

## **BCT78L12E**

### **150mA, High Voltage Regulators**

#### **GENERAL DESCRIPTION**

The BCT78L12E is a low-power, high voltage, low-dropout, CMOS linear voltage regulators operate up to 36.0V input voltage with 3uA low power. It is the perfect choice for high input voltage, low power applications. A low ground current makes this part attractive for battery operated power systems. The BCT78L12E is also offer low dropout voltage to prolong battery life in portable electronics. Output current minimum limit is 150mA.

The output voltage is fixed. Other features include fold-back current limit and thermal shutdown protection.

The BCT78L12E is available in Green SOT23-3, SOT89-3 packages. It operates over an ambient temperature range of -40°C to +85°C.

#### **FEATURES**

- Low Power Consumption
- 150mA Nominal Output Current
- Low Dropout Voltage
- Low Temperature Coefficient
- High Input Voltage(up to 36V)
- Output Voltage Accuracy:±3%
- Fixed Outputs Voltage: 12V
- -40°C to 85°C Operating Temperature Range
- Available in Green SOT23-3 and SOT89-3 Packages.

#### **APPLICATIONS**

Battery-Powered Equipment  
Communication Equipment  
Audio/Video Equipment

#### **ORDERING INFORMATION**

| Order Number    | V <sub>OUT</sub> (V) | Package Type | Temperature Range | Marking          | QTY/Reel |
|-----------------|----------------------|--------------|-------------------|------------------|----------|
| BCT78L12EEJR-TR | 12                   | SOT89-3      | -40°C to +85°C    | 78L12E<br>XXXXXX | 3000     |
| BCT78L12EEUR-TR | 12                   | SOT23-3      | -40°C to +85°C    | QEEXX            | 3000     |

**Note:**

- 1."Q" in Marking is product short code for BCT78L12E.
2. "XXXXXX" or "XX" in Marking will be appeared as the batch code.



# BCT78L12E

## 150mA, High Voltage Regulators

### ABSOLUTE MAXIMUM RATINGS

|                                           |                               |
|-------------------------------------------|-------------------------------|
| VIN to GND.....                           | -0.3V to 44V                  |
| EN to GND.....                            | -0.3V to VIN                  |
| VOUT to GND, $V_{OUT} \leq 5.0V$ .....    | -0.3V to Min(VIN + 0.3V, 6V)  |
| VOUT to GND, $V_{OUT} > 5.0V$ .....       | -0.3V to Min(VIN + 0.3V, 15V) |
| Power Dissipation, $P_D@T_A=25^\circ C$   |                               |
| SOT23-3.....                              | 0.42W                         |
| SOT89-3.....                              | 1.25W                         |
| Package Thermal Resistance                |                               |
| SOT23-3, $\theta_{JA}$ .....              | 300°C/W                       |
| SOT89-3, $\theta_{JA}$ .....              | 100°C/W                       |
| Junction Temperature.....                 | 150°C                         |
| Storage Temperature Range.....            | -65°C to 150°C                |
| Lead Temperature (Soldering, 10 sec)..... | 260°C                         |

### RECOMMENDED OPERATING CONDITIONS

|                                   |                |
|-----------------------------------|----------------|
| Input Voltage Range .....         | 2.7V to 36V    |
| Operating Temperature Range ..... | -40°C to +85°C |

#### NOTE:

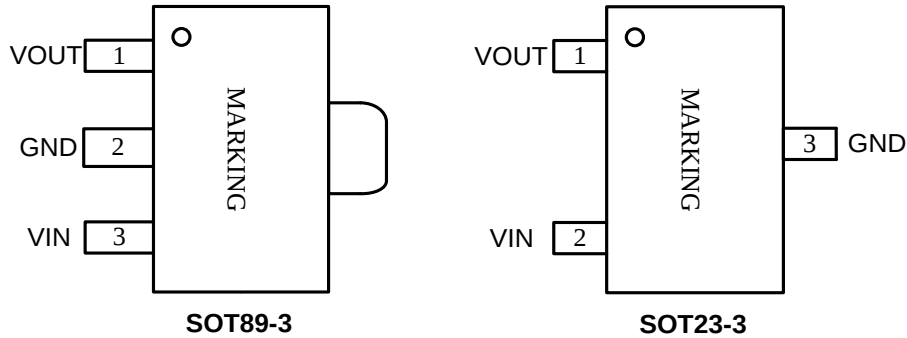
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

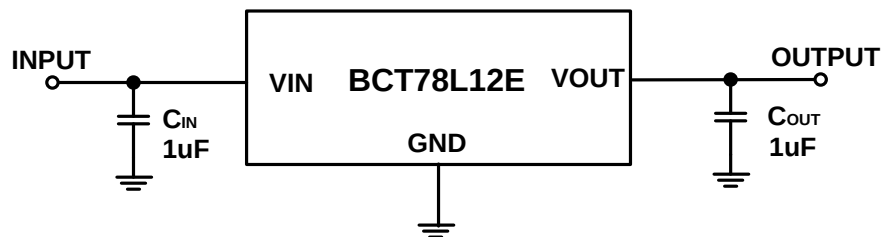
### PIN CONFIGURATION (TOP VIEW)



### PIN DESCRIPTION

| PIN     |         | NAME | FUNCTION                                                                                                                        |
|---------|---------|------|---------------------------------------------------------------------------------------------------------------------------------|
| SOT89-3 | SOT23-3 |      |                                                                                                                                 |
| 1       | 1       | VOUT | Regulated Output. It is recommended to use output capacitor with effective capacitance in the range of 1 $\mu$ F to 10 $\mu$ F. |
| 2       | 3       | GND  | Ground.                                                                                                                         |
| 3       | 2       | VIN  | Regulator Input. Up to 36V input voltage. At least 1 $\mu$ F supply bypass capacitor is recommended.                            |

### TYPICAL APPLICATION CIRCUIT



NOTES: If has a large Load Transient in the application, recommend using 4.7 $\mu$ F or more in C<sub>OUT</sub>.

### ELECTRICAL CHARACTERISTICS

( $V_{IN} = V_{OUT} + 2V$  or  $4V$ , whichever is greater,  $C_{IN} = C_{OUT} = 1\mu F$ , Full =  $-40^{\circ}C$  to  $+85^{\circ}C$ , typical values are at  $T_A = +25^{\circ}C$ , unless otherwise noted.)

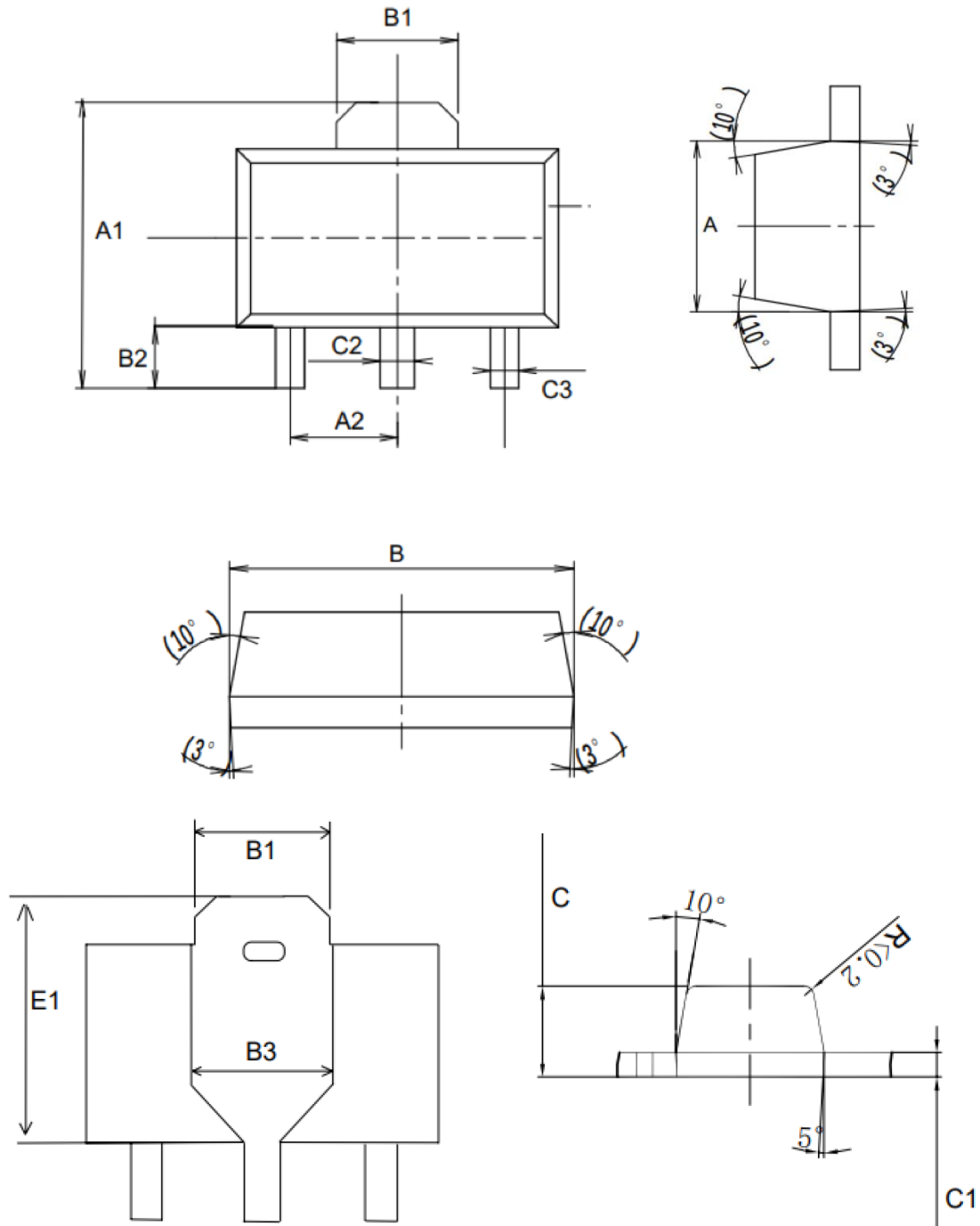
| PARAMETER                             | SYM              | CONDITIONS                                                   | MIN         | TYP   | MAX   | UNITS |
|---------------------------------------|------------------|--------------------------------------------------------------|-------------|-------|-------|-------|
| Input Voltage                         | $V_{IN}$         |                                                              | 2.7         |       | 36    | V     |
| Output Voltage Accuracy               |                  | $I_{OUT}=1mA$                                                | -3.0        |       | 3.0   | %     |
| Ground Pin Current                    | $I_Q$            | No load                                                      |             | 3     |       | uA    |
|                                       |                  | $I_{OUT}=50mA$                                               |             | 40    |       |       |
| Maximum Output Current <sup>(1)</sup> |                  |                                                              | 150         |       |       | mA    |
| Current Limit                         | $I_{LIM}$        |                                                              |             | 500   |       | mA    |
| Dropout Voltage <sup>(2)</sup>        | $V_{DROP}$       | $I_{OUT}=150mA$ , $V_{OUT} \geq 2.5V$                        |             | 1300  |       | mV    |
| Line Regulation                       | $\Delta V_{LNR}$ | $V_{IN}=V_{OUT}+2V$ or $4V$ to $36V$ ,<br>$I_{OUT} = 1mA$    |             | 0.005 | 0.012 | %/V   |
| Load Regulation                       | $\Delta V_{LDR}$ | $V_{IN} = V_{OUT} + 2V$ or $4V$ , $I_{OUT} = 1mA$ to $150mA$ |             | 25    |       | mV    |
| Power Supply Rejection Ratio          | PSRR             | $I_{OUT} = 10mA$                                             | $f = 217Hz$ | 55    |       | dB    |
|                                       |                  |                                                              | $f = 1kHz$  | 40    |       |       |

#### NOTES:

- Maximum output current is affected by the PCB layout, size of metal trace, the thermal conduction path between metal layers, ambient temperature and the other environment factors of system. Attention should be paid to the dropout voltage when  $V_{IN} < V_{OUT} + V_{DROP}$ .
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 95% of the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT} + 2V$ .
- Output voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.

## PACKAGE OUTLINE DIMENSIONS

SOT89-3



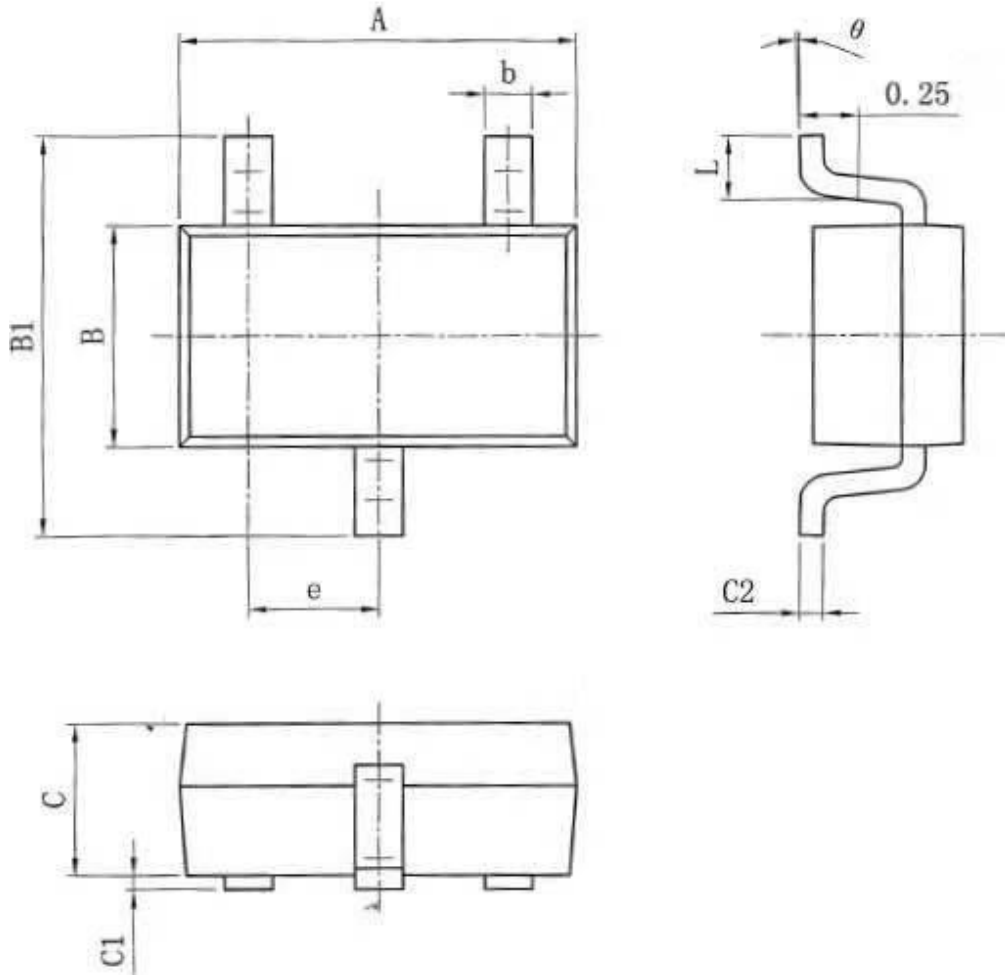
## PACKAGE OUTLINE DIMENSIONS

SOT89-3

| Symbol    | Dimensions In Millimeters |         |      |
|-----------|---------------------------|---------|------|
|           | Min                       | Nom     | Max  |
| <b>A</b>  | 2.35                      | 2.45    | 2.55 |
| <b>A1</b> | 4.10                      | 4.20    | 4.30 |
| <b>A2</b> | 1.45                      | 1.50    | 1.55 |
| <b>B</b>  | 4.40                      | 4.50    | 4.60 |
| <b>B1</b> |                           | 1.55REF |      |
| <b>B2</b> | 0.85                      | 1.00    | 1.15 |
| <b>B3</b> |                           | 1.75REF |      |
| <b>C</b>  | 1.45                      | 1.50    | 1.55 |
| <b>C1</b> | 0.39                      | 0.40    | 0.41 |
| <b>C2</b> | 0.43                      | 0.48    | 0.53 |
| <b>C3</b> | 0.39                      | 0.40    | 0.41 |
| <b>E1</b> | 3.07                      | 3.17    | 3.27 |

## PACKAGE OUTLINE DIMENSIONS

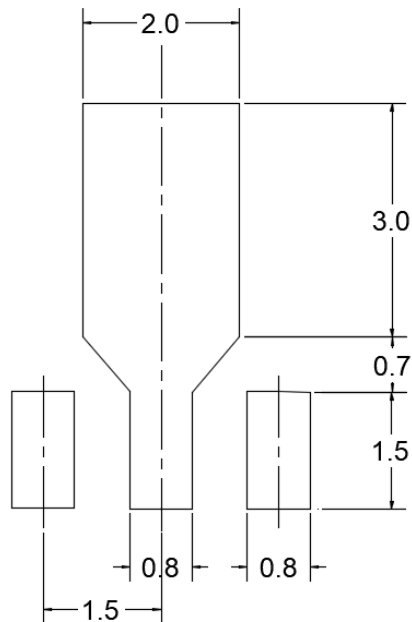
SOT23-3



| Symbol   | Dimensions In Millimeters |      |
|----------|---------------------------|------|
|          | Min                       | Max  |
| A        | 2.82                      | 3.02 |
| e        | 0.95(BSC)                 |      |
| b        | 0.28                      | 0.45 |
| B        | 1.50                      | 1.70 |
| B1       | 2.75                      | 3.05 |
| C        | 1.05                      | 1.15 |
| C1       | 0.03                      | 0.15 |
| C2       | 0.12                      | 0.23 |
| L        | 0.35                      | 0.55 |
| $\theta$ | 0°                        | 8°   |

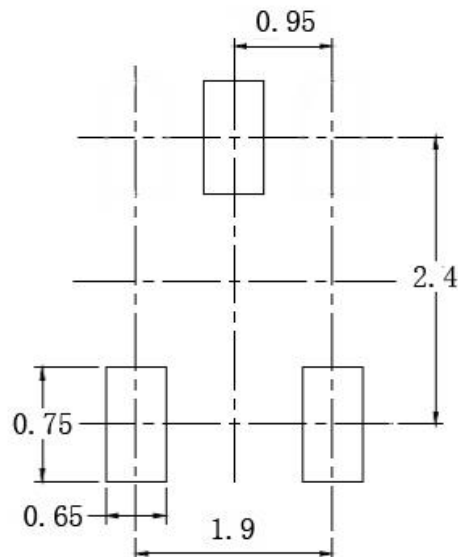
### LAND PATTERN DATA

SOT89-3



RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)

SOT23-3



RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)