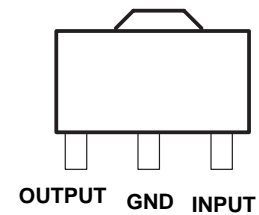
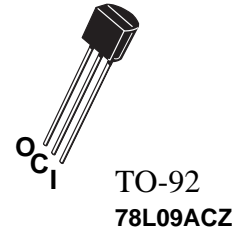


- 3-Terminal Regulators
- Output Current up to 100 mA
- No External Components
- Internal Thermal-Overload Protection
- Internal Short-Circuit Current Limiting
- Provided Pb-Free packages from the end of 2004

### description

This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. One of these regulators can deliver up to 100 mA of output current. The internal limiting and thermal-shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained, together with lower bias current.



SOT-89  
78L09CPK

### electrical characteristics at specified virtual junction temperature, $V_I = 16V$ , $I_O = 40mA$ (unless otherwise noted)

| PARAMETER                 | TEST CONDITIONS                                 | T ‡           | 78L09 |     |      | UNIT    |
|---------------------------|---|---------------|-------|-----|------|---------|
|                           |   |               | MIN   | TYP | MAX  |         |
| Output voltage            | $I_O = 1mA$ to $40mA$ , $V_I = 12V$ to $24V$    | $25^\circ C$  | 8.6   | 9   | 9.4  | V       |
|                           |   | Full range    | 8.55  | 9   | 9.45 |         |
|                           |   | Full range    | 8.55  | 9   | 9.45 |         |
| Input voltage regulation  | $V_I = 12V$ to $24V$                            | $25^\circ C$  |       | 45  | 175  | mV      |
|                           | $V_I = 13V$ to $24V$                            |               |       | 40  | 125  |         |
| Ripple rejection          | $V_I = 15V$ to $25V$ $f = 120$ Hz               | $25^\circ C$  | 38    | 45  |      | dB      |
| Output voltage regulation | $I_O = 1$ mA to $100$ mA                        | $25^\circ C$  |       | 19  | 90   | mV      |
|                           | $I_O = 1$ mA to $40$ mA                         |               |       | 11  | 40   |         |
| Output noise voltage      | $f = 10$ Hz to $100$ kHz                        | $25^\circ C$  |       | 58  |      | $\mu V$ |
| Dropout voltage           |   | $25^\circ C$  |       | 1.7 |      | V       |
| Bias current              |   | $25^\circ C$  |       | 4.1 | 6    | mA      |
|                           |   | $125^\circ C$ |       |     | 5.5  |         |
| Bias current change       | $V_I = 13V$ to $24V$<br>$I_O = 1$ mA to $40$ mA | Full range    |       |     | 1.5  | mA      |
|                           |   |               |       |     | 0.1  |         |

‡ Pulse-testing techniques maintain  $T_J$  as close to  $T_A$  as possible. Thermal effects must be taken into account separately. All characteristics are measured with a  $0.33\text{-}\mu F$  capacitor across the input and a  $0.1\text{-}\mu F$  capacitor across the output. Full range for the 78L05 is  $T_J = 0^\circ C$  to  $70^\circ C$

# WS 78L09

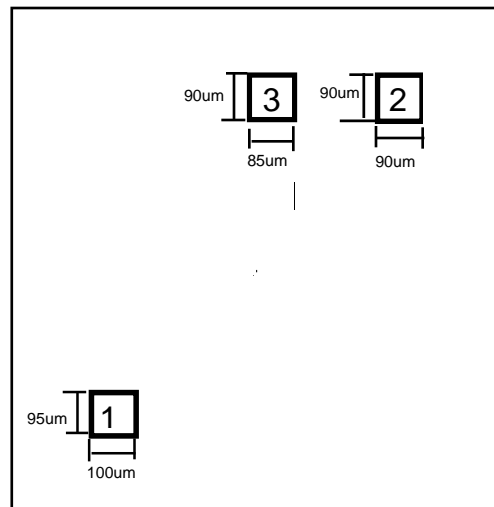
## absolute maximum ratings over operating temperature range (unless otherwise noted)

| 78L09  | PARAMETER  | UNIT |
|--|------------|------|
| Input voltage, $V_I$   | 30         | V    |
| Virtual junction temperature range, $T_J$                    | 150        | °C   |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds | 260        | °C   |
| Storage temperature range, $T_{stg}$                         | -65 to 150 | °C   |

## recommended operating conditions

| 78L09   | MIN  | MAX | UNIT |
|---|------|-----|------|
| Input voltage, $V_I$                          | 11.5 | 24  | V    |
| Output current, $I_O$                         |      | 100 | mA   |
| Operating virtual junction temperature, $T_J$ | 0    | 70  | °C   |

### Pad Location 78L09



Chip size 1.0 x 1.2 mm

| Pad N | Pad Name | X (um) | Y (um) |
|-------|----------|--------|--------|
| 1     | Ground   | 95     | 100    |
| 2     | Input    | 820    | 1010   |
| 3     | Output   | 535    | 1015   |