



# JH5452B (LP/ND)

## Description

The JH5452B (LP/ND) is a high precision non-isolated buck driver with active PFC, specially designed for universal input offline constant current LED lighting. The driver with on-chip PFC circuit achieves high power factor and low THD. Operating in critical conduction mode, the power MOSFET switching loss is reduced and the inductor is fully utilized.

The JH5452B (LP/ND) integrates a 650V power MOSFET. With few external components, the LED output current can be precisely controlled.

The JH5452B (LP/ND) remove the VCC capacitor, COMP capacitor and Rcs resistor to simplify the external BOM. And it utilizes patented current detection, with few external components, it achieves high precision output current, excellent line regulation and load regulation.

The JH5452B (LP/ND) are built-in JFET start-up and IC power supply circuit, which enable the system to quickly start, and reduce the external power supply components, achieve smaller volume.

The JH5452B (LP/ND) offers rich protection functions to improve the system reliability, including LED load short protection. The system reliability is further improved by the thermal regulation function. The output current is reduced when the driver is in condition of over temperature.

Adopts SOP-7 /SOT33-5 package.

## Features

- Active-PFC for High PF and Low THD.
- No VCC and COMP capacitor.
- Integrated current sense resistor.
- Critical Conduction Mode Operation.
- LED Short Protection.
- Cycle by Cycle Current Limit.
- Thermal Regulation Function.
- Adopts SOP-7 /SOT33-5 package.

## Applications

- LED Bulb
- LED tube
- Other LED Light





# JH5452B (LP/ND)

## Typical Application

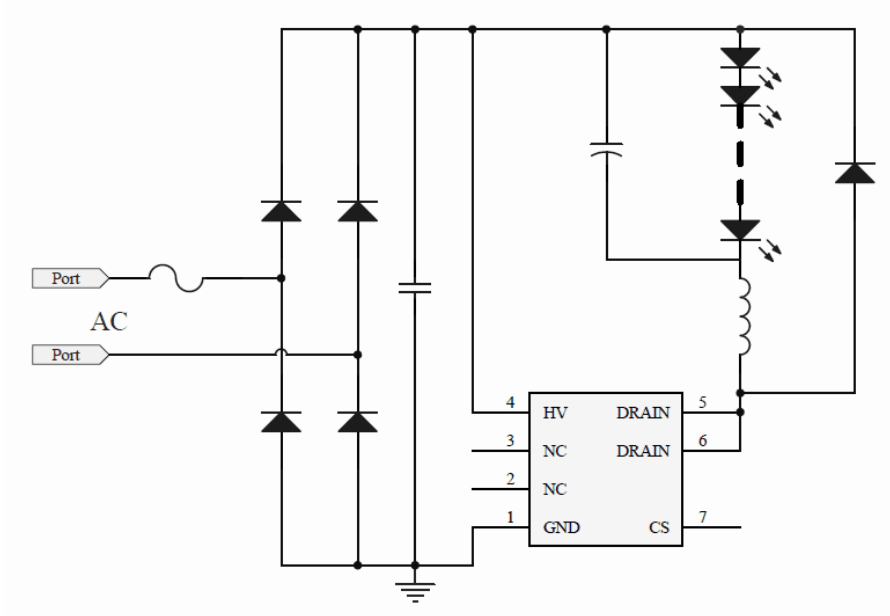


Figure 1. Typical application circuit for JH5452BLP

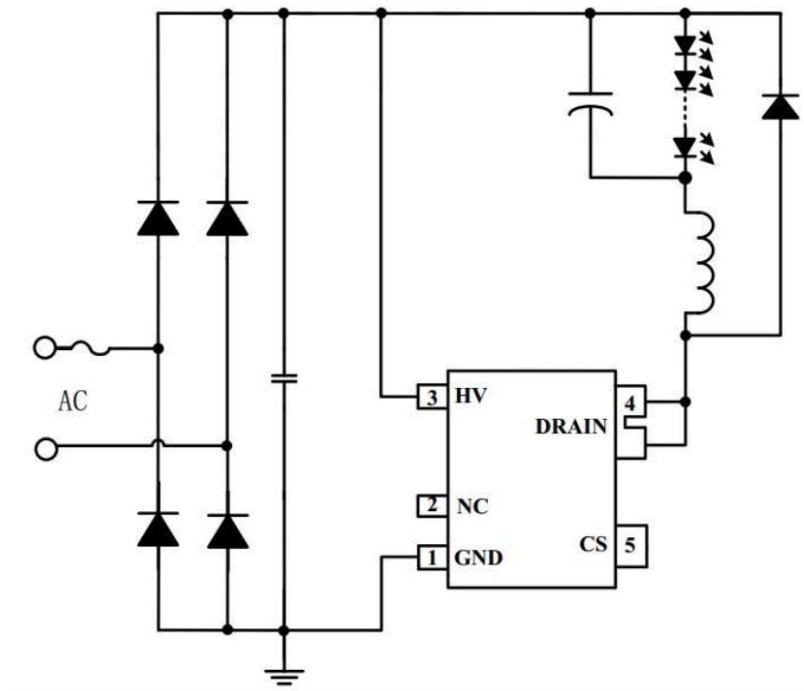


Figure 1. Typical application circuit for JH5452BND





# JH5452B (LP/ND)

## Ordering Information

Order codes				Marking	Package
Halogen-Tube	Halogen-Free-Tube	Halogen-Reel	Halogen-Free-Reel		
N/A	N/A	N/A	JH5452BLP-LP-AR	JH5452	SOP-7
N/A	N/A	N/A	JH5452BND-ND-AR	JH5452	SOT33-5

## Pin Configuration and Marking Information

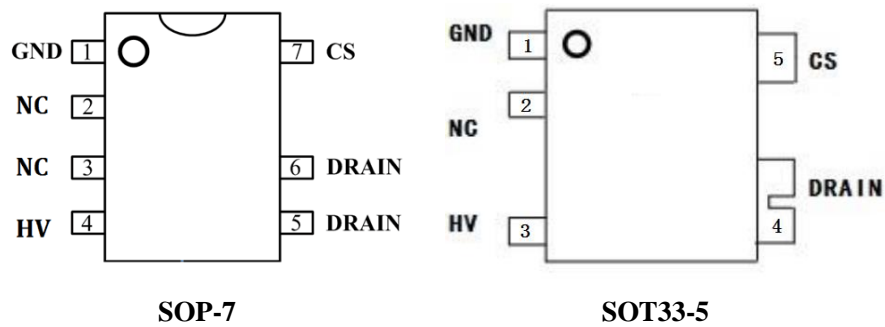


Figure 2. Pin configuration

## Pin Definition

SOP-7		
Pin No.	Name	Description
1	GND	Ground.
2、3	NC	No Connection.
4	HV	High Voltage startup and power supply
5、6	DRAIN	Internal HV Power MOSFET Drain.
7	CS	CS Floating –LED is fixed internally.

SOT33-5		
Pin No.	Name	Description
1	GND	Ground.
2	NC	No Connection.
3	HV	High Voltage startup and power supply
4	DRAIN	Internal HV Power MOSFET Drain.
5	CS	CS Floating –LED is fixed internally.





# JH5452B (LP/ND)

## Internal Block Diagram

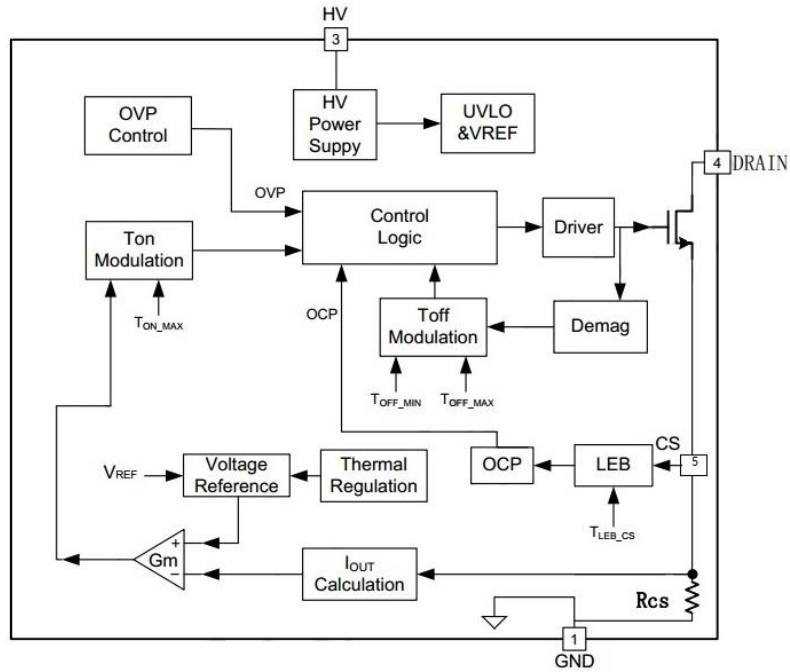


Figure 3.a JH5452BND Internal Block Diagram

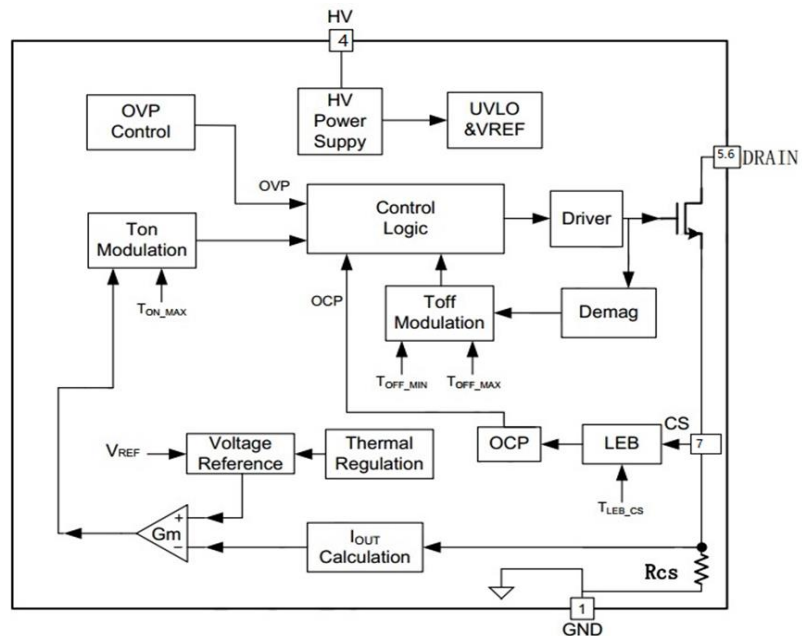


Figure 3.b JH5452BLP Internal Block Diagram





# JH5452B (LP/ND)

## Absolute Maximum Ratings (note1)

Symbol	Parameters	Range (SOP-7)	Range (SOT33-5)	Units
DRAIN	Internal HV MOSFET drain voltage	>650	>650	V
HV	IC high voltage power supply	>650	>650	V
P <sub>DMAX</sub>	Power dissipation (note2)	0.45	0.4	W
$\theta_{JA}$	Thermal resistance (Junction to Ambient)	145	155	°C/W
T <sub>J</sub>	Operating junction temperature	-40 to 150	-40 to 150	°C
T <sub>STG</sub>	Storage temperature range	-55 to 150	-55 to 150	°C

**Note 1:** Stresses beyond those listed “absolute maximum ratings” may cause permanent damage to the device. Under “recommended operating conditions” the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.

**Note 2:** The maximum power dissipation decrease if temperature rise, it is decided by  $T_{JMAX}$ ,  $\theta_{JA}$ , and environment temperature ( $T_A$ ). The maximum power dissipation is the lower one between  $P_{DMAX} = (T_{JMAX} - T_A) / \theta_{JA}$  and the number listed in the maximum table.





## JH5452B (LP/ND)

**Electrical Characteristics** (Notes 3, 4) (Unless otherwise specified, HV=100V and T<sub>A</sub>=25 °C)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>High Voltage Power Supply (HV)</b>						
I <sub>CC</sub>	IC Operating Current	No switching		0.3	0.6	mA
<b>Output LED Current (CS)</b>						
I <sub>LED</sub>	Fixed LED Current			98		mA
<b>Internal Timing Control</b>						
T <sub>ON_MAX</sub>	Maximum On Time			6.0		μs
T <sub>OFF_MAX</sub>	Maximum Off Time			200		μs
<b>Current Sense Section</b>						
V <sub>CS_LIMIT</sub>	CS Peak Voltage Limitation			2		V
T <sub>LEB_CS</sub>	Leading Edge Blanking Time for Current Sense			300		ns
T <sub>DELAY</sub>	Switch off Delay Time			200		ns
<b>Compensation Section</b>						
V <sub>REF</sub>	Internal Reference Voltage			270		mV
<b>OVP Control</b>						
V <sub>OVP</sub>	Shutdown voltage	L=2mH I <sub>LED</sub> =98mA		110		V
T <sub>OVP_RST</sub>	ROVP recovery Time			40		mS
K	OVP Constant			1.8		
<b>Power MOSFET Section</b>						
R <sub>DS_ON</sub>	Static Drain-source On-resistance	V <sub>GS</sub> =10V/I <sub>DS</sub> =0.5A		6.5		Ω
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V/I <sub>DS</sub> =250uA	650			V
I <sub>DSS</sub>	Power MOSFET Drain Leakage Current	V <sub>GS</sub> =0V/V <sub>DS</sub> =650V			1	μA
<b>Thermal Regulation Section</b>						





# JH5452B (LP/ND)

$T_{REG}$	Thermal Regulation Temperature			140		°C
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**Note 3:** production testing of the chip is performed at 25 °C.

**Note4:** the maximum and minimum parameters specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis





# JH5452B (LP/ND)

## Application Information

The JH5452B (LP/ND) is a high precision non-isolated APFC buck LED driver, specially designed for universal mains with constant current control. The driver with on-chip PFC circuit achieves high power factor, low THD and high efficiency.

### 1 Start Up

After system is powered on, the system starts switching very quickly, and the output voltage rises up gradually, and the inductor peak current also rises up. The LED current hence achieves a soft start without overshoot.

### 2 Constant Current Control

The JH5452B (LP/ND) integrate LED current sensing resistor in the IC, the LED current is fixed with 98mA.

The current in LED can be calculated by the equation:

$$I_{LED} \approx \frac{V_{REF}}{R_{CS}} + 98$$

Where,

$V_{REF}$ : Internal reference voltage

$R_{CS}$ : The current sensing resistor value

### 3 Thermal Regulation

The JH5452B (LP/ND) integrates thermal regulation function. When the system is over temperature, the output current is gradually reduced, the output power and thermal dissipation are also reduced. The system temperature is regulated and the system reliability is improved.

### 4 Protection Functions

The JH5452B (LP/ND) offers rich protection functions to improve the system reliability.

When the LED is shorted circuit, the switching frequency will work under 5 kHz.

When the output is shorted or the inductor is saturated, the CS peak voltage will be relatively high. When CS voltage reaches the internal limitation (2V), the power MOSFET will be turned off instantaneously. This cycle by cycle current limitation can help protecting power MOSFET, inductor and output diode.

The  $R_{OVP}$  function is also integrated in the IC, the LED open protection voltage is fixed with 110V, with  $L=2mH$ .  $I_{LED}=98mA$ . The  $V_{OVP}$  is given by:

$$V_{OVP} \approx \frac{L(mH) \times I_{LED}(mA)}{K}$$

where,

L is the inductor value

K is constant 1.8

### 5 PCB Layouts

The following guidelines should be followed in PCB layout:

Ground Path

Keep a short and wide ground path for current sense resistor.

The Area of Power Loop

The area of main current loop should be as small as possible to reduce EMI radiation.

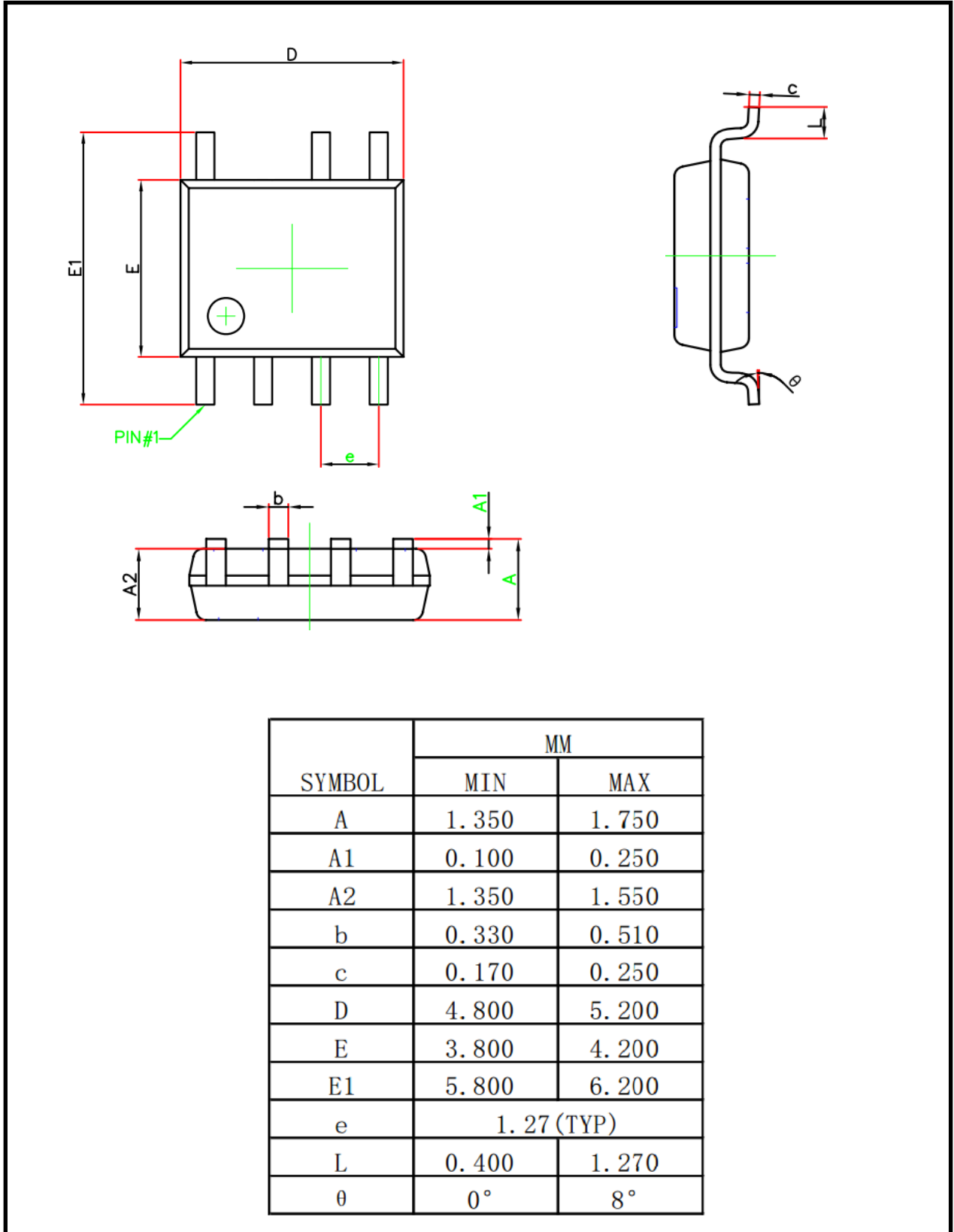






## JH5452B (LP/ND)

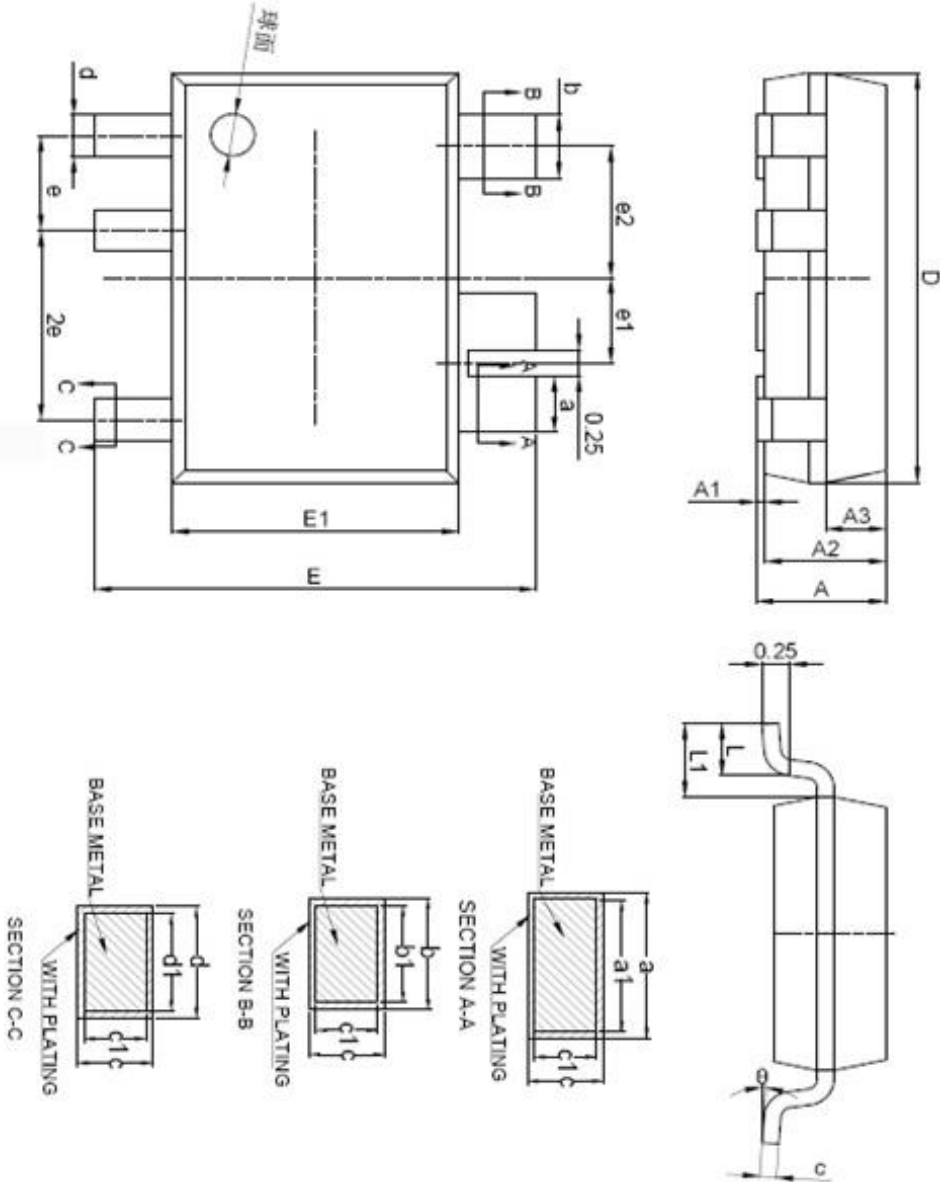
## Physical Dimensions SOP-7





# JH5452B (LP/ND)

## Physical Dimensions SOT33-5



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.30
A1	0.05	—	0.15
A2	1.05	1.10	1.15
A3	0.50	0.55	0.65
a	0.52	—	0.60
a1	0.51	0.54	0.57
b	0.58	—	0.66
b1	0.57	0.60	0.63
c	0.15	—	0.19
c1	0.14	0.15	0.16
d	0.38	—	0.46
d1	0.37	0.40	0.43
D	3.80	3.90	4.00
E1	2.50	2.60	2.70
E	3.80	4.00	4.20
e	0.90BSC		
e1	0.81 BSC		
e2	1.25 BSC		
L	0.40	0.50	0.60
L1	0.70REF.		
theta	0	—	8°





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## 注意事项

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3. Please do not exceed the absolute maximum ratings of the device when circuit designing.
4. Jilin Sino-microelectronics co., Ltd reserves the right to make changes in this specification sheet and is subject to change without prior notice.

## 联系方式

吉林华微电子股份有限公司

公司地址：吉林省吉林市深圳街 99 号

邮编：132013

总机：86-432-64678411

传真：86-432-64665812

网址：[www.hwdz.com.cn](http://www.hwdz.com.cn)

### 市场营销部

地址：吉林省吉林市深圳街 99 号

邮编：132013

电话：86-432-64675588

64675688

64678411-3098/3099

传真：86-432-64671533

## CONTACT

**JILIN SINO-MICROELECTRONICS CO., LTD.**

ADD: No.99 Shenzhen Street, Jilin City, Jilin Province, China.

Post Code: 132013

Tel: 86-432-64678411

Fax: 86-432-64665812

Web Site: [www.hwdz.com.cn](http://www.hwdz.com.cn)

### MARKET DEPARTMENT

ADD: No.99 Shenzhen Street, Jilin City, Jilin Province, China.

Post Code: 132013

Tel: 86-432-64675588

64675688

64678411-3098/3099

Fax: 86-432-64671533

