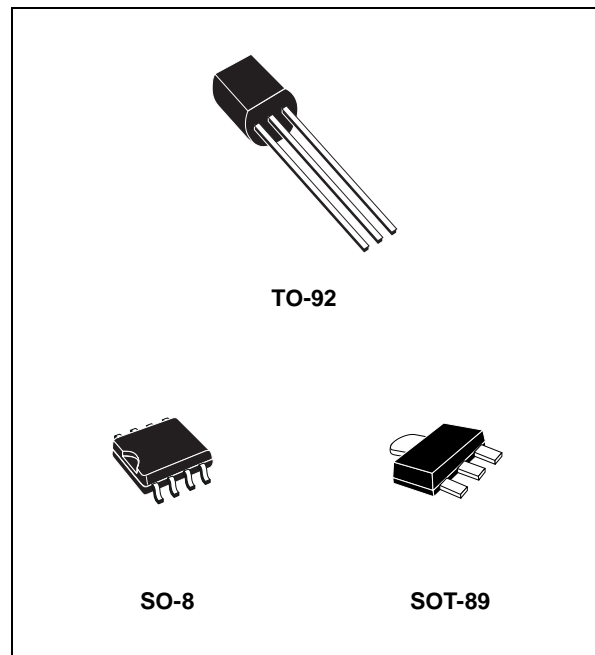


## POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT UP TO 100 mA
- OUTPUT VOLTAGES OF 3.3; 5; 6; 8; 9; 10; 12; 15; 18; 20; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- NO EXTERNAL COMPONENTS ARE REQUIRED
- AVAILABLE IN EITHER  $\pm 5\%$  (AC) OR  $\pm 10\%$  (C) SELECTION

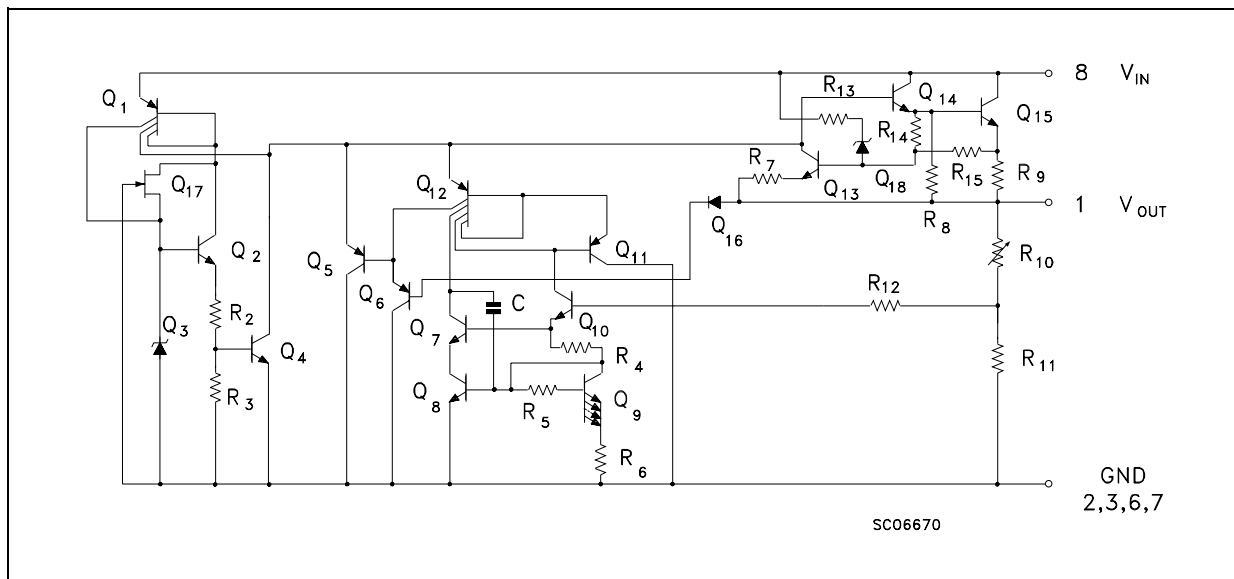
### DESCRIPTION

The L78L00 series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or 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. The L78L00 series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two



orders of magnitude, along with lower quiescent current and lower noise.

### SCHEMATIC DIAGRAM



# L78L00 SERIES

## ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter <sup>2</sup>               |                       | Value                  | Unit |
|-----------|--------------------------------------|-----------------------|------------------------|------|
| $V_I$     | DC Input Voltage                     | $V_O = 3.3$ to $9$ V  | 30                     | V    |
|           |                                      | $V_O = 12$ to $15$ V  | 35                     |      |
|           |                                      | $V_O = 18$ to $24$ V  | 40                     |      |
| $I_O$     | Output Current                       |                       | 100                    | mA   |
| $P_{tot}$ | Power Dissipation                    |                       | Internally Limited (*) |      |
| $T_{stg}$ | Storage Temperature Range            |                       | -40 to 150             | °C   |
| $T_{op}$  | Operating Junction Temperature Range | for L78L00C, L78L00AC | 0 to 125               | °C   |
|           |                                      | for L78L00AB          | -40 to 125             |      |

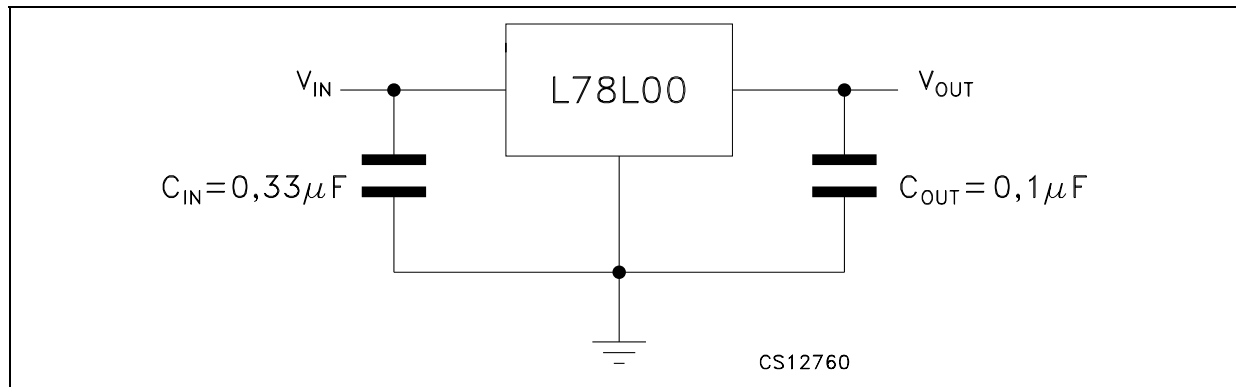
(\*) Our SO-8 package used for Voltage Regulators is modified internally to have pins 2, 3, 6 and 7 electrically communed to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking. The external dimensions are the same as for the standard SO-8.

## THERMAL DATA

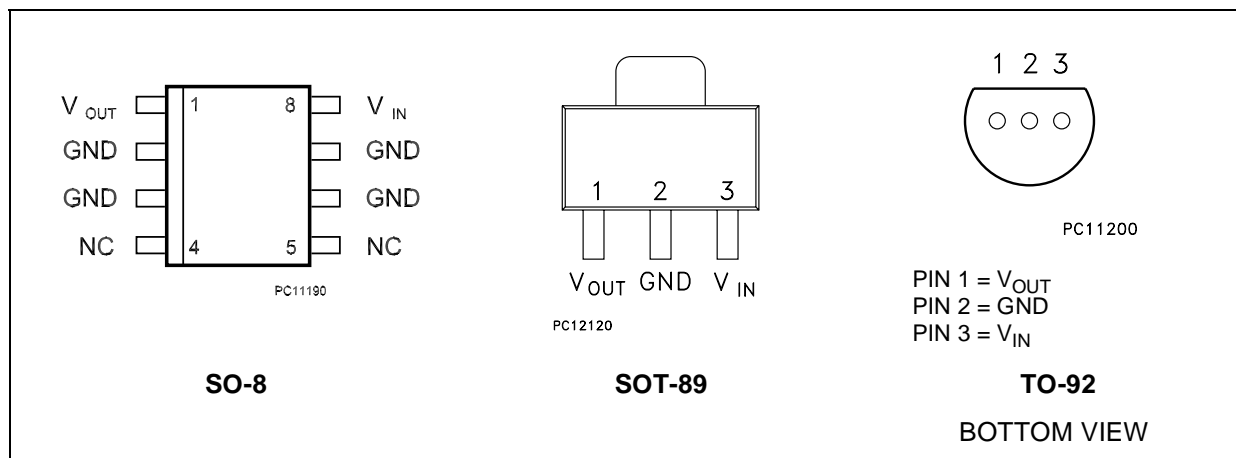
| Symbol         | Parameter                           |     | SO-8   | TO-92 | SOT-89 | Unit |
|----------------|-------------------------------------|-----|--------|-------|--------|------|
| $R_{thj-case}$ | Thermal Resistance Junction-case    | Max | 20     |       | 15     | °C/W |
| $R_{thj-amb}$  | Thermal Resistance Junction-ambient | Max | 55 (*) | 200   |        | °C/W |

(\*) Considering 6 cm<sup>2</sup> of copper Board heat-sink

## TEST CIRCUITS



## CONNECTION DIAGRAM (top view)



## ORDERING CODES

| TYPE     | SO-8 (TUBE)* | TO-92 (TUBE)** | SOT-89 (T&R) | OUTPUT VOLTAGE |
|----------|--------------|----------------|--------------|----------------|
| L78L33C  | L78L33CD     | L78L33CZ       |              | 3.3 V          |
| L78L33AC | L78L33ACD    | L78L33ACZ      | L78L33ACUTR  | 3.3 V          |
| L78L33AB | L78L33ABD    | L78L33ABZ      | L78L33ABUTR  | 3.3 V          |
| L78L05C  | L78L05CD     | L78L05CZ       |              | 5 V            |
| L78L05AC | L78L05ACD    | L78L05ACZ      | L78L05ACUTR  | 5 V            |
| L78L05AB | L78L05ABD    | L78L05ABZ      | L78L05ABUTR  | 5 V            |
| L78L06C  | L78L06CD     | L78L06CZ       |              | 6 V            |
| L78L06AC | L78L06ACD    | L78L06ACZ      | L78L06ACUTR  | 6 V            |
| L78L06AB | L78L06ABD    | L78L06ABZ      | L78L06ABUTR  | 6 V            |
| L78L08C  | L78L08CD     | L78L08CZ       |              | 8 V            |
| L78L08AC | L78L08ACD    | L78L08ACZ      | L78L08ACUTR  | 8 V            |
| L78L08AB | L78L08ABD    | L78L08ABZ      | L78L08ABUTR  | 8 V            |
| L78L09C  | L78L09CD     | L78L09CZ       |              | 9 V            |
| L78L09AC | L78L09ACD    | L78L09ACZ      | L78L09ACUTR  | 9 V            |
| L78L09AB | L78L09ABD    | L78L09ABZ      | L78L09ABUTR  | 9 V            |
| L78L10C  | L78L10CD     | L78L10CZ       |              | 10 V           |
| L78L10AC | L78L10ACD    | L78L10ACZ      | L78L10ACUTR  | 10 V           |
| L78L10AB | L78L10ABD    | L78L10ABZ      | L78L10ABUTR  | 10 V           |
| L78L12C  | L78L12CD     | L78L12CZ       |              | 12 V           |
| L78L12AC | L78L12ACD    | L78L12ACZ      | L78L12ACUTR  | 12 V           |
| L78L12AB | L78L12ABD    | L78L12ABZ      | L78L12ABUTR  | 12 V           |
| L78L15C  | L78L15CD     | L78L15CZ       |              | 15 V           |
| L78L15AC | L78L15ACD    | L78L15ACZ      | L78L15ACUTR  | 15 V           |
| L78L15AB | L78L15ABD    | L78L15ABZ      | L78L15ABUTR  | 15 V           |
| L78L18C  | L78L18CD     | L78L18CZ       |              | 18 V           |
| L78L18AC | L78L18ACD    | L78L18ACZ      | L78L18ACUTR  | 18 V           |
| L78L18AB | L78L18ABD    | L78L18ABZ      | L78L18ABUTR  | 18 V           |
| L78L20C  | L78L20CD     | L78L20CZ       |              | 20 V           |
| L78L20AC | L78L20ACD    | L78L20ACZ      | L78L20ACUTR  | 20 V           |
| L78L20AB | L78L20ABD    | L78L20ABZ      | L78L20ABUTR  | 20 V           |
| L78L24C  | L78L24CD     | L78L24CZ       |              | 24 V           |
| L78L24AC | L78L24ACD    | L78L24ACZ      | L78L24ACUTR  | 24 V           |
| L78L24AB | L78L24ABD    | L78L24ABZ      | L78L24ABUTR  | 24 V           |

(\*) Available in Tape & Reel with the suffix "13TR".

(\*\*) Available in Ammopak with the suffix "-AP" or in Tape & Reel with the suffix "TR".

## L78L00 SERIES

**ELECTRICAL CHARACTERISTICS OF L78L33C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 8.3\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min.  | Typ. | Max.  | Unit          |
|--------------|--------------------------|--|-------|------|-------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 3.036 | 3.3  | 3.564 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 5.3$ to 20 V   | 2.97  |      | 3.63  | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 8.3$ V   | 2.97  |      | 3.63  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 5.3$ to 20 V $T_J = 25^\circ\text{C}$                                       |       |      | 150   | mV            |
|              |                          | $V_I = 6.3$ to 20 V $T_J = 25^\circ\text{C}$                                       |       |      | 100   |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                       |       |      | 60    | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$  |       |      | 30    |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |       |      | 6     | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |       |      | 5.5   | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA   |       |      | 0.2   | mA            |
|              |                          | $V_I = 6.3$ to 20 V  |       |      | 1.5   |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                               |       | 40   |       | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 6.3$ to 16.3 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 41    | 49   |       | dB            |
| $V_d$        | Dropout Voltage          |  |       | 1.7  |       | V             |

**ELECTRICAL CHARACTERISTICS OF L78L05C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 4.6  | 5    | 5.4  | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 7$ to 20 V   | 4.5  |      | 5.5  | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 10$ V  | 4.5  |      | 5.5  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 8.5$ to 20 V $T_J = 25^\circ\text{C}$                                   |      |      | 200  | mV            |
|              |                          | $V_I = 9$ to 20 V $T_J = 25^\circ\text{C}$                                     |      |      | 150  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                   |      |      | 60   | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$                                    |      |      | 30   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA   |      |      | 0.2  | mA            |
|              |                          | $V_I = 8$ to 20 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                           |      | 40   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 9$ to 20 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 40   | 49   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L06C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 12\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 5.52 | 6    | 6.48 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to $40\text{ mA}$ $V_I = 8.5$ to $20\text{ V}$                                       | 5.4  |      | 6.6  | V             |
|              |                          | $I_O = 1$ to $70\text{ mA}$ $V_I = 12\text{ V}$  | 5.4  |      | 6.6  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 8.5$ to $20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 200  | mV            |
|              |                          | $V_I = 9$ to $20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 150  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to $100\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 60   | mV            |
|              |                          | $I_O = 1$ to $40\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 30   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to $40\text{ mA}$  |      |      | 0.2  | mA            |
|              |                          | $V_I = 8$ to $20\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$                                  |      | 50   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 9$ to $20\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 38   | 46   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L08C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 14\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 7.36 | 8    | 8.64 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to $40\text{ mA}$ $V_I = 10.5$ to $23\text{ V}$                                       | 7.2  |      | 8.8  | V             |
|              |                          | $I_O = 1$ to $70\text{ mA}$ $V_I = 14\text{ V}$   | 7.2  |      | 8.8  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 10.5$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 200  | mV            |
|              |                          | $V_I = 11$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 150  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to $100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1$ to $40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to $40\text{ mA}$   |      |      | 0.2  | mA            |
|              |                          | $V_I = 11$ to $23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 60   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 12$ to $23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 36   | 45   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

## L78L00 SERIES

**ELECTRICAL CHARACTERISTICS OF L78L09C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 15\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 8.28 | 9    | 9.72 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to $40\text{ mA}$ $V_I = 11.5$ to $23\text{ V}$                                       | 8.1  |      | 9.9  | V             |
|              |                          | $I_O = 1$ to $70\text{ mA}$ $V_I = 15\text{ V}$   | 8.1  |      | 9.9  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 11.5$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 250  | mV            |
|              |                          | $V_I = 12$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 200  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to $100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1$ to $40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to $40\text{ mA}$   |      |      | 0.2  | mA            |
|              |                          | $V_I = 12$ to $23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 70   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 12$ to $23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 36   | 44   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L10C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 16\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 9.2  | 10   | 10.8 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to $40\text{ mA}$ $V_I = 12.5$ to $23\text{ V}$                                       | 9    |      | 11   | V             |
|              |                          | $I_O = 1$ to $70\text{ mA}$ $V_I = 16\text{ V}$   | 9    |      | 11   |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 12.5$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 230  | mV            |
|              |                          | $V_I = 13$ to $23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 170  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to $100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1$ to $40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to $40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 13$ to $23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 60   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 14$ to $23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 37   | 45   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L12C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 19\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 11.1 | 12   | 12.9 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 14.5$ to 27 V   | 10.8 |      | 13.2 | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 19$ V   | 10.8 |      | 13.2 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 14.5$ to 27 V $T_J = 25^\circ\text{C}$                                   |      |      | 250  | mV            |
|              |                          | $V_I = 16$ to 27 V $T_J = 25^\circ\text{C}$                                     |      |      | 200  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                    |      |      | 100  | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$                                     |      |      | 50   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA  |      |      | 0.2  | mA            |
|              |                          | $V_I = 16$ to 27 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                            |      | 80   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 15$ to 25 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 36   | 42   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L15C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 23\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 13.8 | 15   | 16.2 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 17.5$ to 30 V   | 13.5 |      | 16.5 | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 23$ V   | 13.5 |      | 16.5 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 17.5$ to 30 V $T_J = 25^\circ\text{C}$                                       |      |      | 300  | mV            |
|              |                          | $V_I = 20$ to 30 V $T_J = 25^\circ\text{C}$   |      |      | 250  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$  |      |      | 150  | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$   |      |      | 75   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA  |      |      | 0.2  | mA            |
|              |                          | $V_I = 20$ to 30 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                                |      | 90   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 18.5$ to 28.5 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 33   | 39   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

## L78L00 SERIES

**ELECTRICAL CHARACTERISTICS OF L78L18C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 27\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 16.6 | 18   | 19.4 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 22$ to 33 V   | 16.2 |      | 19.8 | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 27$ V   | 16.2 |      | 19.8 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 22$ to 33 V $T_J = 25^\circ\text{C}$                                     |      |      | 320  | mV            |
|              |                          | $V_I = 22$ to 33 V $T_J = 25^\circ\text{C}$                                     |      |      | 270  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                    |      |      | 170  | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$                                     |      |      | 85   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA  |      |      | 0.2  | mA            |
|              |                          | $V_I = 23$ to 33 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                            |      | 120  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 23$ to 33 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 32   | 38   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L20C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 29\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 18.4 | 20   | 21.6 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 24$ to 33 V   | 18   |      | 22   | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 29$ V   | 18   |      | 22   |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 22.5$ to 34 V $T_J = 25^\circ\text{C}$                                   |      |      | 330  | mV            |
|              |                          | $V_I = 24$ to 34 V $T_J = 25^\circ\text{C}$                                     |      |      | 280  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                    |      |      | 180  | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$                                     |      |      | 90   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA  |      |      | 0.2  | mA            |
|              |                          | $V_I = 25$ to 33 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                            |      | 120  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 25$ to 35 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 31   | 38   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |



**ELECTRICAL CHARACTERISTICS OF L78L24C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 33\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 22.1 | 24   | 25.9 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 27$ to 38 V   | 21.6 |      | 26.4 | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 33$ V   | 21.6 |      | 26.4 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 27$ to 38 V $T_J = 25^\circ\text{C}$                                     |      |      | 350  | mV            |
|              |                          | $V_I = 28$ to 38 V $T_J = 25^\circ\text{C}$                                     |      |      | 300  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                    |      |      | 200  | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$                                     |      |      | 100  |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA  |      |      | 0.2  | mA            |
|              |                          | $V_I = 28$ to 38 V  |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                            |      | 200  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 29$ to 35 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 30   | 37   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L33AB AND L78L33AC**

(refer to the test circuits,  $V_I = 8.3\text{V}$ ,  $I_O = 40$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$ ,  $T_J = 0$  to  $125^\circ\text{C}$  for L78L33AC,  $T_J = -40$  to  $125^\circ\text{C}$  for L78L33AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min.  | Typ. | Max.  | Unit          |
|--------------|--------------------------|--|-------|------|-------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 3.168 | 3.3  | 3.432 | V             |
| $V_O$        | Output Voltage           | $I_O = 1$ to 40 mA $V_I = 5.3$ to 20 V   | 3.135 |      | 3.465 | V             |
|              |                          | $I_O = 1$ to 70 mA $V_I = 8.3$ V   | 3.135 |      | 3.465 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 5.3$ to 20 V $T_J = 25^\circ\text{C}$                                       |       |      | 150   | mV            |
|              |                          | $V_I = 6.3$ to 20 V $T_J = 25^\circ\text{C}$                                       |       |      | 100   |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1$ to 100 mA $T_J = 25^\circ\text{C}$                                       |       |      | 60    | mV            |
|              |                          | $I_O = 1$ to 40 mA $T_J = 25^\circ\text{C}$  |       |      | 30    |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |       |      | 6     | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |       |      | 5.5   | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1$ to 40 mA   |       |      | 0.1   | mA            |
|              |                          | $V_I = 6.3$ to 20 V  |       |      | 1.5   |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$                               |       | 40   |       | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 6.3$ to 16.3 V $f = 120\text{Hz}$<br>$I_O = 40$ mA $T_J = 25^\circ\text{C}$ | 41    | 49   |       | dB            |
| $V_d$        | Dropout Voltage          |  |       | 1.7  |       | V             |

## L78L00 SERIES

### ELECTRICAL CHARACTERISTICS OF L78L05AB AND L78L05AC

(refer to the test circuits,  $V_I = 10V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = 0\text{ to }125^\circ\text{C}$  for L78L05AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L05AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 4.8  | 5    | 5.2  | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 7\text{ to }20\text{ V}$                                    | 4.75 |      | 5.25 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 10\text{ V}$  | 4.75 |      | 5.25 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 7\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 150  | mV            |
|              |                          | $V_I = 8\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 100  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 60   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 30   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$  |      |      | 0.1  | mA            |
|              |                          | $V_I = 8\text{ to }20\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$   |      | 40   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 41   | 49   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

### ELECTRICAL CHARACTERISTICS OF L78L06AB AND L78L06AC

(refer to the test circuits,  $V_I = 12V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,  $T_J = 0\text{ to }125^\circ\text{C}$  for L78L06AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L06AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions   | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$  | 5.76 | 6    | 6.24 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 8.5\text{ to }20\text{ V}$                                  | 5.7  |      | 6.3  | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 12\text{ V}$  | 5.7  |      | 6.3  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 8.5\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 150  | mV            |
|              |                          | $V_I = 9\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 100  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 60   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 30   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$  |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$   |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$  |      |      | 0.1  | mA            |
|              |                          | $V_I = 9\text{ to }20\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$   |      | 50   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 9\text{ to }20\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 39   | 46   |      | dB            |
| $V_d$        | Dropout Voltage          |   |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L08AB AND L78L08AC**(refer to the test circuits,  $V_I = 14\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , $T_J = 0\text{ to }125^\circ\text{C}$  for L78L08AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L08AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 7.68 | 8    | 8.32 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 10.5\text{ to }23\text{ V}$                                  | 7.6  |      | 8.4  | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 14\text{ V}$   | 7.6  |      | 8.4  |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 10.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 175  | mV            |
|              |                          | $V_I = 11\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 125  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 11\text{ to }23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 60   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 12\text{ to }23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 37   | 45   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L09AB AND L78L09AC**(refer to the test circuits,  $V_I = 15\text{V}$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , $T_J = 0\text{ to }125^\circ\text{C}$  for L78L09AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L09AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 8.64 | 9    | 9.36 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 11.5\text{ to }23\text{ V}$                                  | 8.55 |      | 9.45 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 15\text{ V}$   | 8.55 |      | 9.45 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 11.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 225  | mV            |
|              |                          | $V_I = 12\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 150  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 12\text{ to }23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 70   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 12\text{ to }23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 37   | 44   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

## L78L00 SERIES

### ELECTRICAL CHARACTERISTICS OF L78L10AB AND L78L10AC

(refer to the test circuits,  $V_I = 16V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,

$T_J = 0\text{ to }125^\circ\text{C}$  for L78L10AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L10AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 9.6  | 10   | 10.4 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 12.5\text{ to }23\text{ V}$                                  | 9.5  |      | 10.5 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 16\text{ V}$   | 9.5  |      | 10.5 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 12.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 230  | mV            |
|              |                          | $V_I = 13\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 170  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 80   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 40   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6    | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 5.5  | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 13\text{ to }23\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 60   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 14\text{ to }23\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 37   | 45   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

### ELECTRICAL CHARACTERISTICS OF L78L12AB AND L78L12AC

(refer to the test circuits,  $V_I = 19V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,

$T_J = 0\text{ to }125^\circ\text{C}$  for L78L12AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L12AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 11.5 | 12   | 12.5 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 14.5\text{ to }27\text{ V}$                                  | 11.4 |      | 12.6 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 19\text{ V}$   | 11.4 |      | 12.6 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 14.5\text{ to }27\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 250  | mV            |
|              |                          | $V_I = 16\text{ to }27\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 200  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 100  | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 50   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 16\text{ to }27\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 80   |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 15\text{ to }25\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 37   | 42   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

**ELECTRICAL CHARACTERISTICS OF L78L15AB AND L78L15AC**(refer to the test circuits,  $V_I = 19V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , $T_J = 0\text{ to }125^\circ\text{C}$  for L78L15AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L15AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min.  | Typ. | Max.  | Unit          |
|--------------|--------------------------|--|-------|------|-------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 14.4  | 15   | 15.6  | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 17.5\text{ to }30\text{ V}$                                      | 14.25 |      | 15.75 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 23\text{ V}$   | 14.25 |      | 15.75 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 17.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$  |       |      | 300   | mV            |
|              |                          | $V_I = 20\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$  |       |      | 250   |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |       |      | 150   | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |       |      | 75    |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |       |      | 6.5   | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |       |      | 6     | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |       |      | 0.1   | mA            |
|              |                          | $V_I = 20\text{ to }30\text{ V}$   |       |      | 1.5   |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |       | 90   |       | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 18.5\text{ to }28.5\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 34    | 39   |       | dB            |
| $V_d$        | Dropout Voltage          |  |       | 1.7  |       | V             |

**ELECTRICAL CHARACTERISTICS OF L78L18AB AND L78L18AC**(refer to the test circuits,  $V_I = 27V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ , $T_J = 0\text{ to }125^\circ\text{C}$  for L78L18AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L18AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 17.3 | 18   | 18.7 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 22\text{ to }33\text{ V}$                                    | 17.1 |      | 18.9 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 27\text{ V}$   | 17.1 |      | 18.9 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 22\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 320  | mV            |
|              |                          | $V_I = 22\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 270  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 170  | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 85   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 23\text{ to }33\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 120  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 23\text{ to }33\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 33   | 38   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

## L78L00 SERIES

### ELECTRICAL CHARACTERISTICS OF L78L20AB AND L78L20AC

(refer to the test circuits,  $V_I = 29V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,

$T_J = 0\text{ to }125^\circ\text{C}$  for L78L20AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L20AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 19.2 | 20   | 20.8 | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 24\text{ to }33\text{ V}$                                    | 19   |      | 21   | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 29\text{ V}$   | 19   |      | 21   |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 22.5\text{ to }34\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 330  | mV            |
|              |                          | $V_I = 24\text{ to }34\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 280  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 180  | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 90   |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 25\text{ to }33\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 120  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 25\text{ to }35\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 32   | 38   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

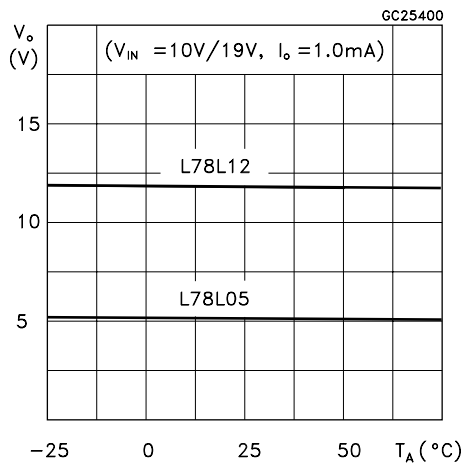
### ELECTRICAL CHARACTERISTICS OF L78L24AB AND L78L24AC

(refer to the test circuits,  $V_I = 27V$ ,  $I_O = 40\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$ ,

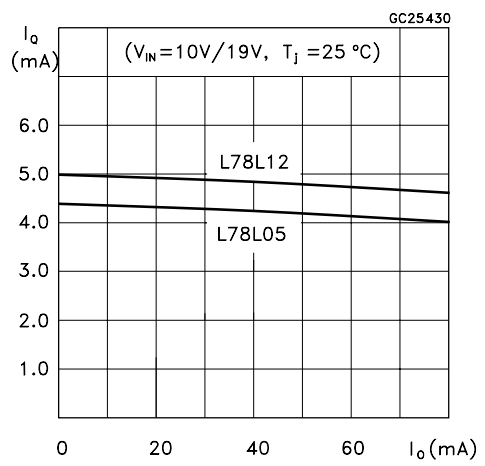
$T_J = 0\text{ to }125^\circ\text{C}$  for L78L24AC,  $T_J = -40\text{ to }125^\circ\text{C}$  for L78L24AB, unless otherwise specified)

| Symbol       | Parameter                | Test Conditions  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--|------|------|------|---------------|
| $V_O$        | Output Voltage           | $T_J = 25^\circ\text{C}$   | 23   | 24   | 25   | V             |
| $V_O$        | Output Voltage           | $I_O = 1\text{ to }40\text{ mA}$ $V_I = 27\text{ to }38\text{ V}$                                    | 22.8 |      | 25.2 | V             |
|              |                          | $I_O = 1\text{ to }70\text{ mA}$ $V_I = 33\text{ V}$   | 22.8 |      | 25.2 |               |
| $\Delta V_O$ | Line Regulation          | $V_I = 27\text{ to }38\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 350  | mV            |
|              |                          | $V_I = 28\text{ to }38\text{ V}$ $T_J = 25^\circ\text{C}$  |      |      | 300  |               |
| $\Delta V_O$ | Load Regulation          | $I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$   |      |      | 200  | mV            |
|              |                          | $I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$  |      |      | 100  |               |
| $I_d$        | Quiescent Current        | $T_J = 25^\circ\text{C}$   |      |      | 6.5  | mA            |
|              |                          | $T_J = 125^\circ\text{C}$  |      |      | 6    | mA            |
| $\Delta I_d$ | Quiescent Current Change | $I_O = 1\text{ to }40\text{ mA}$   |      |      | 0.1  | mA            |
|              |                          | $V_I = 28\text{ to }38\text{ V}$   |      |      | 1.5  |               |
| eN           | Output Noise Voltage     | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$  |      | 200  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $V_I = 23\text{ to }33\text{ V}$ $f = 120\text{Hz}$<br>$I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$ | 31   | 37   |      | dB            |
| $V_d$        | Dropout Voltage          |  |      | 1.7  |      | V             |

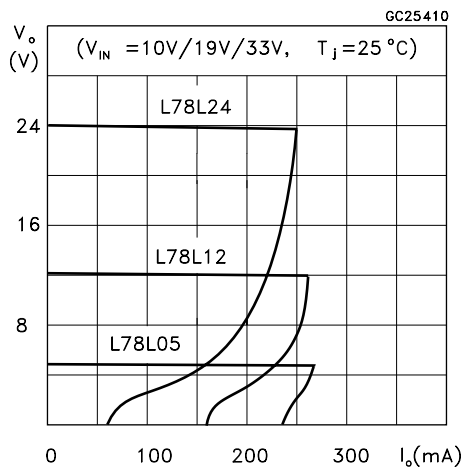
**Figure 1 : L78L05/12 Output Voltage vs Ambient Temperature**



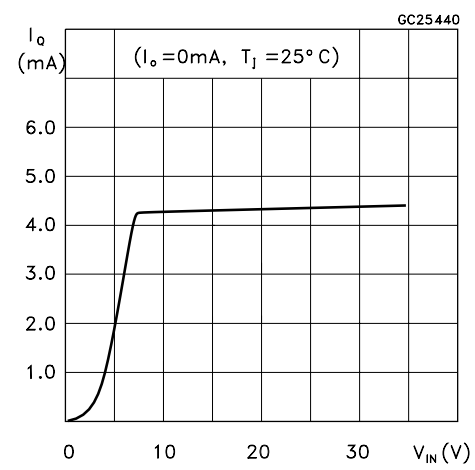
**Figure 4 : L78L05/12 Quiescent Current vs Output Current**



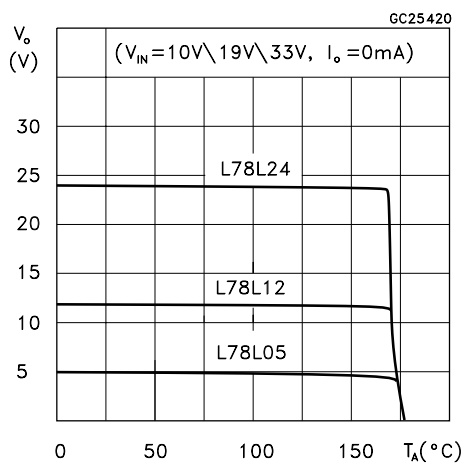
**Figure 2 : L78L05/12/24 Load Characteristics**



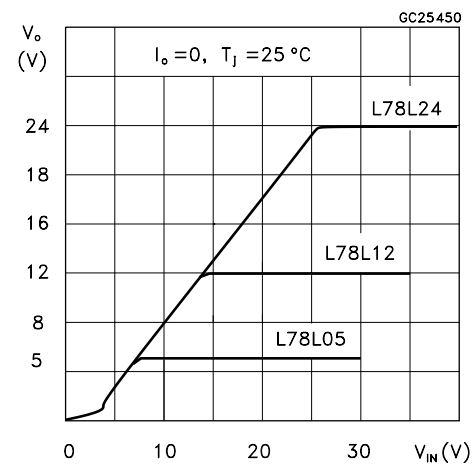
**Figure 5 : L78L05 Quiescent Current vs Input Voltage**



**Figure 3 : L78L05/12/24 Thermal Shutdown**

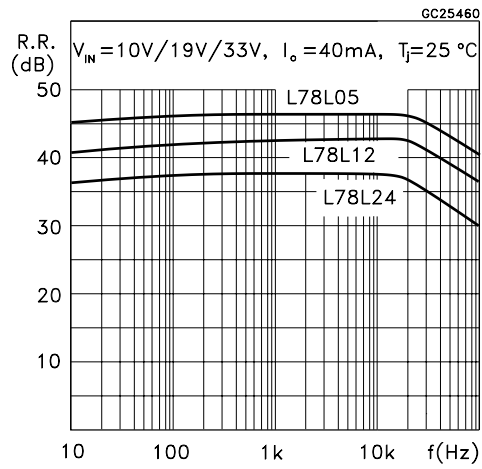


**Figure 6 : L78L05/12/24 Output Characteristics**

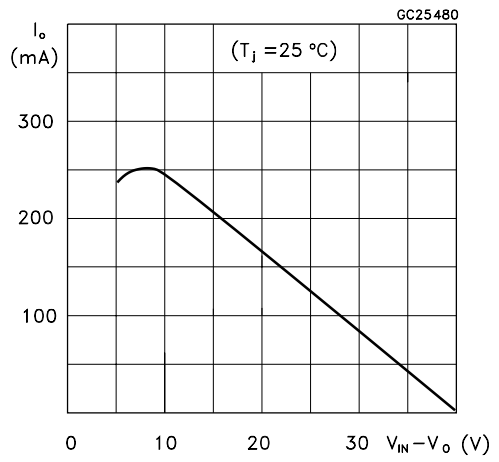


## L78L00 SERIES

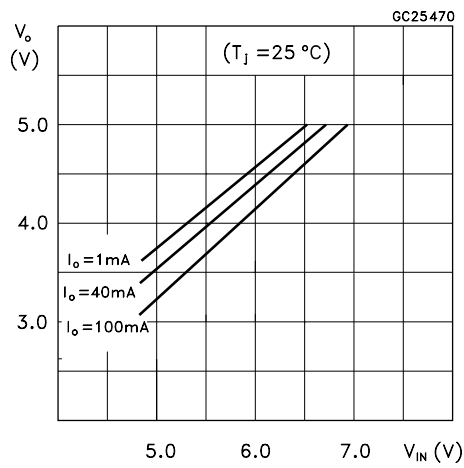
**Figure 7 : L78L05/12/24 Ripple Rejection**



**Figure 9 : L78L00 Series Short Circuit Output Current**



**Figure 8 : L78L05 Dropout Characteristics**





TYPICAL APPLICATIONS

Table 10 : High Output Current Short Circuit Protected

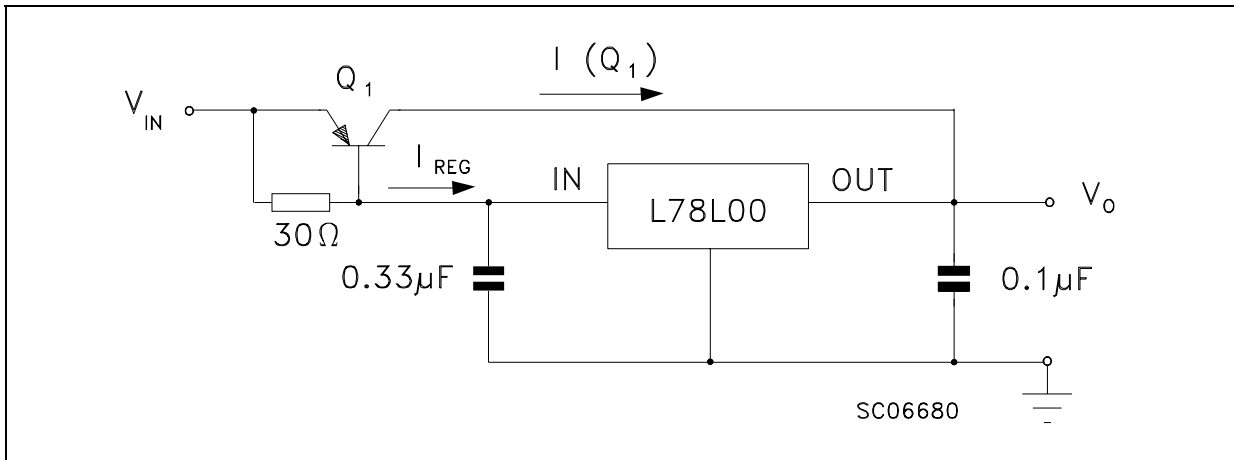


Figure 11 : Edit Boost Circuit

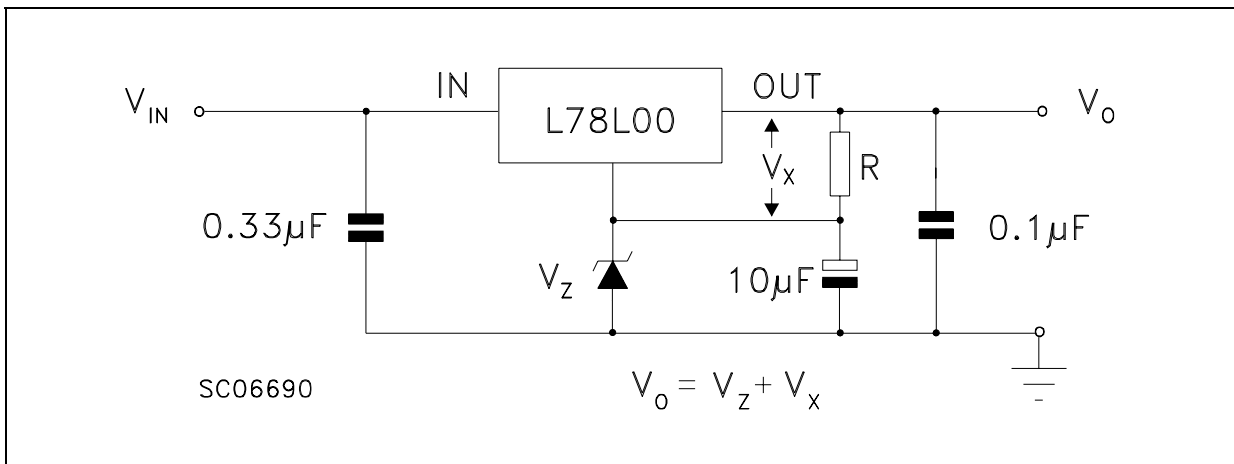
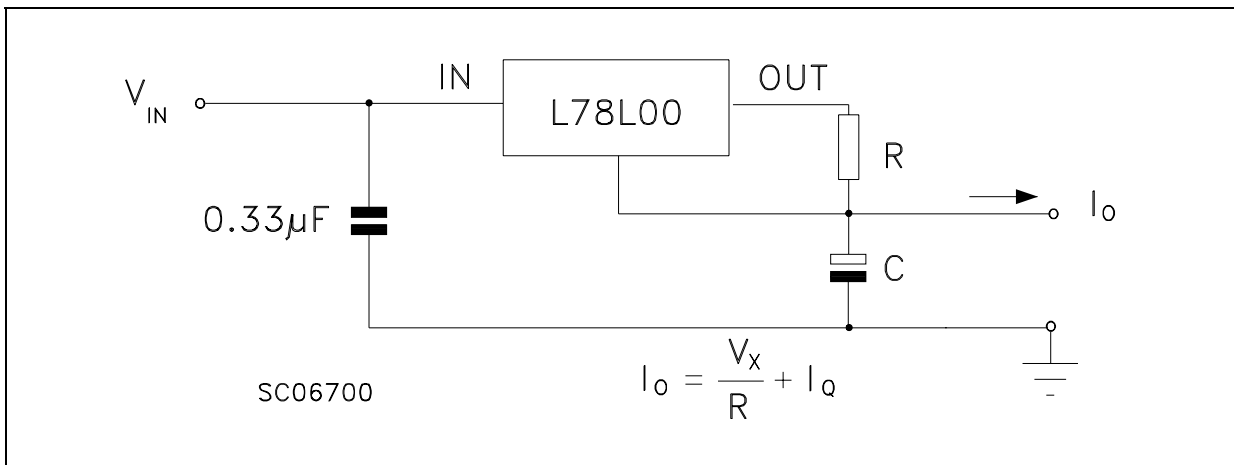
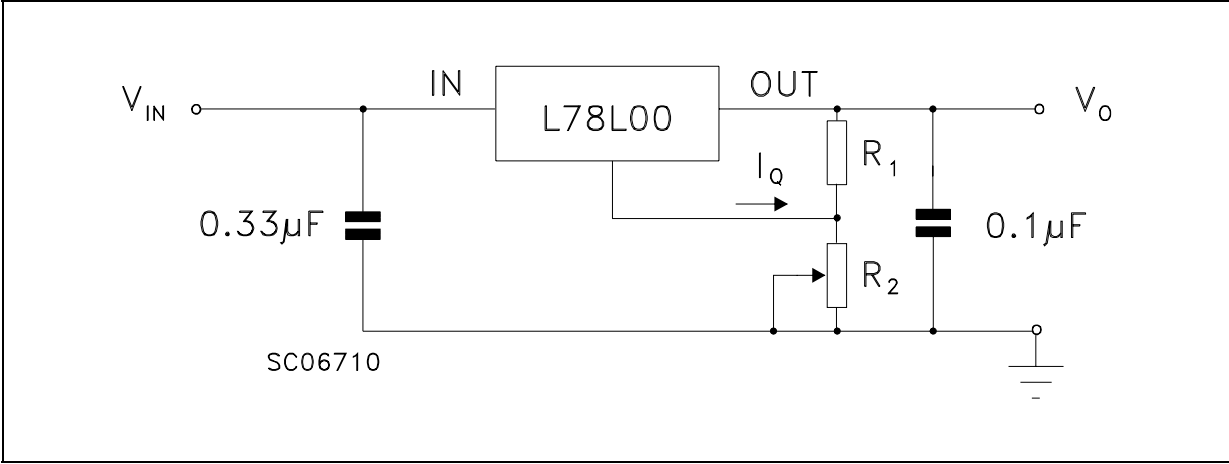


Figure 12 : Current Regulator



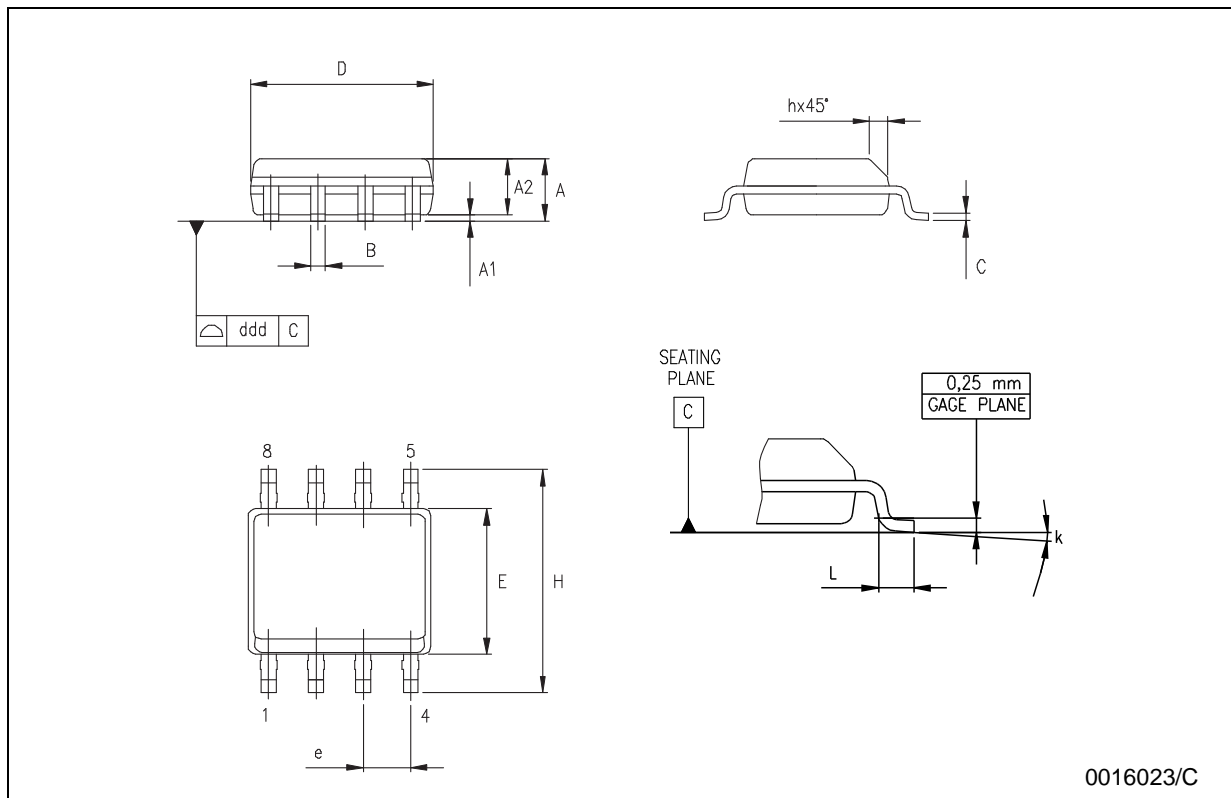
**L78L00 SERIES**

**Figure 13 : Adjustable Output Regulator**



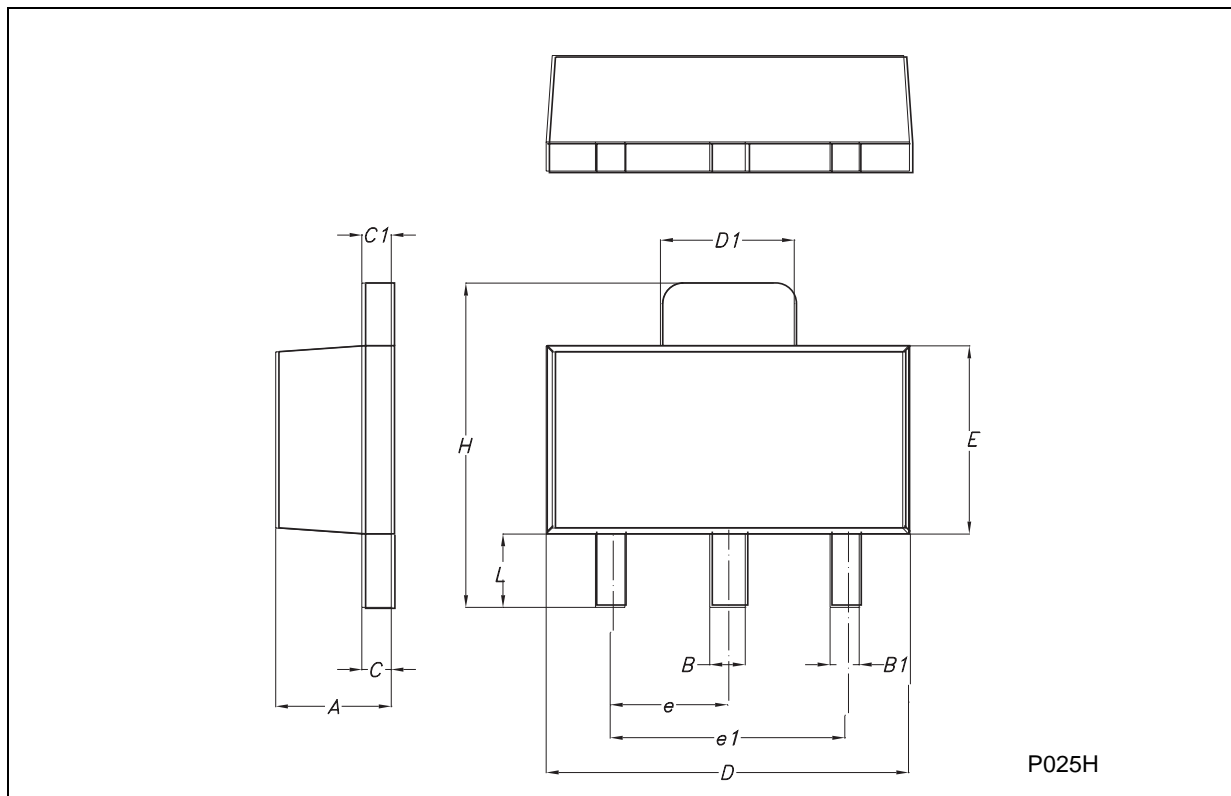
**SO-8 MECHANICAL DATA**

| DIM. | mm.       |      |      | inch  |       |       |
|------|-----------|------|------|-------|-------|-------|
|      | MIN.      | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 1.35      |      | 1.75 | 0.053 |       | 0.069 |
| A1   | 0.10      |      | 0.25 | 0.04  |       | 0.010 |
| A2   | 1.10      |      | 1.65 | 0.043 |       | 0.065 |
| B    | 0.33      |      | 0.51 | 0.013 |       | 0.020 |
| C    | 0.19      |      | 0.25 | 0.007 |       | 0.010 |
| D    | 4.80      |      | 5.00 | 0.189 |       | 0.197 |
| E    | 3.80      |      | 4.00 | 0.150 |       | 0.157 |
| e    |           | 1.27 |      |       | 0.050 |       |
| H    | 5.80      |      | 6.20 | 0.228 |       | 0.244 |
| h    | 0.25      |      | 0.50 | 0.010 |       | 0.020 |
| L    | 0.40      |      | 1.27 | 0.016 |       | 0.050 |
| k    | 8° (max.) |      |      |       |       |       |
| ddd  |           |      | 0.1  |       |       | 0.04  |



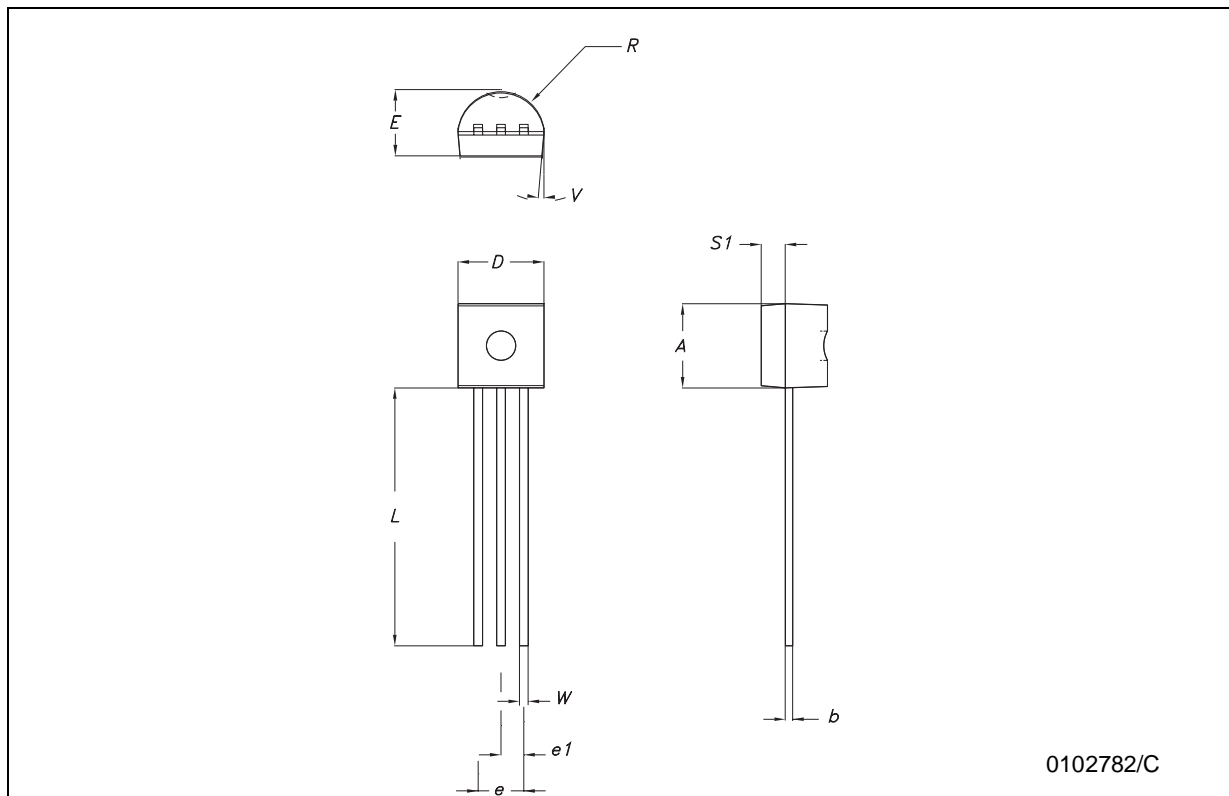
**SOT-89 MECHANICAL DATA**

| DIM. | mm.  |     |      | mils  |      |       |
|------|------|-----|------|-------|------|-------|
|      | MIN. | TYP | MAX. | MIN.  | TYP. | MAX.  |
| A    | 1.4  |     | 1.6  | 55.1  |      | 63.0  |
| B    | 0.44 |     | 0.56 | 17.3  |      | 22.0  |
| B1   | 0.36 |     | 0.48 | 14.2  |      | 18.9  |
| C    | 0.35 |     | 0.44 | 13.8  |      | 17.3  |
| C1   | 0.35 |     | 0.44 | 13.8  |      | 17.3  |
| D    | 4.4  |     | 4.6  | 173.2 |      | 181.1 |
| D1   | 1.62 |     | 1.83 | 63.8  |      | 72.0  |
| E    | 2.29 |     | 2.6  | 90.2  |      | 102.4 |
| e    | 1.42 |     | 1.57 | 55.9  |      | 61.8  |
| e1   | 2.92 |     | 3.07 | 115.0 |      | 120.9 |
| H    | 3.94 |     | 4.25 | 155.1 |      | 167.3 |
| L    | 0.89 |     | 1.2  | 35.0  |      | 47.2  |



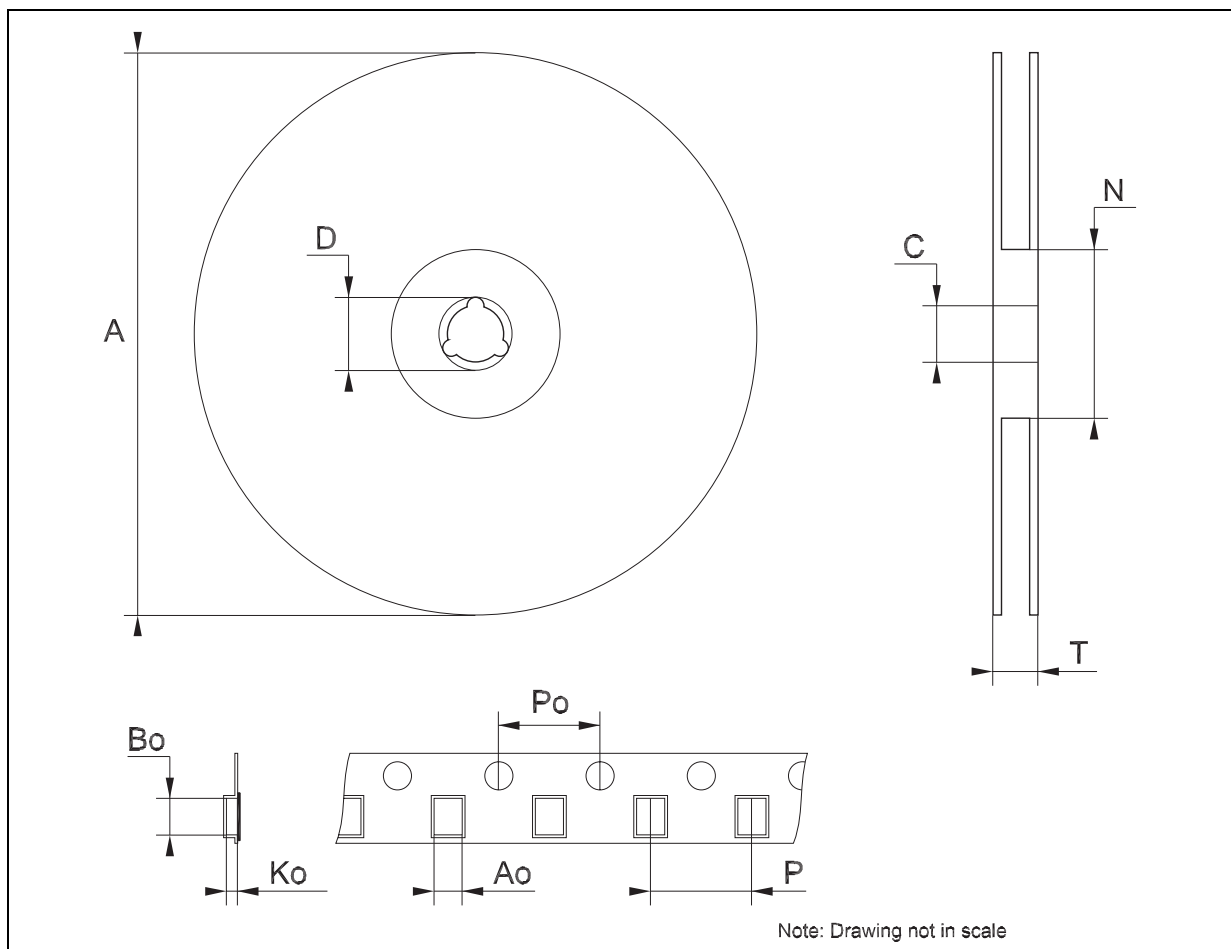
## TO-92 MECHANICA DATA

| DIM. | mm.  |     |       | mils  |      |       |
|------|------|-----|-------|-------|------|-------|
|      | MIN. | TYP | MAX.  | MIN.  | TYP. | MAX.  |
| A    | 4.32 |     | 4.95  | 170.1 |      | 194.9 |
| b    | 0.36 |     | 0.51  | 14.2  |      | 20.1  |
| D    | 4.45 |     | 4.95  | 175.2 |      | 194.9 |
| E    | 3.30 |     | 3.94  | 129.9 |      | 155.1 |
| e    | 2.41 |     | 2.67  | 94.9  |      | 105.1 |
| e1   | 1.14 |     | 1.40  | 44.9  |      | 55.1  |
| L    | 12.7 |     | 15.49 | 500.0 |      | 609.8 |
| R    | 2.16 |     | 2.41  | 85.0  |      | 94.9  |
| S1   | 0.92 |     | 1.52  | 36.2  |      | 59.8  |
| W    | 0.41 |     | 0.56  | 16.1  |      | 22.0  |



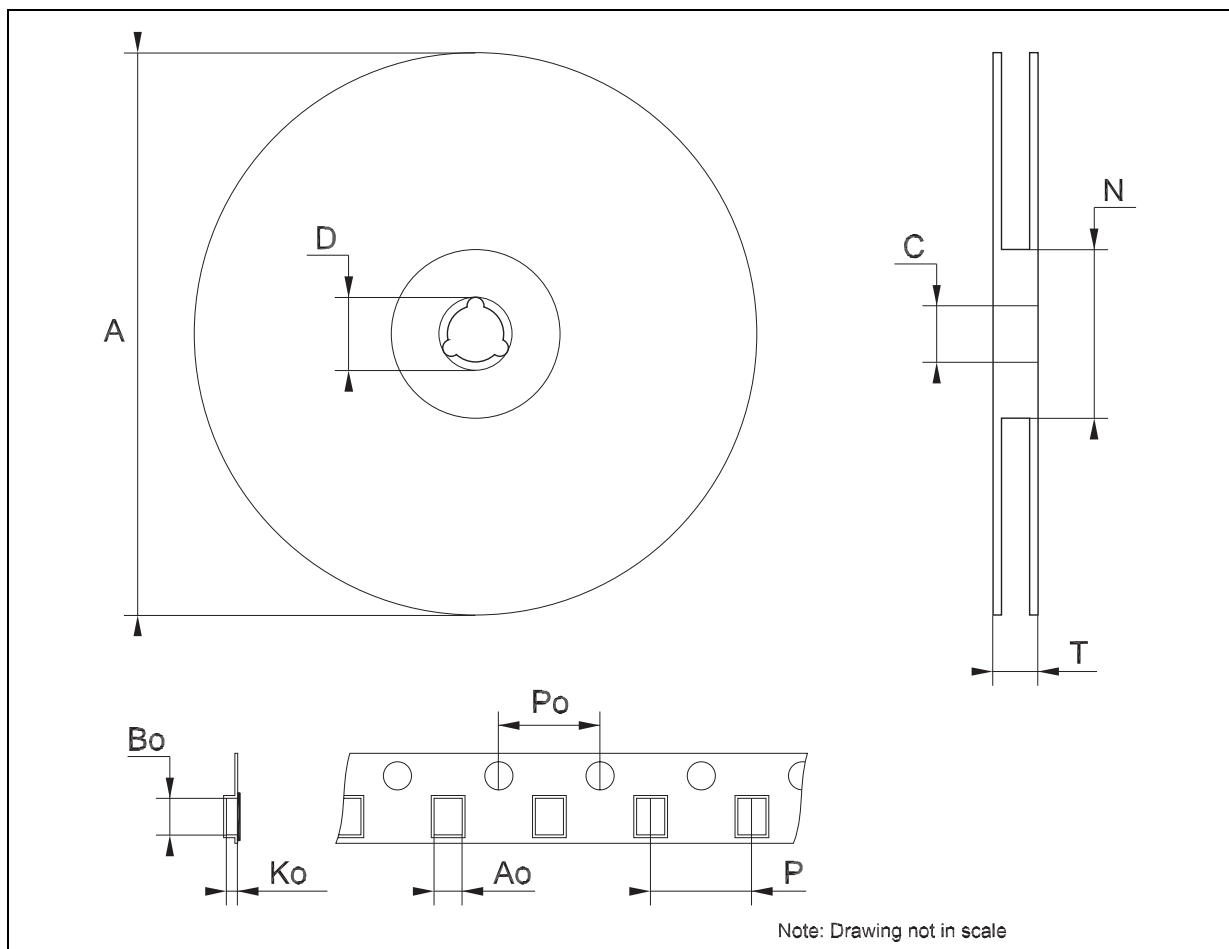
**Tape & Reel SO-8 MECHANICAL DATA**

| DIM. | mm.  |     |      | inch  |      |        |
|------|------|-----|------|-------|------|--------|
|      | MIN. | TYP | MAX. | MIN.  | TYP. | MAX.   |
| A    |      |     | 330  |       |      | 12.992 |
| C    | 12.8 |     | 13.2 | 0.504 |      | 0.519  |
| D    | 20.2 |     |      | 0.795 |      |        |
| N    | 60   |     |      | 2.362 |      |        |
| T    |      |     | 22.4 |       |      | 0.882  |
| Ao   | 8.1  |     | 8.5  | 0.319 |      | 0.335  |
| Bo   | 5.5  |     | 5.9  | 0.216 |      | 0.232  |
| Ko   | 2.1  |     | 2.3  | 0.082 |      | 0.090  |
| Po   | 3.9  |     | 4.1  | 0.153 |      | 0.161  |
| P    | 7.9  |     | 8.1  | 0.311 |      | 0.319  |



## Tape &amp; Reel SOT89 MECHANICAL DATA

| DIM. | mm.  |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      |      | 180  |       |       | 7.086 |
| C    | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D    | 20.2 |      |      | 0.795 |       |       |
| N    | 60   |      |      | 2.362 |       |       |
| T    |      |      | 14.4 |       |       | 0.567 |
| Ao   | 4.70 | 4.80 | 4.90 | 0.185 | 0.189 | 0.193 |
| Bo   | 4.30 | 4.40 | 4.50 | 0.169 | 0.173 | 0.177 |
| Ko   | 1.70 | 1.80 | 1.90 | 0.067 | 0.071 | 0.075 |
| Po   | 3.9  | 4.0  | 4.1  | 0.153 | 0.157 | 0.161 |
| P    | 7.9  | 8.0  | 8.1  | 0.311 | 0.315 | 0.319 |



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