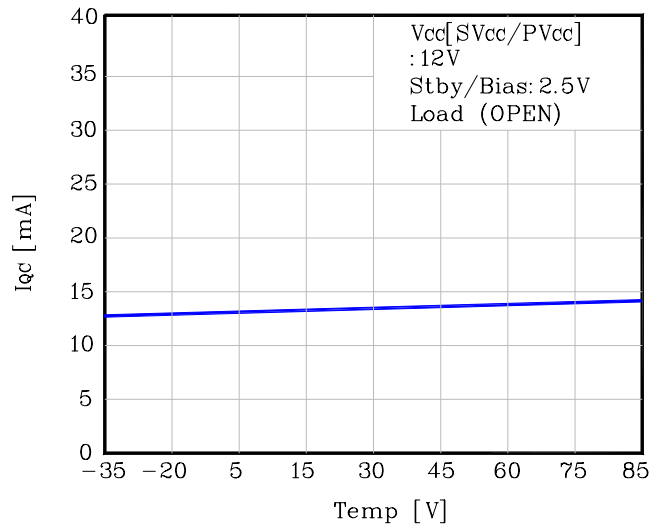


Fig. 3  $V_{OM} - I_O$  1

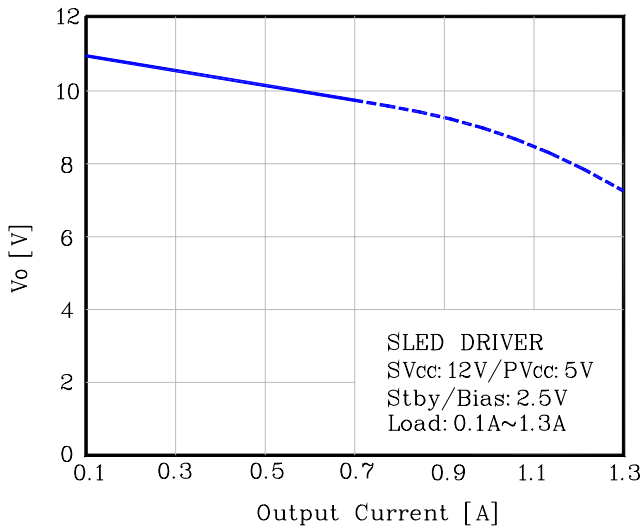


Fig.4  $V_{OM} - I_O$  2

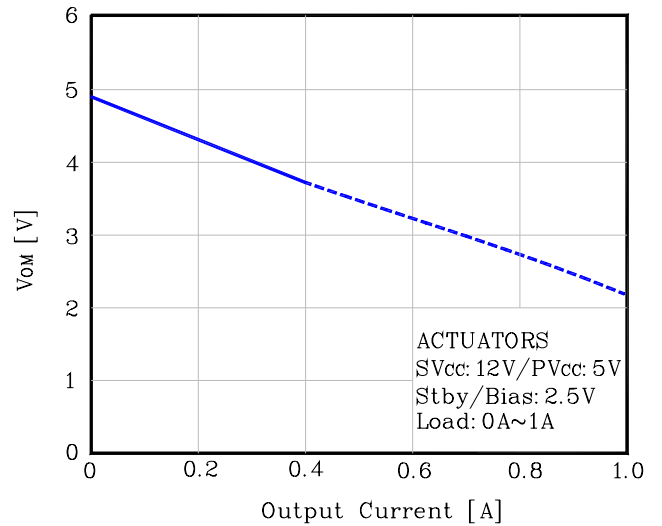


Fig. 5  $V_{OM} - I_O$  3

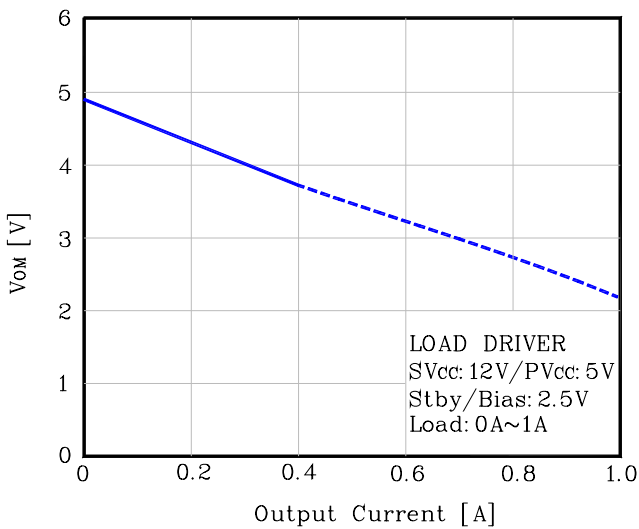
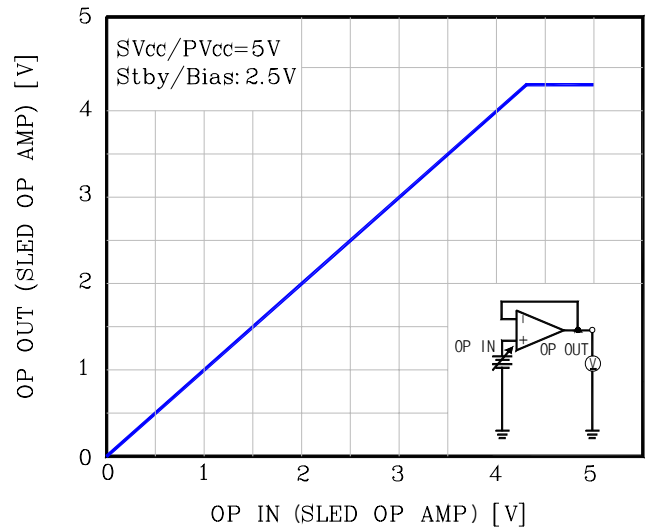
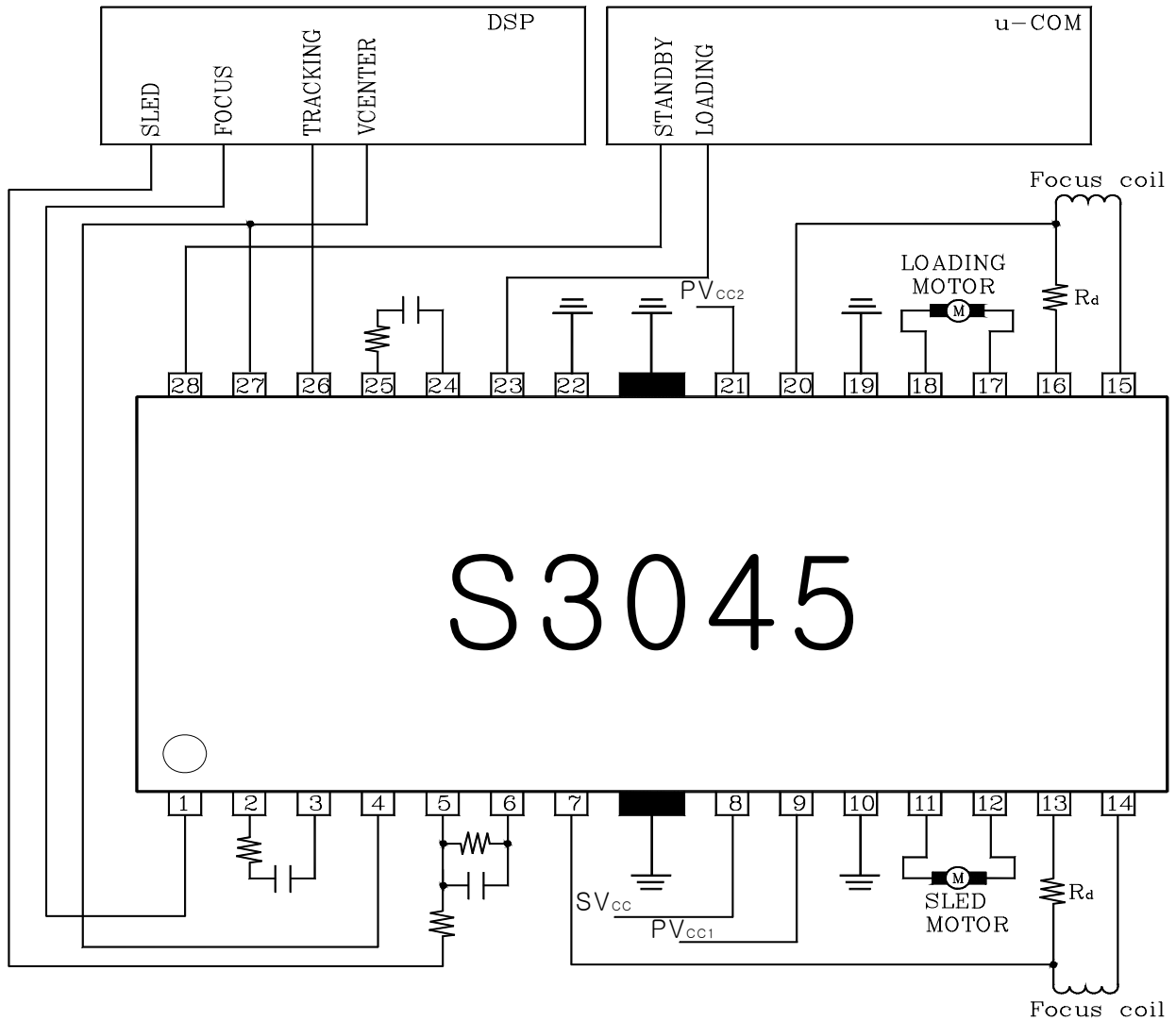


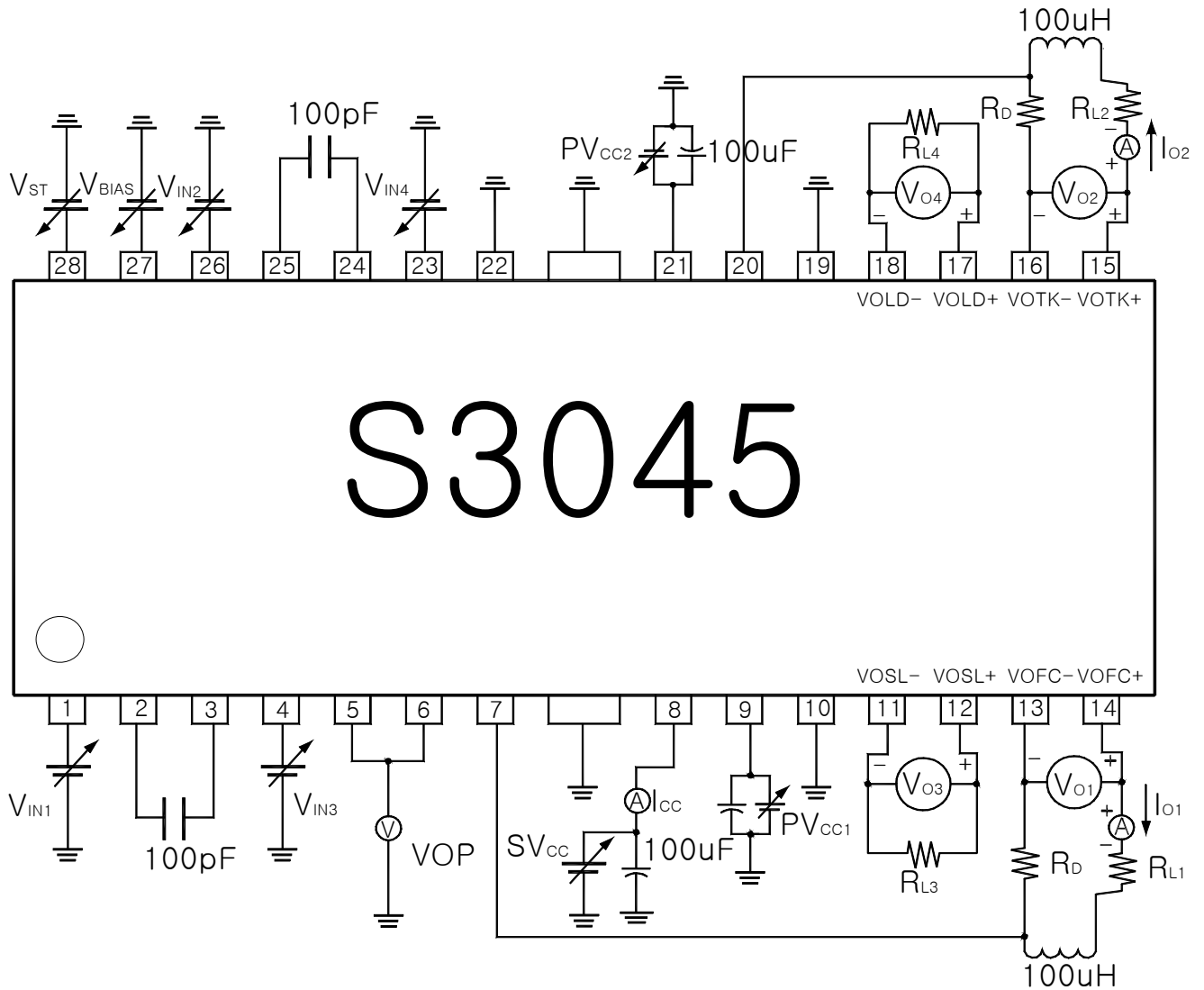
Fig.6 OP  $V_{IN} - OP V_O$  (Buffer)



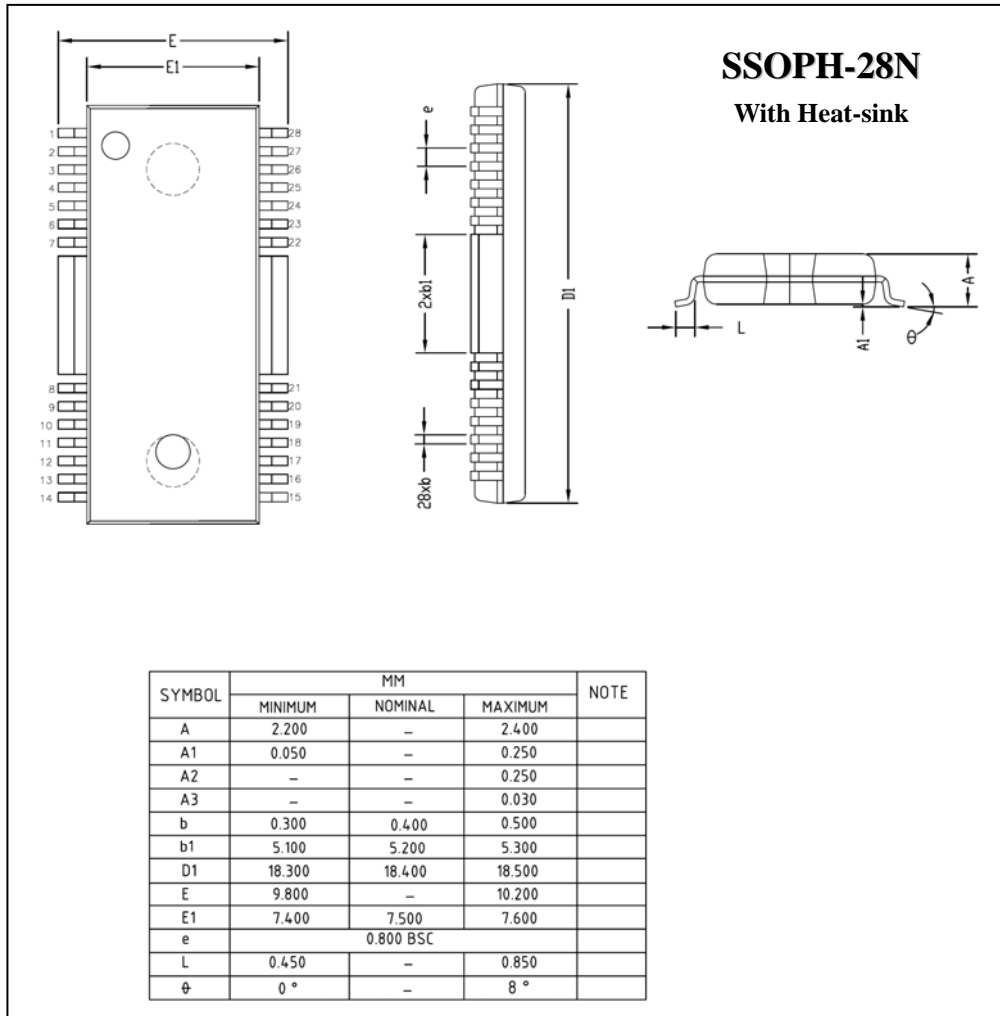
◆ Application Circuit



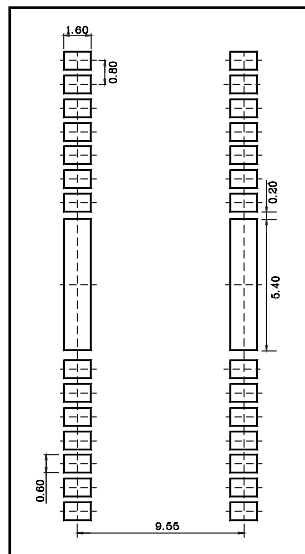
◆ Testing Circuit



◆ Outline Dimension (Unit : mm)



※ Recommend PCB solder land (Unit : mm)



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