



## Synchronous Step-Up DC/DC Converter with PFM Control

### ZS9107 Series

#### ■ INTRODUCTION

The ZS9107 Series is a Synchronous step-up DC/DC Converter with PFM Control.

With the ZS9107 Series, a step-up switching DC/DC converter can be configured by using an external coil, capacitor. The built-in MOSFET is turned off by a protection circuit when the voltage at the LX pin exceeds the limit to prevent it from being damaged.

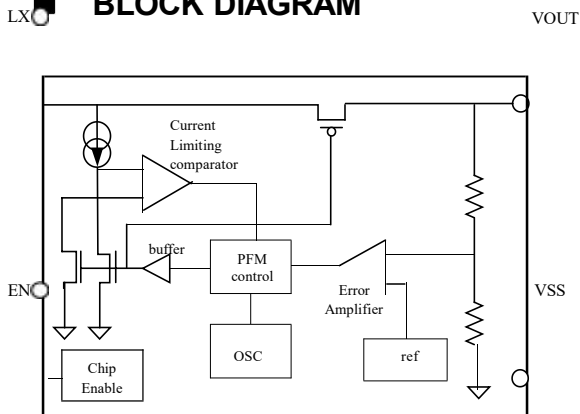
#### ■ FEATURES

- External parts: Coil, capacitor
- Output voltage: Settable to between 2.1V to 5.5 V in 0.1 V steps
- Maximum Oscillation frequency: 300KHz
- Accuracy of  $\pm 2\%$
- High efficiency: 95%

#### ■ APPLICATIONS

- Digital cameras
- Electronic notebooks and PDAs
- Portable CD/MD players
- Cameras, video equipment,
- Communications equipment
- Power supply for microcomputers

#### ■ BLOCK DIAGRAM



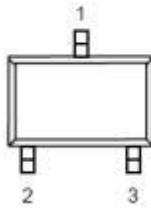
#### DEVICE INFORMATION:

##### ZS9107 ①②③④

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard LX
	B	With shutdown, LX
②③	Integer	Output Voltage (2.1~5.5) e.g. : 3.0V=②:3; ③:0
④	T3/T5	Package: SOT-23-3/5L
	K	Package: SOT-23
	R	Package: SOT-89-3L
	L	Package: TO-92

## Pin configuration

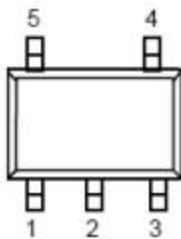
SOT-23  
SOT-23-3L  
Top view



**Table 1 SZS9107A Series (SOT-23-3L/SOT-23 PKG)**

PIN NO.	PIN NAME	FUNCTION
1	$V_{OUT}$	Output voltage pin
2	$V_{SS}$	GND pin
3	LX	External inductor connection pin

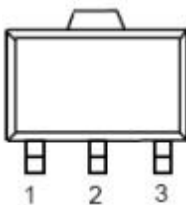
SOT-23-5L  
Top view



**Table 2 SZS9107B Series (SOT-23-5L PKG)**

PIN NO.	PIN NAME	FUNCTION
1	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
2	$V_{OUT}$	Output voltage pin
3	NC	(N.C.)
4	$V_{SS}$	GND pin
5	LX	External inductor connection pin

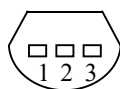
SOT-89-3L  
Top view



**Table 3 SZS9107A Series (SOT-89-3L PKG)**

PIN NO.	PIN NAME	FUNCTION
1	$V_{SS}$	GND pin
2	$V_{OUT}$	Output voltage pin
3	LX	External inductor connection pin

TO-92  
Bottom view



**Table 4 SZS9107A Series (TO-92 PKG)**

PIN NO.	PIN NAME	FUNCTION
1	$V_{SS}$	GND pin
2	$V_{OUT}$	Output voltage pin
3	LX	External inductor connection pin

## Electrical Characteristics

### ■ ABSOLUTE MAXIMUM RATINGS(Unless otherwise specified, Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
V <sub>OUT</sub> Pin Voltage		V <sub>OUT</sub>	V <sub>SS</sub> -0.3 ~ V <sub>SS</sub> +8	V
EN Pin Voltage		EN	V <sub>SS</sub> -0.3 ~ V <sub>SS</sub> +8	V
LX Pin Voltage		V <sub>LX</sub>	V <sub>SS</sub> -0.3 ~ V <sub>SS</sub> +8	V
LX Pin Current		I <sub>LX</sub>	1000	mA
Power Dissipation	SOT-23	PD	250	mW
	SOT23-3/5L		250	mW
	SOT-89-3L		500	mW
	TO-92		500	mW
Operating Temperature		T <sub>opr</sub>	-40 ~+85	°C
Storage Temperature		T <sub>stg</sub>	-40 ~+125	°C
Soldering Temperature & Time		T <sub>solder</sub>	260°C, 10s	

### ■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V <sub>OUT</sub>	–	V <sub>OUT(S)</sub> ×0.98	V <sub>OUT</sub>	V <sub>OUT(S)</sub> ×1.02	V
Input Voltage	V <sub>IN</sub>	–	–	–	5	V
Operation Start Voltage	V <sub>ST1</sub>	I <sub>OUT</sub> = 1 mA	–	–	0.9	V
Input Current At No Load	I <sub>SS</sub>	V <sub>IN</sub> =1.8V, V <sub>OUT</sub> =3.0V	–	15	-	μA
Current Consumption 2	I <sub>SS2</sub>	V <sub>OUT</sub> =V <sub>OUT</sub> +0.5 V	–	6	10	μA
Current Consumption During Shutdown	I <sub>SSS</sub>	V <sub>EN</sub> = 0 V	–	–	1.0	μA
Maximum Oscillation Frequency	f <sub>OSC</sub>	V <sub>OUT</sub> = 0.95×V <sub>OUT</sub> , measure waveform at LX pin		300		KHz
Duty Ratio 1	Duty1	V <sub>OUT</sub> = 0.95×V <sub>OUT</sub> , measure waveform at LX pin	70	78	85	%
Efficiency	EFFI			90		%
Shutdown Pin Input Voltage	V <sub>SH</sub>	V <sub>OUT</sub> =0.95×V <sub>OUT</sub> , judge oscillation at LX pin	0.75	–	–	V
	V <sub>SL1</sub>	V <sub>OUT</sub> = 0.95×V <sub>OUT</sub> , judge stop at LX pin	–	–	0.3	V
Shutdown Pin Input Current	I <sub>SH</sub>	V <sub>EN</sub> =6V	-0.1	–	0.1	μA
	I <sub>SL</sub>	V <sub>EN</sub> =0V	-0.1	–	0.1	μA

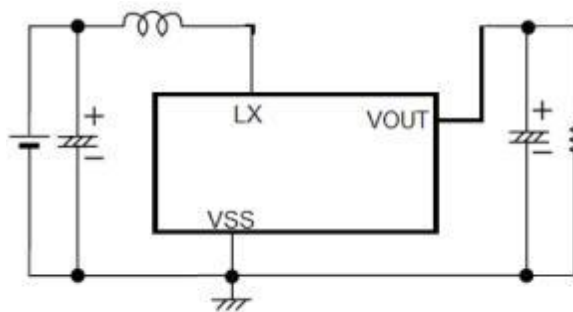
Remark: V<sub>OUT(S)</sub> specified above is the set output voltage value, and V<sub>OUT</sub> is the typical value of the actual output voltage.

### ■ STANDARD CIRCUITS

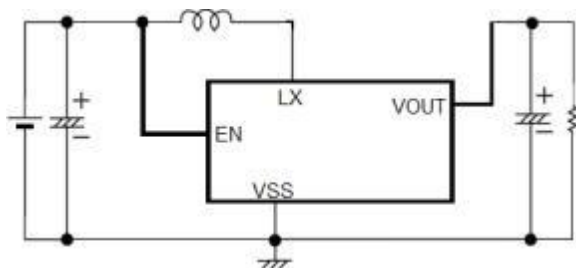
Component: Inductor: 47uH(Sumida)

Capacitor: 47uF/16V(Tantalum)

#### 1、SZS9107A:



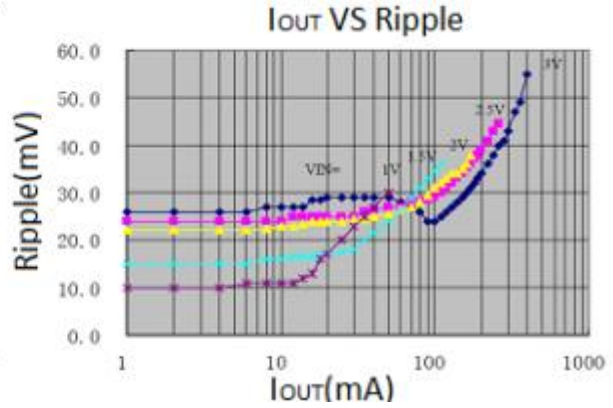
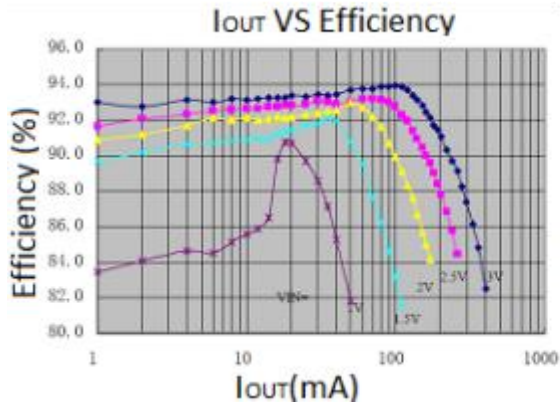
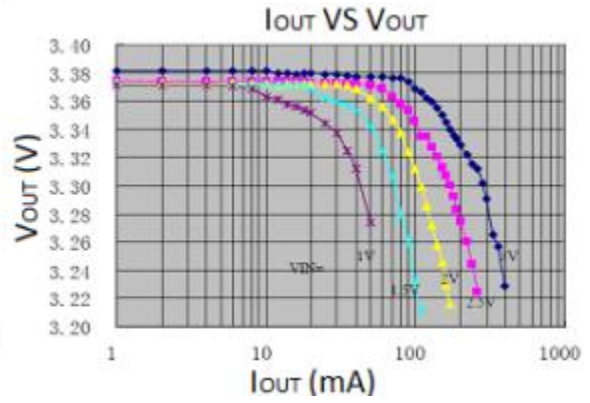
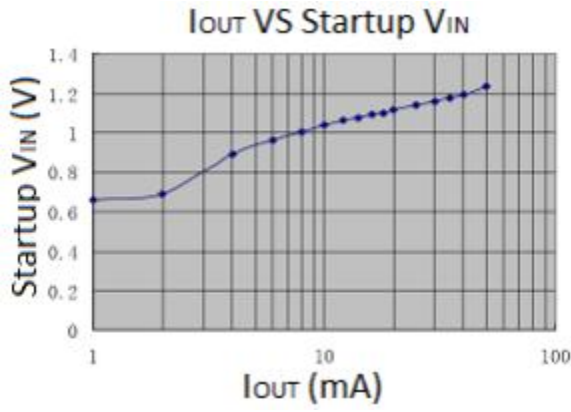
#### 2、SZS9107B:



# Typical Characteristics

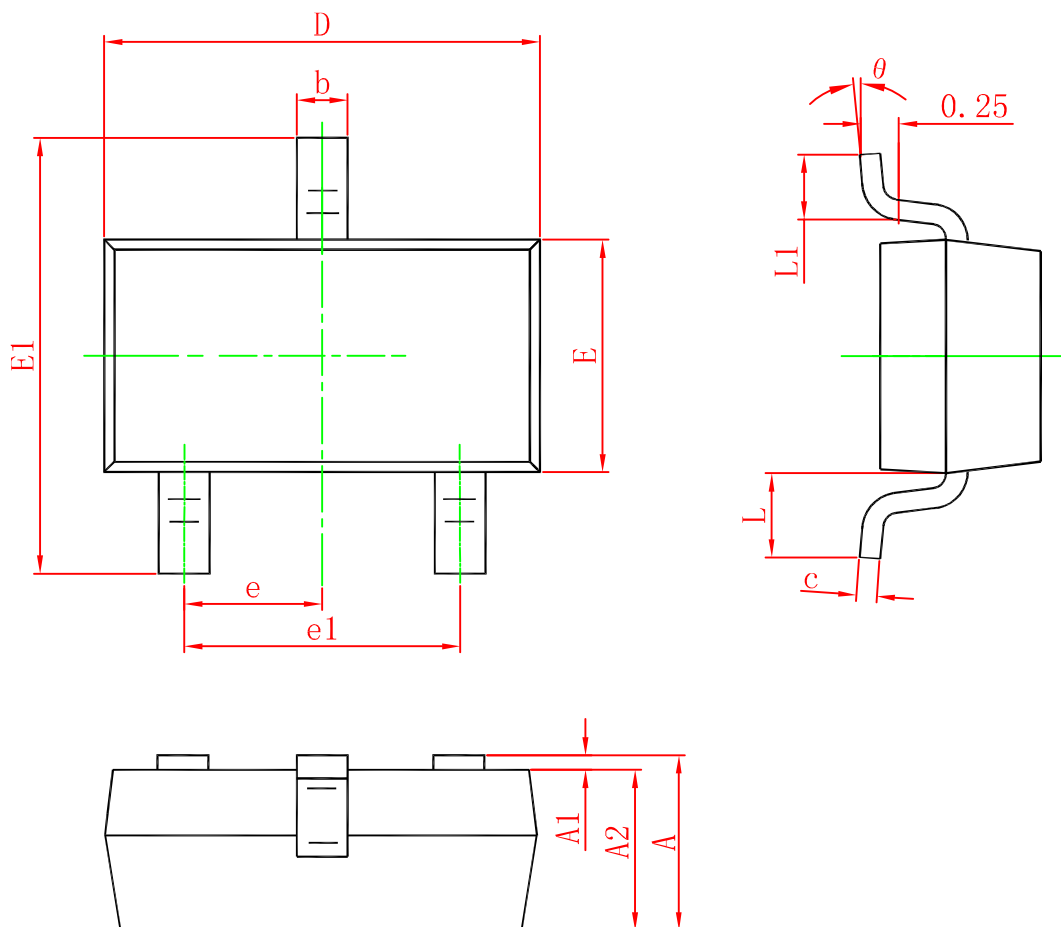
$C_{in}=C_{out}=100\mu F$

$L=47\mu H$



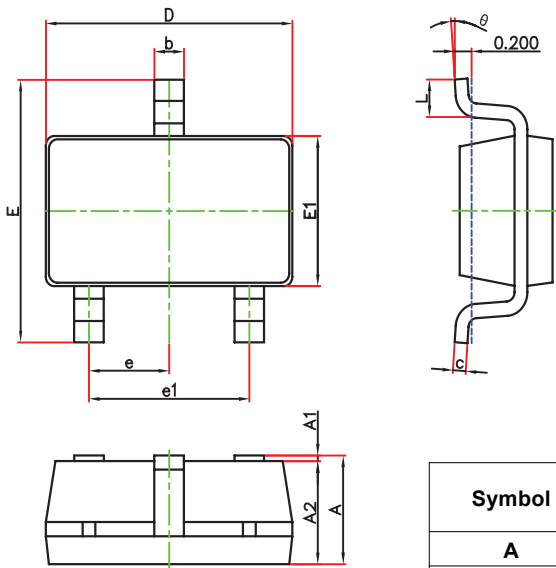
■ PACKAGE INFORMATION

- SOT-23



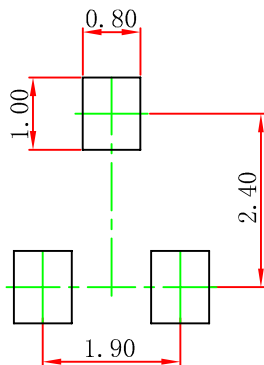
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
$\theta$	0°	8°	0°	8°

## SOT-23-3L Package Outline Dimensions



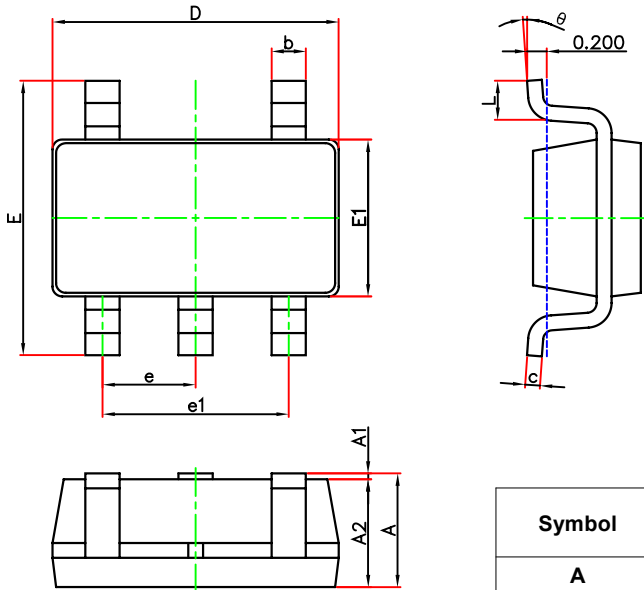
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

## SOT-23-3L Suggested pad Layout



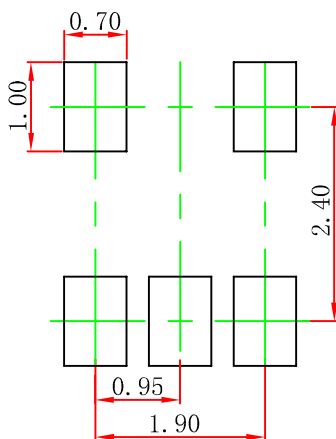
- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05\text{mm}$ .
  3. The pad layout is for reference purposes only.

## SOT-23-5L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°

## SOT-23-5L Suggested Pad Layout

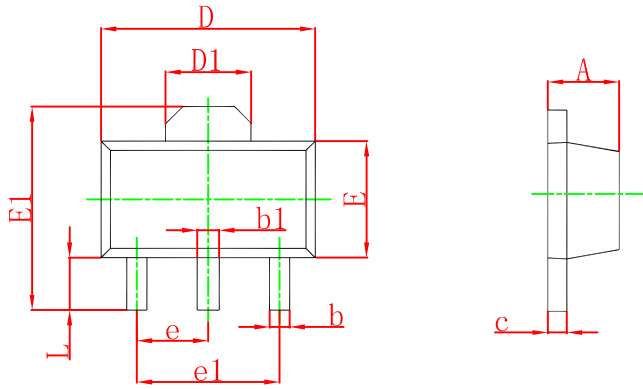


**Note:**

1. Controlling dimension; in millimeters.
2. General tolerance  $\pm 0.05$  mm.
3. The pad layout is for reference purposes only.

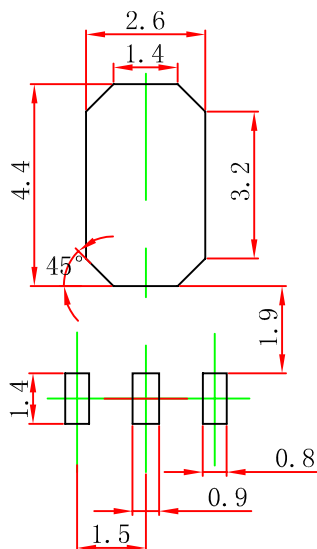


## SOT-89-3L Package Outline Dimensions



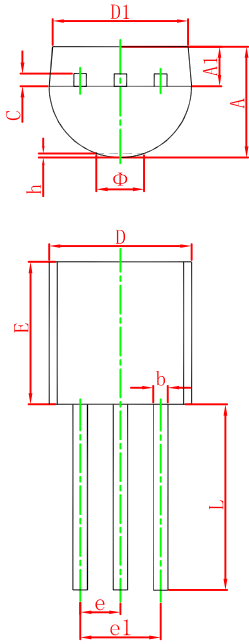
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

## SOT-89-3L Suggested Pad Layout



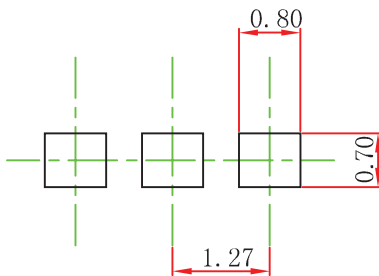
Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance:  $\pm 0.05$  mm.  
 3. The pad layout is for reference purposes only.

## TO-92 package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
<b>A</b>	<b>3.300</b>	<b>3.700</b>	<b>0.130</b>	<b>0.146</b>
<b>A1</b>	<b>1.100</b>	<b>1.400</b>	<b>0.043</b>	<b>0.055</b>
<b>b</b>	<b>0.380</b>	<b>0.550</b>	<b>0.015</b>	<b>0.022</b>
<b>c</b>	<b>0.360</b>	<b>0.510</b>	<b>0.014</b>	<b>0.020</b>
<b>D</b>	<b>4.400</b>	<b>4.700</b>	<b>0.173</b>	<b>0.185</b>
<b>D1</b>	<b>3.430</b>		<b>0.135</b>	
<b>E</b>	<b>4.300</b>	<b>1.400</b>	<b>0.169</b>	<b>0.185</b>
<b>e</b>	<b>1.270 TYP</b>		<b>0.050 TYP</b>	
<b>e1</b>	<b>2.440</b>	<b>2.640</b>	<b>0.096</b>	<b>0.104</b>
<b>L</b>	<b>14.100</b>	<b>14.500</b>	<b>0.555</b>	<b>0.571</b>
<b>Φ</b>		<b>1.600</b>		<b>0.063</b>
<b>h</b>	<b>0.000</b>	<b>0.380</b>	<b>0.000</b>	<b>0.015</b>

## TO-92 suggested pad Layout



### Note:

1. Controlling dimension: In millimeters.
2. General tolerance:  $\pm 0.05$  mm.
3. The pad layout is for reference purposes only.

# DISCLAIMER

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