

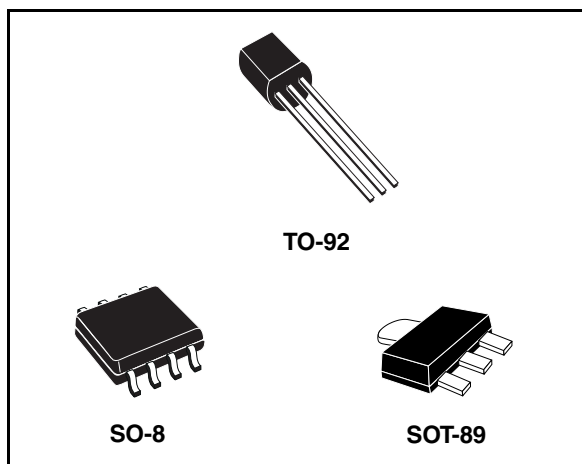
Positive voltage regulators

Feature summary

- Output current up to 100 mA
- Output voltages of 3.3; 5; 6; 8; 9; 12; 15; 18; 24V
- Thermal overload protection
- Short circuit protection
- No external components are required
- Available in either $\pm 5\%$ (AC) or $\pm 10\%$ (C) selection

Description

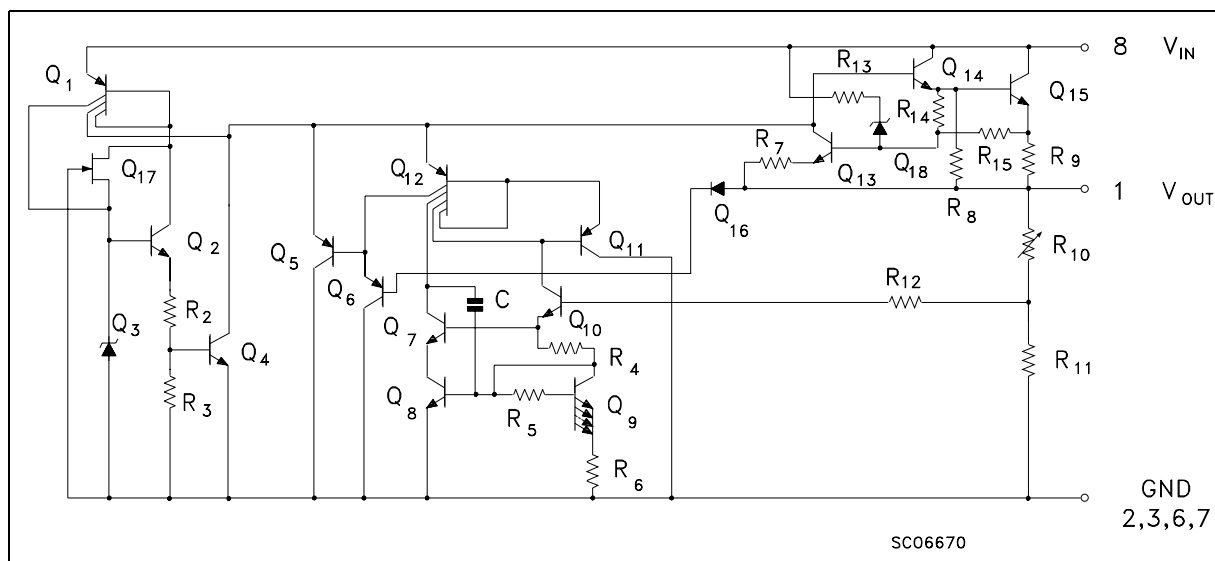
The L78L00 series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current. They are intended as fixed voltage regulators in a wide range of applications 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



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1 Pin configuration

Figure 1. Pin Connection (top view, bottom view for TO-92)

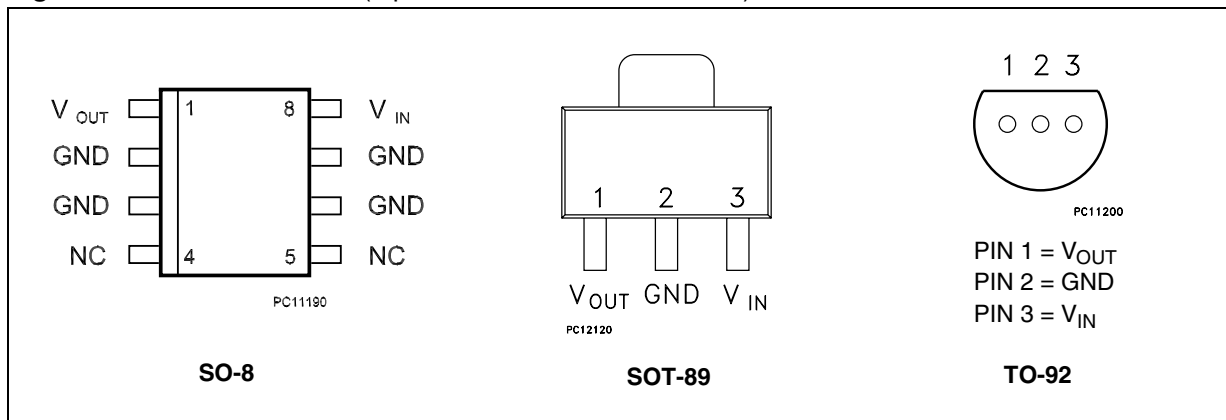
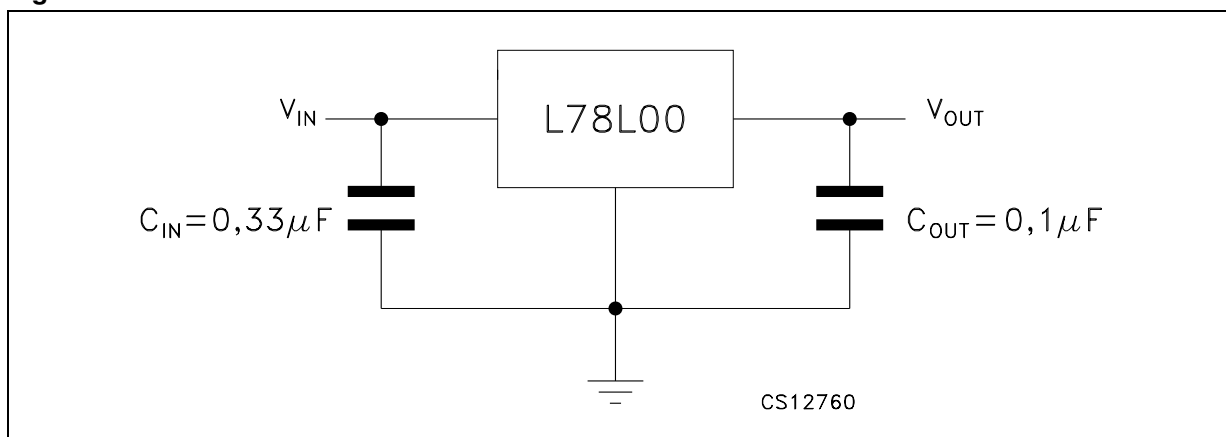


Figure 2. Test circuits



2 Maximum ratings

Table 1. Absolute maximum ratings

| Symbol | Parameter | | Value | Unit |
|-----------|--------------------------------------|------------------|-----------------------------------|------|
| V_I | DC Input voltage | $V_O= 3.3$ to 9V | 30 | V |
| | | $V_O= 12$ to 15V | 35 | |
| | | $V_O= 18$ to 24V | 40 | |
| I_O | Output current | | 100 | mA |
| P_D | Power dissipation | | Internally Limited ⁽¹⁾ | mW |
| T_{STG} | Storage temperature range | | -65 to 150 | °C |
| T_{OP} | Operating junction temperature range | for L7800AC | 0 to 150 | °C |
| | | for L7800AB | -40 to 125 | |

1. 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.

Table 2. Thermal Data

| Symbol | Parameter | SO-8 | TO-92 | SOT-89 | Unit |
|------------|--|-------------------|-------|--------|------|
| R_{thJC} | Thermal resistance junction-case. (Max) | 20 | | 15 | °C/W |
| R_{thJA} | Thermal resistance junction-ambient. (Max) | 55 ⁽¹⁾ | 200 | | °C/W |

1. Considering 6 cm² of copper Board heat-sink.

3 Electrical characteristics

Table 3. Electrical characteristics of L78L33C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 8.3\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|--|-------|------|-------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 8.3\text{ V}$ | 2.97 | | 3.63 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 6.3$ to 16.3 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 41 | 49 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 4. Electrical characteristics of L78L05C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 10\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|--|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 10\text{ V}$ | 4.5 | | 5.5 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 9$ to 20 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 40 | 49 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 5. Electrical characteristics of L78L06C (refer to the test circuits, $T_J = 0$ to 125°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 mA , $V_I = 8.5$ to 20 V | 5.4 | | 6.6 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 12\text{ V}$ | 5.4 | | 6.6 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 , $T_J = 25^\circ\text{C}$ | | 50 | | μV |
| SVR | Supply voltage rejection | $V_I = 9$ to 20 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 38 | 46 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 6. Electrical characteristics of L78L08C (refer to the test circuits, $T_J = 0$ to 125°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 mA , $V_I = 8.5$ to 20 V | 7.2 | | 8.8 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 12\text{ V}$ | 7.2 | | 8.8 | |
| ΔV_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 | |
| ΔV_O | Load regulation | $I_O = 1$ to 100 mA , $T_J = 25^\circ\text{C}$ | | | 80 | mV |
| | | $I_O = 1$ to 40 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 |
| ΔI_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 , $T_J = 25^\circ\text{C}$ | | 60 | | μV |
| SVR | Supply voltage rejection | $V_I = 9$ to 20 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 36 | 45 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 7. Electrical characteristics of L78L09C (refer to the test circuits, $T_J = 0$ to 125°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 mA , $V_I = 11.5$ to 23 V | 8.1 | | 9.9 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 15\text{ V}$ | 8.1 | | 9.9 | |
| ΔV_O | Line regulation | $V_I = 11.5$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 250 | mV |
| | | $V_I = 12$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 200 | |
| ΔV_O | Load regulation | $I_O = 1$ to 100 mA , $T_J = 25^\circ\text{C}$ | | | 80 | mV |
| | | $I_O = 1$ to 40 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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.2 | mA |
| | | $V_I = 12$ to 23 V | | | 1.5 | |
| eN | Output noise voltage | $B = 10\text{Hz}$ to 100KHz , $T_J = 25^\circ\text{C}$ | | 70 | | μV |
| SVR | Supply voltage rejection | $V_I = 12$ to 23 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 36 | 44 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 8. Electrical characteristics of L78L10C (refer to the test circuits, $T_J = 0$ to 125°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 mA , $V_I = 12.5$ to 23 V | 9 | | 11 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 16\text{ V}$ | 9 | | 11 | |
| ΔV_O | Line regulation | $V_I = 12.5$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 230 | mV |
| | | $V_I = 13$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 170 | |
| ΔV_O | Load regulation | $I_O = 1$ to 100 mA , $T_J = 25^\circ\text{C}$ | | | 80 | mV |
| | | $I_O = 1$ to 40 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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.1 | mA |
| | | $V_I = 13$ to 23 V | | | 1.5 | |
| eN | Output noise voltage | $B = 10\text{Hz}$ to 100KHz , $T_J = 25^\circ\text{C}$ | | 60 | | μV |
| SVR | Supply voltage rejection | $V_I = 14$ to 23 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 37 | 45 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 9. Electrical characteristics of L78L12C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 19\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 19\text{ V}$ | 10.8 | | 13.2 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 15$ to 25 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 36 | 42 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 10. Electrical characteristics of L78L15C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 23\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 23\text{ V}$ | 13.5 | | 16.5 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 18.5$ to 28.5 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 33 | 39 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 11. Electrical characteristics of L78L18C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 27\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 27\text{ V}$ | 16.2 | | 19.8 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 23$ to 33 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 32 | 38 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 12. Electrical characteristics of L78L20C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 29\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 29\text{ V}$ | 18 | | 22 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 25$ to 35 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 31 | 38 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 13. Electrical characteristics of L78L24C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 33\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------|
| V_O | Output voltage | $T_J = 25^\circ\text{C}$ | 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 , $V_I = 33\text{ V}$ | 21.6 | | 26.4 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 29$ to 35 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 30 | 37 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 14. Electrical characteristics of L78L33AB and L78L33AC (refer to the test circuits, $V_I = 8.3\text{V}$, $I_O = 40\text{ mA}$, $C_1 = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0\text{ to }125^\circ\text{C}$ for L78L33AC, $T_J = -40\text{ to }125^\circ\text{C}$ 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 | $I_O = 1\text{ to }40\text{ mA}$, $V_I = 5.3\text{ to }20\text{ V}$ | 3.135 | | 3.465 | V |
| | | $I_O = 1\text{ to }70\text{ mA}$, $V_I = 8.3\text{ V}$ | 3.135 | | 3.465 | |
| ΔV_O | Line regulation | $V_I = 5.3\text{ to }20\text{ V}$, $T_J = 25^\circ\text{C}$ | | | 150 | mV |
| | | $V_I = 6.3\text{ to }20\text{ V}$, $T_J = 25^\circ\text{C}$ | | | 100 | |
| ΔV_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 |
| ΔI_d | Quiescent current change | $I_O = 1\text{ to }40\text{ mA}$ | | | 0.1 | mA |
| | | $V_I = 6.3\text{ to }20\text{ V}$ | | | 1.5 | |
| eN | Output noise voltage | $B = 10\text{Hz to }100\text{KHz}$, $T_J = 25^\circ\text{C}$ | | 40 | | μV |
| SVR | Supply voltage rejection | $V_I = 6.3\text{ to }16.3\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 41 | 49 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 15. Electrical characteristics of L78L05AB and L78L05AC (refer to the test circuits, $V_I = 10\text{V}$, $I_O = 40\text{ mA}$, $C_1 = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0\text{ to }125^\circ\text{C}$ 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 8\text{ to }18\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 41 | 49 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 16. 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 9\text{ to }20\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 39 | 46 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 17. Electrical characteristics of L78L08AB and L78L08AC (refer to the test circuits, $V_I = 14V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0\text{ to }125^\circ\text{C}$ 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 12\text{ to }23\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 37 | 45 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 18. Electrical characteristics of L78L09AB and L78L09AC (refer to the test circuits, $V_I = 15\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0$ to 125°C for L78L09AC, $T_J = -40$ to 125°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 | $I_O = 1$ to 40 mA , $V_I = 11.5$ to 23 V | 8.55 | | 9.45 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 15\text{ V}$ | 8.55 | | 9.45 | |
| ΔV_O | Line regulation | $V_I = 11.5$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 225 | mV |
| | | $V_I = 12$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 150 | |
| ΔV_O | Load regulation | $I_O = 1$ to 100 mA , $T_J = 25^\circ\text{C}$ | | | 80 | mV |
| | | $I_O = 1$ to 40 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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.1 | mA |
| | | $V_I = 12$ to 23 V | | | 1.5 | |
| eN | Output noise voltage | $B = 10\text{Hz}$ to 100KHz , $T_J = 25^\circ\text{C}$ | | 70 | | μV |
| SVR | Supply voltage rejection | $V_I = 12$ to 23 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 37 | 44 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 19. Electrical characteristics of L78L10AB and L78L10AC (refer to the test circuits, $V_I = 16\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0$ to 125°C for L78L10AC, $T_J = -40$ to 125°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 | $I_O = 1$ to 40 mA , $V_I = 12.5$ to 23 V | 9.5 | | 10.5 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 16\text{ V}$ | 9.5 | | 10.5 | |
| ΔV_O | Line regulation | $V_I = 12.5$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 230 | mV |
| | | $V_I = 13$ to 23 V , $T_J = 25^\circ\text{C}$ | | | 170 | |
| ΔV_O | Load regulation | $I_O = 1$ to 100 mA , $T_J = 25^\circ\text{C}$ | | | 80 | mV |
| | | $I_O = 1$ to 40 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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.1 | mA |
| | | $V_I = 13$ to 23 V | | | 1.5 | |
| eN | Output noise voltage | $B = 10\text{Hz}$ to 100KHz , $T_J = 25^\circ\text{C}$ | | 60 | | μV |
| SVR | Supply voltage rejection | $V_I = 14$ to 23 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 37 | 45 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 20. 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 15\text{ to }25\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 37 | 42 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 21. Electrical characteristics of L78L15AB and L78L15AC (refer to the test circuits, $V_I = 23V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0\text{ to }125^\circ\text{C}$ 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 18.5\text{ to }28.5\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 34 | 39 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 22. Electrical characteristics of L78L18AB and L78L18AC (refer to the test circuits, $V_I = 27V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0$ to 125°C for L78L18AC, $T_J = -40$ to 125°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 | $I_O = 1$ to 40 mA , $V_I = 22$ to 33 V | 17.1 | | 18.9 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 27\text{ V}$ | 17.1 | | 18.9 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.1 | 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 | | μV |
| SVR | Supply voltage rejection | $V_I = 23$ to 33 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 33 | 38 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 23. Electrical characteristics of L78L20AB and L78L20AC (refer to the test circuits, $V_I = 29V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0$ to 125°C for L78L20AC, $T_J = -40$ to 125°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 | $I_O = 1$ to 40 mA , $V_I = 24$ to 33 V | 19 | | 21 | V |
| | | $I_O = 1$ to 70 mA , $V_I = 29\text{ V}$ | 19 | | 21 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_d | Quiescent current change | $I_O = 1$ to 40 mA | | | 0.1 | 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 | | μV |
| SVR | Supply voltage rejection | $V_I = 25$ to 35 V , $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 32 | 38 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

Table 24. Electrical characteristics of L78L24AB and L78L24AC (refer to the test circuits, $V_I = 33\text{V}$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, $T_J = 0\text{ to }125^\circ\text{C}$ for 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 | |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 | | μV |
| SVR | Supply voltage rejection | $V_I = 29\text{ to }33\text{ V}$, $f = 120\text{Hz}$ $I_O = 40\text{ mA}$, $T_J = 25^\circ\text{C}$ | 31 | 37 | | dB |
| V_d | Dropout voltage | | | 1.7 | | V |

4 Typical performance

Figure 3. L78L05/12 Output voltage vs ambient temperature

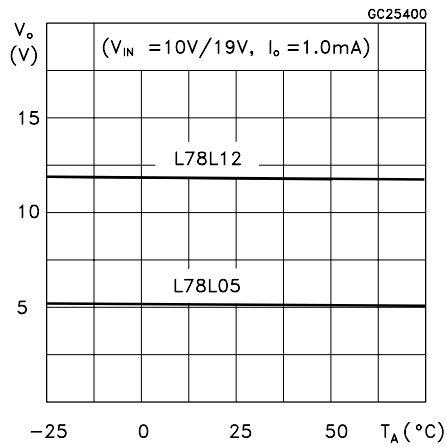


Figure 4. L78L05/12/24 Load characteristics

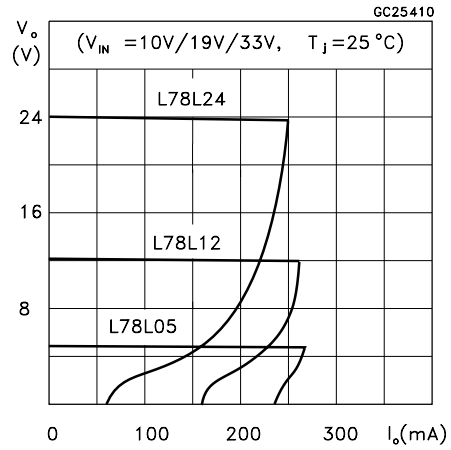


Figure 5. L78L05/12/24 Thermal shutdown

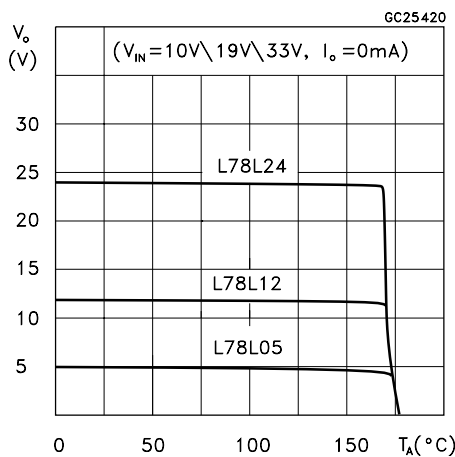


Figure 6. L78L05/12 Quiescent current vs output current

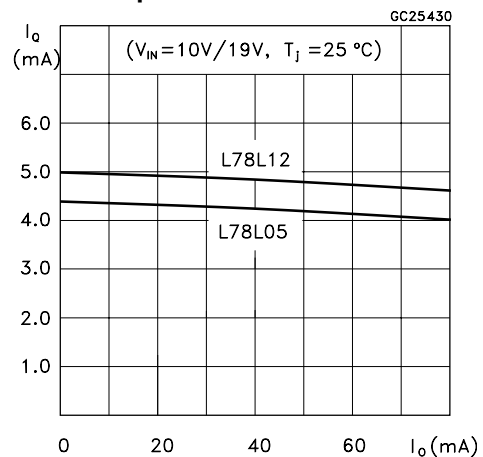


Figure 7. L78L05 Quiescent current vs input voltage

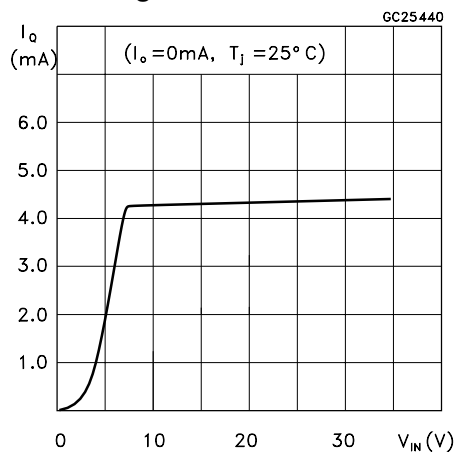


Figure 8. L78L05/12/24 Output characteristics

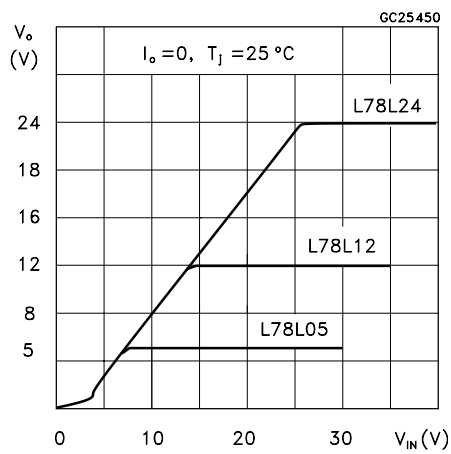


Figure 9. L78L05/12/24 Ripple rejection

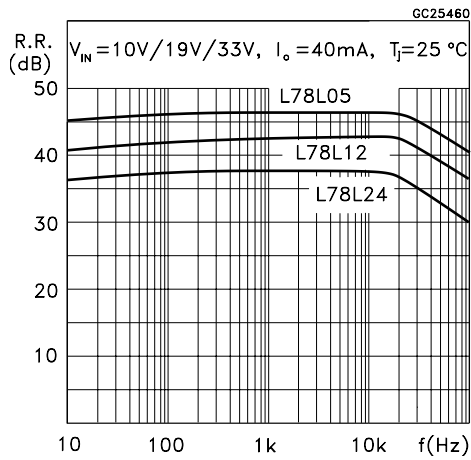


Figure 10. L78L05 Dropout characteristics

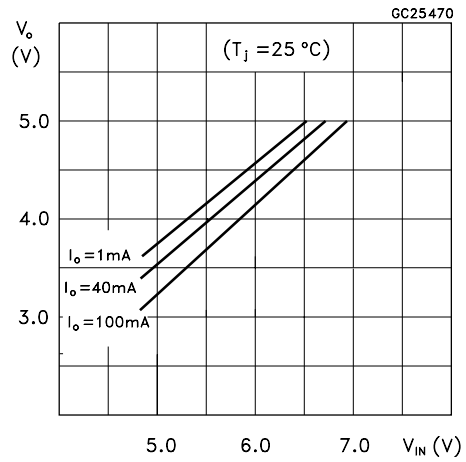
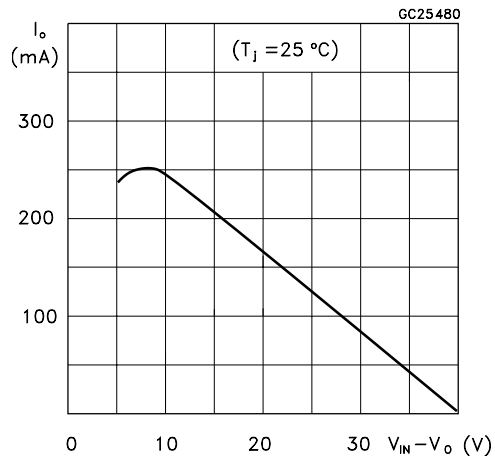


Figure 11. L78L00 Series short circuit output current



5 Typical application

Figure 12. High output current short circuit protected

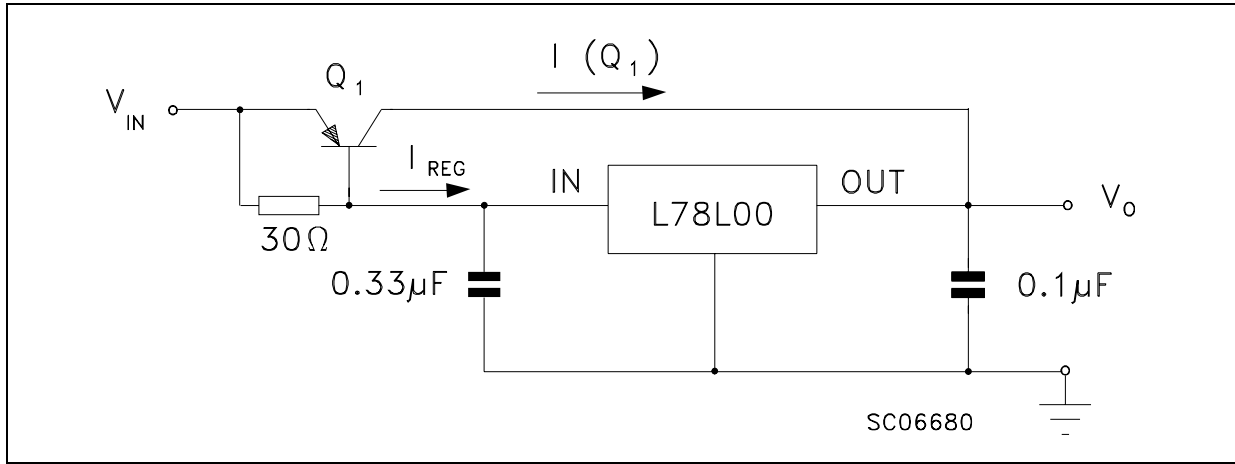


Figure 13. Edit boost circuit

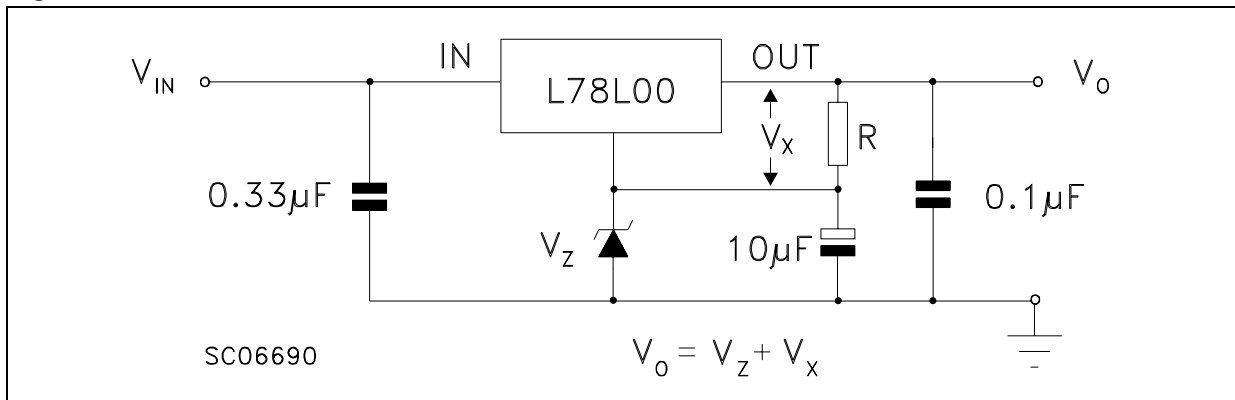


Figure 14. Current regulator

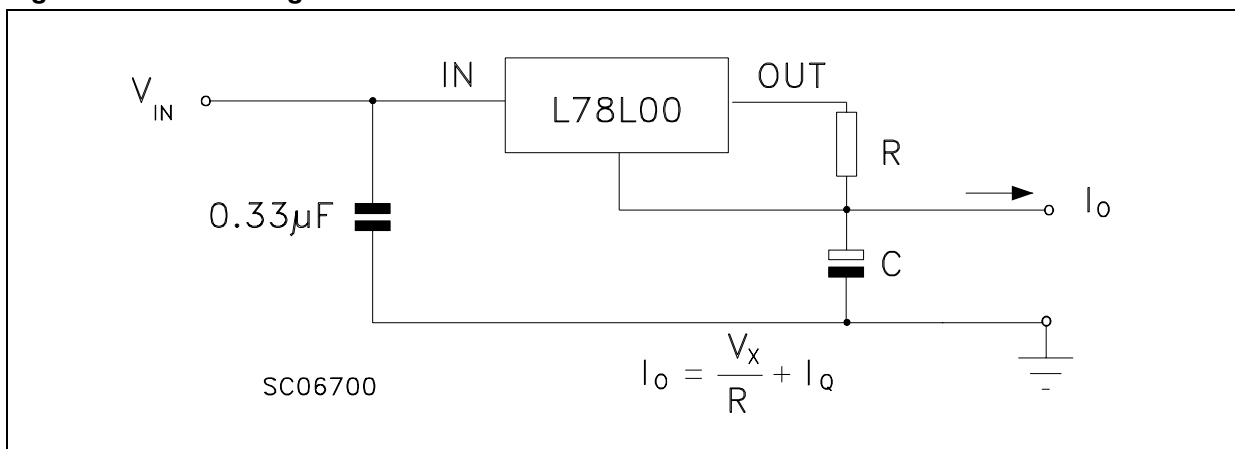
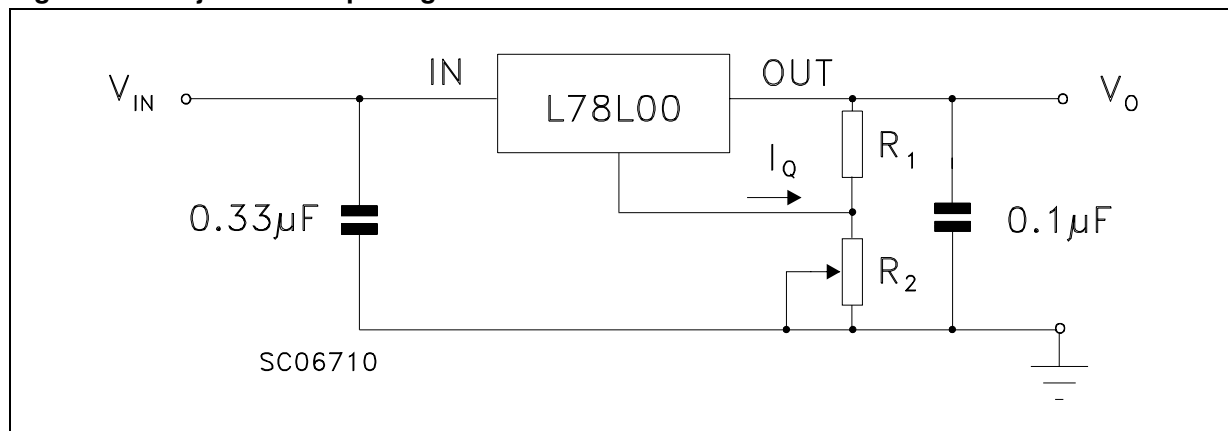


Figure 15. Adjustable output regulator

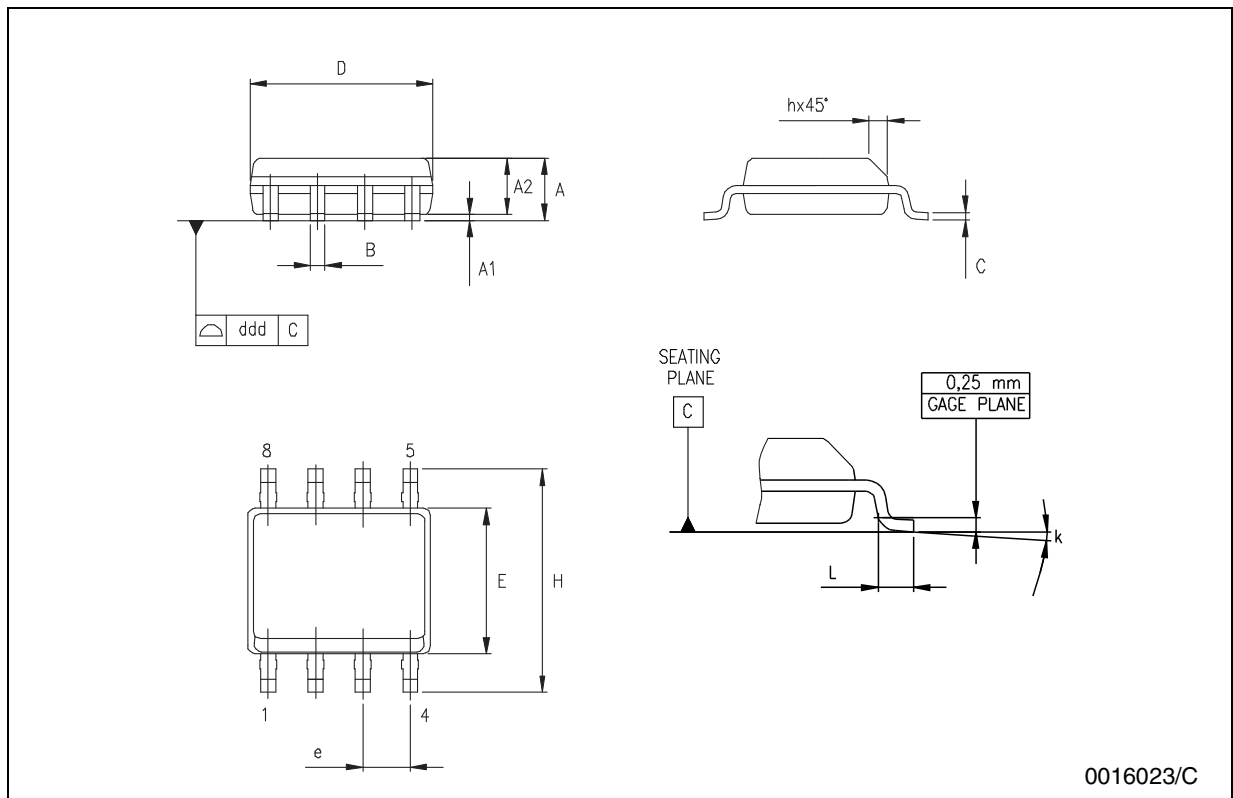


6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

SO-8 MECHANICAL DATA

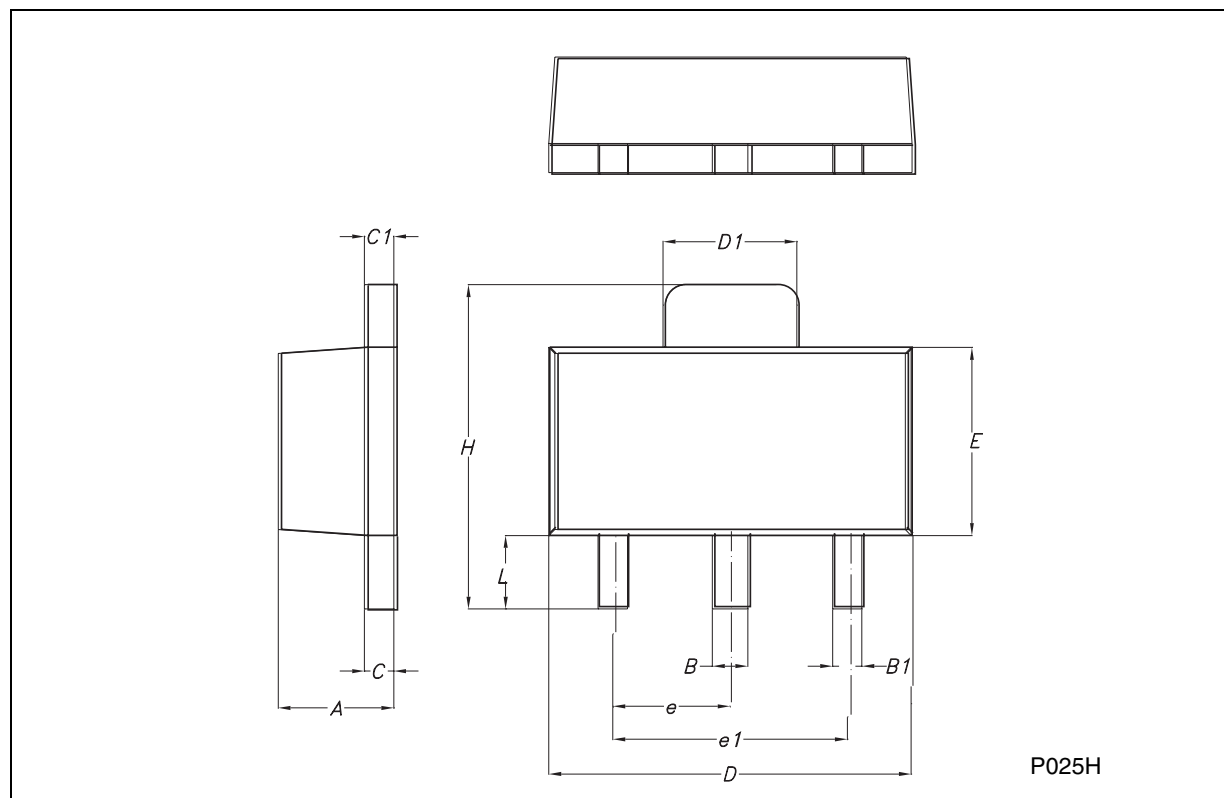
| DIM. | mm. | | | inch | | |
|------|-----------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 1.35 | | 1.75 | 0.053 | | 0.069 |
| A1 | 0.10 | | 0.25 | 0.04 | | 0.010 |
| A2 | 1.10 | | 1.65 | 0.043 | | 0.065 |
| B | 0.33 | | 0.51 | 0.013 | | 0.020 |
| C | 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 |



0016023/C

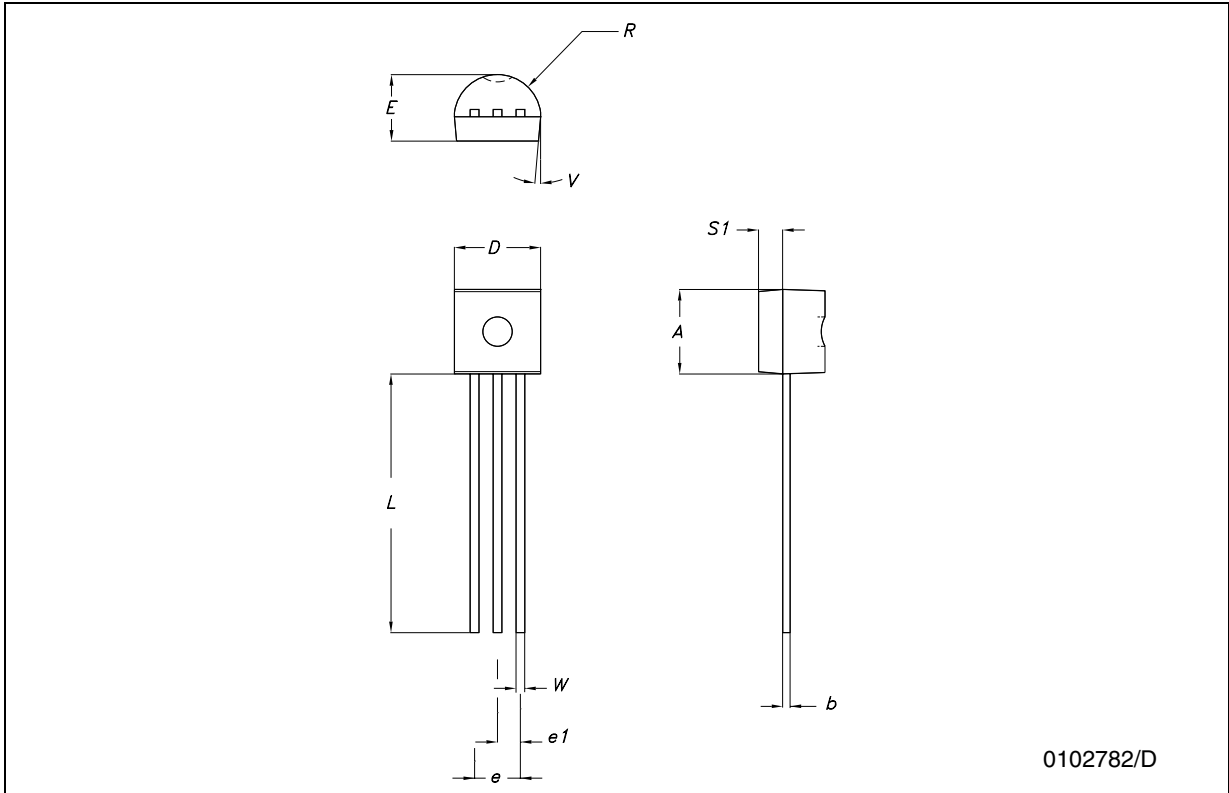
| |
|-------------------------------|
| SOT-89 MECHANICAL DATA |
|-------------------------------|

| 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 MECHANICAL DATA

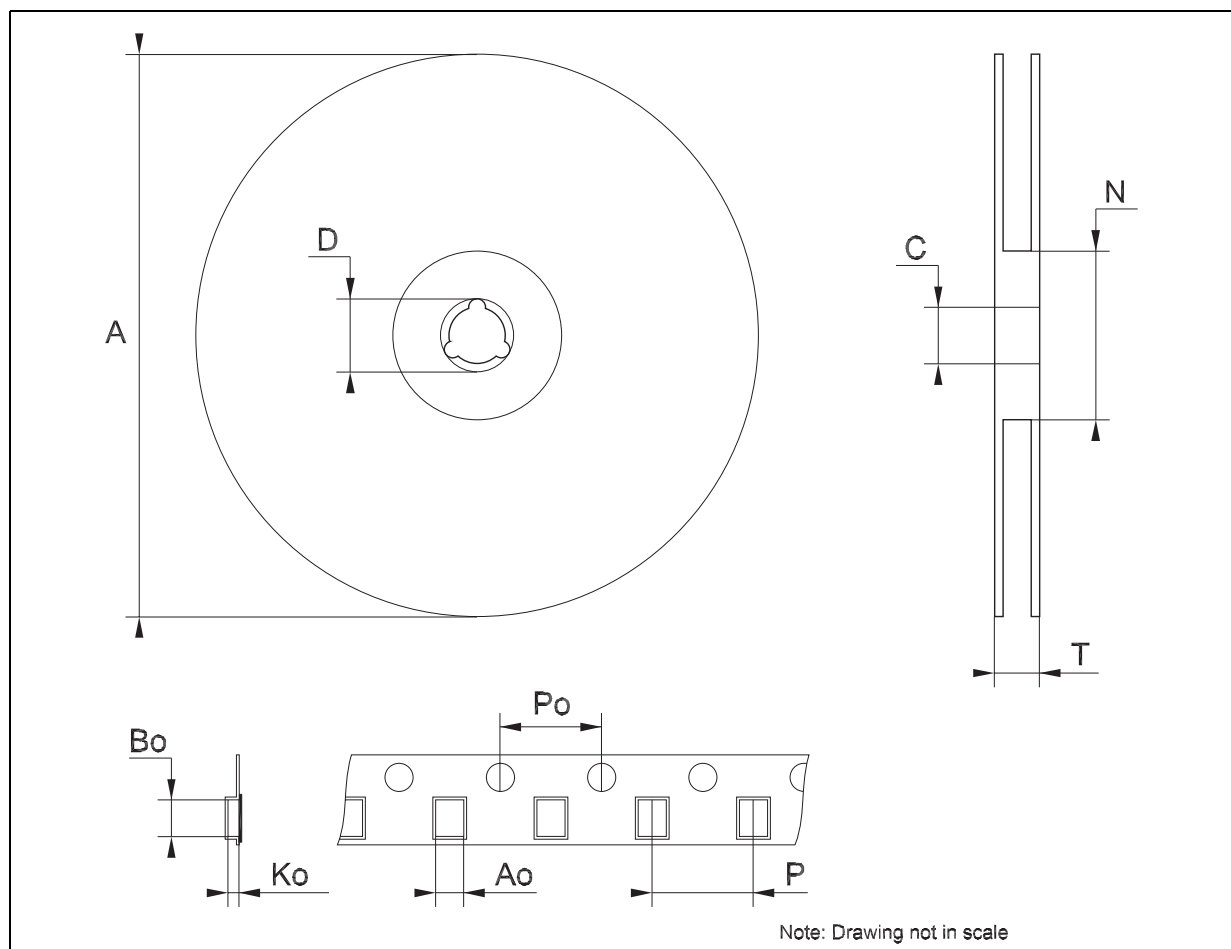
| DIM. | mm. | | | mils | | |
|----------|------|-----|-------|-------|------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.32 | | 4.95 | 170.1 | | 194.9 |
| b | 0.36 | | 0.51 | 14.2 | | 20.1 |
| D | 4.45 | | 4.95 | 175.2 | | 194.9 |
| E | 3.30 | | 3.94 | 129.9 | | 155.1 |
| e | 2.41 | | 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 |
| α | | 5° | | | 5° | |



0102782/D

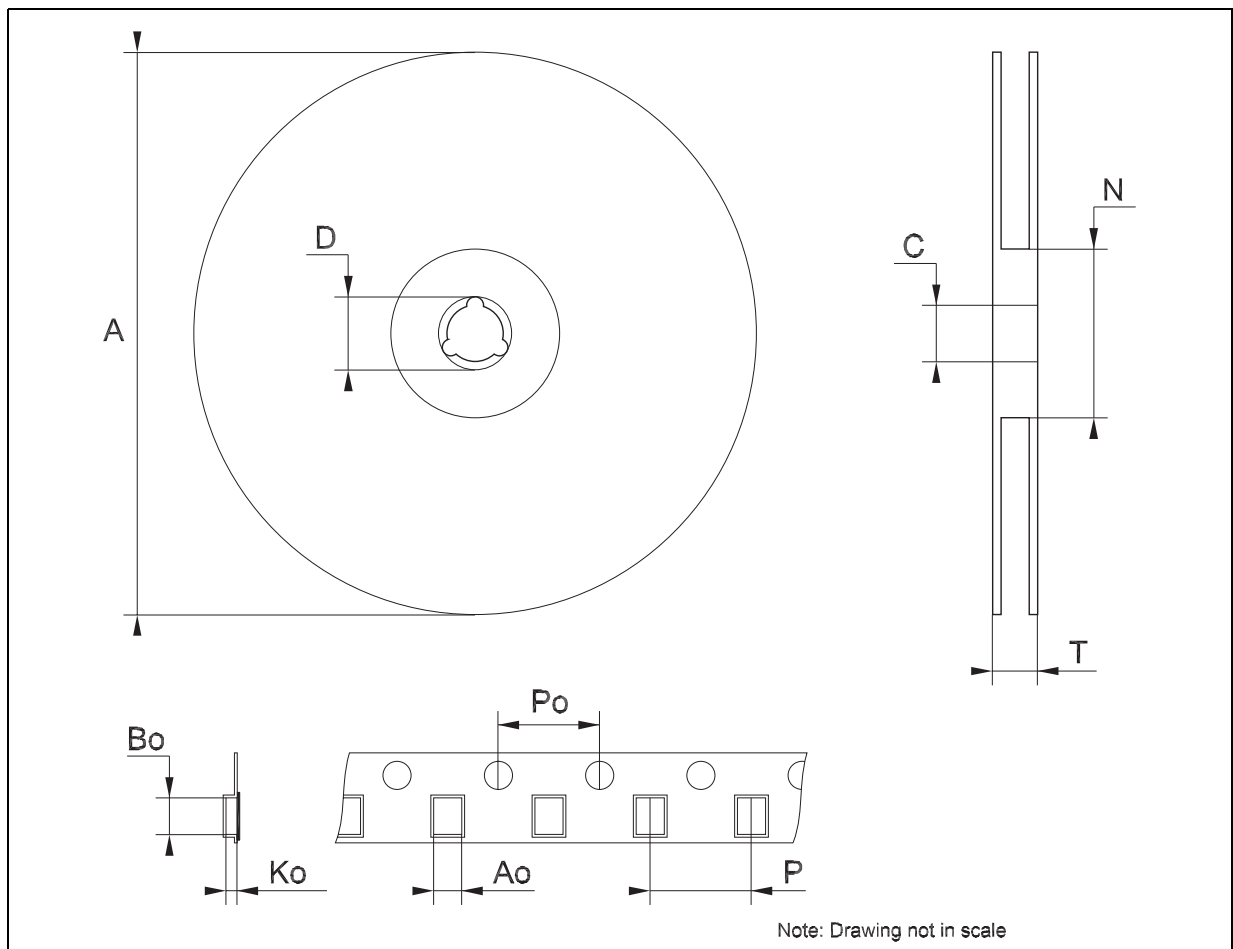
Tape & Reel SO-8 MECHANICAL DATA

| 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 |



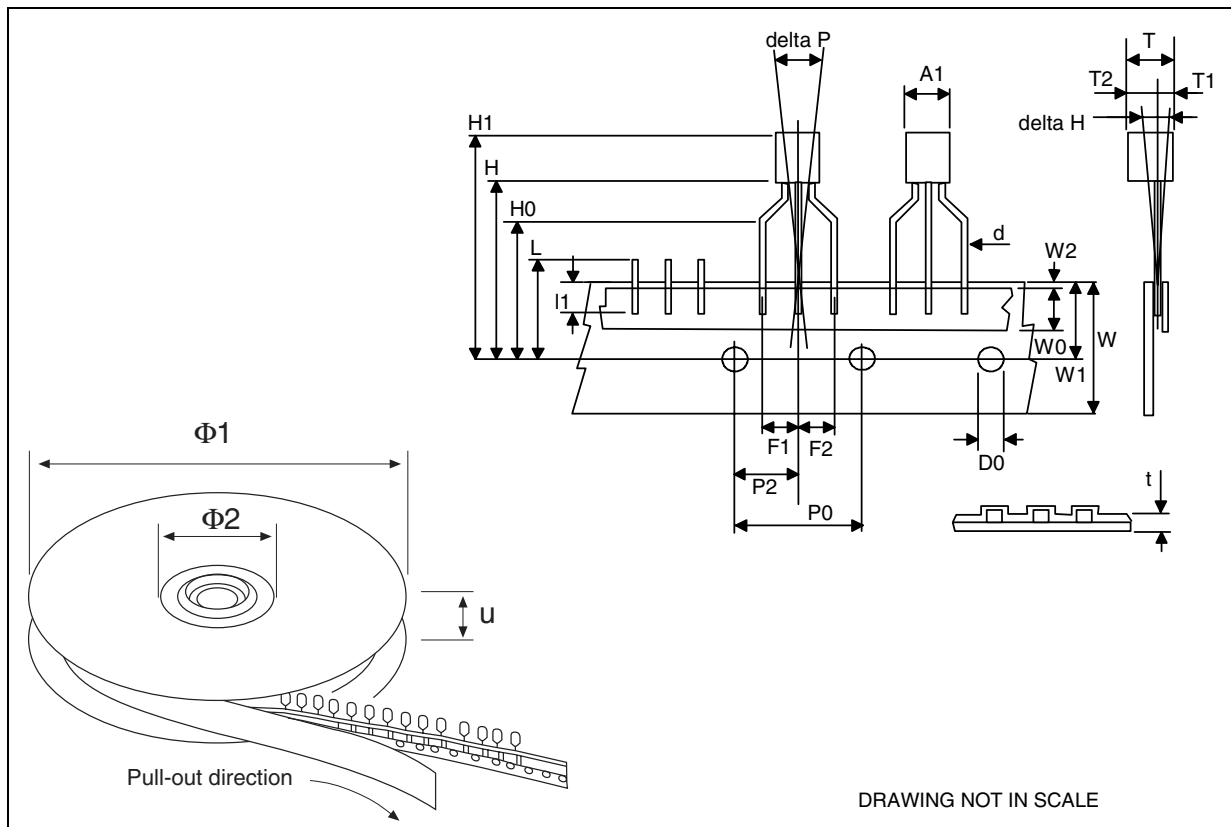
Tape & Reel SOT89 MECHANICAL DATA

| 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 |



Tape & Reel for TO-92 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|---------|-------|-------|-------|-------|--------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A1 | | 4.80 | | | 0.189 | |
| T | | 3.80 | | | 0.150 | |
| T1 | | 1.60 | | | 0.063 | |
| T2 | | 2.30 | | | 0.091 | |
| d | | 0.48 | | | 0.019 | |
| P0 | 12.5 | | 12.9 | 0.492 | | 0.508 |
| P2 | 5.65 | | 7.05 | 0.222 | | 0.278 |
| F1, F2 | 2.44 | 2.54 | 2.94 | 0.096 | 0.100 | 0.116 |
| delta H | | ±2 | | | 0.079 | |
| W | 17.5 | 18.00 | 19.0 | 0.689 | 0.709 | 0.748 |
| W0 | 5.7 | | 6.3 | 0.224 | | 0.248 |
| W1 | 8.5 | | 9.25 | 0.335 | | 0.364 |
| W2 | | 0.50 | | | 0.20 | |
| H | | 18.50 | 18.70 | | 0.728 | 0.726 |
| H0 | 15.50 | | 16.50 | 0.610 | | 0.650 |
| H1 | | 25.00 | | | 0.984 | |
| D0 | 3.8 | | 4.2 | 0.150 | | 0.165 |
| t | | 0.90 | | | 0.035 | |
| L1 | | 3 | | | 0.118 | |
| delta P | | ±1 | | | 0.039 | |
| u | | 50 | | | 1.968 | |
| Φ1 | | 360 | | | 14.173 | |
| Φ2 | | 30 | | | 1.181 | |



7 Order code

Table 25. Order code

| Part numbers | Packaging | | | Output voltage |
|--------------|------------------------------|---------------------------|-------------|----------------|
| | SO-8 | TO92 (BAG) ⁽¹⁾ | SOT-89 | |
| L78L33C | L78L33CD13TR | L78L33CZ | | 3.3 V |
| L78L33AC | L78L33ACD13TR | L78L33ACZ | L78L33ACUTR | 3.3 V |
| L78L33AB | L78L33ABD13TR | L78L33ABZ | L78L33ABUTR | 3.3 V |
| L78L05C | L78L05CD13TR | L78L05CZ | | 5 V |
| L78L05AC | L78L05ACD13TR | L78L05ACZ | L78L05ACUTR | 5 V |
| L78L05AB | L78L05ABD13TR | L78L05ABZ | L78L05ABUTR | 5 V |
| L78L06C | L78L06CD13TR | L78L06CZ | | 6 V |
| L78L06AC | L78L06ACD13TR | L78L06ACZ | L78L06ACUTR | 6 V |
| L78L06AB | L78L06ABD13TR | L78L06ABZ | L78L06ABUTR | 6 V |
| L78L08C | L78L08CD13TR | L78L08CZ | | 8 V |
| L78L08AC | L78L08ACD13TR | L78L08ACZ | L78L08ACUTR | 8 V |
| L78L08AB | L78L08ABD13TR | L78L08ABZ | L78L08ABUTR | 8 V |
| L78L09C | L78L09CD13TR | L78L09CZ | | 9 V |
| L78L09AC | L78L09ACD13TR | L78L09ACZ | L78L09ACUTR | 9 V |
| L78L09AB | L78L09ABD13TR | L78L09ABZ | L78L09ABUTR | 9 V |
| L78L12C | L78L12CD13TR | L78L12CZ ⁽²⁾ | | 12 V |
| L78L12AC | L78L12ACD13TR | L78L12ACZ ⁽²⁾ | L78L12ACUTR | 12 V |
| L78L12AB | L78L12ABD13TR ⁽²⁾ | L78L12ABZ ⁽²⁾ | L78L12ABUTR | 12 V |
| L78L15C | L78L15CD13TR | L78L15CZ | | 15 V |
| L78L15AC | L78L15ACD13TR | L78L15ACZ | L78L15ACUTR | 15 V |
| L78L15AB | L78L15ABD13TR | L78L15ABZ | L78L15ABUTR | 15 V |
| L78L18C | L78L18CD13TR | L78L18CZ | | 18 V |
| L78L18AC | L78L18ACD13TR | L78L18ACZ | L78L18ACUTR | 18 V |
| L78L18AB | L78L18ABD13TR | L78L18ABZ | L78L18ABUTR | 18 V |
| L78L24C | L78L24CD13TR | L78L24CZ | | 24 V |
| L78L24AC | L78L24ACD13TR | L78L24ACZ | L78L24ACUTR | 24 V |
| L78L24AB | L78L24ABD13TR | L78L24ABZ | L78L24ABUTR | 24 V |

1. Available in Ammopak with the suffix "-AP" or in Tape & Reel with the suffix "TR". Please note that in these cases pins are shaped according to Tape & Reel specifications.

2. Available on request.

8 Revision history

Table 26. Revision history

| Date | Revision | Changes |
|-------------|-----------------|--|
| 14-Mar-2005 | 9 | Add Tape & Reel for TO-92. |
| 15-Mar-2005 | 10 | Add note on Table 3. |
| 23-Dec-2005 | 11 | Mistake on Ordering Table in Header. |
| 12-Sep-2006 | 12 | Order Codes has been updated and new template. |

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