

### Product Summary

The GPL6222 series are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra-low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The GPL6222 series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The GPL6222 series consume less than 0.1 $\mu$ A in shutdown mode and have fast turn-on time less than 50 $\mu$ S. The series are very suitable for the battery-powered equipments, such as RF applications and other systems requiring a quiet voltage source.

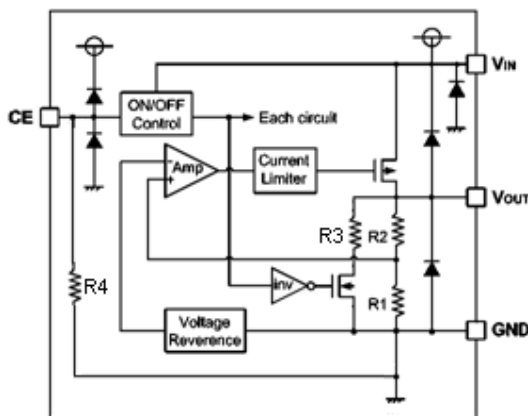
### Features

- Low Quiescent Current: 50 $\mu$ A
- High Ripple Rejection: 80dB@1kHz
- Operating Voltage Range: 1.8V~6.0V
- Low Dropout Voltage: 60mV@100mA
- Output Voltage: 1.0~ 5.0V
- High Accuracy:  $\pm 2\%$ (Typ.)
- TTL-Logic-Controlled Shutdown Input
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection

### Applications

- Cellular and Smart Phones
- Radio control systems
- Laptop, Palmtops and PDAs
- Digital Still and Video Cameras
- MP3, MP4 Player
- Battery-Powered Equipment

### Block Diagram

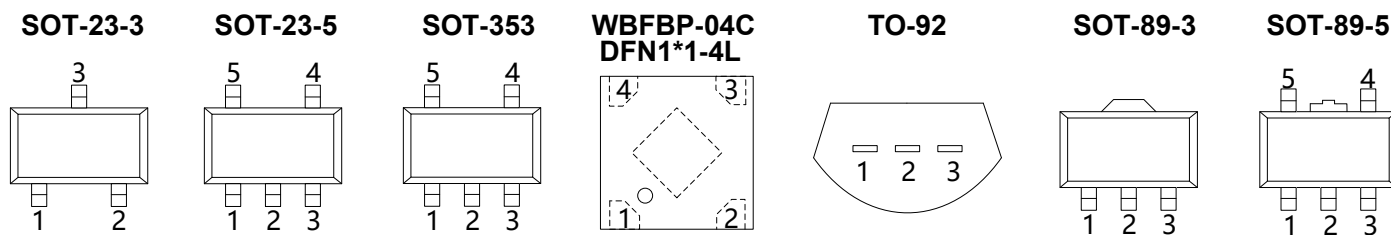


### Order Information

GPL6222V①②

| Designator | Description                                                                                                        |
|------------|--------------------------------------------------------------------------------------------------------------------|
| ①          | Output Voltage<br>e.g. 1.8V=18                                                                                     |
| ②          | Package:<br>SOT-23-3L=K3<br>SOT-23-5L=K5<br>WBFBP-04C=H4<br>DFN1*1-4=H1<br>SOT-89-3L=KE<br>SOT-89-5L=KT<br>TO-92=Z |

## Pin Configuration



| Pin Number |       |          | Pin Name  | Function    |
|------------|-------|----------|-----------|-------------|
| SOT-23-3   | TO-92 | SOT-89-3 |           |             |
| 1          | 1     | 1        | $V_{SS}$  | Ground      |
| 2          | 3     | 3        | $V_{OUT}$ | Output      |
| 3          | 2     | 2        | $V_{IN}$  | Power input |

| Pin Number |         | Pin Name  | Function        |
|------------|---------|-----------|-----------------|
| SOT-23-5L  | SOT-353 |           |                 |
| 1          | 1       | $V_{IN}$  | Power Input Pin |
| 2          | 2       | $V_{SS}$  | Ground          |
| 3          | 3       | CE        | Chip Enable Pin |
| 4          | 4       | NC        | No Connection   |
| 5          | 5       | $V_{OUT}$ | Output Pin      |

### WBFBP-04C/DFN1\*1-4L

| Pin Number | Pin Name  | Function        |
|------------|-----------|-----------------|
| 1          | $V_{OUT}$ | Output Pin      |
| 2          | $V_{SS}$  | Ground          |
| 3          | CE        | Chip Enable Pin |
| 4          | $V_{IN}$  | Power Input Pin |

### SOT-89-5L

| Pin Number | Pin Name  | Function        |
|------------|-----------|-----------------|
| 1          | $V_{OUT}$ | Output Pin      |
| 2          | $V_{SS}$  | Ground          |
| 3          | NC        | No Connection   |
| 4          | CE        | Chip Enable Pin |
| 5          | $V_{IN}$  | Power Input Pin |

## Absolute Maximum Ratings ( $T_a=25^{\circ}\text{C}$ , unless otherwise noted)

| Parameter                                           |                         | Symbol        | Ratings                     | Units                |
|-----------------------------------------------------|-------------------------|---------------|-----------------------------|----------------------|
| Input Voltage <sup>(2)</sup>                        |                         | $V_{IN}$      | $V_{SS}-0.3\sim V_{SS}+7$   | V                    |
| Output Voltage <sup>(2)</sup>                       |                         | $V_{OUT}$     | $V_{SS}-0.3\sim V_{IN}+0.3$ | V                    |
| Output Current                                      |                         | $I_{OUT}$     | 500                         | mA                   |
| Power Dissipation                                   | SOT-23-3/5L             | $P_D$         | 0.38                        | W                    |
|                                                     | SOT-89/TO-92            | $P_D$         | 0.60                        | W                    |
|                                                     | DFN1*1-4                | $P_D$         | 0.40                        | W                    |
| Thermal Resistance                                  | SOT-23-3/5L             | $\theta_{JA}$ | 258                         | $^{\circ}\text{C/W}$ |
|                                                     | SOT-89/TO-92            | $\theta_{JA}$ | 167                         | $^{\circ}\text{C/W}$ |
|                                                     | DFN1*1-4                | $\theta_{JA}$ | 250                         | $^{\circ}\text{C/W}$ |
| Operating Free Air Temperature Range                |                         | $T_A$         | -40~85                      | $^{\circ}\text{C}$   |
| Operating Junction Temperature Range <sup>(3)</sup> |                         | $T_j$         | -40~125                     | $^{\circ}\text{C}$   |
| Storage Temperature                                 |                         | $T_{stg}$     | -40~125                     | $^{\circ}\text{C}$   |
| Lead Temperature(Soldering, 10 sec)                 |                         | $T_{solder}$  | 260                         | $^{\circ}\text{C}$   |
| ESD rating <sup>(4)</sup>                           | Human Body Model -(HBM) |               | 2                           | kV                   |
|                                                     | Machine Model- (MM)     |               | 200                         | V                    |

(1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltages are with respect to network ground terminal.

(3) This IC includes overtemperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed  $125^{\circ}\text{C}$  when overtemperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

(4) ESD testing is performed according to the respective JESD22 JEDEC standard.

The human body model is a 100 pF capacitor discharged through a  $1.5\text{k}\Omega$  resistor into each pin. The machine model is a 200 pF capacitor discharged directly into each pin.

**Electrical Characteristics**( $V_{IN}=V_{OUT}+1V$ ,  $C_{IN}=C_{OUT}=1\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified)

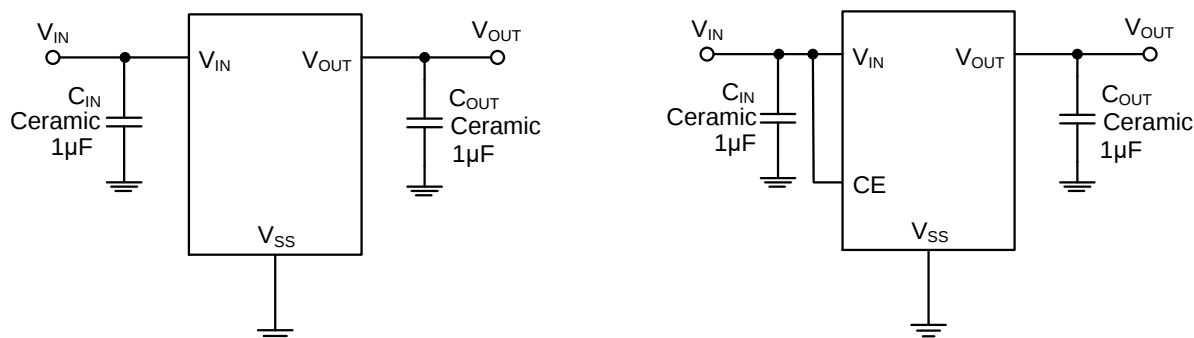
| Parameter                                  | Symbol             | Conditions                                           | Min.           | Typ.      | Max.           | Units      |
|--------------------------------------------|--------------------|------------------------------------------------------|----------------|-----------|----------------|------------|
| Output Voltage                             | $V_{OUT(E)}^{(2)}$ | $I_{OUT}=1mA$                                        | $V_{OUT}*0.98$ | $V_{OUT}$ | $V_{OUT}*1.02$ | V          |
| Supply Current                             | $I_{SS}$           | $I_{OUT}=0$                                          |                | 50        | 100            | $\mu A$    |
| Standby Current                            | $I_{STBY}$         | $CE = V_{SS}$                                        |                | 0.1       | 1              | $\mu A$    |
| Output Current                             | $I_{OUT}$          | —                                                    | 500            | 750       |                | mA         |
| Dropout Voltage <sup>3)</sup>              | $V_{dif}$          | $I_{OUT}=100mA$<br>$V_{OUT}\geq 3.3V$                |                | 60        |                | mV         |
| Load Regulation                            | $\Delta V_{OUT}$   | $V_{IN}=V_{OUT}+1V$ ,<br>$1mA\leq I_{OUT}\leq 100mA$ |                | 10        |                | mV         |
| Line Regulation                            |                    | $I_{OUT}=10mA$<br>$V_{OUT}+1V\leq V_{IN}\leq 6V$     |                | 0.01      | 0.2            | %/V        |
| Output Voltage Temperature Characteristics |                    | $I_{OUT}=10mA$<br>$-40\leq T\leq +85$                |                | 50        |                | ppm        |
| Short Current                              | $I_{Short}$        | $V_{OUT}=V_{SS}$                                     |                | 120       |                | mA         |
| Input Voltage                              | $V_{IN}$           | —                                                    | 1.8            |           | 6.0            | V          |
| Power Supply Rejection Rate                | 100Hz              | $PSRR$<br>$I_{OUT}=50mA$                             |                | 75        |                | dB         |
|                                            | 1kHz               |                                                      |                | 80        |                |            |
|                                            | 10kHz              |                                                      |                | 70        |                |            |
| CE "High" Voltage                          | $V_{CE"H"}$        |                                                      | 1.5            |           | $V_{IN}$       | V          |
| CE "Low" Voltage                           | $V_{CE"L"}$        |                                                      |                |           | 0.3            | V          |
| $C_{OUT}$ Auto-Discharge Resistance        | $R_{DISCHRG}$      | $V_{IN}=5V, V_{OUT}=3.0V$ ,<br>$V_{CE}=V_{SS}$       |                | 100       |                | $\Omega$   |
| Thermal Shutdown Threshold                 | $T_{SD}$           |                                                      |                | 160       |                | $^\circ C$ |
| Thermal Shutdown Hysteresis                | $\Delta T_{SD}$    |                                                      |                | 20        |                | $^\circ C$ |

1)  $V_{OUT}$ : Specified Output Voltage.

2)  $V_{OUT(E)}$ : Effective Output Voltage ( i.e. The output voltage when  $V_{IN} = (V_{OUT} + 1.0V)$  and maintain a certain  $I_{OUT}$  Value).

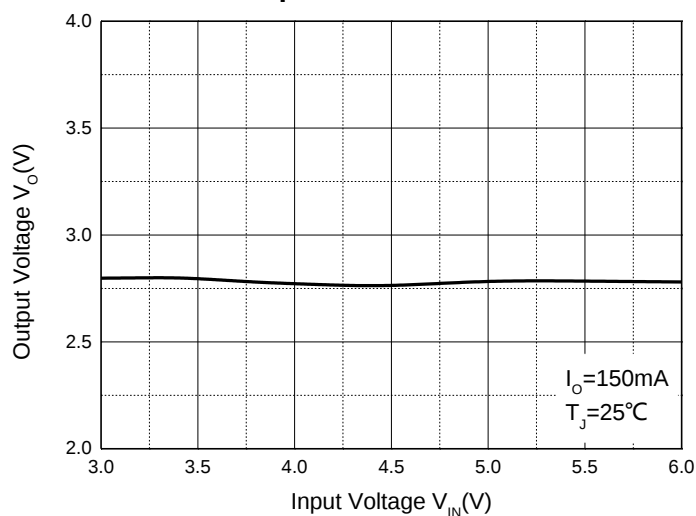
3)  $V_{dif}$ : The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of  $V_{OUT(E)}$ .

## Typical Application

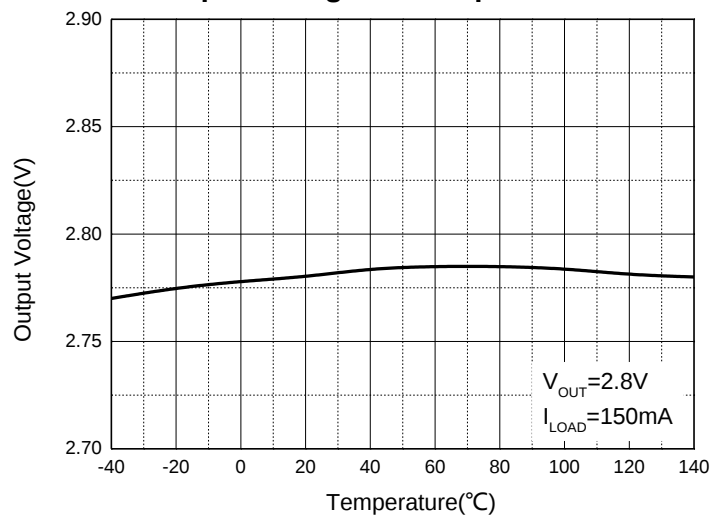


## Typical Performance Characteristics

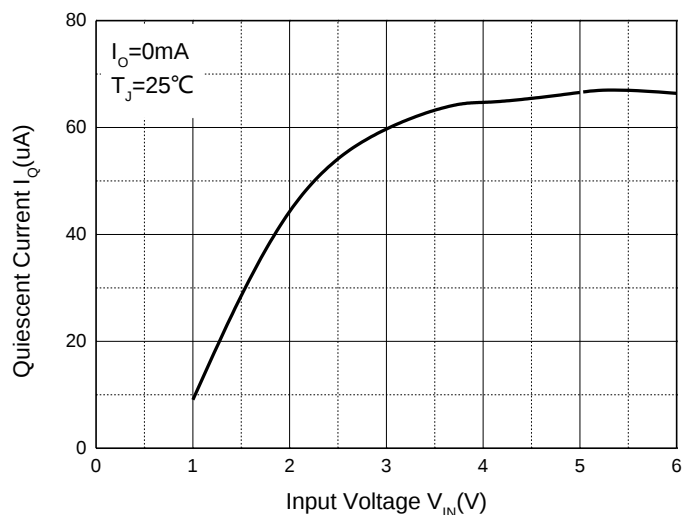
### Output Characteristics



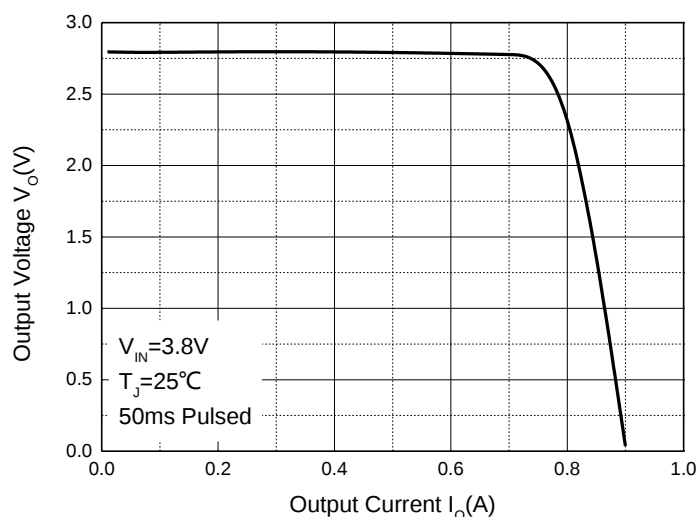
### Output Voltage vs. Temperature



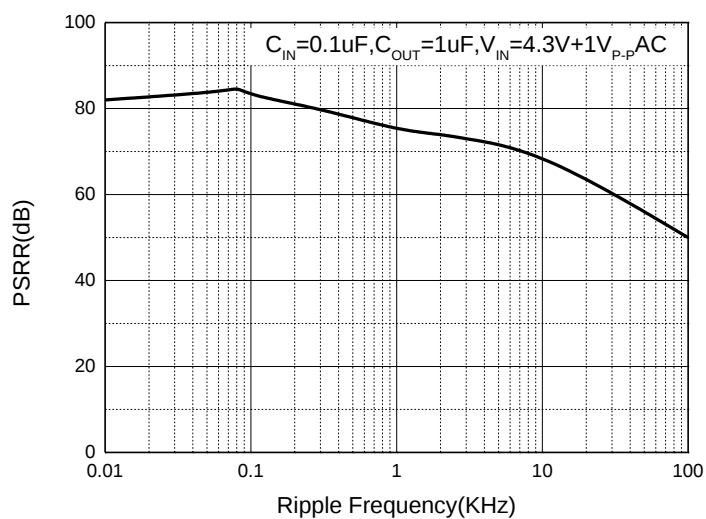
### Quiescent Current



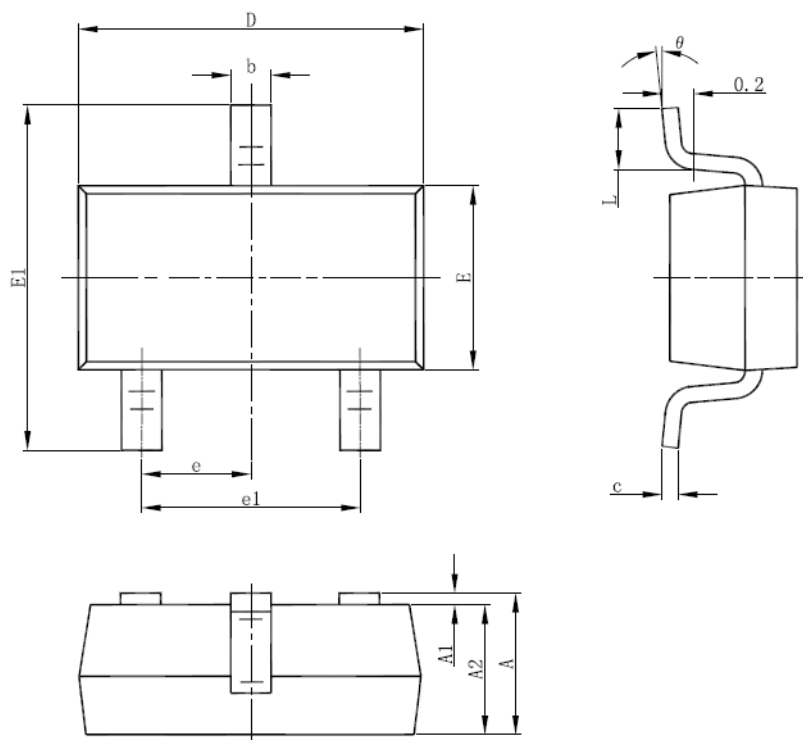
### Current Cut-off Grid Voltage



### PSRR vs. Frequency

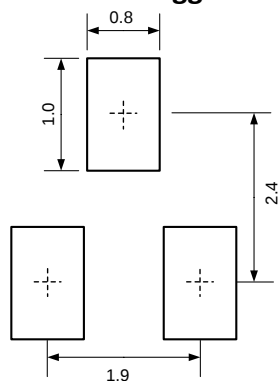


## SOT-23-3L Package Outline Dimensions



| Symbol | Dimensions in millimeters |       |
|--------|---------------------------|-------|
|        | Min.                      | Max.  |
| A      | 1.050                     | 1.250 |
| A1     | 0.000                     | 0.100 |
| A2     | 1.050                     | 1.150 |
| b      | 0.300                     | 0.500 |
| c      | 0.100                     | 0.200 |
| D      | 2.820                     | 3.020 |
| E      | 1.500                     | 1.700 |
| E1     | 2.650                     | 2.950 |
| e      | 0.950TYP                  |       |
| e1     | 1.800                     | 2.000 |
| L      | 0.300                     | 0.600 |
| θ      | 0°                        | 8°    |

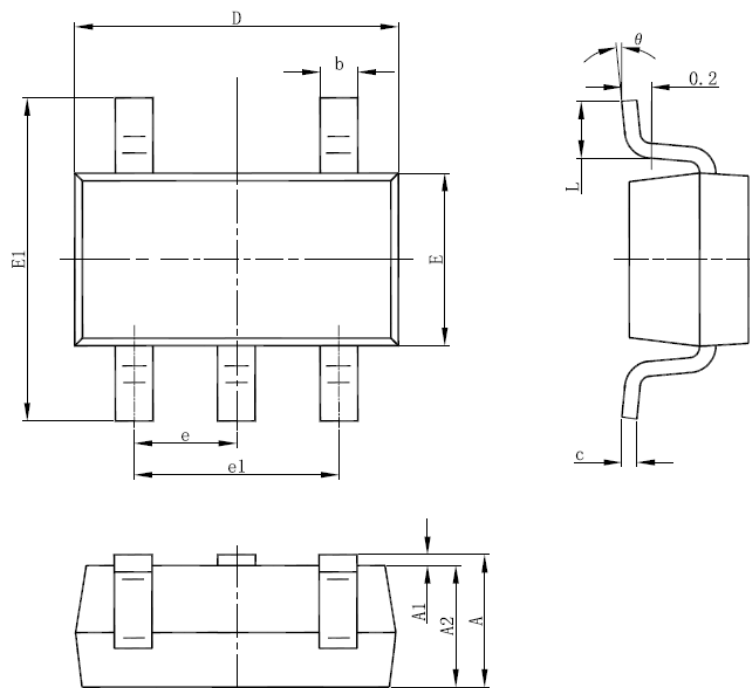
## SOT-23-3L Suggested Pad Layout (Unit: mm)



### Notes:

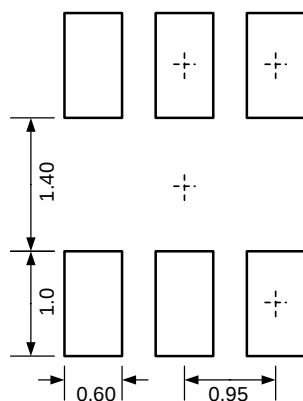
- General tolerance:  $\pm 0.05\text{mm}$ .
- The pad layout is for reference purposes only.

## SOT-23-5L Package Outline Dimensions



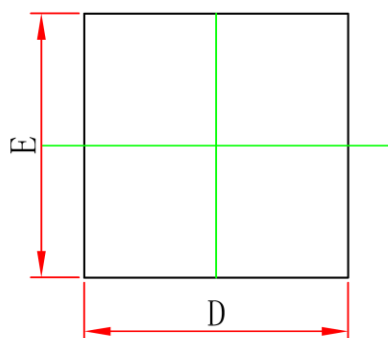
| Symbol   | Dimensions In Millimeters |       |
|----------|---------------------------|-------|
|          | Min.                      | Max.  |
| A        | 1.050                     | 1.250 |
| A1       | 0.000                     | 0.100 |
| A2       | 1.050                     | 1.150 |
| b        | 0.300                     | 0.500 |
| c        | 0.100                     | 0.200 |
| D        | 2.820                     | 3.020 |
| E        | 1.500                     | 1.700 |
| E1       | 2.650                     | 2.950 |
| e        | 0.950(BSC)                |       |
| e1       | 1.800                     | 2.000 |
| L        | 0.300                     | 0.600 |
| $\theta$ | 0°                        | 8°    |

## SOT-23-5L Suggested Pad Layout (Unit: mm)

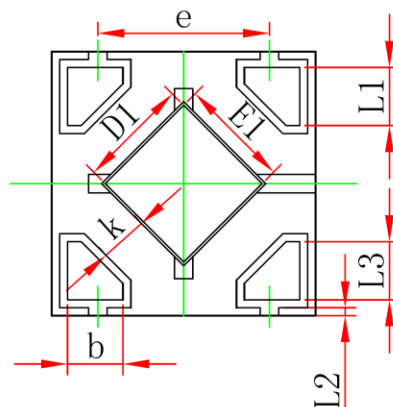


### Notes:

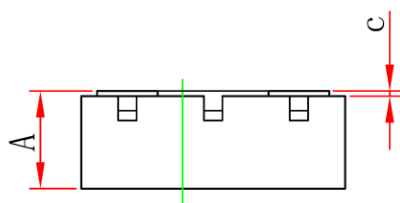
- General tolerance:  $\pm 0.05$ mm.
- The pad layout is for reference purposes only.

**WBFBP-04C Package Outline Dimensions**


TOP VIEW  
[顶视图]

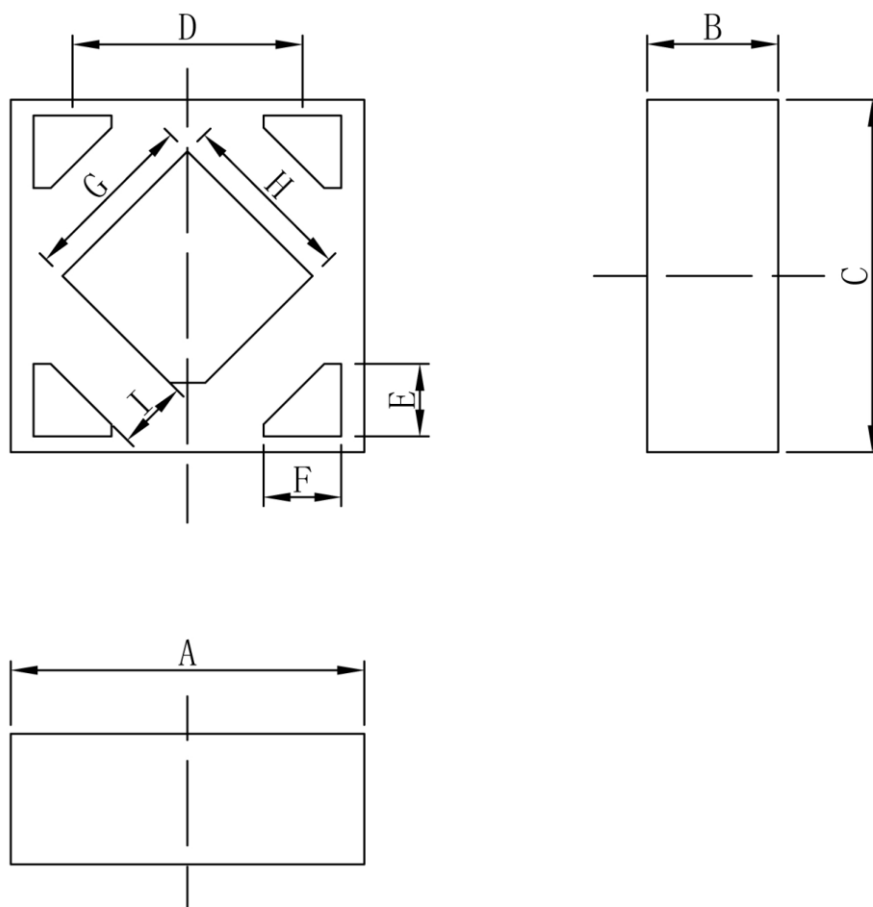


BOTTOM VIEW  
[背视图]



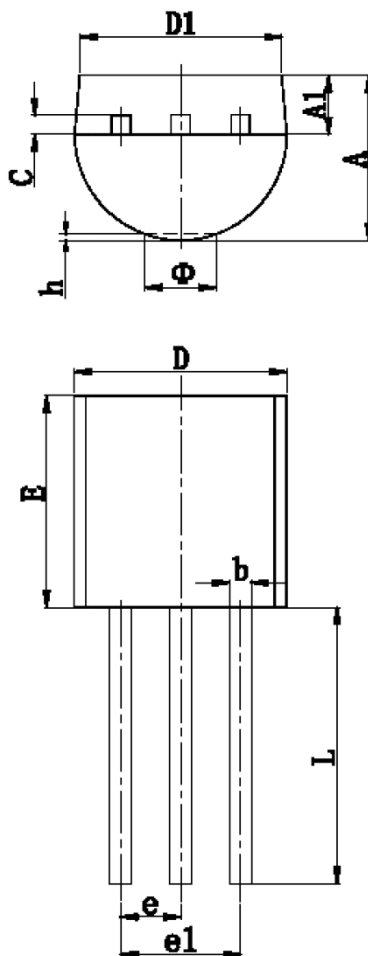
SIDE VIEW  
[侧视图]

| Symbol | Dimensions in millimeters |       | Dimensions in inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.335                     | 0.495 | 0.013                | 0.016 |
| D      | 0.950                     | 1.050 | 0.037                | 0.041 |
| E      | 0.950                     | 1.050 | 0.037                | 0.041 |
| D1     | 0.037                     | 0.047 | 0.015                | 0.019 |
| E1     | 0.037                     | 0.047 | 0.015                | 0.019 |
| k      | 0.17MIN                   |       | 0.007MIN             |       |
| b      | 0.160                     | 0.260 | 0.006                | 0.010 |
| c      | 0.010                     | 0.090 | 0.000                | 0.004 |
| e      | 0.600                     | 0.700 | 0.024                | 0.028 |
| L1     | 0.185                     | 0.255 | 0.007                | 0.010 |
| L2     | 0.030REF                  |       | 0.001REF             |       |
| L3     | 0.185                     | 0.255 | 0.007                | 0.010 |

**DFN1\*1-4L Package Outline Dimensions**


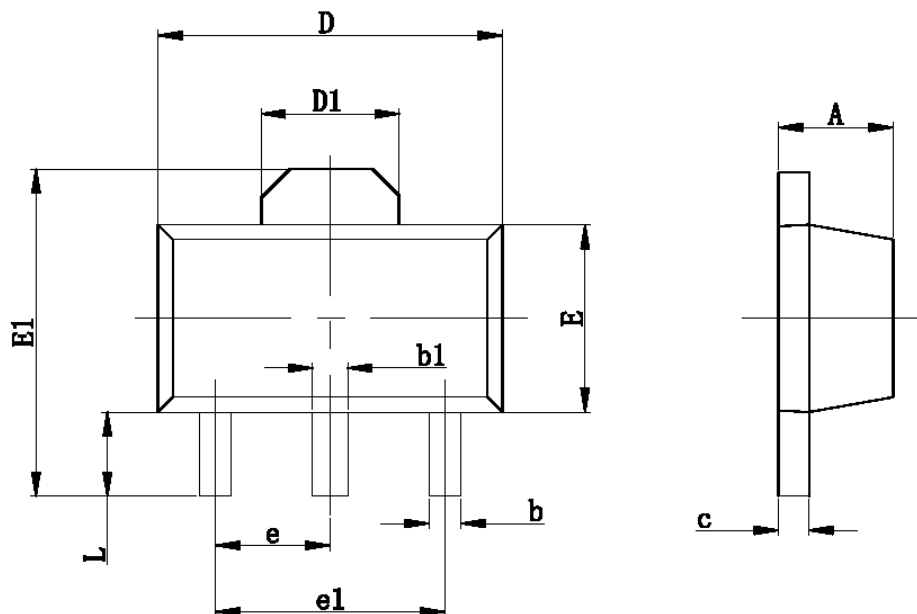
| Symbol | Dimensions in millimeters |       |
|--------|---------------------------|-------|
|        | Min.                      | Max.  |
| A      | 0.950                     | 1.050 |
| B      | 0.320                     | 0.420 |
| C      | 0.950                     | 1.050 |
| D      | 0.600                     | 0.700 |
| E      | 0.175                     | 0.275 |
| F      | 0.170                     | 0.270 |
| G      | 0.440                     | 0.540 |
| H      | 0.440                     | 0.540 |
| I      | 0.140                     | 0.240 |

## TO-92 Package Outline Dimensions



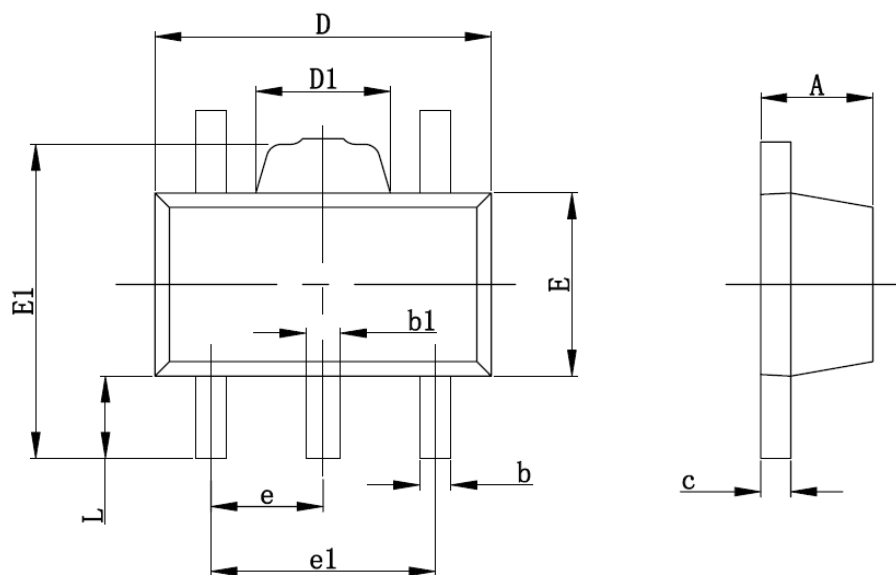
| Symbol | Dimensions in millimeters |        | Dimensions in inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 3.300                     | 3.700  | 0.130                | 0.146 |
| A1     | 1.100                     | 1.400  | 0.043                | 0.055 |
| b      | 0.380                     | 0.550  | 0.015                | 0.022 |
| c      | 0.360                     | 0.510  | 0.014                | 0.020 |
| D      | 4.400                     | 4.700  | 0.173                | 0.185 |
| D1     | 3.430                     |        | 0.135                |       |
| E      | 4.300                     | 4.700  | 0.169                | 0.185 |
| e      | 1.270TYP                  |        | 0.050TYP             |       |
| e1     | 2.440                     | 2.640  | 0.096                | 0.104 |
| L      | 14.100                    | 14.500 | 0.555                | 0.571 |
| $\phi$ |                           | 1.600  |                      | 0.063 |
| h      | 0.000                     | 0.380  | 0.000                | 0.015 |

## SOT-89-3L Package Outline Dimensions



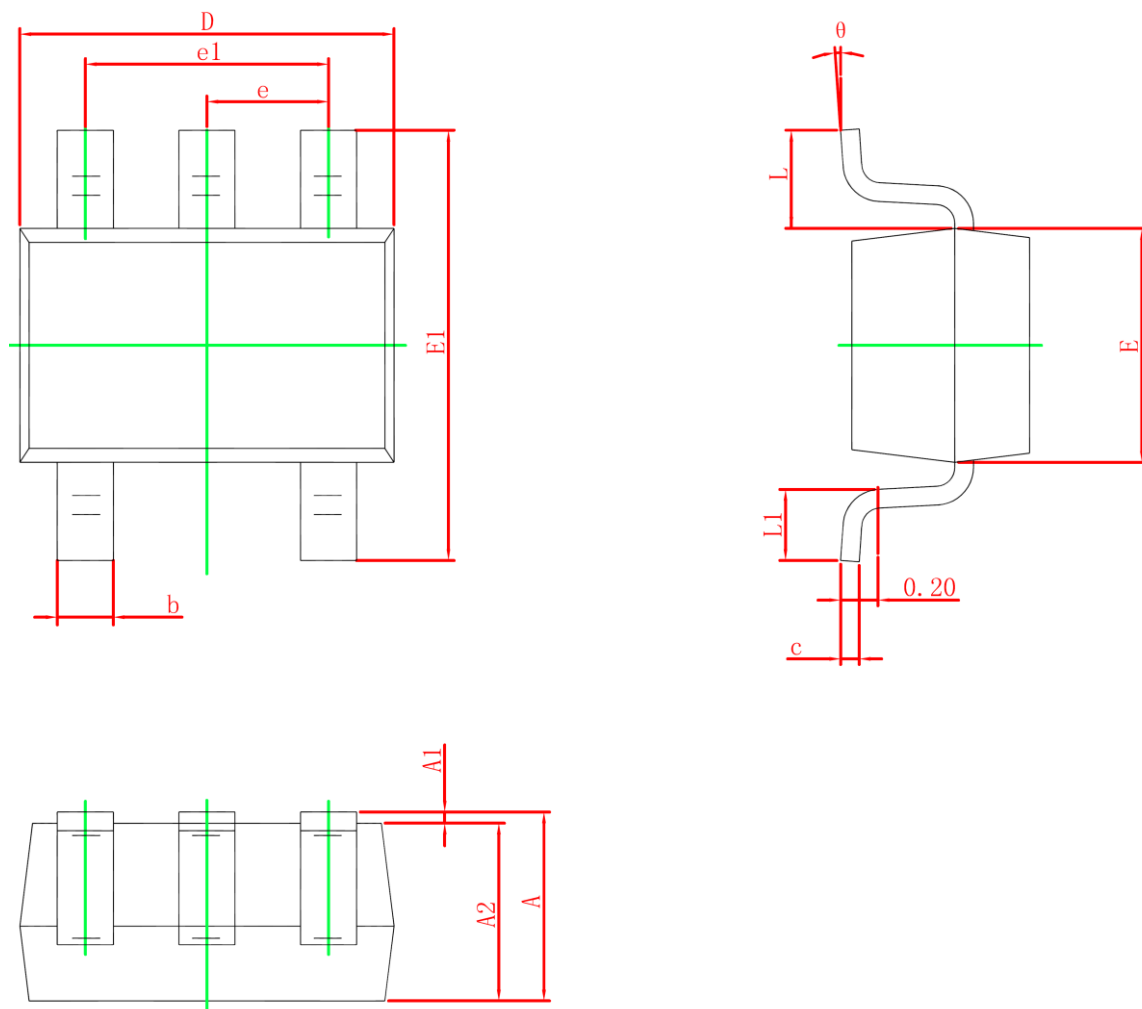
| Symbol | Dimensions in millimeters |       | Dimensions in inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 1.400                     | 1.600 | 0.055                | 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     | 1.550REF                  |       | 0.061REF             |       |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500TYP                  |       | 0.060TYP             |       |
| e1     | 3.000TYP                  |       | 0.118TYP             |       |
| L      | 0.900                     | 1.200 | 0.035                | 0.047 |

## SOT-89-5L 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     | 0.360                     | 0.560 | 0.014                | 0.022 |
| c      | 0.350                     | 0.440 | 0.014                | 0.017 |
| D      | 4.400                     | 4.600 | 0.173                | 0.181 |
| D1     | 1.400                     | 1.800 | 0.055                | 0.071 |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500TYP                  |       | 0.060TYP             |       |
| e1     | 2.900                     | 3.100 | 0.114                | 0.122 |
| L      | 0.900                     | 1.100 | 0.035                | 0.043 |

## SOT-23-5L Package Outline Dimensions



| Symbol   | Dimensions In Millimeters |       |
|----------|---------------------------|-------|
|          | Min.                      | Max.  |
| A        | 0.900                     | 1.100 |
| A1       | 0.000                     | 0.100 |
| A2       | 0.900                     | 1.000 |
| b        | 0.150                     | 0.350 |
| c        | 0.110                     | 0.175 |
| D        | 2.000                     | 2.200 |
| E        | 1.150                     | 1.350 |
| E1       | 2.150                     | 2.450 |
| e        | 0.650 TYP                 |       |
| e1       | 1.200                     | 1.400 |
| L        | 0.525 REF                 |       |
| L1       | 0.260                     | 0.460 |
| $\theta$ | 0°                        | 8°    |